

Fig. 1-10 Z-Scan at power reference point (LTE Band 7 10mm)

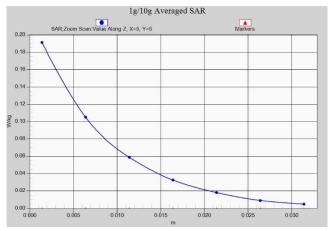


Fig. 1-11 Z-Scan at power reference point (LTE Band 41)

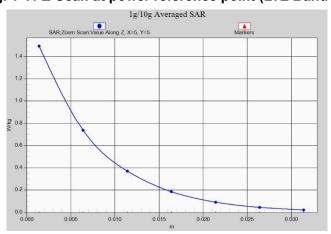


Fig. 1-12 Z-Scan at power reference point (LTE Band 41)





## **ANNEX B** System Verification Results

835 MHz

Date: 6/25/2020

Electronics: DAE4 Sn777 Medium: Head 835 MHz

Medium parameters used: f = 835 MHz;  $\sigma$  =0.907 mho/m;  $\epsilon_r$  = 41.63;  $\rho$  = 1000 kg/m<sup>3</sup>

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(9.66,9.66,9.66)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000

mm

Reference Value = 62.98 V/m; Power Drift = -0.1

Fast SAR: SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.6 W/kg

Maximum value of SAR (interpolated) = 3.1 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,

dz=5mm

Reference Value =62.98 V/m; Power Drift = -0.1 dB

Peak SAR (extrapolated) = 3.63 W/kg

SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.6 W/kg

Maximum value of SAR (measured) = 3.28 W/kg

0 dB = 3.28 W/kg = 5.16 dB W/kg

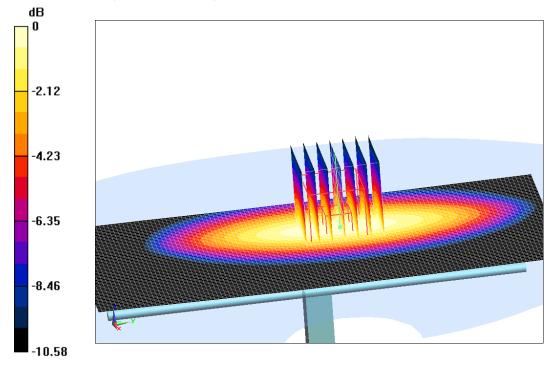


Fig.B.1 validation 835 MHz 250mW





#### 1900 MHz

Date: 6/26/2020

Electronics: DAE4 Sn777 Medium: Head 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma$  =1.375 mho/m;  $\varepsilon_r$  = 39.95;  $\rho$  = 1000 kg/m<sup>3</sup>

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000

mm

Reference Value = 108.93 V/m; Power Drift = -0.05

Fast SAR: SAR(1 g) = 9.96 W/kg; SAR(10 g) = 5.29 W/kg

Maximum value of SAR (interpolated) = 15.3 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

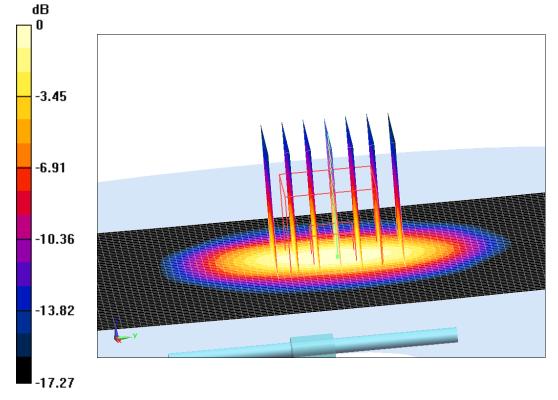
dy=5mm, dz=5mm

Reference Value =108.93 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 17.83 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.15 W/kg

Maximum value of SAR (measured) = 14.67 W/kg



0 dB = 14.67 W/kg = 11.66 dB W/kg

Fig.B.2 validation 1900 MHz 250mW





#### 2450 MHz

Date: 6/27/2020

Electronics: DAE4 Sn777 Medium: Head 2450 MHz

Medium parameters used: f = 2450 MHz;  $\sigma = 1.805 \text{ mho/m}$ ;  $\varepsilon_r = 38.58$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000

mm

Reference Value = 114.6 V/m; Power Drift = -0.04

Fast SAR: SAR(1 g) = 12.83 W/kg; SAR(10 g) = 6 W/kg

Maximum value of SAR (interpolated) = 22.02 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

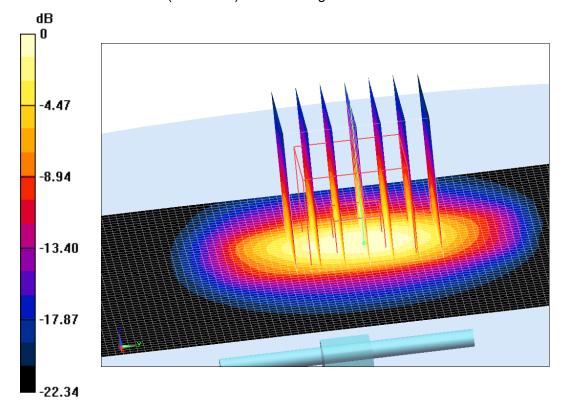
dy=5mm, dz=5mm

Reference Value =114.6 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 25.5 W/kg

SAR(1 g) = 12.73 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 21.68 W/kg



0 dB = 21.68 W/kg = 13.36 dB W/kg

Fig.B.3 validation 2450 MHz 250mW





#### 2600 MHz

Date: 6/28/2020

Electronics: DAE4 Sn777 Medium: Head 2600 MHz

Medium parameters used: f = 2600 MHz;  $\sigma$  =1.935 mho/m;  $\varepsilon_r$  = 38.36;  $\rho$  = 1000 kg/m<sup>3</sup>

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.52,7.52,7.52)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000

mm

Reference Value = 120.52 V/m; Power Drift = 0.06

Fast SAR: SAR(1 g) = 14.02 W/kg; SAR(10 g) = 6.26 W/kg

Maximum value of SAR (interpolated) = 25.21 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

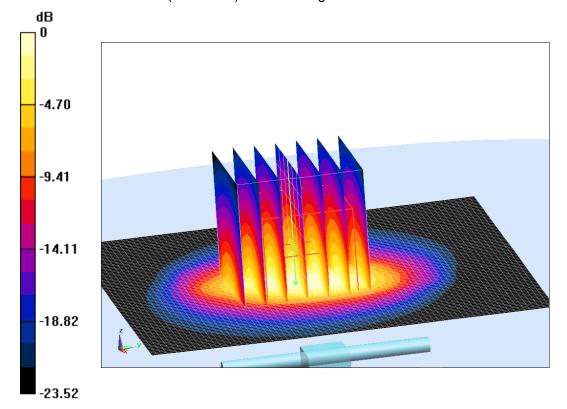
dy=5mm, dz=5mm

Reference Value =120.52 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 28.56 W/kg

SAR(1 g) = 13.98 W/kg; SAR(10 g) = 6.38 W/kg

Maximum value of SAR (measured) = 23.54 W/kg



0 dB = 23.54 W/kg = 13.72 dB W/kg

Fig.B.4 validation 2600 MHz 250mW





The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2020/6/25	835	Head	2.38	2.41	-1.24
2020/6/26	1900	Head	9.96	10.00	-0.40
2020/6/27	2450	Head	12.83	12.73	0.79
2020/6/28	2600	Head	14.02	13.98	0.29

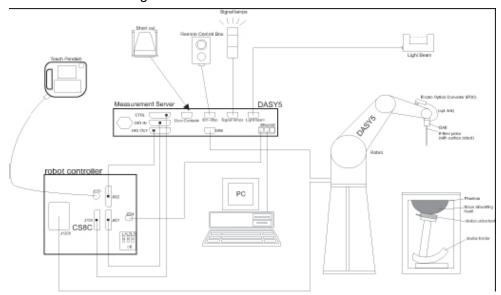




## **ANNEX C** SAR Measurement Setup

#### **C.1 Measurement Set-up**

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



**Picture C.1SAR Lab Test Measurement Set-up** 

- A standard high precision 6-axis robot (StäubliTX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal
  multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision
  detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal
  is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals
  for the digital communication to the DAE. To use optical surface detection, a special version of
  the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY4 or DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as
- warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.





