



# **CERTIFICATION TEST REPORT**

**Report Number.** : 4789893923-E4V2

**Applicant** : SAMSUNG ELECTRONICS CO., LTD.  
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,  
GYEONGGI-DO, 16677, KOREA

**Model** : NP545XLA, NP545XLA-KA1TT, NP545XLA-KA1VZ

**FCC ID** : A3LNP545XLA

**EUT Description** : WCDMA/LTE/5G NR Laptop + BT/BLE, DTS/UNII a/b/g/n/ac/ax

**Test Standard(s)** : FCC CFR47 PART 22 SUBPART H  
FCC CFR47 PART 27 SUBPART L

**Date Of Issue:**

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ACCREDITED

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**TL-637**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2021-06-14	Initial issue	SunGeun Lee
V2	2021-06-22	Updated to address TCB's question	SunGeun Lee

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** WCDMA/LTE/5G NR Laptop + BT/BLE, DTS/UNII a/b/g/n/ac/ax  
**MODEL NUMBER:** NP545XLA, NP545XLA-KA1TT, NP545XLA-KA1VZ  
**SERIAL NUMBER:** FLKR01R2S00504, FLKR01R2S00173 (CONDUCTED);  
FLKJ930R400159L, FLKJ930R400156A, G0GE930R400415E,  
G0GE930R400234R (RADIATED)  
**DATE TESTED:** 2021-04-12 ~ 2021-06-22;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22H, 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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Junwhan Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

Tested By:



Sungeun 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 27.
4. ANSI TIA-603-E, 2016
5. ANSI C63.26, 2015
6. KDB 971168 D01 Power Meas License Digital Systems v03r01
7. KDB 412172 D01 Determining ERP and EIRP v01r01

## 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 <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.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:

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

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

(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	3.01 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 dB
Radiated Disturbance, Above 18 GHz	5.49 dB

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

### 4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a WCDMA/LTE/5G NR Laptop + BT/BLE, DTS/UNII a/b/g/n/ac/ax.  
 This test report addresses the WWAN operational mode.

This report covers the Samsung models NP545XLA, NP545XLA-KA1TT and NP545XLA-KA1VZ. These models are identical in hardware except below.

NP545XLA-KA1TT: eSIM IC unmounted on PCB.

NP545XLA-KA1VZ: There is no difference in hardware(Supported RF band is different).

With some pre-scan, model NP545XLA was set for final test.

### 5.2. MAXIMUM OUTPUT POWER AND EIRP

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

#### LTE Band 5B (Uplink CA)

Part 22						
EIRP Limit [dBm]	38.50					
Antenna Gain [dBi]	-0.01					
Frequency Range [MHz]	Bandwidth [MHz]	Modulation	Output Power			
			Conducted Average Power [dBm]	e.r.p. Average Power		Margin
		dBm		mW		
824 ~ 849	3 + 5	QPSK	24.12	24.11	257.63	-14.39
		16QAM	24.35	24.34	271.64	-14.16
	5 + 3	QPSK	24.17	24.16	260.62	-14.34
		<b>16QAM</b>	<b>24.49</b>	<b>24.48</b>	<b>280.54</b>	<b>-14.02</b>
	5 + 10	QPSK	24.11	24.10	257.04	-14.40
		16QAM	23.72	23.71	234.96	-14.79
	10 + 5	QPSK	23.97	23.96	248.89	-14.54
		16QAM	23.57	23.56	226.99	-14.94
	10 + 10	QPSK	23.81	23.80	239.88	-14.70
		16QAM	23.01	23.00	199.53	-15.50

**LTE Band 66B (Uplink CA)**

Part 27						
EIRP Limit [dBm]	30.00					
Antenna Gain [dBi]	1.80					
Frequency Range [MHz]	Bandwidth [MHz]	Modulation	Output Power			
			Conducted Average Power [dBm]	e.i.r.p. Average Power		Margin
				dBm	mW	
1710 ~ 1780	5 + 5	QPSK	24.30	26.10	407.38	-3.90
		16QAM	23.62	25.42	348.34	-4.58
	5 + 10	QPSK	23.96	25.76	376.70	-4.24
		16QAM	23.38	25.18	329.61	-4.82
	10 + 5	QPSK	23.94	25.74	374.97	-4.26
		16QAM	23.18	24.98	314.77	-5.02
	<b>5 + 15</b>	<b>QPSK</b>	<b>24.39</b>	<b>26.19</b>	<b>415.91</b>	<b>-3.81</b>
		16QAM	23.72	25.52	356.45	-4.48
	15 + 5	QPSK	24.33	26.13	410.20	-3.87
		16QAM	23.68	25.48	353.18	-4.52
	10 + 10	QPSK	24.15	25.95	393.55	-4.05
		16QAM	23.47	25.27	336.51	-4.73

**LTE Band 66C (Uplink CA)**

Part 27						
EIRP Limit [dBm]	30.00					
Antenna Gain [dBi]	1.80					
Frequency Range [MHz]	Bandwidth [MHz]	Modulation	Output Power			
			Conducted Average Power [dBm]	e.i.r.p. Average Power		Margin
				dBm	mW	
1710 ~ 1780	5 + 20	QPSK	24.38	26.18	414.95	-3.82
		16QAM	23.97	25.77	377.57	-4.23
	10 + 15	QPSK	24.43	26.23	419.76	-3.77
		16QAM	23.58	25.38	345.14	-4.62
	10 + 20	QPSK	24.38	26.18	414.95	-3.82
		16QAM	23.58	25.38	345.14	-4.62
	15 + 10	QPSK	24.42	26.22	418.79	-3.78
		16QAM	23.87	25.67	368.98	-4.33
	15 + 15	QPSK	24.44	26.24	420.73	-3.76
		16QAM	24.08	25.88	387.26	-4.12
	15 + 20	QPSK	24.38	26.18	414.95	-3.82
		16QAM	23.71	25.51	355.63	-4.49
	20 + 5	QPSK	24.28	26.08	405.51	-3.92
		16QAM	23.87	25.67	368.98	-4.33
	20 + 10	QPSK	24.31	26.11	408.32	-3.89
		16QAM	23.77	25.57	360.58	-4.43
	20 + 15	QPSK	24.37	26.17	414.00	-3.83
		16QAM	24.44	26.24	420.73	-3.76
	<b>20 + 20</b>	<b>QPSK</b>	<b>24.47</b>	<b>26.27</b>	<b>423.64</b>	<b>-3.73</b>
		16QAM	23.71	25.51	355.63	-4.49

Note. The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results It was found that QPSK and 16QAM results were worst case.



