

HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA Tel. +82 31 634 6300 Fax. +82 31 645 6401

NEAR-FIELD POWER DENSITY EVALUATION REPORT

Applicant Name:

SAMSUNG Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea Date of Issue: Nov.13, 2020 Test Report No.: HCT-SR-2011-FC006 Test Site: HCT CO., LTD.

A3LSMG991U

FCC ID:

Equipment Type: Application Type FCC Rule Part(s): Model Name: Additional Model Name: Date of Test: Mobile Phone Certification CFR §2.1093 SM-G991U, SM-G991U1 SM-G991U1 Oct. 16, 2020~ Nov.09, 2020

Band & Mode	Tx. Frequency	Measured psPD	Reported psPD	
	Młz	mW/cm²	mW/cm ²	
5G NR - n261	27500 Mz - 28350 Mz	0.66	0.89	
5G NR - n260	37000 Mz - 40000 Mz	0.52	0.89	
Total Exposure Ratio		0.9	990	

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By

Moon-Pyung Choi Test Engineer SAR Team Certification Division Reviewed By

Yun-jeang, Heo Technical Manager SAR Team Certification Division

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.



REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Nov.13, 2020	Initial Release



CONTENTS

1. Test Location	4
2. Information of the EUT	5
3. Description of test equipment	8
4. RF Exposure Limits	10
5. Input Power Specifications	11
6. System Verification	11
7. Power Density Data Summary	16
8. The Total Exposure Ratio	20
11. Measurement Uncertainty	27
12. SAR Test Equipment	28
13. Conclusion	29
14. References	30
Attachment 1. – Power Density Test Plots	31
Attachment 2. – Power Density System Verification Plots	36
Attachment 3. – Probe Calibration Data	41
Attachment 4. – Verification Source Calibration Data	79



1. Test Location

1.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Telephone	031-645-6300
Fax.	031-645-6401

1.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

V	National Radio Research Agency (Designation No. KR0032)
Norea	KOLAS (Testing No. KT197)



2. Information of the EUT

Model Name	SM-G991U
Additional Model name	SM-G991U1
Equipment Type	Mobile Phone
FCC ID	A3LSMG991U
Application Type	Certification
Applicant	SAMSUNG Electronics Co., Ltd.

2.1 Device Under Test Description

5G mmWave NR Device Overview

Item.			Description				
Frequency Range		NR Band n261	2750	0 MHz - 28350 MHz			
		NR Band n260	3700	37000 MHz - 40000 MHz			
Channel Ba	ndwidthe	NR Band n261	50 M	50 MHz, 100 MHz			
Charmer Da	nuwiuins	NR Band n260	50 MHz, 100 MHz				
Ch. No.& F	req.(MHz)	Low		Mid	High		
NP Rond n261	50 MHz	27534.8 (20714	13)	27923.5 (2077891)	28319.5 (2084491)		
INK Dahu 11201	100 MHz	27559.3 (20718	321)	27923.5 (2077891)	28292.2 (2084035)		
NP Rond p260	50 MHz	37027.3 (22296	621)	38449.9 (2253331)	39966.2 (2278603)		
INK Banu nzou	100 MHz	37051.8 (22300)29)	38449.9 (2253331)	39949.9 (2278331)		
Sub	carrier Spacing (I	kHz)		120			
Total Number of	of Supported Upli	nk CCs (SISO)	1CC, 2CC				
Total Number o	f Supported Uplin	nk CCs (MIMO)		1CC, 2CC			
Modulations Supported in UL		DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM CP-OFDM: QPSK, 16QAM, 64QAM					
LTE	Anchor Bands (n	260)		LTE Band 2/5/12/13/14/30/48/66			
LTE	Anchor Bands (n	261)	LTE Band 2/5/13/48/66				
Duplex Type (mmWave)			TDD				
Device Serial Numbers			R3CN90ENPPT R3CN9082YMM The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.				



2.2 Time-Averaging Algorithm for RF Exposure Compliance

The equipment under test (EUT) contains:

a)Qualcomme SM8350 modem supporting 2G/3G/4G/5G NR WWAN

The SM8350 device is the new generation Qualcomm®Snapdragon™ premium-tier 5G SoC that has

the integrated modem. It is designed with the 5 nm process, for superior performance and power efficiency.

This equipment contains the Qualcomm SM8350 modem supporting ≤ 4G WWAN technologies and Sub6/ mmW 5G NR bands. This modems are enabled with Qualcomm Smart Transmit feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement.

The Qualcomm® SM8350 modem are enabled with Qualcomm® Smart Transmit feature. This feature performs time averaging algorithm in real time to control and manage transmitting power and ensure the time-averaged RF exposure is in compliance with FCC requirements all the time. Refer to Compliance Summary document for detailed description of Qualcomm® Smart Transmit feature.

Note that WLAN operations are not enabled with Smart Transmit.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR_design_target or PD_design_target, below the predefined time-averaged power limit (i.e., Plimit for sub-6 radio, and input.power.limit for 5G mmW NR), for each characterized technology and band. Smart Transmit allows the device to transmit at higher power instantaneously when needed, but manages power limiting to maintain time-averaged transmit power to input.power.limit listed in Tables 5-1 to 5-4

The purpose of this report (Part 1 test) is to demonstrate that the EUT meets FCC PD limits when transmitting instatic tra nsmission scenario at maximum allowable time-averaged power level given by input.power.limit.

2.3 Test Regulations

November 2017, October 2018, April 2019, November 2019 TCBC Workshop Notes SPEAG DASY6 System Handbook (September 2019) IEC TR 63170:2018 FCC KDB 865664 D02 v01r04 FCC KDB 447498 D01 v02r01

2.4 DUT Antenna Locations

The device has 2 patch antenna arrays (K Patch, L Patch). Table below indicates the surfaces evaluated for part 1 near field power density evaluation.

Band	Antenna	Rear(S2)	Front(S1)	Left(S3)	Right(S4)	Top(S5)	Bottom(S6)
5G NR Band n261	K Patch	Yes	Yes	Yes	No	No	No
	L Patch	Yes	Yes	No	Yes	No	No
5G NR Band n260	K Patch	Yes	Yes	Yes	No	No	No
	L Patch	Yes	Yes	No	Yes	No	No

5C mmWaya NP Davida Surfaces

Note:

1. All test configurations are based on front position view.

2. Additional surfaces were evaluated for simultaneous transmission analysis.



2.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

5G mmWave NR Simultaneous Transmission Scenarios					
Applicable Combination	Head	Body-Worn	Wireless Router	Phablet	
LTE + 5G NR	Yes	Yes	N/A	Yes	
LTE + 2.4 GHz WI-FI + 5G NR	Yes	Yes	Yes	Yes	
LTE + 5 GHz WI-FI + 5G NR	Yes	Yes	Yes	Yes	
LTE + 2.4 GHz Bluetooth + 5G NR	Yes^	Yes	Yes^	Yes^	
LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO + 5G NR	Yes^	Yes	Yes^	Yes^	
LTE + 2.4 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
LTE + 2.4 GHz WI-FI + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
LTE + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	

Note:

- 1. 5G NR Operations are limited to Non-Standalone (EN-DC) operations only.
- 2. NR antenna arrays cannot transmit simultaneously.
- 3. Simultaneous 5G NR FR2 + LTE operations are possible only with LTE 2/5/12/13/66./48 for n261 and LTE 2/5/12/13/14/30/48/66 for n260
- 4. All non-5G NR licensed modes share the same antenna path and cannot transmit simultaneously.
- 5. 5G NR bands cannot transmit simultaneously.
- 6. This device supports time averaging smart transmit algorithm in WWAN. Smart transmit adds directly the time-averaged RF exposure from 4G and time-averaged RF exposure from 5G mmW NR to ensure that the normalized RF exposure from both 4G and 5G mmW NR does not exceed FCC limit.
- 7. ^ Bluetooth Tethering is considered



3. Description of test equipment

3.1 MEASUREMENT SETUP

Peak spatially averaged power density (psPD) measurements for mmWave frequencies were performed using the DASY6 with cDASY6 5G module.

The DASY6 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precisi on robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the 5G phantom. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF)

3.2 SPEAG EUmmWV3 Probe / E-Field 5G Probe

The EUmmWV3 probe consists of two dipoles optimally arranged to obtain pseudo-vector information.

Frequency Range	750 MHz – 110 GHz
Dynamic Range	< 20 V/m – 10,000 V/m with PRE-10 (min < 50 V/m – 3,000 V/m)
Position Precision	< 0.2 mm (cDASY6)
Dimensions	Probe Overall Length: 320 mm Probe Body Diameter: 8 mm Probe Tip Length: 23 mm Probe Tip Diameter: Encapsulation 8 mm Distance from Probe Tip to Sensor X Calibration Point: 1.5 mm Distance from Probe Tip to Sensor Y Calibration Point: 1.5 mm
Applications	E-field measurements of 5G devices and other mm-wave transmitters operating above 10 GHz in < 2 mm distance from device (free-space) Power density, H-field and far-field analysis using total field reconstruction
Compatibility	cDASY6 + 5G-Module SW2.0.2.34





Figure 1. EUmmWV3 Probe





3.3 Peak Spatially Averaged Power Density Assessment Based on E-fieldMeasurements

Within a short distance from the transmitting source, power density was determined based on both electric and magnetic fields. Generally, the magnitude and phase of two components of either the E-field or H-field were needed on a sufficiently large surface to fully characterize the total E-field and H-field distributions. Nevertheless, solutions based on direct measurement of E-field and H-field can be used to compute power density. The general measurement approach used for this device was:

a)The local E field on the measurement surface was measured at a reference location where the field is well above the noise level. This reference level was used at the end of this procedure to assess output power drift of the DUT during the measurement.

b)The electric field on the measurement surface was scanned. Measurements are conducted according to the instructions provided by the measurement system manufacturer. Measurement spatial resolution can depend on the measured field characteristic and measurement methodology used by the system. The planar scan step size was configured at $\lambda/4$.

c)For cDASY6, H-field was calculated from the measured E-field using a reconstruction algorithm. As the power density calculation requires knowledge of both amplitude and phase, reconstruction algorithms can also be used to obtain field information from the measured E-field data (e.g. the phase from the amplitude if only the amplitude is measured). H-field and phase data was reconstructed from repeated measurements (three per measurement point) on two measurement planes separated by $\lambda/4$.

d)The total Peak spatially averaged power density (psPD) distribution on the evaluation surface is determined per the below equation. The spatial averaging area, *A*, is specified by the applicable exposure limits or regulatory requirements. A circular shape was used.

$$p \varepsilon P D = \frac{1}{2A_{av}} \qquad \iint_{A_{av}} || R \varepsilon \{E \times H^*\} || dA$$

f) The local E field reference value, at the same location as step 2, was re-measured after the scan was complete to calculate the power drift. If the drift deviated by more than 5%, the power density test and drift measurements were repeated.

3.4 Reconstruction Algorithm

Computation of the power density in general requires measurement information from the both E-field and H-field amplitudes and phases in the plane of incidence. Reconstruction of these quantities from pseudo-vector E-field measurements is feasible according to the manufacturer, as they are determined via Maxwell's equations. As such, the SPEAG reconstruction approach was based on the Gerchberg-Saxton algorithm, which benefits from the availability of the E-field polarization ellipse information obtained with the EUmmWV3 probe.



4. RF Exposure Limits

Per 1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in units of W/m² or mW/cm².

Peak Spatially Averaged Power Density was evaluated over a circular area of 4 cm² per interim FCC Guidance For near-field power density evaluations per October 2018 TCB Workshop notes.

HUMAN EXPOSURE	Limits For Occupational / Controlled Environments	Limits For General Population / Uncontrolled Environments	
Frequency Range[MHz]	1,500 – 100,000	1,500 – 100,000	
Power Density[mW/㎝²]	5.0	1.0	
Average Time[Minutes]	6	30	

NOTES: 1.0 mW/cm² is 10 W/m²

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be mad fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e.as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.



5. Input Power Specifications All power density measurements for this device were performed at the input.power.limit given in below tables. Table 5-1 5G NR n261 K Patch *input.power.limit*

Antenna	Beam ID_1	Beam ID_2	Input.power.limit (dBm)
	3		8.3
	4		7.8
	8		6.2
	9		7.5
	10		6.3
	13		7.5
	14		7.7
	19		1.9
	20		1.1
	21		1.1
	22		1.6
	23		2.4
	27		1.7
	28		1.0
	29		1.5
	30		1.9
	131		8.8
	132		10.4
	136		5.4
	137		<u> </u>
	138		<u> </u>
	141		<u> </u>
	142		7.0
K Patch	147		3.8
	148		2.5
	149		2.9
	150		2.7
	151		4.0
	155		2.3
	150		2.5
	158		37
	3	131	55
	4	132	6.0
	8	136	22
	9	137	4.5
	10	138	4.0
	13	141	4.5
	14	142	4.0
	19	147	-1.1
	20	148	-1.4
	21	149	-1.1
	22	150	-1.1
	23	151	-1.0
	27	155	-1.2
	28	156	-1.4
	29	157	-1.2
	30	158	-0.8



Table 5-2 5G NR n261 L Patch input.power.limit

Antenna	Beam ID_1	Beam ID_2	Input.power.limit (dBm)
	0		9.4
	1		8.0
	2		8.2
	5		4.3
	6		5.7
	7		6.0
	11		5.7
	12		6.4
	15		1.6
	16		0.7
	17		1.0
	18		2.0
	24		1.1
	25		0.9
	20		1.3
	120		9.8
	129		9.6
	133		7 4
	134		55
	135		7 4
	139		6.6
L Patch	140		5.3
	143		3.2
	144		1.9
	145		1.4
	146		3.5
	152		2.4
	153		1.5
	154		2.2
	0	128	6.5
	1	129	5.9
	2	130	5.6
	5	133	2.4
	6	134	2.7
	/	135	2.7
	11	139	3.2
	12	140	2.0
	10	143	-1.3
	17	144	-1.7
	18	145	-2.1
	24	152	-1.0
	25	153	-1 9
	26	154	-1.7



Antenna	Beam ID_1	Beam ID_2	Input.power.limit (dBm)
	3		11.4
	4		10.9
	5		10.7
	9		7.2
	10		9.6
	11		7.6
	14		7.2
	15		8.5
	21		4.4
	22		4.7
	23		4.5
	24		4.0
	30		4.1 5.1
	31		<u> </u>
	32		4.1
	33		3.6
	131		7.8
	132		8.4
	133		9.3
	137		5.7
	138		5.8
	139		6.0
	142		5.7
	143		5.9
K Patch	149		2.8
	150		2.6
	151		1.9
	152		2.8
	153		2.2
	158		2.4
	159		2.3
	160		2.3
	161		3.1
	3	131	4.9
	4	132	4.8
	5	133	6.4
	9	137	1.4
	11	130	4.4
	14	142	4.0
	14	1/2	5.5
	21	149	-1.0
	22	150	0.4
	23	151	-1.2
	24	152	-1.1
	25	153	-1.4
	30	158	-0.1
	31	159	-0.1
	32	160	-1.3
	33	161	-1.2

Table 5-3 5G NR n260 K Patch input.power.limit



Table 5-4 5G NR 11200 L Patch Input.power.ininit
--

Antenna	Beam ID_1	Beam ID_2	Input.power.limit (dBm)
	0		11.4
	1		11.4
	2		10.6
	6		7.3
	7		8.5
	8		8.0
	12		9.3
	13		7.8
	16		4.9
	17		5.3
	18		4.5
	19		4.6
	20		3.8
	26		5.1
	27		4.4
	28		4.7
	29		3.6
	128		8.1
	129		8.8
	130		8.5
	134		5.7
	135		5.1
	136		6.5
	140		5.6
	141		5.7
L Patch	144		2.8
	145		2.1
	146		2.5
	147		2.4
	148		3.9
	154		2.7
	155		2.3
	156		2.4
	157		3.1
	0	128	6.1
	1	129	5.8
	2	130	5.9
	6	134	3.0
	7	135	2.8
	8	136	3.6
	12	140	3.9
	13	141	2.6
	16	144	-0.5
	17	145	0.2
	18	146	-0.3
	19	147	-0.7
	20	148	-1 0
	26	154	-0.5
	20	155	-0.3
	28	156	-0.6
	20	157	
	23	157	- 1.1



6. System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.

The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.



System Verification Setup Photo

6.1 System Check Results

System Verification										
	Data	Source	Duck a ON	Normal psPD (W/m ² over 4 cm ²)		Deviation (dD)	Total psPD (W/m ² over 4 cm ²)			
Freq. (GHZ)	Date S/N		Probe SN	measured	target	Deviation (dB)	measured	target	Deviation (dB)	
30	11/02/2020	1011	9382	20.5	21.3	-0.166	20.7	21.6	-0.185	
30	11/03/2020	1011	9382	20.4	21.3	-0.187	20.6	21.6	-0.206	
30	11/02/2020	1011	9486	19.5	21.3	-0.383	19.9	21.6	-0.356	
30	11/03/2020	1011	9486	19.4	21.3	-0.406	19.8	21.6	-0.378	

Note: A **10 mm distance spacing** was used from the reference horn antenna aperture to the probe element. This includes 4.45 mm from the reference antenna horn aperture to the surface of the verification source plus5.55 mm from the surface to the probe. The SPEAG software requires a setting of "5.55 mm" for the correct setup.



7. Power Density Data Summary

7.1 Power Density Results

Power density measurements were performed with DUT transmitting at input.power.limit for one single beam for each polarization (H&V) and one beam pair, for each antenna on each worst surfaces

	NR Band n261											
Frequ	lency		Beam ID1	Beam ID2	Input.power.limi		Test	Distance	Power	Normal	Total	Plot
11090	ionoy	Ant.	Boarnibi	BoamBZ	t	Ant	Position	Diotarioo	Drift	psPD	psPD	No
MHz	Ch.		V	Н	(dBm)		T USILION	(mm)	dB	(mW/cm²)	(mW/cm ²)	110.
2 7559.3	2071821		16	-	0.7	SISO	Back(S2)	2	-0.09	0.626	0.662	1
2 7559.3	2071821		16	-	0.7	SISO	Right(S4)	2	0.02	0.463	0.544	-
2 7559.3	2071821	I Dotob	-	145	1.4	SISO	Back(S2)	2	0.12	0.250	0.317	-
2 7559.3	2071821	L Paton	-	145	1.4	SISO	Right(S4)	2	0.08	0.311	0.413	-
2 7559.3	2071821		17	145	-2.1	MIMO	Back(S2)	2	-0.16	0.302	0.338	-
2 7559.3	2071821	21	17	145	-2.1	MIMO	Right(S4)	2	-0.13	0.252	0.270	-
2 7559.3	2071821		28	-	1.0	SISO	Back(S2)	2	-0.11	0.556	0.581	-
2 7559.3	2071821		28	-	1.0	SISO	Left(S3)	2	-0.18	0.618	0.631	2
2 7559.3	2071821	V Dotob	-	156	2.3	SISO	Back(S2)	2	0.18	0.314	0.406	-
2 7559.3	2071821	r Patch	-	156	2.3	SISO	Left(S3)	2	-0.10	0.415	0.504	-
2 7823.5	2077891		29	157	-1.2	MIMO	Back(S2)	2	0.14	0.296	0.330	-
2 7559.3	2071821		20	148	-1.4	MIMO	Left(S3)	2	-0.13	0.266	0.296	-
47 CFR §1.1310 - SAFETY LIMIT							Power Density					
			Spatial F	Peak			1 mW/cm ²					
	Unco	ontrolled	Exposure/	General Po	opulation		Averaged over 4 cm ²					

	NR Band n260											
Frequ	uency	Mode/	Beam ID1	Beam ID2	Input power	Ant	Test	Distance	Power Drift	Normal psPD	Total psPD	Plot
MHz	Ch.	Ant.	V	Н	(dBm)		Position	(mm)	dB	(mW/cm ²)	(mW/cm ²)	NO.
3 9949.9	2278331		20	-	3.8	SISO	Back(S2)	2	-0.06	0.183	0.262	-
3 8449.9	2253331		29	-	3.6	SISO	Right(S4)	2	-0.04	0.289	0.383	-
3 8449.9	2253331	I Datch	-	145	2.1	SISO	Back(S2)	2	0.05	0.404	0.438	3
3 8449.9	2253331	LFaton	-	145	2.1	SISO	Right(S4)	2	-0.13	0.365	0.400	-
3 8449.9	2253331		29	157	-1.1	MIMO	Back(S2)	2	-0.17	0.164	0.251	-
3 8449.9	2253331		29	157	-1.1	MIMO	Right(S4)	2	-0.19	0.280	0.356	-
3 9949.9	2278331		25	-	4.1	SISO	Back(S2)	2	-0.14	0.292	0.382	-
3 8449.9	2253331		33	-	3.6	SISO	Left(S3)	2	0.17	0.338	0.517	4
3 8449.9	2253331	K Dotch	-	151	1.9	SISO	Back(S2)	2	0.13	0.379	0.401	-
3 8449.9	2253331	r raiun	-	151	1.9	SISO	Left(S3)	2	-0.07	0.403	0.414	-
3 8449.9	2253331		32	160	-1.3	MIMO	Back(S2)	2	-0.06	0.179	0.188	-
3 9949.9	2278331		25	153	-1.4	MIMO	Left(S3)	2	-0.16	0.135	0.142	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population						Power Density 1 mW/cm ² Averaged over 4 cm ²						



5G mmWaveNR Band n261 Additional Surface											
Frequ	ency	Mode/	Beam ID1	Beam ID2	Input power	er Ant T	Ant Test	Distance	Normal psPD	Total psPD	Plot
MHz	Ch.	Ant.	V	Н	(dBm)		Position	(mm)	(mW/cm²)	(mW/cm ²)	INU.
2 8292.2	2084035	K Patch	28	-	1.0	SISO	Rear(S2)	10	0.288	0.292	-
2 7559.3	2071821	K Patch	-	147	3.8	SISO	Front(S1)	2	0.177	0.199	-
2 8292.2	2084035	K Patch	28	156	-1.4	MIMO	Left(S3)	10	0.121	0.129	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population								Po ? Avera	wer Density I mW/cm² ged over 4 cm	2	

	5G mmWaveNR Band n260 Additional Surface										
Frequ	ency	Mode/ Beam ID1 Beam ID2 Input power Ant Test Di	Input power	Ant	Ant	Ant Test [Position	Distance	Normal psPD	Total psPD	Plot	
MHz	Ch.	Ant.	V	Н	(dBm)		(mm)	(mW/cm²)	(mW/cm ²)	INO.	
3 7051.8	2230029	K Patch	-	160	3.1	SISO	Rear(S2)	10	0.218	0.229	-
3 7051.8	2230029	K Patch	4	-	10.9	SISO	Front(S1)	2	0.141	0.158	-
3 9949.9	2278331	K Patch	10	-	9.6	SISO	Left(S3)	10	0.346	0.380	-
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/ General Population								Po Avera	wer Density I mW/cm² ged over 4 cm	2	



7.2 Combined power density calculation result

Per Qualcomm document 80-W2112-4, Appendix D, This device were amended to add the computation of combined PD using the Maximum test results and verify that computed combined PD complies with FCC PD Limit

[n261]			
Module	Identified Beam ID	Measured PD (mW/cm ²)	Dominant surface
L Patch	16	0.662	S2-Back
K Patch	28	0.631	S3-Left
BeemID	Contribu	tion factor	
DealmD	L Patch / S2-Back	K Patch / S3-Left	
16		1 0	
28	0.002	2 0.958	
PD_desig	gn_target (mW/cm ²):	0.6166	
Total u	ncertainty (dB):	2.1	
	Location	combined PD (mW/cm ²)	
L Pa	atch / S2-Back	0.662	
KP	Patch / S3-Left	0.606	

[n260]			
Module	Identified Beam ID	Measured PD (mW/cm ²)	Dominant surface
L Patch	145	0.438	S2-Back
K Patch	33	0.517	S3-Left
BoamID	Contribu	ition factor	
Deamid	L Patch / S2-Back	K Patch / S3-Left	
145		1 0.001	
33	0.01	1 1	
PD_desi	gn_target (mW/cm²)	0.6166	
Total u	ncertainty (dB):	2.1	
	Location	combined PD (mW/cm ²)	
L Pa	atch / S2-Back	0.439	
K P	Patch / S3-Left	0.522	

combined $PD = \sum [c(i,j)*measured 4cm^2PD(i,j)] \le PD_design_target$ + uncertainty at reference power level

Through the calculation result of the combined PD of Smart transmit GEN2, it can be seen that the combined PD result is equal to or less than the PD_design_target and represents a valid result within the uncertainty at reference power level.



