



CERTIFICATION TEST REPORT

Report Number. : 13171837-E13V1

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

Model : SM-A515U, SM-A515U1, SM-A515W and SM-S515DL

FCC ID : A3LSMA515U

IC : 649E-SMA515W

EUT Description : GSM/CDMA/WCDMA/LTE PHABLET WITH BT/BLE,DTS/UNII
A/B/G/N/AC, NFC AND ANT+

Test Standard(s) : FCC CFR47 PART 27 SUBPART M
RSS-199 ISSUE 3

Date Of Issue:
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/CDMA/WCDMA/LTE PHABLET WITH BT/BLE,DTS/UNII
A/B/G/N/AC, NFC AND ANT+
MODEL NUMBER: SM-A515U, SM-A515U1, SM-A515W AND SM-S515DL
SAMPLE IMEI NUMBER: 353327110229895 (CONDUCTED)
DATE TESTED: FEB 22, 2020 – FEB 29, 2020;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 27M and ISED RSS-199 Issue 3	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:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Seokhwan Hong
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. ISED RSS-199, ISSUE 3
4. ANSI TIA-603-E, 2016
5. ANSI C63.26, 2015
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	
<input type="checkbox"/>	Chamber 1
<input 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/wp-content/uploads/2017/05/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:

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

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

(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	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 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 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

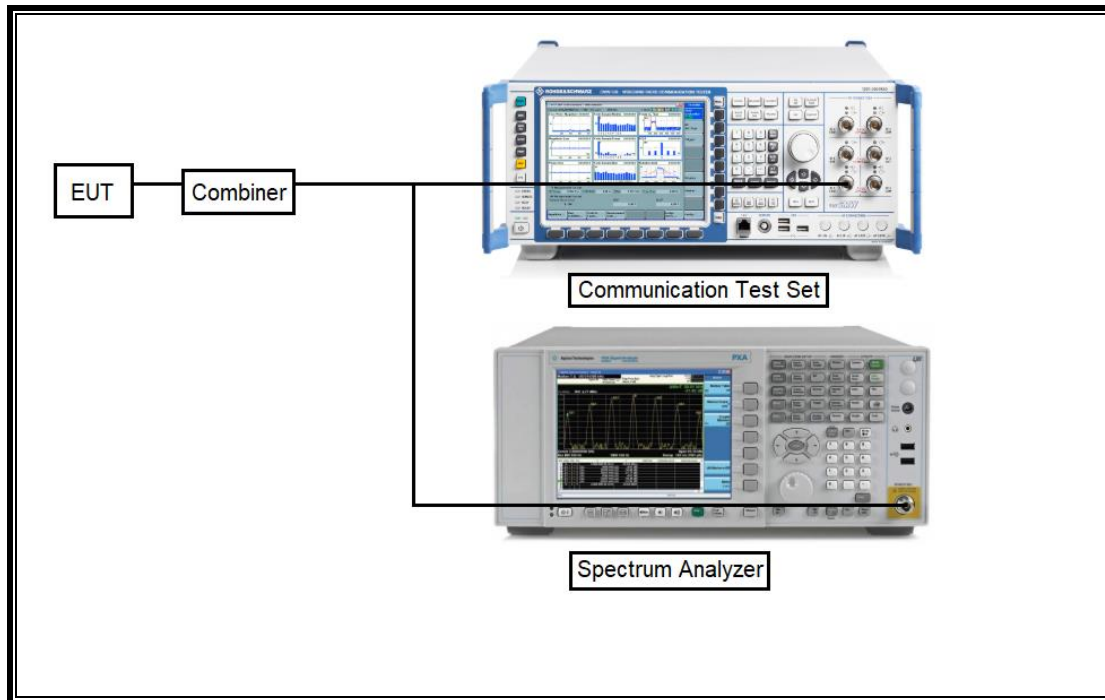
The EUT is a GSM/CDMA/WCDMA/LTE PHABLET WITH BT/BLE,DTS/UNII A/B/G/N/AC, NFC AND ANT+. This test report addresses the LTE Band 41 conducted test item mode.

5.2. DESCRIPTION OF TEST SETUP

TEST SETUP

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

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



5.3. WORST-CASE CONFIGURATION AND MODE

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.

LTE Band 41 FCC were tested on HPUE mode since it is high power.(Power class 2)

A-MPR is implemented in this EUT when operating on HPUE per the A-MPR specification in 3GPP TS 36.101 (Table 6.2.4-4a). Conducted output power verification data are shown Appendix A. Also only Emission mask test item were performed A-MPR condition (Especially low channel side)

LTE Band 41 ISED didn't support HPUE mode.