### 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 5 824 ~ 849 MHz	-0.01
LTE Band 66 1710 ~ 1780 MHz	1.80

### 5.4. WORST-CASE ORIENTATION

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, 64QAM and 256QAM 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 conducted power in QPSK.

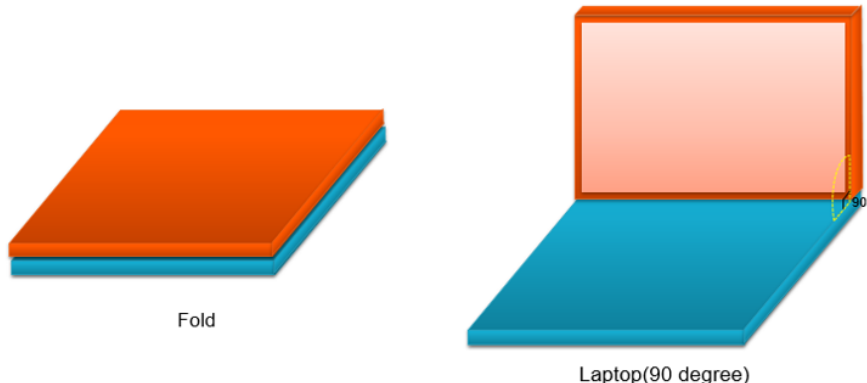
Highest power setting for each bands					
LTE Band	Component Carrier	Frequency [MHz]	Bandwidth [MHz]	RB size	RB offset
5B (Uplink CA)	PCC	843.5	5	1	24
	SCC	847.4	3	1	0
66B (Uplink CA)	PCC	1713.0	5	1	24
	SCC	1722.3	15	1	0
66C (Uplink CA)	PCC	1720.0	20	1	99
	SCC	1739.8	20	1	0

i. Worst Axis Condition

The fundamental and radiated spurious emission were investigated in three orthogonal orientations X and Y, it was determined that below orientation was worst-case orientation for each band.

Band	RSE	
	X	Y
LTE B5B	Laptop	-
LTE B66B	-	Laptop
LTE B66C	Laptop	-

- i. Foldable Condition  
 The Fundamental of the EUT was investigated four foldable conditions(Fold, Laptop).



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

## 5.5. DESCRIPTION OF TEST SETUP

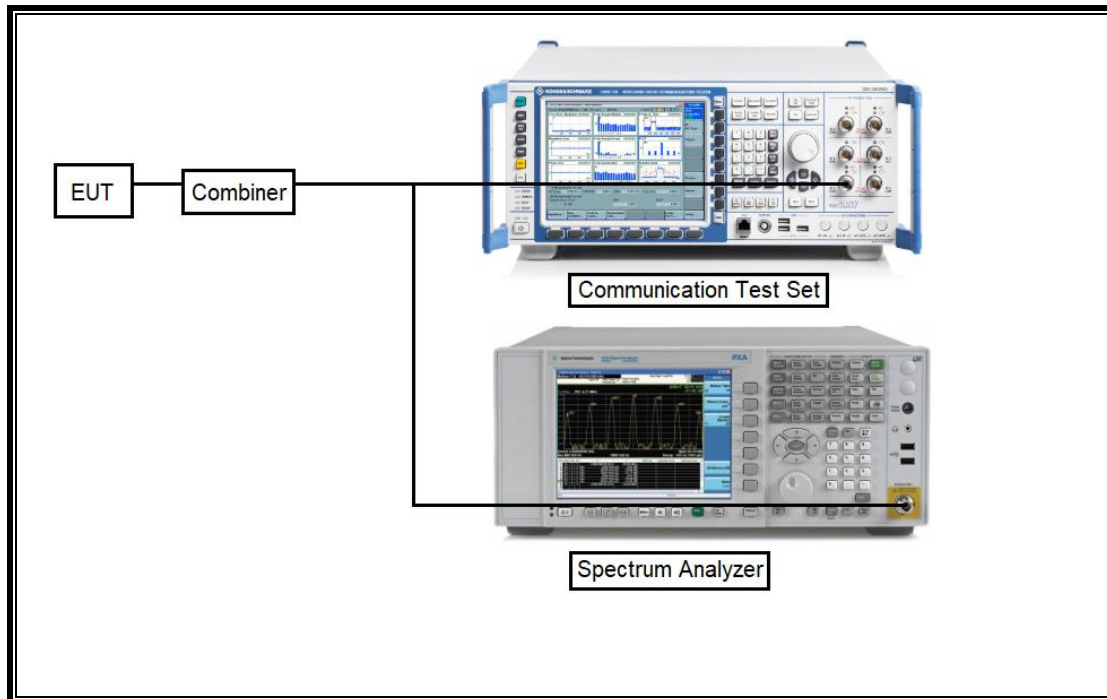
### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37R32A00XADK3	N/A
Data Cable	SAMSUNG	EP-DW767JWE	N/A	N/A

