



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

WWAN

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-T595, SM-T595N, SM-T597

FCC ID: A3LSMT595

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TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/06/18	Initial issue	Hoonpyo Lee
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac and ANT+

MODEL NUMBER: SM-T595, SM-T595N, SM-T597

SERIAL NUMBER: R32K1000TPB (RADIATED);
R32K1000RZM (CONDUCTED);

DATE TESTED: MAY 24, 2018 - JUN 05, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E, 27H and 27L	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
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Tested By:



Hoonpyo Lee
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UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 22.
3. FCC CFR 47 Part 24.
4. FCC CFR 47 Part 27.
5. ANSI TIA-603-E, 2016
6. KDB 971168 D01 Power Meas License Digital Systems v03r01

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, 16675, 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
☒	Chamber 3

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	3.86 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 + BT/BLE, DTS/UNII a/b/g/n/ac and ANT+. This test report addresses the WWAN operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average radiated ERP / EIRP output powers as follows:

GSM

FCC Part 22/24				
Band	Frequency Range	Modulation	Radiated	
	[MHz]		Avg [dBm]	Avg [mW]
GSM850	824~849	GPRS	30.01	1002.31
		EGPRS	24.81	302.69
GSM1900	1850~1910	GPRS	30.06	1013.91
		EGPRS	26.54	450.82

WCDMA

FCC Part 22/24				
Band	Frequency Range	Modulation	Radiated	
	[MHz]		Avg [dBm]	Avg [mW]
Band 5	824~849	REL99	21.12	129.42
		HSDPA	20.98	125.31
Band 4	1710~1755	REL99	22.11	162.55
		HSDPA	21.73	148.94
Band 2	1850~1910	REL99	22.94	196.79
		HSDPA	21.94	156.31

LTE Band 2

FCC Part 24					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Radiated	
				Avg [dBm]	Avg [mW]
Band 2	1850 ~ 1910	20	QPSK	23.33	215.28
			16QAM	22.46	176.20
		15	QPSK	24.14	259.42
			16QAM	23.14	206.06
		10	QPSK	22.96	197.70
			16QAM	21.99	158.12
		5	QPSK	24.28	267.92
			16QAM	23.33	215.28
		3	QPSK	24.12	258.23
			16QAM	23.49	223.36
		1.4	QPSK	24.37	273.53
			16QAM	23.25	211.35

LTE Band 4

FCC Part 27					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Radiated	
				Avg [dBm]	Avg [mW]
Band 4	1710 ~ 1755	20	QPSK	22.27	168.66
			16QAM	21.10	128.82
		15	QPSK	22.67	184.93
			16QAM	22.66	184.50
		10	QPSK	22.17	164.82
			16QAM	21.23	132.74
		5	QPSK	22.49	177.42
			16QAM	21.63	145.55
		3	QPSK	22.27	168.66
			16QAM	21.28	134.28
		1.4	QPSK	22.65	184.08
			16QAM	20.90	123.03

LTE Band 5

FCC Part 22					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Radiated	
				Avg [dBm]	Avg [mW]
Band 5	824 ~ 849	10	QPSK	22.69	185.78
			16QAM	21.77	150.31
		5	QPSK	22.91	195.43
			16QAM	22.28	169.04
		3	QPSK	22.62	182.81
			16QAM	21.99	158.12
		1.4	QPSK	22.90	194.98
			16QAM	21.76	149.97

LTE Band 12

FCC Part 27					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Radiated	
				Avg [dBm]	Avg [mW]
Band 12	699 ~ 716	10	QPSK	18.13	65.01
			16QAM	17.20	52.48
		5	QPSK	18.44	69.82
			16QAM	17.23	52.84
		3	QPSK	18.17	65.61
			16QAM	17.02	50.35
		1.4	QPSK	18.21	66.22
			16QAM	17.22	52.72

LTE Band 17

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 66

FCC Part 27					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Radiated	
			Peak	Avg [dBm]	Avg [mW]
Band 66	1710 ~ 1780	20	QPSK	22.02	159.22
			16QAM	21.15	130.32
		15	QPSK	21.60	144.54
			16QAM	21.46	139.96
		10	QPSK	22.12	162.93
			16QAM	21.48	140.60
		5	QPSK	21.88	154.17
			16QAM	20.63	115.61
		3	QPSK	22.24	167.49
			16QAM	21.04	127.06
		1.4	QPSK	21.73	148.94
			16QAM	20.24	105.68

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency (MHz)	Peak Gain (dBi)
GSM1900 / WCDMA Band 2 / LTE Band 2 1850 ~ 1910 MHz	1.9
GSM850 / WCDMA Band 5 / LTE Band 5 824 ~ 849 MHz	3.3
LTE Band 12/17 699 ~ 716 MHz	-1.0
WCDMA Band 4 / LTE Band 4/66 1710 ~ 1780 MHz	2.4

5.4. WORST-CASE ORIENTATION

Following modes should be considered as worst-case scenario for all other measurements.

- GSM GPRS/EGPRS
- UMTS REL 99/HSDPA

All LTE Bands, measurements were performed on each bandwidth for QPSK/16QAM modulations.

For GSM850 / GSM1900 / WCDMA Band 5 / WCDMA Band 4 / WCDMA Band 2 / LTE Band2 / LTE Band 4 / LTE Band 5 / LTE Band 66, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

For LTE Band 12, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

For simultaneous transmission, Unlicensed band with WWAN, test were conducted for various configurations having the highest power. No noticeable new emission was found.

Note : All radiated spurious tests were performed connected with earphone and charger for evaluation of worst case mode.(For erp/eirp tests, the EUT didn't connected with earphone and charger)

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA20EWE	R37JCWL0FR5DK3	N/A
Data Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Earphone	SAMSUNG	EO-EG920BW	N/A	N/A

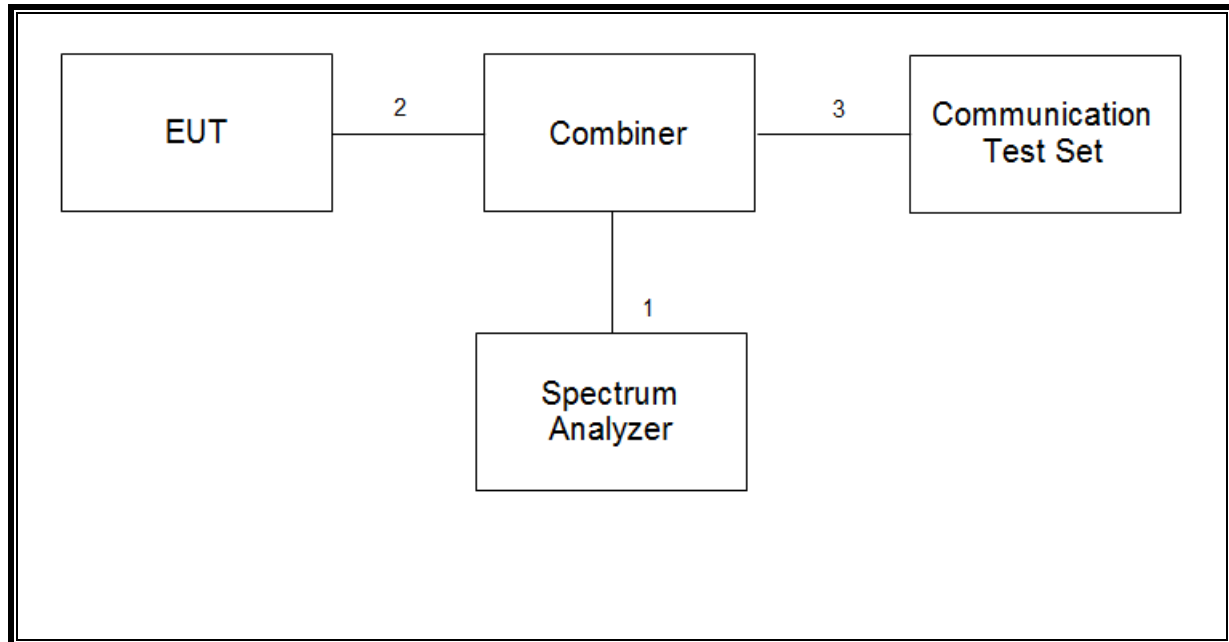
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.1m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

