



FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART D/H/L/M
FCC CFR47 PART 90 SUBPART R/S

WWAN

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-G889A

FCC ID: A3LSMG889A

REPORT NUMBER: 4788768228-E1V1

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ACCREDITED*

Testing
Laboratory

TL-637

Revision History

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Appendix B : Cellular receiver Part 15B test results

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL NUMBER: SM-G889A

SERIAL NUMBER: R38M109WC0D, R38M109WC2T, R38M109WB4F (RADIATED)
R38M109WC5L, R38KB07F1PY, R38KB07F0GP, R38M109W9NZ (CONDUCTED)

DATE TESTED: FEB 10, 2019 - MAY 21, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 24E, 27D, 27H, 27L, 27M and 90R	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:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Junwhan Lee
Suwon Lab Engineer
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. FCC CFR 47 Part 90.
6. ANSI TIA-603-E, 2016
7. ANSI C63.26, 2015
8. 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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC.
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	Conducted		Radiated	
	[MHz]		Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
GSM850	824~849	GPRS	32.8	1905.46	26.77	475.34
		EGPRS	26.8	478.63	22.79	190.11
GSM1900	1850~1910	GPRS	29.7	933.25	29.55	901.57
		EGPRS	25.5	354.81	26.18	414.95

WCDMA

FCC Part 22/24/27						
Band	Frequency Range	Modulation	Conducted		Radiated	
	[MHz]		Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824~849	REL99	23.4	218.78	19.16	82.41
		HSDPA	21.9	154.88	17.50	56.23
Band 4	1710~1755	REL99	22.7	186.21	23.64	231.21
		HSDPA	21.7	147.91	22.53	179.06
Band 2	1850~1910	REL99	22.9	194.98	23.47	222.33
		HSDPA	23.0	199.53	23.32	214.78

LTE Band 2

FCC Part 24							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 2	1850 ~ 1910	20	QPSK	22.99	199.07	25.25	334.97
			16QAM	23.39	218.27	23.94	247.74
		15	QPSK	23.01	199.99	25.66	368.13
			16QAM	22.27	168.66	24.19	262.42
		10	QPSK	22.97	198.15	25.49	354.00
			16QAM	22.41	174.18	24.82	303.39
		5	QPSK	23.03	200.91	25.32	340.41
			16QAM	22.39	173.38	24.43	277.33
		3	QPSK	23.04	201.37	25.89	388.15
			16QAM	22.62	182.81	24.07	255.27
		1.4	QPSK	23.05	201.84	25.85	384.59
			16QAM	22.40	173.78	24.66	292.42

LTE Band 5

FCC Part 22							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 5	824 ~ 849	10	QPSK	23.01	199.99	19.49	88.92
			16QAM	22.31	170.22	18.39	69.02
		5	QPSK	23.10	204.17	18.53	71.29
			16QAM	22.40	173.78	18.03	63.53
		3	QPSK	23.15	206.54	18.97	78.89
			16QAM	22.36	172.19	17.75	59.57
		1.4	QPSK	23.10	204.17	19.06	80.54
			16QAM	22.45	175.79	18.07	64.12

LTE Band 7

FCC Part 27							
Band	Frequency Range	BandWidth	Modulation	Conducted		Radiated	
	[MHz]			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 7	2500 ~ 2570	20	QPSK	22.90	194.98	22.94	196.79
			16QAM	22.26	168.27	22.12	162.93
		15	QPSK	22.90	194.98	23.61	229.61
			16QAM	22.22	166.72	22.68	185.35
		10	QPSK	22.95	197.24	23.72	235.50
			16QAM	22.34	171.40	22.81	190.99
		5	QPSK	22.92	195.88	24.00	251.19
			16QAM	22.23	167.11	22.90	194.98

LTE Band 12

FCC Part 27							
Band	Frequency Range	BandWidth	Modulation	Conducted		Radiated	
	[MHz]			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 12	699 ~ 716	10	QPSK	23.26	211.84	17.59	57.41
			16QAM	22.56	180.30	16.28	42.46
		5	QPSK	23.44	220.80	17.69	58.75
			16QAM	22.61	182.39	16.70	46.77
		3	QPSK	23.43	220.29	17.53	56.62
			16QAM	22.81	190.99	17.19	52.36
		1.4	QPSK	23.47	222.33	18.75	74.99
			16QAM	22.57	180.72	16.40	43.65

LTE Band 14

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 14	788 ~ 798	10	QPSK	23.34	215.77	20.97	125.03
			16QAM	22.42	174.58	19.56	90.36
		5	QPSK	23.33	215.28	20.70	117.49
			16QAM	22.51	178.24	19.73	93.97

LTE Band 30

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 30	2305 ~ 2315	10	QPSK	21.68	147.23	22.66	184.50
			16QAM	20.83	121.06	21.43	139.00
		5	QPSK	21.70	147.91	22.47	176.60
			16QAM	20.94	124.17	22.16	164.44

LTE Band 40

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 40	2305 ~ 2315, 2350 ~ 2360	10	QPSK	11.75	14.96	16.06	40.36
			16QAM	11.88	15.42	17.39	54.83
		5	QPSK	11.88	15.42	17.26	53.21
			16QAM	11.87	15.38	17.42	55.21

LTE Band 41

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 41	2496 ~ 2690	20	QPSK	22.26	168.27	21.07	127.94
			16QAM	21.68	147.23	20.50	112.20
		15	QPSK	22.30	169.82	21.66	146.55
			16QAM	21.42	138.68	20.32	107.65
		10	QPSK	22.27	168.66	22.00	158.49
			16QAM	21.35	136.46	21.38	137.40
		5	QPSK	22.27	168.66	22.22	166.72
			16QAM	21.29	134.59	21.06	127.64

LTE Band 66

FCC Part 27							
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation	Conducted		Radiated	
				Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
Band 66	1710 ~ 1780	20	QPSK	23.33	215.28	26.40	436.52
			16QAM	22.69	185.78	24.83	304.09
		15	QPSK	23.43	220.29	26.40	436.52
			16QAM	22.68	185.35	25.31	339.63
		10	QPSK	23.33	215.28	26.55	451.86
			16QAM	22.65	184.08	25.18	329.61
		5	QPSK	23.31	214.29	26.25	421.70
			16QAM	22.64	183.65	25.70	371.54
		3	QPSK	23.33	215.28	26.57	453.94
			16QAM	22.73	187.50	25.22	332.66
		1.4	QPSK	23.42	219.79	26.58	454.99
			16QAM	22.88	194.09	25.39	345.94

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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 ~ 1915 MHz	2.9
GSM850 / WCDMA Band 5 / LTE Band 5 824 ~ 849 MHz	0.5
WCDMA Band 4 / LTE Band 4 / LTE Band 66 1710 ~ 1780 MHz	1.6
LTE Band 7 2500 ~ 2570 MHz	1.4
LTE Band 12 699~ 716 MHz	-4.8
LTE Band 14 788 ~ 798 MHz	-3.3
LTE Band 30 2305 ~ 2315 MHz	-2.1
LTE Band 38 / LTE Band 41 2496 ~ 2690 MHz	1.4
LTE Band 40 2305-2315 MHz / 2350-2360 MHz	-1.2

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

For all LTE Bands, the worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM and 64QAM modulations. It was found that QPSK and 16QAM results were worst case. All testing was performed using QPSK and 16QAM modulations to represent the worst case. However, the out of band emissions and spurious radiation were only performed on bandwidth and RB offset(with RB size 1) with the highest power in QPSK.

Highest power setting for each bands				
LTE Band	Channel (MHz)	Bandwidth (MHz)	RB size	RB offset
2	1850.7	1.4	1	0
	1880.0		1	0
	1909.3		1	0
5	825.5	3	1	8
	836.5		1	0
	847.5		1	0
7	2505.0	10	1	25
	2535.0		1	25
	2565.0		1	25
12	699.7	1.4	1	0
	707.5		1	0
	715.3		1	0
14	790.5	5	1	24
	793.0		1	12
	796.5		1	24
30	2307.5	5	1	24
	2310.0		1	24
	2312.5		1	24
40	2310	10	1	25
	2355		1	25
41	2503.5	15	1	37
	2593.0		1	37
	2682.5		1	37
66	1717.5	15	1	37
	1745.0		1	37
	1772.5		1	37

- ERP/EIRP

For WCDMA Band 4 / LTE Band 2 / LTE Band 12 / LTE Band 30 / LTE Band 66 / LTE Band 40, 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.

For GSM1900 / WCDMA Band 2 / LTE Band 7 / LTE Band 41, 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.

For GSM850 / WCDMA Band 5 / LTE Band 5 / LTE Band 14, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation.

- Radiated spurious emissions

For LTE Band 2 / LTE Band 14, the spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation.

For GSM1900 / WCDMA Band 2 / LTE Band 5 / LTE Band 12 / LTE Band 30 / LTE Band 66, the spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation.

For GSM850 / WCDMA Band 5 / WCDMA Band 4 / LTE Band 7 / LTE Band 40 / LTE Band 41, the spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation.

Note : For ERP/EIRP testing, the EUT didn't attached with accessories.(travel adapter and earphone), But radiated spurious testing, the EUT attached with accessories for the worst case condition. The EUT is continuously communicated with the call box during the tests.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA300	R37KACB0KE3SE3	N/A
Data Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Earphone	SAMSUNG	GH59-15097A	N/A	N/A

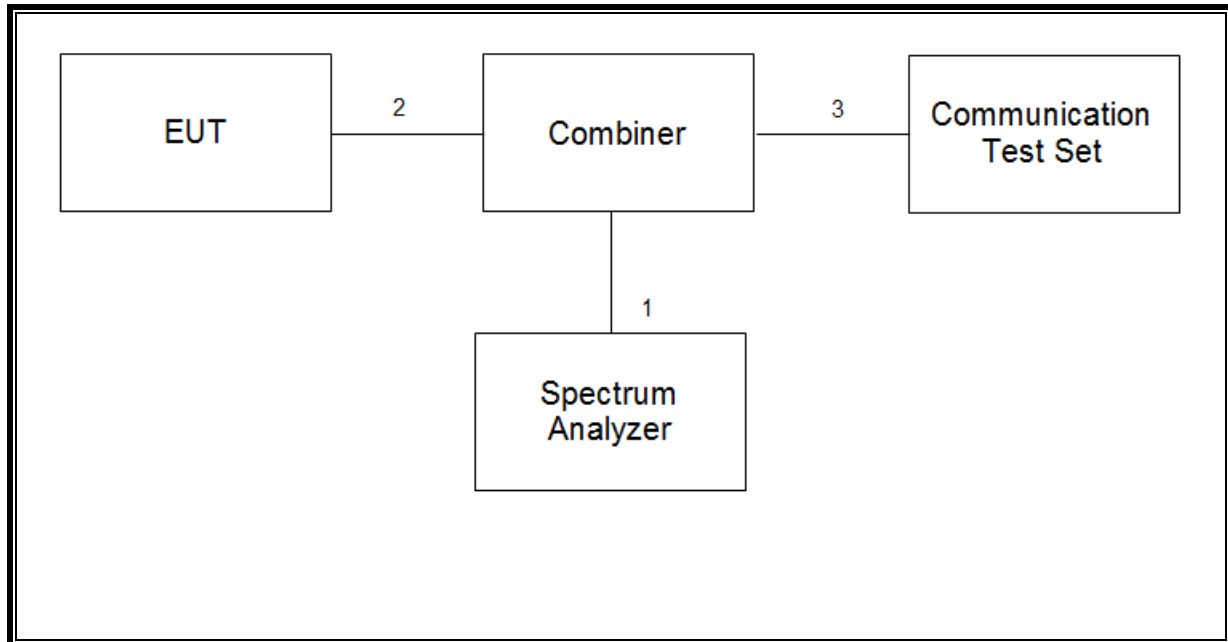
I/O CABLE

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	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.6m	N/A

