FCC SAR TEST REPORT

FCC ID	:	**LHJ-FE5NA0010**
Equipment	:	**FE5NA0010, FE5NA0011**
Brand Name	:	**Continental**
Model Name	:	**FE5NA0010, FE5NA0011**
Applicant	:	**Continental Automotive Systems, Inc. 21440 W Lake Cook Rd., Deer Park, IL 60010, USA**
Manufacturer	:	**Continental Automotive Systems, Inc. 21440 W Lake Cook Rd., Deer Park, IL 60010, USA**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

The product was installed into G12N510G1, G12N500G1 (Brand Name Continental, Model Name: G12N510G1, G12N500G1) during test.

The product was received on Nov. 20, 2023 and testing was started from Nov. 24, 2023 and completed on Jan. 17, 2024. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

Sporton International Inc. EMC & Wireless Communications Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan

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History of this test report

Report No.	Version	Description	Issued Date
FA2N2201-11	01	Initial issue of report	Feb. 08, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Continental Automotive Systems, Inc., FE5NA0010, FE5NA0011, FE5NA0010, FE5NA0011, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Body (Separation 25mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	WCDMA	WCDMA II	0.17	1.13
		WCDMA IV	0.26	
		WCDMA V	0.23	
	LTE	LTE Band 2	0.19	
		LTE Band 5	0.26	
		LTE Band 7	0.40	
		LTE Band 12	0.28	
		LTE Band 13	0.27	
		LTE Band 14	0.26	
		LTE Band 4 / 66	0.21	
		LTE Band 71	0.19	
	FR1	FR1 n5	0.25	
		FR1 n2 / n25	0.18	
		FR1 n41	0.74	
		FR1 n66	0.29	
		FR1 n71	0.19	
		FR1 n77	0.65	
Date of Testing:			2023/11/24 ~ 2024/1/17	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

Reviewed by: Jason Wang
Report Producer: Daisy Peng

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	FE5NA0010, FE5NA0011
Brand Name	Continental
Model Name	FE5NA0010, FE5NA0011
FCC ID	LHJ-FE5NA0010
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
Remark: 1. Based on the original filing Sporton SAR report No.:FA2N2201-07 to enable LTE B71 and 5G NR n2/n5/n41n/n66n/n71/n77 operation in this report 2. The internal antenna active only when the external antenna is broken and used for emergency purpose during an eCall, both antenna will not transmit simultaneous at same time.	

Host Information	
Equipment Name	G12N510G1, G12N500G1
Brand Name	Continental
Model Name	G12N510G1, G12N500G1
EUT Stage	Identical Prototype
Cell internal ANT1 Antenna Information	
Brand Name	Continental
Model Name	INTANT01
Cell internal ANT2 Antenna Information	
Brand Name	Continental
Model Name	INTANT02

Transmit band support antenna	
Antenna	Band
External / Internal	WCDMA B2
External / Internal	WCDMA B4
External / Internal	WCDMA B5
External / Internal	Band 2
External / Internal	Band 4
External / Internal	Band 5
External / Internal	Band 7
External / Internal	Band 12
External / Internal	Band 13
External / Internal	Band 14
External / Internal	Band 66
External / Internal	Band 71
External / Internal	n2
External / Internal	n5
External / Internal	n25
External / Internal	n41
External / Internal	n66
External / Internal	n71
External / Internal	n77

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	LHJ-FE5NA0010
Equipment Name	FE5NA0010, FE5NA0011
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz
Channel Bandwidth	LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 14: 5MHz, 10MHz LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3** Modulation | Channel bandwidth / Transmission bandwidth (N_{RB}) 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | MPR (dB) QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 64 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 2 64 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 3 256 QAM | ≥ 1 | ≤ 5
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power measurement please referred to section 10.
LTE Carrier Aggregation Additional Information	This device supports maximum of 5 carriers in the downlink and 2 carriers in the uplink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

LTE Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		

LTE Band 14				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Channel #	Channel #	Freq.(MHz)
L	23305	790.5	23330	793
M	23330	793		
H	23355	795.5		

LTE Band 66												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770

LTE Band 71								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133147	665.5	133172	668	133197	670.5	133222	673
M	133297	680.5	133297	680.5	133297	680.5	133297	680.5
H	133447	695.5	133422	693	133397	690.5	133372	688

3.1 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
FCC	LHJ-FE5NA0010
Equipment Name	FE5NA0010, FE5NA0011
Operating Frequency Range of each 5G NR transmission band	5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n25: 1850 MHz ~ 1915 MHz 5G NR n41: 2496 MHz ~ 2690 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n71: 663 MHz ~ 698 MHz 5G NR n77: 3700MHz ~ 3980MHz
Channel Bandwidth	5G NR n2: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n5: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n25: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n41: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 80MHz, 90MHz, 100MHz 5G NR n66: 5MHz, 10MHz, 15MHz, 20MHz,30MHz, 40MHz 5G NR n71: 5MHz, 10MHz, 15MHz, 20MHz 5G NR n77: 20MHz, 25MHz, 30MHz, 40MHz, 50MHz, 60MHz, 70MHz, 80MHz, 90MHz, 100MHz
SCS	FDD: SCS15KHz, TDD: SCS30KHz
uplink modulations used	DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM CP-OFDM QPSK / 16QAM / 64QAM / 256QAM
A-MPR (Additional MPR) disabled for SAR Testing?	Yes
LTE Anchor Bands for n2	LTE B2/5/12/14/66
LTE Anchor Bands for n5	LTE B2/5/66
LTE Anchor Bands for n66	LTE B2/5/12/14/66
LTE Anchor Bands for n78	LTE B2/5/12/14/66

NR Band 2

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376000	1880	376000	1880	376000	1880	376000	1880
H	381500	1907.5	381000	1905	380500	1902.5	380000	1900

NR Band 5

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	165300	826.5	165800	829	166300	831.5	166800	834
M	167300	836.5	167300	836.5	167300	836.5	167300	836.5
H	169300	846.5	168800	844	168300	841.5	167800	839

NR Band 25

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	370500	1852.5	371000	1855	371500	1857.5	372000	1860
M	376500	1882.5	376500	1882.5	376500	1882.5	376500	1882.5
H	382500	1912.5	382000	1910	381500	1907.5	381000	1905

NR Band 41

	Bandwidth20MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	502002	2510.01	503004	2515.02	504000	2520	505002	2525.01	506004	2530.02	508002	2540.01	509004	2545.02	510000	2550
M	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99	518598	2592.99
H	535998	2679.99	534996	2674.98	534000	2670	532998	2664.99	531996	2659.98	529998	2649.99	528996	2644.98	528000	2640