7.3 Power density Test Notes

General Notes:

- 1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
- 2. Batteries are fully charged at the beginning of the measurements. The DUT was connected to a wall charger for some measurements due to the test duration. It was confirmed that the charger plugged into this DUT did not impact the near-field PD test results.
- 3. Power density was calculated by repeated E-field measurements on two measurement planes separated by $\lambda/4$. Please see Section 3.3 for more details of the evaluation process.
- 4. DUT was configured to transmit with a manufacturer provided test software to control specific antenna(s), Beam ID(s), and signal type to ensure the test configurations constant for the entire evaluation.
- 5. This device utilizes power reduction for some WLAN wireless modes and technologies for simultaneous transmission compliance. These mechanisms are assessed in the Part 1 SAR Test Report.
- 6. Per FCC TCBC Workshop Notes Apr.2020, When the device is using the Qualcomm-based method already approved by FCC there is no need to submit a pre-submission (pre-TCB) KDB to have the test plan approved
- 7. PD_design_target of 0.6166 mW/cm² was used with mmW device design related uncertainty of 2.1 dB.
- 8. Input.power.limit parameter for 5G mmW NR radio was calculated in Part 0 Power Density Char. Report.
- 9. This device is enabled with Qualcomm[®] Smart Transmit feature to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from WWAN is in compliance with FCC

requirements. Per FCC guidance for devices enabled with Qualcomm[®] Smart Transmit feature, 4G LTE and 5G mmW NR simultaneous transmission scenario does not need to be evaluated under Total Exposure Ratio (TER). The validation of the time-averaging algorithm and compliance under the Tx varying transmission scenario for WWAN technologies are reported in Part 2 report

- Per FCC guidance for devices enabled with Qualcomm[®] Smart Transmit feature, simultaneous transmission analysis is evaluated by combining the exposure from each WWAN and WLAN antenna. 5G mmW NR and WLAN simultaneous transmission scenario is evaluated under the Total Exposure Ratio (TER) in Section 8.
- 11. The Beam ID with one of the highest initial simulated power density for that surface and distance was selected for Part 1 Power Density measurements.
- 12. The device was configured to transmit CW wave signal for testing. Per FCC guidance for devices enabled with Qualcomm[®] Smart Transmit feature, additional testing was not required for different modulations (CP-OFDM QPSK, CP-OFDM 16QAM, CP-OFDM 64QAM, DFT-s-OFDM QPSK, DFT-s-OFDM 16QAM, DFT-s-OFDM 64QAM), RB configurations, component carriers, channel configurations (low channel, mid channel, high channel) since the smart transmit algorithm monitors powers on a per symbol basis, which is independent of these signal characteristics.
- 13. The device was configured to MIMO configuration with H and V polarization beams transmitting together, as indicated in Section 7.1.
- 14. In some cases, the simulation vs. measurement for some surfaces can exceed the device's total uncertainty. Therefore, some additional tests were performed to support simultaneous transmission analysis. See Section 8.



8. The Total Exposure Ratio

The Total Exposure Ratio (TER) is calculated by combining all SAR measurements and power density measurements after normalizing to their respective limits. The general expression is below.

$$TER = \sum_{a=1}^{A} \frac{SAR_a}{SAR_a, limit} + \sum_{b=1}^{B} \frac{SAPD_b}{SAPD_b, limit} < 1$$

The TER shall be less than unity to ensure compliance with the limits.

$$\sum_{n=1}^{N} \frac{4G SAR_n}{4G SAR_n, limit} + \sum_{m=1}^{M} \frac{5G mmW NR SAPD_m}{5G mmW NR SAPD_m, limit} + \sum_{p=1}^{P} \frac{WLAN SAR_p}{WLAN SAR_p, limit} < 1$$

Qualcomm[®] Smart Transmit algorithm for WWAN adds directly the time-averaged RF exposure from 4G and timeaveraged RFexposure from 5G mmW NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G mmW NR to not exceed FCC limit. Therefore, per FCC guidance, TER does not need to be evaluated directly for the 4G and 5G simultaneous compliance via summation. The following equations are derived in this section.. The validation of the time-averaging algorithm and compliance under the Tx varying transmission scenario for WWAN technologies are reported in Part 2 report

$$\sum_{n=1}^{N} \frac{4G SAR_n}{4G SAR_n, limit} + \sum_{p=1}^{r} \frac{WLAN SAR_p}{WLAN SAR_p, limit} < 1$$

$$\sum_{m=1}^{M} \frac{5G mmW NR SAPD_m}{5G mmW NR SAPD_m, limit} + \sum_{p=1}^{P} \frac{WLAN SAR_p}{WLAN SAR_p, limit} < 1$$

For 5G mmW NR, since there is total design-related uncertainty arising from TxAGC and device-to-device variation, the worst-case RF exposure should be determined by accounting for this device uncertainty of 2.1 dB. Due to the application of GEN2 smart transmit algorithm, it can provide maximum PD exposure up to 89%. For more information, please refer to the simulation report.

Reported_psPD = 89% x PD_Design_Target + 2.1dB = 0.89 mW/cm²

Note that since not all the beams supported by this EUT are measured, *reported_PSPD* cannot be computed based on limited *measured PSPD* data. Alternatively, since *measured PSPD* for all the beams will be \leq *PD_design_target* + 2.1dB uncertainty, *reported_PSPD* is computed based on this worst-case PSPD as shown above.

The compliance analysis for simultaneous transmission scenarios of WWAN (4G LTE & 5G mmW NR) with Smart Transmit and 4G & WLAN can be found in two reports indicated in the table below. This section demonstrates compliance for the 5G + WLAN scenarios.

Simultaneous Transmission Scenarios	Evaluation Report
4G LTE WWAN + WLAN	Part 1 SAR Test Report
4G LTE WWAN + 5G mmW NR WWAN	Part2 RF Exposure Report



RF exposure compliance with 5G mmW NR WWAN+WLAN simultaneous transmission scenarios is demonstrated for various radio configurations below.

TER For L Antenna Module was excluded due to the spatial seperation of the antennas per FCC KDB 248227 Sec.6.1 and as described in 80-w2114-4 section G.1.3 In the below plots, it is demonstrated that the -10dB contours of the SAR distributions have no overlap with the simulated area for power density. It was confirmed that all beams for both n260 and n261 operations are fully contained within the simulated area. Appendix A of the simulation report includes plots for all beams. Additionally, the maximum TER contribution for power density for back and front side is 89% per the deserve power margin setting setting of 0.5 dB. The SAR contribution of TER for BT/WLAN Operations is < 0.9.









Note that the above *reported PSPD* applies to the worst-surface of the DUT at 2mm evaluation distance. For this DUT, the worst-surface(s) are listed in section 2.4

Worst-case PD on other surfaces of the DUT are calculated from simulated PD data (see Section 3.1 of Power Density Simulation Report Revision A) by multiplying reported PSPDwith the highest proportion out of all beams and out of all three channels in each band, where the adjustment foreach beam/channel is computed as the proportion of "simulated PD on desired surface" to "simulated PD onworst-surface". For example, to determine worst-case PD on front surface (needed for Head RF Exposure valuation during simultaneous transmission), highest proportion of (simulated PD on front surface)/(simulated PD on worst surface) was determined out of all supported beams and out of all three channels by the DUT in eachband.

Similarly, worst-case PD at other evaluation distances from the DUT are calculated from simulated PD data (see Section 3.1 of Power Density Simulation Report Revision A), bymultiplying reported psPD with the highest proportion out of all beams and out of all three channels in each band.

The adjustment factor for each beam/channel is computed as proportion of "simulated PD on surface at desired evaluation distance" to "simulated PD on worst-surface at 2mm evaluation distance". For example, to determine worst-case PD at 10mm evaluation distance for Rear(S2)side (needed for Hotspot RF Exposure evaluation during simultaneous transmission), highest proportion of (simulated PD on back side at 10mm)/(simulated PD on worst-surface at 2mm) was determined out of all supported beams and out of all three channels by the DUT in each band.

If K patch antennas are considered except for L patch antennas, psPD can be determined as follows.

In some cases, the simulation vs measurement for some surfaces can exceed the device's total uncertainty. In those cases, if the measured psPD > simulated adjusted psPD (assuming a linear congruency of the psPD across surfaces), then 79.4% of the measured value (based on the 1 dB Power back-off power margin) should be used towards the simultaneous TX analysis. Below Table lists the relevant worst-case reported psPD values based on the additional surfaces and evaluation distances needed to perform the TER analysis. The highest of the adjusted Reported_psPD and Measured Total psPD* 0.794 was chosen for TER analysis and the chosen values are indicated by bolded psPD values.

		Simultan	eous Transmission Su	mmation Scenario witl	h 5G mmW NR psPI	
NR Band	Surface	Evaluation	Adjustment Factor due to	adjusted Reported_psPD	Measured Total psPD	Reported Total psPD x 0.794
		Distance	Simulation	ssion Summation Scenario with 5G mmW NR psPD or due to n adjusted Reported_psPD (mW/cm2) Measured Total psPD (mW/cm2) Reported T 0.794 0.794 (mW/cm2) (mW/	(mW/cm2)	
	Back	2 mm	1	0.794		
	Front	2 mm	0.419	0.333	0.199	0.158
~ 001	Left	2 mm	0.617	0.490		
N261	Right	2 mm	1	0.794		
	Back	10 mm	0.599	0.476	0.292	0.232
	Back	15 mm *	Adjustment Factor due to Simulation adjusted Reported_psPD (mW/cm2) Measured Total ps (mW/cm2) 1 0.794 (mW/cm2) 0.419 0.333 0.199 0.617 0.490 0.599 0.599 0.476 0.292 0.599 0.476 0.158 1 0.794 0.292 0.599 0.476 0.292 0.599 0.476 0.292 0.599 0.476 0.292 0.598 0.461 0.229 0.58 0.461 0.229			
	Back	2 mm	1	0.794		-
	Front	2 mm	0.386	0.307	0.158	0.125
- 200	Left	2 mm	1	0.794		
N260	Right	2 mm	1	0.794		
	Back	10 mm	0.58	0.461	0.229	0.182
	Back	15 mm *	0.58	0.461		

*Value at 10mm is used for conservative evaluation.



		5G m	mwave NR H	Head Total E	xposure Rat	io		
	psPD	2.4 GHz WLAN 1	2.4 GHz WLAN 2	2.4 GHz WLAN MIMO	Bluetooth 1	5 GHz WLAN 1	5 GHz WLAN 2	5 GHz WLAN mimo
		Reported SAR	Reported SAR	Reported SAR	Reported SAR	Reported SAR	Reported SAR	Reported SAR
	mW/cm²	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg
	1	2	3	4	5	6	7	8
Applicable Limit	1	1.6	1.6	1.6	1.6	1.6	1.6	1.6
psPD	0.333	0.173	0	0.086	0.459	0.477	0.021	0.436
Ratio to Limit	0.333	0.108	0.000	0.054	0.287	0.298	0.013	0.273

Table 8-1 mmwave NR Head Total Exposure Ratio

psPD + 2.4WLAN Ant1	psPD + 2.4WLAN Ant2	psPD + 2.4WLAN MIMO	psPD + BT 1	psPD + 5G WLAN Ant 1	psPD + 5G WLAN Ant 2	psPD + 5G WLAN MIMO	psPD + 2.4WLAN Ant1+5G WLAN MIMO	psPD + 2.4WLAN Ant2+5G WLAN MIMO	psPD + 2.4WLAN MIMO + 5G WLAN MIMO	psPD + BT + 5G WLAN MIMO
1+2	1+3	1+4	1 + 5	1 + 6	1 + 7	1 + 8	1+2+8	1+3+8	1+4+8	1+5+8
1	1	1	1	1	1	1	1	1	1	1
0.441	0.333	0.387	0.620	0.631	0.346	0.605	0.713	0.605	0.659	0.892

Table 10-25G mmwave NR Body worn Total Exposure Ratio

	psPD	2.4 ∰ WLAN 1 Reported SAR	2.4 (#z WLAN 2 Reported SAR	2.4 GHz WLAN MIMO Reported SAR	Bluetooth 1 Reported SAR	5 ∰ WLAN 1 Reported SAR	5 GHz WLAN 2 Reported SAR	5 ຟີ້ WLAN mimo Reported SAR
	mW/cm²	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg
	1	2	3	4	5	6	7	6+7
Applicable Limit	1	1.6	1.6	1.6	1.6	1.6	1.6	1.6
psPD	0.476	0.107	0.121	0.112	0.06	0.015	0.194	0.209
Ratio to Limit	0.476	0.067	0.076	0.070	0.038	0.009	0.121	0.131

psPD + 2.4WLAN Ant1	psPD + 2.4WLAN Ant2	psPD + 2.4WLAN MIMO	psPD + BT 1	psPD + 5G WLAN Ant 1	psPD + 5G WLAN Ant 2	psPD + 5G WLAN MIMO	psPD + 2.4WLAN Ant1+5G WLAN MIMO	psPD + 2.4WLAN Ant2+5G WLAN MIMO	psPD + 2.4WLAN MIMO + 5G WLAN MIMO	psPD + BT + 5G WLAN MIMO
1+2	1+3	1+4	1 + 5	1 + 6	1 + 7	1 + 8	1+2+8	1+3+8	1+4+8	1+5+8
1	1	1	1	1	1	1	1	1	1	1
0.543	0.551	0.546	0.513	0.485	0.597	0.606	0.673	0.682	0.676	0.644



		50 mmw		LIOLUI Exposu				
	psPD	5 ∰ WLAN 1 Reported SAR	5 ∰ WLAN 2 Reported SAR	5 GHz WLAN MIMO Reported SAR	psPD + 5 배z WLAN 1	psPD + 5 Յե WLAN 2	psPD + 5 (#z WLAN MIMO	
	mW/cm²	W/kg	W/kg	W/kg				
	1	2	3	4	1 + 2	1 + 3	1 + 4	
Applicable Limit	1	4	4	4	1	1	1	
psPD	0.794	0.493	0.497	0.782				
Ratio to Limit	0.794	0.123	0.124	0.196	0.918	0.919	0.990	

Table 10-35G mmwave NRPhabletTotal Exposure Ratio

Table 10-45G mmwave NR Hotspot Total Exposure Ratio

		psPD	2.4 GHz WLAN Ant1 Reported SAR	2.4 GHz WLAN Ant2 Reported SAR	2.4 GHz WLAN MIMO Reported SAR	Bluetooth Reported SAR	5 GHz WLAN Ant1 Reported SAR	5 GHz WLAN Ant2 Reported SAR	5 ⊮ WLAN MIMO Reported SAR
		mW/cm²	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg	W/kg
		1	2	3	4	5	6	7	8
Applicable Limit		1.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Rear Side at	psPD	0.48	0.229	0.333	0.179	0.148	0.069	0.315	0.384
10mm	Ratio to Limit	0.48	0.143	0.208	0.112	0.093	0.043	0.197	0.240
Front Side at	psPD (2 mm)	0.33	0.232	0.004	0.133	0.149	0.026	0.315	0.341
10mm	Ratio to Limit	0.33	0.145	0.003	0.083	0.093	0.016	0.197	0.213
Left Side at	psPD	0.49	0.506	0	0.235	0.221	0.069	0	0.069
10mm	Ratio to Limit	0.49	0.316	0	0.147	0.138	0.043	0	0.043
Right Side at	psPD (2 mm)	0.79	0	0	0	0	0	0	0
10mm	Ratio to Limit	0.79	0	0	0	0	0	0	0
Top Side at	psPD (2 mm)	0	0	0.033	0.052	0	0	0.315	0.315
10mm	Ratio to Limit	0	0	0.021	0.033	0	0	0.197	0.197
Bottom Side	psPD	0	0	0	0	0	0	0	0
at 10mm	Ratio to Limit	0	0	0	0	0	0	0	0



psPD + 2.4 GHz WLAN Ant1	psPD + 2.4 (Hz WLAN Ant2	psPD + 2.4 (Hz WLAN MIMO	psPD + BT	psPD + 5 (II z WLAN Ant1	psPD + 5 (II z WLAN Ant2	psPD + 5 (Hz WLAN MIMO	psPD + 2.4 GHz WLAN Ant 1 + 5 GHz WLAN MIMO	psPD + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN MIMO	psPD + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	psPD + BT + 5 (łłz WLAN MIMO
1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 2 + 8	1 + 3 + 8	1 + 4 + 8	1 + 5 + 8
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.619	0.684	0.588	0.568	0.519	0.673	0.716	0.859	0.924	0.828	0.808
0.478	0.335	0.416	0.426	0.349	0.530	0.546	0.691	0.548	0.629	0.639
0.806	0.490	0.637	0.628	0.533	0.490	0.533	0.849	0.533	0.680	0.671
0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794
0.000	0.021	0.033	0.000	0.000	0.197	0.197	0.197	0.218	0.229	0.197
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note:

1. Worst case Power density results for each test configuration among all antenna arrays and among all supported bands were considered for TER Analysis.

2.Antenna L Module was not considered for TER analysis due to the -10dB contours of the SAR distributions of WLAN/BT Antennas have no overlap with the simulated area for power density of Antenna module L

3. For Front side ,Top edge , Right edge, power density results at 2mm were considered as a more conservative evaluation for 10mm hotspot mode

4.Power density results at 10mm were considered as a more conservative evaluation for 15mm body-worn 5.For Power density measurements, a test separation distance of 2mm was used for phablet configuration due to mmWave probe restraints.

6.Worst case front side reported psPD was considered for Head TER

7. The worst-case between Adjusted_Reported_psPD and measured Total psPD x 0.794 was chosen for TER analysis.

The above numerical summed PD and SAR for all the worst case simultaneous transmission conditions were Total Exposure Ratio.

Therefore, the above analysis is sufficient to determine no further test cases are required and that simultaneous transmission is compliant to the FCC RF exposure limit.



11. Measurement Uncertainty

Measurem	nent Uncertai	inty for CDA	SY6 mmV	Vave mod	ule	
а	b	с	d	е	f= bxe/d	g
	Uncertainty Value	Probability			Standard Uncertainty	
Source of uncertainty	(± dB)	distribution	Div.	Ci	(± dB)	Vi
Probe calibration	0.49	N	1	1	0.49	~
Probe correction	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Frequency Response(BW≤ 1GHz)	0.20	R	1.73	1	0.12	00
Sensor cross coupling	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Istropy	0.50	R	1.73	1	0.29	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Linearity	0.20	R	1.73	1	0.12	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe scattering	0.00	R	1.73	1	0.00	00
Probe positioning offset	0.30	R	1.73	1	0.17	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe positioning Repeatability	0.04	R	1.73	1	0.02	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe spatial Resolution	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Field Impedence Dependence	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Sensor Mechanical Offset	0.00	R	1 73	1	0.00	∞
Amplitude and Phase drift	0.00	Р	1 72	1	0.00	~
Amplitude and Phase drift	0.00	ĸ	1.73	1	0.00	
Amplitude and Phase noise	0.04	R	1.73	1	0.02	00
Measurement area truncation	0.00	R	1.73	1	0.00	00
System Detection Limit	0.04	R	1.73	1	0.02	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Data acquisition	0.03	Ν	1	1	0.03	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Field Reconstruction	0.60	R	1.73	1	0.35	00
Forward Transformation	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Power density Scailing	0.00	R	1.73	1	0.00	00
Spatial Averaging	0.10	R	1.73	1	0.06	00
Test sample and Environmental Factors	1	1				1
Probe coupling with DUT	0.00	R	1.73	1	0.00	00
Modulation Response	0.40	R	1.73	1	0.23	00
Integration time	0.00	R	1.73	1	0.00	00
Response time	0.00	R	1.73	1	0.00	00
Device holder influence	0.10	R	1.73	1	0.06	00
DUT alignment	0.00	R	1.73	1	0.00	00
RF Ambient Conditions	0.04	R	1.73	1	0.02	00
RF ambient - reflections	0.04	R	1.73	1	0.02	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Immunity/Secondary Reception	0.00	R	1.73	1	0.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Power Drif of DUT	0.22	R	1.73	1	0.13	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Combined standard uncertainty $(k = 1)$		RSS			0.76	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Expanded uncertainty (95% confidence level)		k = 2			1.52	



12. SAR Test Equipment

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
SPEAG	5G Module Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F17/ 59RAA1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/ 59RAA1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	011578	N/A	N/A	N/A
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
SPEAG	5G Module Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F11/5K3RA1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F11/5K3RA1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1203 0309	N/A	N/A	N/A
SPEAG	DAE4	446	07/29/2020	Annual	07/29/2021
SPEAG	DAE4	1417	02/26/2020	Annual	02/26/2021
SPEAG	E-Field Probe EUmmWV3	9486	04/14/2020	Annual	04/14/2021
SPEAG	E-Field Probe EUmmWV3	9382	07/31/2020	Annual	07/31/2021
SPEAG	Dipole 5G Verification Source 30 GHz	1011	07/30/2020	Annual	07/30/2021
SPEAG	DAKS 3.5	1038	03/24/2020	Annual	03/24/2021
SPEAG	Network Analyzer /8753ES	JP39240221	01/28/2020	Annual	01/28/2021
TESTO	175-H1/Thermometer	40331922309	01/29/2020	Annual	01/29/2021
TESTO	175-H1/Thermometer	40331949309	01/29/2020	Annual	01/29/2021

*The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.



13. Conclusion

The power density measurements and total exposure ratio analysis indicate that the DUT complies with the RF radiation exposure limits of the FCC, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the RF Exposure and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.



14. References

[1]ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[2]IEC TR 63170:2018, Measurement Procedure for the Evaluation of Power Density Related to Human Exposure to Radiofrequency Fields from Wireless Communication Devices Operating between 6 GHz and 100 GHz.

[3] IEC TR 62630 : 2010, Guidance for Evaluating Exposure from Multiple Electromagnetic Sources

[4] K. Pokovic, T. Schmid, J. Frohlich, and N. Kuster. Novel Probes and Evaluation Procedures to Assess Field Magnitude and Polarization. IEEE Transactions on Electromagnetic Compatibility 42(2): 240 -244, 2000

[5] R. W. Gerchberg and W. O. Saxton. A Practical Algorithm for the Determination of Phase from Image and Diffraction Plane Pictures. Optik 35(2): 237 – 246, 1972.

[6] A. P. Anderson and S. Sali. New Possibilities for Phaseless Microwave Diagnostics. Part 1: Error Reduction Techniques. IEE Proceedings H – Microwaves, Antennas and Propagation 132(5): 290 – 298, 1985

[7] FCC KDB 865664 D02 v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[8] FCC KDB 447498 D01 v02r01: RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices. Federal Communications Commission – Office of Engineering and Technology, Laboratory Division.

[9] November 2017 Telecommunications Certification Body Council (TCBC) Workshop Notes

[10] October 2018 Telecommunications Certification Body Council (TCBC) Workshop Notes

[11] April 2019 Telecommunications Certification Body Council (TCBC) Workshop Notes

[12] November 2019 Telecommunications Certification Body Council (TCBC) Workshop Notes

[13] SPEAG DASY6 System Handbook (September 2019)



Attachment 1. – Power Density Test Plots



Test Laboratory: EUT Type: Room Temperature: Test Date: Plot No.:	F N 2 1 1	ICT CO., LTD ⁄lobile Phone 1.8℃ 1/02/2020				
Exposure ConditionsPhantom Section5GBAC	tion, T K, 2.0	est Distance [mm] 0	Band Group, UID n261 CW, 0	Frequency [MHz], Cha 27559.3, 2071821	annel Number	Conversion Factor 1.0
Hardware SetupPhantomMmmWave - xxxxAi	edium r -	Probe, Calibratio EUmmWV4 - SN	on Date \9486_F1-78GHz,	2020-04-14	DAE, Calibra DAE4 Sn446	tion Date 5, 2020-07-29
Scans Setup Scan Type Grid Extents [mm] Grid Steps [lambda] Sensor Surface [mm]				5G Sca 60.0 x (0.25 x (2.0	in 60.0 0.25	
Measurement Results Scan Type Avg. Area [cm ²] pS _{tot} avg [W/m ²] pS _n avg [W/m ²] E _{peak} [V/m] Power Drift [dB]				5G Scan 4.00 6.62 6.26 82.6 -0.09		





Test Laboratory EUT Type: Room Tempera Test Date: Plot No.:	/: ature:	HCT Mob 20.1 11/0 2	CO., LTD ile Phone ℃ 2/2020					
Exposure Cond	itions				Croup		Channel	Conversion
Section	Position	, Test	t Distance [mm]	Band	UID	Number	Channel	Factor
5G	EDGE L	EFT,	2.00	n261	CW, 0	27559.3, 2071821		1.0
Hardware SetupPhantomMediumProbe, CalibrationmmWave - xxxxAir -EUmmWV3 - Si				Date 382_F1	-78GHz, 202	20-07-31	DAE, Calibratio DAE4 Sn1417,	on Date 2020-02-26
Scans Setup								
Scan Type	-1					5G Scan		
Grid Extents [mn	nj Mal					60.0 X 60.0		
Sensor Surface I	imml					2.0		
Measurement R	esults							
Scan Type						5G Scan		
Avg. Area [cm ²]						4.00		
pStot avg [W/m ²]						6.31		
pS _n avg [W/m ²]						6.18		
E _{peak} [V/m]	E _{peak} [V/m]					73.8		
Power Drift [dB]	Power Drift [dB]					-0.18		





Test Laboratory: EUT Type: Room Temperatu Test Date: Plot No.:	ure:	HCT Mobii 21.4° 11/03 3	CO., LTD le Phone C 9/2020						
Exposure Condit	ions				_				
Phantom Section Position, Test D			t Distance [mm]	Band	Group, UID	Frequency [MHz], Ch		annel Number	Conversion Factor
56	DACK,	2.00		11200	Cvv, 0	30449.9, 2	200001		1.0
Hardware Setup									
Phantom Medium Probe, Calibration Date							DAE, Calibration Date		
mmWave - xxxx	Air -		EUmmWV4 - SN	19486_F	1-78GHz, 20	20-04-14		DAE4 Sn446,	2020-07-29
Scans Setup									
Scan Type						5G	Scan		
Grid Extents [mm]					60.0 x 60.0				
Grid Steps [lambda]				0.25 x 0.25					
Sensor Surface [mm]				2.0					
Measurement Res	sults								
Scan Type						5G S	Scan		
Avg. Area [cm ²]						4.00			
pS _{tot} avg [W/m²]						4.38			
pS _n avg [W/m²]						4.04			
E _{peak} [V/m]						71.2			
Power Drift [dB]						0.05			





Test Laboratory: EUT Type: Room Temperature: Test Date: Plot No.:	HCT CO., LTD Mobile Phone 19.9℃ 11/03/2020 4		
Exposure ConditionsPhantom SectionPositi5GEDGE	n, Test Distance [mm] Band Group, LEFT, 2.00 n260 CW, 0-	UID Frequency [MHz], Ch - 38449.9, 2253331	annel Number Conversion Factor 1.0
Hardware SetupPhantomMeimmWave - xxxxAir	ium Probe, Calibration Date EUmmWV3 - SN9382_F1-78G	GHz, 2020-07-31	DAE, Calibration Date DAE4 Sn1417, 2020-02-26
Scans Setup Scan Type Grid Extents [mm] Grid Steps [lambda] Sensor Surface [mm]		5G Scan 60.0 x 60.0 0.25 x 0.25 2.0	
Measurement Results Scan Type Avg. Area [cm ²] pS _{tot} avg [W/m ²] pS _n avg [W/m ²] E _{peak} [V/m] Power Drift [dB]		5G Scan 4.00 5.17 3.38 97.0 0.17	