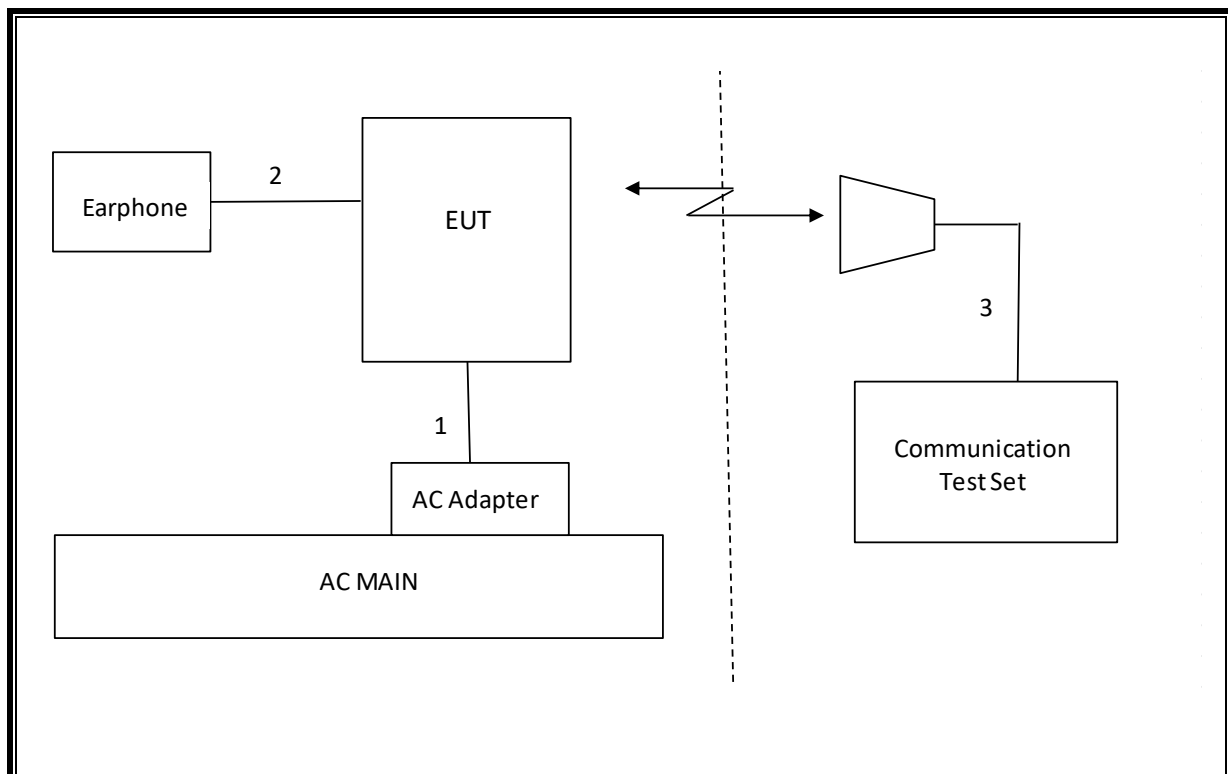
TEST SETUP

The EUT is continuously communicated with 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	08-14-20
Preamplifier	ETS	3116C-PA	00168841	08-09-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Combiner	WEINSCHTEL	1575	2150	08-08-19
Communications Test Set	R&S	CMW500	115331	08-07-19
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-06-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW40	101590	08-06-19
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	08-08-19
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	08-08-19
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	08-08-19
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	08-08-19
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	08-08-19
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	08-08-19
Attenuator	PASTERNAK	PE7087-10	A009	08-08-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7087-10	2	08-07-19
Attenuator	PASTERNAK	PE7395-10	A011	08-08-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
Temperature Chamber	ESPEC	SH-642	93001109	08-06-19
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 2.5	

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(c),(g),(h) 90.543(c)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
90.543(e)		-35dBm		Pass
27.53(a)	Conducted Spurious Emission	-40 dBm		Pass
27.53(m)		-25 dBm		Pass
27.53(a) 27.53(m)	Emission mask	Section 9.2.2		Pass
2.1046	Conducted output power	N/A		See the RF exposure test report. (4788768228-S1 FCC Report SAR)
22.355 24.235 27.54 90.213 90.539(e)	Frequency Stability	2.5PPM		Pass
22.913(a)(5)	Effective Radiated Power	38.5 dBm	Radiated	Pass
27.50(c)(10) 27.50(b)(10) 90.542(a)(7)		34.77 dBm		Pass
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power	33dBm		Pass
27.50(a)		24dBm		Pass
27.50(d)(4)		30dBm		Pass
22.917(a) 24.238(a) 27.53(a),(c), (g),(h) 90.543(c)	Radiated Spurious Emission	-13dBm		Pass
27.53(a) 27.53(f) 90.543(f)		-40dBm		Pass
27.53 (m)		-25dBm		Pass

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.

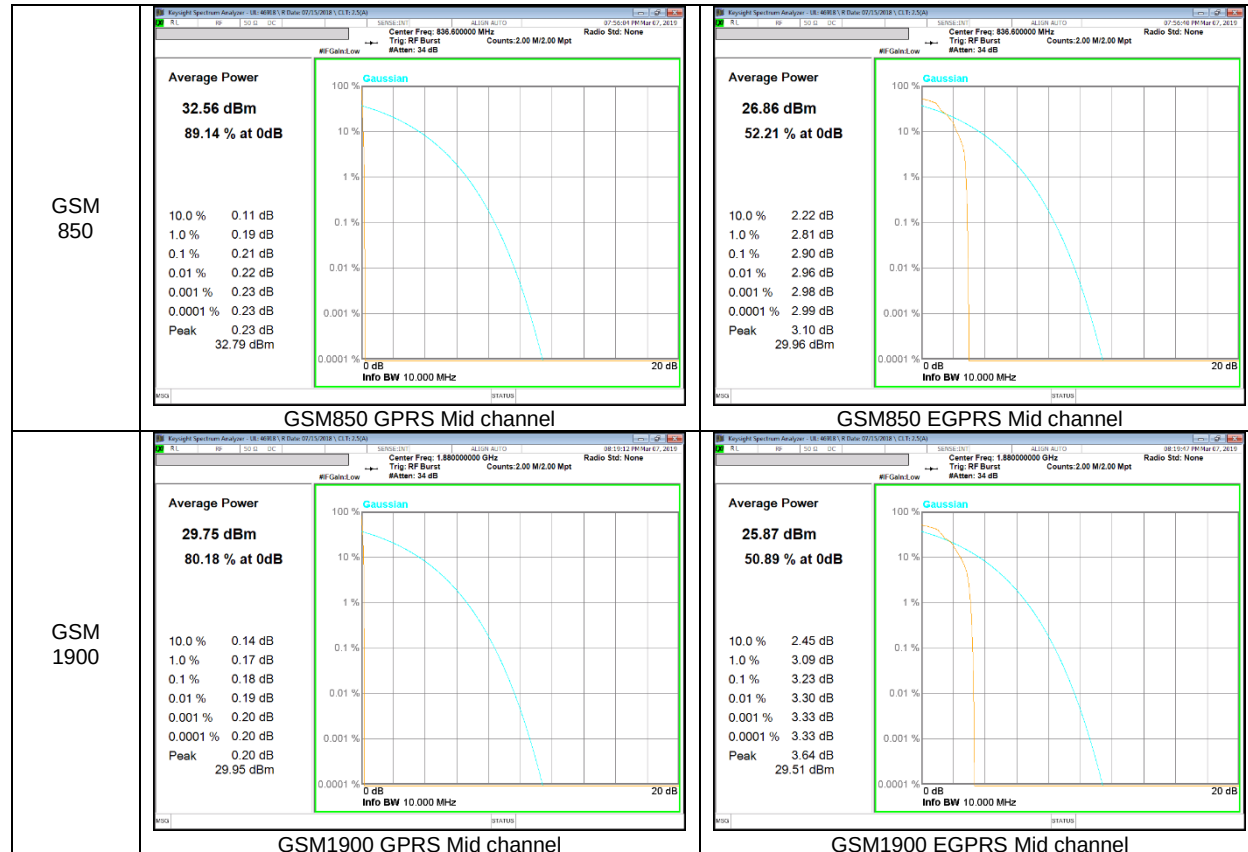
Test Spec

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.