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 conducted 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
B41 (FCC)	2498.5	5	1	0
	2593.0		1	0
	2687.5		1	0
B41 (IC)	2507.5	15	1	0
	2595.0		1	0
	2682.5		1	0

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
Combiner	WEINSCHTEL	1575	2150	08-08-20
Communications Test Set	R&S	CMW500	150313	08-20-08
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-20
Attenuator	PASTERNAK	PE7395-10	A011	08-08-20
Temperature Chamber	ESPEC	SH-642	93001109	08-05-20
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 2.5	

7. SUMMARY TABLE

FCC Part Section	ISED Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-199, 4.2	Occupied Band width (99%)	N/A	Conducted	Pass
27.53(m)	RSS-199, 4.5	Conducted Spurious Emission	-25 dBm		Pass
27.53(m)	RSS-199, 4.5	Emission mask	Section 9.2		Pass
27.54	RSS-199, 4.3	Frequency Stability	2.5PPM		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.

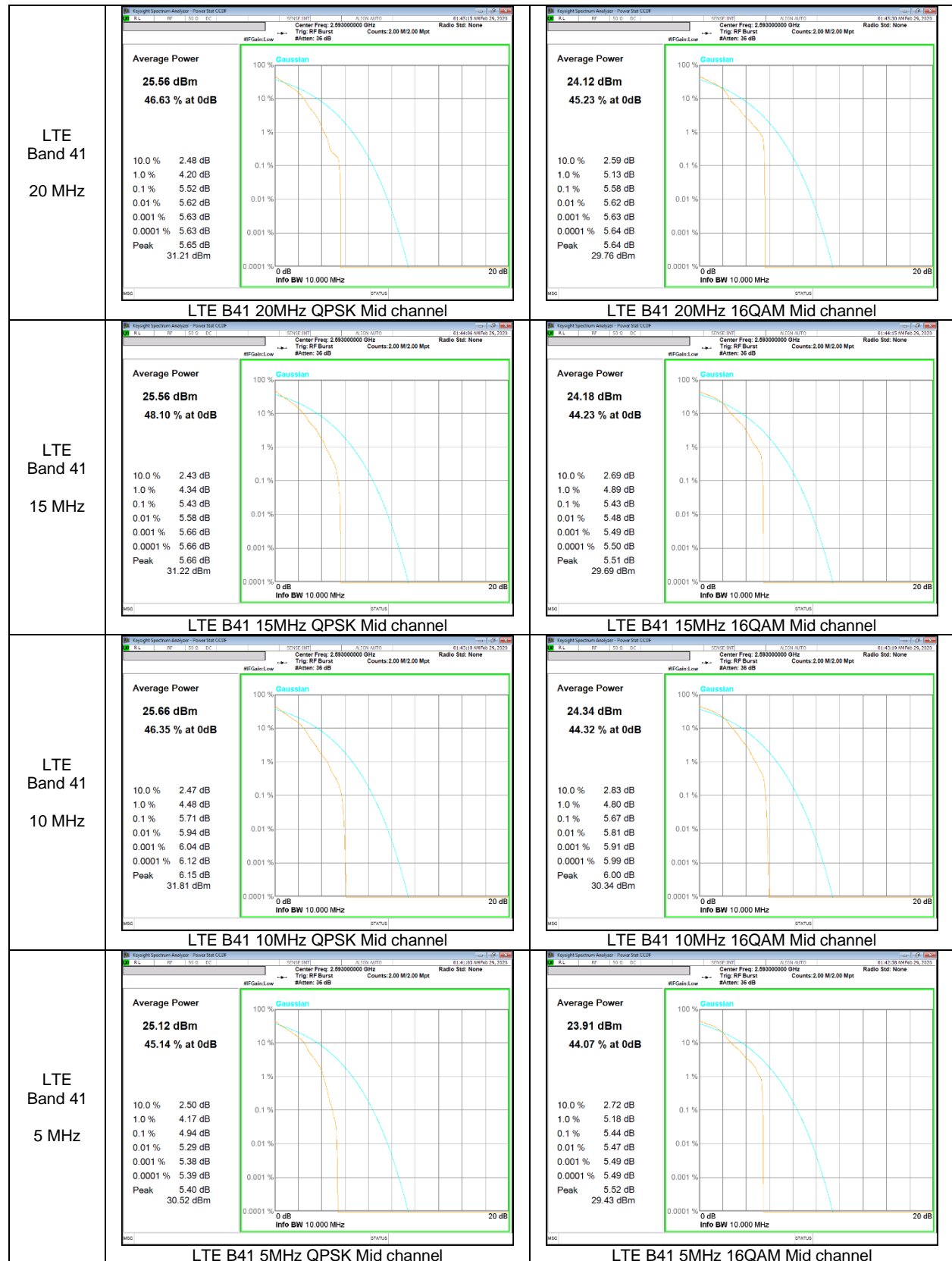
Test Spec

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.