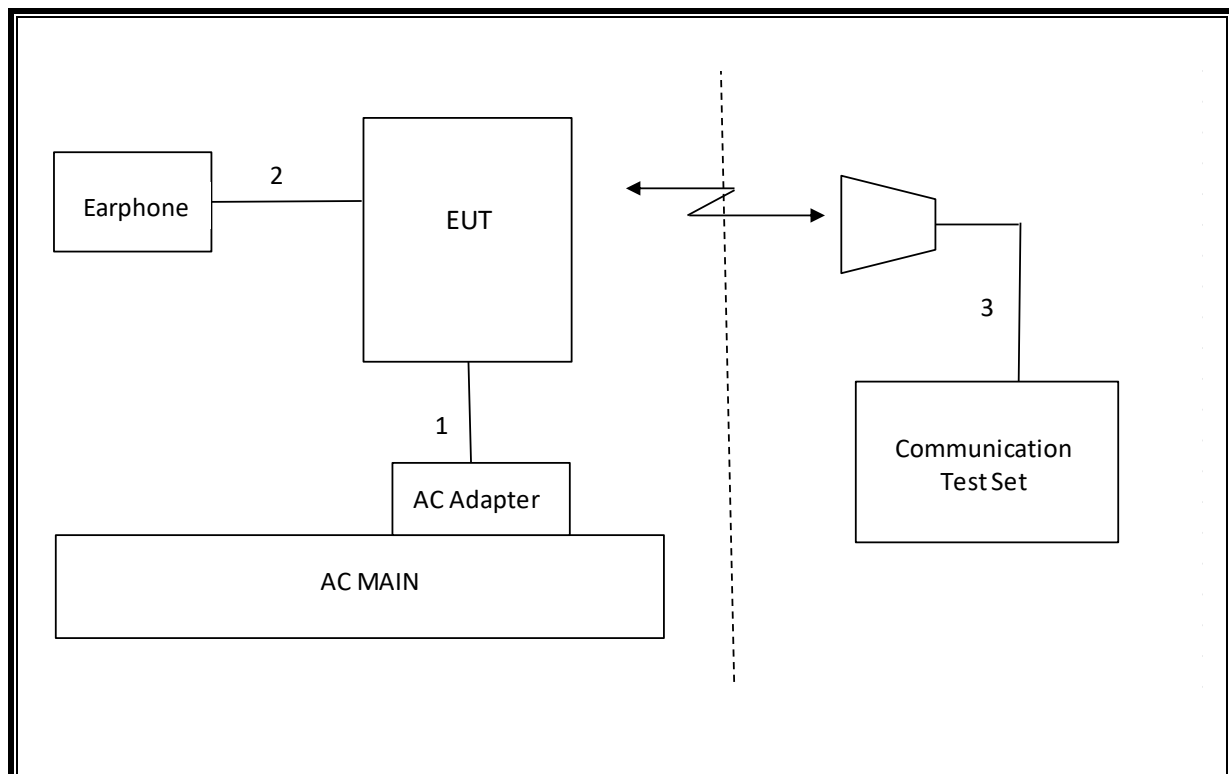
TEST SETUP

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	06-30-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Preamplifier	ETS	3116C-PA	00168841	11-13-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	09-14-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00205959	11-29-18
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Combiner	WEINSCHTEL	1575	2152	08-08-18
Communications Test Set	R&S	CMW500	115331	08-07-18
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-07-18
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-10-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-08-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-11-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 44 GHz	R&S	ESW40	101590	08-09-18
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	08-09-18
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	08-08-18
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	08-09-18
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	08-08-18
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	08-09-18
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	08-08-18
Attenuator	PASTERNAK	PE7087-10	A009	08-08-18
Attenuator	PASTERNAK	PE7087-10	A001	08-08-18
Attenuator	PASTERNAK	PE7087-10	A008	08-08-18
Attenuator	PASTERNAK	PE7087-10	2	08-10-18
Attenuator	PASTERNAK	PE7395-10	A011	02-12-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
Temperature Chamber	ESPEC	SH-642	93001109	08-08-18
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 2.4	

7. Summary Table

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass
22.917(a) 24.238(a) 27.53(g), (h)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
2.1046	Conducted output power	N/A		See the RF exposure test report. (4788452530-S1 FCC Report SAR)
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass
22.913(a)(2)	Effective Radiated Power	38.5 dBm	Radiated	Pass
27.50(b)(10)		34.77 dBm		Pass
24.232(c)	Equivalent Isotropic Radiated Power	33dBm		Pass
27.50(d)(4)		30dBm		Pass
22.917(a) 24.238(a) 27.53(g), (h)	Radiated Spurious Emission	-13dBm		Pass

FCC Rule Part	Frequency Range [MHz]	Output Power [W]	Frequency Tolerance	Emission Designator	Emission Bandwidth [MHz]	Communication Type
GSM						
22H	824.2 - 848.8	1.002	2.5 ppm	249KGXW		GSM850
22H	824.2 - 848.8	0.303	2.5 ppm	245KG7W		EDGE850
24E	1850.2 - 1909.8	1.014	2.5 ppm	245KGXW		GSM1900
24E	1850.2 - 1909.8	0.451	2.5 ppm	246KG7W		EDGE1900
WCDMA						
22H	826.4 - 846.6	0.129	2.5 ppm	4M14F9W		WCDMA B5
27L	1712.4 - 1752.6	0.163	2.5 ppm	4M14F9W		WCDMA B4
24E	1852.4 - 1907.6	0.197	2.5 ppm	4M15F9W		WCDMA B2
LTE Band 2						
24E	1860.0 - 1900.0	0.215	2.5 ppm	17M9G7W	20	QPSK
24E	1860.0 - 1900.0	0.176	2.5 ppm	17M9D7W	20	16QAM
24E	1815.5 - 1908.5	0.223	2.5 ppm	2M70D7W	3	16QAM
24E	1850.7 - 1909.3	0.274	2.5 ppm	1M10G7W	1.4	QPSK
LTE Band 4						
27L	1720.0 - 1745.0	0.169	2.5 ppm	17M9G7W	20	QPSK
27L	1720.0 - 1745.0	0.129	2.5 ppm	17M9D7W	20	16QAM
27L	1717.5 - 1747.5	0.185	2.5 ppm	13M4G7W	15	QPSK
27L	1717.5 - 1747.5	0.185	2.5 ppm	13M4D7W	15	16QAM
LTE Band 5						
22H	829.0 - 844.0	0.186	2.5 ppm	8M97G7W	10	QPSK
22H	829.0 - 844.0	0.150	2.5 ppm	8M97D7W	10	16QAM
22H	826.5 - 846.5	0.195	2.5 ppm	4M51G7W	5	QPSK
22H	826.5 - 846.5	0.169	2.5 ppm	4M49D7W	5	16QAM
LTE Band 12/17						
27H	704.0 - 711.0	0.065	2.5 ppm	8M96G7W	10	QPSK
27H	704.0 - 711.0	0.052	2.5 ppm	8M97D7W	10	16QAM
27H	701.5 - 713.5	0.070	2.5 ppm	4M50G7W	5	QPSK
27H	701.5 - 713.5	0.053	2.5 ppm	4M49D7W	5	16QAM
LTE Band 66						
27L	1720.0 - 1770.0	0.159	2.5 ppm	17M9G7W	20	QPSK
27L	1720.0 - 1770.0	0.130	2.5 ppm	17M9D7W	20	16QAM
27L	1715.0 - 1775.0	0.141	2.5 ppm	8M98D7W	10	16QAM
27L	1711.5 - 1778.5	0.167	2.5 ppm	2M70G7W	5	QPSK

8. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

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.

8.1. CONDUCTED PEAK TO AVERAGE RESULT

GSM

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
GSM850	190	836.6	GPRS	0.43	13.00
			EGPRS	3.41	
GSM1900	661	1880.0	GPRS	0.35	
			EGPRS	3.45	

WCDMA

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 5	4183	836.6	REL99	3.01	13.00
			HSDPA	3.11	
Band 4	1413	1732.6	REL99	3.09	
			HSDPA	3.17	
Band 2	9400	1880.0	REL99	3.01	
			HSDPA	3.11	

LTE

Band	BW [MHz]	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 2	20	18900	1880.0	QPSK	3.46	13.00
				16QAM	4.19	
	15			QPSK	3.46	
				16QAM	4.32	
	10			QPSK	3.46	
				16QAM	4.24	
	5			QPSK	3.48	
				16QAM	4.29	
	3			QPSK	3.45	
				16QAM	4.29	
	1.4			QPSK	3.50	
				16QAM	4.32	
Band 4	20	20174	1732.5	QPSK	4.10	
				16QAM	4.76	
	15			QPSK	4.06	
				16QAM	4.84	
	10			QPSK	4.09	
				16QAM	5.01	
	5			QPSK	4.12	
				16QAM	4.84	
	3			QPSK	4.09	
				16QAM	4.90	
	1.4			QPSK	4.12	
				16QAM	4.91	
Band 5	10	20525	836.5	QPSK	3.07	
				16QAM	3.77	
	5			QPSK	3.13	
				16QAM	3.85	
	3			QPSK	3.15	
				16QAM	3.80	
	1.4			QPSK	3.00	
				16QAM	3.83	