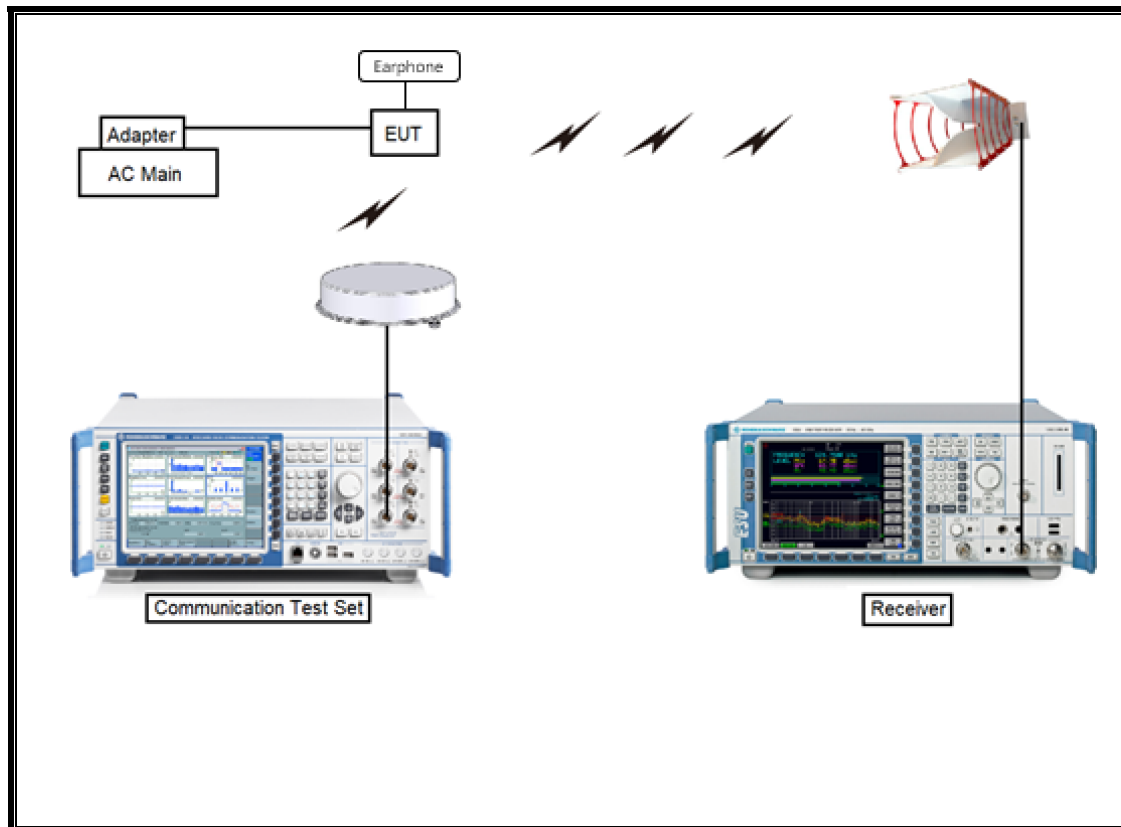
### I/O CABLE

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	1.0 m	N/A

**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	2023-02-08
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2021-10-02
Preamplifier	ETS	3116C-PA	00168841	2021-08-06
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Communications Test Set	R&S	CMW500	150314	2021-08-04
DC Power Supply	Agilent / HP	E3640A	MY54226395	2021-08-05
Preamplifier, 1000 MHz	Sonoma	310N	341282	2021-08-03
Preamplifier, 1000 MHz	Sonoma	310N	370599	2021-08-06
Preamplifier, 1000 MHz	Sonoma	310N	351741	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2021-08-04
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2021-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2021-08-05
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2021-08-05
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2021-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2021-08-03
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2021-08-05
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2021-08-05
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2021-08-05
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2021-08-05
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2021-08-05
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2021-08-05
Attenuator	PASTERNAK	PE7087-10	A009	2021-08-05
Attenuator	PASTERNAK	PE7087-10	A001	2021-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2021-08-03
Attenuator	PASTERNAK	PE7004-10	2	2021-08-04
Attenuator	PASTERNAK	PE7395-10	A011	2021-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2021-10-02
Temperature Chamber	ESPEC	SH-642	93001109	2021-08-04
Power Splitter	MINI-CIRCUITS	WA1534	UL001	2022-01-27
Power Splitter	MINI-CIRCUITS	WA1534	UL002	2022-01-27
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 2.5	
Radiated software	UL	UL EMC	Ver 9.5	
Antenna port test software (5G NR FR1)	UL	UL iM	Ver 1.04	

## 7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Bandwidth(99%)	N/A	Conducted	Pass
22.917(a) 27.53(h)	Band Edge / Conducted Spurious Emission	-13 dBm		Pass
2.1046	Conducted output power	N/A		Pass
22.913(a)	Effective Radiated Power	38.5 dBm	Radiated	Pass
27.50(d)(4)	Equivalent Isotropic Radiated Power	30 dBm		Pass
22.917(a) 27.53(h)	Radiated Spurious Emission	-13 dBm		Pass

## 8. LIMITS AND CONDUCTED RESULTS

### 8.1. RF OUTPUT POWER VERIFICATION (CONDUCTED AND EIRP)

#### Rule Part(s)

FCC: §2.1046, §22.913 and §27.50

#### Limit

§22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

#### §27.50(d)

(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

#### Test Procedure

TIA-603-E Clause 2.2.17

KDB 971168 Section 5.6

$$\text{ERP/EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{C}}$$

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as  $P_{\text{Meas}}$ , typically dBW or dBm);

$P_{\text{Meas}}$  = measured transmitter output power or PSD, in dBm or dBW;

$G_{\text{T}}$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

$L_{\text{C}}$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

## RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

**OUTPUT POWER FOR LTE BAND 5B (3 MHz + 5 MHz)**

Antenna Gain [dBi]	-0.01								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
3MHz / 5MHz	825.6	829.5	1	14	1	0	23.99	24.23	
			1	0	1	24	14.29	14.50	
			15	0	25	0	24.05	24.01	
	834.1	838.0	1	14	1	0	23.91	24.09	
			1	0	1	24	13.58	14.40	
			15	0	25	0	24.00	24.06	
	842.6	846.5	1	14	1	0	24.05	24.35	
			1	0	1	24	14.29	14.41	
			15	0	25	0	24.12	24.14	

**OUTPUT POWER FOR LTE BAND 5B (5 MHz + 3 MHz)**

Antenna Gain [dBi]	-0.01								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
5MHz / 3MHz	826.5	830.4	1	24	1	0	23.95	24.03	
			1	0	1	14	14.21	14.42	
			25	0	15	0	23.97	23.99	
	835.0	838.9	1	24	1	0	24.02	24.28	
			1	0	1	14	14.54	14.31	
			25	0	15	0	24.01	24.49	
	843.5	847.4	1	24	1	0	24.17	24.26	
			1	0	1	14	14.51	14.42	
			25	0	15	0	24.01	24.11	

**OUTPUT POWER FOR LTE BAND 5B (5 MHz + 10 MHz)**

Antenna Gain [dBi]	-0.01								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
5MHz / 10MHz	826.8	834.0	1	24	1	0	23.89	23.34	
			1	0	1	49	14.05	14.23	
			25	0	50	0	22.06	21.10	
	831.8	839.0	1	24	1	0	24.02	23.20	
			1	0	1	49	13.93	14.23	
			25	0	50	0	22.08	21.07	
	836.8	844.0	1	24	1	0	24.11	23.72	
			1	0	1	49	14.22	13.87	
			25	0	50	0	22.04	21.18	

