



FCC CFR47 PART 27 SUBPART D

WWAN

CERTIFICATION TEST REPORT

FOR

WCDMA/LTE Tablet with BT, DTS/UNII a/b/g/n/ac

MODEL NUMBER : SM-T927A

FCC ID: A3LSMT927A

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Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea
Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



ACCREDITED*

Testing
Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	12/22/18	Initial issue	Hoonpyo Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: WCDMA/LTE Tablet with BT, DTS/UNII a/b/g/n/ac
MODEL NUMBER: SM-T927A
SERIAL NUMBER: R32K80027KN, R32K80027ZP (RADIATED);
R32K8001WAF, R32K8001WDZ (CONDUCTED);
DATE TESTED: DEC 20, 2018 - DEC 22, 2018;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 27D	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:



Hoonpyo 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 27.
3. ANSI TIA-603-E, 2016
4. 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	
<input checked="" type="checkbox"/>	Chamber 1
<input checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	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 WCDMA/LTE Tablet with BT, DTS/UNII a/b/g/n/ac.
 This test report addresses the WWAN operational mode(LTE Band 30).

5.2. MAXIMUM OUTPUT POWER

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

LTE Band 30

FCC Part 27					
Band	Frequency Range [MHz]	BandWidth [MHz]	Modulation Peak	Radiated	
				Avg [dBm]	Avg [mW]
Band 30	2305~2315	10	QPSK	21.74	149.28
			16QAM	22.50	177.83
		5	QPSK	22.33	171.00
			16QAM	21.16	130.62

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)
LTE Band 30 2305~ 2315 MHz	0.98

5.4. WORST-CASE ORIENTATION

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

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	Frequency (MHz)	Bandwidth (MHz)	RB size	RB offset
30	2310.0	10	1	0
	2307.5		1	0
	2310.0	5	1	0
	2312.5		1	0

- ERP/EIRP

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

The spurious emissions was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation.

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-TA300	R37K5PK1GA3SE3	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

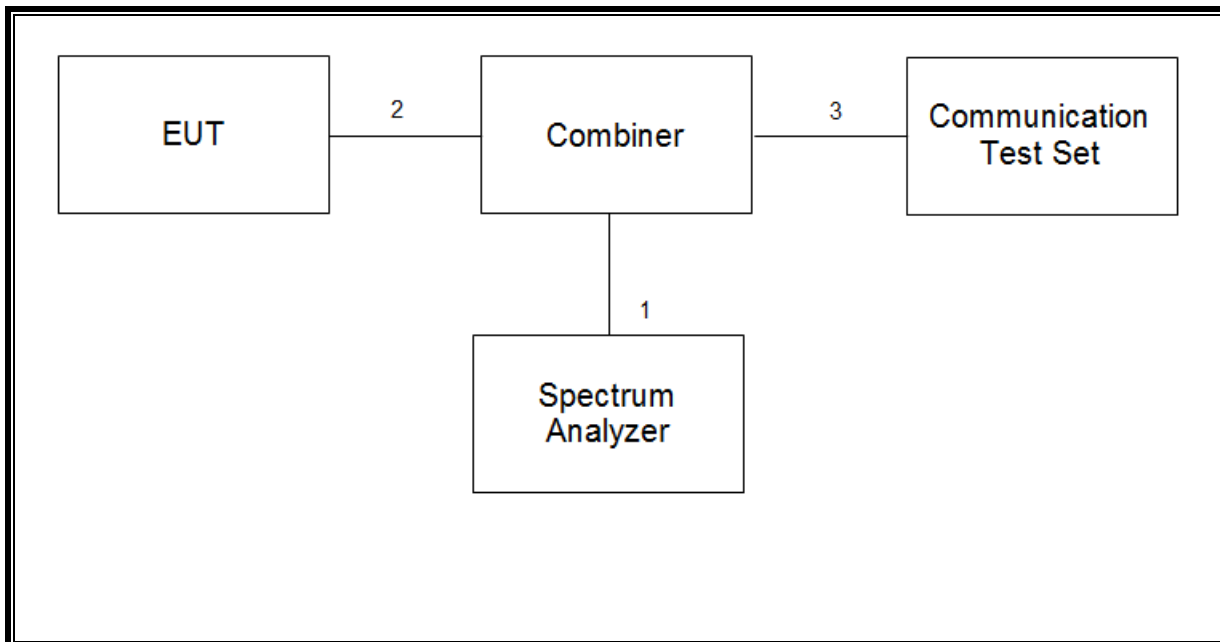
I/O CABLES

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	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1m	N/A

