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 Jun. 02, 2023 and testing was started from Jun. 03, 2023 and completed on Jun. 27, 2023. 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.

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA2N2201-04	01	Initial issue of report	Jul. 03, 2023

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Continental Automotive Systems, Inc., 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	0.01	0.05
		WCDMA IV	0.03	
		WCDMA V	0.04	
	LTE	LTE Band 2	0.01	
		LTE Band 5	0.03	
		LTE Band 7	0.01	
		LTE Band 12	0.05	
		LTE Band 13	0.03	
		LTE Band 14	0.03	
		LTE Band 4 / 66	0.03	
		LTE Band 71	0.05	
	FR1	FR1 n5	< 0.01	
		FR1 n2 / n25	0.01	
		FR1 n41	< 0.01	
		FR1 n66	< 0.01	
		FR1 n71	< 0.01	
		FR1 n77	< 0.01	
Date of Testing:			2023/6/3 ~ 2023/6/27	

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
Host Information	
Equipment Name	G12N510G1, G12N500G1
Brand Name	Continental
Model Name	G12N510G1, G12N500G1
EUT Stage	Identical Prototype
External Antenna Information	
Brand Name	Molex
Model Name	26464255
GM P/N:	26464252
External Antenna Information	
Brand Name	Molex
Model Name	26464260
GM P/N:	26464253

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})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
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 LTE Carrier Aggregation (CA) in the uplink for LTE B5/B7/B66 with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per FCC Guidance. 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

3.3 General 5G NR SAR Test and Reporting Considerations

5G NR Information	
FCC ID	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: 3700 MHz ~ 3980 MHz
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, 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 n77	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	501204	2506.02	502200	2511	503202	2516.01	504204	2521.02	505200	2526	507204	2536.02	508200	2541	509202	2546.01
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		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)
L	647334	3710.01	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
H	664666	3969.99	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:

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

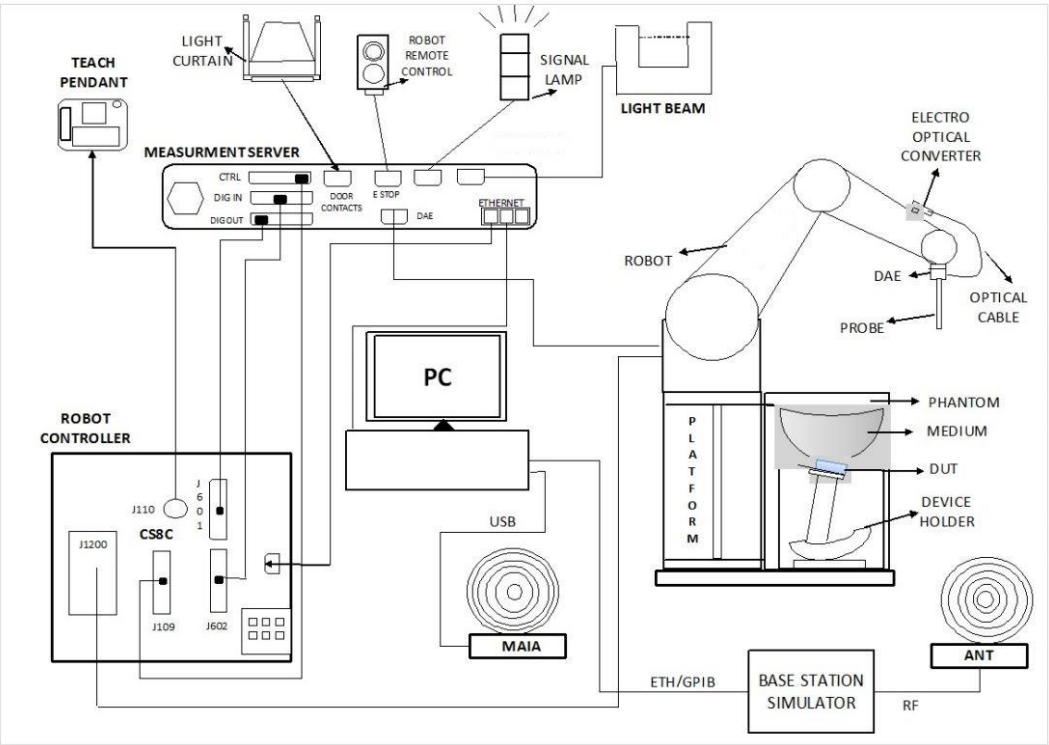
SAR is expressed in units of Watts per kilogram (W/kg)

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

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	10 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	10 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)

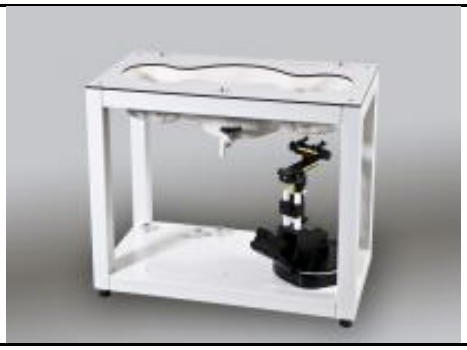
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an 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

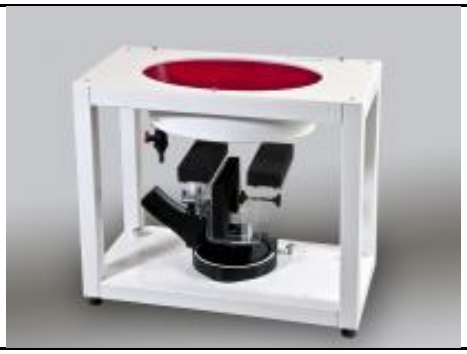
6.4 Phantom

<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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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	1012	Aug. 18, 2021	Aug. 16, 2023
SPEAG	750MHz System Validation Kit(2)	D750V3	1117	Mar. 24, 2022	Mar. 22, 2024
SPEAG	835MHz System Validation Kit(2)	D835V2	499	Aug. 18, 2021	Aug. 16, 2023
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Nov. 21, 2022	Nov. 20, 2023
SPEAG	1900MHz System Validation Kit(2)	D1900V2	5d041	Aug. 19, 2021	Aug. 17, 2023
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1089	Mar. 24, 2022	Mar. 22, 2024
SPEAG	3700MHz System Validation Kit(2)	D3700V2	1022	Jul. 14, 2021	Jul. 12, 2023
SPEAG	3900MHz System Validation Kit(2)	D3900V2	1017	Apr. 22, 2022	Apr. 20, 2024
SPEAG	Data Acquisition Electronics	DAE4	853	Jul. 20, 2022	Jul. 19, 2023
SPEAG	Data Acquisition Electronics	DAE4	1512	Mar. 20, 2023	Mar. 19, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	3728	Mar. 22, 2023	Mar. 21, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	Apr. 25, 2023	Apr. 24, 2024
Testo	Hygro meter	608-H1	45196600	Nov. 02, 2022	Nov. 01, 2023
Testo	Hygro meter	608-H1	45207528	Nov. 02, 2022	Nov. 01, 2023
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 31, 2022	Oct. 30, 2023
Keysight	Wireless Communication Test Set	E5515C	MY50266977	May. 15, 2023	May. 14, 2024
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 12, 2022	Oct. 11, 2023
Keysight	ENA Network Analyzer	E5071C	MY46104758	Sep. 22, 2022	Sep. 21, 2023
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 28, 2022	Sep. 27, 2023
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3796	Jan. 13, 2023	Jan. 12, 2024
Anritsu	Power Meter	ML2495A	1419002	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Power Sensor	MA2411B	1911176	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 21, 2022	Jul. 20, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 14, 2022	Oct. 13, 2023
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	22.5	0.896	42.697	0.89	41.90	0.67	1.90	±5	2023/6/3
750	22.5	0.887	41.596	0.89	41.90	-0.34	-0.73	±5	2023/6/13
835	22.5	0.919	42.401	0.90	41.50	2.11	2.17	±5	2023/6/3
835	22.6	0.921	41.300	0.90	41.50	2.33	-0.48	±5	2023/6/13
1750	22.5	1.368	40.771	1.37	40.10	-0.15	1.67	±5	2023/6/3
1750	22.6	1.357	40.882	1.37	40.10	-0.95	1.95	±5	2023/6/13
1900	22.5	1.445	39.223	1.40	40.00	3.21	-1.94	±5	2023/6/3
1900	22.6	1.433	39.334	1.40	40.00	2.36	-1.66	±5	2023/6/13
2600	22.5	1.989	39.492	1.96	39.00	1.48	1.26	±5	2023/6/3
2600	22.5	1.987	38.208	1.96	39.00	1.38	-2.03	±5	2023/6/13
2600	22.7	1.998	37.929	1.96	39.00	1.94	-2.75	±5	2023/6/27
3700	22.5	3.185	38.107	3.12	37.70	2.08	1.08	±5	2023/6/13
3700	22.7	3.206	38.307	3.12	37.70	2.76	1.61	±5	2023/6/27
3900	22.5	3.398	37.919	3.33	37.51	2.04	1.09	±5	2023/6/13
3900	22.7	3.419	38.119	3.33	37.51	2.67	1.62	±5	2023/6/27

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
2023/6/3	750	50	D750V3-1117	EX3DV4 - SN3728	DAE4 Sn1512	0.414	8.520	8.28	-2.82	SAR05
2023/6/13	750	50	D750V3-1012	EX3DV4 - SN3728	DAE4 Sn1512	0.410	8.560	8.2	-4.21	SAR05
2023/6/3	835	50	D835V2-499	EX3DV4 - SN3728	DAE4 Sn1512	0.496	9.680	9.92	2.48	SAR05
2023/6/13	835	50	D835V2-499	EX3DV4 - SN3728	DAE4 Sn1512	0.495	9.680	9.9	2.27	SAR05
2023/6/3	1750	50	D1750V2-1068	EX3DV4 - SN3728	DAE4 Sn1512	1.740	36.700	34.8	-5.18	SAR05
2023/6/13	1750	50	D1750V2-1068	EX3DV4 - SN3728	DAE4 Sn1512	1.730	36.700	34.6	-5.72	SAR05
2023/6/3	1900	50	D1900V2-5d041	EX3DV4 - SN3728	DAE4 Sn1512	1.920	40.600	38.4	-5.42	SAR05
2023/6/13	1900	50	D1900V2-5d041	EX3DV4 - SN3728	DAE4 Sn1512	1.900	40.600	38	-6.40	SAR05
2023/6/3	2600	50	D2600V2-1089	EX3DV4 - SN3728	DAE4 Sn1512	2.720	55.400	54.4	-1.81	SAR05
2023/6/13	2600	50	D2600V2-1089	EX3DV4 - SN3728	DAE4 Sn1512	2.720	55.400	54.4	-1.81	SAR05
2023/6/27	2600	50	D2600V2-1089	EX3DV4 - SN3925	DAE4 Sn853	2.840	55.400	56.8	2.53	SAR06
2023/6/13	3700	50	D3700V2-1022	EX3DV4 - SN3925	DAE4 Sn853	3.670	68.200	73.4	7.62	SAR06
2023/6/27	3700	50	D3700V2-1022	EX3DV4 - SN3925	DAE4 Sn853	3.400	68.200	68	-0.29	SAR06
2023/6/13	3900	50	D3900V2-1017-3900	EX3DV4 - SN3925	DAE4 Sn853	3.290	68.700	65.8	-4.22	SAR06
2023/6/27	3900	50	D3900V2-1017-3900	EX3DV4 - SN3925	DAE4 Sn853	3.310	68.700	66.2	-3.64	SAR06

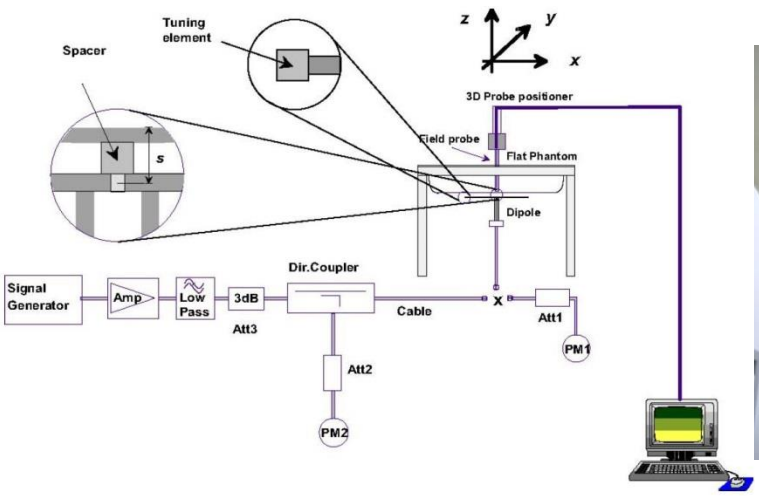


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. UMTS/LTE Output Power (Unit: dBm)

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set RMC 12.2Kbps + HSDPA mode.
   ii. Set Cell Power = -25 dBm
   iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
   iv. Select HSDPA Uplink Parameters
   v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
      a). Subtest 1: β_c/β_d=2/15
      b). Subtest 2: β_c/β_d=12/15
      c). Subtest 3: β_c/β_d=15/8
      d). Subtest 4: β_c/β_d=15/4
   vi. Set Delta ACK, Delta NACK and Delta CQI = 8
   vii. Set Ack-Nack Repetition Factor to 3
   viii. Set CQI Feedback Cycle (k) to 4 ms
   ix. Set CQI Repetition Factor to 2
   x. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
A summary of these settings are illustrated below:

C.8.1.12 Fixed Reference Channel Definition H-Set 12

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

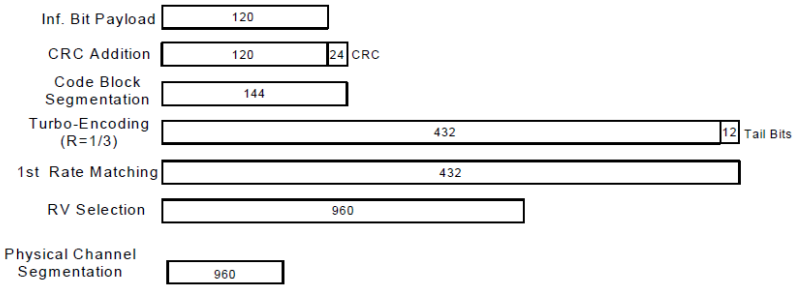


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

<WCDMA>

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	22.68	22.59	22.65	24.00	22.98	23.00	22.57	24.00	23.11	23.00	23.03	24.00
3GPP Rel 6	HSDPA Subtest-1	21.66	21.61	21.66	23.00	21.98	22.06	21.58	23.00	22.13	22.06	22.05	23.00
3GPP Rel 6	HSDPA Subtest-2	21.72	21.63	21.61	23.00	22.01	22.06	21.57	23.00	22.10	22.11	22.05	23.00
3GPP Rel 6	HSDPA Subtest-3	21.20	21.11	21.11	22.50	21.15	21.56	21.10	22.50	21.61	21.58	21.55	22.50
3GPP Rel 6	HSDPA Subtest-4	21.20	21.11	21.13	22.50	21.47	21.51	21.05	22.50	21.59	21.56	21.55	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	21.58	21.54	21.63	23.00	21.81	21.93	21.55	23.00	21.94	21.89	22.04	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	21.55	21.50	21.46	23.00	21.96	22.00	21.51	23.00	21.90	21.99	21.92	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.08	20.97	20.91	22.50	21.00	21.41	20.97	22.50	21.60	21.57	21.41	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.15	20.97	21.09	22.50	21.40	21.40	20.96	22.50	21.42	21.42	21.44	22.50
3GPP Rel 6	HSUPA Subtest-1	21.70	21.64	21.63	23.00	21.97	21.99	21.58	23.00	22.10	22.05	21.95	23.00
3GPP Rel 6	HSUPA Subtest-2	19.73	19.55	19.66	21.00	19.98	20.01	19.59	21.00	20.10	20.00	20.00	21.00
3GPP Rel 6	HSUPA Subtest-3	20.67	20.61	20.65	22.00	20.97	21.00	20.58	22.00	21.12	21.03	20.97	22.00
3GPP Rel 6	HSUPA Subtest-4	19.70	19.58	19.64	21.00	19.99	19.96	19.55	21.00	20.09	20.02	19.99	21.00
3GPP Rel 6	HSUPA Subtest-5	21.70	21.60	21.60	23.00	22.00	21.50	21.60	23.00	22.10	22.00	22.00	23.00

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C 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 B4/B5/B12/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.
9. LTE band 4 SAR test was covered by Band 66; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
    a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
    b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

<LTE Band 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				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	22.44	22.37	22.38	24
20	QPSK	1	49	22.31	22.33	22.35	
20	QPSK	1	99	22.30	22.40	22.43	
20	QPSK	50	0	21.46	21.30	21.35	23
20	QPSK	50	24	21.51	21.47	21.54	
20	QPSK	50	50	21.47	21.46	21.53	
20	QPSK	100	0	21.46	21.41	21.50	
20	16QAM	1	0	21.82	21.77	21.73	23
20	16QAM	1	49	21.77	21.74	21.70	
20	16QAM	1	99	21.74	21.77	21.75	
20	16QAM	50	0	20.46	20.32	20.40	22
20	16QAM	50	24	20.54	20.49	20.56	
20	16QAM	50	50	20.49	20.48	20.56	
20	16QAM	100	0	20.47	20.43	20.51	
20	64QAM	1	0	20.78	20.57	20.62	22
20	64QAM	1	49	20.69	20.64	20.64	
20	64QAM	1	99	20.70	20.69	20.68	
20	64QAM	50	0	19.50	19.32	19.41	21
20	64QAM	50	24	19.55	19.52	19.59	
20	64QAM	50	50	19.49	19.48	19.57	
20	64QAM	100	0	19.49	19.43	19.52	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	22.35	22.29	22.22	24
15	QPSK	1	37	22.18	22.16	22.34	
15	QPSK	1	74	22.28	22.36	22.43	
15	QPSK	36	0	21.41	21.14	21.34	23
15	QPSK	36	20	21.39	21.37	21.48	
15	QPSK	36	39	21.40	21.45	21.35	
15	QPSK	75	0	21.31	21.31	21.47	
15	16QAM	1	0	21.79	21.70	21.61	23
15	16QAM	1	37	21.67	21.65	21.63	
15	16QAM	1	74	21.57	21.58	21.65	
15	16QAM	36	0	20.36	20.12	20.25	22
15	16QAM	36	20	20.45	20.41	20.54	
15	16QAM	36	39	20.48	20.29	20.49	
15	16QAM	75	0	20.41	20.30	20.34	
15	64QAM	1	0	20.70	20.37	20.60	22
15	64QAM	1	37	20.53	20.61	20.45	
15	64QAM	1	74	20.62	20.55	20.67	
15	64QAM	36	0	19.35	19.19	19.23	21
15	64QAM	36	20	19.37	19.42	19.46	
15	64QAM	36	39	19.39	19.46	19.39	
15	64QAM	75	0	19.46	19.36	19.33	
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	22.31	22.23	22.19	24
10	QPSK	1	25	22.19	22.16	22.28	
10	QPSK	1	49	22.16	22.33	22.42	
10	QPSK	25	0	21.28	21.14	21.22	23
10	QPSK	25	12	21.34	21.46	21.35	
10	QPSK	25	25	21.32	21.35	21.37	
10	QPSK	50	0	21.29	21.26	21.39	
10	16QAM	1	0	21.62	21.64	21.69	23
10	16QAM	1	25	21.74	21.54	21.58	
10	16QAM	1	49	21.61	21.64	21.70	

10	16QAM	25	0	20.32	20.15	20.36	22
10	16QAM	25	12	20.45	20.35	20.55	
10	16QAM	25	25	20.31	20.45	20.36	
10	16QAM	50	0	20.30	20.23	20.33	
10	64QAM	1	0	20.71	20.51	20.52	22
10	64QAM	1	25	20.53	20.57	20.56	
10	64QAM	1	49	20.69	20.60	20.64	
10	64QAM	25	0	19.31	19.15	19.31	21
10	64QAM	25	12	19.36	19.44	19.41	
10	64QAM	25	25	19.47	19.33	19.38	
10	64QAM	50	0	19.30	19.32	19.36	
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	22.41	22.23	22.22	24
5	QPSK	1	12	22.13	22.29	22.19	
5	QPSK	1	24	22.29	22.32	22.29	
5	QPSK	12	0	21.44	21.15	21.18	23
5	QPSK	12	7	21.45	21.30	21.36	
5	QPSK	12	13	21.46	21.36	21.38	
5	QPSK	25	0	21.39	21.23	21.32	
5	16QAM	1	0	21.81	21.75	21.69	23
5	16QAM	1	12	21.58	21.59	21.56	
5	16QAM	1	24	21.68	21.77	21.58	
5	16QAM	12	0	20.37	20.12	20.22	22
5	16QAM	12	7	20.34	20.39	20.44	
5	16QAM	12	13	20.36	20.29	20.36	
5	16QAM	25	0	20.44	20.30	20.49	
5	64QAM	1	0	20.69	20.48	20.47	22
5	64QAM	1	12	20.62	20.44	20.47	
5	64QAM	1	24	20.53	20.60	20.55	
5	64QAM	12	0	19.45	19.16	19.28	21
5	64QAM	12	7	19.35	19.47	19.58	
5	64QAM	12	13	19.39	19.39	19.51	
5	64QAM	25	0	19.36	19.28	19.45	
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	22.28	22.26	22.18	24
3	QPSK	1	8	22.12	22.30	22.23	
3	QPSK	1	14	22.21	22.32	22.26	
3	QPSK	8	0	21.33	21.30	21.30	23
3	QPSK	8	4	21.38	21.31	21.51	
3	QPSK	8	7	21.34	21.36	21.35	
3	QPSK	15	0	21.43	21.37	21.39	
3	16QAM	1	0	21.68	21.73	21.57	23
3	16QAM	1	8	21.59	21.62	21.64	
3	16QAM	1	14	21.70	21.58	21.68	
3	16QAM	8	0	20.42	20.32	20.30	22
3	16QAM	8	4	20.34	20.34	20.38	
3	16QAM	8	7	20.35	20.37	20.44	
3	16QAM	15	0	20.39	20.23	20.39	
3	64QAM	1	0	20.62	20.52	20.59	22
3	64QAM	1	8	20.64	20.63	20.45	
3	64QAM	1	14	20.67	20.68	20.68	
3	64QAM	8	0	19.30	19.14	19.21	21
3	64QAM	8	4	19.43	19.41	19.48	
3	64QAM	8	7	19.32	19.39	19.48	
3	64QAM	15	0	19.49	19.29	19.45	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	22.42	22.33	22.33	24
1.4	QPSK	1	3	22.29	22.19	22.24	
1.4	QPSK	1	5	22.12	22.32	22.24	
1.4	QPSK	3	0	22.30	22.28	22.36	

1.4	QPSK	3	1	22.16	22.23	22.33	
1.4	QPSK	3	3	22.22	22.21	22.24	
1.4	QPSK	6	0	21.46	21.40	21.33	23
1.4	16QAM	1	0	21.65	21.63	21.61	23
1.4	16QAM	1	3	21.75	21.55	21.60	
1.4	16QAM	1	5	21.63	21.57	21.62	
1.4	16QAM	3	0	21.44	21.23	21.42	
1.4	16QAM	3	1	21.68	21.71	21.66	
1.4	16QAM	3	3	21.74	21.60	21.54	
1.4	16QAM	6	0	20.43	20.41	20.46	22
1.4	64QAM	1	0	20.68	20.46	20.47	22
1.4	64QAM	1	3	20.57	20.59	20.45	
1.4	64QAM	1	5	20.70	20.67	20.64	
1.4	64QAM	3	0	20.43	20.31	20.26	
1.4	64QAM	3	1	20.45	20.40	20.44	
1.4	64QAM	3	3	20.42	20.42	20.53	
1.4	64QAM	6	0	19.46	19.24	19.33	21

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	22.14	22.54	22.35	24
20	QPSK	1	49	22.39	22.36	22.49	
20	QPSK	1	99	22.22	22.24	22.26	
20	QPSK	50	0	21.45	21.56	21.53	23
20	QPSK	50	24	21.58	21.61	21.60	
20	QPSK	50	50	21.50	21.60	21.58	
20	QPSK	100	0	21.50	21.54	21.49	
20	16QAM	1	0	21.49	21.69	21.70	23
20	16QAM	1	49	21.76	21.91	21.87	
20	16QAM	1	99	21.59	21.56	21.59	
20	16QAM	50	0	20.44	20.57	20.55	22
20	16QAM	50	24	20.61	20.63	20.60	
20	16QAM	50	50	20.54	20.63	20.61	
20	16QAM	100	0	20.51	20.54	20.52	
20	64QAM	1	0	20.39	20.54	20.54	22
20	64QAM	1	49	20.63	20.79	20.74	
20	64QAM	1	99	20.46	20.51	20.49	
20	64QAM	50	0	19.47	19.61	19.57	21
20	64QAM	50	24	19.60	19.66	19.65	
20	64QAM	50	50	19.54	19.63	19.62	
20	64QAM	100	0	19.53	19.56	19.53	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	22.07	22.31	22.20	24
15	QPSK	1	37	22.36	22.49	22.42	
15	QPSK	1	74	22.12	22.06	22.12	
15	QPSK	36	0	21.45	21.48	21.51	23
15	QPSK	36	20	21.55	21.52	21.49	
15	QPSK	36	39	21.43	21.54	21.50	
15	QPSK	75	0	21.50	21.38	21.49	
15	16QAM	1	0	21.36	21.67	21.55	23
15	16QAM	1	37	21.68	21.73	21.84	
15	16QAM	1	74	21.43	21.41	21.41	
15	16QAM	36	0	20.28	20.46	20.39	22
15	16QAM	36	20	20.51	20.56	20.52	
15	16QAM	36	39	20.37	20.62	20.58	
15	16QAM	75	0	20.50	20.42	20.42	
15	64QAM	1	0	20.39	20.40	20.37	22

