

FCC CFR47 PART 22H, 24E, 27 CERTIFICATION TEST REPORT

FCC ID: 2AXY3DL241

Product: Mobile phone

Trade Mark: Digicel

Model Number: DL241

Family Model: N/A

Report No.: STR201023001005E

Prepared for

JOSH COMMUNICATION TECHNOLOGY CO.,LIMITED
RM./FLAT B.13/F,GOLD SHINE TOWER,346-348 QUEEN'S RD
CENTRAL,SHEUNG WAN,HONG KONG

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : JOSH COMMUNICATION TECHNOLOGY CO.,LIMITED
Address..... : RM./FLAT B.13/F,GOLD SHINE TOWER,346-348 QUEEN'S RD
CENTRAL,SHEUNG WAN,HONG KONG
Manufacturer's Name..... : JOSH COMMUNICATION TECHNOLOGY CO.,LIMITED
Address..... : RM./FLAT B.13/F,GOLD SHINE TOWER,346-348 QUEEN'S RD
CENTRAL,SHEUNG WAN,HONG KONG
Product name..... : Mobile phone
Model and/or type reference .. : DL241
Family Model: N/A
Standards..... : FCC CFR 47 Part 22H, Part 24E, Part 27
Test procedure ANSI C63.26:2015
ANSI/TIA-603-E-2016

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests..... 23 Oct. 2020 ~19 Nov. 2020

Date of Issue 19 Nov. 2020

Test Result..... **Pass**

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Mobile phone
Trade Mark	Digicel
Model Name	DL241
Family Model	N/A
Model Difference	N/A
FCC ID:	2AXY3DL241
Frequency Bands:	U.S. Bands: ☒ LTE FDD Band 2, 4, 12, 17
Frequency Range:	LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; LTE FDD Band 12 Uplink: 699MHz-716MHz, Downlink: 729MHz-746MHz; LTE FDD Band 17 Uplink: 704MHz-716MHz, Downlink: 734MHz-746MHz;
Type of Modulation:	QPSK/16QAM
Antenna:	PIFA Antenna
Antenna gain:	-0.5dBi
power control level	LTE:Class 3
Power Supply:	☒ DC supply: DC 3.7V/1000mAh from battery or DC 5V from Adapter.
Adapter:	☒ Adapter supply: Model: DL241 Input: 100-240V~50/60Hz 0.15A Output: 5V---0.5A
Extreme Vol. Limits:	DC 3.4V to DC 4.4V (Nominal DC 3.7V) (Note 1)
HW Version	WW833-MB-V1.1
Firmware version	SPRDROID6.0
SW Version	SPRDROID6.0_KAIO2.5_R3_W20.31.2
** Note1: The High Voltage 4.4V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AXY3DL241** filing to comply with the FCC Part 22H&24E &27.

1.3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 22, Part 24, Part 27, ANSI C63.26:2015.

1.4 TEST FACILITY

The test site used to collect the radiated data is located at:

ShenZhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.26:2015& ANSI C63.4: 2014.

FCC Registration No.:463705

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.5dB
2	Conducted Emission Test	$\pm 1.38\text{dB}$
3	RF power, conducted	$\pm 0.16\text{dB}$
4	Spurious emissions, conducted	$\pm 0.21\text{dB}$
5	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
6	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
7	Temperature	$\pm 0.5^\circ\text{C}$
8	Humidity	$\pm 2\%$

1.5 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

1.6 WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the investigation results.

The device has LTE Bands of: Band 2, Band 4, Band 12, Band 17

The RB Size was selected to measure for peak or average ERP and EIRP, which was based on the conducted power verification baseline data.

For the fundamental investigation of radiated emissions, the EUT is investigated for vertical and horizontal antenna orientations and X Y and Z orientations of the EUT alone. After the investigations the worst case was determined to be at X orientation for all LTE bands.

1.6 SUMMARY OF TEST RESULTS

FCC Part22, Subpart H/ FCC Part24, Subpart E, FCC Part27, Subpart L, KDB 971168 D01 Power Meas License Digital Systems v03			
FCC Rule	Test Item	Verdict	Remark
2.1046	Conducted Output Power	PASS	
22.913(d) 24.232(d) 27.50(d)(5) KDB 971168 D01 Clause 5.7	Peak-to-Average Ratio	PASS	
2.1049 22.917(b) 24.238(b) KDB 971168 D01 Clause 4.2	Occupied Bandwidth	PASS	
2.1051 22.917(a) 24.238(a) 27.53(c), (g), (h) KDB 971168 D01 Clause 6	Band Edge	PASS	
22.913(a)(2) 27.50(b)(10), (c)(10) KDB 971168 D01 Clause 5.6	Effective Radiated Power	PASS	
24.232(c) 27.50(h)(2), (d)(4) KDB 971168 D01 Clause 5.6	Equivalent Isotropic Radiated Power	PASS	
2.1053 22.917(a) 24.238(a) 27.53(c)(g)(h)(m) KDB 971168 D01 Clause 7	Field Strength of Spurious Radiation	PASS	

2.1055 22.355 24.235 27.54 KDB 971168 D01 Clause 9	Frequency Stability for Temperature & Voltage	PASS	
2.1051 22.917(a) 24.238(a) 27.53(c)(g)(h)(m) KDB 971168 D01 Clause 6	Conducted Emission	PASS	
Remark: 1. "N/A" denotes test is not applicable in this Test Report. 2. All test items were verified and recorded according to the standards and without any deviation during the test. 3. No modifications are made to the EUT during all test items.			

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

2.3 CONFIGURATION OF EUT SYSTEM

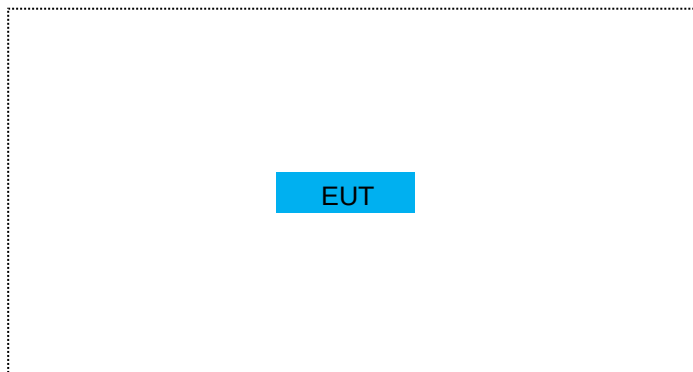
Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Mobile phone	DL241	FCC ID: 2AXY3DL241	EUT

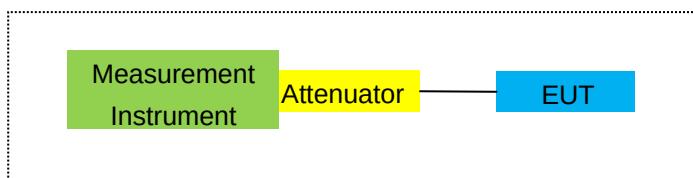
*Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.*