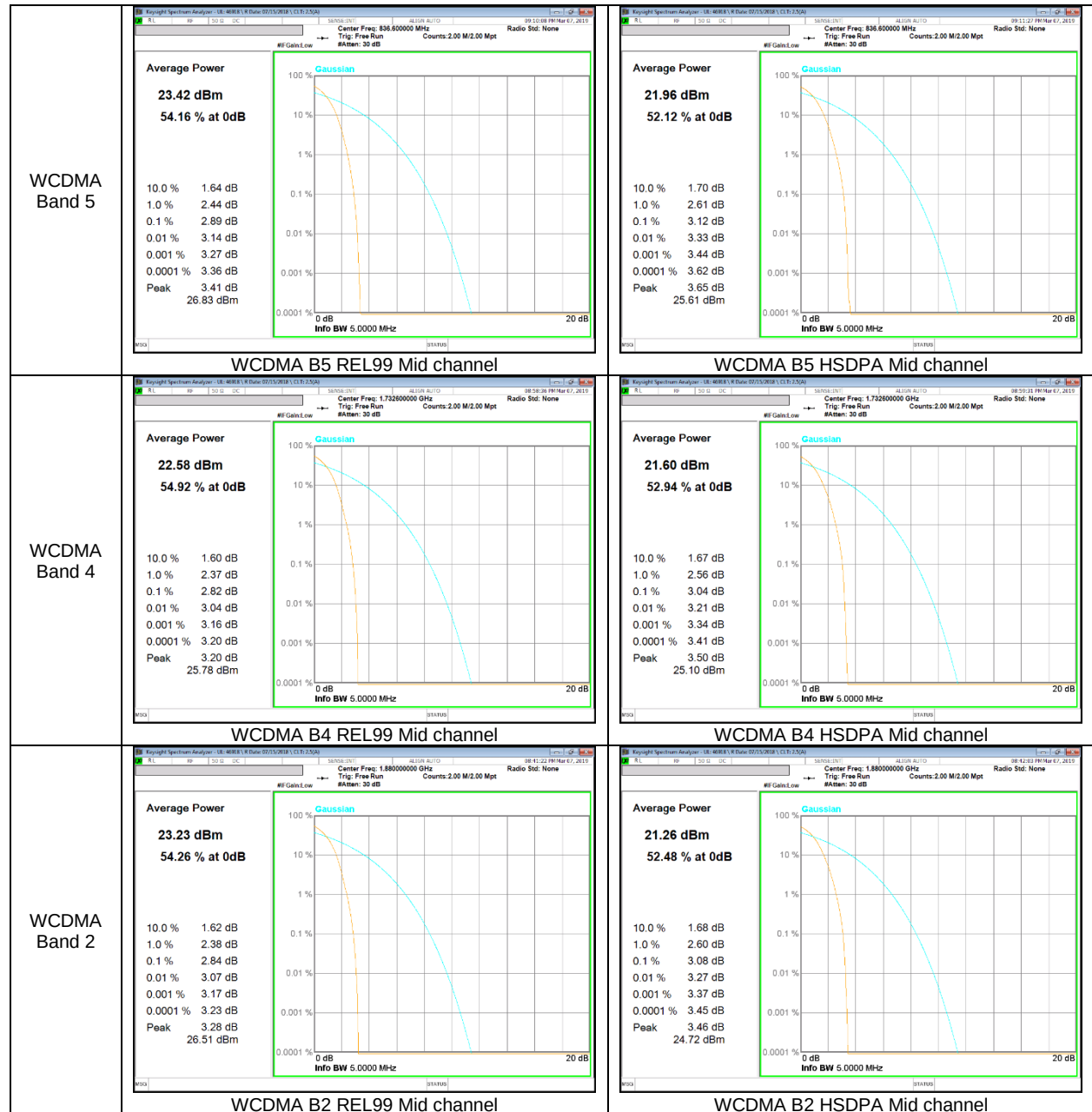
RESULTS

8.1. CONDUCTED PEAK TO AVERAGE RESULT

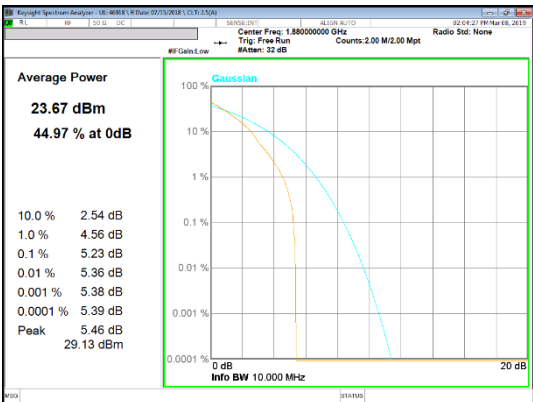
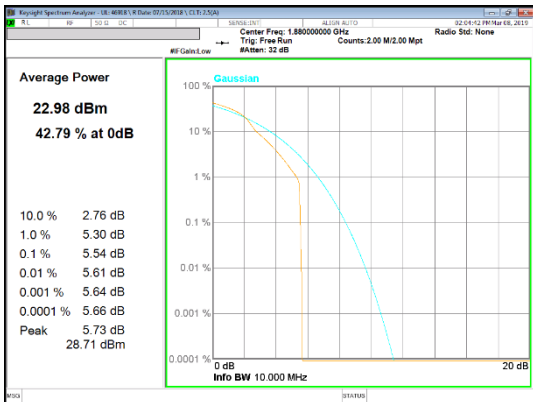
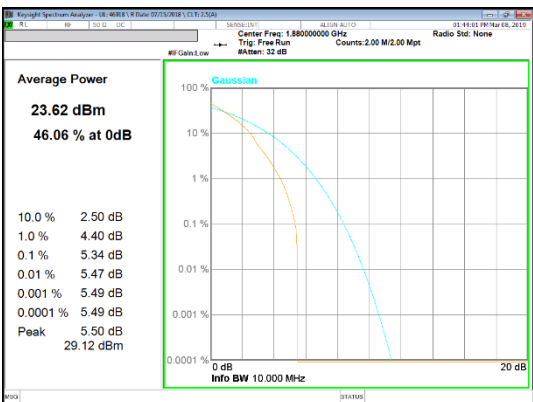
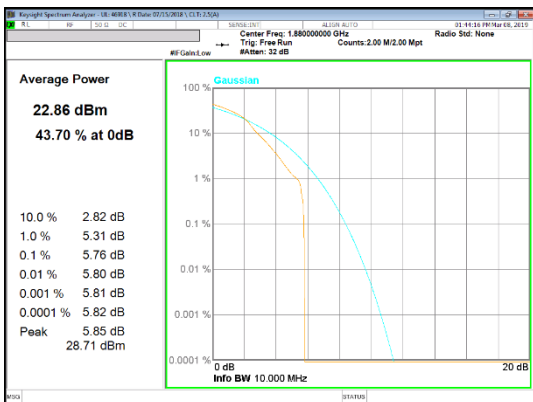
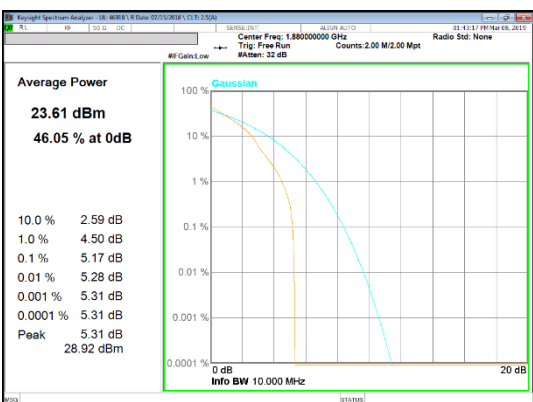
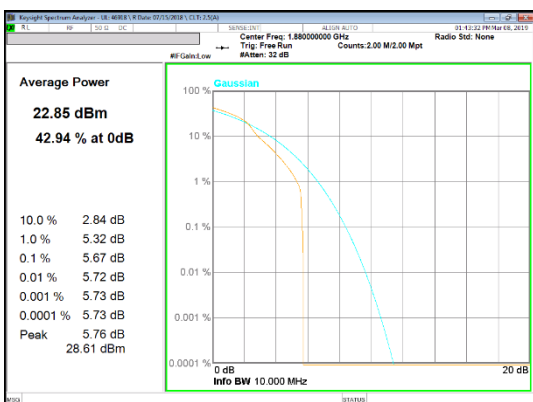
GSM