NR Band 66

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz		Bandwidth 30MHz		Bandwidth 40MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	342500	1712.5	343000	1715	343500	1717.5	344000	1720	345000	1725	346000	1730
M	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745	349000	1745
H	355500	1777.5	355000	1775	354500	1772.5	354000	1770	353000	1765	352000	1760

NR Band 71

	Bandwidth 5MHz		Bandwidth 10MHz		Bandwidth 15MHz		Bandwidth 20MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	133100	665.5	133600	668	13410	670.5	134600	673
M	136100	680.5	136100	680.5	136100	680.5	136100	680.5

H	139100		695.5		138600		693		13810		690.5		137600		688	
NR Band 77																
	Bandwidth 20MHz		Bandwidth25MHz		Bandwidth30MHz		Bandwidth 40MHz		Bandwidth 50MHz		Bandwidth 60MHz		Bandwidth 70MHz		Bandwidth 80MHz		Bandwidth 90MHz		Bandwidth100MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	647334	3710.01	647500	3712.5	647668	3715.02	648000	3720	648334	3725.01	648668	3730.02	649000	3735	649334	3740.01	649668	3745.02	650000	3750
M	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840	656000	3840
H	664666	3969.99	664500	3967.50	664332	3964.98	664000	3960	663666	3954.99	663332	3949.98	663000	3945	662666	3939.99	662332	3934.98	662000	3930

4. RF Exposure Limits

4.1 Uncontrolled Environment

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

4.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

5. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

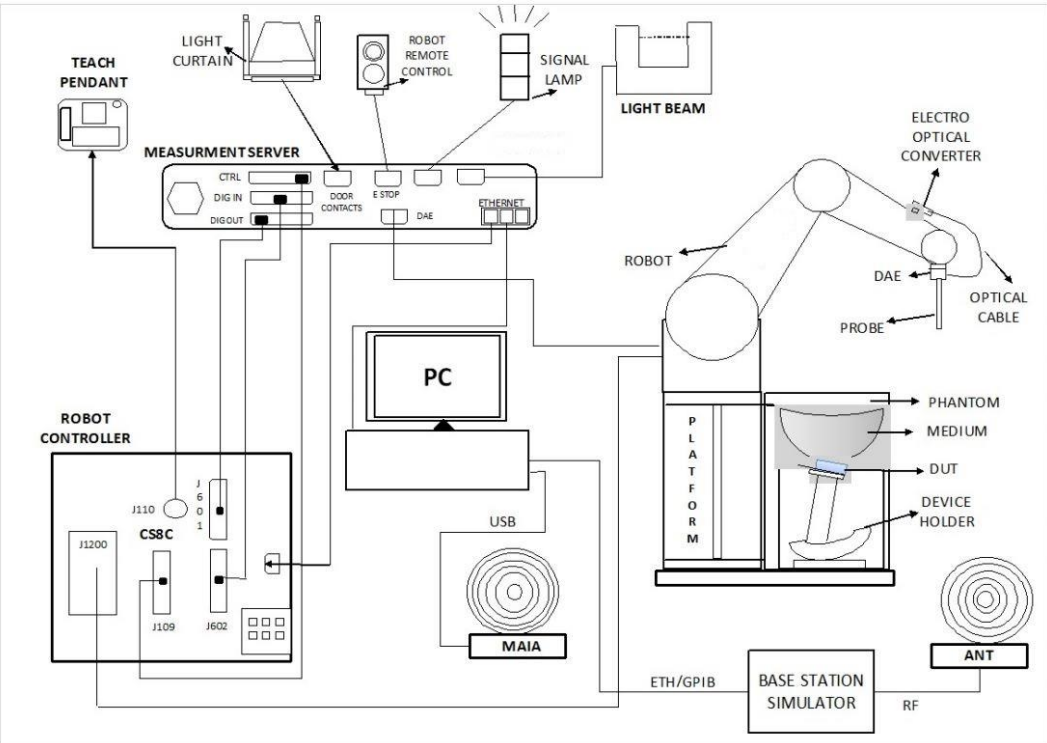
SAR is expressed in units of Watts per kilogram (W/kg)

$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}|\mathbf{E}|^2}{\boldsymbol{\rho}}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

6. System Description and Setup

The DASY system used for performing compliance tests consists of the following items:



- The DASY system in SAR Configuration is shown above
- A standard high precision 6-axis robot 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 windows software and the DASY 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.

6.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY

6.2 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

6.3 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists 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 and 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.

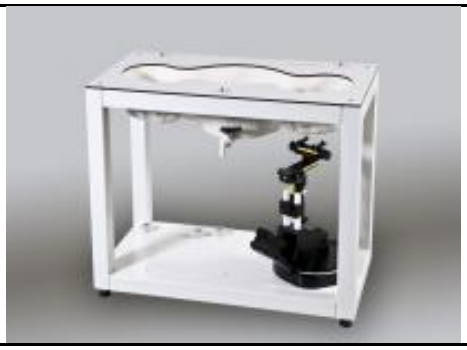
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

6.4 Phantom

<SAM Twin Phantom>

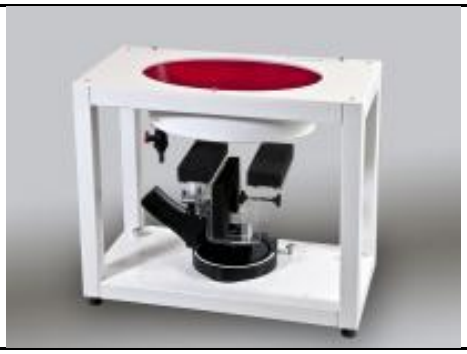
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm



The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

6.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

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 positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

7. Measurement Procedures

The measurement procedures are as follows:

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

7.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

7.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

7.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

7.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit(2)	D750V3	1117	Mar. 24, 2022	Mar. 22, 2024
SPEAG	1750MHz System Validation Kit(2)	D1750V2	1068	Nov. 21, 2022	Nov. 19, 2024
SPEAG	1900MHz System Validation Kit(2)	D1900V2	5d093	Mar. 25, 2022	Mar. 23, 2024
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1008	Aug. 17, 2021	Aug. 14, 2024
SPEAG	3500MHz System Validation Kit(2)	D3500V2	1014	Jan. 17, 2022	Jan. 15, 2024
SPEAG	3500MHz System Validation Kit(2)	D3500V2	1036	Mar. 23, 2022	Mar. 21, 2024
SPEAG	3700MHz System Validation Kit(2)	D3700V2	1022	Jul. 14, 2021	Jul. 11, 2024
SPEAG	3900MHz System Validation Kit(2)	D3900V2	1017	Apr. 22, 2022	Apr. 20, 2024
SPEAG	Data Acquisition Electronics	DAE4	854	Aug. 17, 2023	Aug. 16, 2024
SPEAG	Data Acquisition Electronics	DAE4ip	1823	Jul. 31, 2023	Jul. 30, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	3642	Apr. 26, 2023	Apr. 25, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	7822	Aug. 02, 2023	Aug. 01, 2024
Testo	Hygro meter	608-H1	45196600	Nov. 02, 2023	Nov. 01, 2024
Anritsu	Radio Communication Analyzer	MT8821C	6201074414	Aug. 23, 2023	Aug. 22, 2024
Keysight	5G Wireless Test Platform	E7515B	MY59321826	Apr. 26, 2023	Apr. 25, 2024
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Sep. 27, 2023	Sep. 26, 2024
Keysight	ENA Network Analyzer	E5071C	MY46104758	Oct. 30, 2023	Oct. 29, 2024
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 19, 2023	Sep. 18, 2024
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3690	Aug. 09, 2023	Aug. 08, 2024
Anritsu	Power Meter	ML2495A	1419002	Aug. 17, 2023	Aug. 16, 2024
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2023	Aug. 17, 2024
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 10, 2023	Jul. 09, 2024
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 16, 2023	Oct. 15, 2024
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