Attachment 2. – Power Density System Verification Plots


System Verification Data

Room Temperature:	20.1℃
Test Date:	11/02/2020
Plot No.:	V1

Exposure Conditions

Phantom	Position, Test Distance	Band	Group,	Frequency [MHz], Channel	Conversion
Section	[mm]		UID	Number	Factor
5G	FRONT, 5.55	Validation band	CW, 0	30000.0, 30000	1.0

Hardware Setup

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date
mmWave - xxxx	Air -	EUmmWV3 - SN9382_F1-78GHz, 2020-07-31	DAE4 Sn1417, 2020-02-26

Scans Setup

Scan Type	5G Scan
Grid Extents [mm]	60.0 x 60.0
Grid Steps [lambda]	0.25 x 0.25
Sensor Surface [mm]	5.55
Measurement Results	
Scan Type	5G Scan
Avg. Area [cm ²]	4.00
pS _{tot} avg [W/m ²]	20.7
pSn avg [W/m²]	20.5
E _{peak} [V/m]	105
Power Drift [dB]	-0.01



System Verification Data



EUT Type: Room Temperatu Test Date: Plot No.:	ıre:	Mobile 19.9°0 11/03/ V2	e Phone 2 /2020					
Exposure Cond Phantom Section	itions Position [mm]	, Test [Distance	Band	Group, UID	Frequency [MHz], Number	Channel	Conversion Factor
5G	FRONT,	5.55		Validation band	CW, 0	30000.0, 30000		1.0
Hardware Setup Phantom mmWave - xxxx) Medi Air -	ium l	Probe, Calib EUmmWV3	ration Date - SN9382_F1-78	3GHz, 2020-	07-31	DAE, Calibrati DAE4 Sn1417	on Date , 2020-02-26
Scans Setup Scan Type Grid Extents [mm Grid Steps [lamb Sensor Surface [Measurement R Scan Type Avg. Area [cm ²] pStot avg [W/m ²] pSn avg [W/m ²] Epeak [V/m] Power Drift [dB]	n] da] mm] esults					5G Scan 60.0 x 60.0 0.25 x 0.25 5.55 5G Scan 4.00 20.6 20.4 104 -0.02		
			-20	²] Re{S} (x,y,z,f0) [c	IB(20.6W/m^2)			



S	/stem	Verification	Data
---	-------	--------------	------

Room Temperature:	21.8℃
Test Date:	11/02/2020
Plot No.:	V3

Exposure Conditions

Exposure cona	illoi	13						
Phantom Section	Pos [mn	sition, Test n]	Distance	Band	Group, UID	Frequency [MHz], Number	Channel	Conversion Factor
5G	FR	ONT, 5.55		Validation band	CW, 0	30000.0, 30000		1.0
Hardware Setup)							
Phantom		Medium	Probe, Calib	oration Date			DAE, Calibrati	on Date
mmWave - xxxx		Air -	EUmmWV4	- SN9486_F1-7	8GHz, 2020	-04-14	DAE4 Sn446,	2020-07-29
Scans Setup								
Scan Type						5G Scan		
Grid Extents [mn	n]					60.0 x 60.0		
Grid Steps [lamb	da]					0.25 x 0.25		
Sensor Surface [mm]				5.55		
Measurement R	esu	lts						
Scan Type						5G Scan		
Avg. Area [cm ²]						4.00		
pStot avg [W/m ²]						19.9		
pSn avg [W/m ²]						19.5		
E _{peak} [V/m]						104		
Power Drift [dB]						0.05		





<u>System Verifica</u> Room Tempera Test Date: Plot No.:	tion Data iture:	<u>a</u> 21.4° 11/03 V4	C 8/2020					
Exposure Cond	itions	Toot	Distanco		Group		Channel	Conversion
Section	[mm]	1631	Distance	Band	UID	Number	Channel	Factor
5G	FRONT,	5.55		Validation band	CW, 0	30000.0, 30000		1.0
Hardware Setup) Medi	ium	Probe, Calib	pration Date			DAF, Calibrati	on Date
mmWave - xxxx	Air -		EUmmWV4	- SN9486_F1-7	8GHz, 2020	0-04-14	DAE4 Sn446,	2020-07-29
Scans Setup								
Scan Type						5G Scan		
Grid Extents [mm	ן [60.0 x 60.0		
Grid Steps [lamb	da]					0.25 x 0.25		
Sensor Surface [mm]					5.55		
Measurement R	esults							
Scan Type						5G Scan		
Avg. Area [cm ²]						4.00		
pStot avg [W/m ²]						19.8		
pSn avg [W/m ²]						19.4		
Epeak [V/m]						104		
Power Drift [dB]						-0.01		





■Attachment 3. – Probe Calibration Data



he Swiss Accreditation Servi	ice is one of the signatories	to the EA	reditation No.: 303 0105
luitilateral Agreement for the	recognition of calibration c	ertificates	
lient HCT (Dymste	c)	Certificate No:	EUmmWV4-9486_Apr20
CALIBRATION	CERTIFICATE		
Dbject	EUmmWV4 - SN:	9486	
Calibration procedure(s)	QA CAL-02.v9, Q Calibration proceed evaluations in air	A CAL-25.v7, QA CAL-42.v2 lure for E-field probes optimized f	bralase nearlifield 24
Calibration date:	April 14, 2020	제 /0	1/00
This calibration contilicate doors	monte the terminical Dr. to water	4 1 3 3 0 1	430 2040 1 42
The measurements and the unc	certainties with confidence pro lucted in the closed laboratory	hai standards, which realize the phyto25 case bability are given on the following pages and facility: environment temperature (22 ± 3)°C a	and humidity < 70%.
The measurements and the uncompared occurs of the measurements and the uncompared of the second compared of the second of the se	entrainties with confidence pro ucted in the closed laboratory &TE critical for calibration)	tal standards, which realize the shutces case bability are given on the following pages and . facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.)	an experiments (s) 2 2 22
Primary Standards	ATE critical for calibration) &TE critical for calibration) ID SN: 104778	tal standards, which realize the shutces case bability are given on the following pages and : facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101)	an experiencements (si) 2 < 2 = 2 = 2 = 2 = 2 = 2 = 2 = 2 = 2 =
All calibrations have been cond Calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291	ATE critical for calibration) &TE critical for calibration) ID SN: 104778 SN: 103244	tal standards, which realize the shutces case bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100)	an experiencements (si) 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2
The measurements and the unc All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291	ID SN: 104778 SN: 103245	tal standards, which realize the blocking pages and i bability are given on the following pages and i facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100)	Scheduled Calibration Apr-21 Apr-21
The measurements and the unc All calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator	ID SN: 104778 SN: 104778 SN: 103244 SN: CC2552 (20x)	cal standards, which realize the billowing pages and standards; which realize the billowing pages and standards; environment temperature (22 ± 3)°C a facility: environment temperature (22 ± 3)°C (2000) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100)	Scheduled Calibration Apr-21 Apr-21 Apr-21
All calibrations have been cond Calibrations have been cond Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6	ID SN: 104778 SN: 104778 SN: 103244 SN: 2228	cal standards, which realize the billowing pages and its bability are given on the following pages and its facility: environment temperature (22 ± 3)°C a facility: environment temperature (22 ± 3)°C (2000) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Oct-20
All calibrations have been cond Calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4	ID SN: 104778 SN: 103244 SN: 103245 SN: 2328 SN: 789	cal bability are given on the following pages and is bability are given on the following pages and is facility: environment temperature (22 ± 3)°C and the following pages and its call bate (Certificate No.) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 27-Dec-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19)	Apr-21 Apr-21 Apr-21 Oct-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards	ID SN: 104778 SN: 104778 SN: 104778 SN: 103244 SN: 103245 SN: CC2552 (20x) SN: 2328 SN: 789	cal bability are given on the following pages and a bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_ Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in bouse)	Apr-21 Apr-21 Apr-21 Oct-20 Scheduled Check
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198	ID SN: 104776 SN: 104776 SN: 104776 SN: 103245 SN: 20245 SN: 2024 SN: 2024	cal bability are given on the following pages and a bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (In house) 06-Apr-16 (In house check Jun-18)	Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power meter E44198	ID SN: 104776 SN: 104776 SN: 104776 SN: 103244 SN: 103245 SN: 202252 (20x) SN: 2328 SN: 789 ID SN: GB41293874 SN: GB41293874 SN: MY41498087	cal standards, which realize the bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house check Jun-18) 08-Apr-16 (in house check Jun-18)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house sheck: Jun-20 In house sheck: Jun-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A	ID SN: 104776 SN: 104776 SN: 104776 SN: 103244 SN: 103245 SN: 202252 (20x) SN: 2328 SN: 789 ID SN: GB41293874 SN: GB41293874 SN: 000110210	al standards, which realize the bluest coast bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house sheck: Jun-20 In house sheck: Jun-20 In house sheck: Jun-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A RF generator HP 8648C	ID SN: 102244 SN: 103245 SN: 103245 SN: 103245 SN: 20285 SN: 2328 SN: 789 ID SN: GB41293874 SN: 6841293874 SN: 000110210 SN: US3642U01700	cal standards, which realize the bubility are given on the following pages and a facility: environment temperature (22 ± 3)°C a cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 04-Aug-99 (in house check Jun-18)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-20 In house check: Jun-20 In house check: Jun-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RE generator HP 8648C Natwork Analyzer HP 8753E	ID SN: 104776 SN: 104776 SN: 104776 SN: 103244 SN: 103245 SN: 20245 SN: 20245 SN: 20245 SN: 20245 SN: 20245 SN: 20245 SN: 20245 SN: 20245 SN: 2024 SN: 2025 SN: 2025	cal bability are given on the following pages and isability are given on the following pages and if acility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 04-Aug-99 (in house check Jun-18) 04-Aug-99 (in house check Jun-18)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8468C Natwork Analyzer HP 8753E	ID SN: 102425 SN: 104778 SN: 104778 SN: 104778 SN: 103244 SN: 103245 SN: 2228 SN: 2228 SN: 2228 SN: 2228 SN: 2328 SN: 23	al standards, which realize the bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a call Date (Certificate No.) (21-Apr-20 (No. 217-03100/03101) (21-Apr-20 (No. 217-03100) (21-Apr-20 (No. 217-03100) (21-Apr-20 (No. 217-03101) (21-Apr-20 (No. 21-Apr-20 (No. 21-	Apr.21 Apr.21
The measurements and the uncomposition of the measurements and the uncomposition of the second composition of the second of the	ID SN: 104776 SN: 104776 SN: 104776 SN: 104776 SN: 103245 SN: 103245 SN: 2328 SN: 2328 SN: 2328 SN: 2328 SN: 2829 SN: 289 SN: 289 SN: 289 SN: 289 SN: 289 SN: 289 SN: 289 SN: 289 SN: 288 SN:	al standards, which realize the july 525 case bability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. DAE4-789_Dec19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 06-Apr-16 (in house check Jun-18) 04-Aug-99 (in house check Jun-18) 18-Oct-01 (in house check Jun-18) 18-Oct-01 (in house check Jun-18)	Apr.21 Apr.22 Apr.22 Apr.22 Apr.22 Apr.23 Apr.24 Apr.24

Certificate No: EUmmWV4-9486_Apr20

Page 1 of 18



Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



- Schweizerischer Kalibrierdienst Service suisse d'étaionnage Servizio svizzero di taratura
- Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

OCP CF A, B, C, D Polarization φ	sensitivity in free space diode compression point crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters o rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 9 = 0 is normal to probe axis
Connector Angle Sensor Angles k	information used in DASY system to align probe sensor X to the robot coordinate system sensor deviation from the probe axis, used to calculate the field orientation and polarization is the wave propagation direction

Calibration is Performed According to the Following Standards:

 a) IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 for XY sensors and 9 = 90 for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). For frequencies > 6 GHz, the far field in front of waveguide horn antennas is measured for a set of frequencies in various waveguide bands up to 110 GHz.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- The frequency sensor model parameters are determined prior to calibration based on a frequency sweep (sensor model involving resistors R, R_p, inductance L and capacitors C, C_p).
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- Sensor Offset: The sensor offset corresponds to the mechanical from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).
- Equivalent Sensor Angle: The two probe sensors are mounted in the same plane at different angles. The
 angles are assessed using the information gained by determining the NORMx (no uncertainty required).
- Spherical isotropy (3D deviation from isotropy): in a locally homogeneous field realized using an open waveguide / horn setup.

Certificate No: EUmmWV4-9486_Apr20

Page 2 of 18



April 14, 2020

DASY - Parameters of Probe: EUmmWV4 - SN:9486

Basic Calibration Parameters

	Sensor X	Sensor Y	Unc (k=2)
Norm (µV/(V/m) ²)	0.02160	0.02393	± 10.1 %
DCP (mV) ¹¹	103.0	115.0	
Equivalent Sensor Angle	-59.8	34.3	

Calibration results for Frequency Response (750 MHz - 110 GHz)

Frequency GHz	Target E-Field V/m	Deviation Sensor X dB	Deviation Sensor Y dB	Unc (k=2) dB
0.75	77.2	-0.06	-0.04	± 0.43 dB
1.8	140.4	0.10	0.10	± 0.43 dB
2	133.0	0.04	0.10	± 0.43 dB
2.2	124.8	0.02	0.03	± 0.43 dB
2.5	123.0	-0.05	-0.05	± 0.43 dB
3.5	256.2	0.16	0.07	± 0.43 dB
3.7	249.8	0.25	0.13	± 0.43 dB
6.6	41.8	-0.12	0.08	± 0.98 dB
8	48.4	-0.36	-0.31	± 0.98 dB
10	54,4	-0.03	0.02	± 0.98 dB
15	71.5	0.48	-0.32	± 0.98 dB
18	85.3	0.00	0.24	± 0.98 dB
26.6	96.9	0.28	0.17	+ 0.98 dB
30	92.6	0.10	0.10	+ 0.98 dB
35	93.7	-0.04	-0.02	+ 0.98 dB
40	91.5	-0.51	-0.44	± 0.98 dB
50	19.6	-0.56	-0.49	± 0.98 dB
55	22.4	0.24	0.14	± 0.98 dB
60	23.0	0.01	-0.01	± 0.98 dB
65	27.4	-0.21	0.04	± 0.98 dB
70	23.9	0.15	0.08	± 0.98 dB
75	20.0	0.10	0.12	± 0.98 dB
75	14.8	-0.03	-0.06	± 0.98 dB
80	22.5	0.02	0.21	± 0.98 dB
85	22.8	-0.03	-0.05	± 0.98 dB
90	23.8	0.04	0.06	± 0.98 dB
92	23.9	-0.06	-0.16	± 0.98 dB
95	20.5	-0.24	-0.25	± 0.98 dB
97	24.4	0.04	-0.07	± 0.98 dB
100	22.6	0.04	-0.03	± 0.98 dB
105	22.7	0.00	0.04	± 0.98 dB
110	19.7	0.02	0.12	± 0.98 dB

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

ⁿ Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max: deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EUmmWV4-9486_Apr20

Page 3 of 18



April 14, 2020

DASY - Parameters of Probe: EUmmWV4 - SN:9486

Calibration Results for Modulation Response

Communication System Name		A dB	B dBõV	С	dB	VR mV	Max dev.	Max Unc ^E (k=2)
CW	X	0.00	0.00	1.00	0.00	108.0	± 3.3 %	±4.7%
	Y	0.00	0.00	1.00	202-2	90.5		
Pulse Waveform (200Hz, 10%)	X	2.20	60.00	12.88	10.00	6.0	±1.4%	±9.6 %
The distance of participation of the ord	Y	1.81	60.00	14.09		6.0	1	
Pulse Waveform (200Hz, 20%)	X	12.00	78.00	17.00	6.99	12.0	±0.9 %	±9.6 %
and the second sec	Y	1.17	60.00	13.19		12.0		10000
Pulse Waveform (200Hz, 40%)	X	0.75	60.00	10.84	3.98	23.0	±1.0 %	±9.6%
	Y	0.68	60.00	12.11		23.0		
Pulse Waveform (200Hz, 60%)	X	0.46	60.00	9.91	2.22	27.0	± 0.7 %	±9.6%
Contractor and the August Starting	Y	0.45	60.00	11.19	10000	27.0		10000000
QPSK Waveform, 1 MHz	X	0.90	60.00	10.88	1.00	22.0	±2.1%	±9.6%
	Y	0.97	60.00	11.51		22.0		
QPSK Waveform, 10 MHz	X	1.25	60.00	11.50	0.00	22.0	22.0 ± 0.8 %	±9.6%
The second second second second second second second	Y	1.22	60.00	11.77	100.000.00	22.0	0.0000000000000000000000000000000000000	
84-QAM Waveform, 100 kHz	X	1.93	60.00	13.57	3.01	17.0	±0.7 %	±9.6 %
Same - Contained -	Y	1.99	80.26	13.70		17.0		1.200
64-QAM Waveform, 40 MHz	eform, 40 MHz X 2,11 60.0/	60.00	12.16	0.00	19.0	+0.7%	±9.6 %	
100710001020200000000000000000000000000	Y	2.00	60.00	12.33		19.0		
WLAN CCDF, 64-QAM, 40MHz	X	3.15	60.00	12.62	0.00	12.0	±0.9 %	+96%
WHEN COMPANY CONTRACTORS	Y	2.99	60.00	12.77	100000	12.0		1232/05
	Communication system Name CW Pulse Waveform (200Hz, 10%) Pulse Waveform (200Hz, 20%) Pulse Waveform (200Hz, 40%) Pulse Waveform (200Hz, 60%) QPSK Waveform, 10 MHz G4-QAM Waveform, 100 kHz 64-QAM Waveform, 100 kHz 64-QAM Waveform, 40 MHz WLAN CCDF, 64-QAM, 40MHz	Communication system Name CW X Pulse Waveform (200Hz, 10%) X Pulse Waveform (200Hz, 20%) X Pulse Waveform (200Hz, 40%) X Pulse Waveform (200Hz, 40%) X Pulse Waveform (200Hz, 40%) X Pulse Waveform (200Hz, 60%) X QPSK Waveform, 1 MHz X QPSK Waveform, 10 MHz X Y 64-QAM Waveform, 100 kHz X WLAN CCDF, 64-QAM, 40MHz X	Communication System Name A dB CW X 0.00 Pulse Waveform (200Hz, 10%) X 2.20 Y 1.81 Pulse Waveform (200Hz, 20%) X 12.00 Y 1.81 Pulse Waveform (200Hz, 40%) X 0.75 Pulse Waveform (200Hz, 40%) X 0.46 Pulse Waveform (200Hz, 60%) X 0.46 QPSK Waveform, 1 MHz X 0.97 QPSK Waveform, 10 MHz X 1.25 Y 1.68 Y 1.99 64-QAM Waveform, 100 kHz X 1.99 64-QAM Waveform, 40 MHz X 2.11 Y 2.00 X 3.99 WLAN CCDF, 64-QAM, 40MHz X 3.99	Communication System Name A B dB dB \/yV CW X 0.00 0.00 0.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 Pulse Waveform (200Hz, 20%) X 12.00 78.00 Pulse Waveform (200Hz, 40%) X 0.75 60.00 Pulse Waveform (200Hz, 40%) X 0.75 60.00 Pulse Waveform (200Hz, 40%) X 0.46 80.00 Pulse Waveform (200Hz, 40%) X 0.46 60.00 QPSK Waveform, 100Hz X 0.97 60.00 QPSK Waveform, 10 MHz X 1.25 60.00 Y 0.97 60.00 Y 1.22 60.00 QPSK Waveform, 10 MHz X 1.25 60.00 Y 1.93 60.26 64-QAM Waveform, 100 kHz X 1.93 60.02 Y 2.00 60.00 WLAN CCDF, 64-QAM, 40 MHz X 2.99 60.00 Y 2.99 60.00 Y 2.99 60.00 <td>Communication System Name A B C dB dB vµV dB vµV dB vµV CW X 0.00 0.00 1.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 Pulse Waveform (200Hz, 40%) X 0.75 60.00 12.88 Pulse Waveform (200Hz, 40%) X 0.75 60.00 13.19 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.81 QPSK Waveform (200Hz, 40%) X 0.46 60.00 12.11 QPSK Waveform, 1 MHz X 0.46 60.00 11.51 QPSK Waveform, 10 MHz X 1.25 60.00 11.50 Y 0.97 60.00 11.50 Y 1.22 60.00 11.77 64-QAM Waveform, 100 kHz X 1.93 60.00 12.33 Y 1.99 60.26 13.70 64-QAM Waveform, 40 MHz X<td>Communication System Name A B C D CW X 0.00 0.00 1.00 0.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 0.468 60.00 10.84 3.98 Pulse Waveform (200Hz, 40%) X 0.45 60.00 11.91 2.22 QPSK Waveform, 1200Hz, 60%) X 0.45 60.00 11.68 1.00 QPSK Waveform, 1 MHz X 0.97 60.00 11.58 1.00 QPSK Waveform, 10 MHz X 1.25 60.00 11.50 0.00 QPSK Waveform, 100 kHz X 1.25 60.00 11.50 3.01 QPSK Waveform, 100 kHz X 1.25 60.00 12.18 0.00 QPAGM Waveform, 100 kHz</td><td>Communication system Name A B C D VR CW X 0.00 0.00 1.00 0.00 108.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 Pulse Waveform (200Hz, 40%) X 0.75 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 60%) X 0.46 60.00 11.19 22.0 QPSK Waveform, 1 MHz X 0.97 60.00 11.50 0.00 22.0 QPSK Waveform, 10 MHz X 1.25 60.00 11.51 22.0 17.0 64-QAM Waveform, 100 kHz <td< td=""><td>Communication System Name A B C D VR Max CW X 0.00 0.00 1.00 0.00 108.0 ±3.3 % Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 ±1.4 % Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 0.68 60.00 10.84 3.98 23.0 ± 1.0 % Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 ± 1.0 % Pulse Waveform (200Hz, 60%) X 0.46 60.00 10.84 3.98 23.0 ± 1.0 % QPSK Waveform, 1 MHz X 0.45 60.00 11.58 22.0 ± 0.7 % QPSK Waveform, 10 MHz X 1.25 60.00 11.50 22.0 ± 0.7 %</td></td<></td></td>	Communication System Name A B C dB dB vµV dB vµV dB vµV CW X 0.00 0.00 1.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 Pulse Waveform (200Hz, 40%) X 0.75 60.00 12.88 Pulse Waveform (200Hz, 40%) X 0.75 60.00 13.19 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.81 QPSK Waveform (200Hz, 40%) X 0.46 60.00 12.11 QPSK Waveform, 1 MHz X 0.46 60.00 11.51 QPSK Waveform, 10 MHz X 1.25 60.00 11.50 Y 0.97 60.00 11.50 Y 1.22 60.00 11.77 64-QAM Waveform, 100 kHz X 1.93 60.00 12.33 Y 1.99 60.26 13.70 64-QAM Waveform, 40 MHz X <td>Communication System Name A B C D CW X 0.00 0.00 1.00 0.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 0.468 60.00 10.84 3.98 Pulse Waveform (200Hz, 40%) X 0.45 60.00 11.91 2.22 QPSK Waveform, 1200Hz, 60%) X 0.45 60.00 11.68 1.00 QPSK Waveform, 1 MHz X 0.97 60.00 11.58 1.00 QPSK Waveform, 10 MHz X 1.25 60.00 11.50 0.00 QPSK Waveform, 100 kHz X 1.25 60.00 11.50 3.01 QPSK Waveform, 100 kHz X 1.25 60.00 12.18 0.00 QPAGM Waveform, 100 kHz</td> <td>Communication system Name A B C D VR CW X 0.00 0.00 1.00 0.00 108.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 Pulse Waveform (200Hz, 40%) X 0.75 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 60%) X 0.46 60.00 11.19 22.0 QPSK Waveform, 1 MHz X 0.97 60.00 11.50 0.00 22.0 QPSK Waveform, 10 MHz X 1.25 60.00 11.51 22.0 17.0 64-QAM Waveform, 100 kHz <td< td=""><td>Communication System Name A B C D VR Max CW X 0.00 0.00 1.00 0.00 108.0 ±3.3 % Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 ±1.4 % Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 0.68 60.00 10.84 3.98 23.0 ± 1.0 % Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 ± 1.0 % Pulse Waveform (200Hz, 60%) X 0.46 60.00 10.84 3.98 23.0 ± 1.0 % QPSK Waveform, 1 MHz X 0.45 60.00 11.58 22.0 ± 0.7 % QPSK Waveform, 10 MHz X 1.25 60.00 11.50 22.0 ± 0.7 %</td></td<></td>	Communication System Name A B C D CW X 0.00 0.00 1.00 0.00 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 Pulse Waveform (200Hz, 40%) X 0.468 60.00 10.84 3.98 Pulse Waveform (200Hz, 40%) X 0.45 60.00 11.91 2.22 QPSK Waveform, 1200Hz, 60%) X 0.45 60.00 11.68 1.00 QPSK Waveform, 1 MHz X 0.97 60.00 11.58 1.00 QPSK Waveform, 10 MHz X 1.25 60.00 11.50 0.00 QPSK Waveform, 100 kHz X 1.25 60.00 11.50 3.01 QPSK Waveform, 100 kHz X 1.25 60.00 12.18 0.00 QPAGM Waveform, 100 kHz	Communication system Name A B C D VR CW X 0.00 0.00 1.00 0.00 108.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 Pulse Waveform (200Hz, 40%) X 0.75 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 Pulse Waveform (200Hz, 60%) X 0.46 60.00 11.19 22.0 QPSK Waveform, 1 MHz X 0.97 60.00 11.50 0.00 22.0 QPSK Waveform, 10 MHz X 1.25 60.00 11.51 22.0 17.0 64-QAM Waveform, 100 kHz <td< td=""><td>Communication System Name A B C D VR Max CW X 0.00 0.00 1.00 0.00 108.0 ±3.3 % Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 ±1.4 % Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 0.68 60.00 10.84 3.98 23.0 ± 1.0 % Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 ± 1.0 % Pulse Waveform (200Hz, 60%) X 0.46 60.00 10.84 3.98 23.0 ± 1.0 % QPSK Waveform, 1 MHz X 0.45 60.00 11.58 22.0 ± 0.7 % QPSK Waveform, 10 MHz X 1.25 60.00 11.50 22.0 ± 0.7 %</td></td<>	Communication System Name A B C D VR Max CW X 0.00 0.00 1.00 0.00 108.0 ±3.3 % Pulse Waveform (200Hz, 10%) X 2.20 60.00 12.88 10.00 6.0 ±1.4 % Pulse Waveform (200Hz, 20%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 12.00 78.00 17.00 6.99 12.0 ± 0.9 % Pulse Waveform (200Hz, 40%) X 0.68 60.00 10.84 3.98 23.0 ± 1.0 % Pulse Waveform (200Hz, 40%) X 0.46 60.00 12.11 23.0 ± 1.0 % Pulse Waveform (200Hz, 60%) X 0.46 60.00 10.84 3.98 23.0 ± 1.0 % QPSK Waveform, 1 MHz X 0.45 60.00 11.58 22.0 ± 0.7 % QPSK Waveform, 10 MHz X 1.25 60.00 11.50 22.0 ± 0.7 %