**OUTPUT POWER FOR LTE BAND 5B (10 MHz + 5 MHz)**

Antenna Gain [dBi]	-0.01								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
10MHz / 5MHz	829.0	836.2	1	49	1	0	23.97	23.52	
			1	0	1	24	14.28	14.10	
			50	0	25	0	22.00	21.03	
	834.0	841.2	1	49	1	0	23.78	23.54	
			1	0	1	24	13.97	14.08	
			50	0	25	0	21.98	21.04	
	839.0	846.2	1	49	1	0	23.89	23.57	
			1	0	1	24	14.29	13.87	
			50	0	25	0	22.09	21.19	

**OUTPUT POWER FOR LTE BAND 5B (10 MHz + 10 MHz)**

Antenna Gain [dBi]	-0.01								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
10MHz / 10MHz	829.0	838.9	1	49	1	0	23.81	22.91	
			1	0	1	49	13.89	14.14	
			50	0	50	0	22.01	21.04	
	831.6	841.5	1	49	1	0	23.59	23.01	
			1	0	1	49	13.87	13.89	
			50	0	50	0	22.06	21.09	
	834.1	844.0	1	49	1	0	23.67	22.98	
			1	0	1	49	13.29	13.78	
			50	0	50	0	22.05	21.09	

**OUTPUT POWER FOR LTE BAND 66B (5 MHz + 5 MHz)**

Antenna Gain [dBi]	1.8								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
5MHz / 5MHz	1712.5	1717.3	1	24	1	0	24.30	23.62	
			1	0	1	24	14.21	14.44	
			25	0	25	0	22.28	21.35	
	1742.6	1747.4	1	24	1	0	23.82	23.37	
			1	0	1	24	13.98	14.10	
			25	0	25	0	21.95	20.99	
	1772.7	1777.5	1	24	1	0	23.69	23.04	
			1	0	1	24	13.77	13.97	
			25	0	25	0	21.76	20.81	

**OUTPUT POWER FOR LTE BAND 66B (5 MHz + 10 MHz)**

Antenna Gain [dBi]	1.8								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
5MHz / 10MHz	1712.8	1720.0	1	24	1	0	23.93	23.16	
			1	0	1	49	13.86	14.12	
			25	0	50	0	22.12	21.32	
	1740.3	1747.5	1	24	1	0	23.96	23.38	
			1	0	1	49	13.62	14.11	
			25	0	50	0	21.94	21.01	
	1767.8	1775.0	1	24	1	0	23.87	23.12	
			1	0	1	49	13.82	13.87	
			25	0	50	0	22.12	20.85	

**OUTPUT POWER FOR LTE BAND 66B (10 MHz + 5 MHz)**

Antenna Gain [dBi]	1.8								
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]		
			Size	Offset	Size	Offset	QPSK	16QAM	
10MHz / 5MHz	1715.0	1722.2	1	49	1	0	23.94	23.18	
			1	0	1	24	14.07	14.86	
			50	0	25	0	22.38	21.41	
	1742.5	1749.7	1	49	1	0	23.88	23.15	
			1	0	1	24	14.11	14.42	
			50	0	25	0	22.10	21.21	
	1770.0	1777.2	1	49	1	0	23.78	22.85	
			1	0	1	24	14.25	14.21	
			50	0	25	0	22.12	21.08	



**OUTPUT POWER FOR LTE BAND 66B (5 MHz + 15 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
5MHz / 15MHz	1713.0	1722.3	1	24	1	0	24.39	23.48
			1	0	1	74	13.68	14.08
			25	0	75	0	22.30	21.33
	1738.1	1747.4	1	24	1	0	24.06	23.44
			1	0	1	74	13.54	13.79
			25	0	75	0	22.12	21.15
	1763.2	1772.5	1	24	1	0	23.88	23.17
			1	0	1	74	13.27	13.55
			25	0	75	0	21.92	20.94

**OUTPUT POWER FOR LTE BAND 66B (15 MHz + 5 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 5MHz	1717.5	1726.8	1	74	1	0	24.33	23.46
			1	0	1	24	13.74	14.22
			75	0	25	0	22.35	21.35
	1742.6	1751.9	1	74	1	0	24.05	23.35
			1	0	1	24	13.32	13.72
			75	0	25	0	22.12	21.14
	1767.7	1777.0	1	74	1	0	23.93	23.23
			1	0	1	24	13.19	13.43
			75	0	25	0	21.95	21.00

**OUTPUT POWER FOR LTE BAND 66B (10 MHz + 10 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
10MHz / 10MHz	1715.0	1724.9	1	49	1	0	24.15	23.47
			1	0	1	49	13.58	13.48
			50	0	50	0	22.18	21.38
	1740.1	1750.0	1	49	1	0	24.11	23.21
			1	0	1	49	13.34	13.89
			50	0	50	0	22.15	21.08
	1765.1	1775.0	1	49	1	0	23.87	23.03
			1	0	1	49	13.11	13.22
			50	0	50	0	21.88	21.02

**OUTPUT POWER FOR LTE BAND 66C (5 MHz + 20 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
5MHz / 20MHz	1713.3	1725.0	1	24	1	0	24.23	23.97
			1	0	1	99	15.78	16.61
			25	0	100	0	22.62	21.64
	1735.8	1747.5	1	24	1	0	24.25	23.65
			1	0	1	99	16.07	16.52
			25	0	100	0	22.40	21.47
	1758.3	1770.0	1	24	1	0	24.38	23.44
			1	0	1	99	15.86	16.21
			25	0	100	0	22.21	21.32

**OUTPUT POWER FOR LTE BAND 66C (10 MHz + 15 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
10MHz / 15MHz	1715.3	1727.3	1	49	1	0	24.43	23.43
			1	0	1	74	16.51	16.41
			50	0	75	0	22.62	21.63
	1737.9	1749.9	1	49	1	0	24.32	23.58
			1	0	1	74	15.98	16.12
			50	0	75	0	22.49	21.32
	1760.5	1772.5	1	49	1	0	24.09	23.47
			1	0	1	74	15.91	16.10
			50	0	75	0	22.32	21.29