15	64QAM	1	37	20.58	20.60	20.63	
15	64QAM	1	74	20.26	20.51	20.35	
15	64QAM	36	0	19.40	19.54	19.48	21
15	64QAM	36	20	19.54	19.46	19.57	
15	64QAM	36	39	19.50	19.47	19.44	
15	64QAM	75	0	19.45	19.53	19.47	
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	22.09	22.32	22.31	24
10	QPSK	1	25	22.34	22.37	22.47	
10	QPSK	1	49	22.16	22.09	22.21	
10	QPSK	25	0	21.27	21.46	21.52	23
10	QPSK	25	12	21.55	21.47	21.59	
10	QPSK	25	25	21.49	21.40	21.57	
10	QPSK	50	0	21.30	21.34	21.32	
10	16QAM	1	0	21.43	21.64	21.61	23
10	16QAM	1	25	21.75	21.85	21.85	
10	16QAM	1	49	21.41	21.53	21.53	
10	16QAM	25	0	20.41	20.37	20.38	22
10	16QAM	25	12	20.44	20.44	20.52	
10	16QAM	25	25	20.35	20.54	20.52	
10	16QAM	50	0	20.34	20.41	20.44	
10	64QAM	1	0	20.38	20.46	20.54	22
10	64QAM	1	25	20.45	20.59	20.70	
10	64QAM	1	49	20.27	20.45	20.47	
10	64QAM	25	0	19.43	19.56	19.54	21
10	64QAM	25	12	19.43	19.62	19.52	
10	64QAM	25	25	19.44	19.60	19.49	
10	64QAM	50	0	19.40	19.44	19.35	
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	22.07	22.27	22.26	24
5	QPSK	1	12	22.37	22.39	22.38	
5	QPSK	1	24	22.14	22.15	22.09	
5	QPSK	12	0	21.37	21.45	21.35	23
5	QPSK	12	7	21.43	21.50	21.51	
5	QPSK	12	13	21.44	21.59	21.38	
5	QPSK	25	0	21.44	21.50	21.30	
5	16QAM	1	0	21.46	21.49	21.70	23
5	16QAM	1	12	21.70	21.86	21.79	
5	16QAM	1	24	21.51	21.44	21.54	
5	16QAM	12	0	20.41	20.41	20.46	22
5	16QAM	12	7	20.59	20.60	20.50	
5	16QAM	12	13	20.44	20.47	20.47	
5	16QAM	25	0	20.39	20.34	20.42	
5	64QAM	1	0	20.23	20.36	20.40	22
5	64QAM	1	12	20.45	20.75	20.54	
5	64QAM	1	24	20.36	20.35	20.34	
5	64QAM	12	0	19.44	19.42	19.43	21
5	64QAM	12	7	19.47	19.49	19.55	
5	64QAM	12	13	19.45	19.58	19.52	
5	64QAM	25	0	19.38	19.49	19.48	
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	22.04	22.22	22.22	24
3	QPSK	1	8	22.23	22.48	22.38	
3	QPSK	1	14	22.18	22.24	22.13	
3	QPSK	8	0	21.43	21.36	21.46	23
3	QPSK	8	4	21.48	21.52	21.59	
3	QPSK	8	7	21.45	21.59	21.43	
3	QPSK	15	0	21.36	21.36	21.48	
3	16QAM	1	0	21.34	21.57	21.56	23
3	16QAM	1	8	21.74	21.87	21.76	

3	16QAM	1	14	21.41	21.56	21.40	
3	16QAM	8	0	20.44	20.43	20.41	22
3	16QAM	8	4	20.48	20.44	20.47	
3	16QAM	8	7	20.43	20.59	20.57	
3	16QAM	15	0	20.36	20.43	20.51	
3	64QAM	1	0	20.22	20.35	20.43	22
3	64QAM	1	8	20.46	20.78	20.68	
3	64QAM	1	14	20.32	20.45	20.29	
3	64QAM	8	0	19.37	19.49	19.39	21
3	64QAM	8	4	19.54	19.54	19.51	
3	64QAM	8	7	19.44	19.58	19.55	
3	64QAM	15	0	19.39	19.36	19.47	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	22.09	22.32	22.22	24
1.4	QPSK	1	3	22.33	22.34	22.36	
1.4	QPSK	1	5	22.06	22.20	22.19	
1.4	QPSK	3	0	22.06	22.18	22.31	
1.4	QPSK	3	1	22.23	22.53	22.30	
1.4	QPSK	3	3	22.15	22.11	22.09	
1.4	QPSK	6	0	21.40	21.36	21.41	23
1.4	16QAM	1	0	21.46	21.65	21.50	23
1.4	16QAM	1	3	21.74	21.89	21.67	
1.4	16QAM	1	5	21.46	21.52	21.55	
1.4	16QAM	3	0	21.37	21.49	21.42	
1.4	16QAM	3	1	21.49	21.58	21.46	
1.4	16QAM	3	3	21.45	21.55	21.57	
1.4	16QAM	6	0	20.33	20.40	20.37	22
1.4	64QAM	1	0	20.28	20.40	20.39	22
1.4	64QAM	1	3	20.47	20.71	20.74	
1.4	64QAM	1	5	20.44	20.51	20.32	
1.4	64QAM	3	0	20.28	20.50	20.50	
1.4	64QAM	3	1	20.42	20.56	20.51	
1.4	64QAM	3	3	20.34	20.44	20.60	
1.4	64QAM	6	0	19.52	19.52	19.52	21

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	22.70	22.81	22.72	24
10	QPSK	1	25	22.66	22.76	22.58	
10	QPSK	1	49	22.62	22.74	22.70	
10	QPSK	25	0	21.77	21.84	21.68	23
10	QPSK	25	12	21.74	21.82	21.67	
10	QPSK	25	25	21.83	21.89	21.70	
10	QPSK	50	0	21.66	21.75	21.70	
10	16QAM	1	0	22.10	22.11	21.93	23
10	16QAM	1	25	22.05	22.15	22.06	
10	16QAM	1	49	22.12	22.20	22.06	
10	16QAM	25	0	20.62	20.82	20.62	22
10	16QAM	25	12	20.74	20.83	20.67	
10	16QAM	25	25	20.80	20.91	20.82	
10	16QAM	50	0	20.55	20.74	20.57	
10	64QAM	1	0	20.89	20.95	20.94	22
10	64QAM	1	25	21.03	21.06	20.87	
10	64QAM	1	49	20.70	20.89	20.74	
10	64QAM	25	0	19.78	19.85	19.85	21
10	64QAM	25	12	19.78	19.90	19.84	
10	64QAM	25	25	19.76	19.92	19.85	

10	64QAM	50	0	19.64	19.80	19.62	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.55	22.70	22.63	24
5	QPSK	1	12	22.61	22.69	22.49	
5	QPSK	1	24	22.42	22.65	22.66	
5	QPSK	12	0	21.74	21.71	21.59	23
5	QPSK	12	7	21.57	21.66	21.47	
5	QPSK	12	13	21.75	21.82	21.62	
5	QPSK	25	0	21.62	21.70	21.61	
5	16QAM	1	0	22.09	21.91	21.80	23
5	16QAM	1	12	21.90	21.98	21.89	
5	16QAM	1	24	21.99	22.04	21.93	
5	16QAM	12	0	20.50	20.67	20.55	22
5	16QAM	12	7	20.69	20.83	20.60	
5	16QAM	12	13	20.63	20.78	20.63	
5	16QAM	25	0	20.39	20.65	20.38	
5	64QAM	1	0	20.69	20.81	20.81	22
5	64QAM	1	12	20.99	21.05	20.71	
5	64QAM	1	24	20.65	20.83	20.64	
5	64QAM	12	0	19.78	19.79	19.73	21
5	64QAM	12	7	19.63	19.80	19.84	
5	64QAM	12	13	19.56	19.73	19.69	
5	64QAM	25	0	19.62	19.63	19.46	
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.65	22.73	22.62	24
3	QPSK	1	8	22.63	22.67	22.48	
3	QPSK	1	14	22.59	22.72	22.54	
3	QPSK	8	0	21.65	21.74	21.66	23
3	QPSK	8	4	21.73	21.72	21.47	
3	QPSK	8	7	21.76	21.81	21.55	
3	QPSK	15	0	21.64	21.63	21.67	
3	16QAM	1	0	21.92	22.06	21.92	23
3	16QAM	1	8	21.93	22.11	21.91	
3	16QAM	1	14	21.95	22.06	22.05	
3	16QAM	8	0	20.45	20.80	20.62	22
3	16QAM	8	4	20.65	20.67	20.62	
3	16QAM	8	7	20.70	20.76	20.67	
3	16QAM	15	0	20.41	20.67	20.38	
3	64QAM	1	0	20.77	20.76	20.81	22
3	64QAM	1	8	20.84	20.97	20.79	
3	64QAM	1	14	20.51	20.79	20.55	
3	64QAM	8	0	19.76	19.81	19.72	21
3	64QAM	8	4	19.69	19.82	19.71	
3	64QAM	8	7	19.67	19.72	19.80	
3	64QAM	15	0	19.52	19.63	19.61	
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.63	22.64	22.63	24
1.4	QPSK	1	3	22.50	22.59	22.41	
1.4	QPSK	1	5	22.50	22.79	22.50	
1.4	QPSK	3	0	22.69	22.55	22.58	
1.4	QPSK	3	1	22.60	22.74	22.58	
1.4	QPSK	3	3	22.51	22.67	22.51	
1.4	QPSK	6	0	21.48	21.60	21.70	23
1.4	16QAM	1	0	21.98	21.96	21.80	23
1.4	16QAM	1	3	22.04	22.10	22.06	
1.4	16QAM	1	5	22.10	22.09	21.93	
1.4	16QAM	3	0	21.76	21.67	21.64	
1.4	16QAM	3	1	21.56	21.76	21.54	
1.4	16QAM	3	3	21.82	21.81	21.66	
1.4	16QAM	6	0	20.52	20.57	20.44	22

1.4	64QAM	1	0	20.74	20.77	20.80	22
1.4	64QAM	1	3	20.83	20.88	20.85	
1.4	64QAM	1	5	20.62	20.70	20.65	
1.4	64QAM	3	0	20.66	20.82	20.64	
1.4	64QAM	3	1	20.60	20.90	20.82	
1.4	64QAM	3	3	20.50	20.54	20.37	
1.4	64QAM	6	0	19.46	19.65	19.62	21

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	22.19	22.35	22.22	24
20	QPSK	1	49	22.21	22.25	22.24	
20	QPSK	1	99	22.27	22.34	22.30	
20	QPSK	50	0	21.14	21.28	21.26	23
20	QPSK	50	24	21.37	21.36	21.39	
20	QPSK	50	50	21.34	21.36	21.30	
20	QPSK	100	0	21.29	21.27	21.32	
20	16QAM	1	0	21.49	21.62	21.55	23
20	16QAM	1	49	21.55	21.62	21.61	
20	16QAM	1	99	21.68	21.69	21.63	
20	16QAM	50	0	20.14	20.29	20.28	22
20	16QAM	50	24	20.36	20.36	20.43	
20	16QAM	50	50	20.36	20.38	20.32	
20	16QAM	100	0	20.27	20.29	20.34	
20	64QAM	1	0	20.32	20.44	20.43	22
20	64QAM	1	49	20.42	20.45	20.52	
20	64QAM	1	99	20.55	20.55	20.60	
20	64QAM	50	0	19.14	19.31	19.29	21
20	64QAM	50	24	19.38	19.39	19.43	
20	64QAM	50	50	19.36	19.40	19.32	
20	64QAM	100	0	19.30	19.32	19.35	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	22.09	22.15	22.16	24
15	QPSK	1	37	22.05	22.13	22.04	
15	QPSK	1	74	22.11	22.33	22.23	
15	QPSK	36	0	21.08	21.10	21.23	23
15	QPSK	36	20	21.37	21.25	21.33	
15	QPSK	36	39	21.34	21.27	21.11	
15	QPSK	75	0	21.09	21.15	21.17	
15	16QAM	1	0	21.41	21.60	21.40	23
15	16QAM	1	37	21.39	21.45	21.44	
15	16QAM	1	74	21.58	21.64	21.54	
15	16QAM	36	0	20.06	20.26	20.26	22
15	16QAM	36	20	20.25	20.29	20.32	
15	16QAM	36	39	20.18	20.24	20.13	
15	16QAM	75	0	20.15	20.28	20.23	
15	64QAM	1	0	20.28	20.36	20.43	22
15	64QAM	1	37	20.38	20.32	20.45	
15	64QAM	1	74	20.45	20.49	20.56	
15	64QAM	36	0	19.07	19.15	19.26	21
15	64QAM	36	20	19.31	19.36	19.26	
15	64QAM	36	39	19.28	19.36	19.22	
15	64QAM	75	0	19.10	19.16	19.15	
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	22.17	22.17	22.13	24
10	QPSK	1	25	22.19	22.20	22.08	