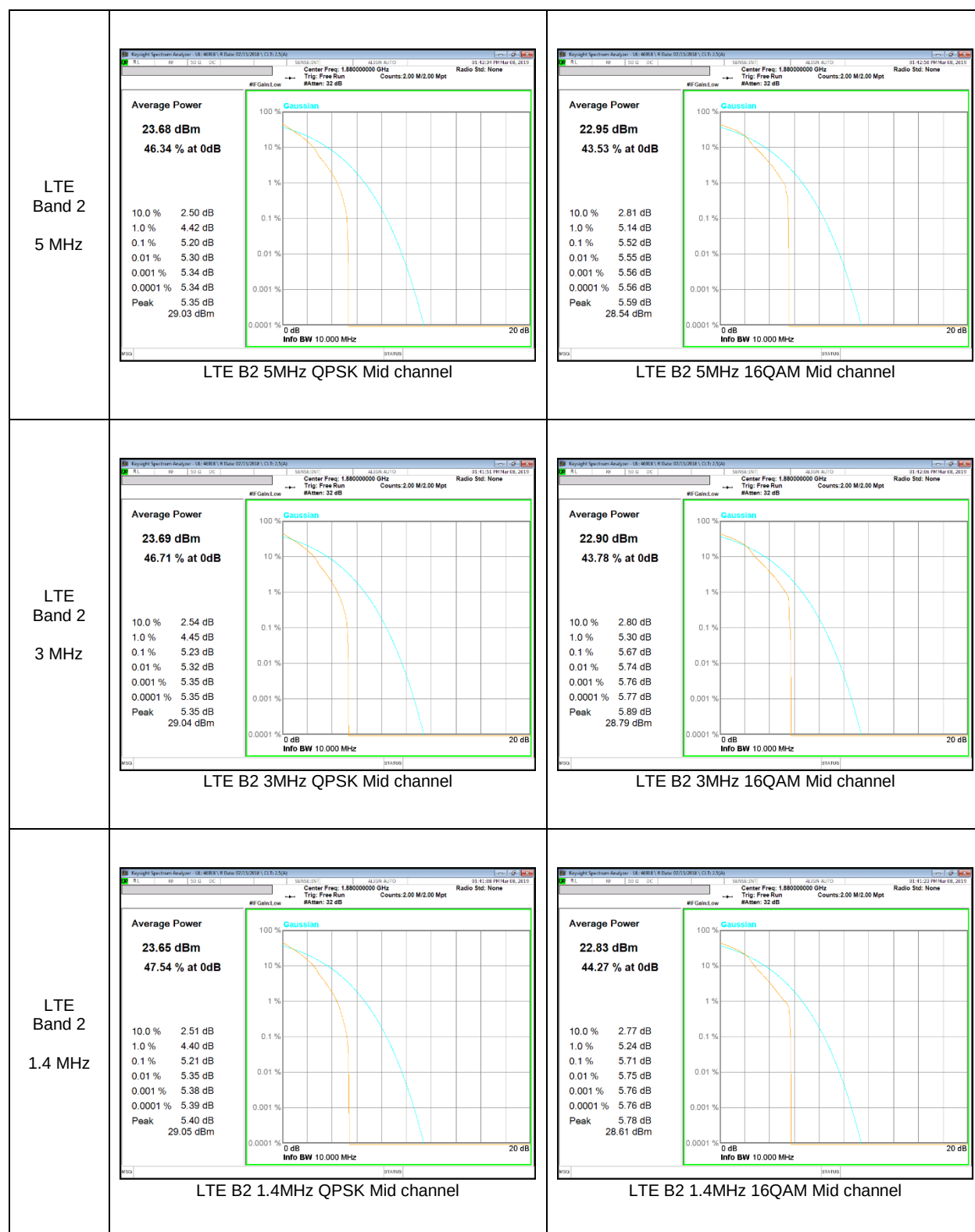


WCDMA

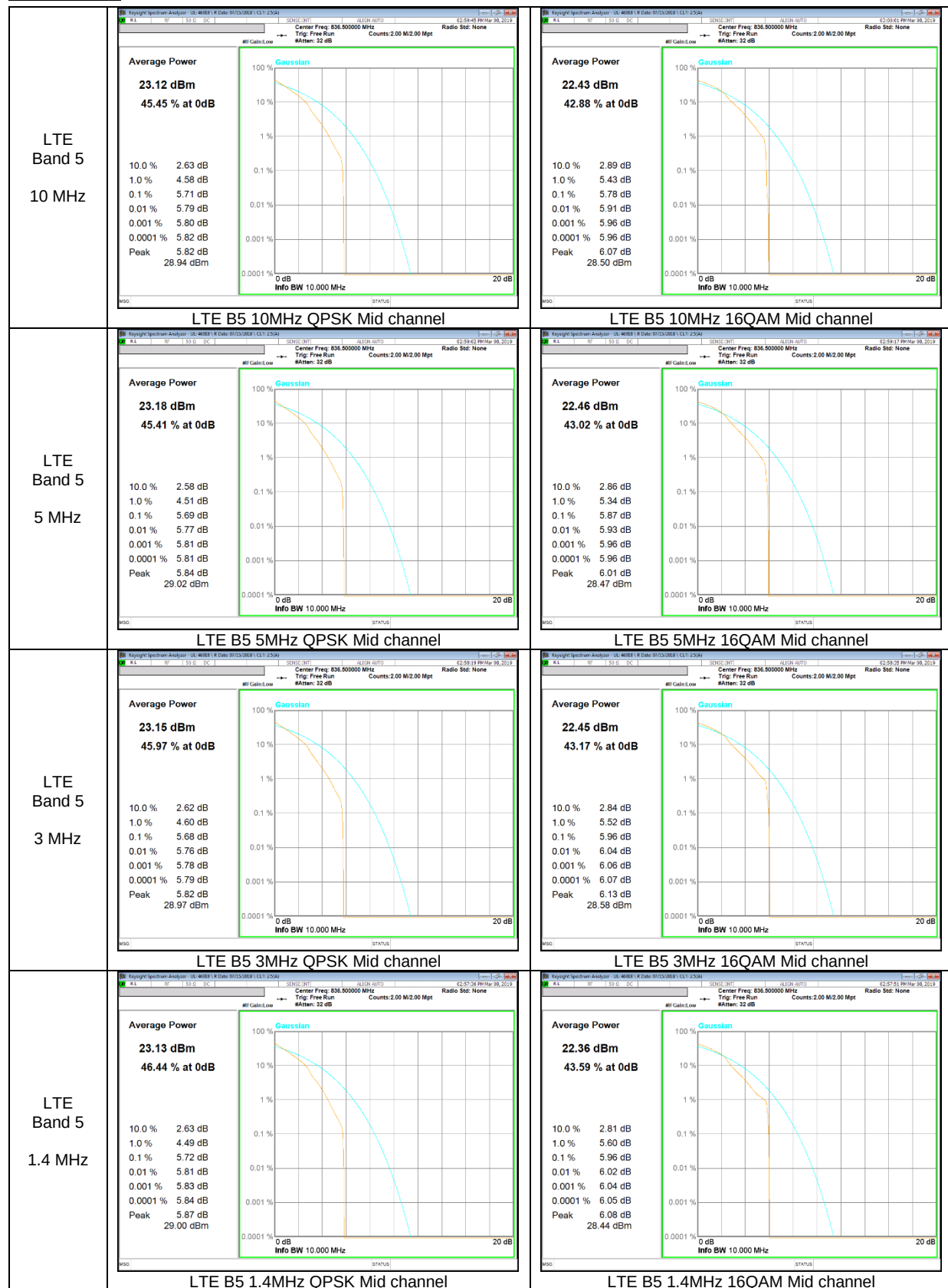


LTE Band 2

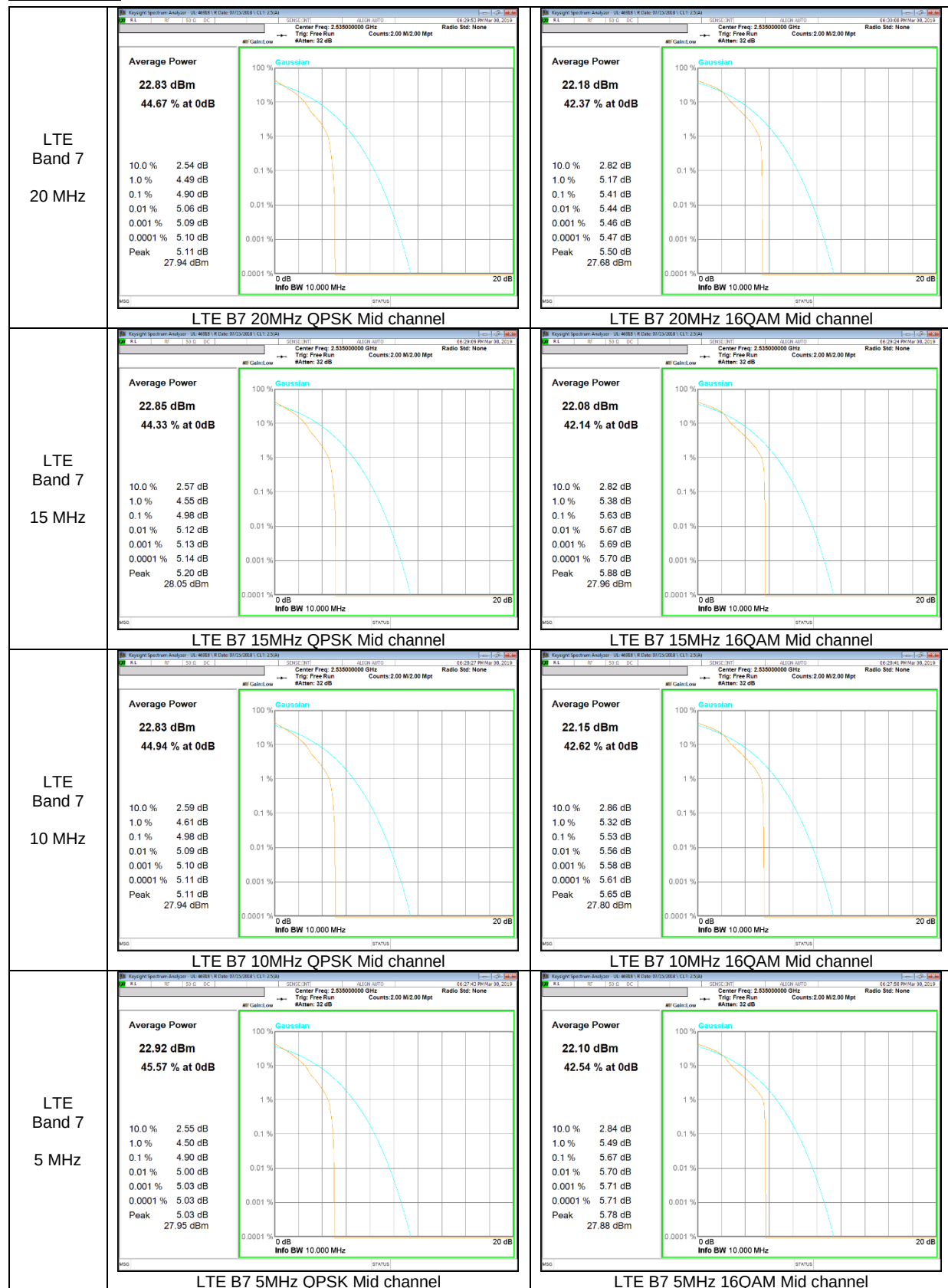
LTE Band 2 20 MHz	 Average Power 23.67 dBm 44.97 % at 0dB 10.0 % 2.54 dB 1.0 % 4.56 dB 0.1 % 5.23 dB 0.01 % 5.36 dB 0.001 % 5.38 dB 0.0001 % 5.39 dB Peak 5.46 dB 29.13 dBm LTE B2 20MHz QPSK Mid channel	 Average Power 22.98 dBm 42.79 % at 0dB 10.0 % 2.76 dB 1.0 % 5.30 dB 0.1 % 5.54 dB 0.01 % 5.61 dB 0.001 % 5.64 dB 0.0001 % 5.66 dB Peak 5.73 dB 28.71 dBm LTE B2 20MHz 16QAM Mid channel
LTE Band 2 15 MHz	 Average Power 23.62 dBm 46.06 % at 0dB 10.0 % 2.50 dB 1.0 % 4.40 dB 0.1 % 5.34 dB 0.01 % 5.47 dB 0.001 % 5.49 dB 0.0001 % 5.49 dB Peak 5.50 dB 29.12 dBm LTE B2 15MHz QPSK Mid channel	 Average Power 22.86 dBm 43.70 % at 0dB 10.0 % 2.82 dB 1.0 % 5.31 dB 0.1 % 5.76 dB 0.01 % 5.80 dB 0.001 % 5.81 dB 0.0001 % 5.82 dB Peak 5.85 dB 28.71 dBm LTE B2 15MHz 16QAM Mid channel
LTE Band 2 10 MHz	 Average Power 23.61 dBm 46.05 % at 0dB 10.0 % 2.59 dB 1.0 % 4.50 dB 0.1 % 5.17 dB 0.01 % 5.28 dB 0.001 % 5.31 dB 0.0001 % 5.31 dB Peak 5.31 dB 28.92 dBm LTE B2 10MHz QPSK Mid channel	 Average Power 22.85 dBm 42.94 % at 0dB 10.0 % 2.84 dB 1.0 % 5.32 dB 0.1 % 5.67 dB 0.01 % 5.72 dB 0.001 % 5.73 dB 0.0001 % 5.73 dB Peak 5.76 dB 28.61 dBm LTE B2 10MHz 16QAM Mid channel