**OUTPUT POWER FOR LTE BAND 66C (10 MHz + 20 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
10MHz / 20MHz	1715.5	1729.9	1	49	1	0	24.31	23.58
			1	0	1	99	16.01	16.51
			50	0	100	0	22.61	21.61
	1735.6	1750.0	1	49	1	0	24.38	23.14
			1	0	1	99	16.11	16.01
			50	0	100	0	22.35	21.43
	1755.6	1770.0	1	49	1	0	24.11	23.38
			1	0	1	99	15.42	15.86
			50	0	100	0	22.36	21.38

**OUTPUT POWER FOR LTE BAND 66C (15 MHz + 10 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 10MHz	1717.5	1729.5	1	74	1	0	24.42	23.87
			1	0	1	49	16.38	16.39
			75	0	50	0	22.61	21.77
	1740.1	1752.1	1	74	1	0	24.21	23.43
			1	0	1	49	16.21	16.41
			75	0	50	0	22.48	21.47
	1762.7	1774.7	1	74	1	0	24.07	23.37
			1	0	1	49	15.82	16.11
			75	0	50	0	22.31	21.42

**OUTPUT POWER FOR LTE BAND 66C (15 MHz + 15 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 15MHz	1717.5	1732.5	1	74	1	0	24.44	24.08
			1	0	1	74	16.28	16.42
			75	0	75	0	22.54	21.59
	1737.5	1752.5	1	74	1	0	24.28	23.31
			1	0	1	74	16.19	16.05
			75	0	75	0	22.61	21.41
	1757.5	1772.5	1	74	1	0	23.98	23.78
			1	0	1	74	15.38	16.01
			75	0	75	0	22.36	21.28

**OUTPUT POWER FOR LTE BAND 66C (15 MHz + 20 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
15MHz / 20MHz	1717.8	1734.9	1	74	1	0	24.38	23.71
			1	0	1	99	15.87	16.31
			75	0	100	0	22.68	21.68
	1735.3	1752.4	1	74	1	0	24.08	23.38
			1	0	1	99	15.67	16.05
			75	0	100	0	22.47	21.58
	1752.9	1770.0	1	74	1	0	23.95	23.68
			1	0	1	99	15.95	16.12
			75	0	100	0	22.18	21.42

**OUTPUT POWER FOR LTE BAND 66C (20 MHz + 5 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 5MHz	1720.0	1731.7	1	99	1	0	24.28	23.87
			1	0	1	99	16.28	16.81
			100	0	100	0	22.71	21.75
	1742.5	1754.2	1	99	1	0	24.11	23.38
			1	0	1	99	15.88	16.11
			100	0	100	0	22.48	21.47
	1765.0	1776.7	1	99	1	0	24.12	23.28
			1	0	1	99	16.17	16.02
			100	0	100	0	22.11	21.38

**OUTPUT POWER FOR LTE BAND 66C (20 MHz + 10 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 10MHz	1720.0	1734.4	1	99	1	0	24.28	23.77
			1	0	1	49	16.04	16.21
			100	0	50	0	22.71	21.78
	1740.1	1754.5	1	99	1	0	24.31	23.18
			1	0	1	49	16.31	16.37
			100	0	50	0	22.42	21.57
	1760.1	1774.5	1	99	1	0	24.21	23.39
			1	0	1	49	15.90	16.11
			100	0	50	0	22.41	21.41

**OUTPUT POWER FOR LTE BAND 66C (20 MHz + 15 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 15MHz	1720.0	1737.1	1	99	1	0	24.37	24.44
			1	0	1	74	16.02	16.11
			100	0	75	0	23.71	22.87
	1737.6	1754.7	1	99	1	0	24.28	24.21
			1	0	1	74	16.11	16.25
			100	0	75	0	24.21	23.47
	1755.1	1772.2	1	99	1	0	24.11	24.11
			1	0	1	74	15.67	16.10
			100	0	75	0	23.88	23.01

**OUTPUT POWER FOR LTE BAND 66C (20 MHz + 20 MHz)**

Antenna Gain [dBi]	1.8							
Bandwidth	PCC Frequency [MHz]	SCC1 Frequency [MHz]	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average Power [dBm]	
			Size	Offset	Size	Offset	QPSK	16QAM
20MHz / 20MHz	1720.0	1739.8	1	99	1	0	24.47	23.71
			1	0	1	99	15.55	15.91
			100	0	100	0	22.61	21.71
	1735.1	1754.9	1	99	1	0	24.38	23.52
			1	0	1	99	15.62	16.01
			100	0	100	0	22.51	21.51
	1750.2	1770.0	1	99	1	0	24.18	23.37
			1	0	1	99	15.87	15.97
			100	0	100	0	22.36	21.31

## 8.2. 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.

#### - LTE Band 5B

Frequency Band [MHz]	Bandwidth [MHz]	Modulation	Frequency [MHz]	99% BW [MHz]	-26dB BW [MHz]
824 ~ 849	3 + 5	QPSK	836.5	7.437	7.865
		16QAM		7.439	7.884
	5 + 3	QPSK		7.492	7.955
		16QAM		7.514	7.927
	5 + 10	QPSK		13.864	14.500
		16QAM		13.832	14.520
	10 + 5	QPSK		13.879	14.670
		16QAM		13.857	14.610
	10 + 10	QPSK		18.694	19.830
		16QAM		18.742	19.680

#### - LTE Band 66B

Frequency Band [MHz]	Bandwidth [MHz]	Modulation	Frequency [MHz]	99% BW [MHz]	-26dB BW [MHz]
1710 ~ 1780	5 + 5	QPSK	1745.0	9.209	9.751
		16QAM		9.199	9.744
	5 + 10	QPSK		13.807	14.500
		16QAM		13.860	14.530
	10 + 5	QPSK		13.887	14.610
		16QAM		13.854	14.580
	5 + 15	QPSK		18.127	18.920
		16QAM		18.184	19.050
	15 + 5	QPSK		18.208	19.030
		16QAM		18.205	19.270
	10 + 10	QPSK		18.613	19.680
		16QAM		18.707	19.670

