



FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART F
FCC CFR47 PART 27 SUBPART L

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Tablet + Bluetooth/BLE and DTS/UNII a/b/g/n/ac and ANT+

MODEL NUMBER : SM-T815

FCC ID: A3LSMT815

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Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Tablet+Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+
MODEL NUMBER: SM-T815
SERIAL NUMBER: R32G300M6CW (RADIATED); R32G300N6DL (CONDUCTED)
DATE TESTED: APRIL 06 - MAY 04, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Tested By:



Ji Ho Choi
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UL Korea, Ltd.

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UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24 and FCC CFR Part 27.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
☒	Chamber 1
☐	Chamber 2

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\text{EIRP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$$

$$\text{ERP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss (between the SG and substitution antenna)}$$

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+.

5.2. MAXIMUM OUTPUT POWER (GSM)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation Peak	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM850	824~849	GMSK	33.27	2123.2		
		GPRS	33.29	2133.0	33.80	2396.1
		EGPRS	26.91	490.9	28.77	752.8
GSM1900	1850~1910	GMSK	30.03	1006.9		
		GPRS	30.03	1006.9	31.01	1261.2
		EGPRS	25.94	392.6	26.39	435.3

5.3. MAXIMUM OUTPUT POWER (WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24						
Band	Frequency Range [MHz]	Modulation Peak	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824~849	REL99	23.30	213.8	23.65	231.5
		HSDPA	23.64	231.2	21.76	149.8
		HSUPA	22.72	187.1		
Band 2	1850~1910	REL99	22.91	195.4	21.13	129.8
		HSDPA	22.97	198.2	23.63	230.6
		HSUPA	22.04	160.0		

5.4. MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

LTE Band 17

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 17	704~716	10MHz	QPSK	23.64	231.0	16.20	41.7
			16QAM	22.70	186.3	15.14	32.7
		5MHz	QPSK	23.49	223.3	16.69	46.7
			16QAM	22.33	170.8	15.69	37.1

LTE Band 5

FCC Part 22							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824~849	10MHz	QPSK	24.23	265.0	19.25	84.1
			16QAM	23.25	211.3	18.58	72.1
		5MHz	QPSK	23.94	247.7	18.67	73.5
			16QAM	23.25	211.2	18.56	71.7
		3MHz	QPSK	24.33	271.2	18.81	75.9
			16QAM	23.28	212.9	18.26	66.9
		1.4MHz	QPSK	24.32	270.5	17.26	53.1
			16QAM	23.42	220.0	16.64	46.1

LTE Band 4

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 4	1710~1755	20MHz	QPSK	22.81	191.1	24.51	282.5
			16QAM	21.76	150.1	23.34	215.8
		15MHz	QPSK	22.84	192.5	21.95	156.7
			16QAM	21.86	153.6	20.48	111.7
		10MHz	QPSK	23.04	201.4	23.34	215.8
			16QAM	22.30	170.0	23.24	210.9
		5MHz	QPSK	22.98	198.5	23.69	233.9
			16QAM	22.25	167.9	22.42	174.6
		3MHz	QPSK	23.42	219.7	19.78	95.1
			16QAM	22.91	195.5	19.11	81.5
		1.4MHz	QPSK	23.38	217.7	19.71	93.5
			16QAM	22.45	175.9	20.42	110.2

LTE Band 2

FCC Part 24							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	1850~1910	20MHz	QPSK	22.96	197.6	22.74	187.8
			16QAM	21.68	147.3	21.60	144.5
		15MHz	QPSK	22.81	191.2	22.42	174.5
			16QAM	21.80	151.4	21.38	137.3
		10MHz	QPSK	22.89	194.6	22.44	175.3
			16QAM	21.84	152.6	21.54	142.5
		5MHz	QPSK	22.86	193.0	21.73	148.9
			16QAM	21.80	151.3	21.33	135.8
		3MHz	QPSK	23.09	203.6	17.26	53.2
			16QAM	21.95	156.6	16.90	49.0
		1.4MHz	QPSK	23.00	199.3	18.68	73.8
			16QAM	22.18	165.2	17.57	57.1

5.5. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a FPCB antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
LTE Band 17 704 ~ 716 MHz	-1.52
GSM 850 / WCDMA Band 5 / LTE Band 5 824 ~ 849 MHz	1.51
LTE Band 4 1710 ~ 1755 MHz	0.57
GSM 1900 / WCDMA Band 2 / LTE Band 2 1850 ~ 1910 MHz	-1.41

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA12EWE	N/A	N/A
Data Cable	SAMSUNG	ECB-DG925UWE	N/A	N/A
Earphone	SAMSUNG	GH59-11129H	N/A	N/A

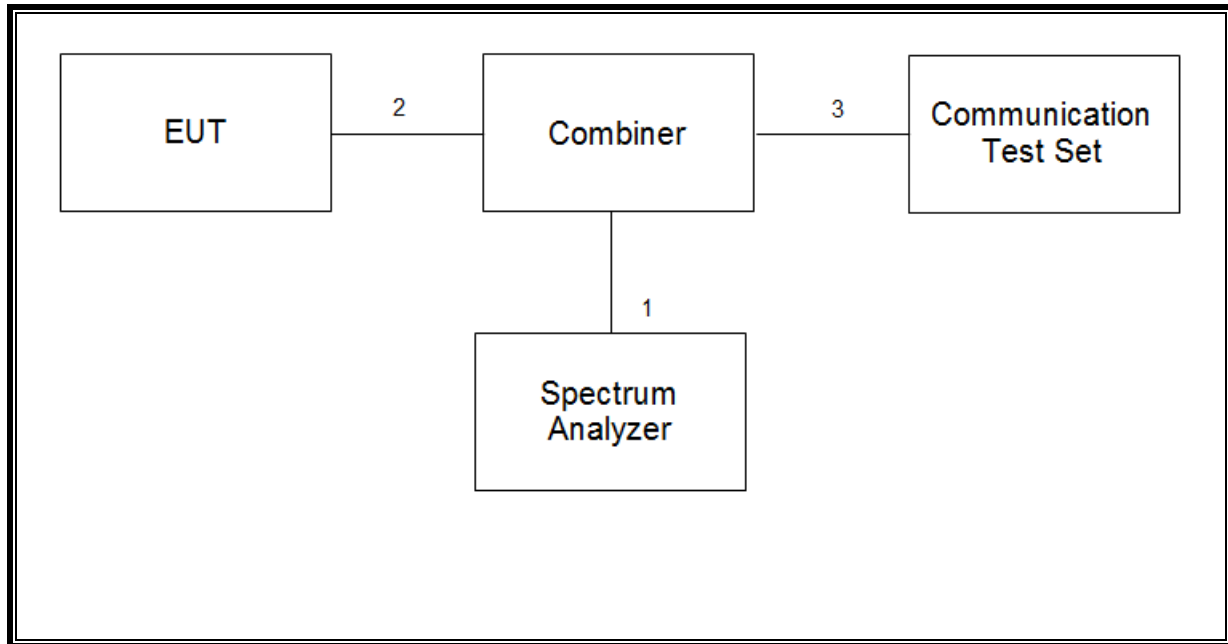
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