#### C.2 Dasy4 or DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 or DASY5 software reads the reflection durning a software approach and looks for the maximum using 2<sup>nd</sup> ord curve fitting. The approach is stopped at reaching the maximum.

#### **Probe Specifications:**

Model: ES3DV3, EX3DV4

Frequency 10MHz — 6.0GHz(EX3DV4) Range: 10MHz — 4GHz(ES3DV3)

Calibration: In head and body simulating tissue at

Frequencies from 835 up to 5800MHz

Linearity:  $\pm 0.2 \text{ dB}(30 \text{ MHz to 6 GHz})$  for EX3DV4

± 0.2 dB(30 MHz to 4 GHz) for ES3DV3 DynamicRange: 10 mW/kg — 100W/kg

Probe Length: 330 mm

**Probe Tip** 

Length: 20 mm Body Diameter: 12 mm

Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)
Tip-Center: 1 mm (2.0mm for ES3DV3)

**Application:SAR Dosimetry Testing** 

Compliance tests of mobile phones

Dosimetry in strong gradient fields

**Picture C.3E-field Probe** 

Picture C.2Near-field Probe

#### C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm²) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or





other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm<sup>2</sup>.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C \frac{\Delta T}{\Delta t}$$

Where:

 $\Delta t$  = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

 $\Delta T$  = Temperature increase due to RF exposure.

$$SAR = \frac{\left|E\right|^2 \cdot \sigma}{\rho}$$

Where:

 $\sigma$  = Simulated tissue conductivity,

 $\rho$  = Tissue density (kg/m<sup>3</sup>).

#### **C.4 Other Test Equipment**

#### C.4.1 Data Acquisition Electronics(DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



PictureC.4: DAE





#### C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)





**Picture C.5DASY 4** 

Picture C.6DASY 5

#### C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O broad, which is directly connected to the PC/104 bus of the CPU broad.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.









Picture C.7 Server for DASY 4

Picture C.8 Server for DASY 5

#### C.4.4 Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of  $\pm 0.5$ mm would produce a SAR uncertainty of  $\pm 20\%$ . Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

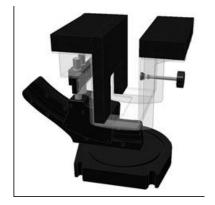
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\ell=3$  and loss tangent  $\delta=0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

#### <Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.



Picture C.9-1: Device Holder



Picture C.9-2: Laptop Extension Kit

#### C.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to

Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation





of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

Shell Thickness: 2±0. 2 mm

Filling Volume: Approx. 25 liters

Dimensions: 810 x 1000 x 500 mm (H x L x W)

Available: Special



**Picture C.10: SAM Twin Phantom** 

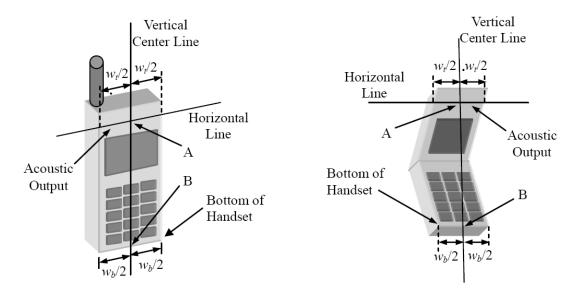




## ANNEX D Position of the wireless device in relation to the phantom

#### **D.1 General considerations**

This standard specifies two handset test positions against the head phantom – the "cheek" position and the "tilt" position.



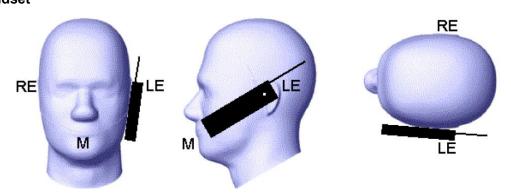
 $W_t$  Width of the handset at the level of the acoustic

 $W_b$  Width of the bottom of the handset

A Midpoint of the width  $W_t$  of the handset at the level of the acoustic output

B Midpoint of the width  $W_b$  of the bottom of the handset

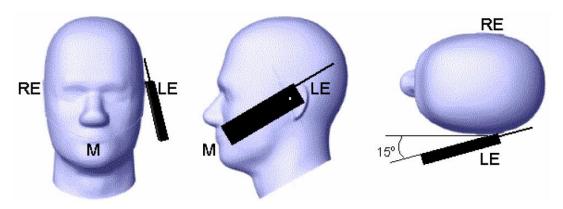
Picture D.1-a Typical "fixed" case handset Picture D.1-b Typical "clam-shell" case handset



Picture D.2 Cheek position of the wireless device on the left side of SAM



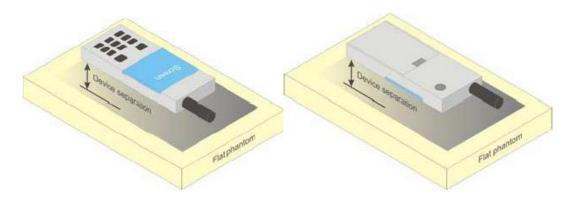




Picture D.3 Tilt position of the wireless device on the left side of SAM

#### D.2 Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.



Picture D.4Test positions for body-worn devices

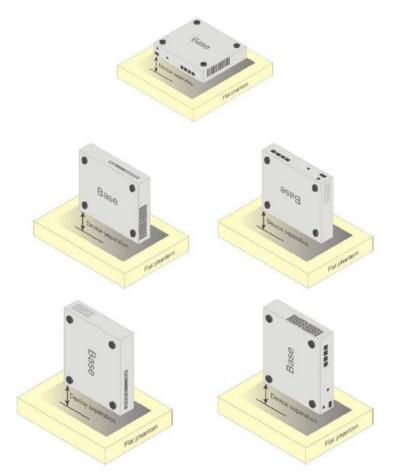
#### D.3 Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.