Note: For details on all calibrated UID parameters see Appendix

Calibration Results for Linearity Response

Frequency GHz	Target E-Field V/m	Deviation Sensor X dB	Deviation Sensor Y dB	Unc (k=2) dB
0.9	50.0	-0.04	0.04	± 0.2 dB
0.9	100.0	-0.07	-0.04	± 0.2 dB
0.9	500.0	0.02	0.01	± 0.2 dB
0.9	1000.0	0.04	0.01	± 0.2 dB
0.9	1500.0	0.03	0.01	± 0.2 dB
0.9	2000.0	-0.02	-0.01	± 0.2 dB

Sensor Frequency Model Parameters (750 MHz - 78 GHz)

	Sensor X	Sensor Y
R (Ω)	40,73	44.58
R _p (Ω)	95.08	90.81
L (nH)	0.04151	0.04075
C (pF)	0.2157	0.2793
C _p (pF)	0.1205	0.1171

Sensor Frequency Model Parameters (55 GHz - 110 GHz)

20	Sensor X	Sensor Y
R (Ω)	28.15	34.53
$R_{p}(\Omega)$	99.60	95.35
L (nH)	0.03606	0.03061
C (pF)	0.1583	0.2541
C _p (pF)	0.1349	0.1315

Certificate No: EUmmWV4-9486_Apr20

Page 4 of 18



April 14, 2020

DASY - Parameters of Probe: EUmmWV4 - SN:9486

Sensor Model Parameters

	C1 fF	C2 fF	α V [→]	T1 ms.V ^{-a}	T2 ms.V ⁻¹	T3 ms	T4 V ⁻²	T5 V-1	Т6
Х	26.5	197.75	35.20	0.92	3.42	4.98	0.00	1.13	1.01
Y	32.5	226.76	31.53	0.92	3.28	5.00	0.00	1.35	1.01

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (")	96.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	320 mm
Probe Body Diameter	8 mm
Tip Length	23 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	1.5 mm
Probe Tip to Sensor Y Calibration Point	1.5 mm

Certificate No: EUmmWV4-9486_Apr20

Page 5 of 18



April 14, 2020

Deviation from Isotropy in Air f = 30, 60 GHz





Probe isotropy for E_{tot} probe rotated $\varphi = 0^{\circ}$ to 360°, tilted from field propagation direction \tilde{k} Parallel to the field propagation ($\psi = 0^{\circ} - 90^{\circ}$) at 30 GHz: deviation within ± 0.33 dB Parallel to the field propagation ($\psi = 0^{\circ} - 90^{\circ}$) at 60 GHz: deviation within ± 0.42 dB

Certificate No: EUmmWV4-9486_Apr20

Page 6 of 18



April 14, 2020

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E (k=2)
0	-	CW	CW	0.00	+47%
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	+96%
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	+9.6 %
10012	CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	+96%
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	+9.6%
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	+9.6%
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	±9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	±9.6%
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	±9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	±9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	±9.6%
10031	CAA	IEEE 802,15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	±9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (Pl/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	±9.6 %
10035	CAA	IEEE 802,15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	±9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	±9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	±9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	±9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	±9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCOMA	11.01	±9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	±9.6 %
10060	CAB	IEEE 802.11b WIFI 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	±9.6 %
10062	CAC	IEEE 802,11a/h WIFI 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	±9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	±9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6 %
10065	CAC	IEEE 802.11a/h WIFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	±9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	±9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	±9,6 %
10071	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6 %
10073	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	±9.6 %
10074	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	±9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6 %
10076	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6 %
10077	CAB	TEEE B02.11g WIFI 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	±9.6%
10081	CAB	GDMA2000 (1xRTT, RC3)	CDMA2000	3.97	±9.6 %
10082	GAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	±9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	±9.6 %
10097	CAB	UNTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	UAB	EDOE FOD (TOMA SOURT 2)	WCDMA	3.98	±9.6 %
10099	CAC	EUGE-FUD (TUMA, SPSK, TN 0-4)	GSM	9.55	±9.6 %
10100	CAE	LTE FOD (SC-FDMA, 100% KB, 20 MHz, QPSK)	LIE-FDD	6.67	±9.6%
10101	CAE	LTE-EDD (SC-EDMA, 100% RB, 20 MHZ, 15-QAM)	LIE-FUU	6.42	±9.6 %
10102	CAE	LTE TOD (SC EDWA, 100% RB, 20 MHZ, 54-CIAM)	LIE-FUU	6.60	19.6 %
10103	CAG	LTE TOD (SC EDWA, 100% RB, 20 MHz, UPSK)	LIE-TOD	9.29	19.6 %
10105	CAG	TE TOD (SC FDMA, 10/% RB, 20 MHZ, 10-QAM)	LIE-IDD	9.97	19.5%
10100	CAG	1 TE EDD (SC EDMA, 100% RD, 20 MITZ, 04-QAM)	LIE-IDD	10.01	19.6%
10100	GMG	LILY OD (SOTOWA, TOTA ND, TO MINZ, QPSK)	LIE-FUU	5.80	1 9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 7 of 18



April 14, 2020

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6%
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	+96%
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	+98%
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	196%
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	+9.6%
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	+96%
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	±9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	±9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 18-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	19.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6,72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDO	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDO	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	±9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6%
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	±9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	±9.6.%
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	±9.6.%
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDO	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
101/6	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
101/7	CAL	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	±9.6 %
101/8	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6 %
101/9	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 84-QAM)	LTE-FDD	6.50	±9.6%
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	LAE	LTE-FDD (SC-PDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 KB, 15 MHZ, 64-QAM)	LTE-FDD	6.50	±9.6 %
10184	CAE	LTE-FUD (SU-FUMA, T HB, 3 MHZ, UPSK)	LIEFDO	5.73	±9.6 %
10180	LARE	LTE-FDU (SC-FDMA, 1 KB, 3 MHZ, 16-QAM)	LTE-FDD	6.51	±9.6 %
10180	CAE	LTE EDD (SC EDMA, 1 HB, 3 MHZ, 64-QAM)	LIE-FDD	6:50	± 9.6 %
10167	CAP	LTE FOD (SC FDMA, 1 RB, 14 MHz, QPSK)	LIE-FUD	5.73	±9.6 %
10100	AAF	LTE EDD (OC EDMA, 1 RB, 1.4 MHz, 16-UAM)	LIE-FDD	6.52	± 9.6 %
10109	CAC	LIEFDU (SUFUMA, 1 KB, 14 MPIZ, 04-UAM)	LIE-FUU	8.50	29.6%
10163	CAC	IEEE 002 11n (PT Greenfield, 30 Mbox, 46 OAM)	WLAN	8.09	19.6%
10105	CAC	IEEE 802 110 (HT Greenfield, 25 Mars. 84 OAM)	WLAN IN	8.12	± 9.6 %
10190	CAC	IEEE 802 111 (H) Greenlied, op Mops, 64-QAM)	WILAN	8.21	19.6 %
10190	CAC	IEEE 002 11n (P1 Mixed 30 Mbrs 10 OAM	WLAN IAU	8.10	19.6%
10107	CAC	IEEE 802 110 /HT Mixed 85 Mars 84 OMM	WEAN	8,13	19.6 %
10210	CAC	IEEE 002 11a (IIT Mixed, 22 Mars, 00005)	WLAN	8.27	19.6%
10/2 18	with	IEEE OVELTHI (PTT MIXED, 7.2 MDDS, BPSK)	WLAN	8.03	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Certificate No: EUmmWV4-9486_Apr20

Page 8 of 18



April 14, 2020

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	+98%
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	19.0 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	+96%
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WEAN	8.48	496%
10224	CAC	IEEE 802,11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	+96%
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	+96%
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	196%
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	+96%
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	+9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	+9.6%
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9,19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	19.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	+9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TOD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	±9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	19.6%
10243	CAB	LTE-TOD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	±9.6%
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	+9.6%
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	+96%
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	+9.6%
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	+9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	±9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	±9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	±9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	±9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	±9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 84-QAM)	LTE-TDD	10.16	±9.6%
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	±9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	19.6.%
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	±9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	±9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	±9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	±9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	.3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6.%
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	±9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	±9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	±9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 9 of 18



April 14, 2020

10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WIMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WIMAX	12.03	±9.6 %
10302	AAA	IEEE 802.15e WIMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WIMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WIMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WIMAX	12.52	±9.6 %
10304	AAA	IEEE 802.16e WIMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WIMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WIMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	±9.6%
10306	AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WIMAX	14.67	#98%
10307	AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, OPSK, PUSC)	WIMAX	14.49	+9.6%
10308	AAA	IEEE 802,16e WIMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WIMAX	14.46	+96%
10309	AAA	IEEE 802 16e WIMAX (29:18: 10ms, 10MHz, 16QAM, AMC 2x3)	WIMAX	14.58	+9.6%
10310	AAA	IEEE 802 16e WIMAX (29:18: 10ms; 10MHz; OPSK; AMC 2x3	WIMAX	14.57	+96%
10311	AAD	LTE-FOD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	+96%
10313	AAA	DEN 13	IDEN	10.51	+06%
10314	AAA	DEN 16	IDEN	13.48	+0.6%
10315	AAB	IEEE 802 11b WIEI 2.4 GHz (DSSS, 1 Mbps, 96pc dc)	WLAN	1.71	+ 9.6 %
10316	AAR	IEEE 802 11a WIEL2 4 GHz (ERP-OEDM & Mixes 06ac de)	WLAN	8.36	+0.6 %
10317	AAC	IEEE 802 11a WIELS GHZ (OFDM & Miner 08nd da)	WI AN	0.30	19.0 %
10352	444	Pulse Waveform (2004z 10%)	Generic	10.00	+0.6 %
10363	0.00	Pulse Waveform (200Hz, 2004)	Ceneric	6.00	1000
10354	444	Poleo Waveform (2004a, 2014)	Ceneric	0.39	1 9.0 %
10324	A 6 6	Pulse Wavelorni (2001z, 40%)	Generic	3.96	19.0 %
10000	AAA	Pulse Waveform (2004z, 00%)	General	2.22	19.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0,97	± 9.6 %
10.387	AAA	UPSK Walveloni, 1 MHz	Generic	5.10	19.8%
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	±9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8,37	±9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	±9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	WLAN	8.53	±9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	±9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	±9.6 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	±9.6 %
10410	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6 %
10414	AAA.	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	±9.6 %
10415	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	±9.6 %
10416	AAA	IEEE 802.11g WIFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	±9.6 %
10417	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	±9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8,19	±9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	±9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	±9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	+9.6%
10425	AAB	IEEE 802,11n (HT Greenfield, 15 Mbos, BPSK)	WLAN	8.41	+98%
10426	AAB	IEEE 802 11p (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	+96%
10427	AAB	IEEE 802 11n (HT Greenfield, 150 Mbos, 64-QAM)	WEAN	8.41	+08%
10430	AAD	LTE-EDD (OEDMA, 5 MHz, E-TM 3 1)	LTE-FOD	8.28	+9.6%
10431	AAD	LTE-EDD (OEDMA, 10 MHz, E-TM 3 1)	LTE-FDD	8 29	+9.8%
10432	AAC	LTE-EDD (OEDMA 15 MHz E-TM 3 1)	LTE-EDD	8.34	+08%
10433	AAC	LTE-EDD (OEDMA 20 MHz E-TM 3.1)	I TE-EDD	9.34	10.0 %
10434	AAA	W.CDMA (BS Test Model 1 & DDC4)	WCOMA	0.04	±0.0 %
10434	AAE	TTE TOD (SC EDMA & DB SI MU- OBOV TH SIA)	LTE TOO	3.00	10.0%
10433	AAD	TE EDD (CEDMA, EMAY, E TA 3.4, Charles 440)	LITE FOO	7.62	19.0%
10441	AAD	TE EDD (OEDMA, 3 MINE, E-1M 3.1, Ulpping 44%)	175.500	7.00	10.0%
10440	AND	LTE FOD (OFDINA, 10 MHZ, E-1M 3.1, Dippin 44%)	LIE-FUU	7.53	19.6%
10448	AAG	LTE-FOD (OFDINA, 15 MHZ, E-1M 3.1, Gipling 44%)	LIE-FOD	7.51	19.6%
10450	AAG	LTE-FOD (OFDMA, 20 MHZ, E-TM 3.1, Clipping 44%)	LIEPDO	7.48	±9.5%
10451	AAA	Welldefeet (Dest Model 1, 64 DPGH, Capping 44%)	WUUMA	7.59	19.6%
10453	(AAL)	Validation (Square, 10ms, 1ms)	1661	10.00	±9.8 %
10456	AAB	IEEE 802.11ac WIFI (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	±9,6%
10457	AAA	UM1S-FDD (DC-HSDPA)	WCDMA.	6.62	± 9.6 %
10458	AAA	COMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	±9.6%
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6.%
		I I THE THEFT INTO A PART & PART & PART A PART AND A PA	I I THINK THINK M.	and the second second	the second second second second
10461	AAB	LTE-TUD (SC-FUMA, 1 KB, 1.4 MHZ, QPSK, UL SUD)	LIE-IDU	7.82	± 9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 10 of 18



April 14, 2020

10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	L'TE-TOD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.8 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	L'TE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	±9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6.%
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	±9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	±9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	±9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	±9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	±9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	±9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	±9.6 %
1048/	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-GAM, UL Sub)	LTE-TDD	8.60	±9.6 %
10460	PAP	LTE-TOD (SC-FDMA, 50% RB, 10 MHz, QFSK, UL SUD)	LTE-TDD	7.70	±9.6 %
10469	AAF	LTE-TIDD (SC-FIDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAE	LTE TOD (SC-FDWA, 50% RB, 10 MHz, 54-QAM, UL SUD)	LTE-TOD	8.54	± 9.6 %
10491	AAE	TTE TOD (SC-FUMA, SU% RB, 15 MHZ, GPSK, UL SUB)	LTE-TDD	7.74	± 9.6 %
10402	AAE	LTE TOD (SC-FDMA, SU% RB, IS MHZ, TO QAM, UL SUD)	LIE-FDD	8.41	±9.6 %
10404	AAE	TTE TOD (SC-FDMA, 50% RB, 15 MHZ, 54-QAM, UL SUD)	LIE-IDD	8.55	± 9.6 %
10405	AAE	TTE TOD ISC FDMA, 50% RD, 20 MILL, QPSK, UL SUD	LIE-IDD	1.14	±9.6 %
10400	AAE	TTE-TOD (SC-FDMA, 50% PB 20 MHz, 16-QAM, UL SUD)	LIE-IDD	8.37	± 9.6 %
10400	AAB	TE TOD (SC FDMA, 50% RB, 20 MR2, 64-QAM, 0C SUD)	LIE-IDD	8.54	29.6%
10407	AAB	1 TE-TOD (SC-EDMA, 100% RB, 1.4 MHz, GP3K, GL SUD)	LIE-IDD	7.67	19.6%
10499	AAB	LTE-TDD (SC-EDMA 100% RB 14 MHz 54 DAM UL S(b)	LIE-IDD	8.40	19.6%
10500	AAC	TTE-TOD (SC-EDMA 100% PB 3 MHz ODSK 18 Stel)	LTE TOD	0.00	19.079
10501	AAC	LTE-TOD (SC-FDMA, 100% RB, 3 MHz, 18 OAM, UL S(b)	LITE TOD	7.07	19.0%
10502	AAC	LTE-TOD (SC-FDMA, 100% RB, 3 MHz, 10-QAM, 0C 300)	LTE-TOO	8,44	19.0.79
10503	AAF	LTE-TDD (SC-FDMA 100% RB 5 MHz, OPSK 11 Still)	LTE-TOD	0.02	19.0 %
10504	AAF	LTE-TDD (SC-FDMA 100% RB 5 MHz 16 OAM LIL Sub)	LTE-TOO	0.24	10.0%
10505	AAF	LTE-TDD (SC-FOMA 100% RB 5 MHz 64-DAM 11 Std)	LTE-TOD	0.31	19.0 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, OPSK, UL Sub)	LTE-TOO	7.74	+08%
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TOO	8 36	+06%
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UI, Sub)	LTE-TOO	8.55	+9636
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDO	7.99	+96%
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	+96%
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDO	8.51	+9.6%
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	+98%
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TOD	8.42	+96%
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	+98%
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1.58	+9.6%
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	19.6%
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	±9.6%
10518	AAB	IEEE 802.11a/h WIFi 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	±9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	±9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802 11a/h WIFi 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7.97	±9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	±9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WIFI (20MHz, MCS0, 99pc dc)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WIFI (20MHz, MCS1, 99pc dc)	WLAN	8.42	±9.6 %
10527	AAB	IEEE 802.11ac WIFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	±9.6 %
					the strength of the strength o

Certificate No: EUmmWV4-9486_Apr20

Page 11 of 18



April 14, 2020

10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	198%
10529	AAB	IEEE 802, 11ac WiFi (20MHz, MCS4, 99pc dc)	WLAN	8.36	+96%
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc dc)	WLAN	8.43	+ 9 8 %
10532	AAB	IEEE 802.11ac WIFI (20MHz, MCS7, 99pc dc)	WLAN	8.20	+96%
10533	AAB	IEEE 802.11ac WIFI (20MHz, MCS8, 99pc dc)	WLAN	8.38	+96%
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc dc)	WLAN	8.45	+96%
10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	+9.6%
10536	AAB	IEEE 802.11ac WIFI (40MHz, MCS2, 99pc dc)	WLAN	8.32	±9.6%
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc dc)	WLAN	8.44	+9.6%
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc dc)	WLAN	8.54	±9.6%
10540	AAB	IEEE 802.11ac WIFI (40MHz, MCS6, 99pc dc)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc dc)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WIFI (40MHz, MCS8, 99pc dc)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WIFI (40MHz, MCS9, 99pc dc)	WLAN.	8.65	±9.8 %
10544	AAB	IEEE 802.11ac WIFi (80MHz, MCS0, 99pc dc)	WLAN	8.47	±9.6 %
10545	AAB	IEEE 802.11ac WIFI (80MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WIFI (80MHz, MCS2, 99pc dc)	WLAN	8.35	±9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc dc)	WLAN	8.49	±9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc dc)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc dc)	WLAN	8.38	±9.6 %
10551	AAB	IEEE 802.11ac WiFI (80MHz, MCS7, 99pc dc)	WLAN	8.50	±9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc dc)	WLAN	8.42	±9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc dc)	WLAN	8.45	±9.6 %
10554	AAC	IEEE 802.11ac WIFI (160MHz, MCS0, 99pc dc)	WLAN	8.48	±9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc dc)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc dc)	WLAN	8.50	±9.6%
1055/	AAC	IEEE 802.11ac WIFI (160MHz, MCS3, 99pc dc)	WLAN	8.52	±9.6 %
10558	AAC	IEEE 802.118c WiFi (160MHz, MCS4, 99pc dc)	WLAN	8.61	±9.6 %
10560	AAC	IEEE 802.11ac WIFI (160MHz, MCS6, 99pc dc)	WLAN	8.73	±9.6 %
10001	AAC	IEEE 802 118C WIFI (160MHz, MCS7, 99pc dc)	WEAN	8.56	± 9.6 %
10002	AAC	IEEE 002.1180 WIF1 (100MPI2, MUS8, 9900.00)	WLAN	8.69	# 9.6 %
10564	000	IEEE 802 11a WIFT (100MINZ, MUS9, SEPC 0C)	WLAN	8.77	±9.6 %
10565	AAA	IEEE 802 114 WIFI 2.4 GHz (DSS3-OFDM, 3 MDps, 33pc 80)	WEAN	8.25	±9.6%
10566	244	IEEE 802 11g WIFI 2.4 GH2 (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	± 9,6 %
10587	444	IEEE 802 11g WIFI 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN .	8.13	±9.6 %
10568	AAA	IEEE 802 11a WIEI 2.4 GHz (DSSS-OFDM, 24 Maps, Sape de)	WILMIN MILANI	8.00	19.6%
10589	AAA	IEEE 802 11a WIEI 2.4 CHy (DSSS-OF DM, 30 Mups, 95pc dc)	VELPSOI	8.37	19.0%
10570	AAA	IFFF 802 11a WIFI 2.4 GHz (DSSS-OFDM, 46 Mbps, 360c dc)	WLAN	8.10	19.0%
10571	AAA	IFEE 802 11h WIEL2 4 GHz (DSSS 1 Mine 90m dr)	VAL AN	8.30	19.0 %
10572	AAA	IEEE 802 11b WiFi 2.4 GHz (DSSS, 2 Mbps, 80pc dc)	WLAN	1.89	19.0%
10573	AAA	IEEE 802 11b WiFi 2.4 GHz (DSSS 5.5 Mhos. 90nc dc)	WI AN	1.99	19.0 %
10574	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 11 Mbox, 90pc dc)	WIAN	1.90	19.0 %
10575	AAA	IEEE 802 11g WIFi 2.4 GHz (DSSS-OEDM 6 Mbgs 90nc dc)	WLAN	9.50	10.6%
10576	AAA	IEEE 802,11g WIFi 2.4 GHz (DSSS-OFDM, 9 Mtos, 90pc dc)	WLAN	8.60	+0.8%
10577	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 12 Mbos, 90pc dc)	WLAN	8.70	+0.6%
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	+96%
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	+98%
10580	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	+96%
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	+95%
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	+96%
10583	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	+9.6%
10584	AAB	IEEE 802.11e/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	19.6%
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	±9.6%
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	±9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	±9.6%
10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	±9.6.%
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	±9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	±9.6%
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	±9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	±9.6 %
10594	AAB	JEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN.	8.74	±9.8%
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8,74	±9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 12 of 18