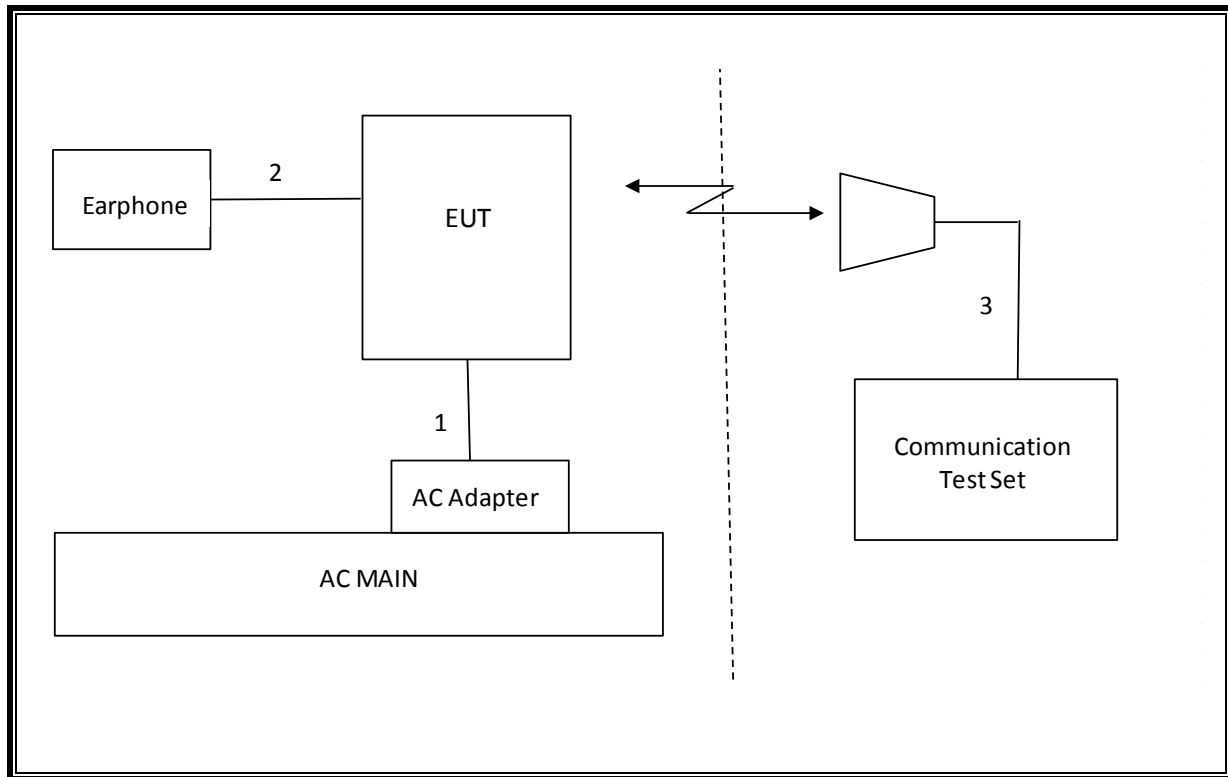
TEST SETUP

The EUT is continuously communicated to the call box during the tests.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121D DB4	00164753	07-29-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	950	11-17-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-15
Antenna, Horn, 40 GHz	ETS	3116C	00166255	09-23-15
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	09-29-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	11-17-15
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	11-18-15
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	09-23-15
Communications Test Set	R&S	CMW500	150312	08-13-15
Average Power Sensor	R&S	NRZ-Z91	102681	11-17-15
Average Power Sensor	Agilent / HP	U2000	MY54270007	09-23-15
EMI Test Receive, 40 GHz	R&S	ESU40	100439	11-17-15
EMI Test Receive, 3 GHz	R&S	ESR3	101832	11-17-15
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	11-17-15
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	11-17-15
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	11-17-15
Combiner	WEINSCHTEL	1575	2153	11-17-15
Temperature Chamber	ESPEC	SH-642	93001109	11-13-15
DC Power Supply	Agilent / HP	E3640A	MY54226395	09-23-15

7. Summary Table

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Note
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass	17.927 MHz
22.917(a) 24.238(a) 27.53(g)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-14.79 dBm
2.1046	Conducted output power	N/A		Pass	33.29 dBm
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass	0.031PPM
22.913(a)(2)	Effective Radiated Power	38 dBm	Radiated	Pass	33.80 dBm
27.50(c)(10)		34.77 dBm		Pass	16.69 dBm
24.232(c)	Equivalent Isotropic Radiated Power	33dBm		Pass	31.01 dBm
27.50(d)(4)		30dBm		Pass	24.51 dBm
22.917(a) 24.238(a) 27.53(g)	Radiated Spurious Emission	-13dBm		Pass	-31.8 dBm

FCC Rule Part	Frequency Range [MHz]	Output Power [W]	Frequency Tolerance	Emission Designator	Emission Bandwidth [MHz]	Communication Type
GSM						
22H	824.2 - 848.8	2.396	2.5 ppm	243KGXW		GSM850
22H	824.2 - 848.8	0.753	2.5 ppm	248KG7W		EDGE850
24E	1850.2 - 1909.8	1.261	2.5 ppm	243KGXW		GSM1900
24E	1850.2 - 1909.8	0.435	2.5 ppm	244KG7W		EDGE1900
WCDMA						
22H	826.4 - 846.6	0.232	2.5 ppm	4M16F9W		WCDMA
24E	1852.4 - 1907.6	0.231	2.5 ppm	4M16F9W		WCDMA
LTE Band 2						
24E	1860.0 - 1900.0	0.188	2.5 ppm	17M9G7D	20	QPSK
24E	1860.0 - 1900.0	0.145	2.5 ppm	17M9D7W	20	16QAM
24E	1857.5 - 1902.5	0.175	2.5 ppm	13M5G7D	15	QPSK
24E	1857.5 - 1902.5	0.137	2.5 ppm	13M5D7W	15	16QAM
24E	1855.0 - 1905.0	0.175	2.5 ppm	9M00G7D	10	QPSK
24E	1855.0 - 1905.0	0.143	2.5 ppm	9M01D7W	10	16QAM
24E	1852.5 - 1907.5	0.149	2.5 ppm	4M51G7D	5	QPSK
24E	1852.5 - 1907.5	0.136	2.5 ppm	4M53D7W	5	16QAM
24E	1851.5 - 1908.5	0.053	2.5 ppm	2M70G7D	3	QPSK
24E	1851.5 - 1908.5	0.049	2.5 ppm	2M70D7W	3	16QAM
24E	1850.7 - 1909.3	0.074	2.5 ppm	1M10G7D	1.4	QPSK
24E	1850.7 - 1909.3	0.057	2.5 ppm	1M10D7W	1.4	16QAM
LTE Band 4						
27L	1720.0 - 1745.0	0.283	2.5 ppm	17M9G7D	20	QPSK
27L	1720.0 - 1745.0	0.216	2.5 ppm	17M9D7W	20	16QAM
27L	1717.5 - 1747.5	0.157	2.5 ppm	13M4G7D	15	QPSK
27L	1717.5 - 1747.5	0.112	2.5 ppm	13M4D7W	15	16QAM
27L	1715.0 - 1750.0	0.216	2.5 ppm	8M99G7D	10	QPSK
27L	1715.0 - 1750.0	0.211	2.5 ppm	8M97D7W	10	16QAM
27L	1712.5 - 1752.5	0.234	2.5 ppm	4M51G7D	5	QPSK
27L	1712.5 - 1752.5	0.175	2.5 ppm	4M51D7W	5	16QAM
27L	1711.5 - 1753.5	0.095	2.5 ppm	2M71G7D	3	QPSK
27L	1711.5 - 1753.5	0.082	2.5 ppm	2M71D7W	3	16QAM
27L	1710.7 - 1754.3	0.094	2.5 ppm	1M10G7D	1.4	QPSK
27L	1710.7 - 1754.3	0.110	2.5 ppm	1M10D7W	1.4	16QAM
LTE Band 5						
22H	829.0 - 844.0	0.084	2.5 ppm	8M98G7D	10	QPSK
22H	829.0 - 844.0	0.072	2.5 ppm	8M97D7W	10	16QAM
22H	826.5 - 846.5	0.074	2.5 ppm	4M50G7D	5	QPSK
22H	826.5 - 846.5	0.072	2.5 ppm	4M51D7W	5	16QAM
22H	825.5 - 847.5	0.076	2.5 ppm	2M71G7D	3	QPSK
22H	825.5 - 847.5	0.067	2.5 ppm	2M71D7W	3	16QAM
22H	824.7 - 848.3	0.053	2.5 ppm	1M10G7D	1.4	QPSK
22H	824.7 - 848.3	0.046	2.5 ppm	1M09D7W	1.4	16QAM
LTE Band 17						
27F	709.0 - 711.0	0.042	2.5 ppm	8M96G7D	10	QPSK
27F	709.0 - 711.0	0.033	2.5 ppm	8M95D7W	10	16QAM
27F	706.5 - 713.5	0.047	2.5 ppm	4M52G7D	5	QPSK
27F	706.5 - 713.5	0.037	2.5 ppm	4M51D7W	5	16QAM

8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900
Press Connection control to choose the different menus
Press RESET > choose all to reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM+GPRS or GSM+EGPRS
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting
 > Slot configuration > Uplink/Gamma
 > 33 dBm for GPRS 850/900
 > 30 dBm for GPRS1800/1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stable)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
Channel Type > Off
P0> 4 dB
Slot Config > Unchanged (if already set under MS Signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3 (Default)
Network Coding Scheme > CS4 (GPRS) and MCS5 ~ MCS9 (EGPRS)
Bit Stream > 2E9-1PSR Bit Pattern
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal On to turn on the signal and change settings