2.4 TEST SETUP

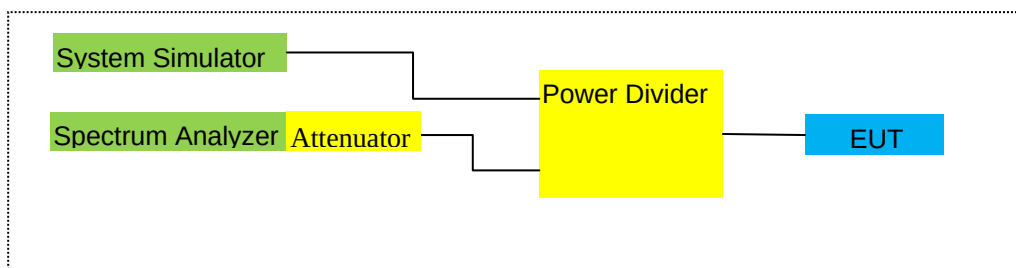
For Radiated Test Cases



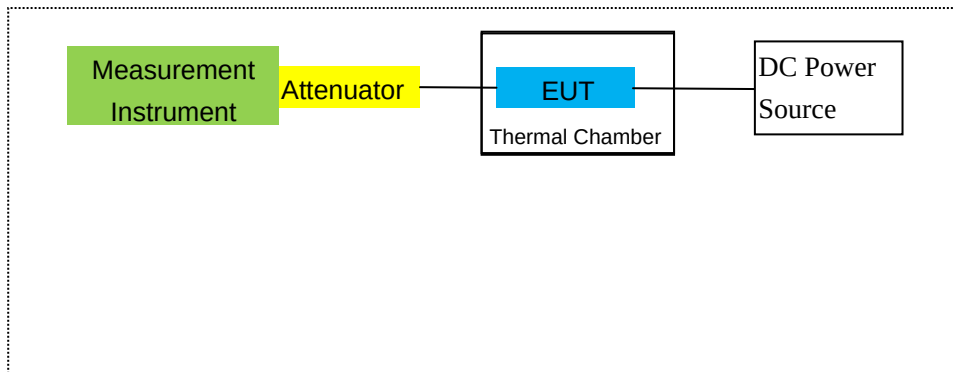
For Conducted Output Power



For Peak-to Average Ratio, Occupied Bandwidth, Conducted Band edge and Conducted Spurious Emission



For Frequency Stability



Note: EUT built-in battery-powered, the battery is fully-charged.

3.TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2020.05.11	2021.05.10	1 year
2	Test Receiver	R&S	ESPI	101318	2020.05.11	2021.05.10	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2020.04.11	2021.04.10	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11	2023.05.10	3 year
5	Horn Antenna	EM	EM-AH-10180	2011071402	2020.04.11	2021.04.10	1 year
6	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2019.12.10	2020.12.09	1 year
7	Amplifier	EM	EM-30180	060538	2020.7.13	2021.7.12	1 year
8	Loop Antenna	ARA	PLA-1030/B	1029	2020.05.11	2021.05.10	1 year
9	Power Meter	R&S	NRVS	100696	2020.7.13	2021.7.12	1 year
10	Power Sensor	R&S	URV5-Z4	0395.1619.05	2020.05.11	2021.05.10	1 year
11	Test Cable	N/A	R-01	N/A	2019.08.06	2022.08.05	3 year
12	Test Cable	N/A	R-02	N/A	2019.08.06	2022.08.05	3 year
13	Test Cable	N/A	R-03	N/A	2019.06.28	2022.06.27	3 year
14	Test Receiver	R&S	ESCI	101160	2020.05.11	2021.05.10	1 year
15	LISN	R&S	ENV216	101313	2020.05.11	2021.05.10	1 year
16	LISN	EMCO	3816/2	00042990	2020.05.11	2021.05.10	1 year
17	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2020.05.11	2021.05.10	1 year
18	Passive Voltage Probe	R&S	ESH2-Z3	100196	2020.04.11	2021.04.10	1 year
19	Test Cable	N/A	C01	N/A	2020.05.11	2023.05.10	3 year
20	Test Cable	N/A	C02	N/A	2020.05.11	2023.05.10	3 year
21	Test Cable	N/A	C03	N/A	2020.05.11	2023.05.10	3 year
22	Attenuator	MCE	24-10-34	BN9258	2020.05.11	2021.05.10	1 year
23	Spectrum Analyzer	agilent	e4440a	us44300399	2020.05.11	2021.05.10	1 year
24	test receiver	R&S	ESCI	a0304218	2020.05.11	2021.05.10	1 year
25	Communication Tester	R&S	CMU200	A0304247	2020.7.13	2021.7.12	1 year
26	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2020.05.11	2021.05.10	1 year

27	DC Power Source	N/A	PS-6005D	2017040292 3	2020.05.11	2023.05.10	3 year
28	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2020.7.13	2021.7.12	1 year
29	Communication Tester	R&S	CMW500	148500	2020.05.11	2021.05.10	1 year
30	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	Jul. 13, 2020	Jul. 12, 2021	1 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& DC Power Source which is scheduled for calibration every 3 years.

4. OUTPUT POWER

4.1 OUTPUT POWER MEASUREMENT

LTE Measurement Procedure:

All LTE bands conducted power peak and average are obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".³

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Test data reference attachment.

5. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 12
- LTE Band 17

RESULTS

PASS

Test data reference attachment.

6. BANDEDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

FCC: §2.1046, §22.913, §24.232

LIMITS

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 is as following.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth.

TEST PROCEDURE

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

Set the spectrum analyzer span to include the block edge frequency

Set a marker to point the corresponding band edge frequency in each test case.

Set display line

Set resolution bandwidth to at least 1% of emission bandwidth.

MODES TESTED

- ☐ LTE Band 2/4/12/17

RESULTS

Test data reference attachment.

7. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMITS

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P[\text{Watts}])$, where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 is as following.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is $65 + 10\log_{10}(P) = -35\text{dBm}$ in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth.

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- ☐ Set display line
- ☐ Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 12
- LTE Band 17

7.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

Test data reference attachment.

8. RADIATED MEASUREMENT

8.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913(a)(2), §24.232(c) and §27.50 (h)(2), (b)(10), (c)(10), (d)(4)

LIMITS:

22.913(a) (2)- The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232 (c) Mobile and portable stations are limited to 2 watts EIRP.
27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.
27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.
27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.
27.50 (h)(2) Mobile and other user stations in the 2500–2570 MHz and 2620–2690 MHz bands. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

TEST PROCEDURE

ANSI/TIA-603-E Clause 2.2.17

KDB 971168 v02r01 RF power output using broadband peak and average power meter method.

KDB 971168 D01 Power Meas License Digital Systems v02r01, "Measurement Guidance for Certification of Licensed Digital Transmitters"

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 12
- LTE Band 17

RESULTS

Pass

8.2 LTE BAND 2

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1850.7	-4.32	3.76	28.24	20.16	103.753	Horizontal	Pass
		1880	-4.09	3.91	28.22	20.22	105.196	Horizontal	Pass
		1909.3	-4.21	3.93	28.20	20.06	101.391	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-4.08	3.77	28.23	20.38	109.144	Horizontal	Pass
		1880	-3.86	3.91	28.24	20.47	111.429	Horizontal	Pass
		1908.5	-3.83	3.94	28.25	20.48	111.686	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-3.65	3.77	28.31	20.89	122.744	Horizontal	Pass
		1880	-3.27	3.91	28.22	21.04	127.057	Horizontal	Pass
		1907.5	-3.20	3.94	28.20	21.06	127.644	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1855	-3.51	3.79	28.33	21.03	126.765	Horizontal	Pass
		1880	-3.21	3.95	28.22	21.06	127.644	Horizontal	Pass
		1905	-3.10	3.97	28.19	21.12	129.420	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1857.5	-3.47	3.79	28.34	21.08	128.233	Horizontal	Pass
		1880	-3.26	3.95	28.22	21.01	126.183	Horizontal	Pass
		1902.5	-3.12	3.97	28.18	21.09	128.529	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1860	-3.46	3.81	28.35	21.08	128.233	Horizontal	Pass
		1880	-3.13	3.96	28.22	21.13	129.718	Horizontal	Pass
		1900	-3.07	4.00	28.16	21.09	128.529	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1850.7	-4.00	3.76	28.24	20.48	111.686	Vertical	Pass
		1880	-3.90	3.91	28.22	20.41	109.901	Vertical	Pass
		1909.3	-4.69	3.93	28.20	19.58	90.782	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1851.5	-4.19	3.77	28.23	20.27	106.414	Vertical	Pass
		1880	-4.40	3.91	28.24	19.93	98.401	Vertical	Pass
		1908.5	-4.21	3.94	28.25	20.10	102.329	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1852.5	-4.45	3.77	28.31	20.09	102.094	Vertical	Pass
		1880	-4.41	3.91	28.22	19.90	97.724	Vertical	Pass
		1907.5	-3.95	3.94	28.20	20.31	107.399	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1855	-4.25	3.79	28.33	20.29	106.905	Vertical	Pass
		1880	-4.24	3.95	28.22	20.03	100.693	Vertical	Pass
		1905	-4.20	3.97	28.19	20.02	100.462	Vertical	Pass