April 14, 2020

10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dd)	WLAN.	8.71	±9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	±9.6 %
10598	AAB	IEEE 802 11n (HT Mixed, 20MHz, MCS7, 90pc dc)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8,79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	±9.6 %
10602	AAB	IEEE 802,11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802,11n (HT Mixed, 40MHz, MCS6, 90pc dc)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	土 9.6 %
10607	AAB	IEEE 802.11ac WIFI (20MHz, MCS0, 90pc dc)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc dc)	WLAN.	8.77	±9.6 %
10609	AAB	IEEE 802.11ac WiFI (20MHz, MCS2, 90pc dc)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WIFI (20MHz, MCS3, 90pc dc)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WIFI (20MHz, MC54, 90pc dc)	WLAN	8.70	±9.6 %
10612	AAB	IEEE 802.11ec WIFI (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFI (20MHz, MCS6, 90pc dc)	WLAN	8.94	± 9.6 %
10014	AAB	IEEE 802.11ac WIFI (20MHz, MCS7, 90pc dc)	WLAN	8.59	± 9.6 %
10010	AAB	TEEE 802,718C WIFI (20MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10010	AAB	IEEE 802.11ac WIFI (40MHz, MUS0, 90pc 0c)	WLAN	8.82	± 9.6 %
10017	AAB	IEEE 802.1180 WIFI (40MHz, MUS1, 90pc dc)	WLAN	8.81	± 9.6 %
10016	AAR	IEEE 002,1180 WIFI (40MPI2, MGS2, 90pc 00)	WLAN	8.58	± 9.6 %
10019	AAB	IEEE 002.1180 VIIIF1 (40MHZ, MUS3, 90pc 00)	WLAN	8.86	± 9.6 %
10020	AAB	IEEE 002.1160 WIFI (40MIFI2, WOS4, 90pc 00)	WLAN	8.87	± 9.6 %
10622	AAB	IEEE 902 11es WEI (40484z, MCSS, 90pc oc)	WLAN	8.77	± 9.6 %
10823	AAR	IEEE 802 11ac WIFT(40MHz, MCS0, 80pc 0c)	WLANK AN	88.8	19.6%
10624	AAB	IEEE 802 11ac WIEI (404Hz MCSR 00cc dc)	WUNDY MIL	0.02	19.0%
10625	AAB	IEEE 802 11ac WIFI (40MHz MCS9, 90pc dc)	WE AN	0.90	19.0%
10626	AAB	IEEE 802 11ac WIFI (80MHz, MCS0, 90pc do)	WEAN	0.90	19.0 %
10627	AAB	IEEE 802 11ac WIFI (80MHz, MCS1, 90pc dc)	WIAN	9.93	10.0%
10628	AAB	IEEE 802.11ac WIFI (80MHz, MCS2, 80nc dz)	WEAN	8.71	19.0 %
10629	AAB	IEEE 802 11ac WIFI (80MHz, MCS3, 90pc dc)	WLAN	8.95	+96%
10530	AAB	IEEE 802.11ac WIFi (80MHz, MCS4, 90pc dc)	WLAN	8.72	+9.6%
10631	AAB	IEEE 802 11ac WIFI (80MHz, MCS5, 90pc dc)	WLAN	8.81	+96%
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc dc)	WEAN	8.74	+9.6%
10633	AAB	IEEE 802.11ac WIFI (80MHz, MCS7, 90pc dc)	WLAN	8.83	+96%
10634	AAB	IEEE 802,11ac WIFi (80MHz, MCS8, 90pc dc)	WLAN	8.80	+9.6%
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc dc)	WLAN	8.81	±96%
10636	AAC	IEEE 802.11ac WIFI (160MHz, MCS0, 90pc dc)	WLAN	8.83	±9.6 %
10637	AAC	IEEE 802.11ac WIFI (160MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc dc)	WLAN	8.86	±9.6 %
10639	AAC	IEEE 802.11ac WIFI (160MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc dc)	WLAN	9.06	± 9.6 %
10842	AAC	IEEE 802 11ac WIFI (160MHz, MCS6, 90pc dc)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11sc WIFI (160MHz, MCS7, 90pc dc)	WLAN	8.89	±9.6 %
10644	AAC	IEEE 802.11ac WIFI (160MHz, MCS8, 90pc dc)	WLAN	9.05	±9.6 %
10645	AAC	IEEE 802.11ac WIFI (160MHz, MCS9, 90pc dc)	WLAN	9.11	±9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	±9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	±9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3,45	±9.6 %
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	±9.6 %
10653	AAE	LTE-TOD (OFDMA, T0 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7,42	±9.6 %
10854	AAD	LTE-TOD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %
10055	AAE	LTE-TOD (GEOMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	±9.6%
10058	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	±9.6 %
10609	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	±9.6%
10060	AAA	Pulse waveform (20042, 40%)	Test	3.98	±9.6 %
10001	AAA	Pulse Mauricen (20042, 50%)	Test	2.22	±9.6 %
10670	AAA AAA	Pulse vidvelollil (20012, 00%) Biustaoth Law Energy	Dist	0.97	±9.8 %
10871	000	IEEE 802 11cm (20MHz MCR0 00cm do)	BIUBBOOT	2.19	19.6%
11/07/1	MAM	1666 002 118K (20MHZ, MUSU, 9000 00)	VVLAN	9.09	1.19.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 13 of 18



April 14, 2020

10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc dc)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc dc)	WLAN	8.74	±9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	±9.6%
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	±9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc dc)	WLAN	8.73	±9.6%
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc dc)	WLAN	8.78	±9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	±9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc dc)	WLAN	8.80	±9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	8.62	±9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc dc)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc.dc)	WLAN	8.42	±9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	WLAN	8.26	±9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc dc)	WLAN	8.33	±9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc dc)	WLAN.	8.28	±9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc dc)	WLAN	8.45	±9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc dc)	WLAN	8.29	±9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc dc)	WLAN	8.55	±9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc dc)	WLAN	8.29	±9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	8.25	±9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc dc)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dd)	WLAN	8.57	±9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc dc)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc dc)	WLAN	8,91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc dc)	WLAN	8.61	± 9,6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc dc)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MC54, 90pc dc)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc dc)	WLAN	8.73	±9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc dc)	WLAN	8.86	±9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc dc)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc dc)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc dc)	WLAN	8.69	±9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc dc)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc dc)	WLAN	8.32	± 9.6.%
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc dc)	WLAN	8.55	±9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc dc)	WLAN	8.33	±9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc dc)	WLAN	8.29	±9.6 %
10711	AAA.	IEEE 802.11ax (40MHz, MCS4, 99pc dc)	WLAN	8.39	±9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc dc)	WLAN	8.67	±9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc dc)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc dc)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	±9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc dc)	WLAN	8,30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc dc)	WLAN	8,48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8,87	±9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	±9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	±9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	±9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WEAN	8.74	±9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802 11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	±9.6 %
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8.65	±9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	±9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	±9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc dc)	WLAN	8.42	±9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WLAN	8.46	±9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	±9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	±9.6%
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	±9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 14 of 18



April 14, 2020

10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc dc)	WLAN	8.27	+95%
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc dc)	WLAN.	8.36	+96%
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc dc)	WLAN	8.42	+96%
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc dc)	WLAN	8.29	+9.6%
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc dc)	WLAN	8.48	±9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc dc)	WLAN	8.40	±9.6 %
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc dc)	WLAN	8.43	±9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc dc)	WLAN	8.94	±9.6 %
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc dc)	WLAN	9.16	± 9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc dc)	WLAN	8.93	± 9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MC\$3, 90pc dc)	WLAN	9.11	±9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	±9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc dc)	WLAN	8.93	±9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	WLAN	8.90	±9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	±9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	19.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	±9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	±9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WLAN	8.94	± 9.6.%
10755	AAA	IEEE 802 11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	±9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8.77	±9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	+9.6%
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	±96%
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	196%
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	+96%
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	+96%
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	+9.6%
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc dc)	WLAN	8.53	+96%
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	+9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	+96%
10766	AAA	IEEE 802.118x (160MHz, MCS11, 99pc dc)	WLAN	8.51	+96%
10787	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	+98%
10768	AAC	5G NR (CP-OFDM, 1 R8, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	+96%
10769	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	+96%
10770	AAC	5G NR (CP-OFDM, 1 R8, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±96%
10771	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6 %
10772	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	+96%
10773	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	±9.6 %
10774	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6%
10775	AAB	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	+9.6%
10776	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6%
10777	AAB	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6 %
10778	AAC	5G NR (CP-OFDM, 50% R8, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	+9.6%
10779	AAB	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	±9.6%
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	±9.6 %
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	+9.6 %
10782	AAC	5G NR (CP-OFDM, 50% R8, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	±9.6%
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	198%
10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	±96%
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	196%
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	+96%
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TOD	8.44	±9.6%
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	196%
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	196%
10790	AAC	56 NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	±9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	±9.6%
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	±9.6%
10793	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	196%
10794	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	196%
10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	±96%
10796	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	+96%
10797	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	196%
10798	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±98%
10799	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TOO	7.93	+96%
					- M. M. M. 101

Certificate No: EUmmWV4-9486_Apr20

Page 15 of 18



April 14, 2020

10801	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±9.6 %
10802	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	19.6%
10603	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	+96%
10605	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	+96%
10606	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	+9.6%
10809	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	B.34	+96%
10610	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	+95%
10612	AAC	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	+96%
10817	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.35	+96%
10818	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	+96%
10819	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	833	+96%
10820	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.30	+96%
10821	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.4.1	+06%
10822	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.41	+08%
10823	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, OPSK, 30 kHz)	AG NR FR1 TDD	0.41	A 0.6 %
10824	AAC	5G NR (CP-OEDM, 100% RB, 50 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.30	10.6%
10825	AAC	5G NR (CP-OEDM, 100% RB, 60 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	0.39	19.0.70
10827	AAC	56 NR (CP-OEDM 100% RB 80 MHz OPSK 30 kHz)	SO NO EDI TOD	0.41	2 9,0 %
10828	AAC	SG NR (CP.OEDM 100% PB 90 MHz OPSK 30 KHz)	5C ND EDA TOD	0.42	19.0 %
10829	AAC	5G NR (CP.OEDM, 100% RB, 100 MHz, OPSK, 30 KHz)	SO NO ERS TRO	0.43	19.6 %
10830	AAC	50 NR (CP.OEDM 1 DR 10 MHz OPEK 40 HHz)	SO NR FRY TUD	6,40	19.0 %
10831	AAC	50 NR (CP OF DM, 1 RB, 10 MHz, QPSK, 00 KHz)	EC NR FR1 TDD	7.63	19.6 %
10832	AAC	SC NR (CP-OFDM, 1 PR, 20 MHz, OPSK, 60 KHz)	SG NR FR1 TDD	7.73	±9.6 %
10032	AAC	SC NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 KHz)	SG NR FR1 TDD	7.74	±9.6 %
10033	AAC	SG NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 KHz)	5G NR FR1 TDD	7.70	±9.6 %
10634	ANG	SO NR (CP-OFDM, 1 RB, 30 MHz, GPSK, 60 KHz)	5G NR FR1 TDD	7.75	±9.6 %
10835	AAC.	DG NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 KHz)	5G NR FR1 TDD	7.70	±9.6%
10836	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	±9.6 %
10837	AAG	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 KHz)	5G NR FR1 TDD	7.68	±9.6 %
108-39	AAG	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 KHz)	5G NR FR1 TDD	7.70	±9.6 %
10840	AAG	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAG	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	±9.6 %
10543	AAG	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAG	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6 %
10846	AAG	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6 %
10854	AAG	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6 %
10855	AAG	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6 %
10856	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6%
10857	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	±9.6 %
10858	AAG	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10659	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10660	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6 %
10861	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	±9.6 %
10863	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6 %
10864	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6 %
10865	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAC	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6 %
10868	AAC	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	±9.6 %
10869	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	±9.6 %
10871	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	±9.6 %
10872	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	±9,6 %
10873	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 84QAM, 120 kHz)	5G NR FR2 TDD	6.61	±9.6 %
10874	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	±9.6 %
10877	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	±9.6 %
10878	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10679	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8,12	±9.6 %
10680	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	±9.6 %
10881	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	±9.6 %
10882	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10683	AAD	5G NR (DFT-6-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	±9.6 %
10884	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10685	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %

Certificate No: EUmmWV4-9486_Apr20

Page 16 of 18



April 14, 2020

10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAD.	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	±9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6 %
10897	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	± 9.6 %
10898	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6 %
10899	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6 %
10900	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5,68	±9.6 %
10901	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.5 %
10903	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6 %
10905	AAA	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6 %
10906	AAA	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5,68	±9.6 %
10907	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	±9.6 %
10908	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	6.93	±9.6 %
10909	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	±9.6 %
10910	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6 %
10912	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6 %
10914	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	±9.6 %
10915	AAA	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	+9.6 %
10916	AAA	5G NR (DFT-s-OFDM, 50% R8, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	+9.6 %
10917	AAA	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	+9.6%
10918	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	+96%
10919	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6 %
10920	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	+9.6%
10921	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	+9.5%
10922	AAA	5G NR (DFT-9-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	19.6%
10923	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	+9.6 %
10924	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	+9.6%
10925	AAA	5G NR (DFT-9-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	196%
10926	AAA	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	+9.6 %
10927	AAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TOD	5.94	+9.6 %
10928	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6 %
10929	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6%
10930	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6 %
10931	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6 %
10932	AAA	5G NR (DFT-8-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6%
10836	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	±9.6 %
10938	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6%
10939	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	±9.6 %
10940	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	±9.6 %
10941	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6%
10942	AAA	5G NR (DFT-8-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	196%
10943	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	±9.6%
10944	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	±9.6 %
10945	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	196%
10946	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6 %
10947	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6%
10948	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6%
10949	AAA	5G NR (DFT-8-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6%
10950	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6%
10951	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	+9.6%
10952	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	±9.6%
10953	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	19.6%

Certificate No: EUmmWV4-9486_Apr20

Page 17 of 18



April 14, 2020

10954	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	+98%
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	+96%
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	+96%
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	+96%
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	+96%
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	+96%
10960	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	+9.6%
10961	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	+96%
10962	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	±9.6 %
10963	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10984	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	+9.6%
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 84-QAM, 30 kHz)	5G NR FR1 TDD	9.37	+9.6%
10966	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	+9.6%
10967	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	+9.6%
10968	AAA	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	+9.6%

[±] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EUmmWV4-9486_Apr20

Page 18 of 18



Schmid & Partner Engineering AG

speag

Zeugheusstrasse 43, 8004 Zurich, Switzerland Phone +41 44 245 9700, Fax +41 44 245 9779 www.spaag.swiss, Info@apeag.awiss

IMPORTANT NOTICE PLEASE READ BEFORE USING THE EQUIPMENT

Care and Handling of EUmmWVx Probe

CAUTION!

The field sensors in the tip of the EUmmWVx probe are printed on very thin quartz glass in order to allow for outstanding performance with minimal scattering.

The glass tip is protected by the Rohacell® foam – DO NOT REMOVE THE FOAM as it is part of the probe design and removal will cause permanent probe damage!

Please note; despite the protective foam, the glass tip of the probe is fragile and extremely sensitive to any mechanical stress, so please handle with care! If the glass tip breaks, the probe is damaged beyond economical repair.

For storage, the probe is further protected with a transparent sleeve (see picture below); the sleeve must be removed before connecting the probe to the DAE; after using the probe, carefully remove from the DAE and re-attach the sleeve and store the probe in a safe place.



Note that probe usage is limited to free-space measurements; water, sugar-water solutions, nutrient solutions and glycol solutions will permanently damage the probe.

We at SPEAG do our best to increase the robustness of the probe as much as possible while allowing for maximum performance. For further questions and support, or to sign up to our probe care program, please contact us at: support@speag.swiss.

Page 1/2





coredited by the Swiss Accredit	ation Service (SAS)	Acres	reditation No : SCS 0108
he Swiss Accreditation Servi fultilateral Agreement for the	ce is one of the signatories t recognition of calibration ce	o the EA rtificates	600 0 100
HCT (Dymstee	5)	Certificate No:	EUmmWV3-9382_Jul2
CALIBRATION	CERTIFICATE		
Object	EUmmWV3 - SN:9	382	
Calibration procedure(s)	QA CAL-02.v9, QA Calibration procedi evaluations in air	CAL-25.v7, QA CAL-42.v2 ure for E-field probes optimized for	or close near field
Calibration date:	July 31, 2020		the state of the state
The measurements and the unc	sertainties with contidence prot	pability are given on the following pages and e	are part of the certificate.
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi	entainties with confidence prov ucted in the closed laboratory (\$TE critical for celibration)	ability are given on the following pages and a facility; environment temperature $(22\pm3)^{\circ}\text{C}$ a	are part of the certificate.
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi	entainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration)	ability are given on the following pages and a facility: environment temperature (22 ± 3)*C a	and humidity < 70%,
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards. Power meter NRP	ertainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration)	ability are given on the following pages and a facility: environment temperature (22 ± 3)*C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101)	see part of the certificate. and humidity < 70%, Scheduled Calibration Apr-21
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-Z91	ertainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration) IID SN: 104778 SN: 103244	Eaclify: environment temperature (22 ± 3)*C a Cal Dete (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100)	Scheduled Calibration
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91	ertainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration) ID SN: 104778 SN: 104244 SN: 103245	Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101)	Scheduled Calibration Apr-21 Apr-21 Apr-21
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power Senaor NRP-Z91 Power senaor NRP-Z91 Reference 20 dB Attenuator	ertainties with contridence pro- ucted in the closed laboratory (\$TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: CC2552 (20x)	Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Apr-21
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power Senaor NRP-Z91 Power senaor NRP-Z91 Reference 20 dB Attenuator Reference Probe ER3DV6	ID SN: 104778 SN: 103244 SN: CC2552 (20x) SN: 2328	Cal Dete (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 03-Apr-20 (No. 217-03100) 03-Apr-20 (No. 217-03100) 05-Apr-20 (No. 217-03100) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP Power sensor NRP Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4	Artainties with confidence prov ucted in the closed laboratory (\$TE critical for calibration) IID SN: 104778 SN: 103244 SN: 103245 SN: CC2552 (20x) SN: 2328 SN: 789	Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dect9)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuetor Reference Probe ER3DV6 DAE4 Secondary Standards	ID SN: 104778 SN: 104778 SN: 103244 SN: 103245 SN: CC2552 (20x) SN: 2328 SN: 789	abbility are given on the following pages and a facility: environment temperature (22 ± 3)*C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. DAE4-789_Dec19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (n house)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Reference 20 dB Attenuetor Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198	ID SN: 104778 SN: 104778 SN: 104778 SN: 103244 SN: 103245 SN: 202552 (20k) SN: 2328 SN: 789 ID SN: GB41293874	ability are given on the following pages and a facility: environment temperature (22 ± 3)°C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. CAE4-789_Dec19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 08-Apr-16 (in house check Jum-20)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check; Jun-22
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power meter E44198	ertainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: CC2552 (20x) SN: 2328 SN: 789 ID SN: GB41293874 SN: MY41496087	Cal Date (Certificate No.) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. CAE4-789_Dect9) Check Date (in house) 08-Apr-16 (in house check Jun-20) 06-Apr-16 (in house check Jun-20)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check; Jun-22 In house check; Jun-22
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A	Artainties with confidence prov ucted in the closed laboratory (ATE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 2328 SN: 2328 SN: 789 ID SN: GB41293874 SN: MY41496087 SN: 000110210	Cal Date (Certificate No.) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. CAE4-789_Dec19) Check Date (in house) 08-Apr-16 (in house check Jun-20) 08-Apr-16 (in house check Jun-20) 08-Apr-16 (in house check Jun-20)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check; Jun-22 In house check: Jun-22
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8548C	ID SN: GB41293874 SN: 00110210 SN: U03842U01700	Cal Date (Certificate No.) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 05-Apr-20 (No. 217-03100) 05-Apr-20 (No. 217-03106) 06-Apr-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 08-Apr-16 (in house check Jun-20) 08-Apr-18 (in house check Jun-20)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-22 In house check: Jun-22 In house check: Jun-22
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8548C Network Analyzer HP 8753E	Artainties with confidence prov ucted in the closed laboratory (ATE critical for calibration) IID SN: 104778 SN: 103244 SN: 103245 SN: 2328 SN: 2328 SN: 789 ID SN: GB41293874 SN: GB41293874 SN: WY41496087 SN: 000110210 SN: US3842U01700 SN: US3842U01700 SN: US37390585	Cal Date (Certificate No.) Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. CAE4-789_Dec19) Check Date (in house) 08-Apr-16 (in house) 08-Apr-16 (in house check Jun-20) 09-Apr-16 (in house check Jun-20) 19-Oct-01 (in house check Jun-20)	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check; Jun-22 In house check: Jun-22
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 8548C Network Analyzer HP 8753E	Artainties with confidence prov ucted in the closed laboratory (ATE critical for calibration) IID SN: 104778 SN: 103244 SN: 103245 SN: 2328 SN: 2328 SN: 789 IID SN: GB41293874 SN: MY41496087 SN: 000110210 SN: US3642U01700 SN: US37390585 Name	abbility are given on the following pages and is facility: environment temperature (22 ± 3)*C a Cal Date (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Mar-20 (No. 217-03106) 05-Oct-19 (No. CR3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Date (in house) 06-Apr-16 (in house) 06-Apr-16 (in house check Jun-20) 08-Apr-16 (in house check Jun-20) 04-Aug-99 (in house check Jun-20) 04-Aug-99 (in house check Jun-20) 18-Oct-01 (in house check Jun-20) Function	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-22 In house check: Jun-22 In house check: Jun-22 In house check: Jun-22 In house check: Jun-22 Signature
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ER3DV6 DAE4 Secondary Standards Power sensor E44198 Power sensor E44198 Power sensor E4412A RF generator HP 8548C Network Analyzer HP 8753E Calibrated by:	Artainties with confidence pro- ucted in the closed laboratory (\$TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 2328 SN: 2328 SN: 789 ID SN: GB41293874 SN: GB41293874 SN: MY41496087 SN: 00110210 SN: US3842U01700 SN: US37390585 Name Name Natja Pokovic	Cal Dete (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 05-Oct-19 (No. 217-03100) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. 217-03106) 06-Apr-16 (in house) 06-Apr-16 (in house check Jun-20) 06-Apr-16 (in house check Jun-20) 08-Apr-16 (in house check Jun-20) 08-Apr-16 (in house check Jun-20) 09-Apr-16 (in house check Jun-20) 19-Oct-01 (in house check Noct-19) Function Technical Manager	Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check: Jun-22 In house check: Jun-24 In h
The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Atlanuator Reference Probe ER3DV6 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A RF generator HP 848C Network Analyzer HP 8753E Calibrated by:	Artainties with confidence pro- ucted in the closed laboratory ATE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 03245 SN: 2328 SN: 2328 SN: 2328 SN: 789 ID SN: GB41293674 SN: GB41293674 SN: GB41293674 SN: GB41293674 SN: 00110210 SN: US37390585 Name Kalja Pizkovic	abbility are given on the following peges and is facility: environment temperature (22 ± 3)°C a back Cal Dete (Certificate No.) 01-Apr-20 (No. 217-03100/03101) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03100) 01-Apr-20 (No. 217-03101) 31-Apr-20 (No. 217-03105) 05-Oct-19 (No. 217-03106) 05-Oct-19 (No. ER3-2328_Oct19) 27-Dec-19 (No. DAE4-789_Dec19) Check Dete (in house) 06-Apr-16 (in house check Jun-20) 07-Apr-20 (in house check Jun-20) 08-Apr-16 (in house check Jun-20) 09-Apr-16 (in house check Jun-20) 09-Apr-16 (in house check Jun-20)	see part of the certificate. Ind humidity < 70%, Scheduled Calibration Apr-21 Apr-21 Apr-21 Apr-21 Oct-20 Dec-20 Scheduled Check In house check; Jun-22 In house ch

Certificate No: EUmmWV3-9382_Jul20

Page 1 of 18



Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



- Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizie svizzero di taratura
- Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

wideboury:	
NORMx,y,z	sensitivity in free space
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 9 = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system
Sensor Angles	sensor deviation from the probe axis, used to calculate the field orientation and polarization is the wave propagation direction

Calibration is Performed According to the Following Standards:

 IEEE Std 1309-2005, "IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 for XY sensors and 9 = 90 for Z sensor (f < 900 MHz in TEM-cell; f > 1800 MHz; R22 waveguide). For frequencies > 6 GHz, the far field in front of waveguide horn antennas is measured for a set of frequencies in various waveguide bands up to 110 GHz.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- The frequency sensor model parameters are determined prior to calibration based on a frequency sweep (sensor model involving resistors R, R_p, inductance L and capacitors C, C_p).
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- Sensor Offset: The sensor offset corresponds to the mechanical from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).
- Equivalent Sensor Angle: The two probe sensors are mounted in the same plane at different angles. The
 angles are assessed using the information gained by determining the NORMx (no uncertainty required).
- Spherical isotropy (3D deviation from isotropy): in a locally homogeneous field realized using an open waveguide / hom setup.