8.1.1. GSM OUTPUT POWER RESULT

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. [MHz]	Max. Power	
						Burst Pwr [dBm]	Frame Pwr [dBm]
850	GSM (Voice)	CS1	1	128	824.2	33.1	24.1
				190	836.6	33.2	24.2
				251	848.8	33.3	24.2
	GPRS (GMSK)	CS1	1	128	824.2	33.1	24.1
				190	836.6	33.2	24.2
				251	848.8	33.3	24.3
			2	128	824.2	32.3	26.3
				190	836.6	32.6	26.6
				251	848.8	32.8	26.7
			3	128	824.2	28.8	24.5
				190	836.6	29.0	24.7
				251	848.8	29.2	24.9
			4	128	824.2	27.6	24.6
				190	836.6	27.8	24.8
				251	848.8	28.2	25.2
	EGPRS (8PSK)	MCS5	1	128	824.2	26.5	17.5
				190	836.6	26.7	17.7
				251	848.8	26.9	17.9
			2	128	824.2	25.4	19.4
				190	836.6	25.5	19.4
				251	848.8	26.0	20.0
			3	128	824.2	23.0	18.8
				190	836.6	23.5	19.2
				251	848.8	23.7	19.4
			4	128	824.2	22.2	19.2
				190	836.6	22.3	19.3
				251	848.8	22.6	19.5

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. [MHz]	Max. Power	
						Burst Pwr [dBm]	Frame Pwr [dBm]
850	GSM (Voice)	CS1	1	512	1850.2	30.0	21.0
				661	1880.0	30.0	21.0
				810	1909.8	29.9	20.9
	GPRS (GMSK)	CS1	1	512	1850.2	30.0	21.0
				661	1880.0	30.0	21.0
				810	1909.8	29.9	20.9
			2	512	1850.2	29.1	23.1
				661	1880.0	29.4	23.4
				810	1909.8	29.2	23.2
			3	512	1850.2	26.1	21.8
				661	1880.0	26.3	22.1
				810	1909.8	26.4	22.1
			4	512	1850.2	25.0	22.0
				661	1880.0	25.1	22.1
				810	1909.8	25.2	22.2
	EGPRS (8PSK)	MCS5	1	512	1850.2	25.7	16.7
				661	1880.0	25.9	16.9
				810	1909.8	25.9	16.9
			2	512	1850.2	24.7	18.6
				661	1880.0	24.8	18.8
				810	1909.8	25.1	19.1
			3	512	1850.2	22.1	17.8
				661	1880.0	22.6	18.3
				810	1909.8	22.6	18.4
			4	512	1850.2	21.0	17.9
				661	1880.0	21.4	18.4
				810	1909.8	21.5	18.5

8.2. UMTS REL 99

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 7 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	11/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs}=\beta_{hs}/\beta_c$	30/15			

HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/1
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	β_{ed}	1309/225	94/75	47/15	56/75	47/15
HSDPA Specific Settings	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	E-DPDCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelisation Codes	2xSF2				SF4

DC-HSDPA Setup Procedures used to establish the test signals

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

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.		

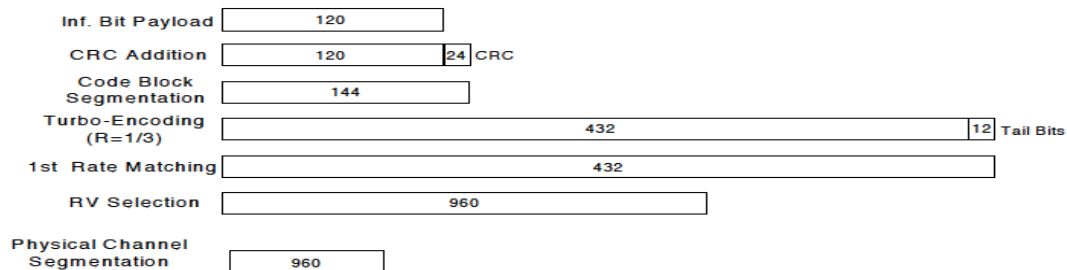


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	11/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	11/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs} / \beta_c$	30/15			

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

8.2.1. WCDMA OUTPUT POWER RESULT

WCDMA Band 5 Measured Results

Band	Mode		UL Ch No.	Freq. [MHz]	MPR [dB]	Avg Pwr [dBm]
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	0	23.3
			4183	836.6	0	23.3
			4233	846.6	0	23.3
	HSDPA	Subtest 1	4132	826.4	0	23.5
			4183	836.6	0	23.5
			4233	846.6	0	23.5
		Subtest 2	4132	826.4	0	23.4
			4183	836.6	0	23.6
			4233	846.6	0	23.6
		Subtest 3	4132	826.4	0.5	22.9
			4183	836.6	0.5	22.9
			4233	846.6	0.5	22.9
		Subtest 4	4132	826.4	0.5	22.7
			4183	836.6	0.5	22.8
			4233	846.6	0.5	22.8
	HSUPA	Subtest 1	4132	826.4	0	22.7
			4183	836.6	0	22.7
			4233	846.6	0	22.7
		Subtest 2	4132	826.4	2	20.3
			4183	836.6	2	20.3
			4233	846.6	2	20.4
		Subtest 3	4132	826.4	1	21.2
			4183	836.6	1	21.2
			4233	846.6	1	21.3
		Subtest 4	4132	826.4	2	20.3
			4183	836.6	2	20.3
			4233	846.6	2	20.3
		Subtest 5	4132	826.4	0	23.5
			4183	836.6	0	23.6
			4233	846.6	0	23.5

WCDMA Band 2 Measured Results

Band	Mode		UL Ch No.	Freq. [MHz]	MPR [dB]	Avg Pwr [dBm]
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	9262	1852.4	0	22.5
			9400	1880.0	0	22.9
			9538	1907.6	0	22.8
	HSDPA	Subtest 1	9262	1852.4	0	22.6
			9400	1880.0	0	23.0
			9538	1907.6	0	22.8
		Subtest 2	9262	1852.4	0	22.6
			9400	1880.0	0	23.0
			9538	1907.6	0	22.8
		Subtest 3	9262	1852.4	0.5	22.1
			9400	1880.0	0.5	22.5
			9538	1907.6	0.5	22.3
		Subtest 4	9262	1852.4	0.5	21.7
			9400	1880.0	0.5	22.0
			9538	1907.6	0.5	21.8
	HSUPA	Subtest 1	9262	1852.4	0	21.8
			9400	1880.0	0	22.0
			9538	1907.6	0	21.8
		Subtest 2	9262	1852.4	2	19.5
			9400	1880.0	2	19.6
			9538	1907.6	2	19.4
		Subtest 3	9262	1852.4	1	21.7
			9400	1880.0	1	21.0
			9538	1907.6	1	20.9
		Subtest 4	9262	1852.4	2	19.3
			9400	1880.0	2	19.5
			9538	1907.6	2	19.3
		Subtest 5	9262	1852.4	0	22.7
			9400	1880.0	0	23.0
			9538	1907.6	0	22.7

8.3. LTE OUTPUT VERIFICATION

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 Signalling Value of "NS_01".

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	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
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.

8.3.1. LTE OUTPUT POWER RESULT

LTE Band 17 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]
						Max. Power
						710 MHz
LTE Band 17	10	QPSK	1	0	0	23.60
			1	25	0	23.62
			1	49	0	23.64
			25	0	1	22.27
			25	12	1	22.17
			25	25	1	22.10
			50	0	1	22.29
		16QAM	1	0	1	22.70
			1	25	1	22.51
			1	49	1	22.56
			25	0	2	21.09
			25	12	2	21.01
			25	25	2	21.06
			50	0	2	21.19
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)
						Max. Power
						710 MHz
LTE Band 17	5	QPSK	1	0	0	23.49
			1	12	0	23.36
			1	24	0	23.44
			12	0	1	22.22
			12	6	1	22.14
			12	11	1	22.06
			25	0	1	22.14
		16QAM	1	0	1	22.33
			1	12	1	22.18
			1	24	1	22.25
			12	0	2	21.09
			12	6	2	20.98
			12	11	2	21.00
			25	0	2	21.07

LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	24.23	23.80	23.52
			1	25	0	24.21	23.89	23.69
			1	49	0	24.11	24.15	23.53
			25	0	1	22.92	22.60	22.24
			25	12	1	22.80	22.50	22.25
			25	25	1	22.81	22.60	22.20
		16QAM	50	0	1	22.92	22.45	22.25
			1	0	1	23.25	22.68	22.62
			1	25	1	23.10	22.70	22.69
			1	49	1	23.06	22.84	22.55
			25	0	2	21.85	21.33	21.21
			25	12	2	21.73	21.49	21.23
LTE Band 5	5	QPSK	25	25	2	21.75	21.48	21.10
			50	0	2	21.89	21.39	21.21
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	23.43	23.74	23.90
			1	12	0	23.39	23.85	23.91
			1	24	0	23.35	23.94	23.82
			12	0	1	22.04	22.42	22.68
			12	7	1	22.01	22.41	22.47
			12	13	1	21.92	22.42	22.48
		16QAM	25	0	1	21.95	22.32	22.61
			1	0	1	22.32	22.62	23.25
			1	12	1	22.24	22.66	23.14
			1	24	1	22.29	22.71	23.15
			12	0	2	20.99	21.26	21.52
			12	7	2	20.88	21.37	21.47
LTE Band 5	3	QPSK	12	13	2	20.82	21.44	21.40
			25	0	2	20.89	21.31	21.52
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.32	23.78	23.54
			1	8	0	24.33	23.91	23.44
			1	14	0	24.29	23.93	23.41
			8	0	1	23.03	22.48	22.25
			8	4	1	23.03	22.51	22.19
			8	7	1	23.00	22.56	22.19
		16QAM	15	0	1	22.98	22.55	22.22
			1	0	1	23.28	23.21	22.92
			1	8	1	23.23	23.16	22.81
			1	14	1	23.11	23.27	22.82
			8	0	2	21.85	21.25	21.22
			8	4	2	21.84	21.25	21.11
LTE Band 5	1.4	QPSK	8	7	2	21.85	21.28	21.09
			15	0	2	21.84	21.39	21.11
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.28	23.90	23.55
			1	3	0	24.32	23.94	23.51
			1	5	0	24.25	23.91	23.52
			3	0	0	24.13	23.67	23.51
			3	1	0	24.15	23.66	23.45
			3	3	0	24.14	23.68	23.37
		16QAM	6	0	1	22.86	22.56	22.30
			1	0	1	23.42	22.97	22.63
			1	3	1	23.38	22.93	22.68
			1	5	1	23.32	22.97	22.65
			3	0	1	23.07	22.65	22.64
			3	1	1	22.96	22.70	22.47
LTE Band 5	1.4	16QAM	3	3	1	23.02	22.66	22.43
			6	0	2	21.78	21.29	21.32

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	22.41	22.59	22.66
			1	49	0	22.45	22.74	22.81
			1	99	0	22.57	22.79	22.81
			50	0	1	21.38	21.27	21.55
			50	24	1	21.27	21.34	21.47
			50	50	1	21.26	21.43	21.37
			100	0	1	21.36	21.27	21.54
		16QAM	1	0	1	21.41	21.48	21.66
			1	49	1	21.46	21.44	21.76
			1	99	1	21.54	21.52	21.67
			50	0	2	20.25	20.19	20.38
			50	24	2	20.21	20.30	20.29
			50	50	2	20.14	20.19	20.30
			100	0	2	20.24	20.14	20.39
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	22.44	22.55	22.78
			1	37	0	22.63	22.68	22.81
			1	74	0	22.55	22.71	22.84
			36	0	1	21.28	21.24	21.63
			36	20	1	21.29	21.38	21.52
			36	39	1	21.24	21.43	21.57
			75	0	1	21.29	21.29	21.61
		16QAM	1	0	1	21.54	21.58	21.78
			1	37	1	21.51	21.59	21.77
			1	74	1	21.58	21.64	21.86
			36	0	2	20.17	20.20	20.49
			36	20	2	20.16	20.24	20.46
			36	39	2	20.11	20.28	20.43
			75	0	2	20.15	20.15	20.51
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	22.50	22.59	22.99
			1	25	0	22.55	22.62	22.99
			1	49	0	22.49	22.70	23.04
			25	0	1	21.23	21.26	21.69
			25	12	1	21.30	21.39	21.66
			25	25	1	21.17	21.32	21.63
			50	0	1	21.19	21.29	21.75
		16QAM	1	0	1	21.47	21.52	22.25
			1	25	1	21.44	21.54	22.27
			1	49	1	21.41	21.61	22.30
			25	0	2	20.16	20.22	20.66
			25	12	2	20.23	20.24	20.61
			25	25	2	20.11	20.29	20.60
			50	0	2	20.08	20.09	20.70

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	22.33	22.60	22.95
			1	12	0	22.34	22.65	22.97
			1	24	0	22.36	22.75	22.98
			12	0	1	21.11	21.22	21.73
			12	7	1	21.14	21.34	21.65
			12	13	1	21.13	21.31	21.67
		16QAM	25	0	1	21.10	21.22	21.72
			1	0	1	21.39	21.68	22.25
			1	12	1	21.38	21.67	22.18
			1	24	1	21.32	21.67	22.24
			12	0	2	20.02	20.16	20.68
			12	7	2	20.05	20.25	20.52
			12	13	2	20.06	20.22	20.53
			25	0	2	20.02	20.16	20.68
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	22.62	22.63	23.42
			1	8	0	22.73	22.76	23.34
			1	14	0	22.75	22.82	23.37
			8	0	1	21.47	21.32	22.08
			8	4	1	21.49	21.39	22.06
			8	7	1	21.48	21.43	22.03
			15	0	1	21.46	21.41	22.11
		16QAM	1	0	1	21.91	21.99	22.91
			1	8	1	21.93	21.95	22.77
			1	14	1	21.85	21.95	22.81
			8	0	2	20.31	20.16	20.95
			8	4	2	20.33	20.27	20.93
			8	7	2	20.33	20.21	20.89
			15	0	2	20.32	20.31	20.90
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	22.65	22.76	23.38
			1	3	0	22.65	22.78	23.30
			1	5	0	22.71	22.80	23.33
			3	0	0	22.59	22.60	23.24
			3	1	0	22.61	22.53	23.24
			3	3	0	22.55	22.56	23.22
			6	0	1	21.42	21.42	22.10
		16QAM	1	0	1	21.65	21.79	22.42
			1	3	1	21.66	21.76	22.42
			1	5	1	21.66	21.78	22.45
			3	0	1	21.44	21.59	22.08
			3	1	1	21.32	21.49	22.01
			3	3	1	21.28	21.52	22.09
			6	0	2	20.31	20.30	21.05

LTE Band 2 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	22.78	22.84	22.39
			1	49	0	22.87	22.95	22.44
			1	99	0	22.88	22.96	22.44
			50	0	1	21.50	21.49	21.31
			50	24	1	21.56	21.55	21.20
			50	50	1	21.52	21.54	21.23
			100	0	1	21.52	21.46	21.27
		16QAM	1	0	1	21.62	21.51	21.61
			1	49	1	21.67	21.53	21.68
			1	99	1	21.63	21.65	21.63
			50	0	2	20.45	20.38	20.08
			50	24	2	20.46	20.37	20.01
			50	50	2	20.48	20.36	20.03
			100	0	2	20.49	20.37	20.21
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	22.77	22.69	22.55
			1	37	0	22.80	22.81	22.48
			1	74	0	22.69	22.79	22.53
			36	0	1	21.55	21.55	21.37
			36	20	1	21.49	21.58	21.24
			36	39	1	21.52	21.58	21.23
			75	0	1	21.42	21.51	21.32
		16QAM	1	0	1	21.57	21.75	21.56
			1	37	1	21.66	21.80	21.44
			1	74	1	21.53	21.75	21.47
			36	0	2	20.32	20.47	20.27
			36	20	2	20.42	20.43	20.16
			36	39	2	20.46	20.43	20.15
			75	0	2	20.33	20.31	20.25
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	22.80	22.67	22.46
			1	25	0	22.87	22.77	22.41
			1	49	0	22.89	22.76	22.49
			25	0	1	21.60	21.40	21.20
			25	12	1	21.57	21.43	21.20
			25	25	1	21.68	21.46	21.15
			50	0	1	21.62	21.47	21.24
		16QAM	1	0	1	21.84	21.64	21.69
			1	25	1	21.79	21.57	21.66
			1	49	1	21.83	21.66	21.71
			25	0	2	20.43	20.42	20.24
			25	12	2	20.56	20.43	20.21
			25	25	2	20.56	20.35	20.24
			50	0	2	20.45	20.30	20.22

LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	22.84	22.77	22.31
			1	12	0	22.77	22.82	22.28
			1	24	0	22.86	22.81	22.29
			12	0	1	21.58	21.45	21.07
			12	7	1	21.71	21.46	21.00
			12	13	1	21.69	21.45	21.02
		16QAM	25	0	1	21.59	21.43	21.07
			1	0	1	21.60	21.80	21.72
			1	12	1	21.60	21.76	21.61
			1	24	1	21.66	21.74	21.68
			12	0	2	20.49	20.43	20.03
			12	7	2	20.64	20.45	19.96
			12	13	2	20.61	20.43	19.97
			25	0	2	20.55	20.32	20.02
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	22.88	22.82	22.39
			1	8	0	23.02	22.80	22.25
			1	14	0	23.09	22.81	22.27
			8	0	1	21.65	21.52	21.12
			8	4	1	21.65	21.52	21.09
			8	7	1	21.70	21.52	21.05
		16QAM	15	0	1	21.67	21.52	21.05
			1	0	1	21.85	21.93	21.76
			1	8	1	21.81	21.95	21.68
			1	14	1	21.82	21.92	21.72
			8	0	2	20.46	20.41	20.03
			8	4	2	20.54	20.37	19.93
			8	7	2	20.51	20.36	19.88
			15	0	2	20.50	20.36	19.96
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr [dBm]		
						Max. Power		
						1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	22.94	22.81	22.43
			1	3	0	22.98	22.80	22.43
			1	5	0	23.00	22.85	22.42
			3	0	0	22.74	22.56	22.32
			3	1	0	22.78	22.56	22.24
			3	3	0	22.81	22.56	22.20
		16QAM	6	0	1	21.74	21.53	21.11
			1	0	1	22.08	22.08	21.87
			1	3	1	22.16	22.01	21.81
			1	5	1	22.18	21.95	21.88
			3	0	1	21.56	21.50	21.23
			3	1	1	21.75	21.56	21.04
			3	3	1	21.73	21.45	21.05
			6	0	2	20.67	20.37	20.03

9. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r02;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

9.1. CONDUCTED PEAK TO AVERAGE RESULT

GSM

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
GSM850	190	836.6	GPRS	2.81	13.00
			EGPRS	5.73	
GSM1900	661	1880.0	GPRS	2.69	
			EGPRS	5.58	

WCDMA

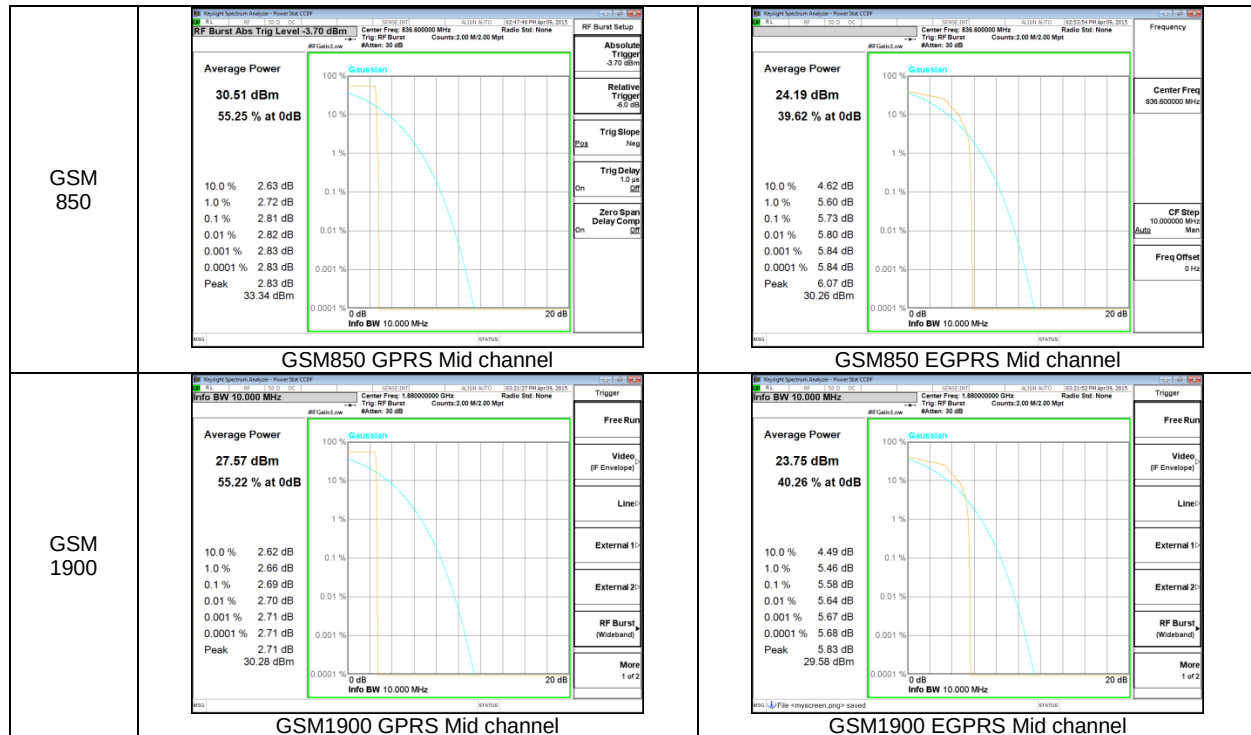
Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 5	4183	836.6	REL99	2.90	13.00
			HSDPA	3.07	
Band 2	9400	1880.0	REL99	2.96	
			HSDPA	2.97	

LTE

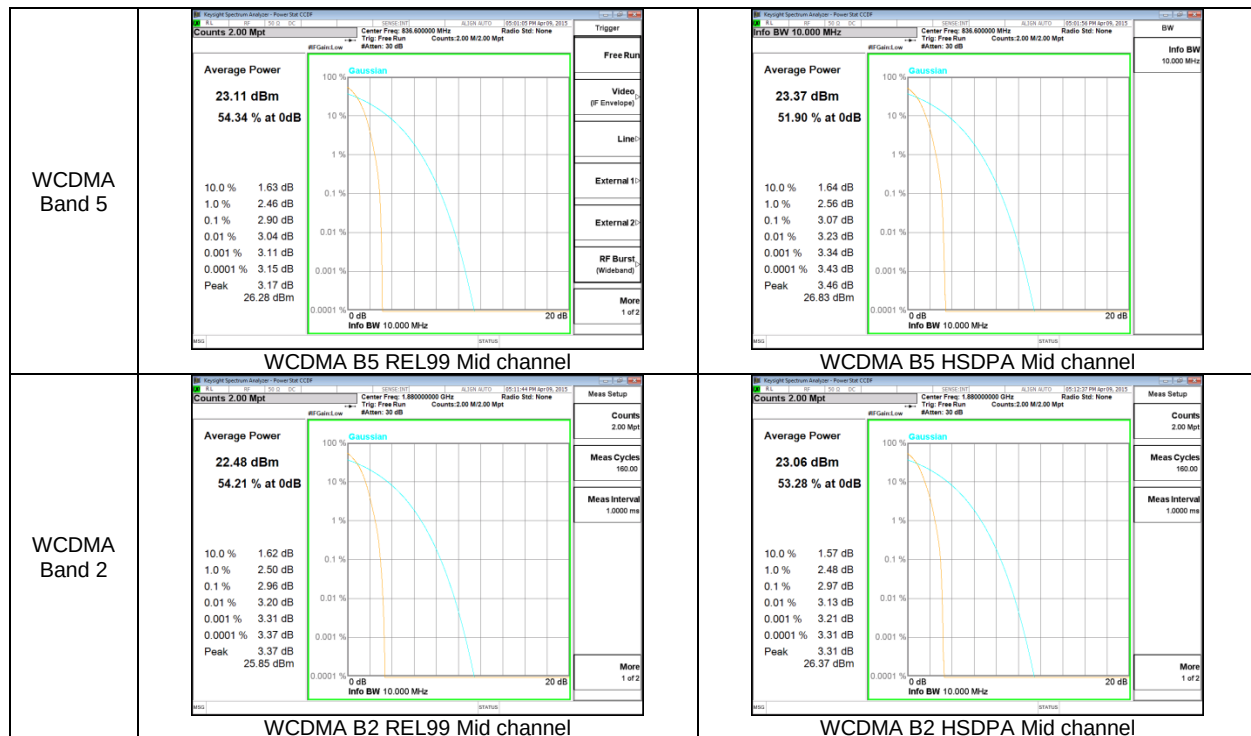
Band	BW [MHz]	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 17	10	23790	710	QPSK	5.47	13.00
				16QAM	5.89	
	5			QPSK	5.36	
				16QAM	5.94	
Band 5	10	20525	836.5	QPSK	5.57	
				16QAM	5.85	
	5			QPSK	5.45	
				16QAM	5.70	
	3			QPSK	5.47	
				16QAM	5.64	
	1.4			QPSK	4.42	
				16QAM	5.41	
Band 4	20	20174	1732.5	QPSK	6.01	
				16QAM	6.81	
	15			QPSK	5.14	
				16QAM	6.35	
	10			QPSK	5.61	
				16QAM	5.95	
	5			QPSK	5.65	
				16QAM	5.91	
	3			QPSK	5.77	
				16QAM	5.94	
	1.4			QPSK	5.38	
				16QAM	5.90	
Band 2	20	18900	1880.0	QPSK	6.06	
				16QAM	6.90	
	15			QPSK	5.20	
				16QAM	6.37	
	10			QPSK	5.61	
				16QAM	5.93	
	5			QPSK	5.31	
				16QAM	5.94	
	3			QPSK	5.70	
				16QAM	5.96	
	1.4			QPSK	5.31	
				16QAM	5.94	