9. System Verification

9.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.4	0.891	43.000	0.89	41.90	0.11	2.63	±5	2023/11/24
1750	22.4	1.370	40.500	1.37	40.10	0.00	1.00	±5	2023/11/24
1900	22.4	1.410	38.600	1.40	40.00	0.71	-3.50	±5	2023/11/24
2600	22.5	1.960	37.900	1.96	39.00	0.00	-2.82	±5	2023/11/25
2600	22.2	1.990	38.800	1.96	39.00	1.53	-0.51	±5	2024/1/17
3500	22.5	2.860	37.700	2.91	37.90	-1.72	-0.53	±5	2023/11/25
3500	22.4	2.860	37.600	2.91	37.90	-1.72	-0.79	±5	2024/1/17
3700	22.5	3.040	37.500	3.12	37.70	-2.56	-0.53	±5	2023/11/25
3700	22.4	3.070	37.500	3.12	37.70	-1.60	-0.53	±5	2024/1/17
3900	22.5	3.230	37.400	3.33	37.51	-3.00	-0.29	±5	2023/11/25
3900	22.4	3.280	37.200	3.33	37.51	-1.50	-0.83	±5	2024/1/17

9.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Test Site
2023/11/24	750	50	D750V3-1117	EX3DV4 - SN3642	DAE4 Sn854	0.415	8.520	8.3	-2.58	SAR-01
2023/11/24	1750	50	D1750V2-1068	EX3DV4 - SN3642	DAE4 Sn854	1.710	36.700	34.2	-6.81	SAR-01
2023/11/24	1900	50	D1900V2-5d093	EX3DV4 - SN3642	DAE4 Sn854	1.910	39.900	38.2	-4.26	SAR-01
2023/11/25	2600	50	D2600V2-1008	EX3DV4 - SN3642	DAE4 Sn854	2.650	58.000	53	-8.62	SAR-01
2024/1/17	2600	250	D2600V2-1008	EX3DV4 - SN7822	DAE4ip Sn1823	14.300	58.000	57.2	-1.38	SAR-04
2023/11/25	3500	50	D3500V2-1014	EX3DV4 - SN3642	DAE4 Sn854	3.190	67.200	63.8	-5.06	SAR-01
2024/1/17	3500	250	D3500V2-1036	EX3DV4 - SN7822	DAE4ip Sn1823	15.800	67.400	63.2	-6.23	SAR-04
2023/11/25	3700	50	D3700V2-1022	EX3DV4 - SN3642	DAE4 Sn854	3.150	68.200	63	-7.62	SAR-01
2024/1/17	3700	250	D3700V2-1022	EX3DV4 - SN7822	DAE4ip Sn1823	16.100	68.200	64.4	-5.57	SAR-04
2023/11/25	3900	50	D3900V2-1017-3900	EX3DV4 - SN3642	DAE4 Sn854	3.150	68.700	63	-8.30	SAR-01
2024/1/17	3900	250	D3900V2-1017-3900	EX3DV4 - SN7822	DAE4ip Sn1823	16.800	68.700	67.2	-2.18	SAR-04

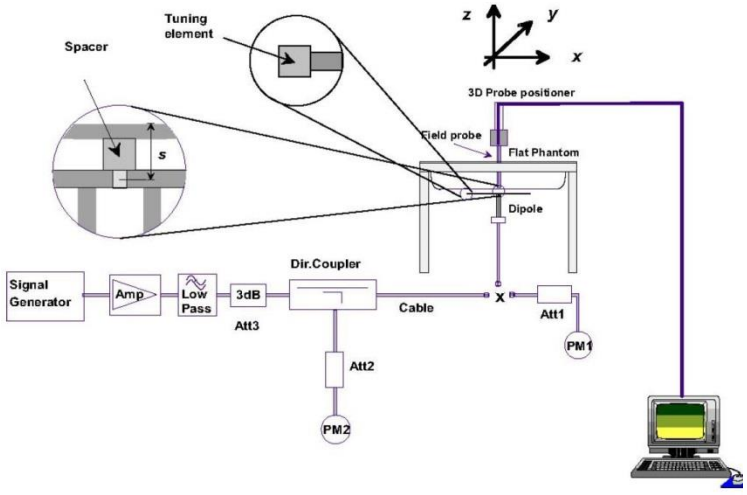


Fig 8.3.1 System Performance Check Setup

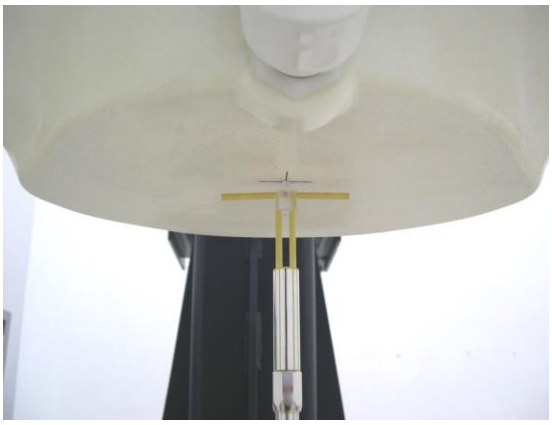


Fig 8.3.2 Setup Photo

10. LTE Output Power (Unit: dBm)

<LTE Conducted Power>

General Note:

1. A Base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

<LTE Band 71_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				133222	133297	133372	
Frequency (MHz)				673	680.5	688	
20	QPSK	1	0	22.50	22.46	22.37	24
20	QPSK	1	49	22.39	22.28	22.19	
20	QPSK	1	99	22.36	22.25	22.22	
20	QPSK	50	0	21.44	21.30	21.31	23
20	QPSK	50	24	21.59	21.50	21.46	
20	QPSK	50	50	21.56	21.44	21.36	
20	QPSK	100	0	21.52	21.47	21.35	
20	16QAM	1	0	21.84	21.74	21.71	23
20	16QAM	1	49	21.71	21.66	21.54	
20	16QAM	1	99	21.73	21.65	21.54	
20	16QAM	50	0	20.43	20.33	20.24	22
20	16QAM	50	24	20.56	20.50	20.36	
20	16QAM	50	50	20.56	20.41	20.35	
20	16QAM	100	0	20.52	20.44	20.33	
20	64QAM	1	0	21.22	21.16	21.04	22
20	64QAM	1	49	20.98	20.91	20.72	
20	64QAM	1	99	20.92	20.84	20.65	
20	64QAM	50	0	19.80	19.70	19.55	21
20	64QAM	50	24	19.91	19.77	19.63	
20	64QAM	50	50	19.80	19.74	19.58	
20	64QAM	100	0	19.90	19.76	19.66	
Channel				133197	133297	133397	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	QPSK	1	0	22.38	22.36	22.35	24
15	QPSK	1	37	22.35	22.20	22.16	
15	QPSK	1	74	22.36	22.24	22.18	
15	QPSK	36	0	21.52	21.48	21.45	23
15	QPSK	36	20	21.37	21.20	21.28	
15	QPSK	36	39	21.47	21.43	21.34	
15	QPSK	75	0	21.52	21.46	21.28	
15	16QAM	1	0	21.75	21.65	21.62	23
15	16QAM	1	37	21.65	21.60	21.54	
15	16QAM	1	74	21.73	21.57	21.51	
15	16QAM	36	0	20.37	20.25	20.23	22
15	16QAM	36	20	20.46	20.43	20.34	
15	16QAM	36	39	20.55	20.40	20.32	
15	16QAM	75	0	20.49	20.41	20.25	
15	64QAM	1	0	21.20	21.08	21.00	22
15	64QAM	1	37	20.94	20.83	20.67	
15	64QAM	1	74	20.88	20.75	20.62	
15	64QAM	36	0	19.80	19.60	19.47	21
15	64QAM	36	20	19.89	19.76	19.56	
15	64QAM	36	39	19.70	19.71	19.53	
15	64QAM	75	0	19.83	19.67	19.62	
Channel				133172	133297	133422	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	QPSK	1	0	22.42	22.46	22.31	24
10	QPSK	1	25	22.36	22.19	22.14	
10	QPSK	1	49	22.35	22.15	22.19	
10	QPSK	25	0	21.54	21.50	21.45	23
10	QPSK	25	12	21.34	21.25	21.31	
10	QPSK	25	25	21.47	21.40	21.28	
10	QPSK	50	0	21.46	21.40	21.28	
10	16QAM	1	0	21.81	21.68	21.68	23
10	16QAM	1	25	21.71	21.60	21.54	
10	16QAM	1	49	21.68	21.59	21.48	

10	16QAM	25	0	20.43	20.25	20.22	22
10	16QAM	25	12	20.56	20.46	20.27	
10	16QAM	25	25	20.47	20.41	20.33	
10	16QAM	50	0	20.48	20.42	20.24	
10	64QAM	1	0	21.14	21.08	20.99	22
10	64QAM	1	25	20.94	20.86	20.62	
10	64QAM	1	49	20.89	20.80	20.62	
10	64QAM	25	0	19.70	19.70	19.50	21
10	64QAM	25	12	19.85	19.73	19.62	
10	64QAM	25	25	19.74	19.70	19.50	
10	64QAM	50	0	19.88	19.74	19.66	
Channel				133147	133297	133447	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	QPSK	1	0	22.46	22.37	22.36	24
5	QPSK	1	12	22.39	22.20	22.12	
5	QPSK	1	24	22.35	22.15	22.17	
5	QPSK	12	0	21.51	21.43	21.44	23
5	QPSK	12	7	21.37	21.23	21.22	
5	QPSK	12	13	21.54	21.41	21.28	
5	QPSK	25	0	21.45	21.47	21.29	
5	16QAM	1	0	21.76	21.70	21.62	23
5	16QAM	1	12	21.69	21.65	21.49	
5	16QAM	1	24	21.67	21.64	21.44	
5	16QAM	12	0	20.43	20.30	20.21	22
5	16QAM	12	7	20.51	20.48	20.34	
5	16QAM	12	13	20.47	20.38	20.26	
5	16QAM	25	0	20.44	20.43	20.27	
5	64QAM	1	0	21.21	21.13	21.01	22
5	64QAM	1	12	20.95	20.88	20.63	
5	64QAM	1	24	20.85	20.83	20.61	
5	64QAM	12	0	19.73	19.60	19.53	21
5	64QAM	12	7	19.91	19.68	19.53	
5	64QAM	12	13	19.80	19.64	19.52	
5	64QAM	25	0	19.81	19.70	19.62	

11. 5G NR Output Power (Unit: dBm)

General Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below
   a. For DFT-OFDM output power measurement, full measurement was done for Pi/2 BPSK and QPSK and for the largest supported bandwidth, repeat test for 16QAM/64QAM/256QAM under 1RB 1Offset configuration. For smaller bandwidth, measure conducted power for Pi/2 BPSK and 1RB 1Offset configuration.
   b. According to the tune-up, CP-OFDM output power is not ½ dB higher than DFT-OFDM mode, and the reported SAR of DFT-OFDM mode reported SAR is ≤ 1.45 W/kg, SAR test and thus conducted power for CP-OFDM mode is not required.
   c. To start SAR test for the largest channel bandwidth for PI/2 BPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. Also do SAR test for 50% RB allocation for PI/2 BPSK SAR testing using 1RB PI/2 BPSK allocation procedure
   d. For PI/2 BPSK with 100% RB allocation, SAR test is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
   e. For higher modulation QPSK/16QAM/64QAM/256QAM, according to tune-up document the power level is not ½ dB higher than the same configuration in PI/2 BPSK, also reported SAR for the PI/2 BPSK configuration is less than 1.45 W/kg, QPSK/16QAM/64QAM/256QAM SAR testing are not required.
   f. Smaller bandwidth output power for each RB allocation configuration for this device is not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg, smaller bandwidth SAR testing is not required for this device
2. Due to test setup limitations, SAR testing for NR was performed using Factory Test Mode software to establish the connection and perform SAR with 100% transmission. And only for TDD power class2 was performed using Factory Test Mode software to establish the connection and perform SAR with 50% transmission

<3GPP 38.101 MPR for EN-DC>

Table 6.2.2-1 Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]	≤ 0.5[2]	0[2]
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		
NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.				
NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.				