15.0MHz Band QPSK	1/#Mid	1857.5	-4.84	3.79	28.34	19.71	93.541	Vertical	Pass
		1880	-4.77	3.95	28.22	19.50	89.125	Vertical	Pass
		1902.5	-4.51	3.97	28.18	19.70	93.325	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1860	-4.43	3.81	28.35	20.11	102.565	Vertical	Pass
		1880	-4.76	3.96	28.22	19.50	89.125	Vertical	Pass
		1900	-4.08	4.00	28.16	20.08	101.859	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 2									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1850.7	-3.67	3.76	28.24	20.81	120.504	Horizontal	Pass
		1880	-3.58	3.91	28.22	20.73	118.304	Horizontal	Pass
		1909.3	-3.41	3.93	28.20	20.86	121.899	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-4.71	3.77	28.23	19.75	94.406	Horizontal	Pass
		1880	-4.71	3.91	28.24	19.62	91.622	Horizontal	Pass
		1908.5	-4.52	3.94	28.25	19.79	95.280	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-4.95	3.77	28.31	19.59	90.991	Horizontal	Pass
		1880	-4.38	3.91	28.22	19.93	98.401	Horizontal	Pass
		1907.5	-4.43	3.94	28.20	19.83	96.161	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-4.59	3.79	28.33	19.95	98.855	Horizontal	Pass
		1880	-5.61	3.95	28.22	18.66	73.451	Horizontal	Pass
		1905	-5.60	3.97	28.19	18.62	72.778	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1857.5	-5.80	3.79	28.34	18.75	74.989	Horizontal	Pass
		1880	-5.49	3.95	28.22	18.78	75.509	Horizontal	Pass
		1902.5	-3.37	3.97	28.18	20.84	121.339	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1860	-3.73	3.81	28.35	20.81	120.504	Horizontal	Pass
		1880	-3.44	3.96	28.22	20.82	120.781	Horizontal	Pass
		1900	-4.15	4.00	28.16	20.01	100.231	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1850.7	-4.59	3.76	28.24	19.89	97.499	Vertical	Pass
		1880	-4.37	3.91	28.22	19.94	98.628	Vertical	Pass
		1909.3	-4.22	3.93	28.20	20.05	101.158	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1851.5	-4.46	3.77	28.23	20.00	100.000	Vertical	Pass
		1880	-4.29	3.91	28.24	20.04	100.925	Vertical	Pass
		1908.5	-4.31	3.94	28.25	20.00	100.000	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1852.5	-5.37	3.77	28.31	19.17	82.604	Vertical	Pass
		1880	-5.21	3.91	28.22	19.10	81.283	Vertical	Pass
		1907.5	-5.19	3.94	28.20	19.07	80.724	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1855	-5.46	3.79	28.33	19.08	80.910	Vertical	Pass
		1880	-3.90	3.95	28.22	20.37	108.893	Vertical	Pass
		1905	-6.36	3.97	28.19	17.86	61.094	Vertical	Pass
15.0MHz Band 16	1/#Mid	1857.5	-5.55	3.79	28.34	19.00	79.433	Vertical	Pass
		1880	-3.17	3.95	28.22	21.10	128.825	Vertical	Pass

QAM		1902.5	-3.15	3.97	28.18	21.06	127.644	Vertical	Pass
20.0MHz	1/#Mid	1860	-3.43	3.81	28.35	21.11	129.122	Vertical	Pass
Band 16		1880	-3.33	3.96	28.22	20.93	123.880	Vertical	Pass
QAM		1900	-2.68	4.00	28.16	21.48	140.605	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.3 LTE BAND 4

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band QPSK	1/#Mid	1710.7	-4.93	3.12	27.58	19.53	89.743	Horizontal	Pass
		1732.5	-4.87	3.27	27.61	19.47	88.512	Horizontal	Pass
		1754.3	-4.92	3.29	27.63	19.42	87.498	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-4.96	3.13	27.61	19.52	89.536	Horizontal	Pass
		1732.5	-4.97	3.27	27.61	19.37	86.497	Horizontal	Pass
		1753.5	-4.98	3.30	27.62	19.34	85.901	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-6.15	3.13	27.63	18.35	68.391	Horizontal	Pass
		1732.5	-4.93	3.27	27.61	19.41	87.297	Horizontal	Pass
		1752.5	-4.86	3.30	27.60	19.44	87.902	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	1715	-5.08	3.15	27.64	19.41	87.297	Horizontal	Pass
		1732.5	-5.71	3.31	27.61	18.59	72.277	Horizontal	Pass
		1750	-5.69	3.33	27.59	18.57	71.945	Horizontal	Pass
15.0MHz Band QPSK	1/#Mid	1717.5	-5.93	3.15	27.65	18.57	71.945	Horizontal	Pass
		1732.5	-6.68	3.31	27.61	17.62	57.810	Horizontal	Pass
		1747.5	-4.97	3.33	27.57	19.27	84.528	Horizontal	Pass
20.0MHz Band QPSK	1/#Mid	1720	-5.32	3.17	27.66	19.17	82.604	Horizontal	Pass
		1732.5	-5.07	3.32	27.61	19.22	83.560	Horizontal	Pass
		1745	-4.97	3.36	27.56	19.23	83.753	Horizontal	Pass
1.4MHz Band QPSK	1/#Mid	1710.7	-5.19	3.12	27.58	19.27	84.528	Vertical	Pass
		1732.5	-4.98	3.27	27.61	19.36	86.298	Vertical	Pass
		1754.3	-6.27	3.29	27.63	18.07	64.121	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	1711.5	-5.29	3.13	27.61	19.19	82.985	Vertical	Pass
		1732.5	-5.19	3.27	27.61	19.15	82.224	Vertical	Pass
		1753.5	-5.17	3.30	27.62	19.15	82.224	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	1712.5	-6.17	3.13	27.63	18.33	68.077	Vertical	Pass
		1732.5	-6.02	3.27	27.61	18.32	67.920	Vertical	Pass
		1752.5	-5.95	3.30	27.60	18.35	68.391	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	1715	-7.30	3.15	27.64	17.19	52.360	Vertical	Pass
		1732.5	-5.19	3.31	27.61	19.11	81.470	Vertical	Pass
		1750	-5.23	3.33	27.59	19.03	79.983	Vertical	Pass