10	QPSK	1	49	22.10	22.19	22.26	
10	QPSK	25	0	21.08	21.11	21.12	23
10	QPSK	25	12	21.35	21.32	21.30	
10	QPSK	25	25	21.18	21.32	21.20	
10	QPSK	50	0	21.09	21.21	21.20	
10	16QAM	1	0	21.36	21.49	21.35	23
10	16QAM	1	25	21.52	21.42	21.59	
10	16QAM	1	49	21.65	21.55	21.58	
10	16QAM	25	0	20.00	20.27	20.25	22
10	16QAM	25	12	20.18	20.23	20.31	
10	16QAM	25	25	20.36	20.33	20.20	
10	16QAM	50	0	20.23	20.25	20.21	
10	64QAM	1	0	20.24	20.31	20.32	22
10	64QAM	1	25	20.39	20.29	20.51	
10	64QAM	1	49	20.45	20.41	20.44	
10	64QAM	25	0	19.06	19.16	19.23	21
10	64QAM	25	12	19.31	19.19	19.30	
10	64QAM	25	25	19.16	19.30	19.29	
10	64QAM	50	0	19.16	19.27	19.18	
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	22.00	22.22	22.09	24
5	QPSK	1	12	22.07	22.23	22.07	
5	QPSK	1	24	22.14	22.22	22.17	
5	QPSK	12	0	21.07	21.09	21.19	23
5	QPSK	12	7	21.24	21.31	21.21	
5	QPSK	12	13	21.26	21.20	21.18	
5	QPSK	25	0	21.15	21.26	21.13	
5	16QAM	1	0	21.49	21.43	21.49	23
5	16QAM	1	12	21.54	21.55	21.52	
5	16QAM	1	24	21.49	21.69	21.45	
5	16QAM	12	0	20.14	20.22	20.12	22
5	16QAM	12	7	20.24	20.19	20.42	
5	16QAM	12	13	20.26	20.38	20.30	
5	16QAM	25	0	20.15	20.12	20.23	
5	64QAM	1	0	20.14	20.28	20.30	22
5	64QAM	1	12	20.41	20.32	20.48	
5	64QAM	1	24	20.50	20.48	20.54	
5	64QAM	12	0	19.02	19.11	19.09	21
5	64QAM	12	7	19.19	19.27	19.28	
5	64QAM	12	13	19.30	19.32	19.14	
5	64QAM	25	0	19.24	19.19	19.19	

<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23060	23095	23130	
Frequency (MHz)				704	707.5	711	
10	QPSK	1	0	22.94	22.76	22.81	24
10	QPSK	1	25	22.75	22.82	22.75	
10	QPSK	1	49	22.76	22.87	22.78	
10	QPSK	25	0	21.77	21.84	21.80	23
10	QPSK	25	12	21.97	21.92	21.97	
10	QPSK	25	25	21.92	21.96	21.91	
10	QPSK	50	0	21.91	21.88	21.81	
10	16QAM	1	0	22.11	22.14	22.15	23
10	16QAM	1	25	22.16	22.22	22.15	
10	16QAM	1	49	22.30	22.23	22.15	
10	16QAM	25	0	20.81	20.84	20.82	22
10	16QAM	25	12	21.00	20.96	20.97	
10	16QAM	25	25	20.95	20.93	20.90	

10	16QAM	50	0	20.95	20.89	20.82	
10	64QAM	1	0	20.98	20.98	21.05	22
10	64QAM	1	25	21.10	21.15	21.09	
10	64QAM	1	49	21.18	21.13	21.03	
10	64QAM	25	0	19.84	19.86	19.82	21
10	64QAM	25	12	20.03	19.97	20.02	
10	64QAM	25	25	19.97	19.98	19.92	
10	64QAM	50	0	19.97	19.90	19.82	
Channel				23035	23095	23155	Tune-up limit (dBm)
Frequency (MHz)				701.5	707.5	713.5	
5	QPSK	1	0	22.76	22.56	22.71	24
5	QPSK	1	12	22.56	22.72	22.73	
5	QPSK	1	24	22.57	22.68	22.63	
5	QPSK	12	0	21.74	21.79	21.64	23
5	QPSK	12	7	21.83	21.79	21.95	
5	QPSK	12	13	21.91	21.87	21.75	
5	QPSK	25	0	21.83	21.87	21.69	
5	16QAM	1	0	21.93	21.98	22.06	23
5	16QAM	1	12	22.05	22.16	22.12	
5	16QAM	1	24	22.17	22.15	22.07	
5	16QAM	12	0	20.61	20.77	20.77	22
5	16QAM	12	7	20.93	20.94	20.90	
5	16QAM	12	13	20.75	20.87	20.73	
5	16QAM	25	0	20.92	20.78	20.68	
5	64QAM	1	0	20.89	20.79	20.89	22
5	64QAM	1	12	21.04	21.12	20.92	
5	64QAM	1	24	21.05	21.09	20.93	
5	64QAM	12	0	19.81	19.67	19.79	21
5	64QAM	12	7	19.93	19.88	19.87	
5	64QAM	12	13	19.94	19.80	19.84	
5	64QAM	25	0	19.94	19.90	19.63	
Channel				23025	23095	23165	Tune-up limit (dBm)
Frequency (MHz)				700.5	707.5	714.5	
3	QPSK	1	0	22.82	22.67	22.61	24
3	QPSK	1	8	22.64	22.73	22.70	
3	QPSK	1	14	22.73	22.83	22.68	
3	QPSK	8	0	21.77	21.76	21.68	23
3	QPSK	8	4	21.82	21.84	21.89	
3	QPSK	8	7	21.73	21.80	21.88	
3	QPSK	15	0	21.84	21.68	21.63	
3	16QAM	1	0	21.94	21.99	21.95	23
3	16QAM	1	8	22.09	22.12	22.07	
3	16QAM	1	14	22.29	22.16	22.10	
3	16QAM	8	0	20.74	20.64	20.62	22
3	16QAM	8	4	20.93	20.90	20.85	
3	16QAM	8	7	20.81	20.74	20.70	
3	16QAM	15	0	20.89	20.74	20.73	
3	64QAM	1	0	20.90	20.98	21.05	22
3	64QAM	1	8	21.08	21.02	20.94	
3	64QAM	1	14	21.09	20.99	20.88	
3	64QAM	8	0	19.70	19.85	19.73	21
3	64QAM	8	4	19.83	19.96	19.84	
3	64QAM	8	7	19.95	19.78	19.84	
3	64QAM	15	0	19.77	19.75	19.62	
Channel				23017	23095	23173	Tune-up limit (dBm)
Frequency (MHz)				699.7	707.5	715.3	
1.4	QPSK	1	0	22.77	22.76	22.70	24
1.4	QPSK	1	3	22.63	22.65	22.66	
1.4	QPSK	1	5	22.76	22.70	22.73	
1.4	QPSK	3	0	22.89	22.63	22.79	
1.4	QPSK	3	1	22.75	22.67	22.55	
1.4	QPSK	3	3	22.68	22.80	22.66	
1.4	QPSK	6	0	21.75	21.78	21.71	23

1.4	16QAM	1	0	21.97	22.02	22.07	23
1.4	16QAM	1	3	22.05	22.12	21.95	
1.4	16QAM	1	5	22.27	22.20	22.07	
1.4	16QAM	3	0	21.61	21.81	21.63	
1.4	16QAM	3	1	21.90	21.73	21.86	
1.4	16QAM	3	3	21.82	21.95	21.87	
1.4	16QAM	6	0	20.85	20.82	20.67	22
1.4	64QAM	1	0	20.83	20.85	20.87	22
1.4	64QAM	1	3	20.91	20.95	21.01	
1.4	64QAM	1	5	21.00	21.04	20.90	
1.4	64QAM	3	0	20.72	20.76	20.80	
1.4	64QAM	3	1	20.83	20.92	20.87	
1.4	64QAM	3	3	20.84	20.85	20.86	
1.4	64QAM	6	0	19.83	19.84	19.82	21

<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23230			
Frequency (MHz)				782			
10	QPSK	1	0		22.97		24
10	QPSK	1	25		22.92		
10	QPSK	1	49		22.91		
10	QPSK	25	0		22.01		23
10	QPSK	25	12		22.02		
10	QPSK	25	25		22.05		
10	QPSK	50	0		21.97		
10	16QAM	1	0		22.32		23
10	16QAM	1	25		22.33		
10	16QAM	1	49		22.28		
10	16QAM	25	0		21.02		22
10	16QAM	25	12		21.02		
10	16QAM	25	25		21.03		
10	16QAM	50	0		20.97		
10	64QAM	1	0		21.10		22
10	64QAM	1	25		21.27		
10	64QAM	1	49		21.23		
10	64QAM	25	0		20.04		21
10	64QAM	25	12		20.05		
10	64QAM	25	25		20.08		
10	64QAM	50	0		19.98		
Channel				23205	23230	23255	Tune-up limit (dBm)
Frequency (MHz)				779.5	782	784.5	
5	QPSK	1	0	22.64	22.80	22.73	24
5	QPSK	1	12	22.63	22.86	22.60	
5	QPSK	1	24	22.57	22.90	22.72	
5	QPSK	12	0	21.75	22.01	21.87	23
5	QPSK	12	7	21.91	21.89	21.83	
5	QPSK	12	13	21.94	22.04	21.85	
5	QPSK	25	0	21.71	21.82	21.89	
5	16QAM	1	0	22.01	22.16	22.11	23
5	16QAM	1	12	22.11	22.19	22.18	
5	16QAM	1	24	22.02	22.20	22.07	
5	16QAM	12	0	20.92	20.89	20.85	22
5	16QAM	12	7	20.99	20.86	20.82	
5	16QAM	12	13	20.69	20.84	20.78	
5	16QAM	25	0	20.70	20.93	20.76	
5	64QAM	1	0	20.90	20.99	20.93	22
5	64QAM	1	12	21.15	21.24	21.04	
5	64QAM	1	24	21.03	21.07	21.04	
5	64QAM	12	0	19.69	19.93	19.89	21

5	64QAM	12	7	19.80	19.92	19.85	
5	64QAM	12	13	19.93	20.01	19.81	
5	64QAM	25	0	19.82	19.83	19.67	

<LTE Band 14>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel					23330		
Frequency (MHz)					793		
10	QPSK	1	0		22.94		24
10	QPSK	1	25		22.81		
10	QPSK	1	49		22.76		
10	QPSK	25	0		21.83		23
10	QPSK	25	12		21.89		
10	QPSK	25	25		21.83		
10	QPSK	50	0		21.80		
10	16QAM	1	0		22.33		23
10	16QAM	1	25		22.19		
10	16QAM	1	49		22.16		
10	16QAM	25	0		20.82		22
10	16QAM	25	12		20.87		
10	16QAM	25	25		20.81		
10	16QAM	50	0		20.81		
10	64QAM	1	0		21.14		22
10	64QAM	1	25		21.13		
10	64QAM	1	49		21.05		
10	64QAM	25	0		19.87		21
10	64QAM	25	12		19.95		
10	64QAM	25	25		19.86		
10	64QAM	50	0		19.85		
Channel				23305	23330	23355	Tune-up limit (dBm)
Frequency (MHz)				790.5	793	795.5	
5	QPSK	1	0	22.65	22.89	22.69	24
5	QPSK	1	12	22.72	22.79	22.63	
5	QPSK	1	24	22.38	22.61	22.52	
5	QPSK	12	0	21.65	21.74	21.69	23
5	QPSK	12	7	21.71	21.80	21.72	
5	QPSK	12	13	21.59	21.73	21.55	
5	QPSK	25	0	21.65	21.72	21.49	
5	16QAM	1	0	22.17	22.30	22.16	23
5	16QAM	1	12	21.99	22.18	21.88	
5	16QAM	1	24	22.09	22.05	22.07	
5	16QAM	12	0	20.46	20.76	20.49	22
5	16QAM	12	7	20.77	20.68	20.80	
5	16QAM	12	13	20.60	20.62	20.46	
5	16QAM	25	0	20.53	20.78	20.49	
5	64QAM	1	0	20.83	21.02	20.93	22
5	64QAM	1	12	20.94	20.93	20.93	
5	64QAM	1	24	20.81	20.94	20.85	
5	64QAM	12	0	19.54	19.76	19.72	21
5	64QAM	12	7	19.77	19.90	19.74	
5	64QAM	12	13	19.59	19.68	19.79	
5	64QAM	25	0	19.67	19.75	19.77	

<LTE Band 66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				132072	132322	132572	
Frequency (MHz)				1720	1745	1770	
20	QPSK	1	0	22.39	22.52	22.80	24
20	QPSK	1	49	22.66	22.79	22.68	
20	QPSK	1	99	22.46	22.55	22.58	
20	QPSK	50	0	21.73	21.83	21.76	23
20	QPSK	50	24	21.81	21.89	21.78	
20	QPSK	50	50	21.73	21.83	21.72	
20	QPSK	100	0	21.75	21.81	21.73	
20	16QAM	1	0	21.71	21.85	22.15	23
20	16QAM	1	49	22.02	22.15	22.03	
20	16QAM	1	99	21.82	21.85	21.95	
20	16QAM	50	0	20.73	20.86	20.79	22
20	16QAM	50	24	20.82	20.87	20.79	
20	16QAM	50	50	20.74	20.84	20.74	
20	16QAM	100	0	20.76	20.81	20.72	
20	64QAM	1	0	20.61	20.68	21.02	22
20	64QAM	1	49	20.91	21.05	20.88	
20	64QAM	1	99	20.72	20.76	20.86	
20	64QAM	50	0	19.73	19.88	19.81	21
20	64QAM	50	24	19.88	19.91	19.83	
20	64QAM	50	50	19.75	19.87	19.75	
20	64QAM	100	0	19.78	19.81	19.75	
Channel				132047	132322	132597	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	QPSK	1	0	22.34	22.32	22.75	24
15	QPSK	1	37	22.61	22.77	22.65	
15	QPSK	1	74	22.30	22.46	22.52	
15	QPSK	36	0	21.70	21.69	21.60	23
15	QPSK	36	20	21.69	21.74	21.73	
15	QPSK	36	39	21.59	21.66	21.53	
15	QPSK	75	0	21.70	21.73	21.73	
15	16QAM	1	0	21.54	21.68	22.00	23
15	16QAM	1	37	21.87	21.95	22.02	
15	16QAM	1	74	21.70	21.81	21.83	
15	16QAM	36	0	20.62	20.83	20.77	22
15	16QAM	36	20	20.68	20.70	20.73	
15	16QAM	36	39	20.66	20.83	20.68	
15	16QAM	75	0	20.67	20.69	20.58	
15	64QAM	1	0	20.60	20.67	21.00	22
15	64QAM	1	37	20.80	20.86	20.68	
15	64QAM	1	74	20.56	20.71	20.85	
15	64QAM	36	0	19.62	19.76	19.73	21
15	64QAM	36	20	19.84	19.86	19.64	
15	64QAM	36	39	19.71	19.68	19.67	
15	64QAM	75	0	19.74	19.80	19.65	
Channel				132022	132322	132622	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	QPSK	1	0	22.37	22.39	22.71	24
10	QPSK	1	25	22.63	22.71	22.66	
10	QPSK	1	49	22.26	22.40	22.48	
10	QPSK	25	0	21.72	21.76	21.71	23
10	QPSK	25	12	21.79	21.80	21.77	
10	QPSK	25	25	21.66	21.65	21.58	
10	QPSK	50	0	21.61	21.71	21.70	
10	16QAM	1	0	21.71	21.77	22.00	23
10	16QAM	1	25	21.84	22.06	21.97	