Table 6.2.2-2 Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

<FR1 n2_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				372000	376000	380000	
Frequency (MHz)				1860	1880	1900	
20	PI/2 BPSK	1	1	22.80	22.94	22.75	24.0
20	PI/2 BPSK	1	53	22.63	22.71	22.66	
20	PI/2 BPSK	1	104	22.66	22.68	22.67	
20	PI/2 BPSK	50	0	22.18	22.22	22.14	23.5
20	PI/2 BPSK	50	28	22.68	22.74	22.70	24.0
20	PI/2 BPSK	50	56	22.20	22.21	22.12	23.5
20	PI/2 BPSK	100	0	22.17	22.17	22.08	
20	QPSK	1	1	22.66	22.80	22.56	24.0
20	QPSK	1	53	22.86	22.87	22.78	
20	QPSK	1	104	22.75	22.77	22.75	
20	QPSK	50	0	21.63	21.71	21.68	23.0
20	QPSK	50	28	22.62	22.72	22.62	24.0
20	QPSK	50	56	21.57	21.66	21.57	23.0
20	QPSK	100	0	21.58	21.68	21.59	
20	16QAM	1	1	21.49	21.56	21.47	23.0
20	64QAM	1	1	19.91	19.91	19.84	21.5
20	256QAM	1	1	18.33	18.35	18.26	19.5
Channel				371500	376000	380500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	PI/2 BPSK	1	1	22.72	22.89	22.65	24.0
Channel				371000	376000	381000	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	PI/2 BPSK	1	1	22.79	22.85	22.65	24.0
Channel				370500	376000	381500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	PI/2 BPSK	1	1	22.74	22.93	22.67	24.0

<FR1 n5_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				166800	167300	167800	
Frequency (MHz)				834	836.5	839	
20	PI/2 BPSK	1	1	22.75	22.83	22.74	24.0
20	PI/2 BPSK	1	53	22.67	22.67	22.57	
20	PI/2 BPSK	1	104	22.57	22.62	22.52	
20	PI/2 BPSK	50	0	22.14	22.18	22.12	23.5
20	PI/2 BPSK	50	28	22.69	22.70	22.67	24.0
20	PI/2 BPSK	50	56	22.04	22.11	22.08	23.5
20	PI/2 BPSK	100	0	22.11	22.14	22.06	
20	QPSK	1	1	22.68	22.80	22.71	24.0
20	QPSK	1	53	22.67	22.77	22.74	
20	QPSK	1	104	22.75	22.79	22.79	
20	QPSK	50	0	21.76	21.86	21.77	23.0
20	QPSK	50	28	22.49	22.59	22.58	24.0
20	QPSK	50	56	21.72	21.73	21.65	23.0
20	QPSK	100	0	21.60	21.69	21.59	
20	16QAM	1	1	21.59	21.65	21.57	23.0
20	64QAM	1	1	19.98	20.00	19.93	21.5
20	256QAM	1	1	18.42	18.42	18.35	19.5
Channel				166300	167300	168300	Tune-up limit (dBm)
Frequency (MHz)				831.5	836.5	841.5	
15	PI/2 BPSK	1	1	22.72	22.73	22.71	24.0
Channel				165800	167300	168800	Tune-up limit (dBm)
Frequency (MHz)				829	836.5	844	
10	PI/2 BPSK	1	1	22.74	22.82	22.68	24.0
Channel				165300	167300	169300	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	PI/2 BPSK	1	1	22.66	22.73	22.66	24.0

<FR1 n25_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				372000	376500	381000	
Frequency (MHz)				1860	1882.5	1905	
20	PI/2 BPSK	1	1	23.04	22.96	22.82	24.0
20	PI/2 BPSK	1	53	22.78	22.62	22.40	
20	PI/2 BPSK	1	104	22.80	22.65	22.50	
20	PI/2 BPSK	50	0	22.26	22.09	21.96	23.5
20	PI/2 BPSK	50	28	22.69	22.57	22.34	24.0
20	PI/2 BPSK	50	56	22.16	22.06	21.76	23.5
20	PI/2 BPSK	100	0	22.22	22.13	21.87	
20	QPSK	1	1	22.94	22.79	22.56	24.0
20	QPSK	1	53	22.94	22.86	22.56	
20	QPSK	1	104	22.91	22.76	22.60	
20	QPSK	50	0	21.84	21.71	21.45	23.0
20	QPSK	50	28	22.79	22.69	22.47	24.0
20	QPSK	50	56	21.68	21.57	21.29	23.0
20	QPSK	100	0	21.78	21.60	21.41	
20	16QAM	1	1	21.64	21.54	21.34	23.0
20	64QAM	1	1	20.11	19.93	19.73	21.5
20	256QAM	1	1	18.47	18.31	18.14	19.5
Channel				371500	376500	381500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1882.5	1907.5	
15	PI/2 BPSK	1	1	23.01	22.86	22.80	24.0
Channel				371000	376500	382000	Tune-up limit (dBm)
Frequency (MHz)				1855	1882.5	1910	
10	PI/2 BPSK	1	1	22.96	22.86	22.76	24.0
Channel				370500	376500	382500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1882.5	1912.5	
5	PI/2 BPSK	1	1	22.94	22.93	22.80	24.0

<FR1 n66_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				346000	349000	352000	
Frequency (MHz)				1730	1745	1760	
40	PI/2 BPSK	1	1	23.08	23.01	23.16	24.0
40	PI/2 BPSK	1	108	22.86	22.85	22.87	
40	PI/2 BPSK	1	214	22.85	22.82	22.91	
40	PI/2 BPSK	108	0	22.25	22.30	22.34	23.5
40	PI/2 BPSK	108	54	22.68	22.65	22.73	24.0
40	PI/2 BPSK	108	108	22.20	22.25	22.30	23.5
40	PI/2 BPSK	216	0	22.25	22.26	22.31	
40	QPSK	1	1	22.77	22.74	22.95	24.0
40	QPSK	1	108	23.00	22.96	23.00	
40	QPSK	1	214	23.05	23.00	23.05	
40	QPSK	108	0	21.74	21.77	21.80	23.0
40	QPSK	108	54	22.72	22.73	22.73	24.0
40	QPSK	108	108	21.73	21.69	21.77	23.0
40	QPSK	216	0	21.71	21.79	21.79	
40	16QAM	1	1	21.70	21.65	21.70	23.0
40	64QAM	1	1	20.07	20.02	20.12	21.5
40	256QAM	1	1	18.51	18.55	18.58	19.5
Channel				345000	349000	353000	Tune-up limit (dBm)
Frequency (MHz)				1725	1745	1765	
30	PI/2 BPSK	1	1	23.03	22.99	23.07	24.0
Channel				344000	349000	354000	Tune-up limit (dBm)
Frequency (MHz)				1720	1745	1770	
20	PI/2 BPSK	1	1	23.03	22.96	23.12	24.0
Channel				343500	349000	354500	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	PI/2 BPSK	1	1	23.03	22.98	23.14	24.0
Channel				343000	349000	355000	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	PI/2 BPSK	1	1	23.04	22.91	23.12	24.0
Channel				342500	349000	355500	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	PI/2 BPSK	1	1	23.05	22.98	23.13	24.0