LTE

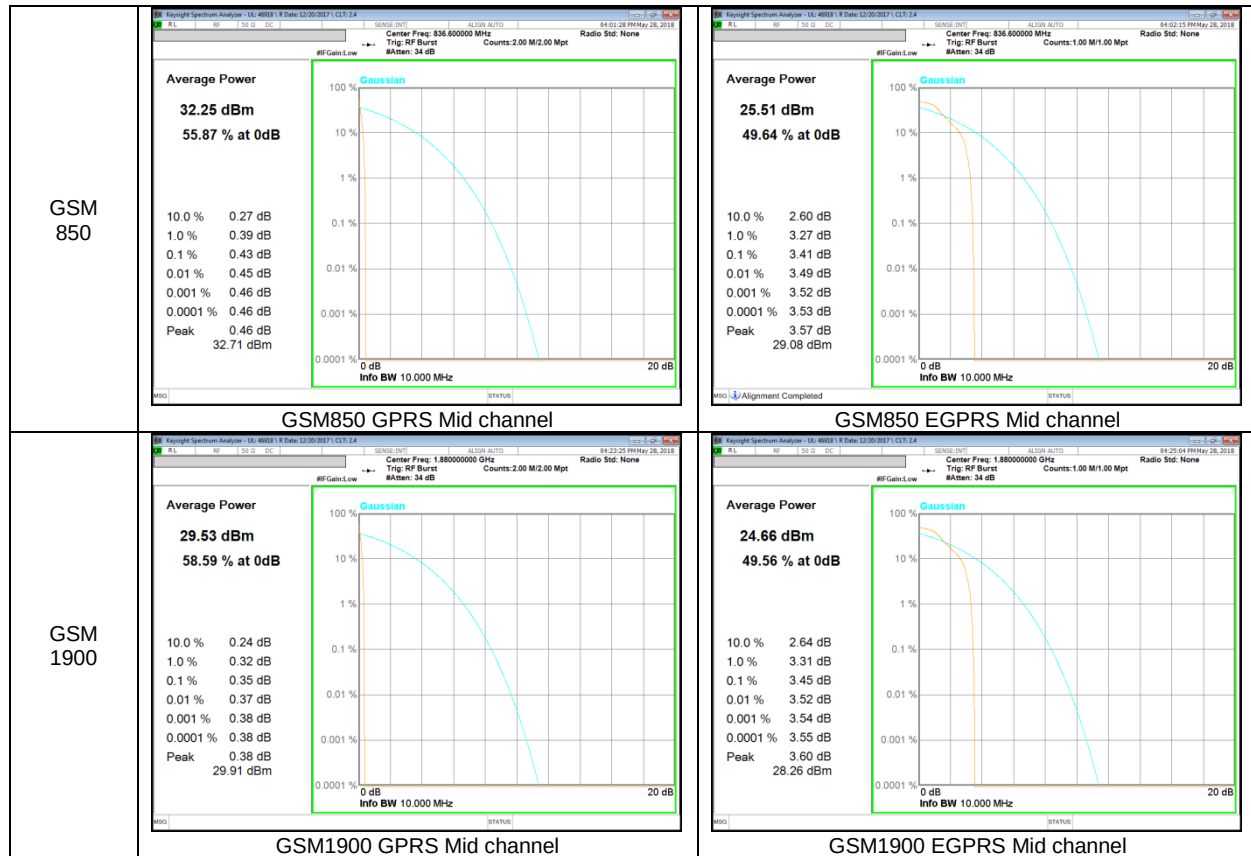
Band	BW [MHz]	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 12	10	23095	707.5	QPSK	4.03	13.00
				16QAM	4.90	
	5			QPSK	4.07	
				16QAM	4.83	
	3			QPSK	4.03	
				16QAM	4.89	
	1.4			QPSK	4.10	
				16QAM	4.85	
Band 66	20	132322	1745.0	QPSK	4.04	13.00
				16QAM	4.88	
	15			QPSK	4.22	
				16QAM	4.93	
	10			QPSK	4.17	
				16QAM	4.86	
	5			QPSK	4.03	
				16QAM	4.86	
	3			QPSK	4.03	
				16QAM	4.85	
	1.4			QPSK	4.08	
				16QAM	4.99	

LTE Band 17

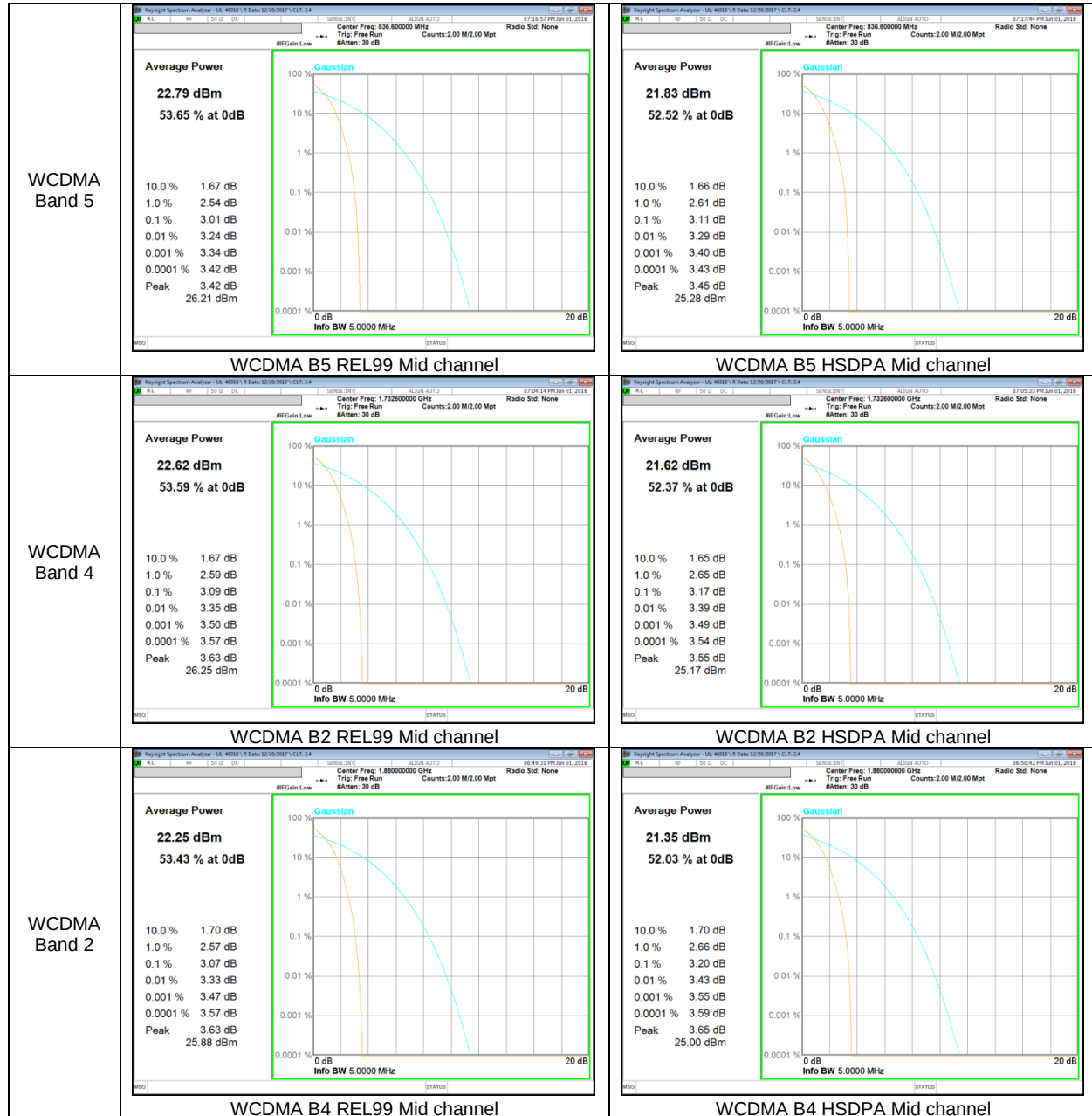
LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