15.0MHz Band QPSK	1/#Mid	1717.5	-5.42	3.15	27.65	19.08	80.910	Vertical	Pass
		1732.5	-5.16	3.31	27.61	19.14	82.035	Vertical	Pass
		1747.5	-4.99	3.33	27.57	19.25	84.140	Vertical	Pass
20.0MHz Band QPSK	1/#Mid	1720	-4.84	3.17	27.66	19.65	92.257	Vertical	Pass
		1732.5	-4.65	3.32	27.61	19.64	92.045	Vertical	Pass
		1745	-4.58	3.36	27.56	19.62	91.622	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

Radiated Power (EIRP) for Band 4									
Mode	RB/RB SIZE	Frequency	Result						Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Max. EIRP Average (dBm)	Max. EIRP Average (mW)	Polarization Of Max. ERP	
1.4MHz Band 16 QAM	1/#Mid	1710.7	-4.42	3.12	27.58	20.04	100.925	Horizontal	Pass
		1732.5	-4.27	3.27	27.61	20.07	101.625	Horizontal	Pass
		1754.3	-4.27	3.29	27.63	20.07	101.625	Horizontal	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-4.36	3.13	27.61	20.12	102.802	Horizontal	Pass
		1732.5	-4.49	3.27	27.61	19.85	96.605	Horizontal	Pass
		1753.5	-4.71	3.30	27.62	19.61	91.411	Horizontal	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-4.19	3.13	27.63	20.31	107.399	Horizontal	Pass
		1732.5	-4.15	3.27	27.61	20.19	104.472	Horizontal	Pass
		1752.5	-3.84	3.30	27.60	20.46	111.173	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-4.26	3.15	27.64	20.23	105.439	Horizontal	Pass
		1732.5	-4.45	3.31	27.61	19.85	96.605	Horizontal	Pass
		1750	-3.83	3.33	27.59	20.43	110.408	Horizontal	Pass
15.0MHz Band 16 QAM	1/#Mid	1717.5	-4.06	3.15	27.65	20.44	110.662	Horizontal	Pass
		1732.5	-4.12	3.31	27.61	20.18	104.232	Horizontal	Pass
		1747.5	-4.14	3.33	27.57	20.10	102.329	Horizontal	Pass
20.0MHz Band 16 QAM	1/#Mid	1720	-4.41	3.17	27.66	20.08	101.859	Horizontal	Pass
		1732.5	-3.81	3.32	27.61	20.48	111.686	Horizontal	Pass
		1745	-3.83	3.36	27.56	20.37	108.893	Horizontal	Pass
1.4MHz Band 16 QAM	1/#Mid	1710.7	-5.59	3.12	27.58	18.87	77.090	Vertical	Pass
		1732.5	-5.01	3.27	27.61	19.33	85.704	Vertical	Pass
		1754.3	-5.22	3.29	27.63	19.12	81.658	Vertical	Pass
3.0MHz Band 16 QAM	1/#Mid	1711.5	-5.71	3.13	27.61	18.77	75.336	Vertical	Pass
		1732.5	-5.63	3.27	27.61	18.71	74.302	Vertical	Pass
		1753.5	-5.10	3.30	27.62	19.22	83.560	Vertical	Pass
5.0MHz Band 16 QAM	1/#Mid	1712.5	-5.36	3.13	27.63	19.14	82.035	Vertical	Pass
		1732.5	-5.24	3.27	27.61	19.10	81.283	Vertical	Pass
		1752.5	-5.38	3.30	27.60	18.92	77.983	Vertical	Pass
10.0MHz Band 16 QAM	1/#Mid	1715	-5.66	3.15	27.64	18.83	76.384	Vertical	Pass
		1732.5	-5.77	3.31	27.61	18.53	71.285	Vertical	Pass
		1750	-5.22	3.33	27.59	19.04	80.168	Vertical	Pass
15.0MHz Band 16	1/#Mid	1717.5	-5.32	3.15	27.65	19.18	82.794	Vertical	Pass
		1732.5	-4.83	3.31	27.61	19.47	88.512	Vertical	Pass

QAM		1747.5	-5.00	3.33	27.57	19.24	83.946	Vertical	Pass
20.0MHz	1/#Mid	1720	-5.68	3.17	27.66	18.81	76.033	Vertical	Pass
Band 16		1732.5	-4.98	3.32	27.61	19.31	85.310	Vertical	Pass
QAM		1745	-5.27	3.36	27.56	18.93	78.163	Vertical	Pass

Note:

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.4 LTE BAND 12

Radiated Power (ERP) for Band 12										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level	Cable Loss	Antenna Gain	Correction	Max. ERP	Max. ERP	Polarization Of Max. ERP	
			(dBm)	(dBm)	(dB)	(dB)	Average (dBm)	Average (mW)		
1.4MHz Band QPSK	1/#Mid	699.7	5.54	1.91	19.21	2.15	20.69	117.220	Vertical	Pass
		707.5	5.38	1.91	19.26	2.15	20.58	114.288	Vertical	Pass
		715.3	5.28	1.93	19.34	2.15	20.54	113.240	Vertical	Pass
3.0MHz Band QPSK	1/#Mid	700.5	5.37	1.91	19.21	2.15	20.52	112.720	Vertical	Pass
		707.5	5.48	1.91	19.26	2.15	20.68	116.950	Vertical	Pass
		714.5	5.43	1.93	19.34	2.15	20.69	117.220	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	701.5	3.43	1.91	19.23	2.15	18.60	72.444	Vertical	Pass
		707.5	3.84	1.91	19.26	2.15	19.04	80.168	Vertical	Pass
		713.5	5.09	1.92	19.33	2.15	20.35	108.393	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	704	4.41	1.91	19.25	2.15	19.60	91.201	Vertical	Pass
		707.5	4.22	1.91	19.26	2.15	19.42	87.498	Vertical	Pass
		711	3.44	1.92	19.32	2.15	18.69	73.961	Vertical	Pass
1.4MHz Band QPSK	1/#Mid	699.7	5.54	1.91	19.21	2.15	20.69	117.220	Horizontal	Pass
		707.5	5.38	1.91	19.26	2.15	20.58	114.288	Horizontal	Pass
		715.3	5.28	1.93	19.34	2.15	20.54	113.240	Horizontal	Pass
3.0MHz Band QPSK	1/#Mid	700.5	5.57	1.91	19.21	2.15	20.72	118.032	Horizontal	Pass
		707.5	5.48	1.91	19.26	2.15	20.68	116.950	Horizontal	Pass
		714.5	5.43	1.93	19.34	2.15	20.69	117.220	Horizontal	Pass
5.0MHz Band QPSK	1/#Mid	701.5	5.04	1.91	19.23	2.15	20.21	104.954	Horizontal	Pass
		707.5	3.97	1.91	19.26	2.15	19.17	82.604	Horizontal	Pass
		713.5	3.59	1.92	19.33	2.15	18.85	76.736	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	704	3.97	1.91	19.25	2.15	19.16	82.414	Horizontal	Pass
		707.5	3.31	1.91	19.26	2.15	18.51	70.958	Horizontal	Pass
		711	6.13	1.92	19.32	2.15	21.38	137.404	Horizontal	Pass