<FR1 n71_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				134600	136100	137600	
Frequency (MHz)				673	680.5	688	
20	PI/2 BPSK	1	1	22.86	22.84	22.80	24.0
20	PI/2 BPSK	1	53	22.63	22.54	22.59	
20	PI/2 BPSK	1	104	22.55	22.52	22.53	
20	PI/2 BPSK	50	0	22.21	22.15	22.20	23.5
20	PI/2 BPSK	50	28	22.63	22.58	22.57	24.0
20	PI/2 BPSK	50	56	22.19	22.11	22.14	23.5
20	PI/2 BPSK	100	0	22.10	22.06	22.07	
20	QPSK	1	1	22.76	22.64	22.67	24.0
20	QPSK	1	53	22.78	22.78	22.77	
20	QPSK	1	104	22.64	22.61	22.55	
20	QPSK	50	0	21.76	21.74	21.72	23.0
20	QPSK	50	28	22.61	22.55	22.60	24.0
20	QPSK	50	56	21.58	21.53	21.50	23.0
20	QPSK	100	0	21.62	21.57	21.52	
20	16QAM	1	1	21.50	21.49	21.46	23.0
20	64QAM	1	1	20.00	19.93	19.95	21.5
20	256QAM	1	1	18.44	18.41	18.38	19.5
Channel				134100	136100	138100	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	PI/2 BPSK	1	1	22.83	22.83	22.71	24.0
Channel				133600	136100	138600	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	PI/2 BPSK	1	1	22.84	22.81	22.74	24.0
Channel				133100	136100	139100	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	PI/2 BPSK	1	1	22.79	22.77	22.75	24.0

<FR1 n41_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				509202	518598	528000	
Frequency (MHz)				2546.01	2592.99	2640	
100	PI/2 BPSK	1	1	23.85	23.68	23.42	24.0
100	PI/2 BPSK	1	137	23.33	23.15	23.19	
100	PI/2 BPSK	1	271	22.75	22.54	22.53	
100	PI/2 BPSK	135	0	23.02	22.76	22.78	23.5
100	PI/2 BPSK	135	69	23.30	23.20	23.17	24.0
100	PI/2 BPSK	135	138	22.50	22.25	22.25	23.5
100	PI/2 BPSK	270	0	22.83	22.58	22.63	
100	QPSK	1	1	23.80	23.55	23.54	24.0
100	QPSK	1	137	23.37	23.20	23.26	
100	QPSK	1	271	22.78	22.60	22.61	
100	QPSK	135	0	22.52	22.29	22.29	24.0
100	QPSK	135	69	23.28	23.04	23.10	
100	QPSK	135	138	22.06	22.04	22.13	
100	QPSK	270	0	22.33	22.10	22.19	23.0
100	16QAM	1	1	22.96	22.71	22.74	23.0
100	64QAM	1	1	21.07	20.80	20.88	21.5
100	256QAM	1	1	19.47	19.21	19.28	19.5
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	23.77	23.66	23.34	24.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	23.77	23.67	23.33	24.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	23.76	23.68	23.36	24.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	23.77	23.65	23.42	24.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	23.83	23.68	23.38	24.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	23.82	23.65	23.38	24.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	23.76	23.58	23.32	24.0

<FR1 n41_Ant 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				509202	518598	528000	
Frequency (MHz)				2546.01	2592.99	2640	
100	PI/2 BPSK	1	1	23.08	22.98	22.94	24.0
100	PI/2 BPSK	1	137	22.81	22.80	22.73	
100	PI/2 BPSK	1	271	23.07	22.97	22.93	
100	PI/2 BPSK	135	0	22.29	22.19	22.18	23.5
100	PI/2 BPSK	135	69	22.92	22.79	22.73	24.0
100	PI/2 BPSK	135	138	22.28	22.29	22.37	23.5
100	PI/2 BPSK	270	0	22.31	22.24	22.23	
100	QPSK	1	1	22.86	22.80	22.84	24.0
100	QPSK	1	137	22.90	22.79	22.81	
100	QPSK	1	271	22.96	22.93	22.80	
100	QPSK	135	0	22.07	22.01	22.09	24.0
100	QPSK	135	69	22.82	22.80	22.80	
100	QPSK	135	138	22.08	22.02	22.06	
100	QPSK	270	0	21.79	21.79	21.79	23.0
100	16QAM	1	1	21.74	21.71	21.66	23.0
100	64QAM	1	1	19.86	19.82	19.83	21.5
100	256QAM	1	1	18.53	18.40	18.45	19.5
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	22.82	22.81	22.76	24.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	22.89	22.73	22.90	24.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	22.78	22.73	22.89	24.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	22.87	22.74	22.86	24.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	22.85	22.74	22.80	24.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	22.87	22.70	22.84	24.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	22.77	22.62	22.79	24.0

<FR1 n41_HPUE_Ant 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				509202	518598	528000	
Frequency (MHz)				2546.01	2592.99	2640	
100	PI/2 BPSK	1	1	25.64	25.37	25.52	27.0
100	PI/2 BPSK	1	137	25.39	25.26	25.28	
100	PI/2 BPSK	1	271	25.62	25.33	25.51	
100	PI/2 BPSK	135	0	24.86	24.77	24.91	26.5
100	PI/2 BPSK	135	69	25.47	25.34	25.34	27.0
100	PI/2 BPSK	135	138	24.88	24.86	24.88	26.5
100	PI/2 BPSK	270	0	24.99	24.82	24.91	
100	QPSK	1	1	25.57	25.38	25.45	27.0
100	QPSK	1	137	25.50	25.41	25.47	
100	QPSK	1	271	25.41	25.56	25.54	
100	QPSK	135	0	25.34	25.29	25.43	27.0
100	QPSK	135	69	25.44	25.32	25.34	
100	QPSK	135	138	24.48	24.38	24.51	
100	QPSK	270	0	24.44	24.37	24.54	26.0
100	16QAM	1	1	24.58	24.39	24.39	26.0
100	64QAM	1	1	22.62	22.52	22.54	24.5
100	256QAM	1	1	20.98	20.98	20.97	22.5
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	25.48	25.22	25.40	27.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	25.51	25.27	25.47	27.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	25.55	25.20	25.51	27.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	25.51	25.19	25.40	27.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	25.53	25.30	25.46	27.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	25.49	25.18	25.37	27.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	25.63	25.44	25.57	27.0