Picture D.5 Test positions for desktop devices

## **D.4 DUT Setup Photos**



Picture D.6









## **ANNEX E Equivalent Media Recipes**

The liquid used for the frequency range of 800-3000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

**TableE.1: Composition of the Tissue Equivalent Matter** 

Frequency	835Head	835Body	1900	1900	2450	2450	5800	5800		
(MHz)	osoneau	ossbouy	Head	Body	Head	Body	Head	Body		
Ingredients (% by	Ingredients (% by weight)									
Water	41.45	52.5	55.242	69.91	58.79	72.60	65.53	65.53		
Sugar	56.0	45.0	\	\	/	\	\	\		
Salt	1.45	1.4	0.306	0.13	0.06	0.18	\	\		
Preventol	0.1	0.1	\	\	/	\	\	\		
Cellulose	1.0	1.0	\	\	\	/	/	\		
Glycol	,	١	44.452	29.96	41.15	27.22	\	\		
Monobutyl	\	\	44.432	29.90	41.13	21.22	\	\		
Diethylenglycol	,	\	\	\	\	\	17.04	17.04		
monohexylether	\	\	\	\	\	\	17.24	17.24		
Triton X-100	\	\	\	\	\	\	17.24	17.24		
Dielectric	c=41.5	ε=55.2	ε=40.0	ε=53.3	ε=39.2	c=52.7	c=25.2	ε=48.2		
Parameters	ε=41.5					ε=52.7	ε=35.3			
Target Value	σ=0.90	σ=0.97	σ=1.40	σ=1.52	σ=1.80	σ=1.95	σ=5.27	σ=6.00		

Note: There are a little adjustment respectively for 750, 1750, 2600, 5200, 5300 and 5600 based on the recipe of closest frequency in table E.1.





## **ANNEX F System Validation**

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

**Table F.1: System Validation for 3617** 

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
3617	Head 750MHz	January 30,2020	750 MHz	OK
3617	Head 850MHz	January 30,2020	835 MHz	OK
3617	Head 900MHz	January 30,2020	900 MHz	OK
3617	Head 1750MHz	January 30,2020	1750 MHz	OK
3617	Head 1810MHz	January 30,2020	1810 MHz	OK
3617	Head 1900MHz	January 30,2020	1900 MHz	OK
3617	Head 2000MHz	January 30,2020	2000 MHz	OK
3617	Head 2100MHz	January 30,2020	2100 MHz	OK
3617	Head 2300MHz	January 30,2020	2300 MHz	OK
3617	Head 2450MHz	January 30,2020	2450 MHz	OK
3617	Head 2600MHz	January 30,2020	2600 MHz	OK
3617	Head 3500MHz	January 30,2020	3500 MHz	OK
3617	Head 3700MHz	January 30,2020	3700 MHz	OK
3617	Head 5200MHz	January 30,2020	5250 MHz	OK
3617	Head 5500MHz	January 30,2020	5600 MHz	OK
3617	Head 5800MHz	January 30,2020	5800 MHz	OK
3617	Body 750MHz	January 30,2020	750 MHz	OK
3617	Body 850MHz	January 30,2020	835 MHz	OK
3617	Body 900MHz	January 30,2020	900 MHz	OK
3617	Body 1750MHz	January 30,2020	1750 MHz	OK
3617	Body 1810MHz	January 30,2020	1810 MHz	OK
3617	Body 1900MHz	January 30,2020	1900 MHz	OK
3617	Body 2000MHz	January 30,2020	2000 MHz	OK
3617	Body 2100MHz	January 30,2020	2100 MHz	OK
3617	Body 2300MHz	January 30,2020	2300 MHz	OK
3617	Body 2450MHz	January 30,2020	2450 MHz	OK
3617	Body 2600MHz	January 30,2020	2600 MHz	OK
3617	Body 3500MHz	January 30,2020	3500 MHz	OK
3617	Body 3700MHz	January 30,2020	3700 MHz	OK
3617	Body 5200MHz	January 30,2020	5250 MHz	OK
3617	Body 5500MHz	January 30,2020	5600 MHz	OK
3617	Body 5800MHz	January 30,2020	5800 MHz	OK





#### **ANNEX G** Probe Calibration Certificate

#### **Probe 3617 Calibration Certificate**

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

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

Client

CTTL (Auden)

Certificate No: EX3-3617\_Jan20/2

#### CALIBRATION CERTIFICATE (Replacement of No: EX3-3617\_Jan20)

Object

EX3DV4 - SN:3617

Calibration procedure(s)

QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5,

QA CAL-25.v7

Calibration procedure for dosimetric E-field probes

Calibration date:

January 30, 2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).

The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	iD	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	27-Dec-19 (No. DAE4-960_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: G841293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by:

Claudio Leubler

Laboratory Technician

Approved by:

Katja Pokovic

Technical Manager

Issued: April 7, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: EX3-3617\_Jan20/2

Page 1 of 23





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





S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S 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:

TSL tissue simulating liquid
NORMx,y,z sensitivity in free space
ConvF sensitivity in TSL / NORMx,y,z
DCP diode compression point

CF crest factor (1/duty\_cycle) of the RF signal A, B, C, D modulation dependent linearization parameters

Polarization 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

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- EC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from handheld and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- 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
- 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.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center 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).

Certificate No: EX3-3617\_Jan20/2

Page 2 of 23





EX3DV4 - SN:3617 January 30, 2020

#### DASY/EASY - Parameters of Probe: EX3DV4 - SN:3617

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	0.35	0.21	0.32	± 10.1 %
DCP (mV) <sup>8</sup>	104.3	93.8	97.1	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	dB/µV	С	dB	VR mV	Max dev.	Max Unc <sup>E</sup> (k=2)
0	CW	X	0.00	0.00	1.00	0.00	130.5	± 3.5 %	±4.7 %
	800000	Y	0.00	0.00	1.00		137.4		
	AND THE RESERVE OF THE PROPERTY.	Z	0.00	0.00	1.00		129.2		
10352-	Pulse Waveform (200Hz, 10%)	X	5.74	74.31	15.16	10.00	60.0	± 2.6 %	± 9.6 %
AAA		¥	20.00	84.63	18.23		60.0		
		Z	20.00	90.64	20.98		60.0		
10353-	Pulse Waveform (200Hz, 20%)	X	11.18	82.57	16.62	6.99	80.0	±1.6%	± 9.6 %
AAA		Y	11.60	81.13	15.97		80.0	1.0.0	
		Z	20.00	91.54	20.06		80.0		-
10354-	Pulse Waveform (200Hz, 40%)	X	20:00	88.75	16.93	3.98	95.0	±1.0%	± 9.6 %
AAA		Y	1.22	64.13	8.17		95.0		
		Z	20.00	94.77	20.04		95.0	1	
10355- AAA	Pulse Waveform (200Hz, 60%)	X	20.00	90.94	16.71	2.22	120.0	±1.3%	±9.6 %
	The second secon	Y	0.41	60.00	4.32		120.0		
		Z	20.00	99.77	20.92		120.0		
10387-	QPSK Waveform, 1 MHz	X	0.73	63.23	9.65	0.00	150.0	±4.1%	± 9.6 %
AAA		Y	0.47	60.00	5.82	1000	150.0		SESSONS
		Z	0.73	63.00	9.63		150.0		
10388-	QPSK Waveform, 10 MHz	X	2.46	70.66	17.17	0.00	150.0	±1.7%	±9.6 %
AAA	Control of the Contro	Y	2.10	68.37	15:67	TOTAL CONTRACTOR	150.0		100000000000000000000000000000000000000
		Z	2.45	70.34	17.05		150.0		
10396-	64-QAM Waveform, 100 kHz	X	3.34	72.82	19.20	3.01	150.0	± 1.6 %	±9.6 %
AAA		Y	3.57	72.45	19.52		150.0		100000000000000000000000000000000000000
		Z	3.45	73.00	19.94		150.0	1	
10399-	64-QAM Waveform, 40 MHz	X	3.61	68.21	16.41	0.00	150.0	± 3.8 %	±9.6 %
AAA		Y	3.40	67.13	15.82		150.0		
Lauren e		Z	3.62	68.06	16.39		150.0		
10414-	WLAN CCDF, 64-QAM, 40MHz	X	4.88	66.26	15.89	0.00	150.0	±6.6%	±9.6 %
AAA		Y	4.57	64.95	15.35		150.0		
		Z	4.92	66.18	15.92		150.0	1	

Note: For details on UID parameters see Appendix

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: EX3-3617\_Jan20/2

Page 3 of 23

<sup>&</sup>lt;sup>6</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>3</sup>-field uncertainty inside TSL (see Pages 5 and 6).
<sup>8</sup> Numerical linearization parameter: uncertainty not required.
<sup>8</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.