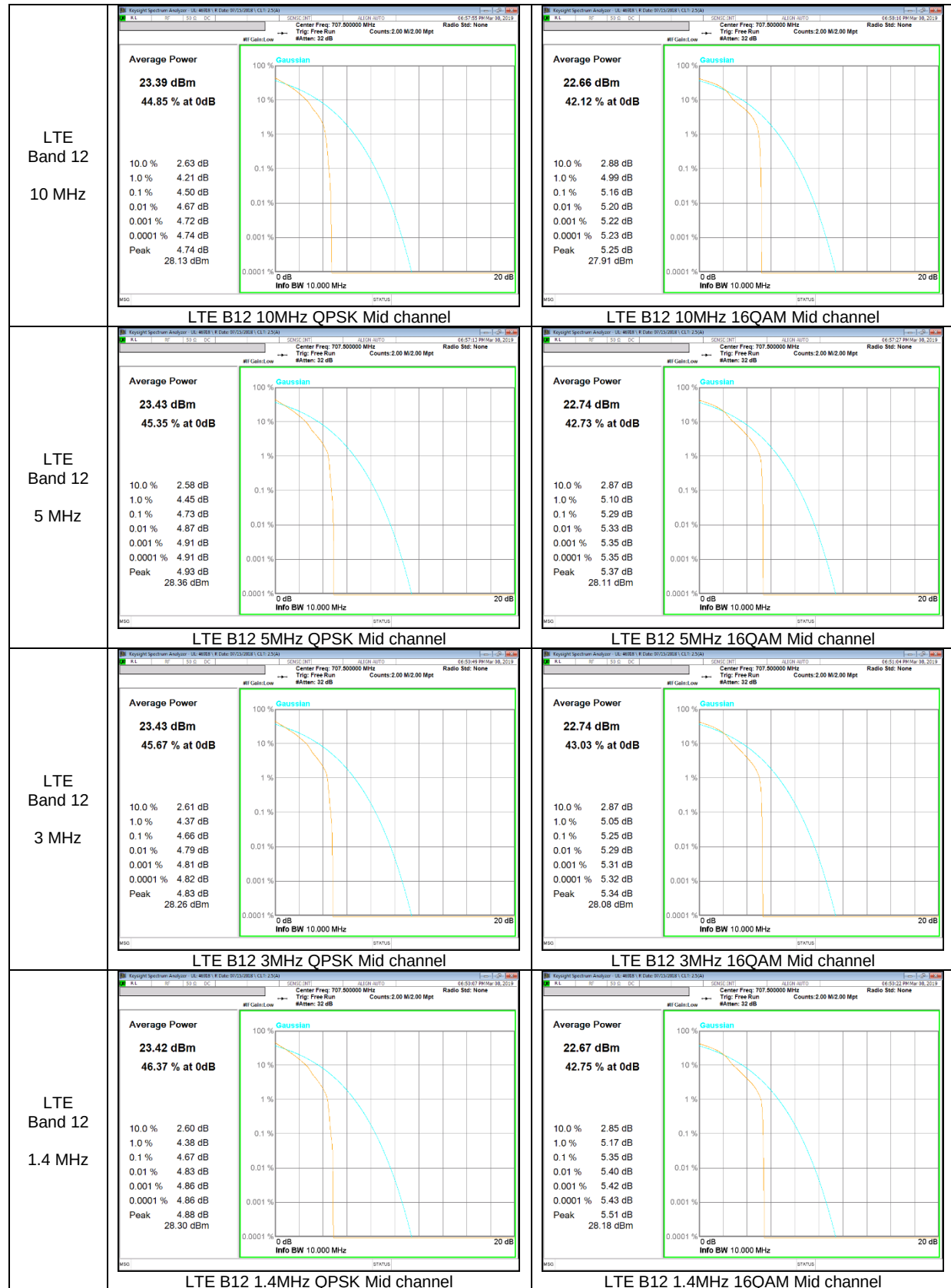
LTE Band 5



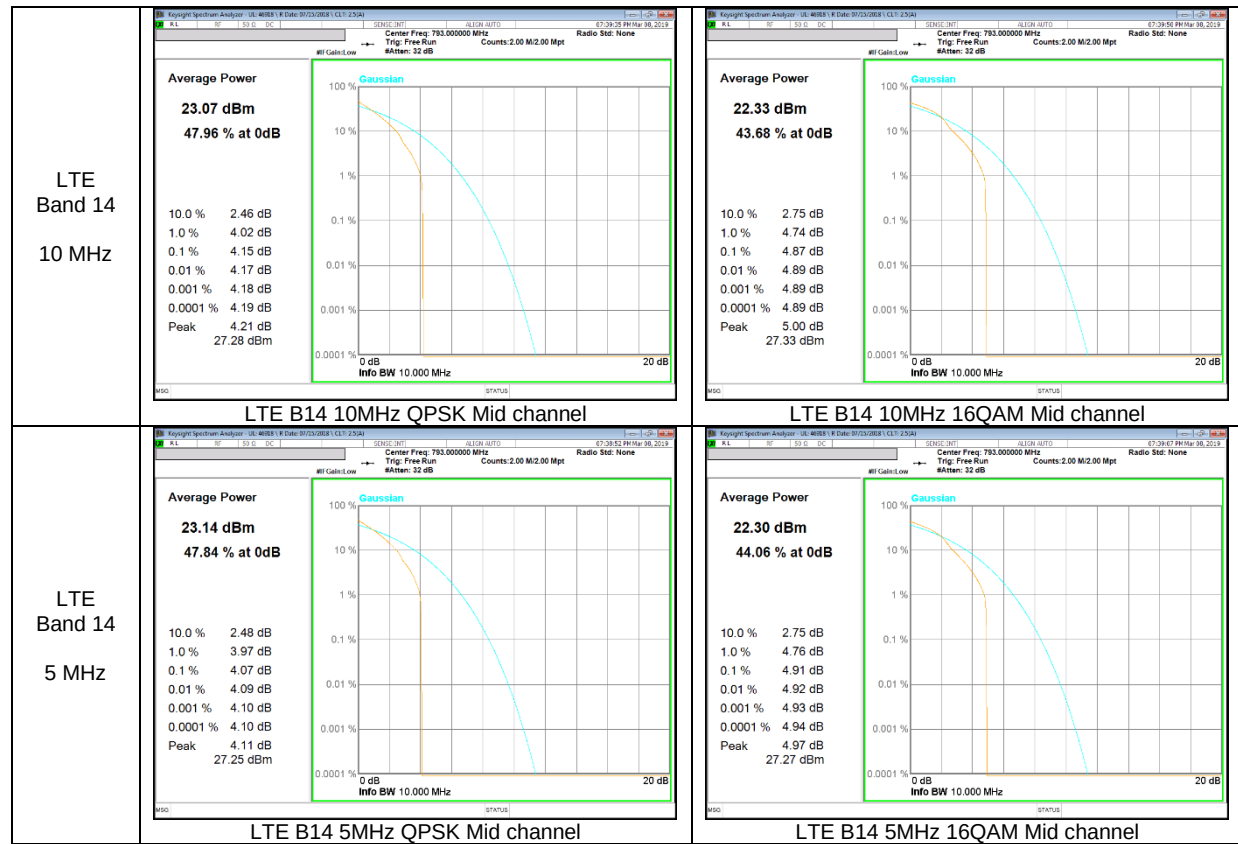
LTE Band 7



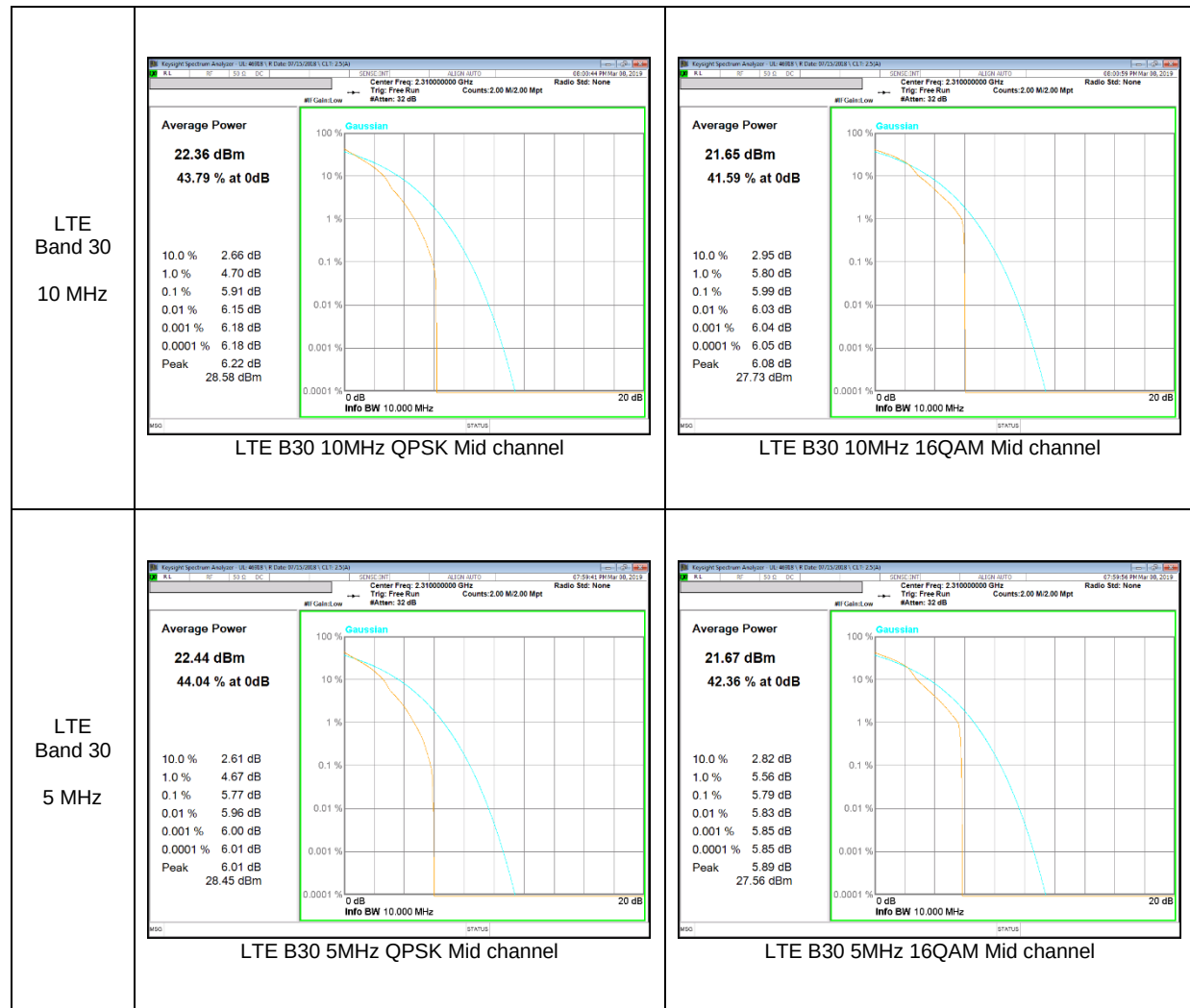
LTE Band 12