Radiated Power (EIRP) for Band 12										
Mode	RB/ RB SIZE	Freque ncy	Result							Conclu sion
			SG Level	Cable Loss	Anten na Gain	Corre ction	Max. ERP	Max. ERP	Polarizati on Of	
			(dBm)	(dBm)	(dB)	(dB)	Averag e	Average	Max. ERP	
							(dBm)	(mW)		
1.4MHz Band 16 QAM	1/#M id	699.7	5.54	1.91	19.21	2.15	20.69	117.220	Vertical	Pass
		707.5	5.38	1.91	19.26	2.15	20.58	114.288	Vertical	Pass
		715.3	5.28	1.93	19.34	2.15	20.54	113.240	Vertical	Pass
3.0MHz Band 16 QAM	1/#M id	700.5	5.44	1.91	19.21	2.15	20.59	114.551	Vertical	Pass
		707.5	5.48	1.91	19.26	2.15	20.68	116.950	Vertical	Pass
		714.5	5.43	1.93	19.34	2.15	20.69	117.220	Vertical	Pass
5.0MHz Band 16 QAM	1/#M id	701.5	3.77	1.91	19.23	2.15	18.94	78.343	Vertical	Pass
		707.5	3.62	1.91	19.26	2.15	18.82	76.208	Vertical	Pass
		713.5	4.86	1.92	19.33	2.15	20.12	102.802	Vertical	Pass
10.0MH z Band 16 QAM	1/#M id	704	4.00	1.91	19.25	2.15	19.19	82.985	Vertical	Pass
		707.5	3.75	1.91	19.26	2.15	18.95	78.524	Vertical	Pass
		711	3.55	1.92	19.32	2.15	18.80	75.858	Vertical	Pass
1.4MHz Band 16 QAM	1/#M id	699.7	5.54	1.91	19.21	2.15	20.69	117.220	Horizontal	Pass
		707.5	5.38	1.91	19.26	2.15	20.58	114.288	Horizontal	Pass
		715.3	5.28	1.93	19.34	2.15	20.54	113.240	Horizontal	Pass
3.0MHz Band 16 QAM	1/#M id	700.5	5.57	1.91	19.21	2.15	20.72	118.032	Horizontal	Pass
		707.5	5.48	1.91	19.26	2.15	20.68	116.950	Horizontal	Pass
		714.5	5.43	1.93	19.34	2.15	20.69	117.220	Horizontal	Pass
5.0MHz Band 16 QAM	1/#M id	701.5	3.72	1.91	19.23	2.15	18.89	77.446	Horizontal	Pass
		707.5	4.36	1.91	19.26	2.15	19.56	90.365	Horizontal	Pass
		713.5	3.87	1.92	19.33	2.15	19.13	81.846	Horizontal	Pass
10.0MH z Band 16 QAM	1/#M id	704	5.46	1.91	19.25	2.15	20.65	116.145	Horizontal	Pass
		707.5	5.63	1.91	19.26	2.15	20.83	121.060	Horizontal	Pass
		711	5.69	1.92	19.32	2.15	20.94	124.165	Horizontal	Pass

Note:

ERP=EIRP-2.15

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

8.5 LTE BAND 17

Radiated Power (ERP) for Band 17										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band QPSK	1/#Mid	706.5	5.52	1.91	19.23	2.15	20.69	117.220	Vertical	Pass
		710	5.38	1.91	19.26	2.15	20.58	114.288	Vertical	Pass
		713.5	5.28	1.92	19.33	2.15	20.54	113.240	Vertical	Pass
10.0MHz Band QPSK	1/#Mid	709	5.53	1.91	19.25	2.15	20.72	118.032	Vertical	Pass
		710	5.48	1.91	19.26	2.15	20.68	116.950	Vertical	Pass
		711	5.44	1.92	19.32	2.15	20.69	117.220	Vertical	Pass
5.0MHz Band QPSK	1/#Mid	706.5	3.66	1.91	19.23	2.15	18.83	76.384	Horizontal	Pass
		710	5.06	1.91	19.26	2.15	20.26	106.170	Horizontal	Pass
		713.5	4.80	1.92	19.33	2.15	20.06	101.391	Horizontal	Pass
10.0MHz Band QPSK	1/#Mid	709	4.90	1.91	19.25	2.15	20.09	102.094	Horizontal	Pass
		710	4.37	1.91	19.26	2.15	19.57	90.573	Horizontal	Pass
		711	3.32	1.92	19.32	2.15	18.57	71.945	Horizontal	Pass

Radiated Power (ERP) for Band 17										
Mode	RB/RB SIZE	Frequency	Result							Conclusion
			SG Level (dBm)	Cable Loss (dBm)	Antenna Gain (dB)	Correction (dB)	Max. ERP Average (dBm)	Max. ERP Average (mW)	Polarization Of Max. ERP	
5.0MHz Band 16 QAM	1/#Midd	706.5	4.87	1.91	19.23	2.15	20.04	100.925	Vertical	Pass
		710	4.78	1.91	19.26	2.15	19.98	99.541	Vertical	Pass
		713.5	4.58	1.92	19.33	2.15	19.84	96.383	Vertical	Pass
10.0MHz Band 16 QAM	1/#Midd	709	4.41	1.91	19.25	2.15	19.60	91.201	Vertical	Pass
		710	4.94	1.91	19.26	2.15	20.14	103.276	Vertical	Pass
		711	4.67	1.92	19.32	2.15	19.92	98.175	Vertical	Pass
5.0MHz Band 16 QAM	1/#Midd	706.5	3.78	1.91	19.23	2.15	18.95	78.524	Horizontal	Pass
		710	3.55	1.91	19.26	2.15	18.75	74.989	Horizontal	Pass
		713.5	3.87	1.92	19.33	2.15	19.13	81.846	Horizontal	Pass
10.0MHz Band 16 QAM	1/#Midd	709	4.08	1.91	19.25	2.15	19.27	84.528	Horizontal	Pass
		710	4.09	1.91	19.26	2.15	19.29	84.918	Horizontal	Pass
		711	3.27	1.92	19.32	2.15	18.52	71.121	Horizontal	Pass

Note:

ERP=EIRP-2.15

SG Level= Signal generator output

Max. EIRP Average (dBm)= Antenna Gain(dB)+ SG Level (dBm)- Cable Loss(dBm)

9. SPURIOUS RADIATION EMISSION

RULE PART(S)

FCC: §2.1051, §22.917(a), §24.238(a), §27.53(c)(g)(h)(m)

LIMIT

For Band 7, the minimum permissible attenuation level of any spurious emission is $55 + \log_{10}(P)$ [Watts]).

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P)$ [Watts]), where P is the transmitter power in Watts.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

- a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \log_{10}(p)$, dB; and
- b. for mobile subscriber equipment, the attenuation shall not be less than $43 + 10 \log_{10}(p)$, dB at the channel edges and $55 + 10 \log_{10}(p)$ at 5.5 MHz away and beyond the channel edges where p in (a) and (b) is the transmitter power measured in watts.

MODES TESTED

- ☐ LTE Band 2
LTE Band 4
- ☐ LTE Band 12
LTE Band 17

RESULTS

PASS

9.1 LTE BAND 2

QPSK EIRP POWER FOR LTE BAND 2 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 1850.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3701.4	-48.10	4.04	33.51	-18.63	-13	-5.63	Horizontal
3701.4	-48.34	4.04	33.51	-18.87	-13	-5.87	Vertical
5552.1	-47.65	5.24	35.84	-17.05	-13	-4.05	Vertical
5552.1	-52.19	5.24	35.84	-21.59	-13	-8.59	Horizontal
176.1	-35.55	1.43	16.02	-20.96	-13	-7.96	Vertical
327.2	-44.95	1.30	17.99	-28.26	-13	-15.26	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-52.69	4.04	33.56	-23.17	-13	-10.17	Horizontal
3760.0	-53.42	4.04	33.56	-23.90	-13	-10.90	Vertical
5640.0	-53.97	5.24	35.91	-23.30	-13	-10.30	Vertical
5640.0	-53.04	5.24	35.91	-22.37	-13	-9.37	Horizontal
177.3	-35.72	1.62	16.97	-20.37	-13	-7.37	Vertical
233.5	-38.00	1.74	15.98	-23.77	-13	-10.77	Horizontal
Test Results for High Channel 1909.3MHz							
3818.6	-45.63	4.04	34.00	-15.67	-13	-2.67	Horizontal
3818.6	-44.22	4.04	34.00	-14.26	-13	-1.26	Vertical
5727.9	-48.30	5.24	36.04	-17.50	-13	-4.50	Vertical
5727.9	-52.90	5.24	36.04	-22.10	-13	-9.10	Horizontal
181.7	-43.35	1.42	17.29	-27.48	-13	-14.48	Vertical
303.9	-34.62	1.50	17.90	-18.21	-13	-5.21	Horizontal