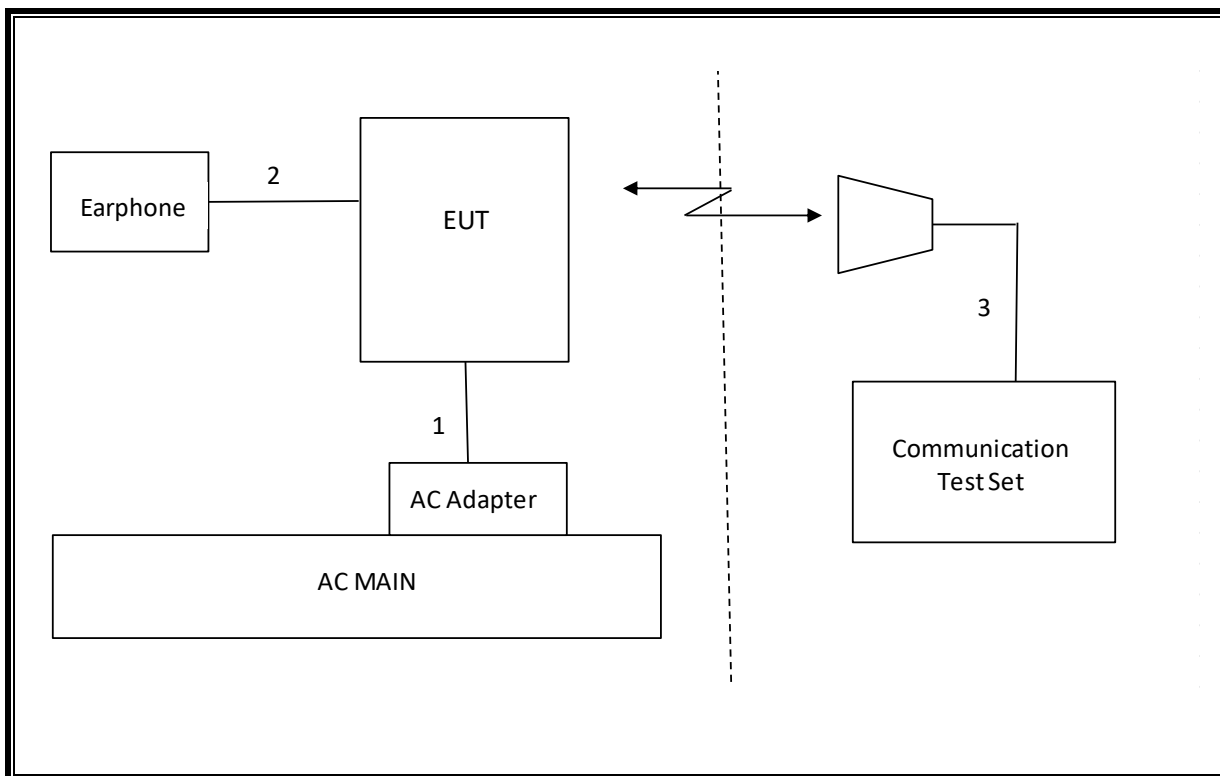
TEST SETUP

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	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	WEINSCHEL	1575	2152	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
27.53(a)	Conducted Spurious Emission	-40 dBm		Pass
27.53(a)	Emission Mask	See section		Pass
2.1046	Conducted output power	N/A		See the RF exposure test report. (12530276-S1 FCC Report SAR)
27.54	Frequency Stability	2.5PPM		Pass
27.50(a)	Equivalent Isotropic Radiated Power	24dBm	Radiated	Pass
27.53(a)	Radiated Spurious Emission	-40dBm		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.

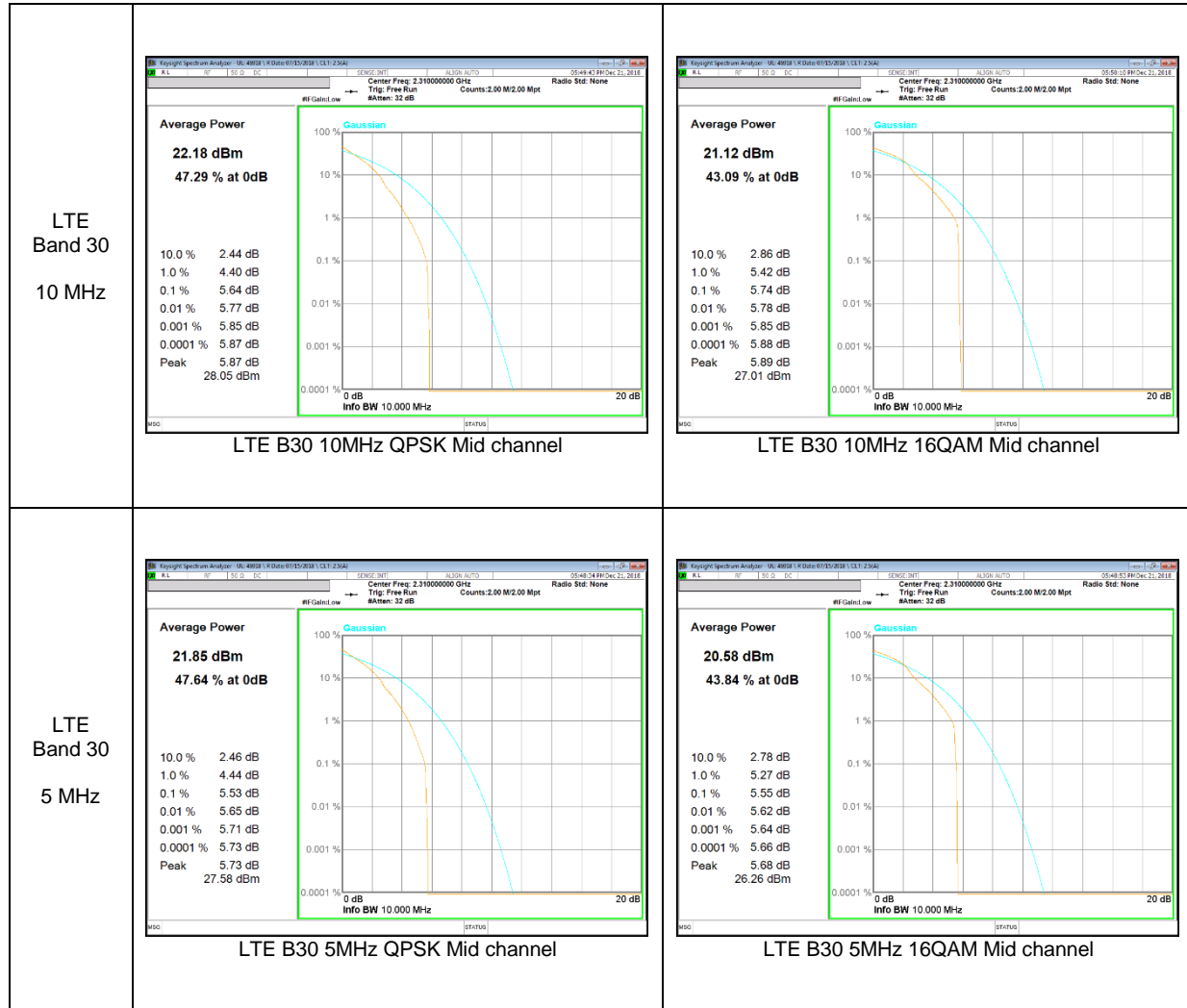
Test Spec

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

LTE Band 30



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.

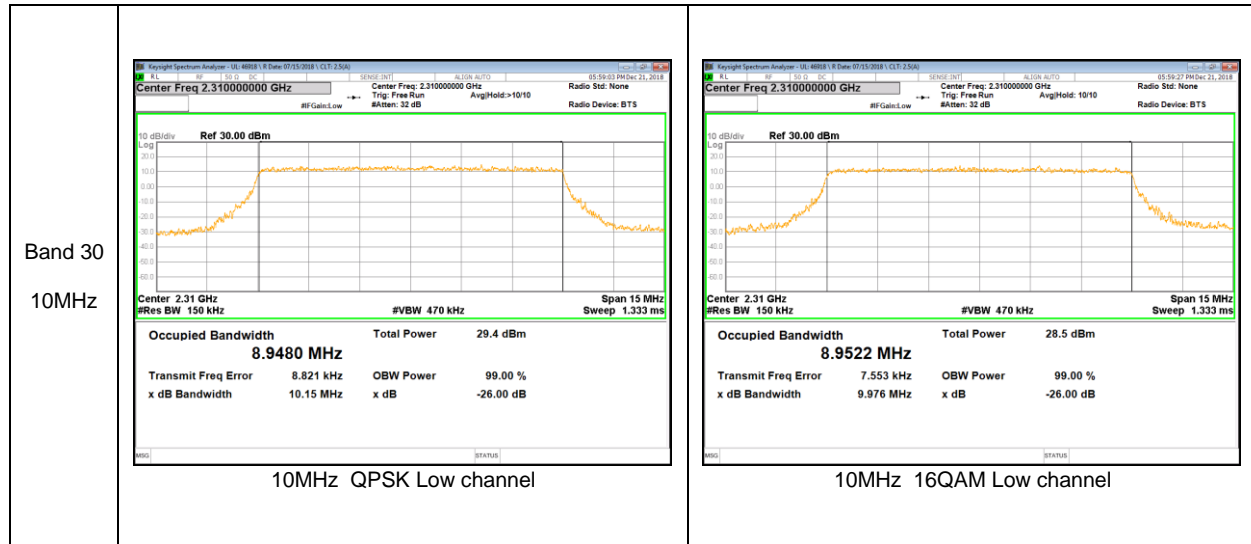
(KDB 971168 D01 Power Meas License Digital Systems v03r01)