**- LTE Band 66C**

Frequency Band [MHz]	Bandwidth [MHz]	Modulation	Frequency [MHz]	99% BW [MHz]	-26dB BW [MHz]
1710 ~ 1780	5 + 20	QPSK	1745.0	22.720	23.670
		16QAM		22.583	23.730
	10 + 15	QPSK		22.976	24.090
		16QAM		22.948	24.180
	10 + 20	QPSK		27.561	28.850
		16QAM		27.459	28.860
	15 + 10	QPSK		22.949	24.140
		16QAM		22.933	24.180
	15 + 15	QPSK		28.289	29.760
		16QAM		28.086	29.600
	15 + 20	QPSK		32.475	34.110
		16QAM		32.284	34.190
	20 + 5	QPSK		22.737	24.010
		16QAM		22.844	23.910
	20 + 10	QPSK		27.772	29.110
		16QAM		27.695	29.110
	20 + 15	QPSK		32.552	34.250
		16QAM		32.498	34.160
	20 + 20	QPSK		37.324	39.090
		16QAM		37.377	39.160

## 8.2.1. OCCUPIED BANDWIDTH RESULTS

### LTE Band 5B (UL CA)







**LTE Band 66B (UL CA)**



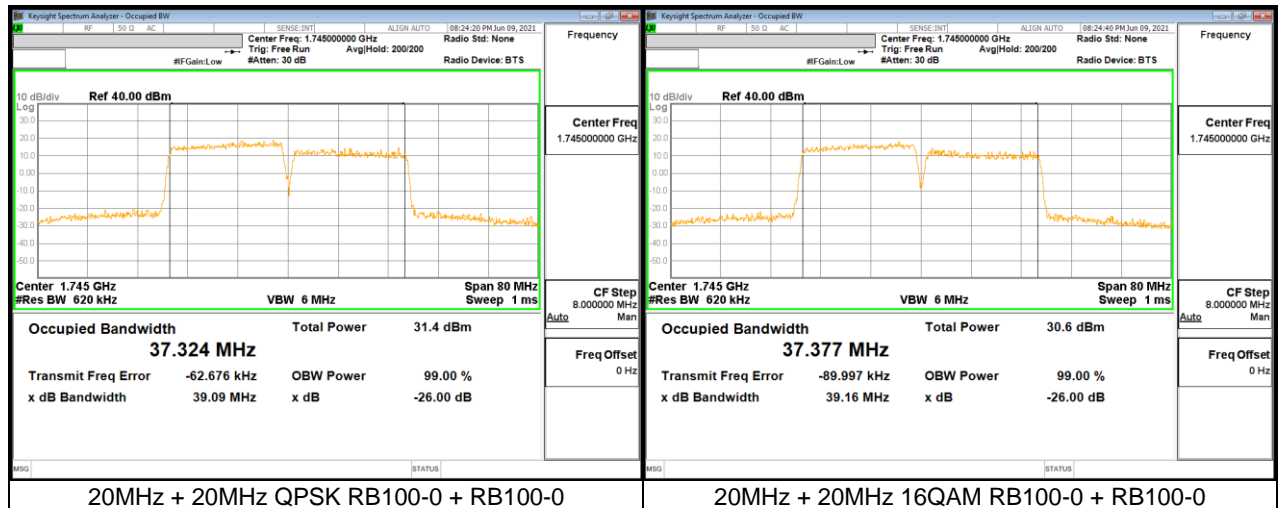


**LTE Band 66C (UL CA)**









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### **8.3. BAND EDGE EMISSIONS**

#### **RULE PART(S)**

FCC: §22.359, §22.917 and §27.53

#### **LIMITS**

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

#### **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.

#### **LTE**

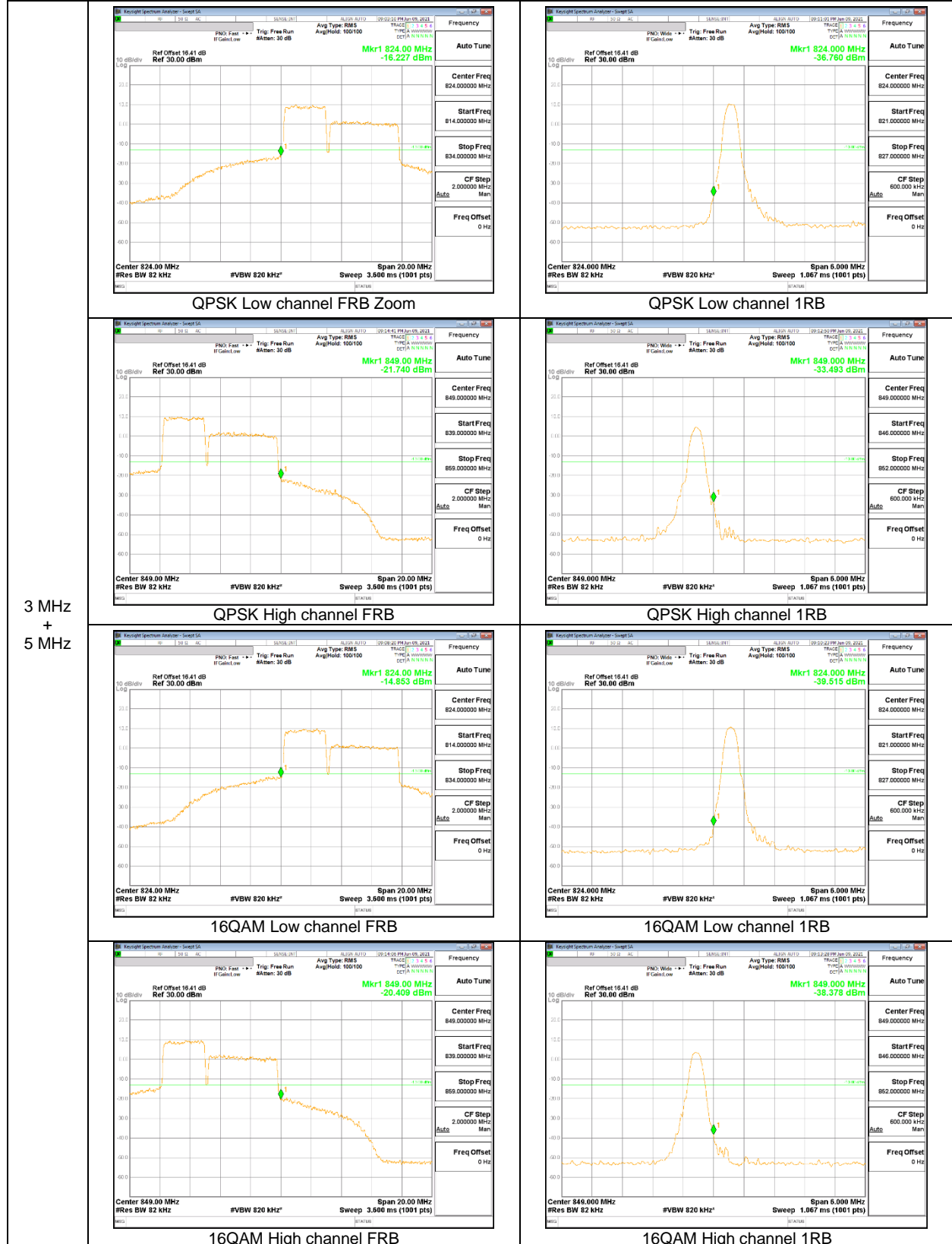
- a) Set the RBW = 1 ~ 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = Auto;
- e) Detector = RMS;
- f) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- g) Trace mode = Average (100);