EX3DV4-SN:3617 January 30, 2020

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3617

#### Sensor Model Parameters

	C1 fF	C2 fF	α V=1	T1 ms.V <sup>-2</sup>	T2 ms.V <sup>-1</sup>	T3 ms	T4 V-2	T5 V <sup>-1</sup>	T6
X	41.2	299.64	34.06	12.13	0.82	5.00	1.88	0.20	1.00
Y	42.0	334.64	39.96	9.91	1.46	5.06	0.00	0.82	1.01
Z	42.8	318.14	35.45	11.95	0.73	5.04	1.02	0.40	1.01

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (")	13
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Certificate No: EX3-3617\_Jan20/2





January 30, 2020 EX3DV4-SN:3617

#### DASY/EASY - Parameters of Probe: EX3DV4 - SN:3617

#### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
64	54.2	0.75	12.37	12.37	12.37	0.00	1.00	± 13.3 %
150	52.3	0.76	11.63	11.63	11.63	0.00	1.00	± 13.3 %
300	45.3	0.87	11.41	11.41	11.41	0.08	1.20	± 13.3 %
450	43.5	0.87	10.84	10.84	10.84	0.12	1.40	± 13.3 %
750	41.9	0.89	10.07	10.07	10.07	0.61	0.80	± 12.0 %
835	41.5	0.90	9.66	9.66	9.66	0.54	0.84	± 12.0 %
900	41.5	0.97	9.56	9.56	9.56	0.54	0.80	± 12.0 %
1450	40.5	1.20	8.72	8.72	8.72	0.45	0.80	± 12.0 %
1640	40.2	1.31	8.50	8.50	8.50	0.25	0.80	± 12.0 %
1750	40.1	1.37	8.41	8.41	8.41	0.30	0.80	± 12.0 %
1810	40.0	1.40	8.20	8.20	8.20	0.15	1.26	± 12.0 %
1900	40.0	1.40	8.14	8.14	8.14	0.31	0.80	± 12.0 9
2000	40.0	1.40	8.25	8.25	8.25	0.40	0.81	± 12.0 9
2100	39.8	1.49	8.16	8.16	8.16	0.28	0.80	± 12.0 %
2300	39.5	1.67	7.95	7.95	7.95	0.35	0.86	± 12.0 9
2450	39.2	1.80	7.65	7.65	7.65	0.33	0.90	± 12.0 9
2600	39.0	1.96	7.52	7.52	7.52	0.38	0.90	± 12.0 9
3300	38.2	2.71	7.07	7.07	7.07	0.30	1.20	± 13.1 9
3500	37.9	2.91	7.02	7.02	7.02	0.35	1.30	±13.19
3700	37.7	3.12	6.77	6.77	6.77	0.35	1.30	± 13.1 9
3900	37.5	3.32	6.62	6.62	6.62	0.40	1.60	± 13.1 9
4100	37.2	3.53	6.60	6.60	6.60	0.40	1.60	± 13.1 9
4200	37.1	3.63	6.50	6.50	6.50	0.40	1.60	± 13.1 9
4400	36.9	3.84	6.35	6.35	6.35	0.40	1.60	± 13.1 9
4600	36.7	4.04	6.30	6.30	6.30	0.40	1.60	± 13.1 9
4800	36.4	4.25	6.25	6.25	6.25	0.40	1.80	± 13.1 9
4950	36.3	4.40	6.10	6.10	6.10	0.40	1.80	± 13.1 9
5200	36.0	4.66	5.49	5.49	5.49	0.40	1.80	± 13.1 9
5250	35.9	4.71	5.39	5.39	5.39	0.40	1.80	± 13.1 5
5300	35.9	4.76	5.29	5.29	5.29	0.40	1.80	± 13.1 9
5500	35.6	4.96	5.14	5.14	5.14	0.40	1.80	± 13.1 9
5600	35.5	5.07	4.99	4.99	4.99	0.40	1.80	± 13.1 9
5750	35.4	5.22	5.10	5.10	5.10	0.40	1.80	± 13.1 9
5800	35.3	5.27	5.00	5.00	5.00	0.40	1.80	± 13.1 9

Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the Corn/F uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for Corn/F assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of Corn/F assessed at 6 MHz is 4-9 MHz, and Corn/F assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

\*\*All frequencies below 3 GHz, the validity of tissue parameters (s and o) can be relaised to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (s and o) is restricted to ± 5%. The uncertainty is the RSS of the Corn/F uncertainty for indicated target fissue parameters.

\*\*Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-3617\_Jan20/2

Page 5 of 23





EX3DV4~SN:3617

January 30, 2020

#### DASY/EASY - Parameters of Probe: EX3DV4 - SN:3617

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha <sup>q</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	55.5	0.96	9.80	9.80	9.80	0.50	0.80	± 12.0 %
835	55.2	0.97	9.53	9.53	9.53	0.43	0.80	± 12.0 %
900	55.0	1.05	9.49	9.49	9.49	0.42	0.80	± 12.0 %
1450	54.0	1.30	8.56	8.56	8.56	0.25	0.80	± 12.0 %
1640	53.7	1.42	8.44	8.44	8.44	0.32	0.80	± 12.0 9
1750	53.4	1.49	8.09	8.09	8.09	0.48	0.80	± 12.0 9
1810	53.3	1.52	8.05	8.05	8.05	0.44	0.80	± 12.0 9
1900	53.3	1.52	7.94	7.94	7.94	0.39	0.80	± 12.0 9
2000	53.3	1.52	7.92	7.92	7.92	0.37	0.86	± 12.0 9
2100	53.2	1.62	7.89	7.89	7.89	0.35	0.89	± 12.0 9
2300	52.9	1.81	7.78	7.78	7.78	0.39	0.85	± 12.0 9
2450	52.7	1.95	7.76	7.76	7.76	0.41	0.80	± 12.0 9
2600	52.5	2.16	7.45	7.45	7.45	0.32	0.80	± 12.0 9
3300	51.6	3.08	6.44	6.44	6.44	0.40	1.70	± 13.1 9
3500	51.3	3.31	6.30	6.30	6.30	0.40	1.70	± 13.1 9
3700	51.0	3.55	6.27	6.27	6.27	0.40	1.70	± 13.1 9
3900	51.2	3.78	6.24	6.24	6.24	0.40	1.70	±13.19
4100	50.5	4.01	6.21	6.21	6.21	0.40	1.70	± 13.1 9
4200	50.4	4.13	6.20	6.20	6.20	0.40	1.70	± 13.1 9
4400	50.1	4.37	5.97	5.97	5.97	0.40	1.70	±13.19
4600	49.8	4.60	5.83	5.83	5.83	0.40	1.70	± 13.1 9
4800	49.6	4.83	5.72	5.72	5.72	0.50	1.80	± 13.1 9
4950	49.4	5.01	5.41	5.41	5.41	0.50	1.90	± 13.1 9
5200	49.0	5.30	4.80	4.80	4.80	0.50	1.90	± 13.1 9
5250	48.9	5.36	4.70	4.70	4.70	0.50	1.90	± 13.1 9
5300	48.9	5.42	4.61	4.61	4.61	0.50	1.90	± 13.1 9
5500	48.6	5.65	4.32	4.32	4.32	0.50	1.90	± 13.1 9
5600	48.5	5.77	4.23	4.23	4.23	0.50	1.90	± 13.1 9
5750	48.3	5.94	4,36	4.36	4.36	0.50	1,90	± 13.1 5
5800	48.2	6.00	4.22	4.22	4.22	0.50	1.90	± 13.1 9

<sup>&</sup>lt;sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

\*\*All frequencies below 3 GHz, the validity of fissue parameters (c and σ) can be reliaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of fissue parameters (c and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF incertainty for indicated target fissue parameters.