<FR1 n77_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
100	PI/2 BPSK	1	1	23.81	23.57	23.46	
100	PI/2 BPSK	1	137	23.66	23.35	23.28	24.0
100	PI/2 BPSK	1	271	23.63	23.35	23.23	
100	PI/2 BPSK	135	0	23.18	22.91	22.79	23.5
100	PI/2 BPSK	135	69	23.57	23.27	23.13	24.0
100	PI/2 BPSK	135	138	23.09	22.83	22.64	
100	PI/2 BPSK	270	0	23.11	22.79	22.68	23.5
100	QPSK	1	1	23.72	23.39	23.35	
100	QPSK	1	137	23.67	23.41	23.29	24.0
100	QPSK	1	271	23.64	23.36	23.19	
100	QPSK	135	0	22.66	22.35	22.28	
100	QPSK	135	69	23.58	23.34	23.21	24.0
100	QPSK	135	138	22.59	22.26	22.18	
100	QPSK	270	0	22.58	22.25	22.14	23.0
100	16QAM	1	1	22.93	22.67	22.55	23.0
100	64QAM	1	1	21.05	20.73	20.70	21.5
100	256QAM	1	1	19.45	19.21	19.07	19.5
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	23.74	23.54	23.38	24.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	23.72	23.48	23.42	24.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	23.74	23.54	23.41	24.0
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	23.78	23.52	23.46	24.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	23.77	23.53	23.36	24.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	23.76	23.48	23.45	24.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	23.77	23.53	23.42	24.0
Channel				647500	656000	664500	Tune-up limit (dBm)
Frequency (MHz)				3712.5	3840.00	3967.50	
25	PI/2 BPSK	1	1	23.75	23.52	23.37	24.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	23.74	23.57	23.39	24.0

<FR1 n77_Ant 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
100	PI/2 BPSK	1	1	23.45	22.91	22.99	24.0
100	PI/2 BPSK	1	137	23.18	22.89	23.20	
100	PI/2 BPSK	1	271	22.82	22.88	23.40	
100	PI/2 BPSK	135	0	22.83	22.34	22.62	23.5
100	PI/2 BPSK	135	69	23.23	22.96	23.22	24.0
100	PI/2 BPSK	135	138	22.56	22.47	22.82	23.5
100	PI/2 BPSK	270	0	22.68	22.37	22.72	
100	QPSK	1	1	23.44	22.89	23.12	24.0
100	QPSK	1	137	23.26	22.82	23.27	
100	QPSK	1	271	23.01	22.88	23.44	
100	QPSK	135	0	22.27	22.01	22.11	24.0
100	QPSK	135	69	23.10	22.94	23.16	
100	QPSK	135	138	22.06	22.01	22.30	
100	QPSK	270	0	22.12	21.87	22.19	23.0
100	16QAM	1	1	22.57	22.10	22.22	23.0
100	64QAM	1	1	20.73	20.13	20.25	21.5
100	256QAM	1	1	19.25	18.71	18.72	19.5
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	23.32	22.88	22.87	24.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	23.25	22.78	22.91	24.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	23.37	22.90	22.97	24.0
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	23.43	22.71	22.96	24.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	23.31	22.86	22.92	24.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	23.29	22.75	22.84	24.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	23.35	22.77	22.81	24.0
Channel				647500	656000	664500	Tune-up limit (dBm)
Frequency (MHz)				3712.5	3840.00	3967.50	
25	PI/2 BPSK	1	1	23.32	22.82	22.91	24.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	23.28	22.91	22.88	24.0

<FR1 n77_HPUE_Ant 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				650000	656000	662000	
Frequency (MHz)				3750	3840	3930	
100	PI/2 BPSK	1	1	26.18	25.65	25.41	27.0
100	PI/2 BPSK	1	137	25.96	25.63	25.43	
100	PI/2 BPSK	1	271	25.92	25.62	25.38	
100	PI/2 BPSK	135	0	25.59	25.16	24.96	26.5
100	PI/2 BPSK	135	69	26.01	25.59	25.38	27.0
100	PI/2 BPSK	135	138	25.42	25.08	24.75	26.5
100	PI/2 BPSK	270	0	25.52	25.11	24.77	
100	QPSK	1	1	25.95	25.64	25.33	27.0
100	QPSK	1	137	26.04	25.61	25.41	
100	QPSK	1	271	26.00	25.60	25.34	
100	QPSK	135	0	25.43	25.03	25.02	27.0
100	QPSK	135	69	25.99	25.62	25.32	
100	QPSK	135	138	25.48	25.00	25.07	
100	QPSK	270	0	24.98	24.63	24.24	26.0
100	16QAM	1	1	25.00	24.65	24.33	26.0
100	64QAM	1	1	23.32	22.89	22.66	24.5
100	256QAM	1	1	21.88	21.46	21.14	22.5
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	25.99	25.65	25.37	27.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	25.99	25.62	25.40	27.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	26.00	25.55	25.33	27.0
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	25.98	25.61	25.24	27.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	26.14	25.61	25.40	27.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	26.14	25.65	25.40	27.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	26.15	25.64	25.34	27.0
Channel				647500	656000	664500	Tune-up limit (dBm)
Frequency (MHz)				3712.5	3840.00	3967.50	
25	PI/2 BPSK	1	1	26.08	25.65	25.24	27.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	26.06	25.45	25.22	27.0