8.2. CONDUCTED PEAK TO AVERAGE PLOTS

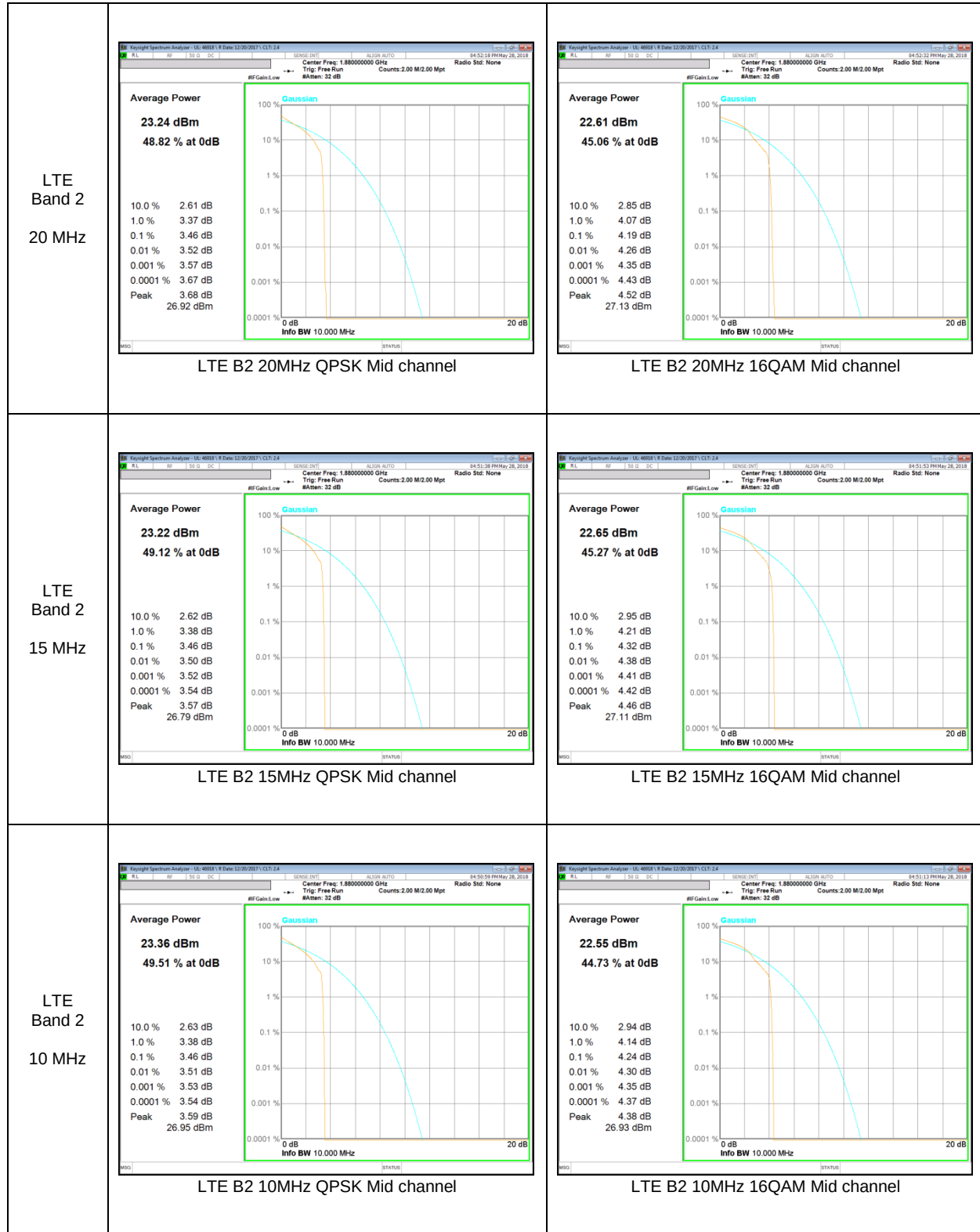
GSM

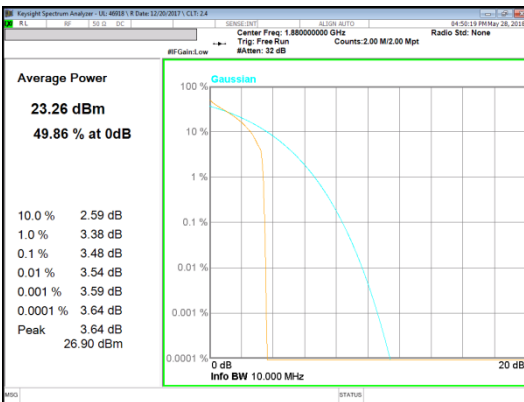
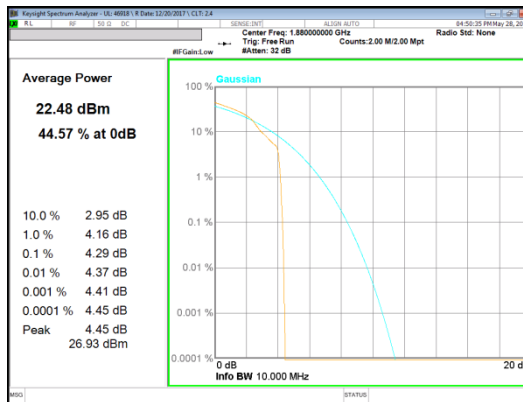
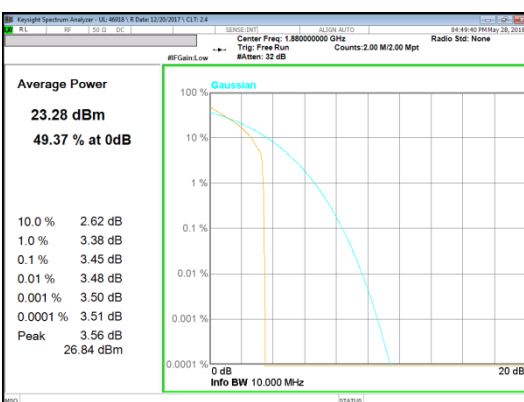
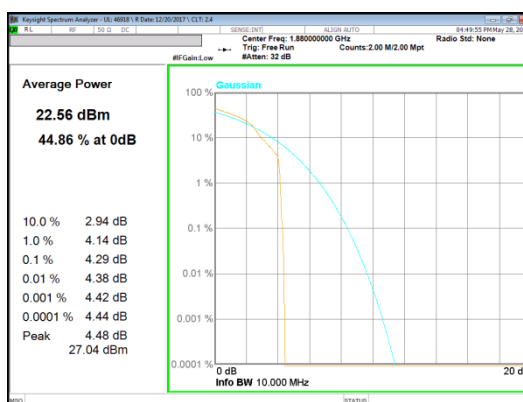
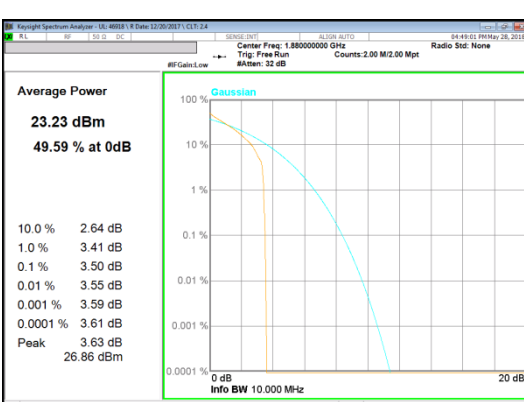
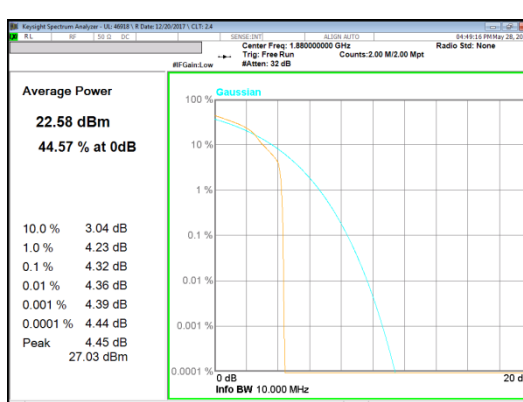