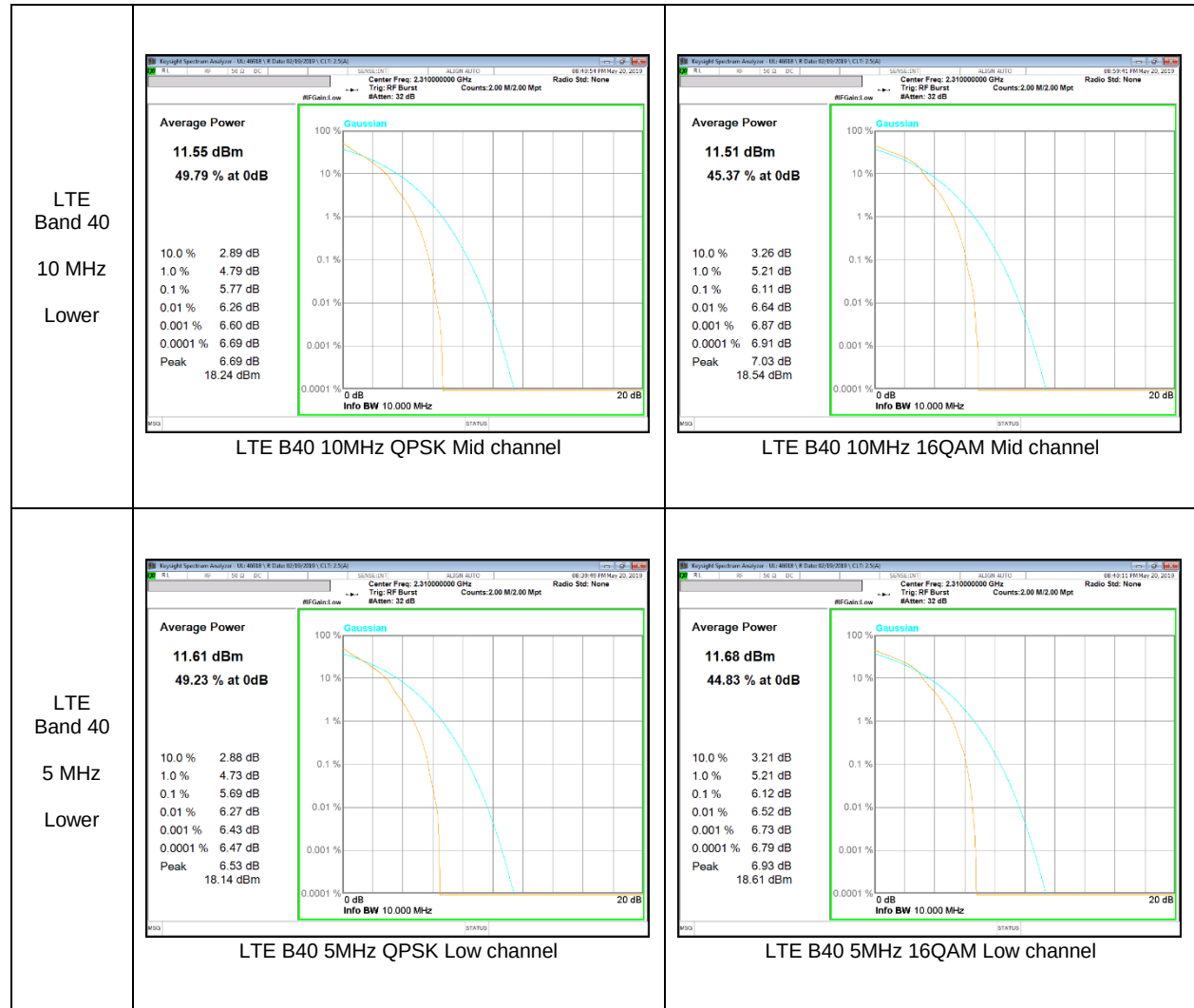
LTE Band 14



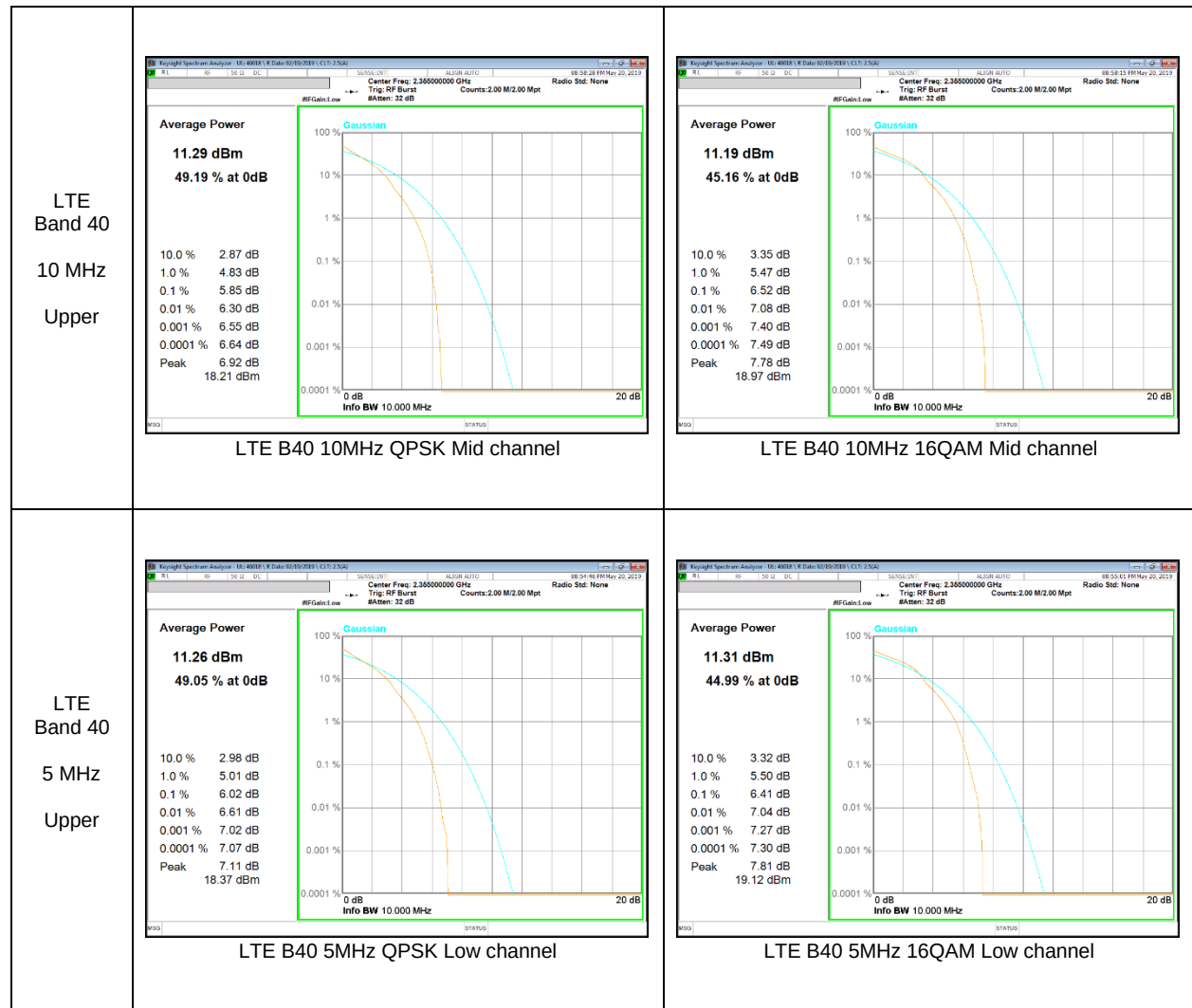
LTE Band 30



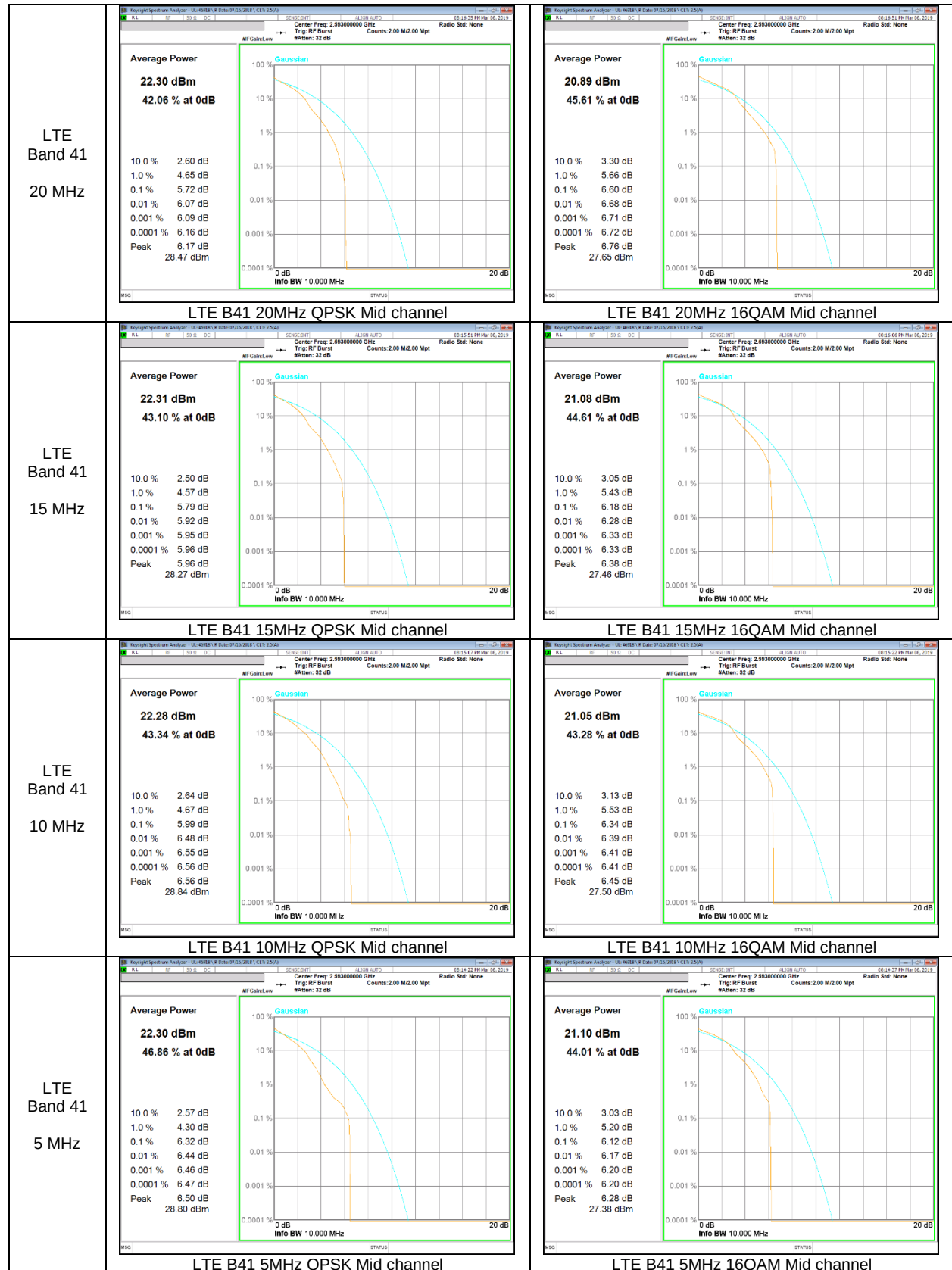
LTE Band 40 (Lower Side)