10	16QAM	1	49	21.67	21.74	21.90	
10	16QAM	25	0	20.64	20.83	20.79	22
10	16QAM	25	12	20.76	20.86	20.64	
10	16QAM	25	25	20.66	20.70	20.55	
10	16QAM	50	0	20.68	20.61	20.61	
10	64QAM	1	0	20.49	20.56	20.97	22
10	64QAM	1	25	20.80	20.98	20.87	
10	64QAM	1	49	20.57	20.67	20.86	
10	64QAM	25	0	19.71	19.74	19.66	21
10	64QAM	25	12	19.70	19.76	19.65	
10	64QAM	25	25	19.56	19.82	19.59	
10	64QAM	50	0	19.65	19.81	19.66	
Channel				131997	132322	132647	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	QPSK	1	0	22.38	22.32	22.71	24
5	QPSK	1	12	22.65	22.61	22.65	
5	QPSK	1	24	22.45	22.38	22.45	
5	QPSK	12	0	21.56	21.79	21.57	23
5	QPSK	12	7	21.80	21.81	21.66	
5	QPSK	12	13	21.71	21.75	21.53	
5	QPSK	25	0	21.57	21.65	21.55	
5	16QAM	1	0	21.71	21.73	22.01	23
5	16QAM	1	12	22.02	21.97	21.83	
5	16QAM	1	24	21.79	21.83	21.83	
5	16QAM	12	0	20.70	20.66	20.59	22
5	16QAM	12	7	20.63	20.68	20.68	
5	16QAM	12	13	20.63	20.77	20.56	
5	16QAM	25	0	20.70	20.65	20.70	
5	64QAM	1	0	20.50	20.61	20.94	22
5	64QAM	1	12	20.74	21.03	20.74	
5	64QAM	1	24	20.52	20.65	20.82	
5	64QAM	12	0	19.64	19.68	19.67	21
5	64QAM	12	7	19.70	19.89	19.73	
5	64QAM	12	13	19.65	19.84	19.66	
5	64QAM	25	0	19.64	19.62	19.61	
Channel				131987	132322	132657	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1745	1778.5	
3	QPSK	1	0	22.34	22.33	22.63	24
3	QPSK	1	8	22.64	22.73	22.65	
3	QPSK	1	14	22.26	22.40	22.45	
3	QPSK	8	0	21.54	21.65	21.76	23
3	QPSK	8	4	21.67	21.79	21.65	
3	QPSK	8	7	21.65	21.69	21.56	
3	QPSK	15	0	21.57	21.72	21.71	
3	16QAM	1	0	21.51	21.75	22.02	23
3	16QAM	1	8	21.86	22.00	21.92	
3	16QAM	1	14	21.74	21.84	21.78	
3	16QAM	8	0	20.59	20.69	20.63	22
3	16QAM	8	4	20.77	20.85	20.61	
3	16QAM	8	7	20.74	20.72	20.56	
3	16QAM	15	0	20.59	20.72	20.64	
3	64QAM	1	0	20.42	20.57	20.84	22
3	64QAM	1	8	20.79	21.03	20.81	
3	64QAM	1	14	20.64	20.73	20.83	
3	64QAM	8	0	19.65	19.82	19.68	21
3	64QAM	8	4	19.68	19.75	19.70	
3	64QAM	8	7	19.58	19.83	19.70	
3	64QAM	15	0	19.74	19.64	19.58	
Channel				131979	132322	132665	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1745	1779.3	
1.4	QPSK	1	0	22.32	22.45	22.78	24
1.4	QPSK	1	3	22.65	22.74	22.65	
1.4	QPSK	1	5	22.29	22.50	22.51	

1.4	QPSK	3	0	22.29	22.45	22.75	
1.4	QPSK	3	1	22.54	22.67	22.54	
1.4	QPSK	3	3	22.30	22.40	22.46	
1.4	QPSK	6	0	21.66	21.75	21.61	23
1.4	16QAM	1	0	21.61	21.78	22.06	23
1.4	16QAM	1	3	21.91	22.09	21.95	
1.4	16QAM	1	5	21.77	21.66	21.76	
1.4	16QAM	3	0	21.62	21.73	21.67	
1.4	16QAM	3	1	21.80	21.73	21.75	
1.4	16QAM	3	3	21.54	21.72	21.68	
1.4	16QAM	6	0	20.56	20.73	20.70	22
1.4	64QAM	1	0	20.57	20.55	20.86	22
1.4	64QAM	1	3	20.75	20.85	20.79	
1.4	64QAM	1	5	20.65	20.67	20.70	
1.4	64QAM	3	0	20.54	20.74	20.63	
1.4	64QAM	3	1	20.62	20.85	20.76	
1.4	64QAM	3	3	20.71	20.64	20.57	
1.4	64QAM	6	0	19.75	19.63	19.57	21

<LTE Band 71>

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	22.92	22.69	22.62	24
20	QPSK	1	49	22.70	22.58	22.63	
20	QPSK	1	99	22.61	22.64	22.66	
20	QPSK	50	0	21.77	21.65	21.60	23
20	QPSK	50	24	21.88	21.78	21.75	
20	QPSK	50	50	21.75	21.76	21.81	
20	QPSK	100	0	21.79	21.72	21.75	
20	16QAM	1	0	22.26	22.04	21.98	23
20	16QAM	1	49	22.03	21.95	21.96	
20	16QAM	1	99	21.99	21.99	22.02	
20	16QAM	50	0	20.78	20.66	20.60	22
20	16QAM	50	24	20.87	20.80	20.73	
20	16QAM	50	50	20.79	20.76	20.82	
20	16QAM	100	0	20.81	20.72	20.74	
20	64QAM	1	0	21.07	20.89	20.82	22
20	64QAM	1	49	20.89	20.80	20.83	
20	64QAM	1	99	20.88	20.90	20.90	
20	64QAM	50	0	19.80	19.67	19.63	21
20	64QAM	50	24	19.91	19.81	19.77	
20	64QAM	50	50	19.81	19.79	19.85	
20	64QAM	100	0	19.85	19.72	19.76	
Channel				133197	133297	133397	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	QPSK	1	0	22.78	22.49	22.47	24
15	QPSK	1	37	22.70	22.40	22.61	
15	QPSK	1	74	22.58	22.45	22.49	
15	QPSK	36	0	21.61	21.49	21.42	23
15	QPSK	36	20	21.71	21.77	21.55	
15	QPSK	36	39	21.55	21.70	21.74	
15	QPSK	75	0	21.63	21.57	21.55	
15	16QAM	1	0	22.16	21.95	21.83	23
15	16QAM	1	37	21.99	21.77	21.83	
15	16QAM	1	74	21.83	21.80	21.96	
15	16QAM	36	0	20.67	20.53	20.59	22
15	16QAM	36	20	20.82	20.70	20.59	
15	16QAM	36	39	20.60	20.75	20.69	
15	16QAM	75	0	20.70	20.66	20.73	

15	64QAM	1	0	20.93	20.75	20.64	22
15	64QAM	1	37	20.74	20.65	20.64	
15	64QAM	1	74	20.77	20.70	20.84	
15	64QAM	36	0	19.65	19.59	19.62	21
15	64QAM	36	20	19.83	19.80	19.61	
15	64QAM	36	39	19.77	19.78	19.80	
15	64QAM	75	0	19.85	19.69	19.65	
Channel				133172	133297	133422	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	QPSK	1	0	22.82	22.56	22.58	24
10	QPSK	1	25	22.57	22.56	22.48	
10	QPSK	1	49	22.57	22.54	22.48	
10	QPSK	25	0	21.66	21.54	21.56	23
10	QPSK	25	12	21.68	21.68	21.57	
10	QPSK	25	25	21.60	21.72	21.63	
10	QPSK	50	0	21.68	21.57	21.57	
10	16QAM	1	0	22.24	21.97	21.80	23
10	16QAM	1	25	21.89	21.89	21.79	
10	16QAM	1	49	21.89	21.97	21.84	
10	16QAM	25	0	20.60	20.65	20.45	22
10	16QAM	25	12	20.86	20.80	20.70	
10	16QAM	25	25	20.78	20.62	20.75	
10	16QAM	50	0	20.61	20.64	20.70	
10	64QAM	1	0	21.01	20.82	20.62	22
10	64QAM	1	25	20.73	20.69	20.78	
10	64QAM	1	49	20.68	20.70	20.88	
10	64QAM	25	0	19.72	19.54	19.44	21
10	64QAM	25	12	19.87	19.78	19.76	
10	64QAM	25	25	19.64	19.63	19.84	
10	64QAM	50	0	19.80	19.54	19.61	
Channel				133147	133297	133447	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	QPSK	1	0	22.82	22.50	22.56	24
5	QPSK	1	12	22.58	22.54	22.58	
5	QPSK	1	24	22.46	22.46	22.49	
5	QPSK	12	0	21.77	21.62	21.60	23
5	QPSK	12	7	21.84	21.62	21.74	
5	QPSK	12	13	21.75	21.66	21.70	
5	QPSK	25	0	21.64	21.62	21.72	
5	16QAM	1	0	22.21	21.91	21.88	23
5	16QAM	1	12	21.85	21.89	21.78	
5	16QAM	1	24	21.94	21.89	21.83	
5	16QAM	12	0	20.78	20.66	20.51	22
5	16QAM	12	7	20.68	20.60	20.71	
5	16QAM	12	13	20.77	20.65	20.70	
5	16QAM	25	0	20.73	20.54	20.61	
5	64QAM	1	0	21.03	20.75	20.75	22
5	64QAM	1	12	20.82	20.69	20.67	
5	64QAM	1	24	20.86	20.74	20.78	
5	64QAM	12	0	19.63	19.50	19.62	21
5	64QAM	12	7	19.74	19.62	19.58	
5	64QAM	12	13	19.80	19.78	19.70	
5	64QAM	25	0	19.83	19.55	19.61	

<LTE Carrier Aggregation combinations>

General Note:

1. This device supports Carrier Aggregation on downlink only for inter and intra band, Uplink CA is not supported. For the device supports combination bands and configurations are according to 3GPP.
2. In applying the existing power measurement procedure of KDB 941225 D05A for DL CA SAR test exclusion, only the subset with the largest number of combinations of the frequency band and CCs in each row need consideration, and that configurations require power measurement should be highlighted in the below table.