QPSK EIRP POWER FOR LTE BAND 2 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1860MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3720.0	-44.71	4.07	33.54	-15.24	-13	-2.24	Horizontal
3720.0	-48.17	4.07	33.54	-18.70	-13	-5.70	Vertical
5580.0	-47.89	5.28	35.86	-17.31	-13	-4.31	Vertical
5580.0	-49.28	5.28	35.86	-18.70	-13	-5.70	Horizontal
180.8	-36.58	1.58	16.89	-21.26	-13	-8.26	Vertical
236.7	-42.48	1.76	17.26	-26.98	-13	-13.98	Horizontal
Test Results for Mid Channel 1880MHz							
3760.0	-49.61	4.04	33.56	-20.09	-13	-7.09	Horizontal
3760.0	-46.85	4.04	33.56	-17.33	-13	-4.33	Vertical
5640.0	-53.84	5.24	35.91	-23.17	-13	-10.17	Vertical
5640.0	-51.91	5.24	35.91	-21.24	-13	-8.24	Horizontal
193.2	-40.92	1.46	16.27	-26.11	-13	-13.11	Vertical
291.0	-41.77	1.59	15.15	-28.21	-13	-15.21	Horizontal
Test Results for High Channel 1900MHz							
3800.0	-45.12	4.04	34.00	-15.16	-13	-2.16	Horizontal
3800.0	-47.97	4.04	34.00	-18.01	-13	-5.01	Vertical
5700.0	-44.09	5.24	36.04	-13.29	-13	-0.29	Vertical
5700.0	-51.42	5.24	36.04	-20.62	-13	-7.62	Horizontal
186.6	-34.90	1.36	17.39	-18.86	-13	-5.86	Vertical
407.4	-41.48	1.66	15.39	-27.75	-13	-14.75	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

. Over Limit= : P_{Mea}(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

9.2 LTE BAND 4

QPSK EIRP POWER FOR LTE BAND 4 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 1710.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3421.4	-51.70	4.02	29.80	-25.92	-13	-12.92	Horizontal
3421.4	-50.53	4.02	29.80	-24.75	-13	-11.75	Vertical
5132.1	-45.55	5.24	35.84	-14.95	-13	-1.95	Vertical
5132.1	-52.41	5.24	35.84	-21.81	-13	-8.81	Horizontal
209.8	-43.68	1.68	16.04	-29.32	-13	-16.32	Vertical
341.2	-43.16	1.78	17.74	-27.20	-13	-14.20	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-48.55	4.03	30.00	-22.58	-13	-9.58	Horizontal
3465.0	-46.89	4.03	30.00	-20.92	-13	-7.92	Vertical
5197.5	-53.58	5.25	35.86	-22.97	-13	-9.97	Vertical
5197.5	-53.22	5.25	35.86	-22.61	-13	-9.61	Horizontal
206.3	-39.48	1.72	17.69	-23.51	-13	-10.51	Vertical
420.6	-43.41	1.62	16.02	-29.00	-13	-16.00	Horizontal
Test Results for High Channel 1754.3MHz							
3508.6	-52.13	4.05	30.01	-26.17	-13	-13.17	Horizontal
3508.6	-53.28	4.05	30.01	-27.32	-13	-14.32	Vertical
5262.9	-48.58	5.26	35.86	-17.98	-13	-4.98	Vertical
5262.9	-52.51	5.26	35.86	-21.91	-13	-8.91	Horizontal
201.3	-44.01	1.80	16.69	-29.12	-13	-16.12	Vertical
438.3	-35.17	1.75	16.66	-20.27	-13	-7.27	Horizontal

QPSK EIRP POWER FOR LTE BAND 4 (20.0MHZ BANDWIDTH)

Test Results for Low Channel 1720MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
3440.0	-52.70	4.02	29.80	-26.92	-13	-13.92	Horizontal
3440.0	-48.68	4.02	29.80	-22.90	-13	-9.90	Vertical
5160.0	-49.22	5.24	35.84	-18.62	-13	-5.62	Vertical
5160.0	-52.92	5.24	35.84	-22.32	-13	-9.32	Horizontal
211.9	-40.91	1.57	17.26	-25.22	-13	-12.22	Vertical
291.4	-41.19	1.78	16.35	-26.62	-13	-13.62	Horizontal
Test Results for Mid Channel 1732.5MHz							
3465.0	-44.52	4.03	30.00	-18.55	-13	-5.55	Horizontal
3465.0	-51.29	4.03	30.00	-25.32	-13	-12.32	Vertical
5197.5	-46.06	5.25	35.86	-15.45	-13	-2.45	Vertical
5197.5	-49.85	5.25	35.86	-19.24	-13	-6.24	Horizontal
203.6	-36.93	1.44	17.95	-20.42	-13	-7.42	Vertical
408.2	-44.51	1.65	16.09	-30.07	-13	-17.07	Horizontal
Test Results for High Channel 1745MHz							
3490.0	-50.46	2.91	27.68	-25.69	-13	-12.69	Horizontal
3490.0	-46.94	2.91	27.68	-22.17	-13	-9.17	Vertical
5235.0	-51.34	5.26	35.86	-20.74	-13	-7.74	Vertical
5235.0	-53.30	5.26	35.86	-22.70	-13	-9.70	Horizontal
197.0	-38.72	1.61	16.85	-23.48	-13	-10.48	Vertical
330.6	-40.80	1.61	15.19	-27.22	-13	-14.22	Horizontal

Note: P_{Mea}(dBm)= Power(dBm)+ AR_{pl} (dBm)

. Over Limit= : P_{Mea}(dBm)-Limit(dBm)

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

9.3 LTE BAND 12

QPSK EIRP POWER FOR LTE BAND 12 (1.4MHZ BANDWIDTH)

Test Results for Low Channel 699.7MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1399.4	-53.95	2.60	27.20	-29.35	-13	-16.35	Horizontal
1399.4	-52.41	2.60	27.20	-27.81	-13	-14.81	Vertical
2099.1	-48.94	2.85	27.54	-24.25	-13	-11.25	Vertical
2099.1	-52.76	2.85	27.54	-28.07	-13	-15.07	Horizontal
192.3	-34.79	1.49	17.78	-18.50	-13	-5.50	Vertical
326.2	-35.69	1.36	17.33	-19.72	-13	-6.72	Horizontal
Test Results For Mid Channel 707.5MHz							
1415.0	-47.85	2.61	27.28	-23.18	-13	-10.18	Horizontal
1415.0	-47.40	2.61	27.28	-22.73	-13	-9.73	Vertical
2122.5	-52.69	2.87	27.59	-27.97	-13	-14.97	Vertical
2122.5	-49.44	2.87	27.59	-24.72	-13	-11.72	Horizontal
179.8	-35.19	1.73	15.74	-21.18	-13	-8.18	Vertical
240.5	-34.41	1.62	15.79	-20.24	-13	-7.24	Horizontal
Test Results for High Channel 715.3MHz							
1430.6	-48.74	2.63	27.28	-24.09	-13	-11.09	Horizontal
1430.6	-47.56	2.63	27.28	-22.91	-13	-9.91	Vertical
2145.9	-53.73	2.88	27.60	-29.01	-13	-16.01	Vertical
2145.9	-53.78	2.88	27.60	-29.06	-13	-16.06	Horizontal
202.2	-44.09	1.61	18.00	-27.70	-13	-14.70	Vertical
279.8	-38.81	1.45	15.49	-24.78	-13	-11.78	Horizontal