Certificate No: EX3-3617\_Jan20/2

Page 6 of 23

the ConvF uncertainty for indicated target tissue parameters.

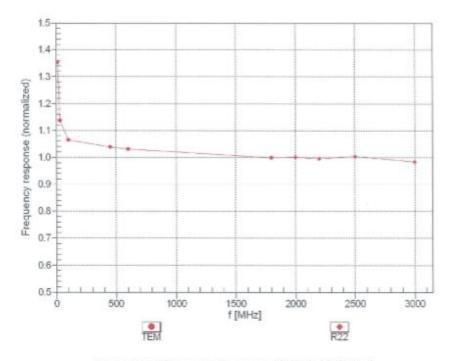
Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.





EX3DV4-SN:3617 January 30, 2020

# Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: EX3-3617\_Jan20/2

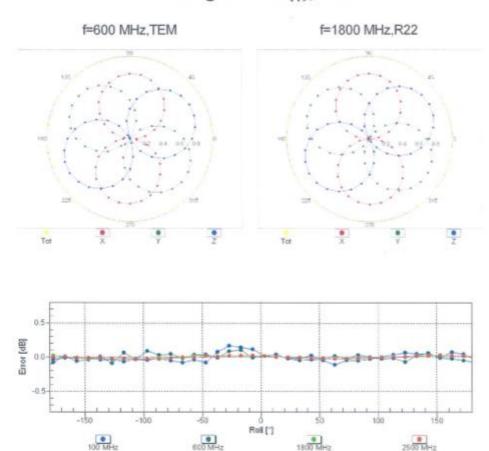
Page 7 of 23





EX3DV4— SN:3617 January 30, 2020

## Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: EX3-3617\_Jan20/2

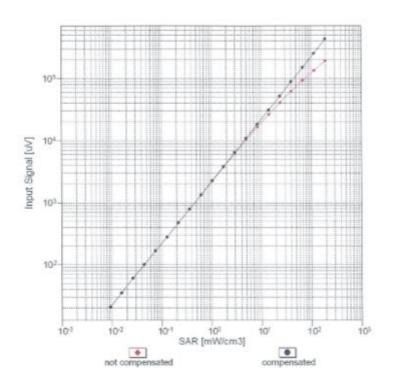
Page 8 of 23

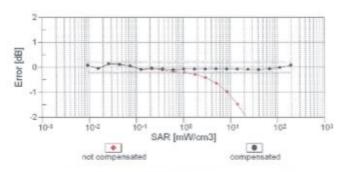




EX3DV4- SN:3617 January 30, 2020

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: EX3-3617\_Jan20/2

Page 9 of 23

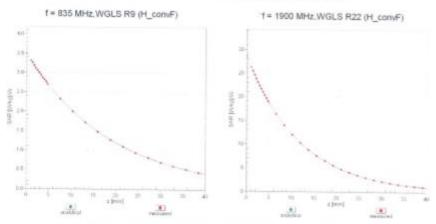




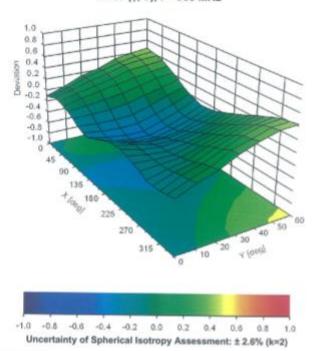
EX3DV4-SN:3617

January 30, 2020

## Conversion Factor Assessment



### Deviation from Isotropy in Liquid Error (0, 9), f = 900 MHz



Certificate No: EX3-3617\_Jan20/2

Page 10 of 23





EX3DV4- SN:3617 January 30, 2020

#### **Appendix: Modulation Calibration Parameters**

UID	Rev	Communication System Name	Group	PAR (dB)	Unc <sup>2</sup> (k=2)
)		CW	CW	0.00	±4.7 %
0010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
0011	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 %
0013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
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 %
0025	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 %
0028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6.3
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	±9.65
0031	CAA	IEEE 802,15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 5
0032	CAA	IEEE 802,15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
0033	CAA	IEEE 802.15.1 Bluetooth (PV4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
0034	CAA	IEEE 802,15,1 Bluetooth (PV4-DQPSK, DH3)	Sluetooth	4.53	± 9.6 9
0035	CAA	IEEE 802.15.1 Bluetooth (PV4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
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)	Bluetooth	4.77	±9.63
0038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluelooth	4.10	± 9.6 %
0039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
0042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	±9.65
0044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	±9.63
0048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	19.63
0049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	1961
0056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 °
0058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	19.61
0059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	19.6
0060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.65
0061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 5
0062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 1
0063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 5
0064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6
0065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 °
0066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 °
0067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6
0068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 °
0069	CAC	IEEE 802.11a/h WIFI 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6
0071	CAB	IEEE 802.11g WiFl 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6
0072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6
0073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6
0074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6
0075	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6
0076	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6
0077	CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS/OFDM, 46 Mbps)	WLAN	11.00	± 9.6
0081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6
0082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PV4-DQPSK, Fullrate)	AMPS	4.77	± 9.6
0090	DAG	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6
0090	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	±9.6
0098	CAB		WCDMA	3.98	± 9.6
		UMTS-FDD (HSUPA, Subtest 2)		9.55	
0099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM LTE EDD		±9.6
0100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	±9.6
0101	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-QAM)	LTE-FDD	6.60	±9.6
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TOO	9.29	± 9.6
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TOO	9.97	±9.6
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDO	10.01	±9.6
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6