9.2. CONDUCTED PEAK TO AVERAGE PLOTS

GSM



WCDMA



The figure displays four screenshots of a Keysight Spectrum Analyzer, arranged in a 2x2 grid. Each screenshot shows the power spectral density (PSD) of an LTE signal in Band 17. The top row shows results for a 10 MHz bandwidth, and the bottom row shows results for a 5 MHz bandwidth. The left column shows QPSK modulation, and the right column shows 16QAM modulation. Each plot includes a Gaussian curve and a table of power levels at various percentages.

Top Left: LTE Band 17 10 MHz QPSK Mid channel

Average Power: 22.45 dBm
46.90 % at 0dB

Percentage	Power (dB)
10.0 %	2.31 dB
1.0 %	4.36 dB
0.1 %	5.47 dB
0.01 %	5.77 dB
0.001 %	5.99 dB
0.0001 %	6.07 dB
Peak	28.54 dBm

Top Right: LTE Band 17 10 MHz 16QAM Mid channel

Average Power: 21.25 dBm
44.88 % at 0dB

Percentage	Power (dB)
10.0 %	2.92 dB
1.0 %	4.97 dB
0.1 %	5.89 dB
0.01 %	6.14 dB
0.001 %	6.27 dB
0.0001 %	6.36 dB
Peak	27.65 dBm

Bottom Left: LTE Band 17 5 MHz QPSK Mid channel

Average Power: 23.92 dBm
45.38 % at 0dB

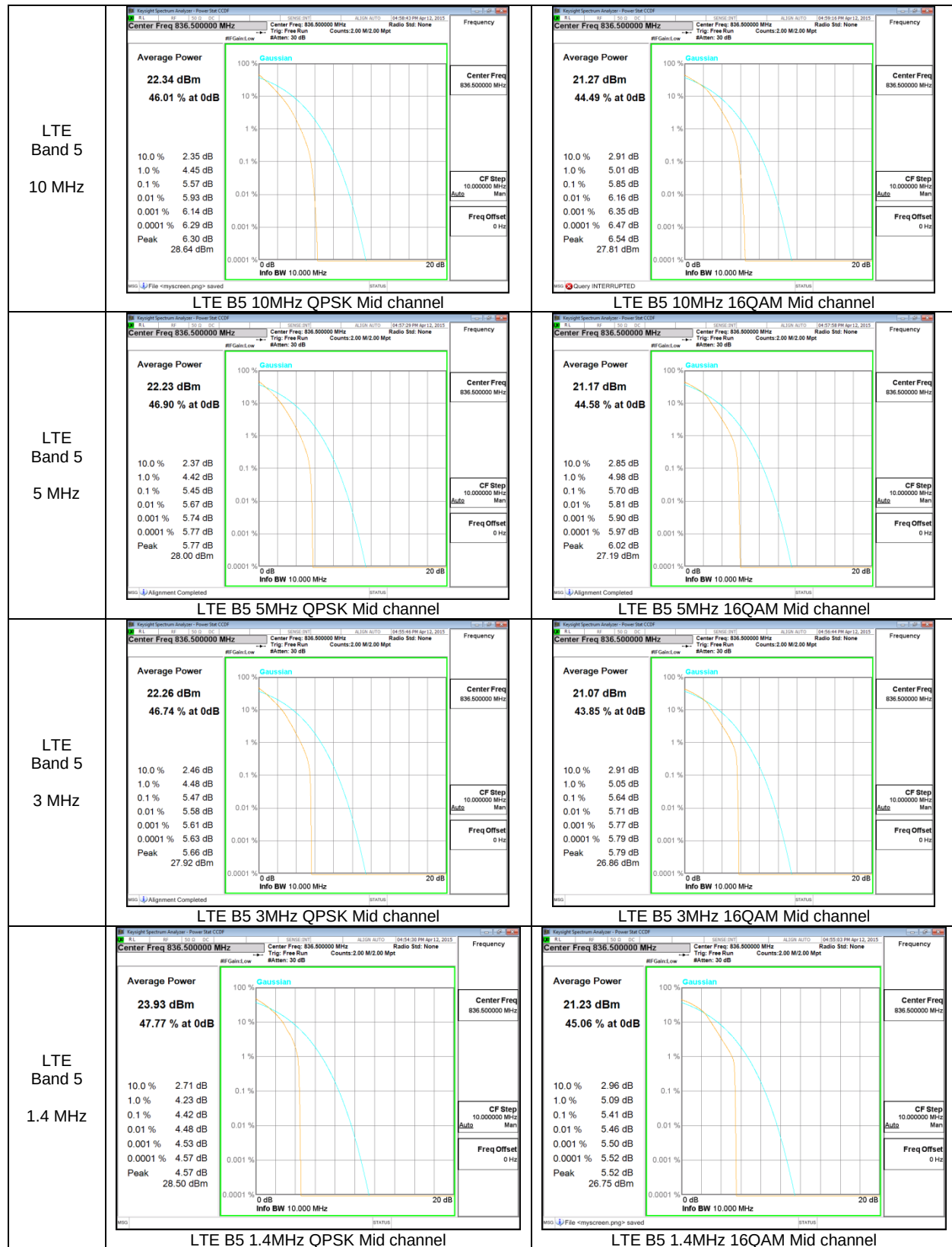
Percentage	Power (dB)
10.0 %	2.65 dB
1.0 %	4.62 dB
0.1 %	5.36 dB
0.01 %	5.55 dB
0.001 %	5.76 dB
0.0001 %	5.81 dB
Peak	29.76 dBm