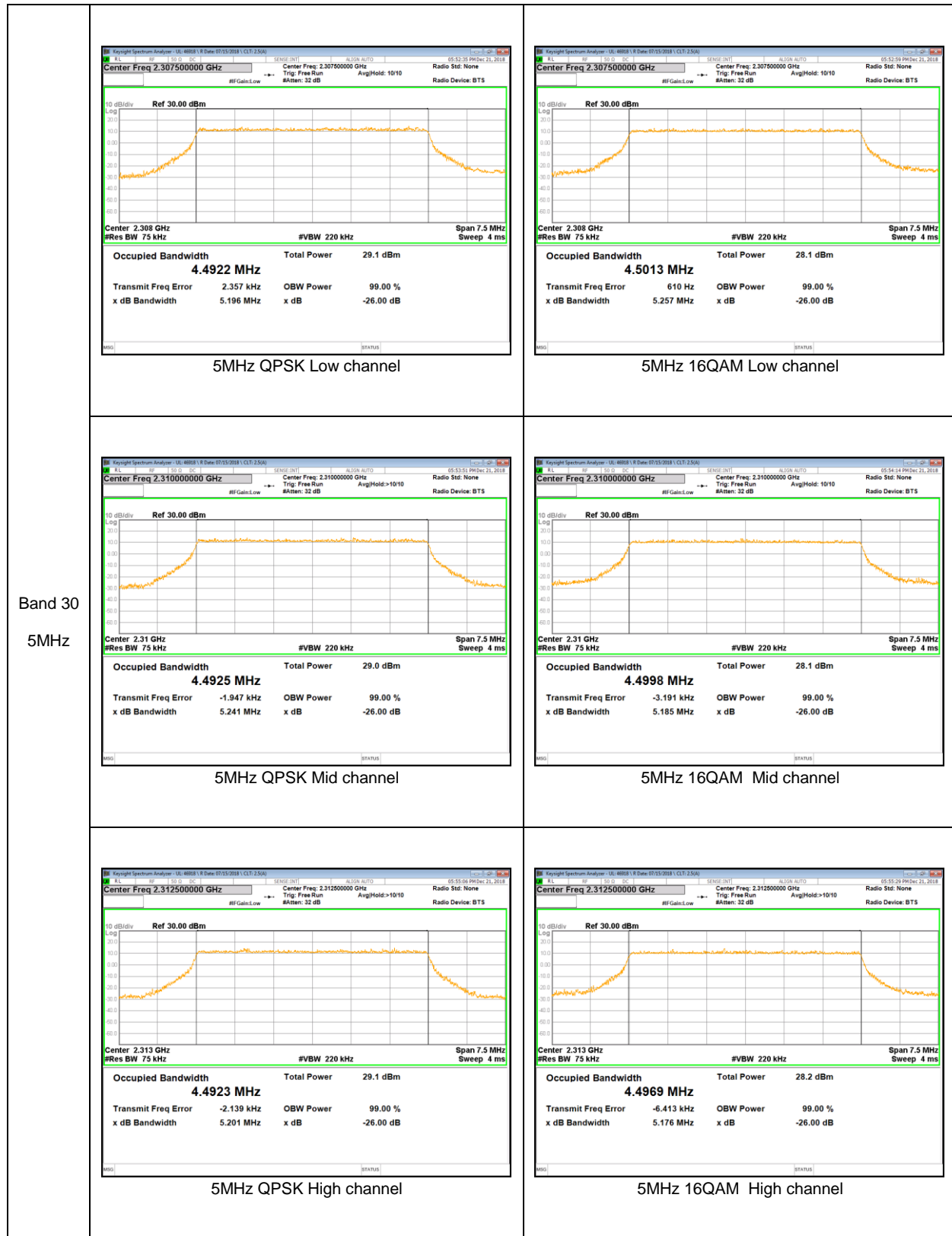
RESULTS

See the following pages.

9.1.1. OCCUPIED BANDWIDTH RESULTS

LTE Band 30





9.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §27. 53(a)

LIMITS

Part 27.53:

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log (P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log (P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log (P)$ dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz;

(iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

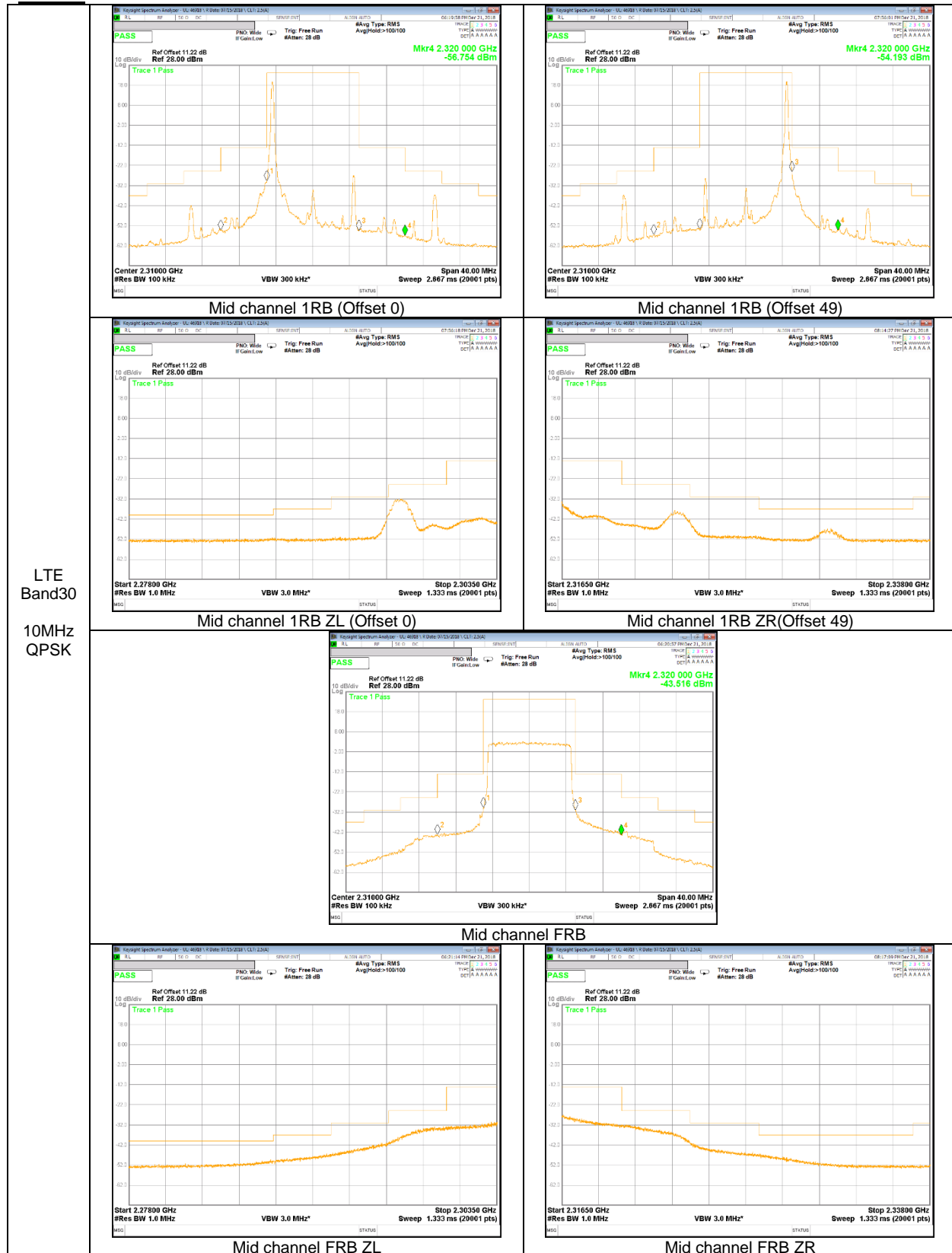
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