Certificate No: EX3-3617\_Jan20/2

Page 11 of 23





EX3DV4- SN:3617 January 30, 2020

10111   CAG   LTE-FDD (SC-FDMA 100% RB, 10 MHz, 64-CAM)   LTE-FDD   6.59   ±	10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10113   CAG	10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6 %
101114   CAG   LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-CAM)   LTE-FDD   6.62   ± 1	10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	±9.6 %
10116   CAC				LTE-FDD	6.59	±9.6 %
10116   CAC		The second second second			6.62	±9.6 %
10111				- I was a second and a second a		±9.6 %
10118   CAC   IEEE 802.11n (HT Missed, 31 Mbps, BPSK)				The second secon		± 9.6 %
10119						±9.6%
101140   CAC   LTE-FDD (SC-FDMA, 100%, RB, 15 MHz, 16-QAM)						±9.6%
10141						± 9.6 %
10141   CAE   LTE-FDD (SC-FDMA 100% RB, 15 MHz, 64-CAM)   LTE-FDD   6.73   2				The second desirable and the second desirable		±9.6 %
10143   CAE   LTE-FDD (SC-FDMA 100% RB 3 MHz, GPSK)   LTE-FDD   5.73   ±						±9.6 %
10144   CAE	and the second second	Market Comment				± 9.6 %
10144   CAE   LTE-FDD   (SC-FDMA, 100%; RB, 3 MHz, 64-QAM)   LTE-FDD   6,65   ±:						±9.6 %
10146   CAF		Company of the Compan				±9.6 %
10146   CAF			the State of the Author Co. The Advantage of the Author Co.			±9.6 %
10147   CAF   LTE-FDD (SC-FDMA, 100% RB, 14 MHz, 64-QAM)   LTE-FDD   6.72   ±1						±9.6 %
10150   CAE					dimension and a second	±9.6 %
10150   CAE   LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)						±9.6 %
10151   CAG						±9.6 %
10152   CAG   LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)				The state of the s	The state of the s	± 9.6 %
10153   CAG						±9.6 %
10154   CAG						±9.6 %
10155   CAG						±9.6 %
10156   CAG						±9.6 %
10157   CAG   LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)   LTE-FDD   6.49   ± 10158   CAG   LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)   LTE-FDD   6.62   ± 10160   CAG   LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)   LTE-FDD   6.56   ± 10160   CAG   LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)   LTE-FDD   5.82   ± 10161   CAE   LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)   LTE-FDD   6.43   ± 10162   CAE   LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)   LTE-FDD   6.43   ± 10166   CAF   LTE-FDD (SC-FDMA, 50% RB, 14 MHz, QPSK)   LTE-FDD   6.46   ± 10167   CAF   LTE-FDD (SC-FDMA, 50% RB, 14 MHz, 16-QAM)   LTE-FDD   6.46   ± 10167   CAF   LTE-FDD (SC-FDMA, 50% RB, 14 MHz, 64-QAM)   LTE-FDD   6.46   ± 10168   CAF   LTE-FDD (SC-FDMA, 50% RB, 14 MHz, 64-QAM)   LTE-FDD   6.79   ± 10169   CAE   LTE-FDD (SC-FDMA, 50% RB, 14 MHz, 64-QAM)   LTE-FDD   6.79   ± 10170   CAE   LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-FDD   6.73   ± 10170   CAE   LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-FDD   6.52   ± 10173   CAG   LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-FDD   6.49   ± 10172   CAG   LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-FDD   6.49   ± 10173   CAG   LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-TDD   9.21   ± 10173   CAG   LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-TDD   9.21   ± 10173   CAG   LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-TDD   9.48   ± 10176   CAG   LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)   LTE-TDD   10.25   ± 10176   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10176   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10176   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10177   CAI   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10178   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10178   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.52   ± 10178   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)   LTE-FDD   6.50   ± 10181   CAE   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)   LTE-FDD   6.50   ± 10181   CAE   LTE-FDD (SC-FDMA, 1 RB	- Control of the Control			110/06/05/04/11/04/05/11		±9.6 %
10158   CAG		-				±9.6%
10159						±9.6 %
10160						±9.6 %
10161		_				±9.6%
10162						± 9.6 %
10166						± 9.6 %
10167						± 9.6 %
10168						± 9.6 %
10169   CAE						± 9.6 %
10170   CAE	10169	CAE		The state of the s		±9.6 %
10171   AAE	10170	CAE				±9.6 %
10172	10171	AAE			the second second second	± 9.6 %
10173	10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)			± 9.6 %
10174	10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)			±9.6 %
10175	10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	±9.6 %
10176	10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10178	10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	±9.6 %
10179   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)   LTE-FDD   6.50   ± 10180   CAG   LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)   LTE-FDD   6.50   ± 10181   CAE   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)   LTE-FDD   5.72   ± 10182   CAE   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)   LTE-FDD   6.52   ± 10183   AAD   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)   LTE-FDD   6.50   ± 10184   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)   LTE-FDD   5.73   ± 10185   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)   LTE-FDD   6.51   ± 10186   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)   LTE-FDD   6.50   ± 10187   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   5.73   ± 10188   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   6.50   ± 10189   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)   LTE-FDD   6.52   ± 10189   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)   LTE-FDD   6.50   ± 10193   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.09   ± 10194   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.12   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.11   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5,73	± 9.6 %
10179   CAG   LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)   LTE-FDD   6.50   ± 10180   CAG   LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)   LTE-FDD   6.50   ± 10181   CAE   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)   LTE-FDD   5.72   ± 10182   CAE   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)   LTE-FDD   6.52   ± 10183   AAD   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)   LTE-FDD   6.50   ± 10184   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)   LTE-FDD   5.73   ± 10185   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)   LTE-FDD   6.51   ± 10186   AAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)   LTE-FDD   6.50   ± 10187   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   5.73   ± 10188   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   6.50   ± 10189   AAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)   LTE-FDD   6.52   ± 10189   AAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)   LTE-FDD   6.50   ± 10193   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.09   ± 10194   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.12   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.11   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6 %
10180	10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)			± 9.6 %
10181   CAE	10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	±9.6 %
10183   AAD   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)   LTE-FDD   6.50   ± 10184   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)   LTE-FDD   5.73   ± 10185   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)   LTE-FDD   6.51   ± 10186   AAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)   LTE-FDD   6.50   ± 10187   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   5.73   ± 10188   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   6.52   ± 10189   AAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)   LTE-FDD   6.50   ± 10193   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.08   ± 10194   CAC   IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)   WLAN   8.12   ± 10195   CAC   IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)   WLAN   8.21   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.10   ± 10197   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QA	10181	CAE		LTE-FDD	5.72	±9.6%
10183   AAD   LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)   LTE-FDD   6.50   ± 10184   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)   LTE-FDD   5.73   ± 10185   CAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)   LTE-FDD   6.51   ± 10186   AAE   LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)   LTE-FDD   6.50   ± 10187   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   5.73   ± 10188   CAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)   LTE-FDD   6.52   ± 10189   AAF   LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, GPSK)   LTE-FDD   6.50   ± 10193   CAC   IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)   WLAN   8.09   ± 10194   CAC   IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)   WLAN   8.12   ± 10196   CAC   IEEE 802.11n (HT Greenfield, 65 Mbps, BPSK)   WLAN   8.21   ± 10196   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.10   ± 10197   CAC   IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.13   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)   WLAN   8.27   ± 10198   CAC   IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	10182			LTE-FDD	6.52	±9.6%
10184   CAE	the best was to be to be the	the same before the same of th		LTE-FDD	6.50	±9.6%
10186   AAE			LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6 %
10187         CAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)         LTE-FDD         5.73         ±           10188         CAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)         LTE-FDD         6.52         ±           10189         AAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)         LTE-FDD         6.50         ±           10193         CAC         IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)         WLAN         8.09         ±           10194         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 16-QAM)         WLAN         8.12         ±           10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±	Transfer (married great married					± 9.6 %
10188         CAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)         LTE-FDD         6.52         ±           10189         AAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)         LTE-FDD         6.50         ±           10193         CAC         IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)         WLAN         8.09         ±           10194         CAC         IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)         WLAN         8.12         ±           10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.21         ±           10196         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 18-QAM)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 36 Mbps, 64-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±						± 9.6 %
10189         AAF         LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)         LTE-FDD         6,50         ±           10193         CAC         IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)         WLAN         8.08         ±           10194         CAC         IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)         WLAN         8.12         ±           10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.21         ±           10196         CAC         IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±					5.73	±9.6 %
10193         CAC         IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)         WLAN         8.09         ±           10194         CAC         IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)         WLAN         8.12         ±           10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.21         ±           10196         CAC         IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±						± 9.6 %
10194         CAC         IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)         WLAN         8.12         ±           10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.21         ±           10196         CAC         IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±	Committee and the long or the second					± 9.6 %
10195         CAC         IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)         WLAN         8.21         ±           10196         CAC         IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±						±9.6 %
10196         CAC         IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)         WLAN         8.10         ±           10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±						± 9.6 %
10197         CAC         IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)         WLAN         8.13         ±           10198         CAC         IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)         WLAN         8.27         ±						±9.5 %
10198 CAC IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM) WLAN 8.27 ±						± 9.6 %
						±9.6 %
						± 9.6 %
10219 CAC   IEEE 802.11ft (H1 MIX86, 7.2 MDps, BPSK)   WLAN   8.03   ±	10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6%