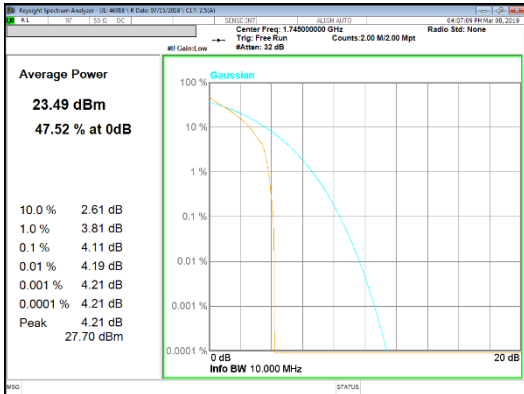
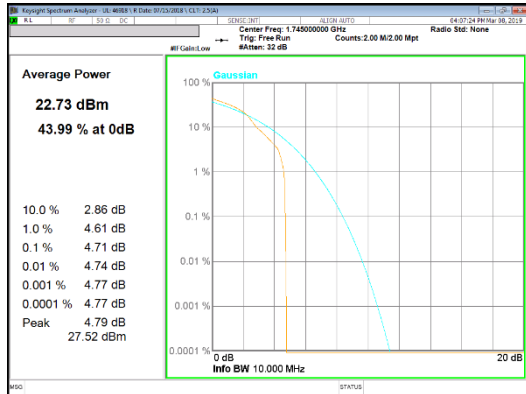
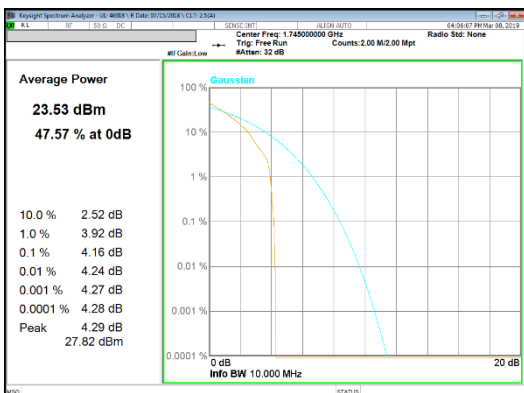
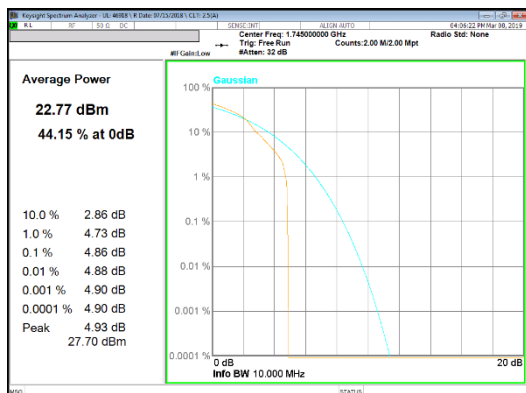
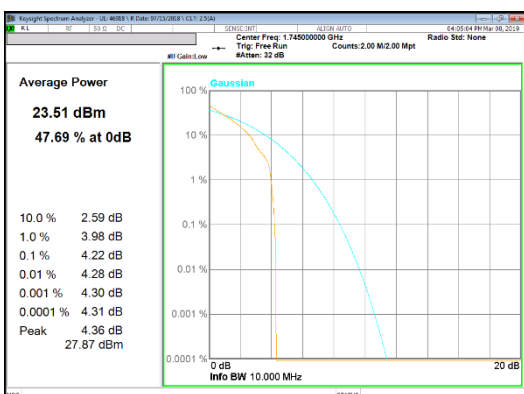
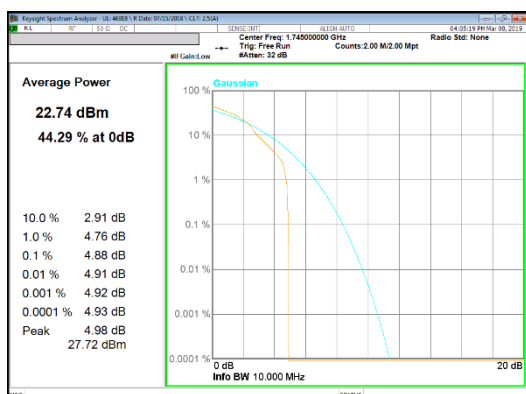
LTE Band 40 (Upper Side)

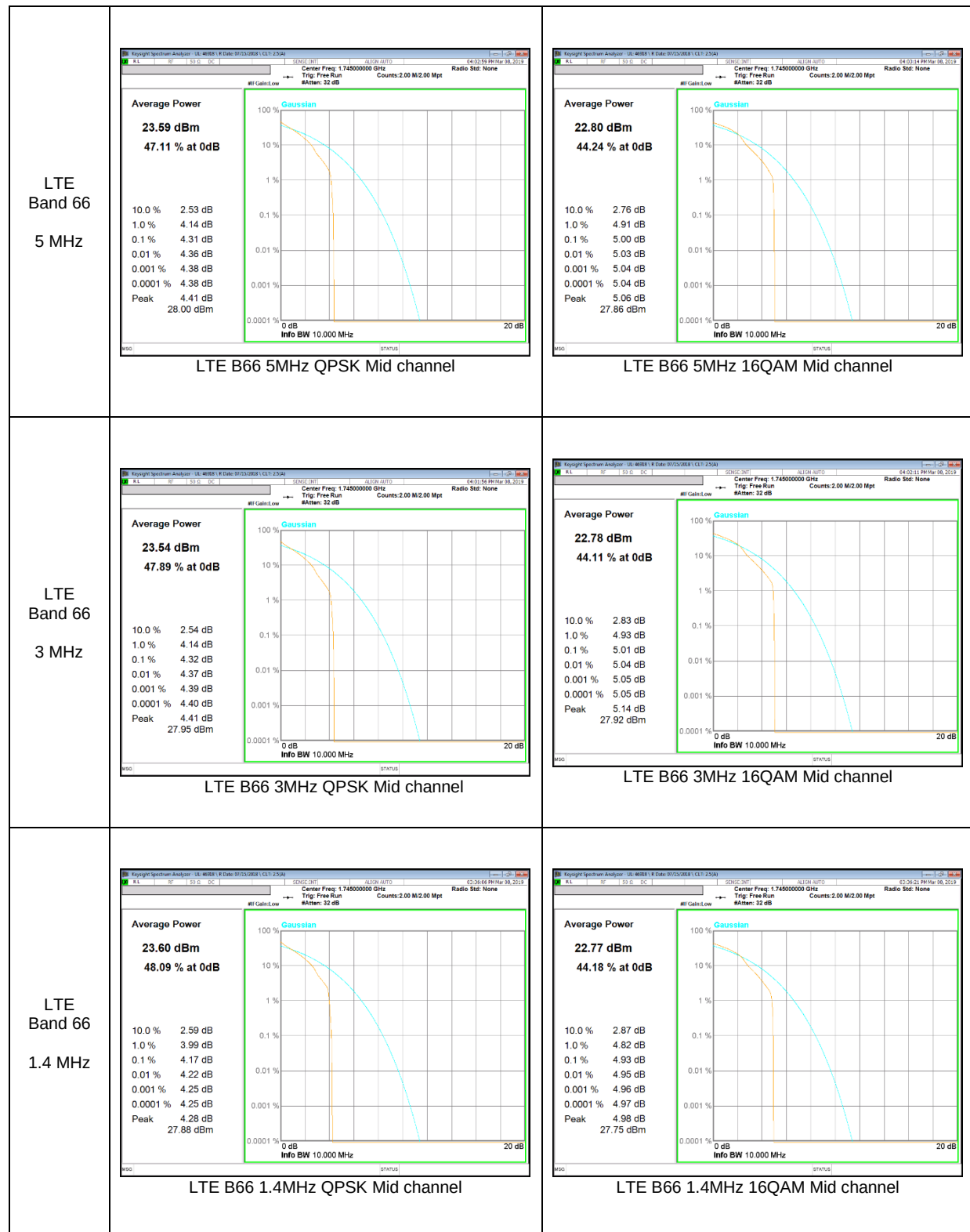


LTE Band 41



LTE Band 66

LTE Band 66 20 MHz	 Average Power 23.49 dBm 47.52 % at 0dB <table><tr><td>10.0 %</td><td>2.61 dB</td></tr><tr><td>1.0 %</td><td>3.81 dB</td></tr><tr><td>0.1 %</td><td>4.11 dB</td></tr><tr><td>0.01 %</td><td>4.19 dB</td></tr><tr><td>0.001 %</td><td>4.21 dB</td></tr><tr><td>0.0001 %</td><td>4.21 dB</td></tr><tr><td>Peak</td><td>4.21 dB</td></tr><tr><td>Peak</td><td>27.70 dBm</td></tr></table> LTE B66 20MHz QPSK Mid channel	10.0 %	2.61 dB	1.0 %	3.81 dB	0.1 %	4.11 dB	0.01 %	4.19 dB	0.001 %	4.21 dB	0.0001 %	4.21 dB	Peak	4.21 dB	Peak	27.70 dBm	 Average Power 22.73 dBm 43.99 % at 0dB <table><tr><td>10.0 %</td><td>2.86 dB</td></tr><tr><td>1.0 %</td><td>4.61 dB</td></tr><tr><td>0.1 %</td><td>4.71 dB</td></tr><tr><td>0.01 %</td><td>4.74 dB</td></tr><tr><td>0.001 %</td><td>4.77 dB</td></tr><tr><td>0.0001 %</td><td>4.77 dB</td></tr><tr><td>Peak</td><td>4.79 dB</td></tr><tr><td>Peak</td><td>27.52 dBm</td></tr></table> LTE B66 20MHz 16QAM Mid channel	10.0 %	2.86 dB	1.0 %	4.61 dB	0.1 %	4.71 dB	0.01 %	4.74 dB	0.001 %	4.77 dB	0.0001 %	4.77 dB	Peak	4.79 dB	Peak	27.52 dBm
10.0 %	2.61 dB																																	
1.0 %	3.81 dB																																	
0.1 %	4.11 dB																																	
0.01 %	4.19 dB																																	
0.001 %	4.21 dB																																	
0.0001 %	4.21 dB																																	
Peak	4.21 dB																																	
Peak	27.70 dBm																																	
10.0 %	2.86 dB																																	
1.0 %	4.61 dB																																	
0.1 %	4.71 dB																																	
0.01 %	4.74 dB																																	
0.001 %	4.77 dB																																	
0.0001 %	4.77 dB																																	
Peak	4.79 dB																																	
Peak	27.52 dBm																																	
LTE Band 66 15 MHz	 Average Power 23.53 dBm 47.57 % at 0dB <table><tr><td>10.0 %</td><td>2.52 dB</td></tr><tr><td>1.0 %</td><td>3.92 dB</td></tr><tr><td>0.1 %</td><td>4.16 dB</td></tr><tr><td>0.01 %</td><td>4.24 dB</td></tr><tr><td>0.001 %</td><td>4.27 dB</td></tr><tr><td>0.0001 %</td><td>4.28 dB</td></tr><tr><td>Peak</td><td>4.29 dB</td></tr><tr><td>Peak</td><td>27.82 dBm</td></tr></table> LTE B66 15MHz QPSK Mid channel	10.0 %	2.52 dB	1.0 %	3.92 dB	0.1 %	4.16 dB	0.01 %	4.24 dB	0.001 %	4.27 dB	0.0001 %	4.28 dB	Peak	4.29 dB	Peak	27.82 dBm	 Average Power 22.77 dBm 44.15 % at 0dB <table><tr><td>10.0 %</td><td>2.86 dB</td></tr><tr><td>1.0 %</td><td>4.73 dB</td></tr><tr><td>0.1 %</td><td>4.86 dB</td></tr><tr><td>0.01 %</td><td>4.88 dB</td></tr><tr><td>0.001 %</td><td>4.90 dB</td></tr><tr><td>0.0001 %</td><td>4.90 dB</td></tr><tr><td>Peak</td><td>4.93 dB</td></tr><tr><td>Peak</td><td>27.70 dBm</td></tr></table> LTE B66 15MHz 16QAM Mid channel	10.0 %	2.86 dB	1.0 %	4.73 dB	0.1 %	4.86 dB	0.01 %	4.88 dB	0.001 %	4.90 dB	0.0001 %	4.90 dB	Peak	4.93 dB	Peak	27.70 dBm
10.0 %	2.52 dB																																	
1.0 %	3.92 dB																																	
0.1 %	4.16 dB																																	
0.01 %	4.24 dB																																	
0.001 %	4.27 dB																																	
0.0001 %	4.28 dB																																	
Peak	4.29 dB																																	
Peak	27.82 dBm																																	
10.0 %	2.86 dB																																	
1.0 %	4.73 dB																																	
0.1 %	4.86 dB																																	
0.01 %	4.88 dB																																	
0.001 %	4.90 dB																																	
0.0001 %	4.90 dB																																	
Peak	4.93 dB																																	
Peak	27.70 dBm																																	
LTE Band 66 10 MHz	 Average Power 23.51 dBm 47.69 % at 0dB <table><tr><td>10.0 %</td><td>2.59 dB</td></tr><tr><td>1.0 %</td><td>3.98 dB</td></tr><tr><td>0.1 %</td><td>4.22 dB</td></tr><tr><td>0.01 %</td><td>4.28 dB</td></tr><tr><td>0.001 %</td><td>4.30 dB</td></tr><tr><td>0.0001 %</td><td>4.31 dB</td></tr><tr><td>Peak</td><td>4.36 dB</td></tr><tr><td>Peak</td><td>27.87 dBm</td></tr></table> LTE B66 10MHz QPSK Mid channel	10.0 %	2.59 dB	1.0 %	3.98 dB	0.1 %	4.22 dB	0.01 %	4.28 dB	0.001 %	4.30 dB	0.0001 %	4.31 dB	Peak	4.36 dB	Peak	27.87 dBm	 Average Power 22.74 dBm 44.29 % at 0dB <table><tr><td>10.0 %</td><td>2.91 dB</td></tr><tr><td>1.0 %</td><td>4.76 dB</td></tr><tr><td>0.1 %</td><td>4.88 dB</td></tr><tr><td>0.01 %</td><td>4.91 dB</td></tr><tr><td>0.001 %</td><td>4.92 dB</td></tr><tr><td>0.0001 %</td><td>4.93 dB</td></tr><tr><td>Peak</td><td>4.98 dB</td></tr><tr><td>Peak</td><td>27.72 dBm</td></tr></table> LTE B66 10MHz 16QAM Mid channel	10.0 %	2.91 dB	1.0 %	4.76 dB	0.1 %	4.88 dB	0.01 %	4.91 dB	0.001 %	4.92 dB	0.0001 %	4.93 dB	Peak	4.98 dB	Peak	27.72 dBm
10.0 %	2.59 dB																																	
1.0 %	3.98 dB																																	
0.1 %	4.22 dB																																	
0.01 %	4.28 dB																																	
0.001 %	4.30 dB																																	
0.0001 %	4.31 dB																																	
Peak	4.36 dB																																	
Peak	27.87 dBm																																	
10.0 %	2.91 dB																																	
1.0 %	4.76 dB																																	
0.1 %	4.88 dB																																	
0.01 %	4.91 dB																																	
0.001 %	4.92 dB																																	
0.0001 %	4.93 dB																																	
Peak	4.98 dB																																	
Peak	27.72 dBm																																	



LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41 (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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)

RESULTS

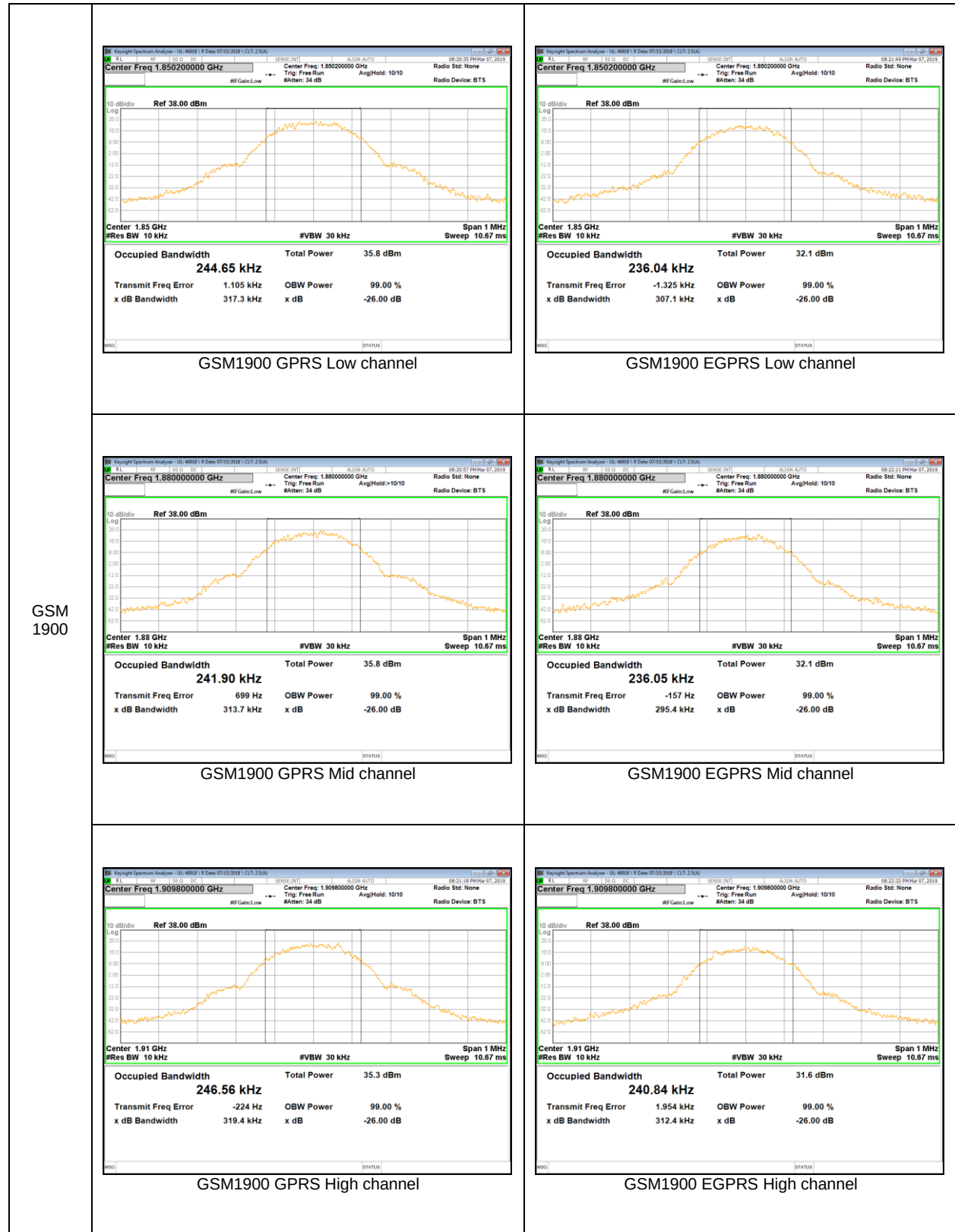
See the following pages.

9.1.1. OCCUPIED BANDWIDTH RESULTS

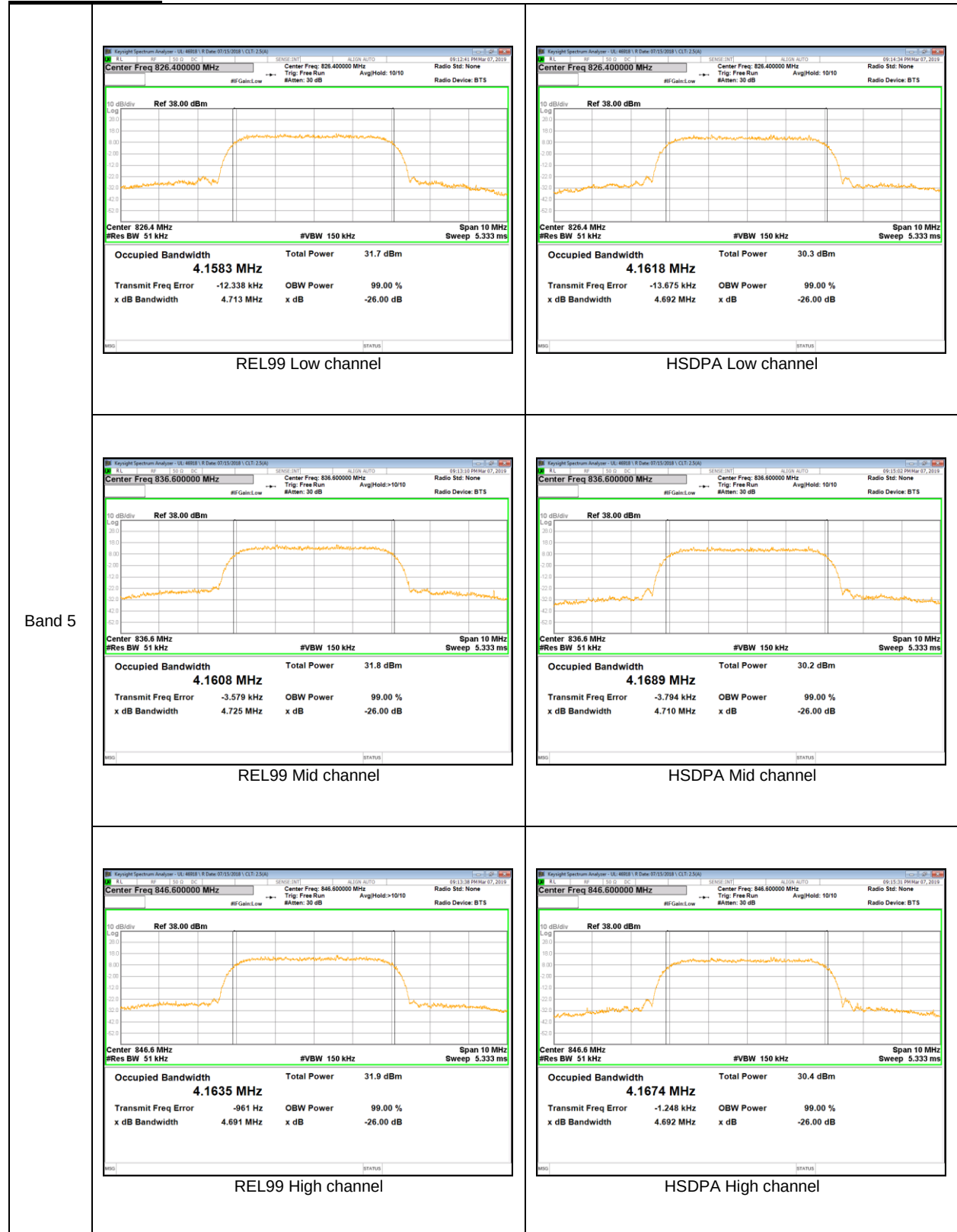
GSM 850



GSM 1900



WCDMA Band 5



WCDMA Band 4



WCDMA Band 2