QPSK EIRP POWER FOR LTE BAND 12 (10MHZ BANDWIDTH)

Test Results for Low Channel 704MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1408.0	-47.20	2.61	27.26	-22.55	-13	-9.55	Horizontal
1408.0	-46.27	2.61	27.26	-21.62	-13	-8.62	Vertical
2112.0	-52.31	2.87	27.58	-27.60	-13	-14.60	Vertical
2112.0	-50.08	2.87	27.58	-25.37	-13	-12.37	Horizontal
185.4	-39.99	1.31	16.97	-24.33	-13	-11.33	Vertical
323.0	-39.34	1.65	16.70	-24.29	-13	-11.29	Horizontal
Test Results for Mid Channel 707.5MHz							
1415.0	-44.99	2.61	27.28	-20.32	-13	-7.32	Horizontal
1415.0	-44.76	2.61	27.28	-20.09	-13	-7.09	Vertical
2122.5	-49.85	2.87	27.59	-25.13	-13	-12.13	Vertical
2122.5	-50.62	2.87	27.59	-25.90	-13	-12.90	Horizontal
186.4	-44.15	1.72	17.99	-27.88	-13	-14.88	Vertical
291.8	-44.38	1.73	17.94	-28.17	-13	-15.17	Horizontal
Test Results for High Channel 711MHz							
1422.0	-49.74	2.62	27.28	-25.08	-13	-12.08	Horizontal
1422.0	-47.02	2.62	27.28	-22.36	-13	-9.36	Vertical
2133.0	-52.60	2.87	27.60	-27.87	-13	-14.87	Vertical
2133.0	-52.49	2.87	27.60	-27.76	-13	-14.76	Horizontal
187.5	-38.67	1.58	15.93	-24.32	-13	-11.32	Vertical
273.4	-37.53	1.36	15.59	-23.30	-13	-10.30	Horizontal

Note: $P_{Mea}(dBm) = Power(dBm) + ARpl(dBm)$

. Over Limit = $P_{Mea}(dBm) - Limit(dBm)$

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

9.4 LTE BAND 17

QPSK EIRP POWER FOR LTE BAND 17 (5MHZ BANDWIDTH)

Test Results for Low Channel 706.5MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1413.0	-44.94	2.61	27.28	-20.27	-13	-7.27	Horizontal
1413.0	-52.25	2.61	27.28	-27.58	-13	-14.58	Vertical
2119.5	-51.58	2.87	27.59	-26.86	-13	-13.86	Vertical
2119.5	-50.60	2.87	27.59	-25.88	-13	-12.88	Horizontal
187.7	-43.74	1.71	16.15	-29.30	-13	-16.30	Vertical
265.8	-37.67	1.41	17.32	-21.76	-13	-8.76	Horizontal
Test Results For Mid Channel 710MHz							
1420.0	-46.19	2.62	27.30	-21.51	-13	-8.51	Horizontal
1420.0	-45.24	2.62	27.30	-20.56	-13	-7.56	Vertical
2130.0	-49.21	2.87	27.62	-24.46	-13	-11.46	Vertical
2130.0	-51.62	2.87	27.62	-26.87	-13	-13.87	Horizontal
197.3	-34.61	1.42	15.25	-20.79	-13	-7.79	Vertical
460.2	-41.65	1.36	17.19	-25.82	-13	-12.82	Horizontal
Test Results for High Channel 713.5MHz							
1427.0	-46.52	2.66	27.28	-21.90	-13	-8.90	Horizontal
1427.0	-50.77	2.66	27.28	-26.15	-13	-13.15	Vertical
2140.5	-46.06	2.88	27.60	-21.34	-13	-8.34	Vertical
2140.5	-51.73	2.88	27.60	-27.01	-13	-14.01	Horizontal
188.9	-34.19	1.32	17.29	-18.22	-13	-5.22	Vertical
269.4	-34.14	1.72	16.89	-18.97	-13	-5.97	Horizontal

QPSK EIRP POWER FOR LTE BAND 17 (10MHZ BANDWIDTH)

Test Results for Low Channel 709MHz							
Frequency(MHz)	SG Level(dBm)	Cable Loss(dB)	Antenna Gain(dB)	Absolute Level(dBm)	Limit (dBm)	Margin(dBm)	Polarity
1418.0	-45.42	2.62	27.30	-20.74	-13	-7.74	Horizontal
1418.0	-50.14	2.62	27.30	-25.46	-13	-12.46	Vertical
2127.0	-47.33	2.87	27.62	-22.58	-13	-9.58	Vertical
2127.0	-50.86	2.87	27.62	-26.11	-13	-13.11	Horizontal
195.1	-41.81	1.35	16.91	-26.25	-13	-13.25	Vertical
425.2	-44.46	1.62	16.31	-29.77	-13	-16.77	Horizontal
Test Results for Mid Channel 710MHz							
1420.0	-51.89	2.62	27.30	-27.21	-13	-14.21	Horizontal
1420.0	-53.90	2.62	27.30	-29.22	-13	-16.22	Vertical
2130.0	-48.03	2.87	27.62	-23.28	-13	-10.28	Vertical
2130.0	-52.45	2.87	27.62	-27.70	-13	-14.70	Horizontal
183.7	-37.39	1.51	17.14	-21.76	-13	-8.76	Vertical
368.1	-41.15	1.77	16.88	-26.04	-13	-13.04	Horizontal
Test Results for High Channel 711MHz							
1422.0	-48.74	2.62	27.30	-24.06	-13	-11.06	Horizontal
1422.0	-51.14	2.62	27.30	-26.46	-13	-13.46	Vertical
2133.0	-53.75	2.87	27.62	-29.00	-13	-16.00	Vertical
2133.0	-53.36	2.87	27.62	-28.61	-13	-15.61	Horizontal
186.6	-35.54	1.78	15.95	-21.37	-13	-8.37	Vertical
284.3	-44.86	1.34	17.95	-28.26	-13	-15.26	Horizontal

Note: $P_{Mea}(dBm) = Power(dBm) + ARpl(dBm)$

. Over Limit = $P_{Mea}(dBm) - Limit(dBm)$

. Both QPSK and 16QAM has been tested, the worst case is QPSK mode, the report just reported the worst case.

10. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- ☐ Temp. = -30° to $+50^{\circ}\text{C}$
- ☐ Voltage = low voltage, DC 3.4V, Normal, DC 3.7V and High voltage, DC 4.4V.

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to -30°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- ☐ LTE Band 2
- LTE Band 4
- LTE Band 12
- LTE Band 17

RESULTS

See the following pages.