Certificate No: EX3-3617\_Jan20/2

Page 12 of 23





EX3DV4- SN:3617	January 30, 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	±9.69
0224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
0225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	±9.6 %
0226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6 %
0227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	±9.63
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 %
0231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	±9.6 %
0232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	±9.69
0233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	±9.63
0234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	±9.6 %
0235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	±9.69
0236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	±9.65
0237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	±9.69
0238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	±9.6 9
0239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	±9.63
0240	CAF				Commission of the Commission o
0240	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK) LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TOD	9.21	±9.69
	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TOD	9.82	±9.69
0242			LTE-TDD	9.86	±9.61
0243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	±9.65
0244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	±9.65
0245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	±9.6
0246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6
0247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	±9.6
0248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	±9.6
0249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	±9.6
0250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	±9.6
0251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	±9.6
0252	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 9
0254	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	±9.61
0259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6
0260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6
0261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6
0262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6
0263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	±9.6
0264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6
0265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6
0266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	±9.6
0267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6
0268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6
0269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.00	± 9.6
	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 04-QAM)	LTE-TDD	9.58	± 9.6
0270		UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)		4.87	
0274	CAB		WCDMA		±9.6
0275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	±9.6
0277	CAA	PHS (QPSK)	PHS	11.81	± 9.6
0278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	±9.6
0279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6
0290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	±9.6
0291	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: EX3-3617\_Jan20/2

Page 13 of 23





EX3DV4- SN:3617 January 30, 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, 3 CTRL symbols)	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, 15 symbols)	WIMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	±9.6 %
10307	AAA	IEEE 802,16e WIMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	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, 18 symbols)	WIMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	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	± 9.6 %
10314	AAA	IDEN 1:6	IDEN	13.48	±9.6 %
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	±9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	±9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	±9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	±9.6 %
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	±9.69
10400	AAD	IEEE 802,11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	±9.6.9
10401	AAD	IEEE 802,11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	±9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	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	19.6%
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	±9.69
10410	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL. Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	± 9.6 9
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 duty cycle)	WLAN	1.54	±9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	WLAN	8.14	±9.63
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	WLAN	8.19	±9.6 9
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	±9.69
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 9
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	±9.6 9
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	±9.69
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 9
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	±9.65
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	±9.69
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-FDD	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 Subframe=2.3.4.7.8.9)	LTE-TDD	7.82	± 9.6 1
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	±9.69
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	±9.69
	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	±9.69
10449					

Certificate No: EX3-3617\_Jan20/2

Page 14 of 23





EX3DV4- SN:3617 January 30, 2020

10451 -	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	±9.6%
10453	AAD	Validation (Square, 10ms, 1ms)	Test	10.00	±9.6%
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	± 9.6 %
10457	AAA	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAA	CDMA2000 (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 %
10461	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL	LTE-TDD	8.30	±9.69
10463	AAB	Subframe≈2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL	LTE-TDD	8.56	± 9.6 9
0464	AAC	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL	LTE-TDD	7.82	±9.69
0465	AAC	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL.	LTE-TDD	8.32	±9.63
10466	AAC	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL	LTE-TDD	8.57	±9.6°
10467	AAF	Subframe=2,3,4,7,8,9)	LTE-TOD	7.82	
	2.000	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3.4,7,8,9)		0.000.0004	±9.6 °
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL	LTE-TDD	8.57	± 9.6
10473	AAE	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL	LTE-TDD	7.82	± 9.6
10474	AAE	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL.	LTE-TDD	8.32	±9.6
10475	AAE	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL	LTE-TDD	8.57	±9.6
10477	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL	LTE-TDD	8.32	±9.6
10478	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL	LTE-TDD	8.57	±9.6
0500000	AAB	Subframe=2,3,4,7,8,9)	39/02/11/03/04	7.74	
10479	1000000	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	100000	±9.6
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8,18	± 9.6
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	±9.6
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL	LTE-TDD	8.39	±9.6
10484	AAC	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL	LTE-TDD	8.47	± 9.6
10485	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL	LTE-TDD	7.59	±9.6
10486	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL	LTE-TDD	8.38	±9.6
10487	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL	LTE-TDD	8.60	±9.6
10488	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL	LTE-TDD	7.70	±9.6
10489	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL	LTE-TDD	8.31	±9.6
02031	AAF	Subframe=2,3,4,7,8,9)	2000	122.00	
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6

Certificate No: EX3-3617\_Jan20/2





EX3DV4- SN:3617 January 30, 2020

10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,6,9)	LTE-TDD	7.74	±9.6 %
10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL. Subframe=2.3.4.7.8.9)	LTE-TDD	8.41	±9.6%
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL	LTE-TDD	8.55	± 9.6 %
10494	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL.	LTE-TDD	8.37	±9.6 %
10496	AAF	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL	LTE-TDD	8.54	± 9.6 %
10497	AAB	Subframe=2,3.4,7,8.9) LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL	LTE-TDD	7.67	± 9.6 %
10498	AAB	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL	LTE-TDD	8.68	±9.6 %
10500	AAC	Subframe=2,3,4,7,8,9) LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	±9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3.4.7.8.9)	LTE-TDD	8.52	±9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL. Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL. Subframe=2.3,4,7,8,9)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2.3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TOD	7.74	±9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TOD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	WLAN	1.58	±9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1,58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	±9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	±9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	WLAN	8.42	±9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	WLAN	8.21	±9.69
10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	WLAN	8.36	± 9.6 9
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	WLAN	8.36	±9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	WLAN	8.38	± 9.6 %

Certificate No: EX3-3617\_Jan20/2 Page 16 of 23





EX3DV4- SN:3617 January 30, 2020

10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	WLAN	8.45	±9.6 %
10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	WLAN	8.45	±9.6%
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	WLAN	8.32	±9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	WLAN	8.54	±9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	WLAN	8.39	±9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	WLAN	8.46	±9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	WLAN	8.65	±9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	WLAN	8.65	±9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	WLAN	8.35	±9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	WLAN	8.49	±9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	WLAN	8.37	±9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	WLAN	8.38	±9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	WLAN	8.50	±9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	WLAN	8.42	±9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	WLAN	8.45	The second second
10554	AAC		The second secon		±9.6 %
	and the contract of the contra	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802,11ac WiFi (160MHz, MCS2, 99pc duty cycle)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802,11ac WiFi (160MHz, MCS3, 99pc duty cycle)	WLAN	8.52	±9.63
10558	AAC	IEEE 802,11ac WiFi (160MHz, MCS4, 99pc duty cycle)	WLAN	8.61	±9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	WLAN	8.56	±9.6 9
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	WLAN	8.77	± 9.6 9
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 1
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.13	±9.65
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	±9.6 9
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	± 9.6 9
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	± 9.6 1
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.30	± 9.6 °
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	±9.6
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	WLAN	1.99	± 9.6
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	± 9.6
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	±9.61
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty	WLAN	8.59	±9.61
10010	7001	cycle)	W.D.	0.00	2.0.0
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±9.6
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	± 9.6
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	± 9.6
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±9.6
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±9.6
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±9.6
	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±9.6
		THE PARTY OF THE P	1 FF 6 F 10 F	101,000	1 W. St. 155
10584 10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±9.6