WCDMA

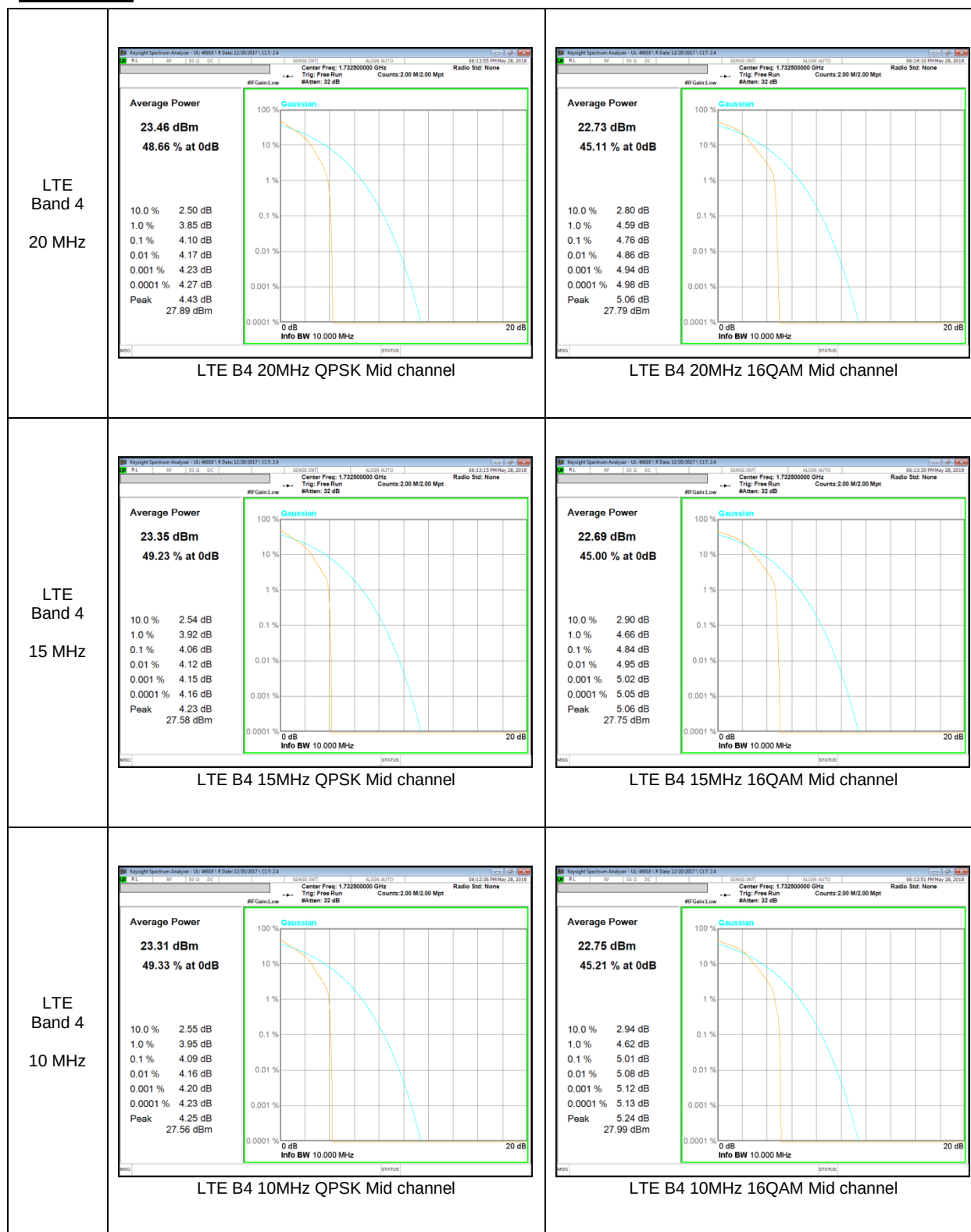


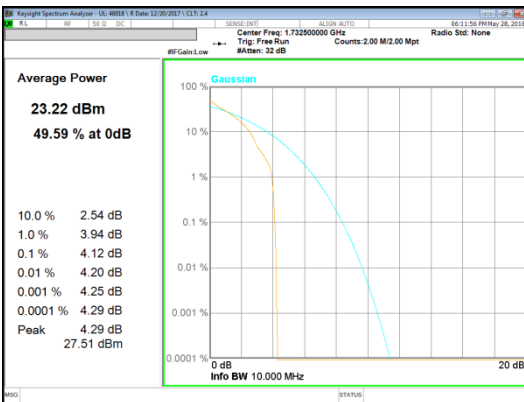
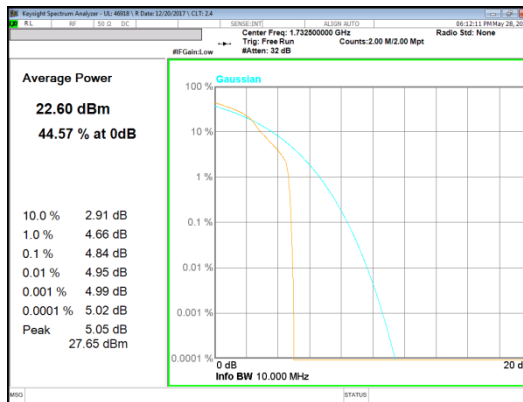
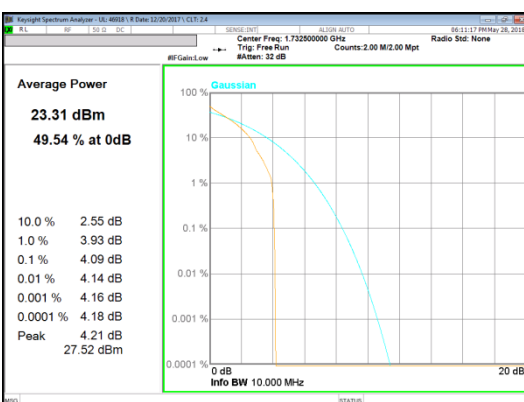
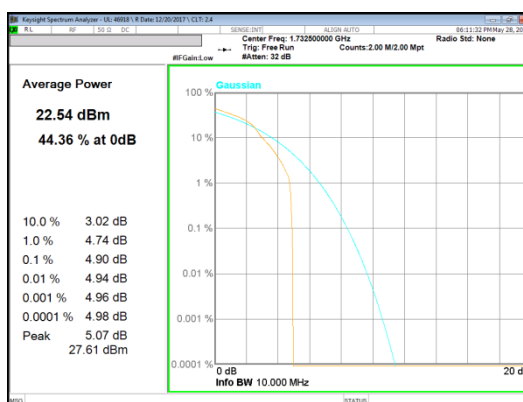
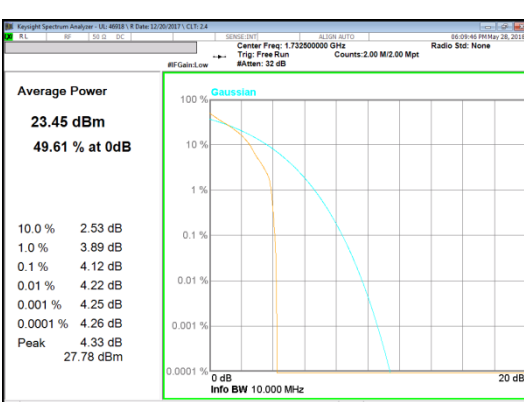
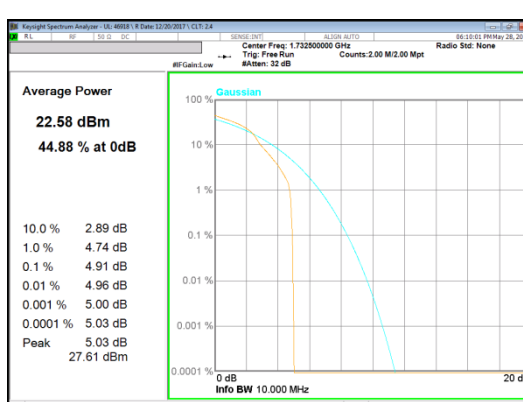
LTE Band 2