Certificate No: EUmmWV3-9382_Jul20

Page 2 of 18



July 31, 2020

DASY - Parameters of Probe: EUmmWV3 - SN:9382

Basic Calibration Parameters

	Sensor X	Sensor Y	Unc (k=2)
Norm (µV/(V/m) ²)	0.02120	0.02787	± 10.1 %
DCP (mV) ^B	105.0	103.0	
Equivalent Sensor Angle	-56.8	28.2	

Calibration results for Frequency Response (750 MHz - 110 GHz)

Frequency GHz	Target E-Field V/m	Deviation Sensor X dB	Deviation Sensor Y dB	Unc (k=2) dB
0.75	77.2	0.04	0.28	± 0.43 dB
1,8	140.4	0.12	0.24	± 0.43 dB
2	133.0	0.11	0.15	± 0.43 dB
2.2	124,8	0.07	0.03	± 0.43 dB
2.5	123.0	-0.05	-0.19	± 0.43 dB
3.5	256.2	0.20	-0,18	± 0.43 dB
3.7	249.8	0.23	-0.19	± 0.43 dB
6.6	41.8	0.11	0.22	± 0.98 dB
8	48.4	-0.22	-0.27	± 0.98 dB
10	54.4	-0.01	0.03	± 0.98 dB
15	71.5	0.07	-0.29	± 0.98 dB
18	85.3	0.03	0.31	± 0.98 dB
26.6	96.9	0.16	0.15	± 0.98 dB
30	92.6	0.16	0.05	± 0.98 dB
35	93.7	-0.43	-0.16	± 0.98 dB
40	91.5	-0.61	-0.55	± 0.98 dB
50	19.6	-0.46	-0.09	± 0.98 dB
55	22.4	0.44	0.27	± 0.98 dB
60	23.0	-0.03	0.00	± 0.98 dB
65	27.4	-0.03	0.05	± 0.98 dB
70	23.9	0.25	0.02	± 0.98 dB
75	20.0	0.18	-0.06	± 0.98 dB
75	14.8	-0.10	-0.05	± 0.98 dB
80	22.5	0.15	0.32	± 0.98 dB
85	22.8	-0.04	0.03	± 0.98 dB
90	23.8	0.07	0,11	± 0.98 dB
92	23.9	-0.38	-0.27	± 0.98 dB
95	20.5	-0.10	-0.28	± 0.98 dB
97	24.4	-0.13	-0.27	± 0.98 dB
100	22.6	0.12	-0.11	± 0.98 dB
105	22.7	-0.03	0.06	± 0.98 dB
110	19.7	0.08	0.26	± 0.98 dB

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

* Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EUmmWV3-9382_Jul20

Page 3 of 18



July 31, 2020

DASY - Parameters of Probe: EUmmWV3 - SN:9382

Calibration Results for Modulation Response

D CW X 0.00 0.00 1.00 0.00 138.1 ± 3.8 10352- AAA Pulse Waveform (200Hz, 10%) X 1.25 60.00 12.66 10.00 60.1 ± 2.1 10353- AAA Pulse Waveform (200Hz, 20%) X 0.86 60.00 12.77 6.0 ± 0.8 10354- AAA Pulse Waveform (200Hz, 20%) X 0.86 60.00 12.20 ± 0.8 10354- AAA Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 10355- AAA Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 10355- DAAA Pulse Waveform (200Hz, 60%) X 0.26 60.00 11.45 23.0 ± 1.0	Max Unc ^E (k=2)
Y 0.00 0.00 1.00 64.1 10352- AAA Pulse Waveform (200Hz, 10%) X 1.25 60.00 12.66 10.00 6.0 ± 2.1 10353- AAA Pulse Waveform (200Hz, 20%) X 0.86 60.00 12.77 6.0 10353- AAA Pulse Waveform (200Hz, 20%) X 0.80 60.00 12.20 12.0 10354- AAA Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 10355- AAA Pulse Waveform (200Hz, 60%) X 0.26 60.00 11.45 23.0 ± 1.0 10355- Pulse Waveform (200Hz, 60%) X 0.26 60.00 10.92 3.98 23.0 ± 1.0	5 ±4.7 %
10352- AAA Pulse Waveform (200Hz, 10%) X 1,25 60,00 12,66 10,00 6,0 ± 2.1 10353- AAA Pulse Waveform (200Hz, 20%) X 0,86 60,00 12,77 6,0 ± 0.8 10353- AAA Pulse Waveform (200Hz, 20%) X 0,86 60,00 11,81 6.99 12.0 ± 0.8 10354- AAA Pulse Waveform (200Hz, 40%) X 0,46 60,00 10,92 3,98 23,0 ± 1.0 10355- AAA Y 0,63 60,00 11,45 23,0 ± 1.0 10355- DAAA Y 0,63 80,00 10,95 2,27 ± 0,9	S
AAA Y 1.88 60.00 12.77 6.0 10353- AAA Pulse Waveform (200Hz, 20%) X 0.80 60.00 11.81 6.99 12.0 ± 0.8 AAA Y 1.10 60.00 12.20 12.0 ± 0.8 10353- AAA Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 AAA Y 0.63 60.00 11.45 23.0 ± 1.0 I0355- D055 Pulse Waveform (200Hz, 60%) X 0.26 60.00 11.45 23.0 ± 0.9	5 ±9.6%
X 0.80 60.00 11.81 6.99 12.0 ± 0.8 AAA Y 1.10 60.00 12.0 ± 0.8 ± 0.8 10353- AAA Pulse-Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 AAA Y 0.63 60.00 11.45 23.0 ± 1.0 AAA Y 0.63 60.00 11.45 23.0 ± 1.0	
AAA Y 1.10 60.00 12.20 12.0 10354- Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 AAA Y 0.63 60.00 11.45 23.0 ± 1.0 I0355- Pulse Waveform (200Hz, 60%) X 0.26 60.00 11.45 23.0	6 ±9.6 %
10354- AAA Pulse Waveform (200Hz, 40%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0 IO355- 10355 Pulse Waveform (200Hz, 60%) X 0.46 60.00 10.92 3.98 23.0 ± 1.0	8 7-308037
AAA Y 0.63 60.00 11.45 23.0 10355 Dules Waveform (200Hz 60%) X 0.29 60.00 10.50 2.22 27.0 ±0.9	5 ±9.6%
10355. Dulee Waveform (200Hz 60%) X 0.29 60.00 10.50 2.22 27.0 ±0.9	
10000 Long Long Long Long Long Long Long Long	5 ±9.6 %
AAA Y 0.55 60.00 10.45 27.0	5 SASSAGE
10387- QPSK Waveform, 1 MHz X 0.71 60.00 11.09 1.00 22.0 ±1.5	6 ±9.6%
AAA Y 1.07 60.00 10.48 22.0	2 10.000
10388- QPSK Waveform, 10 MHz X 1.12 60.00 11.73 0.00 22.0 ± 0.8	5 ±9.6%
AAA Y 1.51 60.00 11.18 22.0	111 013-5042-04P
10396- 64-QAM Waveform, 100 kHz X 1.52 60.00 13.59 3.01 17.0 ±1.1	6 ± 9.6 %
AAA Y 1.89 60.00 13.00 17.0	10. S-1629-282
10399- 64-QAM Waveform, 40 MHz X 1.98 60.00 12.29 0.00 19.0 ±0.9	6 ± 9.6 %
AAA Y 2.28 60.00 12.03 19.0	
10414- WLAN CCDF, 64-QAM, 40MHz X 2,84 60.00 12,72 0.00 12.0 ±0.8	6 ±9.6%
AAA Y 3.29 60.00 12.42 12.0	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Note: For details on all calibrated UID parameters see Appendix

Calibration Results for Linearity Response

Frequency GHz	Target E-Field V/m	Deviation Sensor X dB	Deviation Sensor Y dB	Unc (k=2) dB
0.9	50.0	0.03	0.14	± 0.2 dB
0.9	100.0	-0.02	0.03	± 0.2 dB
0.9	500.0	-0.01	-0.04	± 0.2 dB
0.9	1000.0	0.03	-0.01	± 0.2 dB
0.9	1500.0	0.02	-0.01	± 0.2 dB
0.9	2000.0	0.02	-0.01	± 0.2 dB

Sensor Frequency Model Parameters (750 MHz - 78 GHz)

1.11.11.11.11.11.11.11.11.11.11.11.11.1	Sensor X	Sensor Y
R (Ω)	57.68	56.60
R _p (Ω)	87.94	85.47
L (nH)	0.04094	0.04229
C (pF)	0.3620	0.3356
C _p (pF)	0.1032	0.0976

Sensor Frequency Model Parameters (55 GHz - 110 GHz)

	Sensor X	Sensor Y
R (Ω)	43.81	45.38
$R_p(\Omega)$	93.57	90.35
L (nH)	0.02842	0.03327
C (pF)	0.3141	0.2717
C _p (pF)	0.1231	0.1060

Certificate No: EUmmWV3-9382_Jul20

Page 4 of 18



July 31, 2020

DASY - Parameters of Probe: EUmmWV3 - SN:9382

Sensor Model Parameters

	C1 IF	C2 fF	α V=1	T1 ms.V ^{-z}	T2 ms.V ⁻¹	T3 ms	T4 V ⁻²	T5 V~1	T6
X	18.2	131.33	33.13	0.92	1,53	4.97	0.00	0.22	1,00
Y	17.6	126.07	32.96	0.92	1.42	4.99	0.00	0.38	1.00

Other Probe Parameters

Sensor Arrangement	Rectangular
Connector Angle (°)	73.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	320 mm
Probe Body Diameter	8 mm
Tip Length	23 mm
Tip Diameter	8.0 mm
Probe Tip to Sensor X Calibration Point	1.5 mm
Probe Tip to Sensor Y Calibration Point	1.5 mm

Certificate No: EUmmWV3-9382_Jul20

Page 5 of 18



July 31, 2020

Deviation from Isotropy in Air f = 30, 60 GHz





Probe isotropy for E_{tot}: probe rotated $\phi = 0^{\circ}$ to 360°, tilted from field propagation direction \tilde{k} Parallel to the field propagation ($\psi = 0^{\circ} - 90^{\circ}$) at 30 GHz: deviation within ± 0.36 dB Parallel to the field propagation ($\psi = 0^{\circ} - 90^{\circ}$) at 60 GHz: deviation within ± 0.31 dB

Certificate No: EUmmWV3-9382_Jul20

Page 6 of 18



July 31, 2020

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^h (k=2)
0		CW	CW	0.00	±4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	±9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2,91	±9.6 %
0012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	19.6 %
0021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	±9.6 %
0023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	±9.6 %
0024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	±9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
0026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
0027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	±9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
0029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
0030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	±9.6 %
0031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	±9.6 %
0032	CAA	IEEE 802 15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	±9.6 %
0033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	19.6 %
0034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	+9.6 %
0035	CAA	IEEE 802 15 1 Bluetooth (PI/4-DOPSK, DH5)	Bluetooth	3.83	19.6%
0036	CAA	IEEE 802 15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	+ 9.6 %
0037	CAA	IEEE 802 15 1 Bluetooth (8-DPSK DH3)	Bluetopth	4.77	+9.6%
0038	CAA	IEEE 802 15 1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	+9.6%
0039	CAB	CDMA2000 (1xRTT_RC1)	CDMA2000	4.57	+96%
0042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DDPSK, Halfrate)	AMPS	7.78	+96%
0044	CAA	IS-91/EIA/TIA-553 EDD (EDMA, EM)	AMPS	0.00	+96%
0048	CAA	DECT (TOD_TDMA/EDM_GESK_Full Stot. 24)	DECT	13.80	+96%
0049	CAA	DECT (TDD_TDMA/EDM_GESK_Double Slot_12)	DECT	10.00	+96%
0056	CAA	UMTS-TOD (TD-SCDMA, 1.28 Mins)	TD-SCDMA	11.01	+0.6%
0058	DAC	EDGE-EDD /TDMA BOSK TN 0.1.2.3	CSM	6.62	+0.0 %
10050	CAR	IEEE 802 11b WIEI 24 GHz (DSSS, 2 Mbrs)	WI AN	5.42	+06%
00060	CAB	IFEE 802.11h WEI 2.4 GHz (DSSS 5.5 Mhos)	WI AN	2.82	40.0%
0361	CAB	IFEE 802 11h WIFI 24 GHz (DSSS_11 Mbrs)	WLAN	3.60	+0.0.%
10062	CAC	IEEE 802 15ab WEL5 GHz (GEDM & Mbos)	WIAN	8.68	+0.6.%
10063	CAC	IEEE 8/2 11a/b WIELS GHz (OFDM, G Mbre)	WLAN	8.63	40.6%
100004	CAC	IEEE 802 11ab WEES GHz (OFDM, 3 Maps)	WLAN	0.00	+0.0.0
10085	CAC	IEEE 802 11ab WIELS GHz (DEDM 18 Mbos)	WIAN	0.00	+0.6 %
10055	CAC	IEEE 802 11ab WELS CH2 (OFDM 24 Miles)	WILAN	0.39	10.0 %
10087	CAC	HEEE 002 11ah WIELS GH- (CEDAL 36 Million)	MULANI	10.10	10.0 %
10088	CAC	IEEE 802 11a/h WIELS CH2 (OF DW, 30 Mopa)	WE AN	10.12	+0.6 %
10080	CAC	IEEE 802 11ah WITTO GRE (OF DW, 40 Milph)	INT AN	10.64	1000
100031	CAR	IEEE 002.11 ani WIFLO GH2 (OF LM, DV MLUS)	IAIE AAI	10,00	10.0 %
10071	CAR	IEEE 802.11g MPT 2.4 GH2 (DODG/OF DM, 8 MOD8)	Wighted AM	5.03	1.0.0.%
10072	CAB	IEEE 002.11g WIFI 2.4 GHz (DGGG/DEDM, 12 W0p5)	W/LAW	3,02	19.0 %
10074	CAP	JEEE 002 119 WIFI 2.4 ONE [UGGG/OFDM, 16 Mups]	TYLPCI M/LAN	3.94	19.0 %
0076	CAD	IEEE 002.11g WIFT 2.4 GHz (DSSG/OFDM, 24 Weps)	171-1913	10.30	19,0 %
0078	CAR	IEEE 002.11g WH12.4 GH2 (DOSO/DEDM, 30 M005)	WALANI	10.77	10.0%
10070	CAR	IEEE 002.110 WIFLAR OFF (USSS/UFUM, 46 M005)	WILMN MARK	10.94	100%
0077	CAB .	TEEE BUZ 11g WIFT Z.4 GHZ (USSS/UFUN, 04 M0ps)	VYL/VIV	11.00	19.0 %
10081	GAB	CDMA2000 (1XK11, KC3)	COMA2000	3.97	19.6 %
00B2	GAB	IS-54 / IS-T36 FDD (TDMA/FUM, PI/4-DQPSK, Fullrate)	AMPS	4.11	19.6%
0090	LIAG	GPRS-FDD (TDMA, GMSK, TN 0-4)	LIST	6.56	±9.6 %
0097	CAB	UMIS-FUD (HSUPA)	WCOMA	3.96	1 9.6 %
0098	CAB	UM13-FUD (HSUFA, SUDJEST 2)	WODMA	3.98	29.6 %
10099	LIAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FOD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-GAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	±9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	±9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

Certificate No: EUmmWV3-9382_Jul20

Page 7 of 18



July 31, 2020

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.8 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WEAN	8.10	±9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, B1 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	19.6%
10142	CAE	LTE-FDD (SC-FDMA, 100% HB, 3 MHz, QPSK)	LTE-PDD	5.73	±9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	±9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	±9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% R8, 1.4 MHz, QPSK)	LTE-FDD	5.78	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% R8, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% R8, 20 MHz, 64-QAM)	LTE-TDD	10.05	±9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	±9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 60% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	±9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	±9.6%
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDO	5.46	±9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FOO	6.79	± 9,6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 54-QAM)	LTE-FDD	6,49	± 9.6%
10172	CAG	LTE-TDD (SC-FDMA, 1 R8, 20 MHz, QPSK)	LTE-TUD	9.21	±9.6 %
10173	GAG	LTE-TDD (SG-FDMA, 1 R8, 20 MHz, 16-QAM)	LIE-IDD	9,48	± 9.6 %
10174	GAG	LTE-TDD (SG-FDMA, 1 HB, 20 MHz, 64-GAM)	LTE-TDD	10.25	±9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6 %
10176	GAG	LTE-FDD (SG-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	29.6%
10177	GAI	LTE-FUD (SG-FUMA, 1 RB, 5 MHZ, QPSK)	LIE-FUD	5.73	19.6 %
10178	CAG	LTE-PDD (SG-PDMA, 1 KB, 5 MMZ, 10-GAM)	LIE-FUD	0.02	19.6 %
10179	CAG	LTE-FUD (SC-FUMA, 1 KB, 10 MHz, 64-QAM)	LTE-FDD	0.50	19.6 %
10180	CAG	LIE-FUU (SC-FUMA, 1 RB, 5 MHZ, 64-GAM)	LIE-FUU	6.50	19.6 %
10181	CAE	LTE-FUD (SG-FDMA, 1 RB, 15 MHz, QPSK)	LTE-PDD	5.72	± 9.6 %
10182	CAE	LIE-FUD (SG-FUMA, T KB, 15 MHz, 16-QAM)	LIE-PDD	6.52	19.0 %
10183	AAD	LTE-FUD (SG-FUMA, 1 KB, 15 MHz, 64-QAM)	LIE-FUD	0.50	19.0 %
10164	CAE	LTE-FUU (SC-FUMA, 1 NB, 3 MHZ, QP3A)	LIE-PUD	0.73	19.8%
10185	LAE	LIE-FUU (SC-FUMA, 1 KB, 3 MHZ, 10-QAM)	LIE-FUD	5.51	19.0%
10186	AAE	LIE-FUU (SU-FUMA, LRB, 3 MHZ, 64-QAM)	LIEPUD	6.50	13.0 %
10107	CAF	LITE EDD (SC EDMA, LDD, 4,4444, 16,0444	LIC-FUU	5.73	2 8.0 %
10188	AAF	LITE EDD (SC EDMA, 1 PD, 1.4 MPZ, 10-QAM)	175,000	0.02	1000
10183	CAP	LIEFE M2 tig (HT Greenfeld & E Mars DBCK)	LIE-PUD WI AM	0.00	10.0%
10/19/3	CAC	IEEE DO2 110 (PT Grandiale 30 Mbps, BP3K)	VYLPSTV MAT TAK	8.09	19.076
10104	CAC	IEEE 002.110 (11 Greenfield, 39 MDps, 10-QAM)	SHILAN	8.12	10.0 %
10180	CAC	IEEE DO2 111 (FT Ordenado, 00 MODS, 04-QAM)	WILAW	0,21	10.0%
10190	CAC	IEEE 002 110 (FT Mixed, 0.0 MDps, DPDN)	WI AN	0.10	40.0%
10108	CAC	IEEE 802 110 (FT Mixed, 88 Merc 81 OAM)	WEAN	0,10	+0.0.0
10240	CAC	IEEE B/2 116 (HT Most, 50 Mups, 64-GMM)	101 414	0.27	+0.0.0/
104110	UNU-	THELE DIRE THE THE MONDULY OF DIDDS, EPOND	ALC:NU	0.03	1 2 0 0 70

Certificate No: EUmmWV3-9382_Jul20

Page 8 of 18



July 31, 2020

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	±9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	±9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	±9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.8 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	±9.8 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.8 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	±9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TOD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	+9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 15-QAM)	LTE-TOD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	+9.6%
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TOD	9.48	+9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TD0	10.25	+96 14
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, OPSK)	LTE-TDD	9.21	+98%
10241	CAR	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	+96%
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 14 MHz, 64-OAM)	LTE-TDD	9.86	+9.6 %
10241	CAR	LTE-TOD (SC-FDMA, 50% RB, 1.4 MHz, OPSK)	LTE-TOD	9.46	+98.%
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-OAM)	LTE-TDD	10.05	+96%
10245	CAD	LTE-TOD (SC-EDMA 50% RB 3 MH> 64-DAM)	LTE-TOD	10.06	+08%
10246	CAD	LTE-TOD (SC-EDMA 50% RB 3 MHz OPSIO	I TE-TOD	9.30	+0.6%
10247	CAG	LTE-TOD (SC-EDMA 50% PR 5 MHz 16-OAM)	LTE-TOD	0.00	+0.6 %
10248	CAG	LTE-TOD (SC-EDMA 50% PR 5 MH+ 64-OAM)	I TE-TOD	10.09	+0.0%
10240	CAG	LTE-TDD (SC-EDMA 50% RB 5 MHz (DPSK)	LTE-TDD	0.20	+96%
10250	CAG	LTE-TOD (SC-FOMA 50% RB 10 MHz 16-OAM)	LTE-TOD	0.20	+98%
10251	CAG	LTE TOD (SC EDMA 50% PB 10 MHz 64 OAM)	LTETDO	10.17	+06%
10252	CAG	TTE-TOD (SC-EDMA 50% PB 10 MHz DPSK)	LTE-TDD	0.24	+96%
10253	CAE	TE-TDD/SC-EDMA 50% PB 15 MHz 18-DAM	LTE-TOD	0.00	+96%
10254	CAF	LTE-TOD (SC-EDMA 5/% RB 15 MHz 84-DAM)	LTETDO	10.14	+9.6%
10255	CAF	LTE-TOD (SC-EDMA 50% PB 15 MHz OPSK)	LTE-TDD	0.14	+96%
1//258	CAR	LTE-TOD (SC-EDMA 100% PE 14 MHz 16-DAM)	LTE-TDO	0.06	+06%
10257	CAR	LTE-TOD (SC-EDMA 100% RB 14 MHz 64-OAM)	175-700	10.08	+96%
10259	CAR	LTE-TOD (SC-EDMA 100% RB 14 MHz OPSK)	175-700	0.34	+96%
10250	CAD	LITE TOD (SC EDMA 100% DB 3 MH+ 18 OAM)	175-700	0.04	+96%
10260	CAD	LTE-TOD (SC-EDMA 100% RB 3 MHz 64 OAM)	1.75,700	0.00	+96%
10261	CAD	LTE-TOD (SC-EDMA 100% RB 3 MHz OPSK)	1.75-700	9.24	+0.6%
10262	CAG	LTE-TOD (SC-EDMA 100% RB 5 MHz 16-DAM)	LTE-TDD	9.89	+96%
10263	CAG	LTE-TOD (SC-EDMA 100% RB 5 MHz 54-DAM)	1 TE-TDD	10.15	+0.6%
10264	CAG	LTE-TOD (SC-EDMA 100% RB 5 MHz OPSK)	LTE-TOD	9.29	49.6 %
10265	CAG	LTE-TDD (SC-FDMA 100% RB 10 MHz 16-DAM)	LTE-TOD	9.92	+9.6 %
10266	CAG	LTE-TOD (SC-EDMA, 100%, RB, 10 MHz, 54-OAM)	LTE-TOD	10.07	+96%
10200	CAG	LTE-TOD (SC-EDMA 100% RB 10 MHz OPSK)	1 TE-TDD	9.30	496W
10268	CAF	175-TDD (SC-EDMA 100% RB 15 MHz 16 OAM)	LTE-TDD	10.06	+96%
10200	CAF	LTE-TOD (SC-EDMA 100% PR 15 MHz 64-OAM)	LTE-TOD	10.10	10.0 %
10200	CAE	1 TE TOD (SC FOMA 100% PD 15 MU+ ODOL)	LTE-TDD	0.59	+0-0.01
10270	CAR	LIMITS,EDD (HSUDA, Subject 6 3000 Bals 10)	WCDMA	4.00	10.0 %
10274	CAD	LIMTS, EDD (HSLID), Subject 5, 3000 Date A)	WCDNA	9.07	10.0 %
10273	CAA	pue (//pee/)	BHS	3.80	+0.0 %
10277	CAA	DHE (ODEK BW SSAMH» DAIWED S	0HP	11.01	10.0 %
10270	CAA	DHC (ODCK DW 004MHz, R010H 0.20)	DHS	11.01	+0.0%
10279	AAR	Character of cost cash	000442000	12.16	10.0 %
10290	AAB	COMA2000, RC1, SU33, PUE Rate	CUMA2000	3.91	19.0 %
10281	AAB	COMP2000, RG3, SUSS, FUE RATE	COMA2000	3.40	1000
10292	AAB	CDMA2000, RC3, SO32, FUE KBIE	CDMA2000	3.59	29.0 %
10293	AAB	COMMON DOL 201 HOLD TO 1	CDMA2000	3.50	19.0 %
10290	AAB	COMP2000, RC1, SO3, 1/801 R818 25 IF.	CUMA2000	12,49	¥ 9,0 %
10297	AAD	LTE EDD (3G-FUMA, 30% RB, 20 MHZ, GPSK)	115-100	5.81	19.6 %
10296	AAD	LTE FOD (SC FDMA, SU% RB, 3 MHZ, GPSK)	LIE-FUU	0.72	19.0 %
10299	AAD	LIEFDD (SCFDMA, 30% RB, 3 MPZ, 16-CAM)	LIEPUU	6,39	23.0.%

Certificate No: EUmmWV3-9382_Jul20

Page 9 of 18



July 31, 2020

10300	AAD .	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802 16e WIMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WIMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WIMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WIMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WIMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WIMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WIMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WIMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802,16e WIMAX (29:18, 10ms, 10MHz, 54QAM, PUSC)	WIMAX	14.67	± 9.6 %
10307	AAA	IEEE 802,16e WIMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WIMAX	14,49	± 9.6 %
10308	AAA	IEEE 802 16e WIMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WIMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, 16QAM,AMC 2x3)	WIMAX	14.58	+9.6 %
10310	AAA	IEEE 802 16e WIMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3	WIMAX	14.57	+9.6%
10311	AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	+9.6%
10313	AAA	IDEN 1/3	IDEN	10.51	+86%
10314	AAA	IDEN 1:6	IDEN	53.48	+9.6%
10315	AAB	IEEE 802 11b WIEI 2.4 GHz (DSSS, 1 Mbos, 96oc dc)	WLAN	1.71	+9.6%
10316	AAR	IFFF 802 11a WIFI 2.4 GHz (FRP-OFDM, 6 Mbos, 96ec dc)	WLAN	8.36	+9.6%
10317	AAC	IEEE 802 11a WIELS GHz (OEDM & Mons 98no do)	WLAN	8.96	+9.6%
10352	444	Pideo Wayeform (200Hz 10%)	Generic	10.00	+96%
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	A 00	+96%
10355	A.6.6	Duken Minumform (2004a, 40%)	Canarie	2.08	+96%
10355	444	Puise Wausform (2004z 80%)	Generic	3.30	+96%
10350	0.00	Pulse Waveform (200Hz 80%)	Generic	0.97	+964
10387	1000	OPSK Waveform 1 Miler	Generic	5.40	108.11
10307	0.00	COSK Wassform 40 MHz	Generic	5,10	+0.0%
10300	464	64-0AM Weigelow 100 kHz	Caneric	0.22	10.0%
10390	1000	64-QAM Waveform, 100 kHz	Concelle	12.0	19.0 %
10389	AAA	De-GAM Wavelorn, 40 MHz	GENERIC NAV	0.27	19.0 %
10400	AND	IEEE 802.118C WIFI (20042, 64-QAM, 89pc 00)	WILAN	0.37	19.0 %
10401	AAD	TEEE 802.11ac WIFI (40MHz, 64-QAM, 99pc 0c)	WELVIN .	8,60	19.0 %
10402	AAD	IEEE BUZ TTac WIPI (80MPZ, 64-GAM, 99pc dc)	WILAN.	8.53	19.0 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	29.6%
10404	AAB	COMA2000 (1xEV-DO, KeV, A)	CDMA2000	3.11	19.0 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	10.0%
10410	APIG	LTE-TOD (SC-FDMA, 1 RB, 10 MHZ, QPSK, UE SUD=2,3,4,7,8,9)	LIE-IDD	7.82	19.8 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8,54	19.6 %
10415	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	19.6 %
10416	AAA	IEEE 802.11g WIFI 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	±9.6 %
10417	BAA	IEEE 802,11am WIFI 5 GHz (OFDM, 6 Mbps, 99pc oc)	WLAN	8.23	±9.6 %
10418	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	±9,6 %
10419	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	±9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	±9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps; 64-QAM)	WLAN	8.41	± 9,6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6.%
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	±9,6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FOO	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6%
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	±9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	±9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	±9.6%
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	±9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
100 900 1	1.2.2.5		1.0002.00	10.00	40696
10453	AAD	Validation (Square, 10ms, 1ms)	1051	10.00	2 0.0 10
10453 10455	AAD AAB	Valdation (Square, 10ms, 1ms) IEEE 802.11ac WIFI (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10453 10455 10457	AAD AAB AAA	Validation (Square, 10ms, 1ms) IEEE 802.11ac WIFI (160MHz, 64-QAM, 99pc dc) UMTS-FDD (DC-HSDPA)	WLAN WCDMA	8.63	±9.6%
10453 10456 10457 10458	AAD AAB AAA AAA	Valdation (Square, 10ms; 1ms) IEEE 802 11ac WIFI (160MHz, 64-QAM, 99pc dc) UMTS-FDD (DC-HSDPA) CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	WLAN WCDMA CDMA2000	8.63 6.62 6.55	± 9.6 % ± 9.6 % ± 9.6 %
10453 10456 10457 10458 10459	AAD AAB AAA AAA AAA	Valdation (Square, 10ms, 1ms) IEEE 802.11ac WIFI (160MHz, 64-QAM, 99pc dc) UMTS-FDD (DC-HSDPA) CDMA2000 (1xEV-DO, Rev. B, 2 carriers) CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	WLAN WCDMA CDMA2000 CDMA2000	8.63 6.62 6.55 8.25	19.6% 19.6% 19.6% 19.6%
10453 10455 10457 10458 10459 10460	AAD AAB AAA AAA AAA AAA	Validation (Square, 10ms, 1ms) IEEE 802.11ac WIFI (160MHz, 64-QAM, 99pc dc) UMTS-FDD (DC-HSDPA) CDMA2000 (1xEV-DO, Rev. B, 2 carriers) CDMA2000 (1xEV-DO, Rev. B, 3 carriers) UMTS-FDD (WCDMA, AMR)	VULAN WCDMA CDMA2000 CDMA2000 WCDMA	8.63 6.62 6.55 8.25 2.39	19.6% 19.6% 19.6% 19.6% 19.6%
10453 10456 10457 10458 10459 10460 10461	AAD AAB AAA AAA AAA AAA AAB	Validation (Square, 10ms; 1ms) IEEE 802 11ac WHT (160MHz, 64-QAM, 99pc dc) UMTS-FDD (DC-HSDPA) CDMA2000 (1xEV-DO, Rev. B, 2 carriers) CDMA2000 (1xEV-DO, Rev. B, 3 carriers) UMTS-FDD (WCOMA, AMR) LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	VLAN WCDMA CDMA2000 CDMA2000 WCDMA LTE-TDD	8.63 6.62 6.55 8.25 2.39 7.62	19.6% ±9.6% ±9.6% ±9.6% ±9.6% ±9.6%