2CC Downlink Carrier Aggregation			3CC Downlink Carrier Aggregation			4CC Downlink Carrier Aggregation		
Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset	Number	Combination	Covered by Measurement Superset
1	2A-2A	65	22	2A-2A-4A	61	48	2A-2A-5A-66A	65
2	2A-4A	61	23	2A-2A-5A	58	49	2A-2A-12A-66A	66
3	2A-5A	58	24	2A-2A-12A	58	50	2A-2A-14A-66A	67
4	2A-12A	58	25	2A-12B	58	51	2A-2A-66A-66A	65
5	2A-14A	67	26	2A-2A-14A	67	52	2A-5A-66A-66A	65
6	2A-66A	58	27	2A-2A-66A	65	53	2A-5B-66A	65
7	4A-4A	61	28	2A-4A-5A	64	54	2A-12A-66A-66A	66
8	4A-5A	64	29	2A-4A-12A	64	55	2A-14A-66A-66A	67
9	4A-12A	64	30	2A-12A-66A	58	56	5B-66A-66A	65
10	5B	64	31	2A-14A-66A	67	57	2A-4A-4A-12A	61
11	5A-66A	58	32	4A-4A-5A	64	58	2A-5A-12A-66A	
12	12B	61	33	4A-4A-12A	64	59	2A-2A-7A-66A	
13	12A-66A	58	34	4A-12B	64	60	2A-4A-7A-7A	61
14	14A-66A	67	35	12A-66A-66A	66	61	2A-4A-7A-12A	
15	66A-66A	65	36	14A-66A-66A	67	62	2A-4A-7C	61
16	66B	65	37	2A-4A-7A	61	63	2A-2A-4A-12A	61
17	66C	65	38	2A-5A-66A	58	64	2A-4A-5A-12A	
18	7C	59	39	2A-66A-66A	65			
19	5A-7A		40	2A-7A-7A	59			
20	4A-7A	61	41	2A-7A-12A	61			
21	7A-7A	61	42	2A-7C	59			
			43	4A-7A-7A	61			
			44	4A-7A-12A	61			
			45	4A-7C	61			
			46	7A-66A-66A	59			
			47	12A-66C	58			

5CC Downlink Carrier Aggregation		
Number	Combination	Covered by Measurement Superset
65	2A-2A-5A-66A-66A	
66	2A-2A-12A-66A-66A	
67	2A-2A-14A-66A-66A	
68	2A-5B-66A-66A	65
69	2A-14A-66A-66A-66A	
70	5B-66A-66A-66A	65
71	2A-2A-5B-66A	65

<Power verification when LTE Carrier Aggregation Active>

General Note:

i. According to KDB941225 D05A v01r02, Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

ii. Uplink maximum output power with downlink carrier aggregation active does not show more than ¼ dB higher than the maximum output power without downlink carrier aggregation active, therefore SAR evaluation with downlink carrier aggregation active can be excluded.

iii. The device supports downlink two carrier aggregation. For power measurement were control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

iv. Selected highest measured power when downlink carrier aggregation is inactive for conducted power comparison with downlink carrier aggregation is active, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

v. For non-contiguous intra-band CA, the SCC selected to provide maximum separation from the PCC and must remain fully within the downlink transmission band.

vi. For Intra-band, contiguous CA, the downlink channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1\left|BW_{Channel(1)} - BW_{Channel(2)}\right|}{0.6} \right\rfloor 0.3 \ \ [\text{MHz}]$$

<Two Carrier power verification>

Configure	PCC							SCC				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	Band 5	10	836.5	20525	QPSK	1	0	Band 7	20	2655	3100	22.71	22.81

<Four Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	Band 2	20	1860	18700	QPSK	1	0	Band 5	10	2525	881.5	Band 12	10	5095	737.5	Band 66	20	2155	66886	22.68	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 2	5	1987.5	1175	Band 7	20	2655	3100	Band 66	20	2155	66886	22.69	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 4	20	2132.5	2175	Band 7	20	2655	3100	Band 12	10	5095	737.5	22.75	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 4	20	2132.5	2175	Band 5	10	2525	881.5	Band 12	10	5095	737.5	22.71	22.81

<Five Carrier power verification>

Configure	PCC							SCC1				SCC2				SCC3				SCC4				Power	
	LTE Band	BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL # RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band	Band 2	20	1860	18700	QPSK	1	0	Band 2	5	1987.5	1175	Band 5	10	881.5	2525	Band 66	20	2155	66886	Band 66	5	2197.5	67311	22.70	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 2	5	1987.5	1175	Band 12	10	5095	737.5	Band 66	20	2155	66886	Band 66	5	2197.5	67311	22.65	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 2	5	1987.5	1175	Band 14	10	763	5330	Band 66	20	2155	66886	Band 66	5	2197.5	67311	22.68	22.81
	Band 2	20	1860	18700	QPSK	1	0	Band 14	10	763	5330	Band 66	20	2155	66886	Band 66	5	2197.5	67311	Band 66	20	66536	2120	22.71	22.81

<LTE Uplink carrier aggregation>

2CC Uplink Carrier Aggregation	
Number	Combination
1	CA_5B
2	CA_7C
3	CA_66B
4	CA_66C

<Intra-band>

General Note:

i. The device supports intra-band uplink carrier aggregation with a maximum of two 20MHz component carriers. For intra band contiguous carrier aggregation scenarios, 3GPP 36.101 table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when not-contiguous RB allocation is implemented. The conducted power and MPR setting in this device are permanently implemented pre 3GPP requirement.

ii. According TCB workshop, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

iii. Uplink CA is only operating with power class3, and additional SAR measurement for LTE UL CA whit other DL CA combinations active were not required since the maximum output power for this configuration was not > 0.25dB higher than the maximum output power for UL CA active.

iv. For Intra-band, contiguous CA, the channels selected to perform the uplink power measurement must satisfy 3GPP channel spacing (5.4.1A of 3GPP TS 36.521 or equivalent) and channel bandwidth (5.4.2A) requirements.

CA_5B										
Combination 10MHz+10MHz (50RB+50RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
20450	20549	QPSK	1	0	0	0	1	0	22.32	24
20475	20574	QPSK	1	49	1	0	2	0	22.25	24
20600	20501	QPSK	1	0	1	49	2	0	22.37	24

CA_7C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
20850	21048	QPSK	1	0	0	0	1	0	22.1	24
21100	20902	QPSK	1	0	1	99	2	0	22.15	24
21350	21152	QPSK	1	0	1	99	2	0	22.13	24

CA_66B										
Combination 15MHz+5MHz (75RB+25RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
132047	132140	QPSK	1	0	0	0	1	0	22.24	24
132322	132229	QPSK	1	0	1	24	2	0	22.4	24
132597	132504	QPSK	1	0	1	24	2	0	22.36	24

CA_66C										
Combination 20MHz+20MHz (100RB+100RB)										
PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset				
132072	132270	QPSK	1	0	0	0	1	0	22.47	24
132322	132124	QPSK	1	0	1	99	2	0	22.6	24
132572	132374	QPSK	1	0	1	99	2	0	22.63	24

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	22.32	22.36	22.25	24.0
20	PI/2 BPSK	1	53	22.14	22.22	22.08	
20	PI/2 BPSK	1	104	22.23	22.25	22.18	
20	PI/2 BPSK	50	0	21.77	21.82	21.74	23.5
20	PI/2 BPSK	50	28	22.11	22.25	22.09	24.0
20	PI/2 BPSK	50	56	21.75	21.76	21.60	23.5
20	PI/2 BPSK	100	0	21.74	21.77	21.75	
20	QPSK	1	1	22.18	22.31	22.22	24.0
20	QPSK	1	53	22.15	22.30	22.27	
20	QPSK	1	104	22.16	22.27	22.18	
20	QPSK	50	0	21.58	21.78	21.59	23.0
20	QPSK	50	28	22.06	22.26	22.10	24.0
20	QPSK	50	56	21.23	21.28	21.21	23.0
20	QPSK	100	0	21.13	21.30	21.18	
20	16QAM	1	1	21.22	21.30	21.28	23.0
20	64QAM	1	1	19.51	19.55	19.50	21.5
20	256QAM	1	1	17.73	17.87	17.87	19.5
Channel				371500	376000	380500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	PI/2 BPSK	1	1	22.15	22.16	22.05	24.0
Channel				371000	376000	381000	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	PI/2 BPSK	1	1	22.23	22.19	22.21	24.0
Channel				370500	376000	381500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	PI/2 BPSK	1	1	22.30	22.33	22.11	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	22.87	23.08	22.84	24.0
20	PI/2 BPSK	1	53	22.79	22.91	22.72	
20	PI/2 BPSK	1	104	22.37	22.52	22.32	
20	PI/2 BPSK	50	0	22.33	22.43	22.38	23.5
20	PI/2 BPSK	50	28	22.59	22.77	22.58	24.0
20	PI/2 BPSK	50	56	22.27	22.29	22.28	23.5
20	PI/2 BPSK	100	0	22.13	22.28	22.11	
20	QPSK	1	1	22.72	22.80	22.73	24.0
20	QPSK	1	53	22.76	22.84	22.65	
20	QPSK	1	104	22.55	22.59	22.45	
20	QPSK	50	0	21.73	21.87	21.74	23.0
20	QPSK	50	28	22.82	22.84	22.74	24.0
20	QPSK	50	56	21.60	21.75	21.70	23.0
20	QPSK	100	0	21.68	21.84	21.71	
20	16QAM	1	1	22.17	22.18	21.98	23.0
20	64QAM	1	1	20.14	20.14	20.08	21.5
20	256QAM	1	1	18.56	18.60	18.54	19.5
Channel				166300	167300	168300	Tune-up limit (dBm)
Frequency (MHz)				831.5	836.5	841.5	
15	PI/2 BPSK	1	1	22.68	22.89	22.72	24.0
Channel				165800	167300	168800	Tune-up limit (dBm)
Frequency (MHz)				829	836.5	844	
10	PI/2 BPSK	1	1	22.67	22.98	22.64	24.0

Channel				165300	167300	169300	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	PI/2 BPSK	1	1	22.70	22.95	22.76	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	23.01	22.84	22.86	24.0
20	PI/2 BPSK	1	53	22.60	22.68	22.60	
20	PI/2 BPSK	1	104	22.20	22.20	22.03	
20	PI/2 BPSK	50	0	22.24	22.24	22.18	23.5
20	PI/2 BPSK	50	28	22.63	22.60	22.45	24.0
20	PI/2 BPSK	50	56	22.10	22.13	22.12	23.5
20	PI/2 BPSK	100	0	21.87	22.07	22.01	
20	QPSK	1	1	22.37	22.38	22.29	24.0
20	QPSK	1	53	22.48	22.61	22.61	
20	QPSK	1	104	22.16	22.19	22.00	
20	QPSK	50	0	21.77	21.79	21.69	23.0
20	QPSK	50	28	22.49	22.61	22.51	24.0
20	QPSK	50	56	21.94	22.13	22.02	23.0
20	QPSK	100	0	21.73	21.80	21.60	
20	16QAM	1	1	21.59	21.61	21.59	23.0
20	64QAM	1	1	20.39	20.42	20.41	21.5
20	256QAM	1	1	18.15	18.32	18.31	19.5
Channel				371500	376500	381500	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1882.5	1907.5	
15	PI/2 BPSK	1	1	23.00	22.76	22.76	24.0
Channel				371000	376500	382000	Tune-up limit (dBm)
Frequency (MHz)				1855	1882.5	1910	
10	PI/2 BPSK	1	1	22.81	22.84	22.78	24.0
Channel				370500	376500	382500	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1882.5	1912.5	
5	PI/2 BPSK	1	1	22.91	22.71	22.79	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	23.11	23.17	23.15	24.0
40	PI/2 BPSK	1	108	22.94	23.08	23.05	
40	PI/2 BPSK	1	214	22.83	22.92	22.73	
40	PI/2 BPSK	108	0	22.53	22.68	22.50	23.5
40	PI/2 BPSK	108	54	23.08	23.12	23.05	24.0
40	PI/2 BPSK	108	108	22.46	22.56	22.53	23.5
40	PI/2 BPSK	216	0	22.36	22.54	22.42	
40	QPSK	1	1	22.99	23.09	23.09	24.0
40	QPSK	1	108	22.93	23.08	23.02	
40	QPSK	1	214	22.70	22.85	22.74	
40	QPSK	108	0	22.05	22.13	22.11	23.0
40	QPSK	108	54	23.10	23.11	22.97	24.0
40	QPSK	108	108	22.05	22.07	21.97	23.0
40	QPSK	216	0	22.05	22.08	21.97	
40	16QAM	1	1	22.24	22.34	22.34	23.0
40	64QAM	1	1	20.44	20.58	20.54	21.5
40	256QAM	1	1	18.59	18.76	18.68	19.5
Channel				345000	349000	353000	Tune-up limit (dBm)
Frequency (MHz)				1725	1745	1765	
30	PI/2 BPSK	1	1	23.05	22.99	22.97	24.0
Channel				344000	349000	354000	Tune-up limit (dBm)
Frequency (MHz)				1720	1745	1770	
20	PI/2 BPSK	1	1	22.95	23.00	23.04	24.0
Channel				343500	349000	354500	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1745	1772.5	
15	PI/2 BPSK	1	1	23.08	23.07	23.14	24.0
Channel				343000	349000	355000	Tune-up limit (dBm)
Frequency (MHz)				1715	1745	1775	
10	PI/2 BPSK	1	1	22.97	22.97	23.01	24.0
Channel				342500	349000	355500	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1745	1777.5	
5	PI/2 BPSK	1	1	23.03	23.09	22.99	24.0

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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	22.75	22.91	22.82	24.0
20	PI/2 BPSK	1	53	22.76	22.76	22.67	
20	PI/2 BPSK	1	104	22.61	22.76	22.76	
20	PI/2 BPSK	50	0	22.26	22.33	22.32	23.5
20	PI/2 BPSK	50	28	22.82	22.83	22.69	24.0
20	PI/2 BPSK	50	56	22.17	22.31	22.30	23.5
20	PI/2 BPSK	100	0	22.13	22.32	22.24	
20	QPSK	1	1	22.70	22.89	22.71	24.0
20	QPSK	1	53	22.78	22.80	22.64	
20	QPSK	1	104	22.57	22.72	22.66	
20	QPSK	50	0	21.88	21.90	21.78	23.0
20	QPSK	50	28	22.82	22.86	22.74	24.0
20	QPSK	50	56	21.78	21.81	21.66	23.0
20	QPSK	100	0	21.81	21.82	21.64	
20	16QAM	1	1	21.98	22.07	22.00	23.0
20	64QAM	1	1	20.24	20.43	20.34	21.5
20	256QAM	1	1	18.44	18.48	18.37	19.5
Channel				134100	136100	138100	Tune-up limit (dBm)
Frequency (MHz)				670.5	680.5	690.5	
15	PI/2 BPSK	1	1	22.61	22.88	22.78	24.0
Channel				133600	136100	138600	Tune-up limit (dBm)
Frequency (MHz)				668	680.5	693	
10	PI/2 BPSK	1	1	22.67	22.75	22.69	24.0
Channel				133100	136100	139100	Tune-up limit (dBm)
Frequency (MHz)				665.5	680.5	695.5	
5	PI/2 BPSK	1	1	22.71	22.77	22.79	24.0