10.1 LTE BAND 2

QPSK, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1880	13.1	0.006974	2.5
3.7	1880	14.2	0.007528	2.5
4.4	1880	13.3	0.007069	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 QPSK, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	12.5	0.006649	2.5
Extreme (50C)	1880	11.5	0.006128	2.5
Extreme (40C)	1880	13.6	0.007237	2.5
Extreme (30C)	1880	13.8	0.007335	2.5
Extreme (10C)	1880	13.8	0.007346	2.5
Extreme (0C)	1880	12.2	0.006478	2.5
Extreme (-10C)	1880	12.7	0.006770	2.5
Extreme (-20C)	1880	14.5	0.007736	2.5
Extreme (-30C)	1880	14.4	0.007664	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1880	10.3	0.005454	2.5
3.7	1880	8.5	0.004541	2.5
4.4	1880	8.0	0.004239	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 2 16QAM, (CH 18900 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1880	9.8	0.005207	2.5
Extreme (50C)	1880	8.7	0.004636	2.5
Extreme (40C)	1880	7.7	0.004089	2.5
Extreme (30C)	1880	9.1	0.004832	2.5
Extreme (10C)	1880	9.2	0.004896	2.5
Extreme (0C)	1880	8.2	0.004384	2.5
Extreme (-10C)	1880	9.3	0.004928	2.5
Extreme (-20C)	1880	8.8	0.004699	2.5
Extreme (-30C)	1880	8.1	0.004305	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.2 LTE BAND 4

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1732.5	9.2	0.005334	2.5
3.7	1732.5	8.4	0.004872	2.5
4.4	1732.5	8.5	0.004903	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 QPSK, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	8.4	0.004861	2.5
Extreme (50C)	1732.5	9.0	0.005196	2.5
Extreme (40C)	1732.5	7.2	0.004158	2.5
Extreme (30C)	1732.5	5.8	0.003341	2.5
Extreme (10C)	1732.5	7.4	0.004257	2.5
Extreme (0C)	1732.5	9.9	0.005686	2.5
Extreme (-10C)	1732.5	7.9	0.004574	2.5
Extreme (-20C)	1732.5	6.7	0.003847	2.5
Extreme (-30C)	1732.5	8.3	0.004774	2.5

16QAM, (20MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
3.4	1732.5	10.1	0.005821	2.5
3.7	1732.5	8.9	0.005153	2.5
4.4	1732.5	8.5	0.004928	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 4 16QAM, (CH 20175 RB size 100 RB Offset 0 20MHz BANDWIDTH)				
Normal (25C)	1732.5	9.4	0.005415	2.5
Extreme (50C)	1732.5	9.3	0.005364	2.5
Extreme (40C)	1732.5	8.4	0.004837	2.5
Extreme (30C)	1732.5	9.1	0.005272	2.5
Extreme (10C)	1732.5	8.9	0.005144	2.5
Extreme (0C)	1732.5	8.2	0.004736	2.5
Extreme (-10C)	1732.5	9.3	0.005360	2.5
Extreme (-20C)	1732.5	9.2	0.005288	2.5
Extreme (-30C)	1732.5	8.5	0.004893	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.3 LTE BAND 12

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	707.5	8.6	0.012219	2.5
3.7	707.5	10.1	0.014292	2.5
4.4	707.5	8.5	0.012012	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	8.8	0.012494	2.5
Extreme (50C)	707.5	7.4	0.010493	2.5
Extreme (40C)	707.5	7.3	0.010340	2.5
Extreme (30C)	707.5	8.2	0.011647	2.5
Extreme (10C)	707.5	7.1	0.010013	2.5
Extreme (0C)	707.5	8.6	0.012184	2.5
Extreme (-10C)	707.5	7.9	0.011219	2.5
Extreme (-20C)	707.5	9.4	0.013274	2.5
Extreme (-30C)	707.5	7.5	0.010634	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 16QAM, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	707.5	7.5	0.010614	2.5
3.7	707.5	8.6	0.012170	2.5
4.4	707.5	7.2	0.010176	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 12 QPSK, (CH 23095 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	707.5	6.5	0.009175	2.5
Extreme (50C)	707.5	5.5	0.007765	2.5
Extreme (40C)	707.5	6.4	0.009110	2.5
Extreme (30C)	707.5	-7.7	-0.010912	2.5
Extreme (10C)	707.5	-8.2	-0.011590	2.5
Extreme (0C)	707.5	2.9	0.004100	2.5
Extreme (-10C)	707.5	-5.2	-0.007292	2.5
Extreme (-20C)	707.5	-8.7	-0.012302	2.5
Extreme (-30C)	707.5	-10.2	-0.014350	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

10.4 LTE BAND 17

QPSK, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	710.0	10.3	0.014475	2.5
3.7	710.0	8.9	0.012501	2.5
4.4	710.0	8.0	0.011330	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	10.1	0.014199	2.5
Extreme (50C)	710.0	8.5	0.011917	2.5
Extreme (40C)	710.0	8.4	0.011789	2.5
Extreme (30C)	710.0	8.8	0.012341	2.5
Extreme (10C)	710.0	8.8	0.012447	2.5
Extreme (0C)	710.0	7.7	0.010884	2.5
Extreme (-10C)	710.0	9.5	0.013376	2.5
Extreme (-20C)	710.0	9.1	0.012782	2.5
Extreme (-30C)	710.0	7.7	0.010874	2.5

16QAM, (10MHz BANDWIDTH)

Frequency error vs. Voltage

Voltage [Vdc]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 16QAM, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
3.4	710.0	10.4	0.014636	2.5
3.7	710.0	9.1	0.012875	2.5
4.4	710.0	8.3	0.011678	2.5

Frequency error vs. Temperature

Temperature [°C]	Frequency [MHz]	Frequency* Error[Hz]	Frequency Error[ppm]	Limit [ppm]
BAND 17 QPSK, (CH 23790 RB size 50 RB Offset 0 10MHz BANDWIDTH)				
Normal (25C)	710.0	9.5	0.013318	2.5
Extreme (50C)	710.0	8.4	0.011886	2.5
Extreme (40C)	710.0	8.6	0.012165	2.5
Extreme (30C)	710.0	8.6	0.012095	2.5
Extreme (10C)	710.0	7.7	0.010838	2.5
Extreme (0C)	710.0	8.1	0.011448	2.5
Extreme (-10C)	710.0	9.5	0.013319	2.5
Extreme (-20C)	710.0	9.2	0.013018	2.5
Extreme (-30C)	710.0	8.3	0.011758	2.5

***Note:** Frequency error measurements were made by using the build-in capability of the Wireless Communication Test Set.

11. Peak-to-Average Ratio

11.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

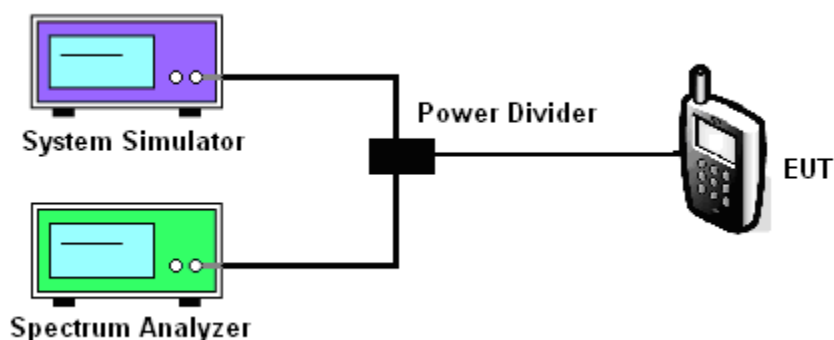
11.2 Measuring Instruments

See list of measuring instruments of this test report.

11.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. For GSM/EGPRS operating modes:
 - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
 - b. Set EUT in maximum power output, and triggered the burst signal.
 - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
 - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
 - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

11.4 Test Setup



MODES TESTED

- ☐ LTE Band 2/4/12/17
- ☐

Test data reference attachment.

----END OF REPORT----