#### **RESULTS**

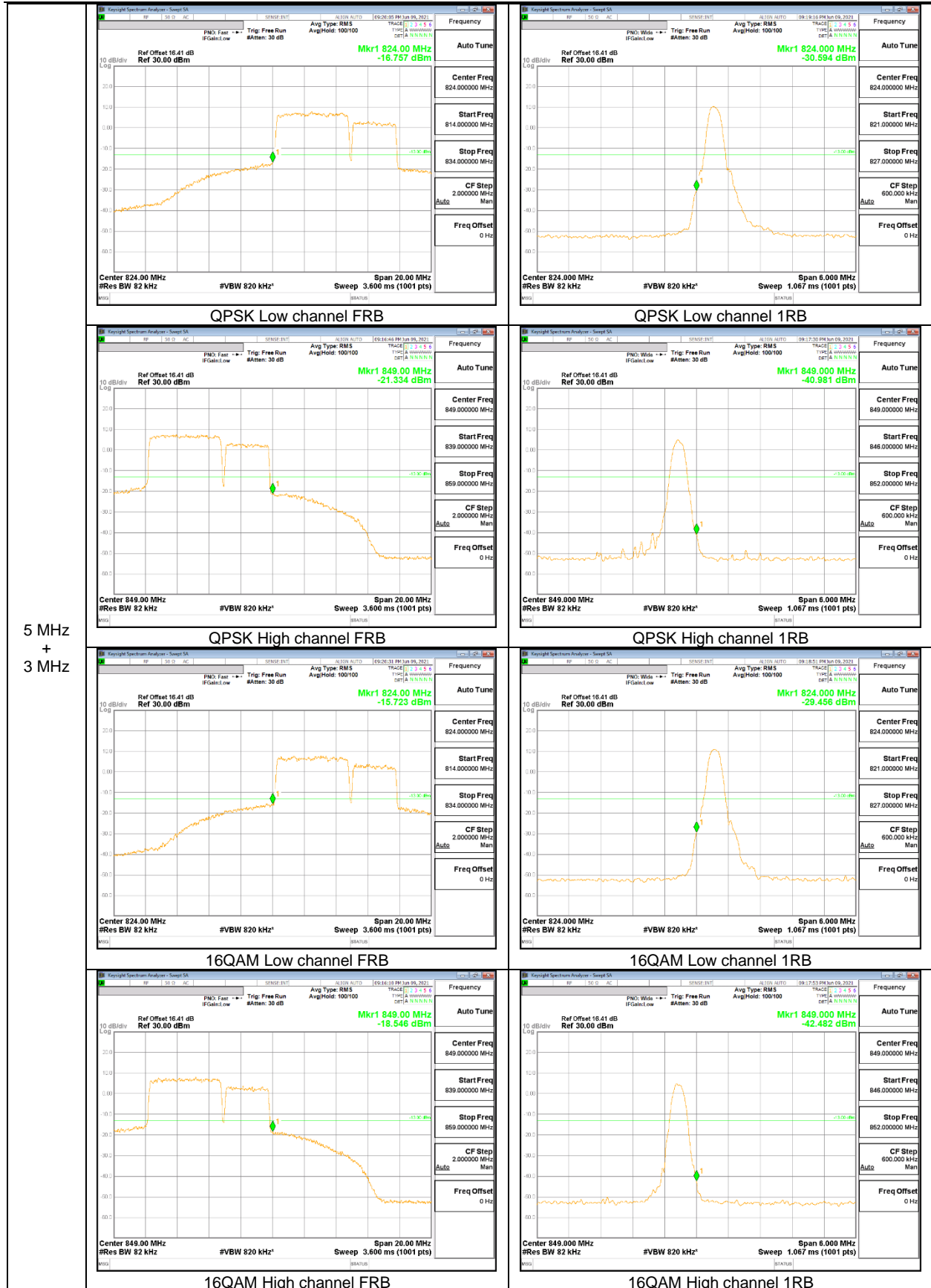
See the following pages.