Bottom Right: LTE Band 17 5 MHz 16QAM Mid channel

Average Power: 21.23 dBm
44.39 % at 0dB

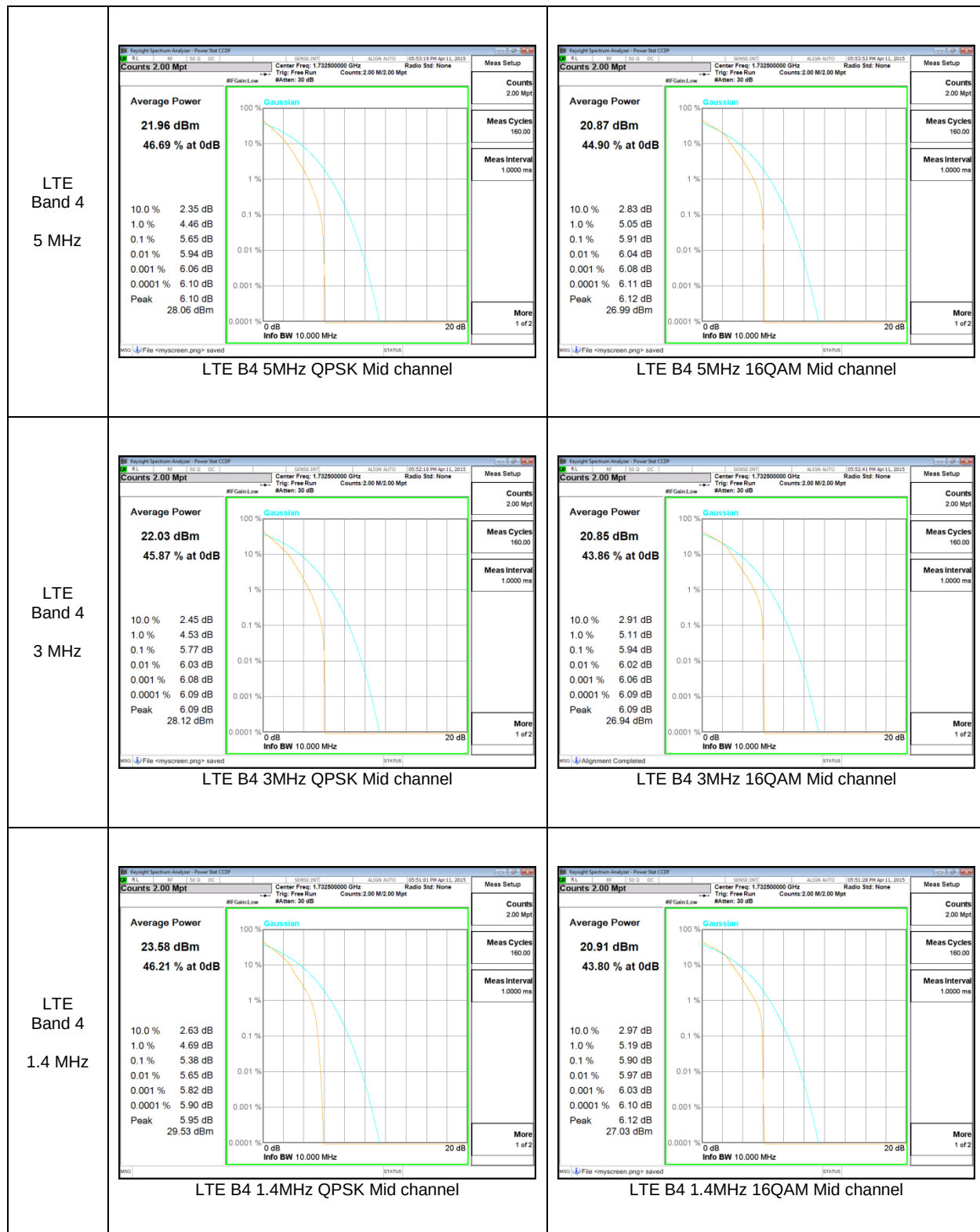
Percentage	Power (dB)
10.0 %	2.87 dB
1.0 %	5.07 dB
0.1 %	5.94 dB
0.01 %	6.07 dB
0.001 %	6.12 dB
0.0001 %	6.16 dB
Peak	27.44 dBm