RESULTS

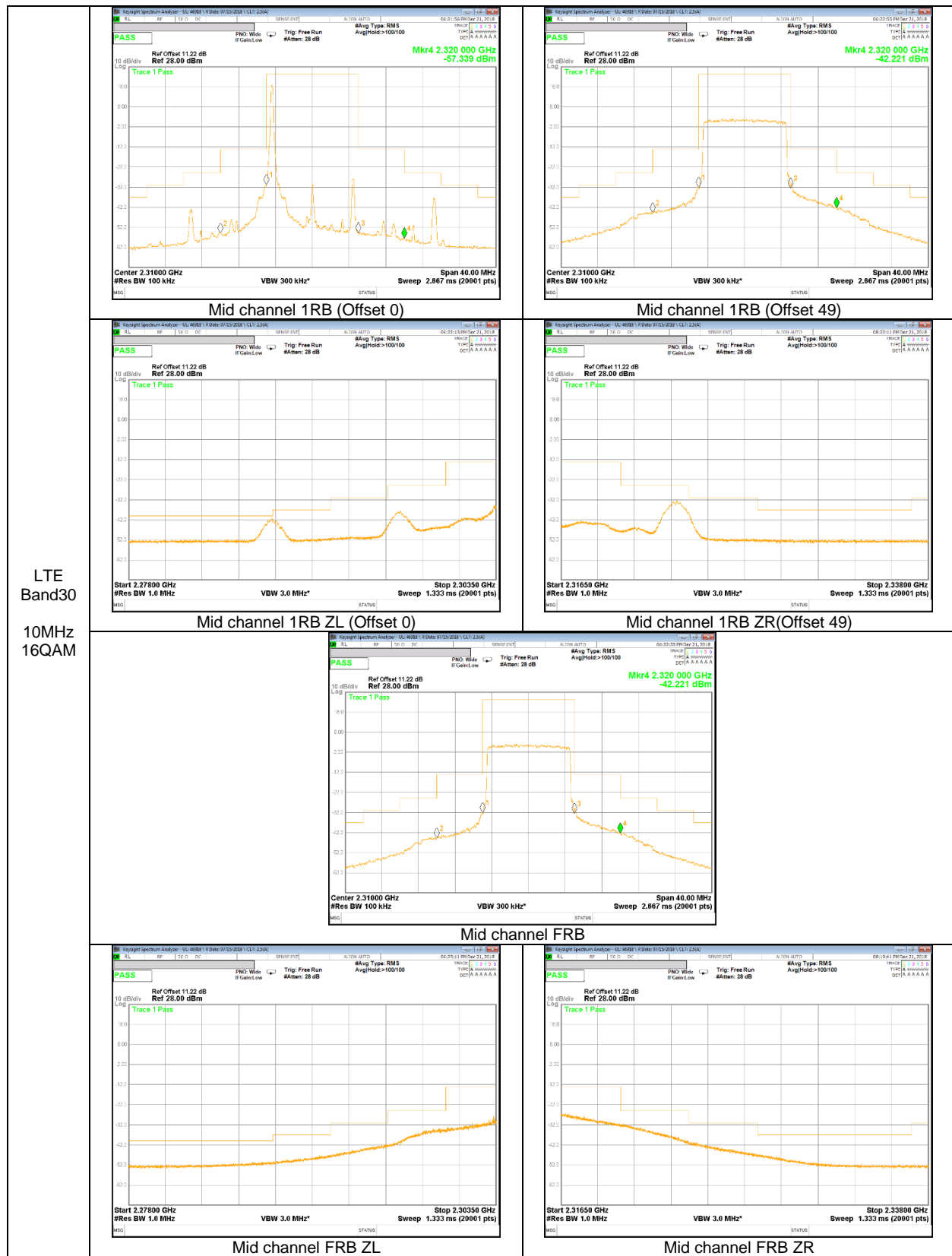
See the following pages.