Certificate No: EX3-3617\_Jan20/2

Page 17 of 23





EX3DV4- SN:3617 January 30, 2020

10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6 %
0588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±9.6 %
0589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
0590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
0591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	WLAN	8.63	± 9.6 %
0592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
0593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	WLAN	8.64	± 9.6 %
0594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
0595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	WLAN	8.74	±9.6 %
10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	WLAN	8.79	±9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	WLAN	8.76	
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	WLAN	8.97	±9.6 %
					±9.6 %
10606	BAA	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6 %
10607	BAA	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	WLAN		±9.6 %
10608	AAB	IEEE 802.11ac WIFI (20MHz, MCS1, 90pc duty cycle)	WLAN	8.77	±9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	WLAN	8.94	±9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	WLAN	8.81	±9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6 %
10624	BAA	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	WLAN	8.96	±9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	WLAN	8.72	±9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	WLAN	8.83	±9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	WLAN	8.80	±9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	WLAN		
10636	AAC		The state of the s	8.81	±9.6 %
		IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	WLAN	8.83	±9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	WLAN	8.86	±9.63
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6%
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	WLAN	8.98	± 9.6 9
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	WLAN	9.06	±9.6 9
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	WLAN	9.06	±9.69
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	WLAN	8.89	±9.69
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	WLAN	9.05	±9.69
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	WLAN	9.11	±9.69
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.69
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.69
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	±9.69
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	±9.69
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 9

Certificate No: EX3-3617\_Jan20/2

Page 18 of 23





EX3DV4- SN:3617 January 30, 2020

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 %
0658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
0659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
0660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
0661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
0662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
0670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
0671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc duty cycle)	WLAN	9.09	± 9.6 %
0672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc duty cycle)	WLAN	8.57	± 9.6 %
0673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc duty cycle)	WLAN	8.78	± 9.6 %
0674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
0675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc duty cycle)	WLAN	8.90	±9.69
0676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 9
0677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc duty cycle)	WLAN	8.73	± 9.6 9
0678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc duty cycle)	WLAN	8.78	±9.69
0679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc duty cycle)	WLAN	8,89	± 9.6 9
0680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc duty cycle)	WLAN	8.80	± 9.6 9
0681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc duty cycle)	WLAN	8.62	±9.6 °
0682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc duty cycle)	WLAN	8.83	± 9.6 °
0683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc duty cycle)	WLAN	8.42	± 9.6 °
0684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc duty cycle)	WLAN	8.26	± 9.6 °
0685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6 °
0686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc duty cycle)	WLAN	8.28	± 9.6 °
0687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc duty cycle)	WLAN	8.45	± 9.6 5
8890	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc duty cycle)	WLAN	8.29	±9.6
0689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc duty cycle)	WLAN	8.55	± 9.6 5
0690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
0691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc duty cycle)	WLAN	8.25	±9.6 °
0692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc duty cycle)	WLAN	8.29	± 9.6
0693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc duty cycle)	WLAN	8.25	± 9.6 °
0694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc duty cycle)	WLAN	8.57	±9.6
0695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc duty cycle)	WLAN	8.78	±9.65
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc duty cycle)	WLAN	8.91	±9.69
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc duty cycle)	WLAN	8.61	±9.6 9
0698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc duty cycle)	WLAN	8.89	±9.6
0699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc duty cycle)	WLAN	8.82	± 9.6 °
0700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc duty cycle)	WLAN	8.73	±9.6
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc duty cycle)	WLAN	8.86	±9.6 °
0702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc duty cycle)	WLAN	8.70	±9.6
0703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.61
0704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc duty cycle)	WLAN	8.56	±9.61
0705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc duty cycle)	WLAN	8.69	± 9.6
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc duty cycle)	WLAN	8.66	±9.6
0707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle)	WLAN	8.32	±9.6
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.61
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
0710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc duty cycle)	WLAN	8.29	±9.6
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc duty cycle)	WLAN	8.39	±9.6
0712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc duty cycle)	WLAN	8.67	±9.6
0713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc duty cycle)	WLAN	8.33	±9.6
0714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc duty cycle)	WLAN	8.26	±9.6
0715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc duty cycle)	WLAN	8.45	± 9.6
0716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc duty cycle)	WLAN	8.30	±9.6
0717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc duty cycle)	WLAN	8.48	± 9.6
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc duty cycle)	WLAN	8.24	± 9.6
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	WLAN	8.81	± 9.6
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc duty cycle)	WLAN	8.87	± 9.6
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc duty cycle)	WLAN	8.76	± 9.6
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc duty cycle)	WLAN	8,55	± 9.6
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc duty cycle)	WLAN	8.90	± 9.6
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc duty cycle)	WLAN	8.72	± 9.6

Certificate No: EX3-3617\_Jan20/2





EX3DV4- SN:3617 January 30, 2020

10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc duty cycle)	WLAN	8.66	± 9.6 %
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc duty cycle)	WLAN	8.65	±9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc duty cycle)	WLAN	8.64	±9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc duty cycle)	WLAN	8.67	±9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc duty cycle)	WLAN	8.46	±9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc duty cycle)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc duty cycle)	WLAN	8.25	±9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc duty cycle)	WLAN	8.33	±9.6 %
10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc duty cycle)	WLAN	8.27	±9.6 %
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc duty cycle)	WLAN	8.48	±9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc duty cycle)	WLAN	8,40	±9.6%
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc duty cycle)	WLAN	8,94	±9.6%
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc duty cycle)	WLAN	9.16	±9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc duty cycle)	WLAN	8.93	±9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MCS3, 90pc duty cycle)	WLAN	9.11	±9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc duty cycle)	WLAN	9.04	± 9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc duty cycle)	WLAN	8.93	± 9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc duty cycle)	WLAN	8.79	±9.6%
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc duty cycle)	WLAN	9.00	± 9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc duty cycle)	WLAN	8.94	±9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc duty cycle)	WLAN	8.64	± 9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc duty cycle)	WLAN	8.77	±9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc duty cycle)	WLAN	8.77	±9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc duty cycle)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc duty cycle)	WLAN	8.58	± 9.6 %
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc duty cycle)	WLAN	8.58	±9.6 %
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc duty cycle)	WLAN	8.53	±9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10766	AAA	IEEE 802.11ax (160MHz, MCS11, 99pc duty cycle)	WLAN	8.51	± 9.6 %
10767	AAB	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1	7.99	± 9.6 %
1000000	10000	Particular States of Company C	TDD	0.000,000	100000000
10768	AAB	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1	8.01	±9.6 %
10769	AAB	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1	8.01	± 9.6 %
10770	AAB	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1	8.02	± 9.6 %
10771	AAB	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1	8.02	±9.6 %
10772	AAB	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	TDD 5G NR FR1	8.23	±9.6 %
10773	AAB	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	TDD 5G NR FR1	8.03	± 9.6 %
10774	AAB	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	TDD 5G NR FR1	8.02	±9.6 %
10000000	17 63 63 6		TDD	1377	2000000
10776	AAB	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAB	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10780	AAB	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1	8.38	± 9.6 %
10781	AAB	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1	8.38	± 9.6 %

Certificate No: EX3-3617\_Jan20/2

Page 20 of 23