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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	22.62	22.30	22.23	24.0
100	PI/2 BPSK	1	137	22.10	22.16	22.07	
100	PI/2 BPSK	1	271	22.05	22.12	22.03	
100	PI/2 BPSK	135	0	21.63	21.64	21.56	23.5
100	PI/2 BPSK	135	69	22.14	22.24	22.20	24.0
100	PI/2 BPSK	135	138	21.52	21.52	21.60	23.5
100	PI/2 BPSK	270	0	21.65	21.65	21.55	
100	QPSK	1	1	22.21	22.25	22.19	24.0
100	QPSK	1	137	22.03	22.10	22.04	
100	QPSK	1	271	22.06	22.12	22.05	
100	QPSK	135	0	22.15	22.04	22.02	24.0
100	QPSK	135	69	22.08	22.06	22.01	
100	QPSK	135	138	22.00	22.01	22.25	
100	QPSK	270	0	21.08	21.14	21.04	23.0
100	16QAM	1	1	21.02	21.02	21.09	23.0
100	64QAM	1	1	19.78	19.83	19.82	21.5
100	256QAM	1	1	17.74	17.75	17.73	19.5
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	22.50	22.29	22.03	24.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	22.48	22.16	22.14	24.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	22.43	22.14	22.23	24.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	22.42	22.27	22.07	24.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	22.48	22.25	22.08	24.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	22.43	22.14	22.16	24.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	22.49	22.13	22.10	24.0

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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	23.35	23.46	23.36	24.0
100	PI/2 BPSK	1	137	23.09	23.27	23.21	
100	PI/2 BPSK	1	271	23.04	23.14	23.03	
100	PI/2 BPSK	135	0	23.03	23.22	23.11	23.5
100	PI/2 BPSK	135	69	22.96	23.16	23.01	24.0
100	PI/2 BPSK	135	138	22.98	23.06	23.06	23.5
100	PI/2 BPSK	270	0	23.06	23.20	23.06	
100	QPSK	1	1	23.25	23.38	23.33	23.5
100	QPSK	1	137	23.12	23.25	23.18	
100	QPSK	1	271	23.07	23.12	23.09	
100	QPSK	135	0	23.09	23.26	23.14	23.5
100	QPSK	135	69	23.07	23.14	23.11	
100	QPSK	135	138	23.00	23.13	22.93	
100	QPSK	270	0	23.12	23.16	22.96	23.5
100	16QAM	1	1	23.18	23.20	23.14	23.5
100	64QAM	1	1	22.44	22.50	22.44	23.0
100	256QAM	1	1	20.30	20.38	20.34	21.0
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	23.20	23.40	23.31	24.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	23.24	23.34	23.36	24.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	23.20	23.35	23.27	24.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	23.24	23.31	23.22	24.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	23.30	23.33	23.29	24.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	23.22	23.29	23.16	24.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	23.31	23.28	23.27	24.0

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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	25.03	25.39	25.41	27.0
100	PI/2 BPSK	1	137	25.10	25.11	25.32	
100	PI/2 BPSK	1	271	25.02	25.04	25.23	
100	PI/2 BPSK	135	0	24.51	24.56	24.73	26.5
100	PI/2 BPSK	135	69	25.02	25.03	25.24	27.0
100	PI/2 BPSK	135	138	24.75	24.62	24.78	26.5
100	PI/2 BPSK	270	0	25.16	25.11	25.29	
100	QPSK	1	1	25.01	25.03	25.32	27.0
100	QPSK	1	137	25.12	25.02	25.22	
100	QPSK	1	271	25.15	25.12	25.33	
100	QPSK	135	0	25.03	25.02	25.30	27.0
100	QPSK	135	69	25.12	25.10	25.34	
100	QPSK	135	138	25.15	25.01	25.13	
100	QPSK	270	0	24.89	24.83	25.03	26.0
100	16QAM	1	1	24.08	24.10	24.20	26.0
100	64QAM	1	1	22.57	22.56	22.74	24.5
100	256QAM	1	1	21.42	21.47	21.77	22.5
Channel				508200	518598	528996	Tune-up limit (dBm)
Frequency (MHz)				2541	2592.99	2644.98	
90	PI/2 BPSK	1	1	25.04	25.01	25.01	27.0
Channel				507204	518598	529998	Tune-up limit (dBm)
Frequency (MHz)				2536.02	2592.99	2649.99	
80	PI/2 BPSK	1	1	25.00	25.11	25.20	27.0
Channel				505200	518598	531996	Tune-up limit (dBm)
Frequency (MHz)				2526	2592.99	2659.98	
60	PI/2 BPSK	1	1	25.03	25.14	25.03	27.0
Channel				504204	518598	532998	Tune-up limit (dBm)
Frequency (MHz)				2521.02	2592.99	2664.99	
50	PI/2 BPSK	1	1	25.12	25.10	25.14	27.0
Channel				503202	518598	534000	Tune-up limit (dBm)
Frequency (MHz)				2516.01	2592.99	2670	
40	PI/2 BPSK	1	1	25.16	25.00	25.08	27.0
Channel				502200	518598	534996	Tune-up limit (dBm)
Frequency (MHz)				2511	2592.99	2674.98	
30	PI/2 BPSK	1	1	25.03	25.10	25.09	27.0
Channel				501204	518598	535998	Tune-up limit (dBm)
Frequency (MHz)				2506.02	2592.99	2679.99	
20	PI/2 BPSK	1	1	25.07	25.05	25.13	27.0

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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	23.30	23.50	23.44	24.0
100	PI/2 BPSK	1	137	23.20	23.29	23.11	
100	PI/2 BPSK	1	271	23.31	23.37	23.36	
100	PI/2 BPSK	135	0	22.50	22.63	22.62	23.5
100	PI/2 BPSK	135	69	23.19	23.20	23.17	24.0
100	PI/2 BPSK	135	138	22.58	22.70	22.64	23.5
100	PI/2 BPSK	270	0	22.69	22.74	22.74	
100	QPSK	1	1	23.12	23.26	23.20	24.0
100	QPSK	1	137	23.17	23.26	23.21	
100	QPSK	1	271	23.18	23.35	23.31	
100	QPSK	135	0	22.04	22.17	22.10	24.0
100	QPSK	135	69	23.04	23.18	23.13	
100	QPSK	135	138	22.04	22.20	22.02	
100	QPSK	270	0	22.06	22.16	22.15	23.0
100	16QAM	1	1	21.97	22.14	22.06	23.0
100	64QAM	1	1	20.74	20.86	20.76	21.5
100	256QAM	1	1	18.53	18.73	18.66	19.5
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	23.17	23.40	23.42	24.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	23.13	23.45	23.49	24.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	23.08	23.47	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	23.01	23.43	23.49	24.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	23.07	23.33	23.48	24.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	23.18	23.35	23.39	24.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	23.17	23.35	23.46	24.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	23.15	23.39	23.39	24.0

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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	22.81	22.85	22.84	24.0
100	PI/2 BPSK	1	137	22.60	22.74	22.56	
100	PI/2 BPSK	1	271	22.76	22.81	22.67	
100	PI/2 BPSK	135	0	22.53	22.59	22.53	24.0
100	PI/2 BPSK	135	69	22.62	22.66	22.52	24.0
100	PI/2 BPSK	135	138	22.54	22.65	22.52	24.0
100	PI/2 BPSK	270	0	22.54	22.64	22.55	
100	QPSK	1	1	22.67	22.72	22.66	24.0
100	QPSK	1	137	22.75	22.76	22.60	
100	QPSK	1	271	22.70	22.80	22.74	
100	QPSK	135	0	22.56	22.60	22.51	24.0
100	QPSK	135	69	22.62	22.62	22.54	
100	QPSK	135	138	22.55	22.66	22.65	
100	QPSK	270	0	22.57	22.65	22.59	24.0
100	16QAM	1	1	22.33	22.52	22.32	24.0
100	64QAM	1	1	21.74	21.80	21.75	23.0
100	256QAM	1	1	19.61	19.67	19.67	21.0
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	22.66	22.56	22.56	24.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	22.78	22.83	22.76	24.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	22.67	22.67	22.76	24.0
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	22.65	22.73	22.71	24.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	22.63	22.70	22.69	24.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	22.64	22.65	22.83	24.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	22.65	22.82	22.80	24.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	22.74	22.81	22.84	24.0

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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	25.06	25.39	25.44	27.0
100	PI/2 BPSK	1	137	25.04	25.10	25.24	
100	PI/2 BPSK	1	271	25.12	25.13	25.33	
100	PI/2 BPSK	135	0	24.85	24.78	25.06	26.5
100	PI/2 BPSK	135	69	25.28	25.16	25.27	27.0
100	PI/2 BPSK	135	138	24.80	24.83	24.99	26.5
100	PI/2 BPSK	270	0	24.83	24.82	24.94	
100	QPSK	1	1	25.24	25.13	25.24	27.0
100	QPSK	1	137	25.26	25.12	25.33	
100	QPSK	1	271	25.18	25.12	25.36	
100	QPSK	135	0	25.11	25.08	25.23	27.0
100	QPSK	135	69	25.08	25.03	25.13	
100	QPSK	135	138	25.09	25.04	25.26	
100	QPSK	270	0	24.31	24.30	24.48	26.0
100	16QAM	1	1	24.36	24.29	24.39	26.0
100	64QAM	1	1	22.66	22.59	22.84	24.5
100	256QAM	1	1	21.15	21.04	21.27	22.5
Channel				649668	656000	662332	Tune-up limit (dBm)
Frequency (MHz)				3745.02	3840	3934.98	
90	PI/2 BPSK	1	1	25.01	25.06	25.11	27.0
Channel				649334	656000	662666	Tune-up limit (dBm)
Frequency (MHz)				3740.01	3840	3939.99	
80	PI/2 BPSK	1	1	25.02	25.13	25.08	27.0
Channel				649000	656000	663000	Tune-up limit (dBm)
Frequency (MHz)				3735	3840	3945	
70	PI/2 BPSK	1	1	25.00	25.14	25.10	27.0
Channel				648668	656000	663332	Tune-up limit (dBm)
Frequency (MHz)				3730.02	3840	3949.98	
60	PI/2 BPSK	1	1	25.00	25.10	25.13	27.0
Channel				648334	656000	663666	Tune-up limit (dBm)
Frequency (MHz)				3725.01	3840	3954.99	
50	PI/2 BPSK	1	1	25.03	25.12	25.06	27.0
Channel				648000	656000	664000	Tune-up limit (dBm)
Frequency (MHz)				3720	3840	3960	
40	PI/2 BPSK	1	1	25.05	25.05	25.08	27.0
Channel				647668	656000	664332	Tune-up limit (dBm)
Frequency (MHz)				3715.02	3840.00	3964.98	
30	PI/2 BPSK	1	1	25.01	25.09	25.05	27.0
Channel				647334	656000	664666	Tune-up limit (dBm)
Frequency (MHz)				3710.01	3840	3969.99	
20	PI/2 BPSK	1	1	25.03	25.06	25.03	27.0

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.
4. In this report only perform external antenna SAR testing, for the internal antenna will away human body 20cm and address in MPE report No.:FA2N2201-03, FCC ID: LHJ-FE5NA0010

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

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 B4/B5/B12/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.
7. LTE band 4 SAR test was covered by Band 66; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
   b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

5G NR Note:

1. Referencing the procedure in KDB 941225, the test procedures are outlined as below:
   a. 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
   b. 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.
   c. 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.
   d. 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
   e. For 5G FR1 n5/n41/n71/n77, the maximum channel bandwidth does not support three non-overlapping channels in the frequency band, the middle channel of the group of overlapping channels were selected for testing.
   f. 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

12.1 Body SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Antenna	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	WCDMA II_Ant 1	RMC 12.2Kbps	Back	25mm	9400	1880	Molex 26464260	22.59	24.00	1.384	0.02	0.007	0.010
	WCDMA II_Ant 1	RMC 12.2Kbps	Back	25mm	9538	1907.6	Molex 26464260	22.65	24.00	1.365	0.01	0.005	0.007
	WCDMA II_Ant 1	RMC 12.2Kbps	Back	25mm	9262	1852.4	Molex 26464260	22.68	24.00	1.355	-0.05	0.004	0.005
	WCDMA II_Ant 1	RMC 12.2Kbps	Back	25mm	9400	1880	Molex 26464255	22.59	24.00	1.384	0.06	0.004	0.006
02	WCDMA IV_Ant 1	RMC 12.2Kbps	Back	25mm	1413	1732.6	Molex 26464260	23.00	24.00	1.259	0.07	0.026	0.033
	WCDMA IV_Ant 1	RMC 12.2Kbps	Back	25mm	1312	1712.4	Molex 26464260	22.98	24.00	1.265	0.01	0.021	0.027
	WCDMA IV_Ant 1	RMC 12.2Kbps	Back	25mm	1513	1752.6	Molex 26464260	22.57	24.00	1.390	0.08	0.019	0.026
	WCDMA IV_Ant 1	RMC 12.2Kbps	Back	25mm	1413	1732.6	Molex 26464255	23.00	24.00	1.259	0.11	0.020	0.025
03	WCDMA V_Ant 1	RMC 12.2Kbps	Back	25mm	4132	826.4	Molex 26464260	23.11	24.00	1.227	0.06	0.030	0.037
	WCDMA V_Ant 1	RMC 12.2Kbps	Back	25mm	4182	836.4	Molex 26464260	23.00	24.00	1.259	0.01	0.025	0.031
	WCDMA V_Ant 1	RMC 12.2Kbps	Back	25mm	4233	846.6	Molex 26464260	23.03	24.00	1.250	-0.05	0.023	0.029
	WCDMA V_Ant 1	RMC 12.2Kbps	Back	25mm	4132	826.4	Molex 26464255	23.11	24.00	1.227	-0.16	0.026	0.032