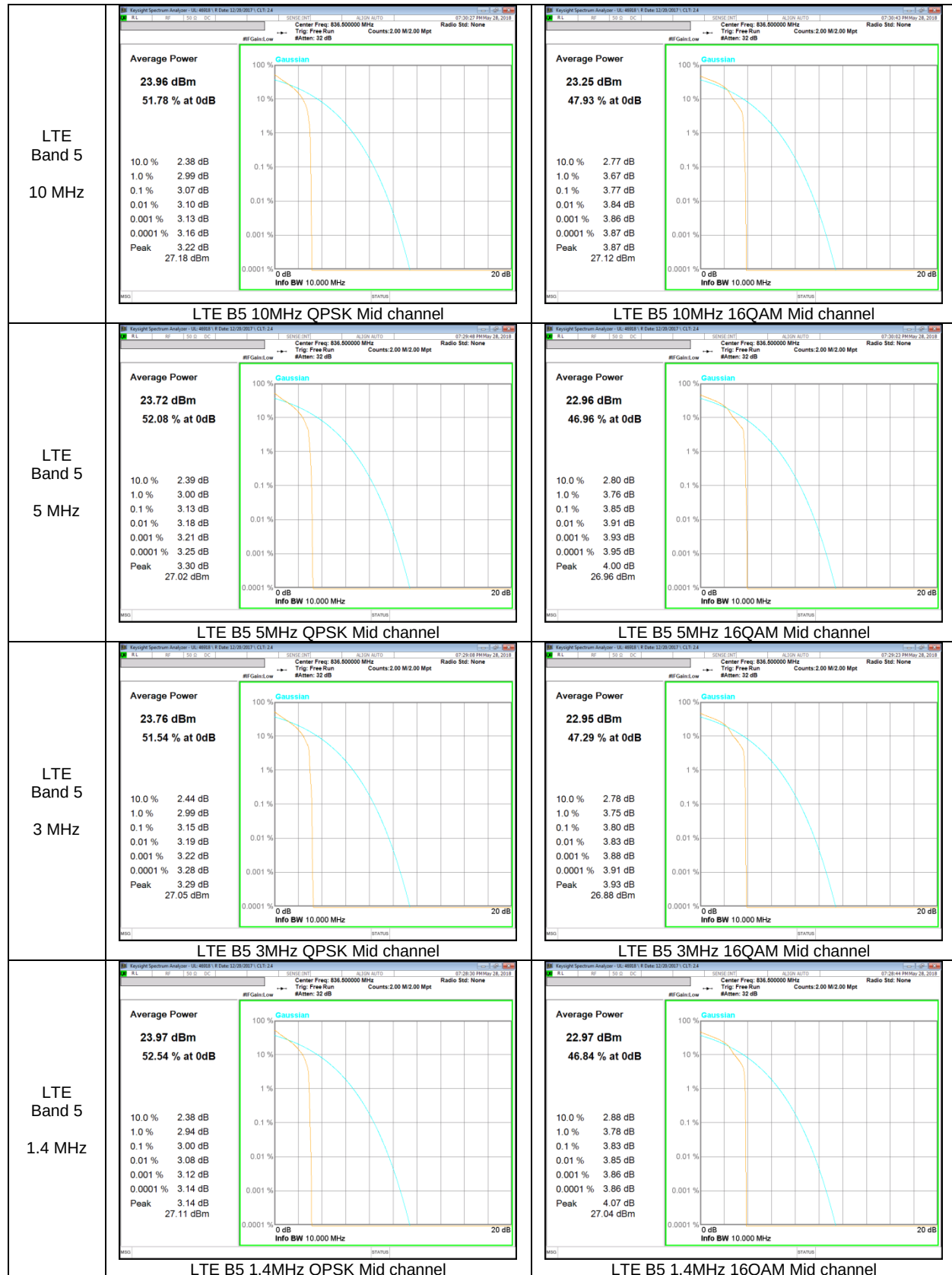
LTE Band 2 5 MHz	 Average Power 23.26 dBm 49.86 % at 0dB 10.0 % 2.59 dB 1.0 % 3.38 dB 0.1 % 3.48 dB 0.01 % 3.54 dB 0.001 % 3.59 dB 0.0001 % 3.64 dB Peak 3.64 dB 26.90 dBm LTE B2 5MHz QPSK Mid channel	 Average Power 22.48 dBm 44.57 % at 0dB 10.0 % 2.95 dB 1.0 % 4.16 dB 0.1 % 4.29 dB 0.01 % 4.37 dB 0.001 % 4.41 dB 0.0001 % 4.45 dB Peak 4.45 dB 26.93 dBm LTE B2 5MHz 16QAM Mid channel
LTE Band 2 3 MHz	 Average Power 23.28 dBm 49.37 % at 0dB 10.0 % 2.62 dB 1.0 % 3.38 dB 0.1 % 3.45 dB 0.01 % 3.48 dB 0.001 % 3.50 dB 0.0001 % 3.51 dB Peak 3.56 dB 26.84 dBm LTE B2 3MHz QPSK Mid channel	 Average Power 22.56 dBm 44.86 % at 0dB 10.0 % 2.94 dB 1.0 % 4.14 dB 0.1 % 4.29 dB 0.01 % 4.38 dB 0.001 % 4.42 dB 0.0001 % 4.44 dB Peak 4.48 dB 27.04 dBm LTE B2 3MHz 16QAM Mid channel
LTE Band 2 1.4 MHz	 Average Power 23.23 dBm 49.59 % at 0dB 10.0 % 2.64 dB 1.0 % 3.41 dB 0.1 % 3.50 dB 0.01 % 3.55 dB 0.001 % 3.59 dB 0.0001 % 3.61 dB Peak 3.63 dB 26.86 dBm LTE B2 1.4MHz QPSK Mid channel	 Average Power 22.58 dBm 44.57 % at 0dB 10.0 % 3.04 dB 1.0 % 4.23 dB 0.1 % 4.32 dB 0.01 % 4.36 dB 0.001 % 4.39 dB 0.0001 % 4.44 dB Peak 4.45 dB 27.03 dBm LTE B2 1.4MHz 16QAM Mid channel

LTE Band 4



LTE Band 4 5 MHz	 LTE B4 5MHz QPSK Mid channel	 LTE B4 5MHz 16QAM Mid channel
LTE Band 4 3 MHz	 LTE B4 3MHz QPSK Mid channel	 LTE B4 3MHz 16QAM Mid channel
LTE Band 4 1.4 MHz	 LTE B4 1.4MHz QPSK Mid channel	 LTE B4 1.4MHz 16QAM Mid channel

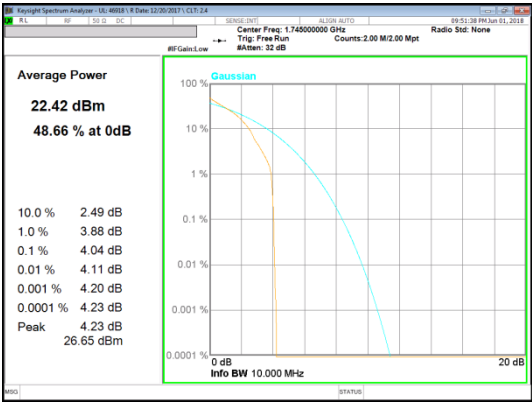
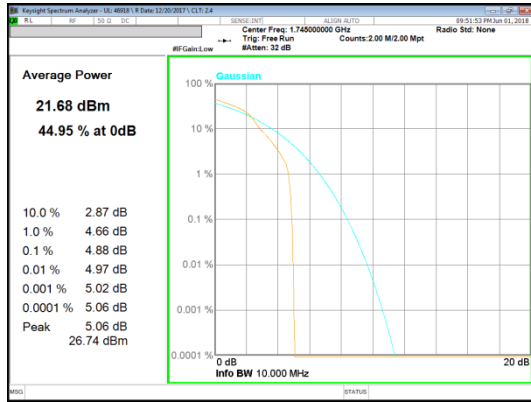
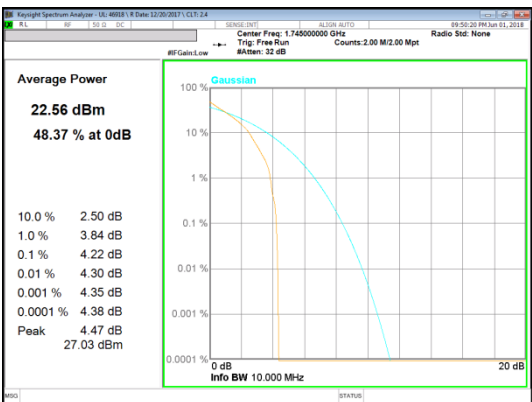
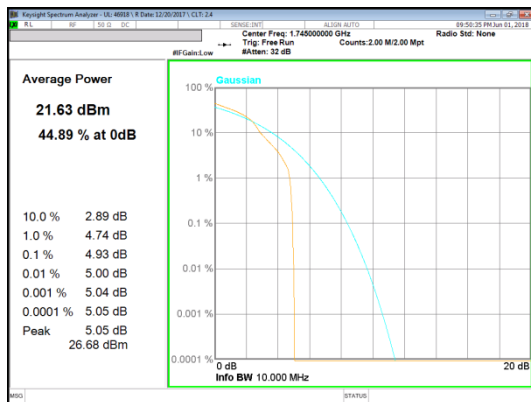
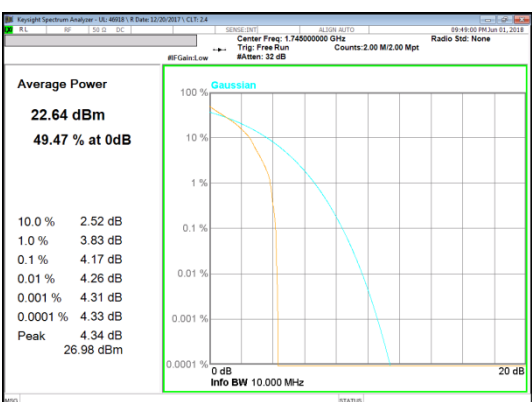
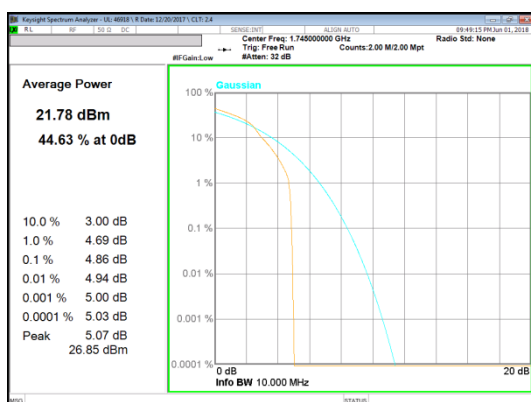
LTE Band 5