LTE Band 5

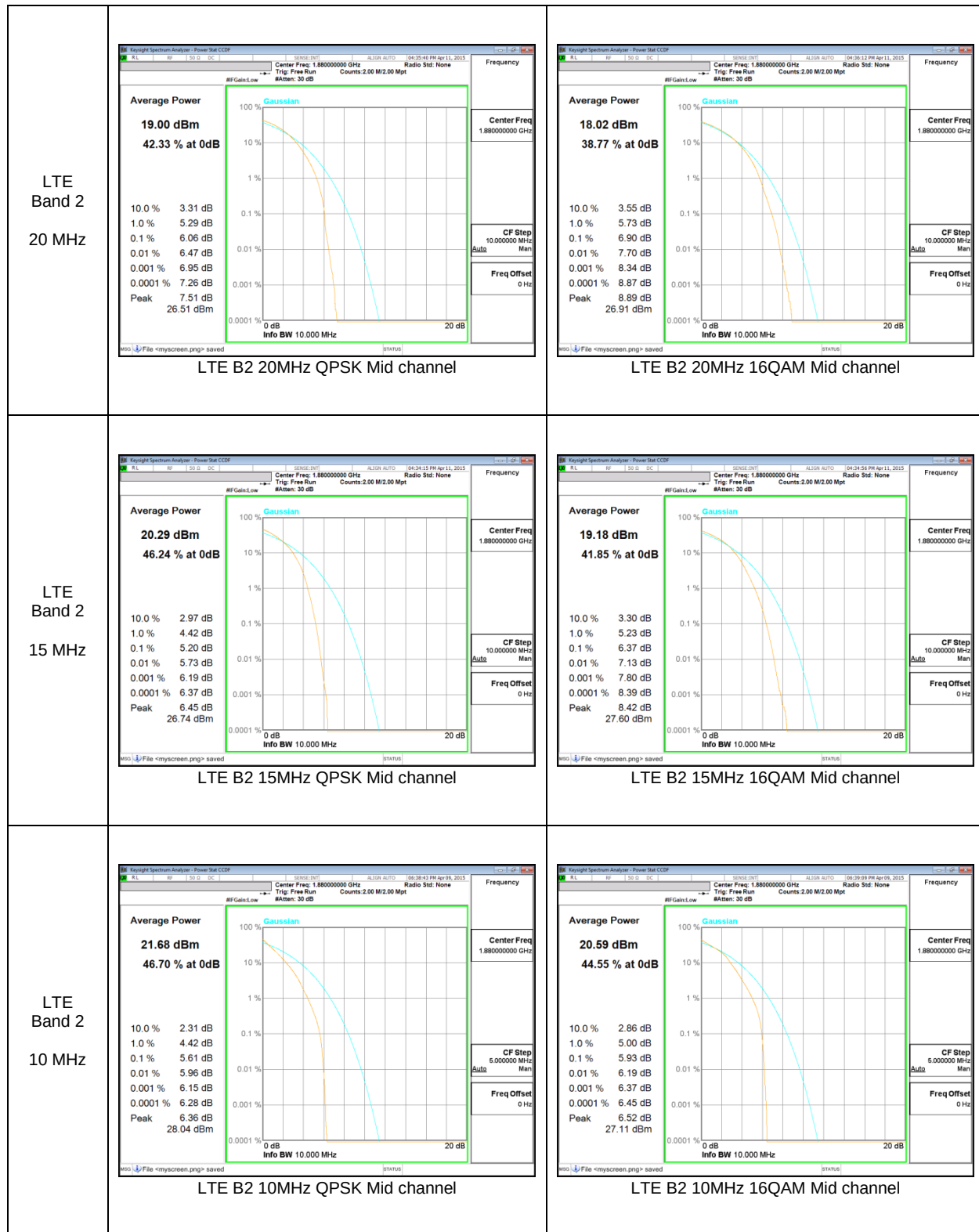


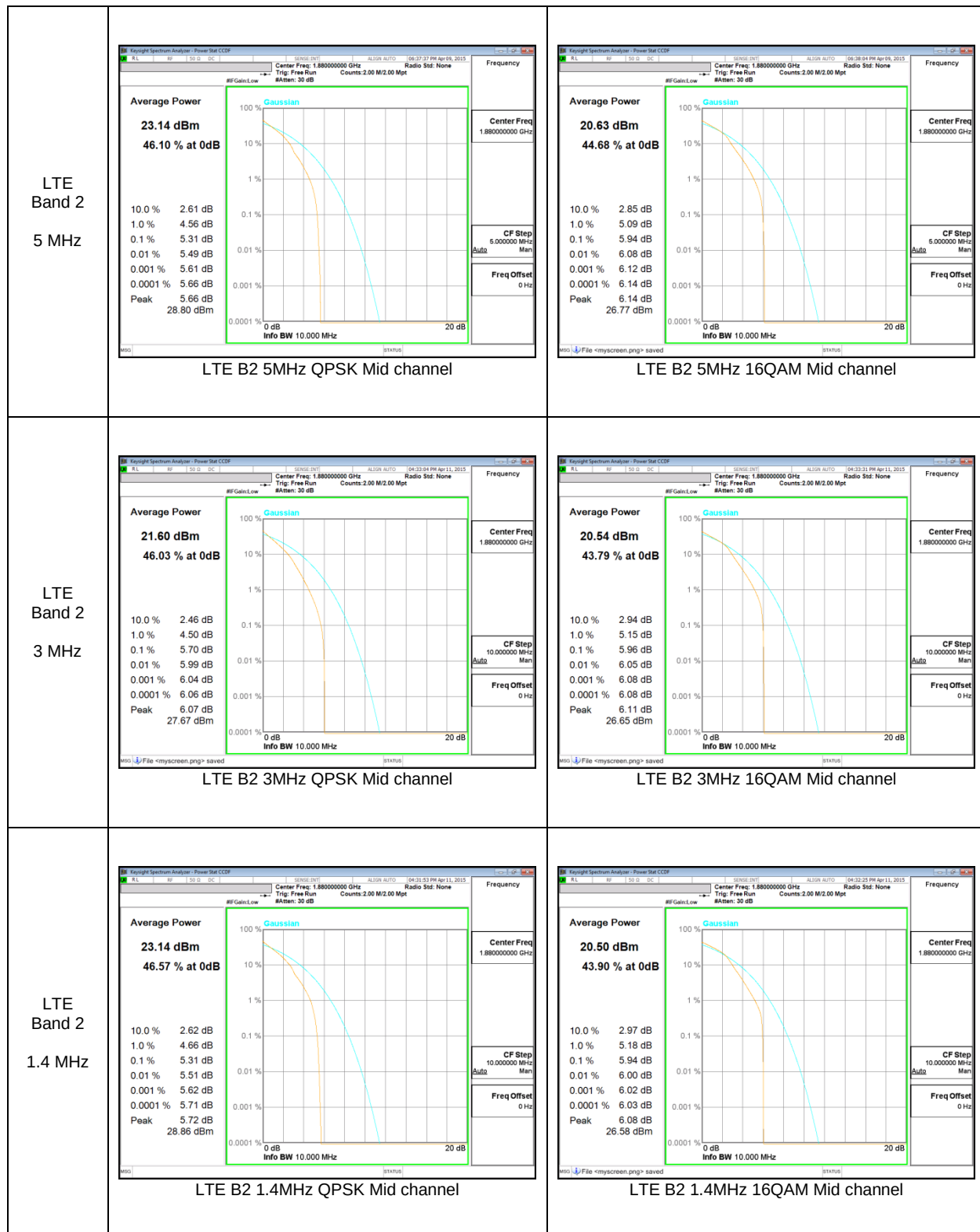
LTE Band 4

LTE Band 4 20 MHz	LTE B4 20MHz QPSK Mid channel	LTE B4 20MHz 16QAM Mid channel
LTE Band 4 15 MHz	LTE B4 15MHz QPSK Mid channel	LTE B4 15MHz 16QAM Mid channel
LTE Band 4 10 MHz	LTE B4 10MHz QPSK Mid channel	LTE B4 10MHz 16QAM Mid channel



LTE Band 2





10. LIMITS AND CONDUCTED RESULTS

10.1. 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.

(KDB 971168 D01 Power Meas License Digital Systems v02r02)

10.1.1. OCCUPIED BANDWIDTH RESULTS

GSM

Band	Mode	Channel	f [MHz]	99% BW [KHz]	26dB BW [KHz]
GSM850	GPRS	128	824.2	240.3	319.2
		190	836.6	241.1	317.8
		251	848.8	243.1	318.8
	EGPRS	128	824.2	242.5	315.5
		190	836.6	247.5	312.7
		251	848.8	242.7	309.8
GSM1900	GPRS	512	1850.2	242.4	314.6
		661	1880.0	243.1	312.2
		810	1909.8	240.2	312.7
	EGPRS	512	1850.2	243.3	310.4
		661	1880.0	244.0	314.0
		810	1909.8	239.0	311.6

WCDMA

Band	Mode	Channel	f [MHz]	99% BW [MHz]	26dB BW [MHz]
Band 5	REL99	4132	826.4	4.139	4.721
		4183	836.6	4.148	4.719
		4233	846.6	4.141	4.72
	HSDPA	4132	826.4	4.143	4.703
		4183	836.6	4.154	4.728
		4233	846.6	4.155	4.744
Band 2	REL99	9262	1852.4	4.148	4.733
		9400	1880.0	4.143	4.718
		9538	1907.6	4.131	4.725
	HSDPA	9262	1852.4	4.142	4.717
		9400	1880.0	4.155	4.720
		9538	1907.6	4.151	4.723

LTE Band 17

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 17	10	23780	709.0	QPSK	8.941	10.13
				16QAM	8.926	10.116
		23790	710.0	QPSK	8.954	10.198
				16QAM	8.938	9.937
		23799	711.0	QPSK	8.959	10.315
				16QAM	8.952	10.447
	5	23755	706.5	QPSK	4.496	5.260
				16QAM	4.507	5.208
		23790	710.0	QPSK	4.498	5.197
				16QAM	4.504	5.264
		23824	713.5	QPSK	4.517	5.297
				16QAM	4.505	5.361

LTE Band 5

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 5	10	20450	829.0	QPSK	8.977	10.325
				16QAM	8.965	10.052
		20524	836.5	QPSK	8.959	10.016
				16QAM	8.964	10.124
		20599	844.0	QPSK	8.944	10.378
				16QAM	8.964	10.273
	5	20425	826.5	QPSK	4.494	5.150
				16QAM	4.510	5.261
		20524	836.5	QPSK	4.499	5.209
				16QAM	4.510	5.218
		20624	846.5	QPSK	4.501	5.274
				16QAM	4.499	5.293
	3	20415	825.5	QPSK	2.691	3.069
				16QAM	2.705	3.111
		20524	836.5	QPSK	2.707	3.115
				16QAM	2.696	3.061
		20634	847.5	QPSK	2.711	3.067
				16QAM	2.698	3.055
	1.4	20407	824.7	QPSK	1.094	1.411
				16QAM	1.094	1.389
		20524	836.5	QPSK	1.093	1.383
				16QAM	1.093	1.321
		20624	848.3	QPSK	1.095	1.397
				16QAM	1.093	1.385

LTE Band 4

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 4	20	20050	1720.0	QPSK	17.918	19.786
				16QAM	17.927	19.893
		20174	1732.5	QPSK	17.850	19.715
				16QAM	17.875	19.851
		20299	1745.0	QPSK	17.898	19.568
				16QAM	17.873	19.616
	15	20025	1717.5	QPSK	13.440	15.006
				16QAM	13.428	15.264
		20174	1732.5	QPSK	13.416	15.127
				16QAM	13.428	15.063
		20324	1747.5	QPSK	13.437	14.878
				16QAM	13.424	15.098
	10	20000	1715.0	QPSK	8.973	10.232
				16QAM	8.965	10.244
		20174	1732.5	QPSK	8.968	10.123
				16QAM	8.968	10.262
		20349	1750.0	QPSK	8.987	10.408
				16QAM	8.974	10.326
	5	19975	1712.5	QPSK	4.497	5.342
				16QAM	4.507	5.294
		20174	1732.5	QPSK	4.505	5.295
				16QAM	4.508	5.372
		20374	1752.5	QPSK	4.507	5.228
				16QAM	4.496	5.282
	3	19965	1711.5	QPSK	2.696	3.137
				16QAM	2.709	3.113
		20174	1732.5	QPSK	2.707	3.093
				16QAM	2.695	3.078
		20384	1753.5	QPSK	2.708	3.118
				16QAM	2.701	3.107
	1.4	19957	1710.7	QPSK	1.098	1.504
				16QAM	1.094	1.394
		20174	1732.5	QPSK	1.093	1.438
				16QAM	1.100	1.506
		20392	1754.3	QPSK	1.097	1.470
				16QAM	1.106	1.455

LTE Band 2

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 2	20	18700	1860.0	QPSK	17.864	19.632
				16QAM	17.859	19.535
		18900	1880.0	QPSK	17.908	19.675
				16QAM	17.908	19.833
		19099	1900.0	QPSK	17.857	19.648
				16QAM	17.860	19.566
	15	18675	1857.5	QPSK	13.426	15.034
				16QAM	13.413	15.103
		18900	1880.0	QPSK	13.432	15.101
				16QAM	13.450	15.128
		19124	1902.5	QPSK	13.450	15.239
				16QAM	13.436	15.148
	10	18650	1955.0	QPSK	8.992	10.292
				16QAM	8.992	10.439
		18900	1880.0	QPSK	8.986	10.263
				16QAM	9.002	10.278
		19149	1905.0	QPSK	8.997	10.338
				16QAM	9.005	10.297
	5	18625	1852.5	QPSK	4.508	5.290
				16QAM	4.518	5.297
		18900	1880.0	QPSK	4.504	5.191
				16QAM	4.525	5.390
		18175	1907.5	QPSK	4.509	5.273
				16QAM	4.514	5.235
	3	18615	1815.5	QPSK	2.698	3.065
				16QAM	2.703	3.125
		18900	1880.0	QPSK	2.703	3.108
				16QAM	2.697	3.089
		19184	1908.5	QPSK	2.703	3.118
				16QAM	2.700	3.088
	1.4	18607	1850.7	QPSK	1.095	1.453
				16QAM	1.093	1.494
		18900	1880.0	QPSK	1.098	1.375
				16QAM	1.098	1.418
		19192	1909.3	QPSK	1.092	1.481
				16QAM	1.101	1.522