Certificate No: EUmmWV3-9382_Jul20

Page 10 of 18



July 31, 2020

10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	±9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	±9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	±9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-GAM, UL Sub)	LTE-TDD	8.56	±9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	±9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	±9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	±9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	±9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	土9.6%
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TOD	7,74	±9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	L'TE-TOD	8.18	土9.6%
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	±9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	±9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	±9.6%
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8,47	±9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	±9.6 %
10486	AAF	LTE-TOD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	±9.6.%
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	±9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% R8, 10 MHz, QPSK, UL Sub)	LTE-TDD	7,70	±9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	±9.6 %
10491	AAE	LTE-TOD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	±9.6 %
10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8,41	±9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TOD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TOD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RE, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	±9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1:4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	±9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDO	7.67	±9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	±9.6 %
10503	AAF	LTE-TOD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8,31	±9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	±9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.36	±9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TOD	8.55	± 9,6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.51	±9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TOD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TOD	8.45	±9.6%
10515	AAA	IEEE 802,11b WIFI 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1,58	±9.6 %
10518	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	±9.6 %
10517	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	±9.6 %
10518	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	±9.6%
10519	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802,11a/h WIFI 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	19.6%
10521	AAB	(EEE 802.11a/h WIFI 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7,97	±9.6 %
10522	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8,45	± 9.6 %
10523	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	±9.6 %
10524	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	±9.6 %
10525	AAB	IEEE 802.11ac WIFI (20MHz, MCS0, 99pc dc)	WLAN	8.36	±9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc dc)	WLAN	8.42	±9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	± 9.6 %
and the state of the state			The second	and the second se	

Certificate No: EUmmWV3-9382_Jul20

Page 11 of 18



July 31, 2020

10528	AAB	IEEE 802.11ec WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	±9.6 %
10529	AAB	IEEE 802,11ac WIFI (20MHz, MCS4, 99pc dc)	WLAN	8.36	± 9.6 %
10531	AAS	IEEE 802,11ac WIFI (20MHz, MCS6, 99pc dc)	WLAN	8.43	±9.6 %
10532	AAB	IEEE 802,11ac WIFI (20MHz, MCS7, 99pc dc)	WLAN	8.29	±9.6 %
10533	AAB	IEEE 802.11ac W/FI (20MHz, MCS8, 99pc dc)	WLAN	8.38	± 9.6 %
10534	AAB	(EEE 802,11sc WiFI (40MHz, MCS0, 99pc dc)	WLAN	8.45	±9.6 %
10535	AAB	IEEE 802 11ac WIFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	±9.6 %
10536	AAB	IEEE 802.11ac WiEI (40MHz, MCS2, 99bc dc)	WLAN	8.32	±9.6 %
10537	AAR	(EEE 802 11ac WIEI (40MHz, MCS3, 99pc dc)	WLAN	8,44	±9.6 %
10538	AAB	IEEE 802 11ac WIEI (40MHz, MCS4, 99oc do)	WLAN	8.54	±9.8 %
10540	AAB	IFFF 802 11ac WIFI (40MHz, MCS6, 99pc dc)	WLAN	8.39	±9.6 %
10541	AAB	IEEE 802 11ac WIEI (40MHz, MCS7, 99oc dc)	WLAN	8.46	+9.6%
10542	AAR	IEEE 802 11sc WIEI (40MHz, MCS8, 99pc dc)	WEAN	8.65	±9.6 %
10543	AAR	IEEE 802 11ac WIEI (40MHz, MCS9, 99nc dc)	WLAN	8.65	+9.6%
10544	AAB	IEEE 802 11ac WIEI (ROMHz MCS0, 99pc dc)	WLAN	8.47	+9.6%
TOUT	AAD	IEEE 802 11ac W/EI (80MHz MCS1 99nc dr.)	WEAN	8.55	+96%
10540	AAR	IEEE 802 11ac W/EI (80MHz, MCS2, 99c dc)	WLAN	8 35	+96%
10540	AAD	IEEE 802 theo WEI (80MHz, WOS2, 85pc do)	WI AN	8.40	+96%
10047	AAD	IEEE 002 11de WIE (DOWN 12, WORd, order do)	WEAN	8.37	+98%
10560	AAD	IEEE 802 11ac WIEL/8/MHz MCCR D0co del	WIAN	8.28	+96%
10000	AAD	IEEE 802 1146 WIELISOMH'S MCCO, SOLUCE	WLAN	9.50	405W
10001	AAB	IEEE OVA THE WITTOWITH, WORT, SODE OF	WI AN	8,00	+04 %
10502	AAB	ICCC OVA THE WIFT (BUNKER, WUSS, SEPT DC)	160.45	0,92	±0.5 %
10553	AAB	TEEE 002.1180 WIFI (80MHZ, MC89, 9900.00)	UNLAN	8,40	10.0 %
10554	AAG	TEEE BUZ 11ad WIFI (160MHZ, MCS0, 99pc 00)	VYLAN IALAN	0.40	1 0 0 %
10565	AAC	IEEE 802,11ac WIFI (160MHz, MCS1, 99pc dc)	WLAN	8.47	19.0 %
10558	AAG	TEEE 802.11ac WIFI (160MHz, MGSZ; 89pc dc)	VVL/APV	8.50	± 9.0 %
10557	AAC	TEEE 802.11ac WIFI (160MHz, MCS3, 99pc 0c)	WLAN	8.52	1 2 8.0 %
10558	AAG	IEEE 802.13ac WIFI (160MHz, MCS4, 99pc dc)	WILAN	8.61	19.5%
10560	AAC	IEEE 802.11ac WIFI (160MHz, MC56, 99pc dc)	WILAN	8.73	19.0.%
10561	AAC	IEEE 802.11ac WIFI (160MHz, MCS7, 99pc dc)	WLAN	8.56	± 9,0 %
10562	AAC	TEEE 802.11ac WIFI (160MHz, MCSB, 9apc dc)	WLAN	8.68	19.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MC59, 99pc dc)	WLAN	8,77	1 9.6 %
10564	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc dc)	WLAN	8.25	±9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	\$ 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN	8.13	± 9.6 %
10587	AAA	IEEE 802.11g WiFI 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc dc)	WLAN	8.00	±9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc dc)	WLAN	8.37	19.6%
10569	AAA	IEEE 802.11g WIFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc dc)	WLAN	8.10	±9.6 %
10570	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc dc)	WLAN	8.30	1.9.6 %
10571	AAA	IEEE 802 11b WIFI 2.4 GHz (DSSS, 1 Mbps, 90pc dc)	WLAN	1.99	±9.6 %
10572	AAA	IEEE 802,11b WIFI 2.4 GHz (DSSS, 2 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 5.5 Mbps, 90pc dc)	WLAN	1.98	±9.6 %
10574	AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 11 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	±9.6%
10576	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	±9.6 %
10677	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	±9.6 %
10579	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8,36	±9.6%
10580	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	±9.6%
10582	AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	±9.8 %
10583	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8,59	±9.6 %
10584	AAB	(EEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	±9.6%
10585	AAB	IEEE 802,11a/h WIFI 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	±9.6 %
10586	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	±9.6 %
10588	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	±9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	± 9.6 %
10692	AAB	IEEE B02.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	±9.6 %
10593	AAB	IEEE 802,11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	±9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8.74	±9.6 %
10594 10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 80pc dc) IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN WLAN	8.74 8.74	-

Certificate No: EUmmWV3-9382_Jul20

Page 12 of 18


July 31, 2020

10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dc)	WLAN	8.71	±9.6 %
0597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	±9.6 %
0596	AAB	JEEE 802 11n (HT Mixed 20MHz, MCS7, 90pc dc)	WLAN	8.50	±9.6%
0599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8.79	±9.6 %
0600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	±9.6 %
0601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	±9.6%
3602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9,6 %
0603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	±9.6 %
0604	AAB.	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8,76	±9.6 %
0805	AAB	IEEE 802,11n (HT Mixed, 40MHz, MCS8, 90pc dc)	WLAN	8.97	± 9.6 %
0608	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	±9.6 %
0607	AAB	IEEE 802,11ac WiFi (20MHz, MCS0, 90pc dc)	WLAN	8.64	±9.6 %
0E0B	AAB	IEEE 802,11ac WiFi (20MHz, MCS1, 90pc dc)	WEAN	8.77	±9.6 %
0609	AAB	IEEE 802.11ac WIFI (20MHz, MCS2, 90pc dc)	WLAN	8.57	±9.6%
0610	AAB	IEEE 802.11ac WIFI (20MHz, MCS3, 90pc dc)	WLAN	8.78	±9.6 %
0611	AAB	IEEE 802.11ac WIFI (20MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
0612	AAR	IEEE 802 11ac WIEI (20MHz, MCS5, 90pc dc)	WLAN	8.77	±9.6 %
0613	AAR	IEEE 802 11ac WiEi (20MHz, MCS6, 90nc dc)	WLAN	8.94	± 9.6 %
0614	AAR	IEEE 802 11ac WIE (20MHz MCS7 90cc dc)	WLAN	8.59	+9.6 %
8615	AAR	IFFE 802 11ac WIEI (20MHz, MCS8, 90cc dc)	WLAN	8.82	196%
0616	AAB	IEEE 802 11ac WIEI (40MHz MCSD D0ac do)	WLAN	8.82	+96%
0617	AAB	IEEE 802 11sc WIE (40MHz MCS1 80sc 4c)	WLAN	8.81	±96%
0819	AAD.	IEEE 802 11ac WIEI (40MHz MCS2 00cc da)	WLAN	8.69	498.14
0510	AAB	IEEE 802 11an WIEI (40MHz, MCSS, 90pc do)	WLAN	8.86	+96%
0618	AAD AAD	IEEE 902 Har WIEI (ADMH2 MCS3, Bur da)	WLAN	8.87	+9.6 W
UD2U	100D	IEEE 002 I I DC WIFT (40MIN2, MICO4, 0000 00)	160 ANI	0.07	40.6 %
10621	AAB	IEEE 802,11ac WiFi (40MPz, MCSS, 90pc 0c)	JAT AN	0.77	1064
0022	AAD	IEEE 002.1186 WIFI (40Minz, MCG7, 00pc dc)	IAILANI	0.00	10.0.76
10023	AND	IEEE 802, 1180 WIFI (40MHz, MCG7, 90pc 00)	JAR AN	0.02	100%
0624	AAB	IEEE 802 11ac WF1 (40MHz, MCS0, 90pc dc)	JAIL AN	9.05	10.6 %
10625	AAB	TEEE 802.11ac WFFI (40MHz, MCS3, 90pc dc)	WLAN	0.90	19.0 %
0020	AAB	TEEE 002.1130 WIF1 (00MHz, MCOU, 90pc dc)	WEAN	0.03	1000
0627	AAB	TEEE 802.1140 WHY (BUMHZ, WGS1, BOPC 00)	TVLPV4	0.00	10.0 %
10628	AAB	TEEE 802.1180 WIFI (80MHZ, WUSZ, 90pc.00)	AVLANA AM	0.11	19.0.%
10623	AAB	TEEE 802.11ac WIFI (80MHz, MCS3, 90pc 0c)	VYL/VN	0.03	2.9.0.70
10830	AAB	TEEE 802.11ac WIP1 (80MP2, MCS4, SUpc 02)	VVLAN	0.12	19.0 %
10631	AAB	TEEE 802.11ac WIFI (80MHz, MCS6, 90pc 0c)	VVLPAN	0.81	39.0 %
10632	AAB	TEEE 802.11ac WIFI (80MHz, MCB6, 90pc 0c)	VYLAN	8.74	19.0 %
10833	AAB	IEEE 802.118c WIFI (80MHz, MCS7, 90pc dc)	VYLAN	0.03	I 9.0 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc dc)	VVLAN	8.80	19.0 %
10635	AAB	IEEE 802.11ac WIFI (80MPiz, MCS9, 90pc dc)	WLAN	8.81	19.6 %
10636	AAC	IEEE 802.11ac WIFI (160MHz, MCS0, 90pc dc)	WLAN	8.83	29.5%
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc dc)	WLAN	8,79	± 9.6 %
10638	AAC	IEEE 802,11ac WIFI (160MHz, MCS2, 90pc dc)	WLAN	8.86	19.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc dc)	WLAN	8.85	19.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	89.8	19.6%
10641	AAC	IEEE 802.11ac WIFI (160MHz, MCS5, 90pc dc)	WLAN	9.06	19.6%
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc dc)	WLAN	9.06	±9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc dc)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WIFI (160MHz, MCS8, 90pc dc)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc dc)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TOD	11,96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA.	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
0652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	29.5%
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	L'TE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	±9.6 %
10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	±9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6,99	±9.6 %
10680	AAA	Pulse Waveform (200Hz, 40%)	Test	3,98	±9.6%
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	±9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc dc)	WLAN	9.09	± 9.6 %

Certificate No: EUmmWV3-9382_Jul20

Page 13 of 18



July 31, 2020

102000	in the second second		1.000.000		
10672	AAA	IEEE 802.118x (20MHz, MCS1, 90pc dc)	WLAN	8.57	±9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	±9.6 %
10674	AAA	IEEE 802.118x (20MHz, MCS3, 90pc dc)	WLAN	8,74	±9.8 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	±9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10877	AAA	IEEE 802.11ax (20MHz, MCS6, 80pc dc)	VVLAN	8.73	19.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc 6c)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802,11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	19.0.%
10680	AAA	(EEE 802.11ax (20MHz, MCS9, 90pc dc)	VVLAN	00.8	19.0 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	0.02	19.0 %
10682	AAA	IEEE 802,11ax (20MHz, MCS11, 90pc dc)	WLAN	6.63	19.0 %
10683	AAA	IEEE BUZ 11ax (20MHZ, MUSU, 99pc dc)	VELOTS	0.42	13.0.%
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	VICAN	0.20	19.0 %
10685	AAA	IEEE 802.11EX (20MHZ, MGS2, 99pc dc)	VELAN	0.00	10.0 %
10686	AAA	TEEE 802.118X (20MHz, MCS3, 9900.00)	WLAN	0.20	10.0%
10687	AAA	IEEE 802.118x (20MHz, MGS4, 99pc dc)	WEAN	8.90	10070
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc 0c)	WCAN AN	0,23	19.0 %
10689	AAA	IEEE 802.11ax (20MPlz, MC86, 99pc.dc)	WLAN	0,00	10.0 %
10690	AAA.	IEEE 802.11ax (20MHz, MGS7, 99pc dc)	WLAN	0.29	19,0 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	0.23	10.0%
10692	AAA	IEEE BUZ 11ax (ZUMHZ, MCS9, 99pc 6c)	TYLAN MO AN	0.28	19.0 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WEAN	0.20	19.079
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dc)	WLAN	6.57	19.0%
10695	AAA	TELE 802.11ax (40MHz, MCS0, 90pc 6c)	WILAN SKILAN	0.76	19.0 %
10695	AAA	TEEE 802.11ax (40MHz, MGS1, 90pc dc)	MTLAN	0.91	±9.0.7e
10697	AAA	IEEE 802.118x (40MHz, MCS2, 90pc dc)	VYLAN WILAN	6.61	23.0 %
10698	AAA	TEEE BU2,11ax (40MHz, MCS3, 30DC 0C)	VELANE VELANE	0.09	10.0 %
10699	AAA	TEEE 802.11ax (40MPIZ, MCS4, 90pc dc)	VELATA	0.02	± 0.0 %
10700	AAA	TEEE 802.11ax (40MHz, MGS3, 90pc dc)	INF AN	0.75	10.6 N
10701	AAA	TEEE 802.11ax (40MPIZ, MCS0, 90pc 0c)	IAR AN	0.00	10.0 %
10/02	AAA	TEEE 802.11ax (40MHz, MCS7, 90pc cc)	IAD AN	0.70	10.0%
10703	1004	TEEE 802.118X (40MHz, WUS8, 80pc.00)	LAN AM	0.02	10.0 %
10704	AAA	IEEE 802.118X (40MPIZ, MCS8, SUPC 00)	AN AN	9.00	105%
10790	1000	IEEE 802.1188 (40MHz, MCS10, 90pt 00)	MA IN	8.65	+0.64
10700	1000	IEEE 002 1184 (404612, 4053)1, 60pc (c)	WI AN	8.32	+96%
10707	AAA	IEEE 802 1 fax (40MHz, MCS0, SSpc.0c)	UVLAN	8.55	+ 0 6 %
10708	044	IEEE 802 11 ax (40MHz, MCS2, 90oc dc)	WLAN	8.33	*96%
10700	000	IEEE 802 Hax (40Mile MCS3, 900c dc)	WI AN	8.29	+96%
10711	000	IEEE 802 11av (40MHz MCS4 99oc dc)	WLAN	8.39	+96%
10712	0.0.0	IEEE 802 11ax (40MHz, MCS5, 99oc dc)	WLAN	8.67	+9.6 %
10713	444	IEEE 802 11ax (40MHz MCS6 99pc dc)	WLAN	8.33	+9.6%
10714	444	IEEE 802 11ax (40MHz MCS7 99pc dc)	WLAN	8.26	±9.6 %
10715	444	IEEE 802 11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	+9.5%
10716	AAA	IEEE 802 11ax (40MHz, MCS9, 99pc dc)	WLAN	8.30	±9.6 %
10717	AAA	JEEE 802 (1ax (40MHz, MCS10, 99pc dc)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802 11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	±9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8.87	±9.6 %
10721	AAA	IEEE 802 11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	±9.6%
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	±9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WLAN	8,74	±9.6%
10728	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	±9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	±9.6%
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8,65	± 9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	± 9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	± 9.6 %
10731	AAA	IEEE 802.11ax (80MHz; MCS0, 99pc dc)	WLAN	8.42	±9.8.%
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WEAN	8.46	± 9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	± 9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	19.6 %

Certificate No: EUmmWV3-9382_Jul20

Page 14 of 18



July 31, 2020

10736	444	IFFF 802 11ax (80MHz MCS5 00m/de)	WEAN	8.27	+96%
10730	0.00	IEEE BAD 15 av (2014) AMOR OGA da)	WEAN	9.9.6	+9.6%
10737	AAA	IEEE BOX 11ax (DUMPL, MUSD, DOLC OU)	WILLAN	0.00	+0.6%
10730	100	IEEE 002.11dX (000012, MCO7, 88pc 007	MAR AN	29.0	10.0%
10730	1 AAA	IEEE OUE I HA (DUMINE, MODO, DOPU UV)	UVI AN	0.40	+0.6%
10740	1000	IEEE 002 1184 (00WH2, MC00, 9900 00)	MU AN	0.40	1000
10741	1000	1222 802.118X (80MPI2, MGS10, 8900.00)	SVLAN	0.40	19.0 %
10/42	AAA	TEEE 002.118X (00MIN2, MUS11, SSpc 00)	TELPAR	0.43	19.0 %
10743	AAA	TEEE BUZ,1184 (160MPHZ, MCSU, 90pc 00)	TYL/Are	0.09	10.0 %
10744	0,0,0	TEEE BUZ 11ax (160MPHz, MUS1, 90pc dc)	WLAN	9.10	19.0 %
10745	AAA	TEEE 802.11ax (160MHz, MCS2, 90pc dc)	VILAN	8.93	19.6%
10746	AAA	IEEE 602.118x (160MHZ, MCS3, 90pc oc)	VELAN	9,11	19.0%
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	19.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc 00)	WLAN	8.93	± 9.8 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	VVLAN	8.90	±9.6.%
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	±9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	±9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	±9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	±9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WEAN	8.94	± 9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	±9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8,77	± 9.6 %
10757	AAA.	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	± 9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	±9.6 %
10760	AAA	IEEE 802 11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802 11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	± 9.6 %
10782	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	±9.6 %
10785	AAA	IEEE 802,11ax (160MHz, MC58, 99pc dc)	WLAN	8.53	+9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	±9.6 %
10785	AAA	IEEE 802 11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	±9.6 %
10786	AAA	IEEE 802 11av (160MHz, MCS11, 99nc dc)	WLAN	8.51	+96%
10767	AAC	SG NR (CR-OEDM, 1 RB, 5 MHz, OPSK, 15 kHz)	5G NR FR1 TDD	7.99	+96%
10769	AAC	SO NR (CP OF DM, 1 PB, 10 MHz OPSK 15 kHz)	5G NR ER1 TOD	8.04	+9.8%
10700	AAC	EC ND (CD CEDM & DD 15 MM+ COOV 15 MM)	50 NR EPH TOD	8.04	+0.6%
40770	AAC	SO MR (OP OF DM, 1 PB, 10 MHz, OP SK, 10 KHz)	5G NR FR1 TOO	8.02	+96%
10770	AAC	50 NR (0P-0FDM, 1 RB, 20 MHz, 0PSK, 15 KHz)	5G MR FR1 TDD	8.02	+9.6%
40770	1000	EC ND (CD OCDM + DD 30 MHz ODDX +5 HHz)	50 NP EPS TOD	8.25	+0.6 %
10773	680	EC ND (CD OFTM & DD 40 MHz OPSK 15 KHz)	5G MP EP1 TOD	8.03	406%
40774	000	SO ND (CD OFDM 1 PD 50 MHz OPSK 15 KHz)	50 NP EP1 TDD	8.02	+96%
10774	600	ED ND (CHOPDM, 1 HD, 50 MHz, GPSH, 15 KHz)	SC NR ER1 TOD	0.02	+0.6 %
10773	AAB	SO NR (GP-OPDW, 50% RB, 5 MHz, GP5K, 15 KHz)	SC ND ED1 TOD	0.31	10.0 %
10/70	AAG	SO NR (OP-OPDM, SUS RB, 10 MHZ, QPSK, 15 KHZ)	SC ND FD1 TDD	0.30	10.0 %
10/77	AAB	SG NK (CP-OFDM, 50% RB, 15 MHZ, QP3K, 15 KHZ)	DO NR FRI TOD	0.30	100%
10778	AAG	5G NR (CP-OFDM, 50% RB, 20 MHZ, QPSR, 15 KHZ)	DO NR FRI TOD	0.34	1 8.0 %
10779	AAB	5G NR (GP-OFDM, 50% RB, 25 MHZ, UPSK, 15 KHZ)	DG NR FR1 TDD	8.42	19.0%
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	50 NR FR1 T00	8.38	19.6%
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 l01z)	5G NR FR1 TDD	8.38	23.6%
10782	AAC	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TUD	8,43	± 9.6 %
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	19.6%
10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	±9.6 %
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	±9.6 %
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	19.0%
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	\$ 9.6 %
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	±9,6 %
10790	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9,6 %
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	±9.6%
the second se	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10793	- Contraction (5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6 %
10793	AAC			and the second	surgers and in the surgery like in the literature of the surgery states of the surgery s
10793 10794 10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	±9.6 %
10793 10794 10795 10795	AAC AAC AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz) 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD 5G NR FR1 TDD	7.84	±9.6 % ±9.6 %
10793 10794 10795 10795 10795	AAC AAC AAC AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QP8K, 30 kHz) 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz) 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD 5G NR FR1 TDD 5G NR FR1 TDD	7.84 7.82 8.01	± 9.6 % ± 9.6 % ± 9.6 %
10793 10794 10795 10795 10797 10798	AAC AAC AAC AAC AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz) 5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz) 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz) 5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD 5G NR FR1 TDD 5G NR FR1 TDD 5G NR FR1 TDD	7.84 7.82 8.01 7.89	±9.6 % ±9.6 % ±9.6 % ±9.6 %