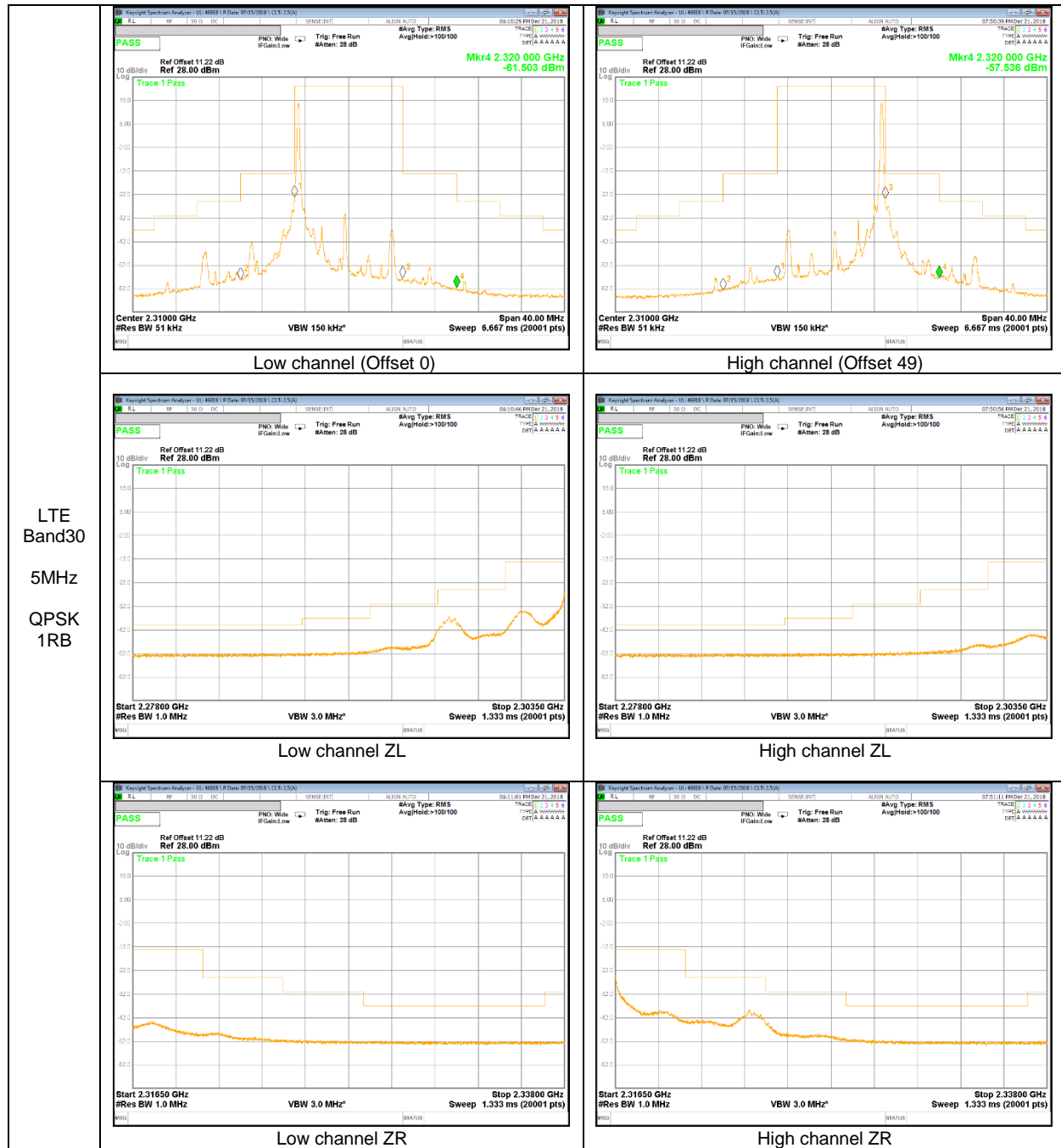
9.2.1. EMISSION MASK RESULT

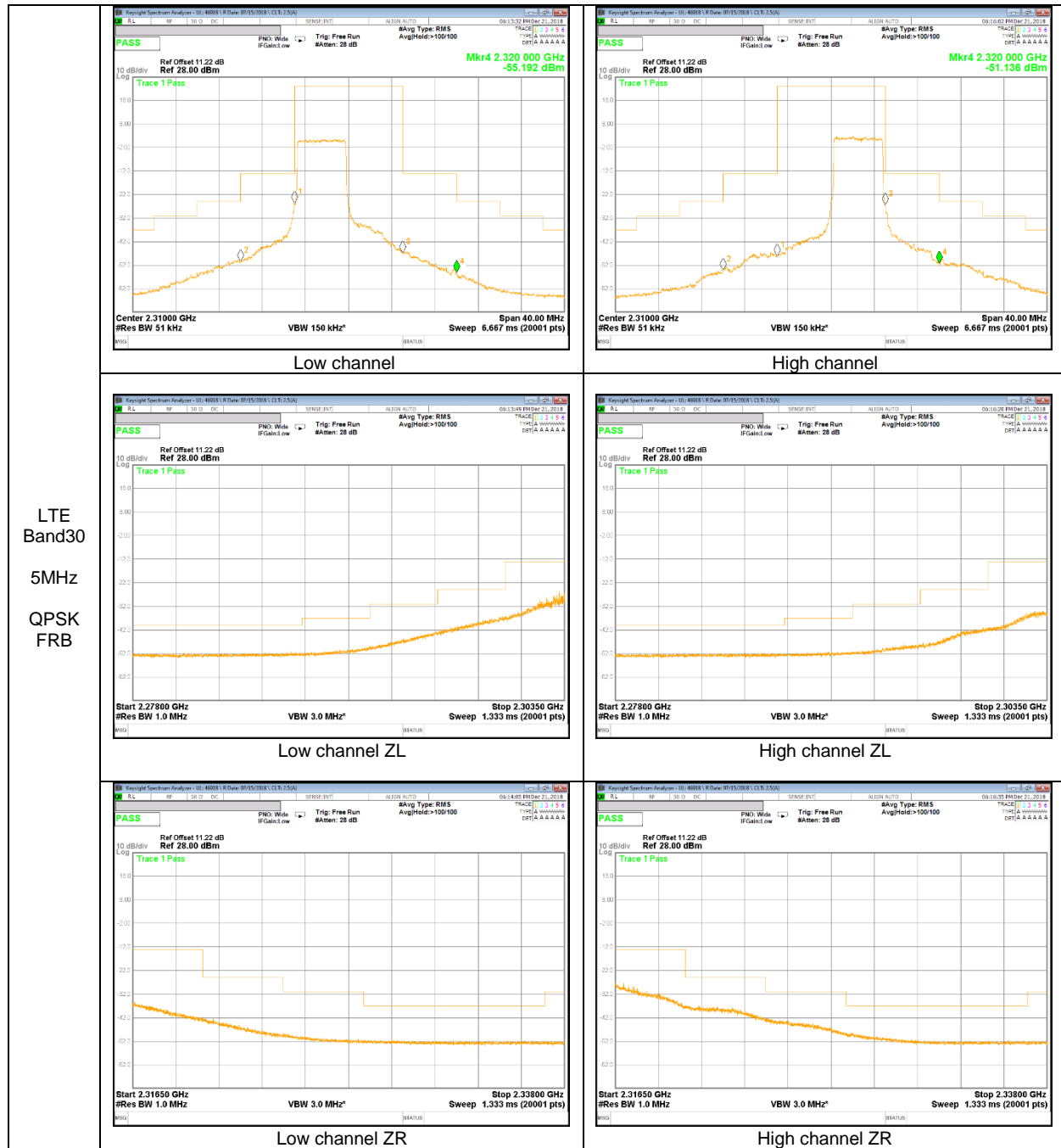
LTE 30

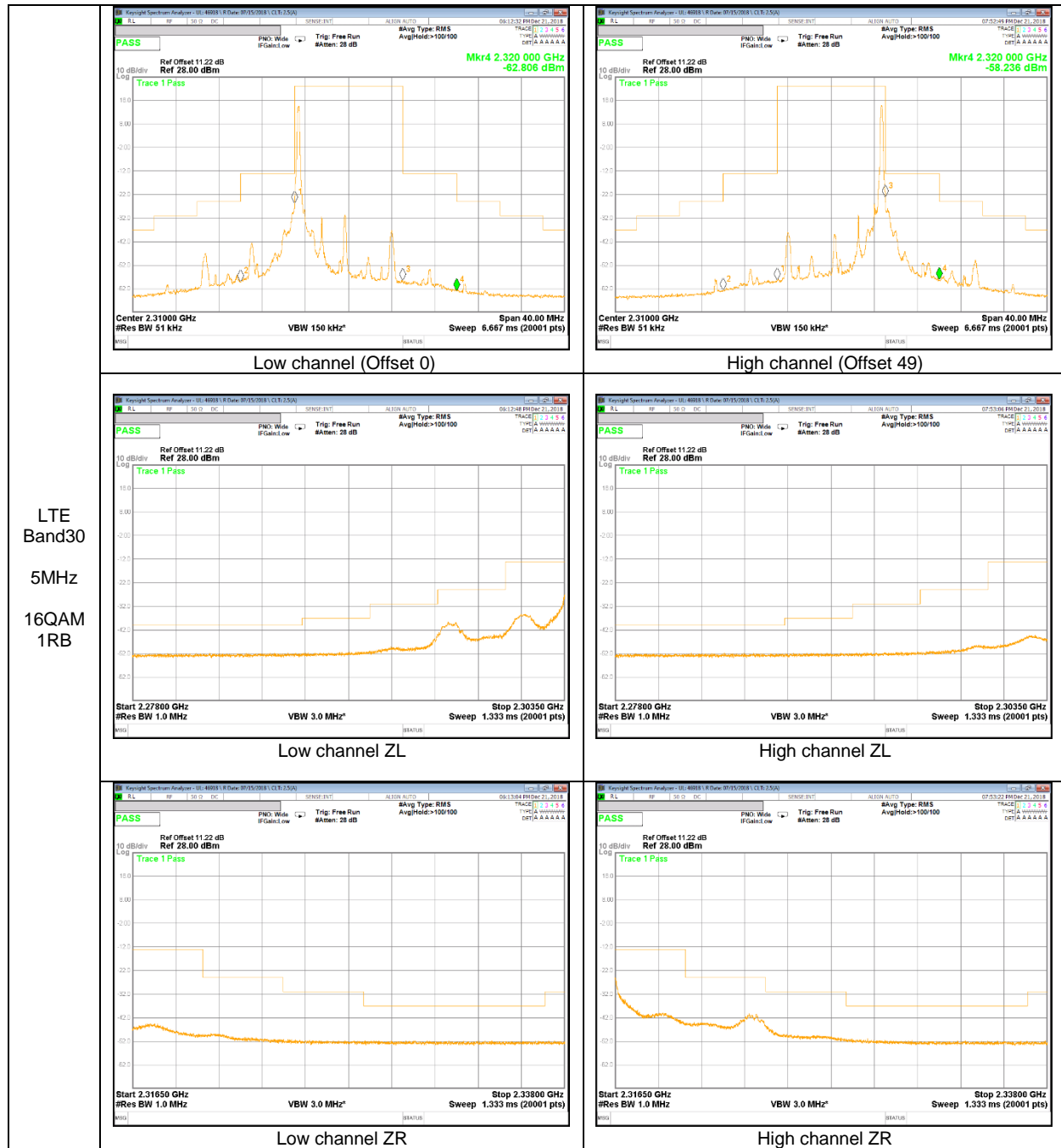


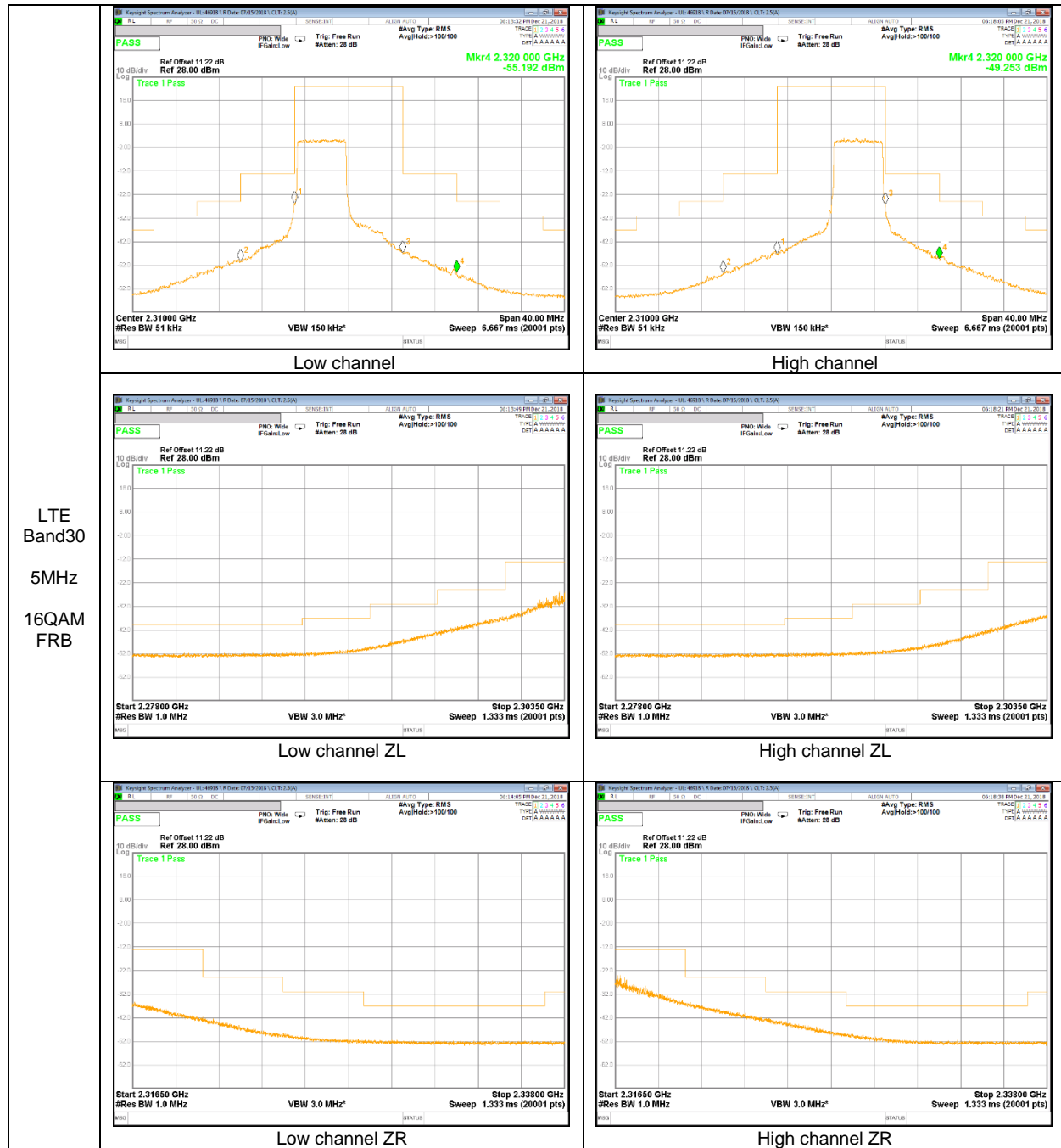
LTE
 Band30
 10MHz
 QPSK











9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §27.53

LIMITS

Part 27.53:

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: $43 + 10 \log (P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log (P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log (P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log (P)$ dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log (P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log (P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log (P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log (P)$ dB below 2288 MHz;

(iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

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

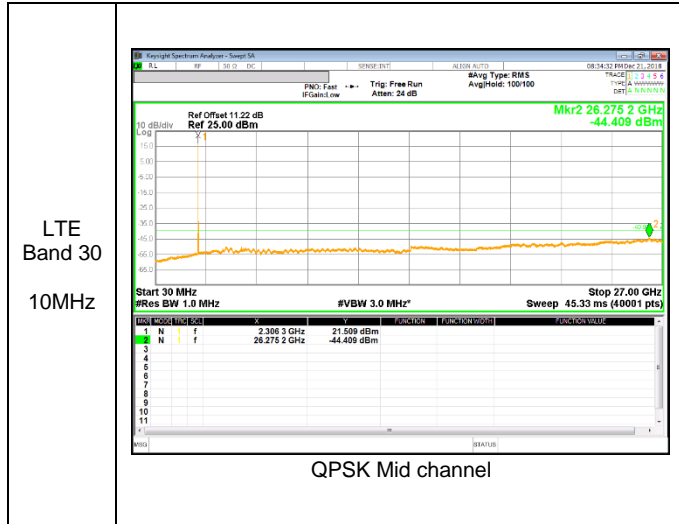
- a) Set the RBW = 100KHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points = Max (40001);
- g) Trace mode = average(LTE);

RESULTS

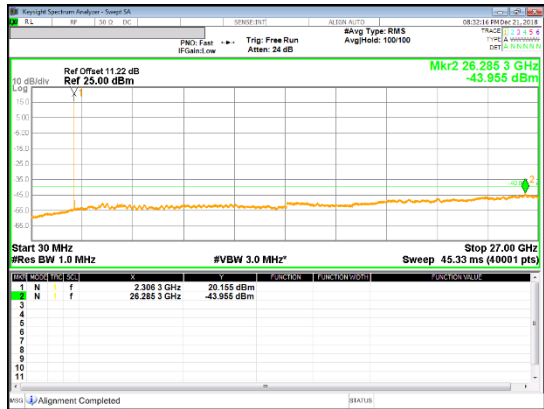
See the following pages.

9.3.1. OUT OF BAND EMISSIONS RESULT

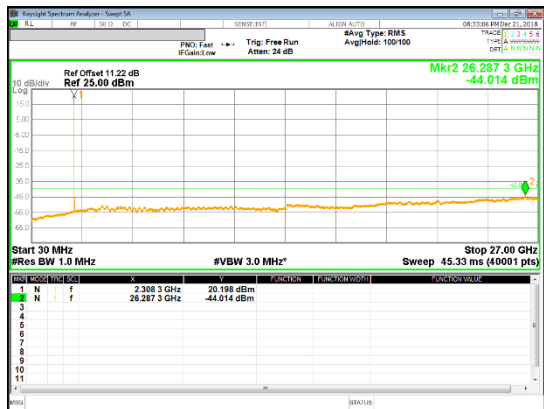
LTE Band 30



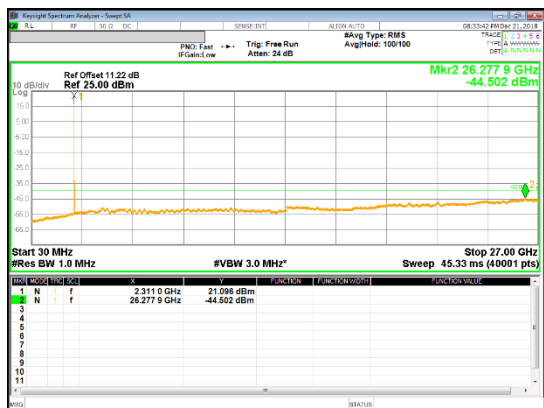
LTE
 Band 30
 5MHz



QPSK Low channel



QPSK Mid channel



QPSK High channel

9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §27.54

LIMITS

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

RESULTS

See the following pages.

9.4.1. FREQUENCY STABILITY RESULTS

LTE Band 30 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2307.4977	2312.5022		
Extreme (50C)		2307.4977	2312.5022	-7.0	-0.003
Extreme (40C)		2307.4977	2312.5022	-8.6	-0.004
Extreme (30C)		2307.4977	2312.5022	-7.8	-0.003
Extreme (10C)		2307.4977	2312.5022	-4.7	-0.002
Extreme (0C)		2307.4977	2312.5022	-7.7	-0.003
Extreme (-10C)		2307.4977	2312.5022	-8.9	-0.004
Extreme (-20C)		2307.4977	2312.5022	-4.6	-0.002
Extreme (-30C)		2307.4977	2312.5022	-9.0	-0.004
20C	15%	2307.4977	2312.5022	-5.3	-0.002
	-15%	2307.4977	2312.5022	-8.1	-0.004
	End Point	2307.4977	2312.5022	-5.1	-0.002

10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §27.50

LIMITS

Part 27.50:

(a) The following power limits and related requirements apply to stations transmitting in the 2305-2320 MHz band or the 2345-2360 MHz band.

(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

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

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

a) Set the RBW \geq OBW; b) Set VBW $\geq 3 \times$ RBW; c) Set span $\geq 2 \times$ RBW; d) Sweep time = auto couple; e) Detector = rms; f) Ensure that the number of measurement points \geq span/RBW; g) Trace mode = average(LTE);

TEST RESULTS

10.1.1. ERP/EIRP Results

LTE Band 30

Band	BW	Mode	RB Size/	f [MHz]	ERP / EIRP	
	[MHz]		RB Offset		[dBm]	[mW]
Band 30	10	QPSK	1/0	2310.0	21.74	149.28
		16QAM	1/0	2310.0	22.50	177.83
	5	QPSK	1/0	2307.5	22.33	171.00
			1/0	2310.0	22.30	169.82
			1/0	2312.5	22.27	168.66
		16QAM	1/0	2307.5	21.16	130.62
			1/0	2310.0	20.52	112.72
	1/0	2312.5	21.07	127.94		