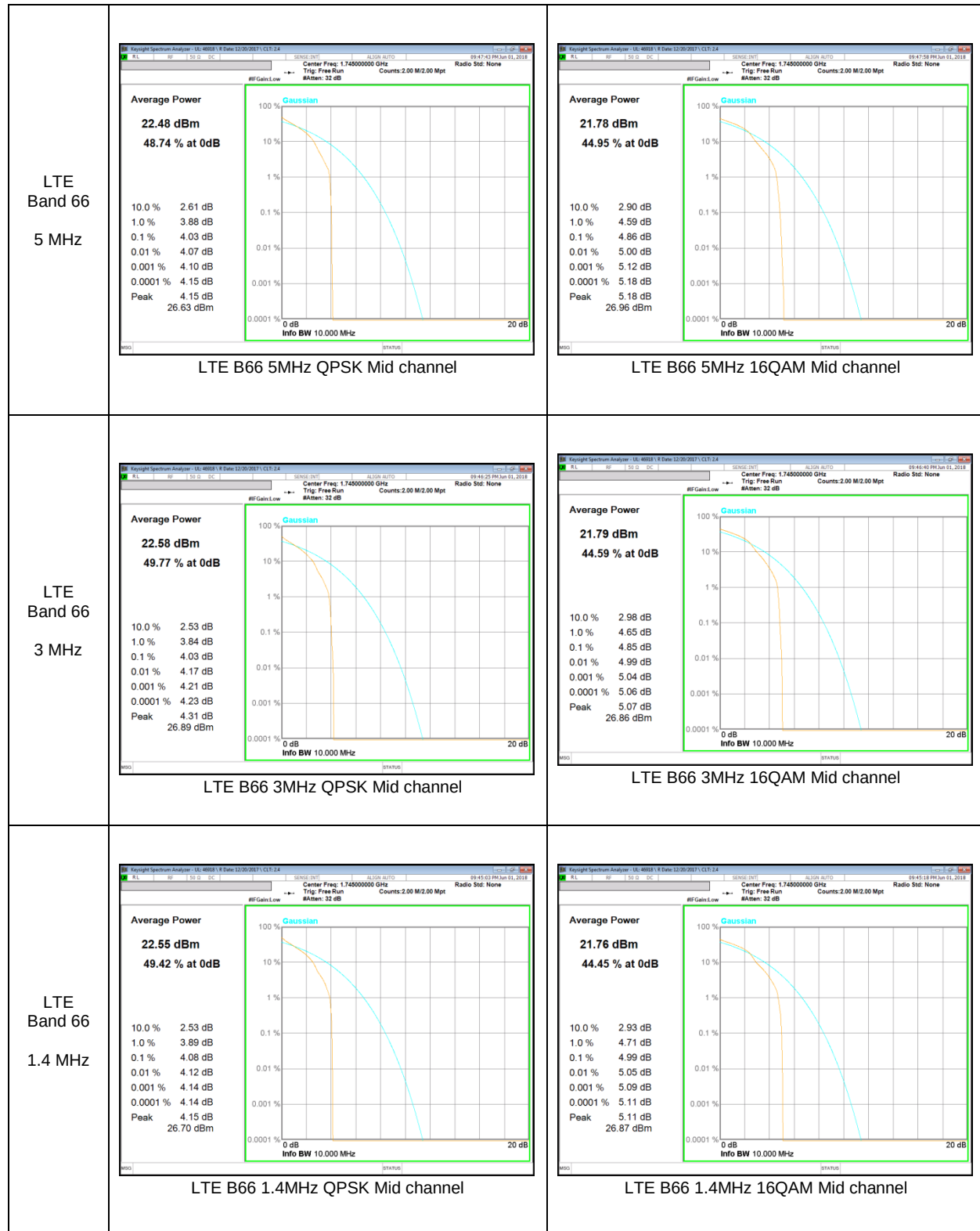


LTE Band 12



LTE Band 66

LTE Band 66 20 MHz	 LTE B66 20MHz QPSK Mid channel	 LTE B66 20MHz 16QAM Mid channel
LTE Band 66 15 MHz	 LTE B66 15MHz QPSK Mid channel	 LTE B66 15MHz 16QAM Mid channel
LTE Band 66 10 MHz	 LTE B66 10MHz QPSK Mid channel	 LTE B66 10MHz 16QAM Mid channel



9. LIMITS AND CONDUCTED RESULTS

9.1. 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 v03r01)

9.1.1. OCCUPIED BANDWIDTH RESULTS

GSM

Band	Mode	Channel	f [MHz]	99% BW [KHz]	26dB BW [KHz]
GSM850	GPRS	128	824.2	249.14	314.6
		190	836.6	246.31	318.9
		251	848.8	244.27	314.3
	EGPRS	128	824.2	244.94	296.5
		190	836.6	242.65	307.1
		251	848.8	245.03	303.8
GSM1900	GPRS	512	1850.2	244.89	317.4
		661	1880.0	241.61	309.8
		810	1909.8	241.19	317.4
	EGPRS	512	1850.2	242.28	308.6
		661	1880.0	246.47	302.4
		810	1909.8	244.27	312.9

WCDMA

Band	Mode	Channel	f [MHz]	99% BW [MHz]	26dB BW [MHz]
Band 5	REL99	4132	826.4	4.1162	4.666
		4183	836.6	4.1435	4.675
		4233	846.6	4.1157	4.667
	HSDPA	4132	826.4	4.1290	4.663
		4183	836.6	4.1247	4.682
		4233	846.6	4.1159	4.689
Band 4	REL99	1312	1712.4	4.1174	4.681
		1413	1732.6	4.1389	4.675
		1513	1752.6	4.1202	4.671
	HSDPA	1312	1712.4	4.1408	4.682
		1413	1732.6	4.1352	4.672
		1513	1752.6	4.1282	4.667
Band 2	REL99	9262	1852.4	4.1443	4.685
		9400	1880.0	4.1439	4.680
		9538	1907.6	4.1414	4.671
	HSDPA	9262	1852.4	4.1373	4.684
		9400	1880.0	4.1515	4.682
		9538	1907.6	4.1448	4.672

LTE Band 2

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 2	20	18700	1860.0	QPSK	17.865	19.29
				16QAM	17.876	19.31
		18900	1880.0	QPSK	17.884	19.34
				16QAM	17.869	19.26
		19099	1900.0	QPSK	17.895	19.15
				16QAM	17.883	19.18
	15	18675	1857.5	QPSK	13.408	14.51
				16QAM	13.407	14.53
		18900	1880.0	QPSK	13.426	14.59
				16QAM	13.421	14.57
		19124	1902.5	QPSK	13.426	14.47
				16QAM	13.395	14.53
	10	18650	1955.0	QPSK	8.9761	9.791
				16QAM	8.9679	9.764
		18900	1880.0	QPSK	8.9526	9.826
				16QAM	8.9377	9.797
		19149	1905.0	QPSK	8.9577	9.834
				16QAM	8.9142	9.705
	5	18625	1852.5	QPSK	4.4919	4.961
				16QAM	4.4794	4.923
		18900	1880.0	QPSK	4.5034	4.975
				16QAM	4.4899	4.985
		19175	1907.5	QPSK	4.4865	4.947
				16QAM	4.4880	4.939
	3	18615	1815.5	QPSK	2.6923	2.955
				16QAM	2.6926	2.998
		18900	1880.0	QPSK	2.6924	2.972
				16QAM	2.6986	2.947
		19184	1908.5	QPSK	2.6926	2.970
				16QAM	2.6893	2.979
	1.4	18607	1850.7	QPSK	1.0976	1.326
				16QAM	1.0837	1.305
		18900	1880.0	QPSK	1.0824	1.308
				16QAM	1.0844	1.303
		19192	1909.3	QPSK	1.0893	1.297
				16QAM	1.0960	1.318

LTE Band 4

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 4	20	20050	1720.0	QPSK	17.898	19.43
				16QAM	17.878	19.28
		20174	1732.5	QPSK	17.862	19.27
				16QAM	17.867	19.29
		20299	1745.0	QPSK	17.871	19.35
				16QAM	17.850	19.22
	15	20025	1717.5	QPSK	13.426	14.59
				16QAM	13.405	14.54
		20174	1732.5	QPSK	13.412	14.58
				16QAM	13.419	14.46
		20324	1747.5	QPSK	13.421	14.44
				16QAM	13.437	14.63
	10	20000	1715.0	QPSK	8.9688	9.954
				16QAM	8.9627	9.775
		20174	1732.5	QPSK	8.9459	9.902
				16QAM	8.9508	9.758
		20349	1750.0	QPSK	8.9500	9.914
				16QAM	8.9398	9.816
	5	19975	1712.5	QPSK	4.4891	4.934
				16QAM	4.4823	4.937
		20174	1732.5	QPSK	4.5055	4.960
				16QAM	4.4933	4.977
		20374	1752.5	QPSK	4.4903	4.953
				16QAM	4.4850	4.965
	3	19965	1711.5	QPSK	2.6878	2.960
				16QAM	2.6896	2.989
		20174	1732.5	QPSK	2.6929	2.980
				16QAM	2.6937	2.983
		20384	1753.5	QPSK	2.6960	2.986
				16QAM	2.6932	2.961
	1.4	19957	1710.7	QPSK	1.0961	1.310
				16QAM	1.0840	1.307
		20174	1732.5	QPSK	1.0818	1.299
				16QAM	1.0848	1.304
		20392	1754.3	QPSK	1.0885	1.303
				16QAM	1.0947	1.320