Certificate No: EUmmWV3-9382_Jul20

Page 15 of 18



July 31, 2020

10801	AAC	KG NR (CP-OFDM 1 RB 80 MHz OPSK 30 kHz)	5G NR FR1 TDD	7.89	±9.6 %
10003	AAC	50 NR (CP-OFDM, 1 RB, 00 MHz, 0P SK, 30 kHz)	5G NR FR1 TDD	7.87	±9.6 %
10802	AAC.	SC NP (CP-OFDM, 1 RB, 30 MHz, GP SK, 30 MHz)	5G NR FR1 TDD	7.93	+9.6 %
10805	AAC	50 NR (CP.OFDM, FRW, RB, 10 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.5%
10806	AAC	5G NR (CP-OFDM 50% RB 15 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10800	AAC	AG NR (CP-OFDM 50% RB 30 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.34	±9.6 %
10810	AAC	5G NR (CP-OEDM, 50% RB, 40 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6 %
10812	AAC	5G NR (CP-OEDM 50% RB 60 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.35	±9.6 %
10817	AAC	5G NR (CP-OEDM, 100% RB, 5 MHz, GPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAC	5G NR (CP-OFDM 100% RB 10 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAC	5G NR (CP-OFDM: 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10921	AAC	5G NR (CP-OEDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	B.41	±9.6%
10822	AAC	5G NR (CP-OEDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6%
10823	AAC	5G NR (CP-OEDM 100% RB 40 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.36	±9.6 %
10824	AAC	50 NR (CP.OEDM 100% R8 50 MHz OP5K 30 kHz)	5G NR FR1 TDD	8.39	±9.6 %
10824	AAC	5G NR (CR-OFDM 100% RB 80 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10620	AAC	5G NR (CP.OEDM, 100% RB 80 MHz, OPSK, 30 kHz)	5G NR FR1 TOD	8.42	+9.6%
1/18/26	AAC	50 NR (CP,OEDM, 100% BB, 90 MHz, OPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10820	AAC:	5G NR (CP-OFDM 100% RB 100 MHz OPSK 30 kHz)	5G NR FR1 TDD	8.40	+9.6 %
10830	AAC	5G NR (CP-OFDM, 1 R8, 10 MHz, OPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAC	5G NR (CP.OEDM 1 HB 15 MHz OPSK 60 kHz)	5G NR FR1 TDD	7.73	±9.6 %
10832	AAC	5G NR (CP.OEDM 1 RB 20 MHz OPSK 60 kHz)	5G NR FR1 TDD	7.74	±9.6%
10032	AAC	SCINP (CROEDM 1 RB 25 MHz OPSK 50 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10033	AAC	SC NR (CD,OEDM 1 RB 30 MHz OPSK 60 kHz)	5G NR FR1 TDD	7.75	+98%
10034	0.50	50 NP (CP.OEDM 1 PB 40 MHz OPSK 60 kHz)	5G NR FR1 TDD	7.70	+9.6 %
10635	ANC	SC NP (CP OFDM, 1 RB, 40 MHz, QP SK, 60 MHz)	56 NR FR1 TDD	7.66	+9.6 %
10030	AAC	RC ND (CD.OEDM 1 RB RO MH2 OPSK R0 kH2)	5G NR FR1 TDD	7.68	+9.6%
10037	ABC	SO NR (CP-CFDM, 1 RB, 80 MHz, GP 0K, 60 kHz)	5G NR FR1 TDD	7.70	+96%
10638	AAC	SO NR (CP-OPDM, 1 NB, 60 MHz, GPSK, 60 MHz)	5G NR FR1 TDO	7.67	+98%
10040	AAC	KOND (CPOTON, 1 PB, 100 MHz, OPSK 60 kHz)	SG NR FR1 TDD	7.71	+96%
10041	040	CO ND (CD OEDM, EAS, DD, 15 MHz, ODSV, 60 MHz)	5G NR ER1 TDD	8.45	+96%
10043	0010	TO NO ICO OFTIM, SOL DD, TO MIN, GE OK, OU MIN	5G MR FR1 TDD	R 34	+96%
10844	AAC	SO NO (CP-OFDW, 50% RB, 20 MIN2, CP 65, 60 KHz)	5G NR FR1 TDD	8.41	+98%
10840	000	SO NO (CD.OEDM, 30% CD, 30 MHz, GPGK, 60 MHz)	5G NR FR1 TDD	8.34	+96%
10854	0.52	SO ND (CP-OFDM, 1008 PD, 10 MHz, OFSK, 60 KHz)	SG NR FR1 TDD	8.36	+96%
10055	AAC	SC NP / CO DEDM, 1005 PB 20 MH+ OPSK 80 kHV	SG NR FR1 TDD	8.37	+96%
10800	0.00	50 ND (CD.OEDM. 100% DB 25 MHz, OPSK 60 kHz)	5G NR FR1 TDD	8.35	+9.6 %
10007	AAC	KO NO (CO. OFOM, 100% DB 30 MHz OPSK 60 MHz)	5G NR FR1 TDD	8.36	+9.6%
10020	AAC	EO NR (CP-OPDM, 100% RB, 30 MHz, GPSK, 80 KHz)	50 NR FR1 TOD	8.34	+96%
10608	AAC	50 NR (CP-OFDM, 100% PB 50 MHz, OPSK 60 kHz)	5G NR FR1 TOO	8.41	+9.6%
10000	AAC	50 NR (OP OF DW, 100% PB, 60 MHz, OPSK 60 kHz)	5G NR FR1 TDD	8.40	+96%
10001	AAC	50 NR (CP-OFDM, 100% RB 80 MHz, GPSK, 60 kHz)	5G NR FR1 TDD	8.41	+9.6%
10003	AAC	SO NO (CD. CEDM 100% PB DO MHT (CPSK 60 kHz)	5G NR FR1 TOD	8.37	+9.6%
10009	AAC	LO ND (CD OEDM, 100% DB, 100 MHz, OPSK 60 kHz)	5G NR FR1 TDD	8.41	+9.6%
10800	AAC	50 NR (DET-8-DEDM_1 R8, 100 MHz OPSK 30 kHz)	5G NR FR1 TDD	5.68	+9.6%
10868	AAC	50 NR IDET & OEDM 100% RR 100 MHz OPSK 30 MHz	5G NR FR1 TDD	5.89	±9.6 %
10880	AAD	50 NR (DET.s.OEDM 1 R8 100 MHz OPSK 120 HH	5G NR FR2 TDD	5.75	19.6 %
10870	440	50 MP (DET.e. OEDM 100% RB 100 MHz ORSK 100 kHz)	5G NR FR2 TDD	5.86	+9.6%
10670	440	SCINE (DET & OEDW 1 BB 100 MHz 180AM 120 KHz)	5G NR FR2 TDD	575	196%
10871	AAD	50 NR (DET.s.OEDM, 100% RB, 100 MHz, 100 AM, 120 MHz)	50 NR FR2 TDD	6.52	+98%
10072	000	SC ND (DET + DEDM 1 PR 100 MHz 6604M 100 HHz)	5G NR FR2 TDD	6.61	+96%
100/3	AAD	50 NR (DET + OEDM, 100% RR 100 MH+ 840AM, 120 MH+1	5G NR FR2 TDD	8.85	+96%
10074	AAD	50 ND /00.0EDM 1 BE 100 MHz DPSK 120 MHz	5/3 NR FR2 TOD	7.78	+96%
10876	440	SG NR (CP,OEDM, 100% RB, 100 MHz, OPSK, 120 HHz)	5G NR FR2 TDD	8.39	196%
10870	440	SC NR (CR.OEDM 1 RR 100 MH+ 160AM 120 kH+)	5G NR FR2 TDD	7.95	+96%
10377	AAD	5G NR (CP-OFDM 100% RB 100 MHz 180 AM 120 HHz)	5G NR FR2 TDD	8.41	196%
10870	AAD	5G NR (CP.OFDM 1 RB 100 MHz 540AM 120 kHz)	5G NR FR2 TDD	8.12	19.6%
10079	AAD	SC NR (CD.OEDM 100% PB 100 MH+ 640AM 120 HH+	50 NR FR2 TDD	8.38	+98%
10880	0.40	50 ND (DET.s. OEDAL 1 DB. 50 MHz, DBSV, 100 MHz)	5G NR FR2 TDD	5.75	+96%
10661	AAD	40 NR (DET = OEDM 100% RB 50 MHz OPSK 100 MHz)	SG NR FR2 TDD	5.08	+98%
10662	AAD	SO NR (DET + OEDM 1 RR ROAL+ 120AM 100 MHZ)	50 NR FR2 TDD	8.57	+06%
10883	AND	50 NR (DFT-S-OFDM, 1 RD, 50 NRC, 102400, 120 KR2)	5G NR FR2 TDD	8.53	+9.8 %
10804	AAD	EO NE (DET = DEDM 1 DE ED ML- BADAM 120 ML)	50 NR ER2 TOD	6.05	+0.640
10885	MAD	DG MR (DET-S-OFDM, 1 RB, DO MRZ, 04GPM, 320 KRZ)	JO NOT THE TOD	0.03	1 2 9 0 10

Certificate No: EUmmWV3-9382_Jul20

Page 16 of 18



July 31, 2020

10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	±9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	±9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	±9.6 %
10890	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	±9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDO	8.13	±9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6 %
10897	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	±9.6%
10098	AAA	5G NR (DFT-8-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	-SG NR FR1 TDD	5.67	±9.6 %
10899	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6 %
10900	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAA	5G NR (DFT-s-DFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6 %
10903	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6 %
10905	AAA	5G NR (DFT-6-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5,68	± 9.6 %
10906	AAA	5G NR (DFT-s-OFDM, 1 R8, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	19.6%
10907	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	±9.6 %
10908	AAA	5G NR (DFT-8-OFDM, 50% R8, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	±9.6 %
10910	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TOD	5.83	±9.6 %
10911	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.8 %
10912	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6 %
10913	AAA	5G NR (DFT-6-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAA	5G NR (DFT-9-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	±9.6 %
10915	AAA	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAA	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAA	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6 %
10918	AAA.	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.88	±9.6 %
10919	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6%
10920	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	±9.6 %
10921	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6 %
10922	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	±9.6 %
10923	AAA.	5G NR (DFT-8-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6%
10924	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6 %
10925	AAA	5G NR (DFT-8-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	±9.6 %
10926	AAA	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6 %
10927	AAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6%
10928	AAA	5G NR (DFT-8-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6%
10930	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,52	±9.6 %
10931	AAA	5G NR (DFT-8-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6 %
10932	AAA.	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,51	±9.6%
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAA	5G NH (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	BG NR FR1 FDD	0.90	19.6 %
10937	AAA	5G NR (DFT-6-OFDM, 50% RB, 10 MHz, QPSK, 15 KHz)	DG NR FRI FDD	0.77	19.6 %
10938	AAA	5G NR (DFT-&-OFDM, 50% RB, 15 MHz, QPSK, 15 KHz)	5G NR FR1 FDD	5.90	19.5%
10939	AAA	5G NR (DFT-8-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	DG NR PRT PDD	5.82	19.6%
10940	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAA	5G NR (DFT-5-OFDM, 50% RB, 38 MHz, QPSK, 15 kHz)	SG NR FRT FOO	5.63	19.6 %
10942	AAA	SG NR (DF1-8-OFDM, 50% KB, 40 MHZ, QPSK, 15 KHZ)	DG NR FRI FDD	0.85	19.6.76
10943	AAA	DO NR (DET-S-OFDM, 50% RB, 50 MHZ, QPSK, 15 KHZ)	SG NR FK1 FUU	0.95	19.0.76
10944	AAA	5G NR (UF1-6-OFDM, 100% RB, 5 MHz, QPSK, 15 KHz)	DG NR FR1 FUD	5.61	19.0 %
10:945	AAA	DG NR (DP1-8-UPDM, 100% RB, 10 MHZ, QPSR, 15 KHZ)	DO NR FRT FDD	2,65	13.0 %
10946	AAA	55 NK (DFT-5-OFDM, 100% KB, 15 MHz, GPSK, 15 KHz)	DU NR FRI FUD	5.63	19.6.%
10947	ARA	SG NR (UP1-6-UPUM, 100% KB, 20 MHZ, UP3K, 10 KHZ)	BO NR FRI PDD	D.0/	19.0 %
10948	AAA	DG NK (UP 1-S-OPDM, 100% KB, 20 MHZ, UPSK, 10 KHZ)	DO NR PRI PDD	0.94	100%
10949	AAA	SO NR (UP 1-S-OFDM, 100% KB, 30 MHZ, QPSK, 15 KMZ)	SG NR FR1 FUU	0.87	13.070
10950	AAA	SO NR (DP1-B-OPDM, 100% RB, 40 MHZ, QP3K, 15 KHZ)	50 NR FRI FUU	0.34	10.0%
10931	AAA	SO NR (UP 1-9-UP UM, 100% RB, 00 MINZ, UP SK, 15 MHZ)	SC NR ERI FOO	0.92	19.0 %
10952	AAA	SC NR DL (CP-OFDM, HM 3.1, 5 MHZ, 64-QAM, 15 KHZ)	SG ND EDI COD	0.43	120.0%
10953	AAA	DO NR DL (GP-OFDM, 1M 3.1, 10 MRZ; 04-04M; 10 KRZ)	JUS NEW FRI PUU	0.10	T 0.0 %

Certificate No: EUmmWV3-9382_Jul20

Page 17 of 18



July 31, 2020

10954	AAA	5G NR DL (CP-DFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	6.23	\$9.6%
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	±9.6%
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	±9.6 %
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	±9.6 %
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	±9.6 %
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	±9.6 %
10960	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	SG NR FR1 TDD	9.32	±9.6 %
10961	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-DAM, 15 kHz)	5G NR FR1 TDD	9.36	±9.8 %
10962	AAA	5G NR DL (CP-OEDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	±9.6 %
10963	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	±9.6 %
10964	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	±9,6%
10965	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	± 9.6 %
10966	AAA	5G NR OL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	±9.6%
10967	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	±9.6 %
10968	AAA	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	±9.6 %

⁶ Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EUmmWV3-9382_Jul20

Page 18 of 18



Attachment 4. – Verification Source Calibration Data



FCC ID : A3LSMG991U

Report No:HCT-SR-2011-FC006

Calibration Laborate Schmid & Partner Engineering AG Reughausstrasse 43, 8004 Zu	ory of		S Schweizerischer Kalibrierdi C Service suisse d'étatonnege Servizio svizzero di taratura Swiss Calibration Service
Accredited by the Swiss Accred The Swiss Accreditation Serv Aultilateral Agreement for the	Itation Service (SAS) ice is one of the signator recognition of calibratio	ies to the EA n certificates	Accreditation No.: SCS 010
CALIBRATION		Cert	Illeate No: 5G-Veri30-1011_Jul
CALIDHATION	GENTIFICA		
Object	5G Venfication	Source 30 GHz - SN: 1011	
Calibration procedure(s)	QA CAL-45.v3 Calibration proc	cedure for sources in air ab	ove 6 GHz
Calibration date: This calibration certificate doc The measurements and the u All calibrations have been con	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labora	ational standards, which realize the pl probability are given on the following dory facility: environment temperature	hysical units of measurements (SI), pages and are part of the cartificate. $(22 \pm 3)^{4}$ C and humidity < 70%.
Calibration date: This calibration certificate door The reassurements and the ur All calibrations have been con Calibration Equipment used (I Primary Standards	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labors ducted in the closed labors	ational standards, which realize the p s probability are given on the following dory facility: environment temperature) Cal Date (Certificate No.)	hysical units of measurements (SI), pages and are part of the certificate. (22 ± 3)*C and humidity < 70%. Scheduled Calibration
Calibration date: This calibration certificate doc The measurements and the ui All calibrations have been con Calibration Equipment used (8 Primary Standards Reference Probe EUmmWV3 DAE4lp	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labors M&TE critical for calibration ID # SN: 9374 SN: 1602	ational standards, which realize the pl probability are given on the following dory facility: environment temperature) <u>Cal Date (Certificate No.)</u> 31-Dec-19 (No. EUmmWV3-937 16-Jun-20 (No. DAE4ip-1602_JL	hysical units of measurements (SI), pages and are part of the certificate. (22 ± 3)*C and humidity < 70%. Scheduled Calibration (4_Dec19) Dec-20 un20) Jun-21
Calibration date: This calibration certificate doc The measurements and the ui All calibrations have been con Calibration Equipment used (I Primary Standards Reference Probe EUmmWV3 DAE4lp Secondary Standards	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labors M&TE critical for calibration ID # SN: 9374 SN: 1602	ational standards, which realize the pl probability are given on the following dory facility: environment temperature) <u>Cal Date (Certificate No.)</u> 31-Dec-19 (No. EUmmWV3-937 16-Jun-20 (No. DAE-sip-1602_JL Check Date (in house)	hysical units of measurements (SI), pages and are part of the certificate. (22 ± 3)*C and humidity < 70%. Scheduled Calibration (4_Dec19) Dec-20 Jun-21 Scheduled Chock
Calibration date: This calibration certificate doc The measurements and the un All calibrations have been con Calibration Equipment used (k Primary Standards Reference Probe EUmmWV3 DAE4lp Secondary Standards	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labors M&TE critical for calibration ID # SN: 9374 SN: 1602	ational standards, which realize the pl probability are given on the following dory facility: environment temperature) <u>Cal Date (Certificate No.)</u> 31-Dec-19 (No. EUmenWV3-937 16-Jun-20 (No. DAE4ip-1602_JL <u>Check Date (in house)</u>	hysical units of measurements (SI), pages and are part of the cartificate. ($22 \pm 33^{\circ}$ C and humidity < 70%. ($22 \pm 33^{\circ}$ C and humidity < 70%. ($22 \pm 33^{\circ}$ C and humidity < 70%. Scheduled Calibration (4. Dec19) Dec-20 Jun-21 Scheduled Check ($31 + 52 + 24$ Scheduled Check ($51 + $
Calibration date: This calibration certificate door The measurements and the un- All calibrations have been con Calibration Equipment used (I Primary Standards Reference Probe EUmmWV3 DAE4lp Secondary Standards	July 30, 2020 uments the traceability to n ncertainties with confidence ducted in the closed labors M&TE critical for calibration ID # SN: 9374 SN: 1602	ational standards, which realize the pl probability are given on the following dory facility: environment temperature) Cal Date (Certificate No.) 31-Dec-19 (No. EUmerWV23-037 16-Jun-20 (No. DAE4ip-1602_Ju Check Date (in house)	Applical units of measurements (SI), pages and are part of the cartificate. $(22 \pm 3)^{4}C$ and humidity < 70%. (22 \pm 3)^{4}C and humidity < 70%. Scheduled Calibration (4.Dec19) Dec-20 Jun-21 Scheduled Check Standard Check Standard Check Standard Check Standard Check Standard Check
Calibration date: This calibration certificate door The measurements and the un All calibrations have been con Calibration Equipment used (M Primary Standards Reference Probe EUmmWV3 DAE4lp Secondary Standards Calibrated by:	July 30, 2020 umenta the traceability to n ncertainties with confidence ducted in the closed lation M&TE critical for calibration ID # SN: 9374 SN: 1802 ID # ID #	ational standarda, which realize the pl probability are given on the following dory facility: environment temperature) Gal Date (Certificate No.) 31-Dec-19 (No. EUmmWV3-037 16-Jun-20 (No. DAE4ip-1602_Ju Check Date (in house) Check Date (in house)	Applical units of measurements (SI), pages and are part of the certificate. $(22 \pm 3)^{*C} \text{ and humidity} < 70\%,$ $(22 \pm 3$

Certificate No: 5G-Veri30-1011_Jul20 Page 1 of 5



FCC ID : A3LSMG991U

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service

S

C

S

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary

CW Continuous wave

Calibration is Performed According to the Following Standards

- Internal procedure QA CAL-45-5Gsources
- IEC TR 63170 ED1, "Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz", January 2018

Methods Applied and Interpretation of Parameters

- Coordinate System: z-axis in the waveguide horn boresight, x-axis is in the direction of the E-field, y-axis normal to the others in the field scanning plane parallel to the horn flare and horn flange.
- Measurement Conditions: (1) 10 GHz: The forward power to the horn antenna is measured prior and after the measurement with a power sensor. During the measurements, the horn is directly connected to the cable and the antenna ohmic and mismatch losses are determined by far-field measurements. (2) 30, 45, 60 and 90 GHz. The verification sources are switched on for at least 30 minutes. Absorbers are used around the probe cub and at the ceiling to minimize reflections.
- Hom Positioning: The waveguide horn is mounted vertically on the flange of the waveguide source to allow vertical positioning of the EUmmW probe during the scan. The plane is parallel to the phantom surface. Probe distance is verified using mechanical gauges positioned on the flare of the horn.
- E- field distribution: E field is measured in two x-y-plane (10mm, 10mm + λ/4) with a vectorial E-field probe. The E-field value stated as calibration value represents the E-fieldmaxima and the averaged (1cm² and 4cm²) power density values at 10mm in front of the horn.
- Field polarization: Above the open horn, linear polarization of the field is expected. This is verified graphically in the field representation.

Calibrated Quantity

 Local peak E-field (V/m) and peak values of the total and normal component of the poynting vector |Re{S}| and n.Re{S} averaged over the surface area of 1 cm² (pS_{tot}avg1cm² and pSnavg1cm²) and 4cm² (pS_{tot}avg4cm² and pSnavg4cm²) at the nominal operational frequency of the verification source.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: 5G-Veri30-1011_Jul20

Page 2 of 5



Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	cDASY6 Module mmWave	V2.0
Phantom	5G Phantom	
Distance Horn Aperture - plane	10 mm	
XY Scan Resolution	dx, dy = 2.5 mm	
Number of measured planes	2 (10mm, 10mm + λ/4)	
Frequency	30 GHz ± 10 MHz	

Calibration Parameters, 30 GHz

Distance Horn Aperture to Measured Plane	Prad' (mW)	Max E-field (V/m)	Uncertainty (k = 2)	Avg Power Density n.Re{S}, [Re{S}] (W/m2)		Uncertainty (k = 2)
			1 cm ²	4 cm ²		
10 mm	20.0	104	1.27 dB	24.7, 25.0	21.3, 21.6	1.28 dB

¹ derived from far-field data

Certificate No: 5G-Veri30-1011_Jul20 Page 3 of 5



DASY Report

Measurement Report for 5G Verification Source 30 GHz, UID 0 -, Channel 30000 (30000.0MHz)

perties					
Dimensions [mm	1	IMEI		DUT Type	
He 100.0 x 100.0 x 1	00.0	SN: 101	1	8	
Position, Test Distance [mm]	Band	Grou	ip,	Frequency [MHz], Channel Number	Conversion Factor
5.55 mm	Validation band	CW		30000.0, 30000	10
Medium			Probe, Calibration Date	e	DAE, Calibration Date
Air			EUmmWV3 - SN9374_1 2019-12-31	F1-78GHz,	DAE4lp Sn1602, 2020-06-16
			Measurement Res	ults	
	561	Scan	100000		5G Scan
	60.0 x	60.0	Date		2020-07-30, 10:30
	0.25 %	0.25	Avg, Area (OTT)		25.0
	MALA OCT	0.30	pour svg (w/mr)		24.7
	WORLD THES I	usev	E-m [V/m]		104
			Brower Drift [rill]		-0.05
	perties Dimensions (mm 4z 100.0 × 100.0 × 3 Position, Test Distance [mm] S. 55 mm Miedlum Air	perties Dimensions [mm] 4: 100.0 x 100.0 x 100.0 Position, Test Distance Band [mm] S.55 mm Validation band Medium Air 56: 0.25 x MAIA nos 0.25 x MAIA nos	perties Dimensions [mm] MEI 100.0 x 100.0 x 100.0 SN: 101 Posibion, Test Distance Band Grow [mm] 5.55 mm Validation band CVV Medium Air 56 Scan 60.0 x 60.0 0.25 x 0.25 5.55 MAIA not used Medium Larr? Holi(000,000000) USE DISCUSSION	perties Dimensions [mm] IME 10 0.0 x 100.0 x 100.0 SN: 1011 Posiblon, Test Distance Band Group, [mm] 5.55 mm Velidation band CW Medium Prote, Calibration Date Air EtimmWV3-516374_3 2019-12-31 Measurement Res 50 Scan 60.0 x 60.0 0.25 x 0.25 S.55 MAIA not used Date Avg. Area [cm] Power Drift [db] Family [V/m] Power Drift [db]	perties Dimensions [mm] MEI DUT type 4 100.0 x 100.0 x 100.0 SN: 1011 Position, Test Distance Band Group, Prequency [MHi], [mm] Channel Number 5.55 mm Velidation band CW 30000.0, 30030 Medium Probe, Celibration Date EummWV3-5NG374_F1-78GHz, 2015-12-31 Medium CONTRACTOR CONTRA

Certificate No: 5G-Veri30-1011_Jul20

Page 4 of 5



DASY Report

Measurement Report for 5G Verification Source 30 GHz, UID 0 -, Channel 30000 (30000.0MHz)

Device under Test P	roperties Dimensions Imm	0	IME	DUT Type	
5G Verification Source 30	GHz 100.0 x 100.0 x 1	00.0	5N: 1011		
Exposure Conditions					
Phantom Section	Position, Test Distance [mm]	Band	Group,	Frequency (MHz), Channel Number	Conversion Factor
5G -	5.55 mm	Validation band	CW	30000.0, 30000	1.0
the day of the second					
Hardware Setup					

Phantom	Medium	Probe, Calibration Date	DAE, Calibration Date	
mmWave Phantom - 1002	Air	EUmmWV3 - 5N9374_F1-78GHz,	DAE4lp 5n1602,	
		2019-12-31	2029-06-16	

-			-		
•	F B	-	24	nt:	10
~					410

can Setup		Measurement Results	
	5G Scan		5G Scan
Grid Extents (mm)	60.0 × 60.0	Diete:	2020-07-30, 10:30
Grid Steps [lambda]	0.25 × 0.25	Avg. Area [cm ²]	4.00
Sensor Surface [mm]	5.55	pSm avg [W/m]	21.6
MAIA	MAIA not used	pS _n avg. [W/m ²]	21.3
		Epent [V/m]	104
		Power Drift [dB]	-0.06



Certificate No: 5G-Veri30-1011_Jul20

Page 5 of 5



Report No:HCT-SR-2011-FC006