### 8.3.1. BAND EDGE RESULT

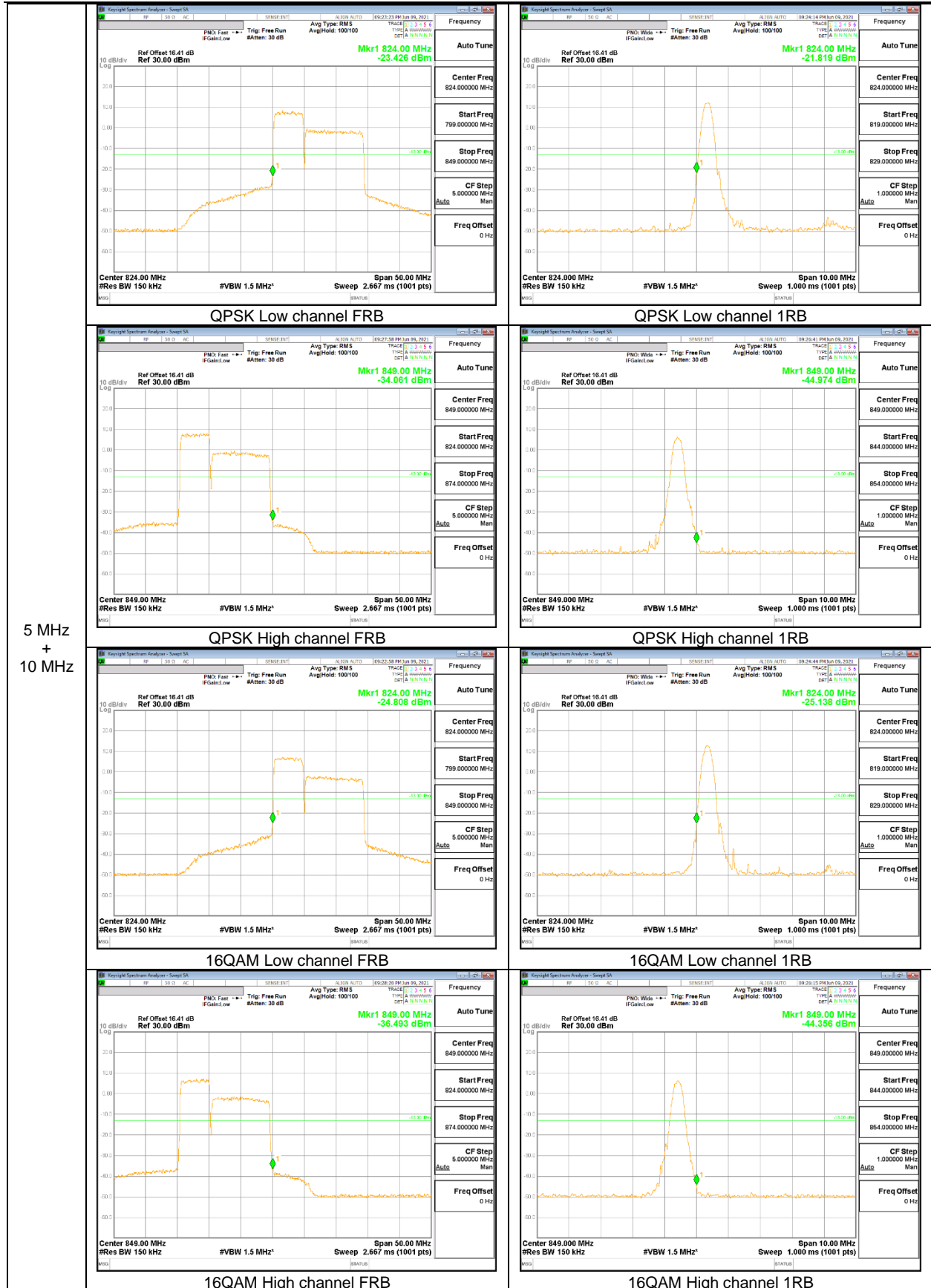
#### LTE Band 5B



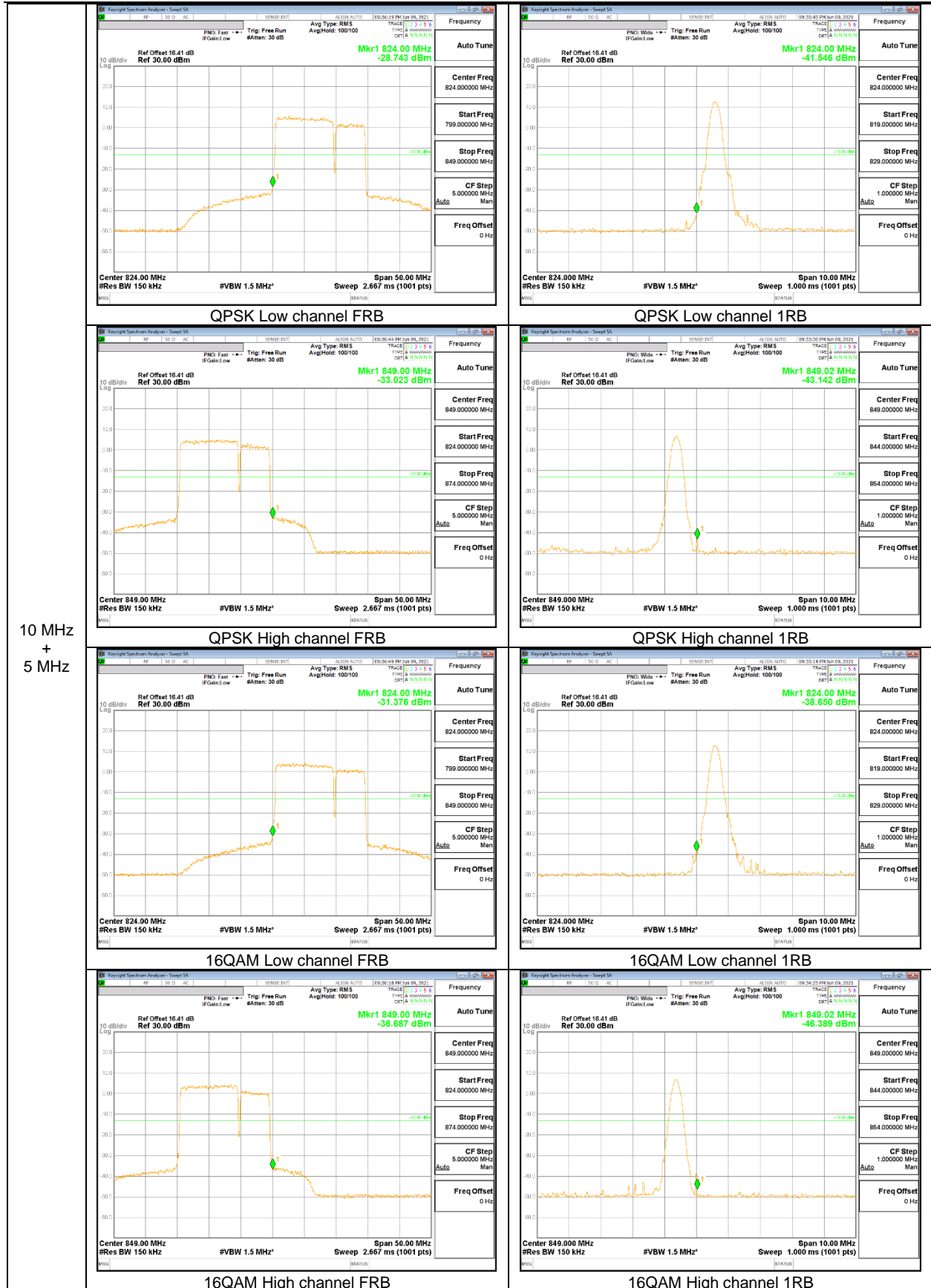




5 MHz  
+  
3 MHz



5 MHz + 10 MHz



10 MHz  
+  
5 MHz