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Antenna	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
04	LTE Band 2_Ant 1	20M	QPSK	1	0	Back	25mm	18700	1860	Molex 26464260	22.44	24.00	1.432	0.09	0.008	0.012
	LTE Band 2_Ant 1	20M	QPSK	1	0	Back	25mm	18900	1880	Molex 26464260	22.37	24.00	1.455	0.01	0.005	0.007
	LTE Band 2_Ant 1	20M	QPSK	1	0	Back	25mm	19100	1900	Molex 26464260	22.38	24.00	1.452	-0.03	0.006	0.009
	LTE Band 2_Ant 1	20M	QPSK	50	24	Back	25mm	19100	1900	Molex 26464260	21.54	23.00	1.400	0.15	0.003	0.004
	LTE Band 2_Ant 1	20M	QPSK	1	0	Back	25mm	18700	1860	Molex 26464255	22.44	24.00	1.432	-0.09	0.001	0.001
05	LTE Band 5_Ant 1	10M	QPSK	1	0	Back	25mm	20525	836.5	Molex 26464260	22.81	24.00	1.315	0.06	0.026	0.034
	LTE Band 5_Ant 1	10M	QPSK	25	25	Back	25mm	20525	836.5	Molex 26464260	21.89	23.00	1.291	-0.16	0.020	0.026
	LTE Band 5B_Ant 1	10M	QPSK	1	0	Back	25mm	20600	844	Molex 26464260	22.37	24.00	1.455	0.01	0.021	0.031
	LTE Band 5_Ant 1	10M	QPSK	1	0	Back	25mm	20525	836.5	Molex 26464255	22.81	24.00	1.315	0.05	0.023	0.030
06	LTE Band 7_Ant 1	20M	QPSK	1	0	Back	25mm	21100	2535	Molex 26464260	22.35	24.00	1.462	0.19	0.005	0.008
	LTE Band 7_Ant 1	20M	QPSK	1	0	Back	25mm	20850	2510	Molex 26464260	22.19	24.00	1.517	0.06	0.002	0.003
	LTE Band 7_Ant 1	20M	QPSK	1	0	Back	25mm	21350	2560	Molex 26464260	22.22	24.00	1.507	-0.12	0.001	0.002
	LTE Band 7_Ant 1	20M	QPSK	50	24	Back	25mm	21350	2560	Molex 26464260	21.39	23.00	1.449	0.04	0.002	0.003
	LTE Band 7C_Ant 1	20M	QPSK	1	0	Back	25mm	21100	2535	Molex 26464260	22.15	24.00	1.531	0.01	0.004	0.006
	LTE Band 7_Ant 1	20M	QPSK	1	0	Back	25mm	21100	2535	Molex 26464255	22.35	24.00	1.462	-0.13	0.003	0.004
07	LTE Band 12_Ant 1	10M	QPSK	1	0	Back	25mm	23095	707.5	Molex 26464260	22.76	24.00	1.330	-0.08	0.035	0.047
	LTE Band 12_Ant 1	10M	QPSK	25	12	Back	25mm	23095	707.5	Molex 26464260	21.92	23.00	1.282	0.09	0.028	0.036
	LTE Band 12_Ant 1	10M	QPSK	1	0	Back	25mm	23095	707.5	Molex 26464255	22.76	24.00	1.330	0.02	0.030	0.040
08	LTE Band 13_Ant 1	10M	QPSK	1	0	Back	25mm	23230	782	Molex 26464260	22.97	24.00	1.268	0.14	0.020	0.025
	LTE Band 13_Ant 1	10M	QPSK	25	25	Back	25mm	23230	782	Molex 26464260	22.05	23.00	1.245	-0.06	0.015	0.019
	LTE Band 13_Ant 1	10M	QPSK	1	0	Back	25mm	23230	782	Molex 26464255	22.97	24.00	1.268	0.02	0.012	0.015
09	LTE Band 14_Ant 1	10M	QPSK	1	0	Back	25mm	23330	793	Molex 26464260	22.94	24.00	1.276	0.13	0.024	0.031
	LTE Band 14_Ant 1	10M	QPSK	25	12	Back	25mm	23330	793	Molex 26464260	21.89	23.00	1.291	-0.06	0.018	0.023
	LTE Band 14_Ant 1	10M	QPSK	1	0	Back	25mm	23330	793	Molex 26464255	22.94	24.00	1.276	0.11	0.019	0.024
10	LTE Band 66_Ant 1	20M	QPSK	1	0	Back	25mm	132572	1770	Molex 26464260	22.80	24.00	1.318	-0.05	0.022	0.029
	LTE Band 66_Ant 1	20M	QPSK	1	0	Back	25mm	132072	1720	Molex 26464260	22.39	24.00	1.449	0.02	0.019	0.028
	LTE Band 66_Ant 1	20M	QPSK	1	0	Back	25mm	132322	1745	Molex 26464260	22.52	24.00	1.406	0.15	0.017	0.024
	LTE Band 66_Ant 1	20M	QPSK	50	24	Back	25mm	132322	1745	Molex 26464260	21.89	23.00	1.291	0.09	0.014	0.018
	LTE Band 66B_Ant 1	20M	QPSK	1	0	Back	25mm	132322	1745	Molex 26464260	22.40	24.00	1.445	0.01	0.019	0.027
	LTE Band 66C_Ant 1	20M	QPSK	1	0	Back	25mm	132572	1770	Molex 26464260	22.63	24.00	1.371	0.02	0.014	0.019
	LTE Band 66_Ant 1	20M	QPSK	1	0	Back	25mm	132572	1770	Molex 26464255	22.80	24.00	1.318	-0.11	0.018	0.024
11	LTE Band 71_Ant 1	20M	QPSK	1	0	Back	25mm	133297	680.5	Molex 26464260	22.69	24.00	1.352	0.02	0.034	0.046
	LTE Band 71_Ant 1	20M	QPSK	50	24	Back	25mm	133297	680.5	Molex 26464260	21.78	23.00	1.324	0.08	0.026	0.034
	LTE Band 71_Ant 1	20M	QPSK	1	0	Back	25mm	133297	680.5	Molex 26464255	22.69	24.00	1.352	0.19	0.023	0.031

<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Antenna	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
12	FR1 n5_Ant 1	20M	BPSK	1	1	Back	25mm	167300	836.5	Molex 26464260	23.08	24.00	1.236	0.17	0.002	0.002
	FR1 n5_Ant 1	20M	BPSK	50	28	Back	25mm	167300	836.5	Molex 26464260	22.77	24.00	1.327	-0.08	0.001	0.001
	FR1 n5_Ant 1	20M	BPSK	1	1	Back	25mm	167300	836.5	Molex 26464255	23.08	24.00	1.236	0.03	0.001	0.001
	FR1 n25_Ant 1	20M	BPSK	1	1	Back	25mm	372000	1860	Molex 26464260	23.01	24.00	1.256	0.05	0.006	0.008
13	FR1 n25_Ant 1	20M	BPSK	1	1	Back	25mm	376500	1882.5	Molex 26464260	22.84	24.00	1.306	0.11	0.007	0.009
	FR1 n25_Ant 1	20M	BPSK	1	1	Back	25mm	381000	1905	Molex 26464260	22.86	24.00	1.300	-0.09	0.006	0.008
	FR1 n25_Ant 1	20M	BPSK	50	28	Back	25mm	372000	1860	Molex 26464260	22.63	24.00	1.371	0.04	0.006	0.008
	FR1 n25_Ant 1	20M	BPSK	1	1	Back	25mm	376500	1882.5	Molex 26464255	22.84	24.00	1.306	-0.03	0.006	0.008
14	FR1 n41_Ant 1	100M	BPSK	1	1	Back	25mm	518598	2592.99	Molex 26464260	22.30	24.00	1.479	0	0.001	0.001
.	FR1 n41_Ant 1	100M	BPSK	135	69	Back	25mm	518598	2592.99	Molex 26464260	22.24	24.00	1.500	0.03	0.001	0.001
	FR1 n41_Ant 1	100M	BPSK	1	1	Back	25mm	518598	2592.99	Molex 26464255	22.30	24.00	1.479	-0.12	0.001	0.001
	FR1 n41_Ant 2	100M	BPSK	1	1	Back	25mm	518598	2592.99	Molex 26464260	23.46	24.00	1.132	0.15	0.001	0.001
	FR1 n41_Ant 2	100M	BPSK	135	69	Back	25mm	518598	2592.99	Molex 26464260	23.16	24.00	1.213	-0.05	0.001	0.001
	FR1 n41_HPUE_Ant 2	100M	BPSK	1	1	Back	25mm	518598	2592.99	Molex 26464260	25.39	27.00	1.449	-0.05	0.001	0.001
	FR1 n41_Ant 2	100M	BPSK	1	1	Back	25mm	518598	2592.99	Molex 26464255	23.46	24.00	1.132	-0.18	0.001	0.001
15	FR1 n66_Ant 1	40M	BPSK	1	1	Back	25mm	349000	1745	Molex 26464260	23.17	24.00	1.211	0.13	0.001	0.001
	FR1 n66_Ant 1	40M	BPSK	108	54	Back	25mm	349000	1745	Molex 26464260	23.12	24.00	1.225	-0.05	0.001	0.001
	FR1 n66_Ant 1	40M	BPSK	1	1	Back	25mm	349000	1745	Molex 26464255	23.17	24.00	1.211	0.09	0.001	0.001
16	FR1 n71_Ant 1	20M	BPSK	1	1	Back	25mm	136100	680.5	Molex 26464260	22.91	24.00	1.285	-0.05	0.002	0.002
	FR1 n71_Ant 1	20M	BPSK	50	28	Back	25mm	136100	680.5	Molex 26464260	22.83	24.00	1.309	-0.08	0.001	0.001
	FR1 n71_Ant 1	20M	BPSK	1	1	Back	25mm	136100	680.5	Molex 26464255	22.91	24.00	1.285	0.01	0.001	0.001
17	FR1 n77_Ant 1	100M	BPSK	1	1	Back	25mm	656000	3840	Molex 26464260	23.50	24.00	1.122	0.01	0.001	0.001
	FR1 n77_Ant 1	100M	BPSK	135	69	Back	25mm	656000	3840	Molex 26464260	23.20	24.00	1.202	0	0.001	0.001
	FR1 n77_Ant 1	100M	BPSK	1	1	Back	25mm	656000	3840	Molex 26464255	23.50	24.00	1.122	-0.12	0.001	0.001
	FR1 n77_Ant 2	100M	BPSK	1	1	Back	25mm	656000	3840	Molex 26464260	22.85	24.00	1.303	0.17	0.001	0.001
	FR1 n77_Ant 2	100M	BPSK	135	69	Back	25mm	656000	3840	Molex 26464260	22.66	24.00	1.361	-0.09	0.001	0.001
	FR1 n77_HPUE_Ant 2	100M	BPSK	1	1	Back	25mm	656000	3840	Molex 26464260	25.39	27.00	1.449	0.13	0.001	0.001
	FR1 n77_Ant 2	100M	BPSK	1	1	Back	25mm	656000	3840	Molex 26464255	22.85	24.00	1.303	0.05	0.001	0.001

12.2 LTE Band 41 Power Class 2 and Power Class 3 Linearity

This device support Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operation is 43.3% using UL-DL configuration 1. 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 LTE configuration and exposure condition combination, according to the highest time averaged power for all applicable uplink-downlink configurations in 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	FR1 n41_Ant 2
	(Power Class 3)	(Power Class 2)
Maximum Tune up Power (dBm)	24	27
Reported 1g SAR (W/kg)	0.001	0.001
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR(W/kg)	0.00	
% deviation from expected linearity		0.24%

12.3 FR1 n77Power Class 2 and Power Class 3 Linearity

This device support Power Class 2 and Power Class 3 operations for n77. 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 NR configuration and exposure condition combination, according to the highest time averaged power for all applicable uplink-downlink configurations in 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 n77_Ant 2	FR1 n77_Ant 2
	(Power Class 3)	(Power Class 2)
Maximum Tune up Power (dBm)	24	27
Reported 1g SAR (W/kg)	0.001	0.001
Duty Cycle	100.00%	50.00%
Frame Averaged (mW)	251.19	250.59
Linearity SAR(W/kg)	0.00	
% deviation from expected linearity		0.24%

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN Ant 1 + WWAN Ant 2	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	2	1+2 Summed 1g SAR (W/kg)
	Maximum WWAN Ant 1	Maximum WWAN Ant 2	
	1g SAR (W/kg)	1g SAR (W/kg)	
Back at 25mm	0.047	0.001	**0.048**

Test Engineer： Lu Chen, Bevis Chang and Jimmy Lu

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.