10.1.2. ERP/EIRP DATA

LTE Band 30

LTE Band 30 QPSK 10MHz	<p>UL Verification Services, Inc. High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 4788694343 Date: 2018-12-21 Test Engineer: 47989 Configuration: EUT, Z-Position Location: Chamber 1 Mode: LTE_QPSK Band 30 Fundamentals, 10MHz Bandwidth</p> <p><u>Test Equipment:</u> Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Mid Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2310.00</td> <td>10.47</td> <td>V</td> <td>5.0</td> <td>9.7</td> <td>15.09</td> <td>24.0</td> <td>-8.9</td> <td></td> </tr> <tr> <td>2310.00</td> <td>17.12</td> <td>H</td> <td>5.0</td> <td>9.7</td> <td>21.74</td> <td>24.0</td> <td>-2.3</td> <td></td> </tr> </tbody> </table>	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Mid Ch									2310.00	10.47	V	5.0	9.7	15.09	24.0	-8.9		2310.00	17.12	H	5.0	9.7	21.74	24.0	-2.3	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes																													
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LTE Band 30 16QAM 10MHz	<p>UL Verification Services, Inc. High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 4788694343 Date: 2018-12-21 Test Engineer: 45585 Configuration: EUT / Z-Position Location: Chamber 1 Mode: LTE_16QAM Band 30 Fundamentals, 10MHz Bandwidth</p> <p><u>Test Equipment:</u> Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>Mid Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2310.00</td> <td>13.16</td> <td>V</td> <td>5.0</td> <td>9.7</td> <td>17.78</td> <td>24.0</td> <td>-6.2</td> <td></td> </tr> <tr> <td>2310.00</td> <td>17.88</td> <td>H</td> <td>5.0</td> <td>9.7</td> <td>22.50</td> <td>24.0</td> <td>-1.5</td> <td></td> </tr> </tbody> </table>	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Mid Ch									2310.00	13.16	V	5.0	9.7	17.78	24.0	-6.2		2310.00	17.88	H	5.0	9.7	22.50	24.0	-1.5	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes																													
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LTE Band 30 QPSK 5MHz	<p style="text-align: center;">UL Verification Services, Inc. High Frequency Substitution Measurement</p> <p> Company: Samsung Project #: 4788694343 Date: 2018-12-21 Test Engineer: 45585 Configuration: EUT / Z-Position Location: Chamber 1 Mode: LTE_QPSK Band 30 Fundamentals, 5MHz Bandwidth </p> <p> Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 2.5m SMA-type Cable </p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>2307.50</td> <td>12.70</td> <td>V</td> <td>5.0</td> <td>9.6</td> <td>17.32</td> <td>24.0</td> <td>-6.7</td> <td></td> </tr> <tr> <td>2307.50</td> <td>17.72</td> <td>H</td> <td>5.0</td> <td>9.6</td> <td>22.33</td> <td>24.0</td> <td>-1.7</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>2310.00</td> <td>12.86</td> <td>V</td> <td>5.0</td> <td>9.7</td> <td>17.48</td> <td>24.0</td> <td>-6.5</td> <td></td> </tr> <tr> <td>2310.00</td> <td>17.68</td> <td>H</td> <td>5.0</td> <td>9.7</td> <td>22.30</td> <td>24.0</td> <td>-1.7</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>2312.50</td> <td>13.09</td> <td>V</td> <td>5.0</td> <td>9.7</td> <td>17.72</td> <td>24.0</td> <td>-6.3</td> <td></td> </tr> <tr> <td>2312.50</td> <td>17.63</td> <td>H</td> <td>5.0</td> <td>9.7</td> <td>22.27</td> <td>24.0</td> <td>-1.7</td> <td></td> </tr> </tbody> </table>	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									2307.50	12.70	V	5.0	9.6	17.32	24.0	-6.7		2307.50	17.72	H	5.0	9.6	22.33	24.0	-1.7		Mid Ch									2310.00	12.86	V	5.0	9.7	17.48	24.0	-6.5		2310.00	17.68	H	5.0	9.7	22.30	24.0	-1.7		High Ch									2312.50	13.09	V	5.0	9.7	17.72	24.0	-6.3		2312.50	17.63	H	5.0	9.7	22.27	24.0	-1.7	
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10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §27.53

LIMIT

Part 27.53 (a) (4) (iii) By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

- a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace mode = average(LTE);

NOTE : Radiated spurious emissions were investigated below 30MHz, 30MHz – 1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz – 1GHz.

RESULTS

See the following pages.

10.2.1. SPURIOUS RADIATION PLOTS

LTE Band 30

LTE Band 30 QPSK 10MHz	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement																																																																																																																																	
	Company: Samsung																																																																																																																																	
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UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
LTE Band 30 QPSK 5MHz		Company:		Samsung						
		Project #:		4788694343						
		Date:		2018-12-21						
		Test Engineer:		45585						
		Configuration:		EUT / AC Adapter / Earphone, X-Position						
		Location:		Chamber 2						
Mode:		LTE_QPSK Band 30 Harmonics, 5MHz Bandwidth								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch, 2307.5MHz										
4615.00	-24.3	V	3.0	39.8	1.0	-63.1	-40.0	-23.1		
6922.50	-21.9	V	3.0	39.7	1.0	-60.5	-40.0	-20.5		
9230.00	-23.0	V	3.0	38.8	1.0	-60.7	-40.0	-20.7		
11537.50	-16.6	V	3.0	38.5	1.0	-54.1	-40.0	-14.1		
13845.00	-17.1	V	3.0	40.2	1.0	-56.3	-40.0	-16.3		
4615.00	-25.0	H	3.0	39.8	1.0	-63.8	-40.0	-23.8		
6922.50	-24.9	H	3.0	39.7	1.0	-63.6	-40.0	-23.6		
9230.00	-23.9	H	3.0	38.8	1.0	-61.7	-40.0	-21.7		
11537.50	-19.9	H	3.0	38.5	1.0	-57.4	-40.0	-17.4		
13845.00	-18.8	H	3.0	40.2	1.0	-58.1	-40.0	-18.1		
Mid Ch, 2310MHz										
4620.00	-24.6	V	3.0	39.8	1.0	-63.4	-40.0	-23.4		
6930.00	-18.6	V	3.0	39.7	1.0	-57.3	-40.0	-17.3		
9240.00	-23.1	V	3.0	38.8	1.0	-60.9	-40.0	-20.9		
11550.00	-18.2	V	3.0	38.5	1.0	-55.7	-40.0	-15.7		
13860.00	-18.5	V	3.0	40.2	1.0	-57.7	-40.0	-17.7		
4620.00	-25.1	H	3.0	39.8	1.0	-63.9	-40.0	-23.9		
6930.00	-22.5	H	3.0	39.7	1.0	-61.1	-40.0	-21.1		
9240.00	-24.0	H	3.0	38.8	1.0	-61.8	-40.0	-21.8		
11550.00	-21.0	H	3.0	38.5	1.0	-58.5	-40.0	-18.5		
13860.00	-18.6	H	3.0	40.2	1.0	-57.8	-40.0	-17.8		
High Ch, 2312.5MHz										
4625.00	-24.5	V	3.0	39.8	1.0	-63.3	-40.0	-23.3		
6937.50	-17.2	V	3.0	39.6	1.0	-55.9	-40.0	-15.9		
9250.00	-22.3	V	3.0	38.8	1.0	-60.0	-40.0	-20.0		
11562.50	-18.6	V	3.0	38.5	1.0	-56.1	-40.0	-16.1		
13875.00	-15.7	V	3.0	40.2	1.0	-55.0	-40.0	-15.0		
4625.00	-25.1	H	3.0	39.8	1.0	-63.8	-40.0	-23.8		
6937.50	-22.0	H	3.0	39.6	1.0	-60.6	-40.0	-20.6		
9250.00	-24.0	H	3.0	38.8	1.0	-61.7	-40.0	-21.7		
11562.50	-21.0	H	3.0	38.5	1.0	-58.5	-40.0	-18.5		
13875.00	-18.5	H	3.0	40.2	1.0	-57.8	-40.0	-17.8		