<FR1 n78_Ant 1>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				633334	641666	650000	
Frequency (MHz)				3500.01	3624.99	3750	
100	PI/2 BPSK	1	1	23.92	23.58	23.73	24.0
100	PI/2 BPSK	1	137	23.65	23.45	23.57	
100	PI/2 BPSK	1	271	23.45	23.37	23.40	
100	PI/2 BPSK	135	0	23.11	23.03	23.06	23.5
100	PI/2 BPSK	135	69	23.49	23.45	23.48	24.0
100	PI/2 BPSK	135	138	22.97	22.88	22.96	23.5
100	PI/2 BPSK	270	0	22.98	22.91	22.97	
100	QPSK	1	1	23.81	23.27	23.62	24.0
100	QPSK	1	137	23.58	23.50	23.52	
100	QPSK	1	271	23.42	23.42	23.33	
100	QPSK	135	0	22.55	22.45	22.51	24.0
100	QPSK	135	69	23.45	23.36	23.40	
100	QPSK	135	138	22.40	22.32	22.30	
100	QPSK	270	0	22.38	22.35	22.30	23.0
100	16QAM	1	1	22.61	22.54	22.52	23.0
100	64QAM	1	1	20.88	20.84	20.81	21.5
100	256QAM	1	1	19.34	19.25	19.29	19.5
Channel				633000	641666	650332	Tune-up limit (dBm)
Frequency (MHz)				3495	3624.99	3754.98	
90	PI/2 BPSK	1	1	23.86	23.58	23.68	24.0
Channel				632668	641666	650666	Tune-up limit (dBm)
Frequency (MHz)				3490.02	3624.99	3759.99	
80	PI/2 BPSK	1	1	23.88	23.48	23.72	24.0
Channel				632334	641666	651000	Tune-up limit (dBm)
Frequency (MHz)				3485.01	3624.99	3765	
70	PI/2 BPSK	1	1	23.89	23.57	23.68	24.0
Channel				632000	641666	651332	Tune-up limit (dBm)
Frequency (MHz)				3480	3624.99	3769.98	
60	PI/2 BPSK	1	1	23.90	23.57	23.65	24.0
Channel				631668	641666	651666	Tune-up limit (dBm)
Frequency (MHz)				3475.02	3624.99	3774.99	
50	PI/2 BPSK	1	1	23.89	23.51	23.71	24.0
Channel				631334	641666	652000	Tune-up limit (dBm)
Frequency (MHz)				3470.01	3624.99	3780	
40	PI/2 BPSK	1	1	23.91	23.54	23.73	24.0
Channel				631000	641666	652332	Tune-up limit (dBm)
Frequency (MHz)				3465	3624.99	3784.98	
30	PI/2 BPSK	1	1	23.87	23.49	23.69	24.0
Channel				630834	641666	652500	Tune-up limit (dBm)
Frequency (MHz)				3462.51	3624.99	3787.50	
25	PI/2 BPSK	1	1	23.87	23.53	23.67	24.0
Channel				630668	641666	652666	Tune-up limit (dBm)
Frequency (MHz)				3460.02	3624.99	3789.99	
20	PI/2 BPSK	1	1	23.82	23.53	23.70	24.0

12. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B71 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

12.1 Body SAR

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	LTE Band 71_Ant 1	20M	QPSK	1	0	Front	25mm	133297	680.5	22.46	24.00	1.426	-0.02	0.130	0.185
	LTE Band 71_Ant 1	20M	QPSK	50	24	Front	25mm	133297	680.5	21.50	23.00	1.413	-0.13	0.111	0.157

<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
02	FR1 n5_Ant 1	20M	BPSK	1	1	Front	25mm	167300	836.5	22.83	24.00	1.309	0.02	0.190	0.249
	FR1 n5_Ant 1	20M	BPSK	50	28	Front	25mm	167300	836.5	22.70	24.00	1.349	-0.12	0.176	0.237
03	FR1 n25_Ant 1	20M	BPSK	1	1	Front	25mm	372000	1860	23.04	24.00	1.247	-0.06	0.143	0.178
	FR1 n25_Ant 1	20M	BPSK	50	28	Front	25mm	372000	1860	22.69	24.00	1.352	-0.18	0.125	0.169
04	FR1 n66_Ant 1	40M	BPSK	1	1	Front	25mm	349000	1745	23.01	24.00	1.256	0	0.229	0.288
	FR1 n66_Ant 1	40M	BPSK	108	54	Front	25mm	349000	1745	22.65	24.00	1.365	-0.06	0.205	0.280
05	FR1 n71_Ant 1	20M	BPSK	1	1	Front	25mm	136100	680.5	22.84	24.00	1.306	-0.03	0.142	0.185
	FR1 n71_Ant 1	20M	BPSK	50	28	Front	25mm	136100	680.5	22.58	24.00	1.387	-0.19	0.130	0.180
	FR1 n41_Ant 1	100M	BPSK	1	1	Front	25mm	518598	2592.99	23.68	24.00	1.076	0.05	0.464	0.499
	FR1 n41_Ant 1	100M	BPSK	135	69	Front	25mm	518598	2592.99	23.20	24.00	1.202	0.01	0.405	0.487
	FR1 n41_Ant 2	100M	BPSK	1	1	Front	25mm	518598	2592.99	22.98	24.00	1.265	0	0.518	0.655
06	FR1 n41_Ant 2	100M	BPSK	135	69	Front	25mm	518598	2592.99	22.79	24.00	1.321	-0.1	0.557	0.736
	FR1 n41_HPUE_Ant 2	100M	BPSK	1	1	Front	25mm	518598	2592.99	25.37	27.00	1.455	-0.04	0.477	0.694
	FR1 n77_Ant 1	100M	BPSK	1	1	Front	25mm	656000	3840	23.57	24.00	1.104	0.04	0.325	0.359
	FR1 n77_Ant 1	100M	BPSK	135	69	Front	25mm	656000	3840	23.27	24.00	1.183	-0.12	0.289	0.342
07	FR1 n77_Ant 2	100M	BPSK	1	1	Front	25mm	656000	3840	22.91	24.00	1.285	-0.12	0.506	0.650
	FR1 n77_Ant 2	100M	BPSK	135	69	Front	25mm	656000	3840	22.96	24.00	1.271	-0.14	0.481	0.611
	FR1 n77_HPUE_Ant 2	100M	BPSK	1	1	Front	25mm	656000	3840	25.65	27.00	1.365	0.02	0.447	0.610

12.2 FR1 n41/n77 Power Class 2 and Power Class 3 Linearity

This device support Power Class 2 and Power Class 3 operations for FR1 n41/n77. The highest available duty cycle for Power Class 2 operation is 50%. Per FCC Guidance based on the device behavior, all SAR tests were performed using Power Class 3. Power Class 2 is tested using the highest SAR test configuration in Power Class 3 for each FR1 configuration and exposure condition combination, according to the highest time averaged power for Power Class 2. When the reported SAR vs. output power is linearly scaled with < 10% discrepancy between power classes and all reported SAR are < 1.4 W/kg, Separate SAR testing for Power Class 2 is not required. Use PC3 power level and SAR to estimated PC2 SAR linearly, and check if the deviation from the measured PC2 SAR is <10%

	FR1 n41_Ant 2 (Power Class 3)	FR1 n41_Ant 2 (Power Class 2)
Maximum Tune up Power (dBm)	24	27
Reported 1g SAR (W/kg)	0.736	0.694
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR(W/kg)	0.73	
% deviation from expected linearity		-5.48%

	FR1 n77_Ant 2 (Power Class 3)	FR1 n77_Ant 2 (Power Class 2)
Maximum Tune up Power (dBm)	24	27
Reported 1g SAR (W/kg)	0.65	0.61
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR(W/kg)	0.65	
% deviation from expected linearity		-5.93%

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	LTE + NR	Yes

General Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

13.1 Body Exposure Conditions

Exposure Position	1 Maximum LTE 1g SAR (W/kg)	2 Maximum NR 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)
Front at 25mm	0.398	0.736	**1.134**

Test Engineer： Mood Huang

14. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.
Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

15. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992
[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013
[4] SPEAG DASY System Handbook
[5] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015
[6] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015
[7] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015
[8] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015
[9] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
[10] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.