LTE Band 5

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 5	10	20450	829.0	QPSK	8.9377	9.738
				16QAM	8.9718	9.783
		20524	836.5	QPSK	8.9741	9.881
				16QAM	8.9746	9.800
		20599	844.0	QPSK	8.9381	9.817
				16QAM	8.9589	9.809
	5	20425	826.5	QPSK	4.5068	5.015
				16QAM	4.4935	4.944
		20524	836.5	QPSK	4.4865	4.955
				16QAM	4.4856	4.957
		20624	846.5	QPSK	4.4805	4.934
				16QAM	4.4737	4.939
	3	20415	825.5	QPSK	2.6910	2.986
				16QAM	2.6966	2.982
		20524	836.5	QPSK	2.6955	2.980
				16QAM	2.6958	2.968
		20634	847.5	QPSK	2.6933	2.979
				16QAM	2.6894	2.983
	1.4	20407	824.7	QPSK	1.0956	1.309
				16QAM	1.0818	1.273
		20524	836.5	QPSK	1.0825	1.286
				16QAM	1.0863	1.293
		20624	848.3	QPSK	1.0909	1.306
				16QAM	1.0913	1.282

LTE Band 12

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 12	10	23060	704.0	QPSK	8.9632	9.804
				16QAM	8.9711	9.725
		23095	707.5	QPSK	8.9248	9.783
				16QAM	8.9489	9.746
		23130	711.0	QPSK	8.9504	9.719
				16QAM	8.9409	9.751
	5	23035	701.5	QPSK	4.4968	4.944
				16QAM	4.4799	4.914
		23095	707.5	QPSK	4.4901	4.959
				16QAM	4.4884	4.944
		23155	713.5	QPSK	4.4930	4.972
				16QAM	4.4822	4.967
	3	23025	700.5	QPSK	2.6946	2.946
				16QAM	2.6885	2.972
		23095	707.5	QPSK	2.6889	2.987
				16QAM	2.6935	2.957
		23165	714.5	QPSK	2.6933	2.949
				16QAM	2.6905	2.971
	1.4	23017	699.7	QPSK	1.0964	1.296
				16QAM	1.0833	1.272
		23095	707.5	QPSK	1.0818	1.268
				16QAM	1.0851	1.290
		23173	715.3	QPSK	1.0885	1.294
				16QAM	1.0962	1.286

LTE Band 17

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 66

Band	BW [MHz]	Channel	f [MHz]	Mode	99% BW [MHz]	26dB BW [MHz]
Band 66	20	132072	1720.0	QPSK	17.915	19.30
				16QAM	17.905	19.17
		132322	1745.0	QPSK	17.887	19.28
				16QAM	17.867	19.19
		132572	1770.0	QPSK	17.853	19.31
				16QAM	17.870	19.42
	15	132047	1717.5	QPSK	13.414	14.55
				16QAM	13.413	14.58
		132322	1745.0	QPSK	13.404	14.53
				16QAM	13.419	14.54
		132597	1772.5	QPSK	13.405	14.63
				16QAM	13.402	14.60
	10	132022	1715.0	QPSK	8.9504	9.694
				16QAM	8.9792	9.788
		132322	1745.0	QPSK	8.9566	9.841
				16QAM	8.9420	9.786
		132622	1775.0	QPSK	8.9541	9.822
				16QAM	8.9622	9.789
	5	131997	1712.5	QPSK	4.4879	4.945
				16QAM	4.4790	4.895
		132322	1745.0	QPSK	4.4903	4.954
				16QAM	4.4808	4.940
		132647	1775.5	QPSK	4.4906	4.933
				16QAM	4.4793	4.927
	3	131987	1711.5	QPSK	2.6885	2.977
				16QAM	2.6902	3.002
		132322	1745.0	QPSK	2.6953	2.979
				16QAM	2.6907	2.965
		132657	1778.5	QPSK	2.6938	2.975
				16QAM	2.6955	2.984
	1.4	131979	1710.7	QPSK	1.0971	1.305
				16QAM	1.0849	1.301
		132322	1745.0	QPSK	1.0894	1.299
				16QAM	1.0909	1.296
		132665	1779.3	QPSK	1.0958	1.313
				16QAM	1.0842	1.308

9.1.2. OCCUPIED BANDWIDTH PLOTS

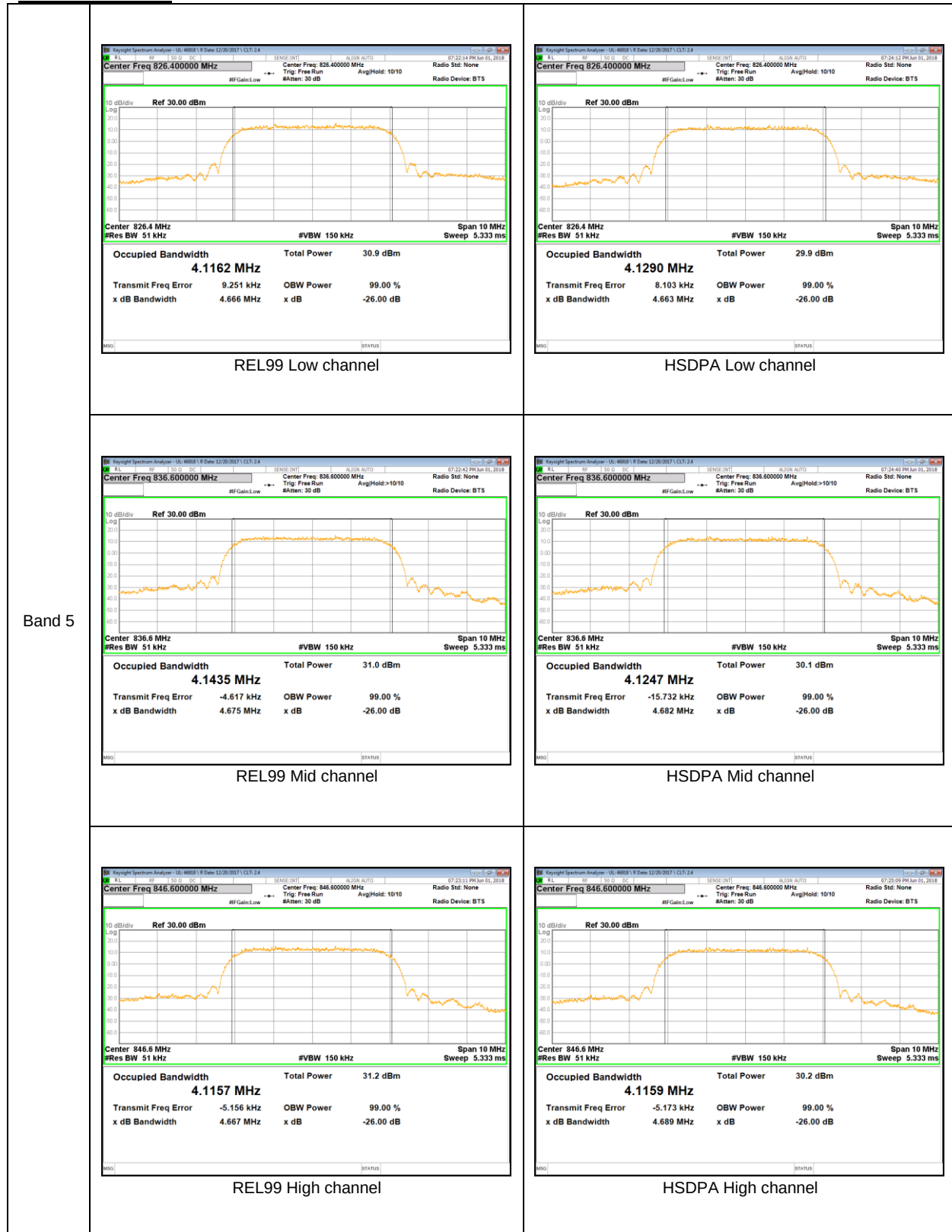
GSM 850



GSM 1900



WCDMA Band 5



WCDMA Band 4