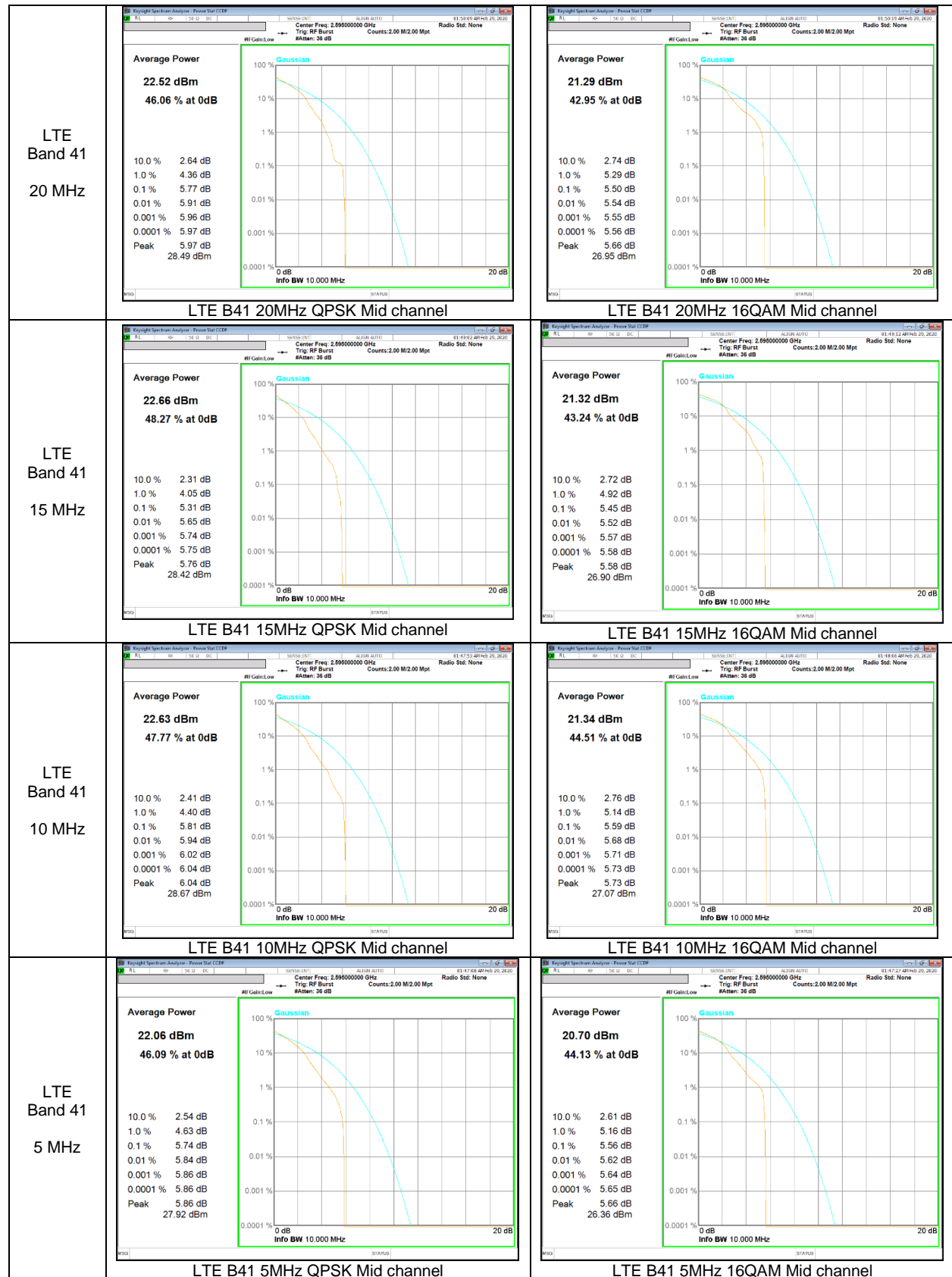
RESULTS

8.1. CONDUCTED PEAK TO AVERAGE RESULT

LTE Band 41(FCC)



LTE Band 41(IC)



9. LIMITS AND CONDUCTED RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
ISED: RSS-199, 4.2

LIMITS

For reporting purposes only

TEST PROCEDURE

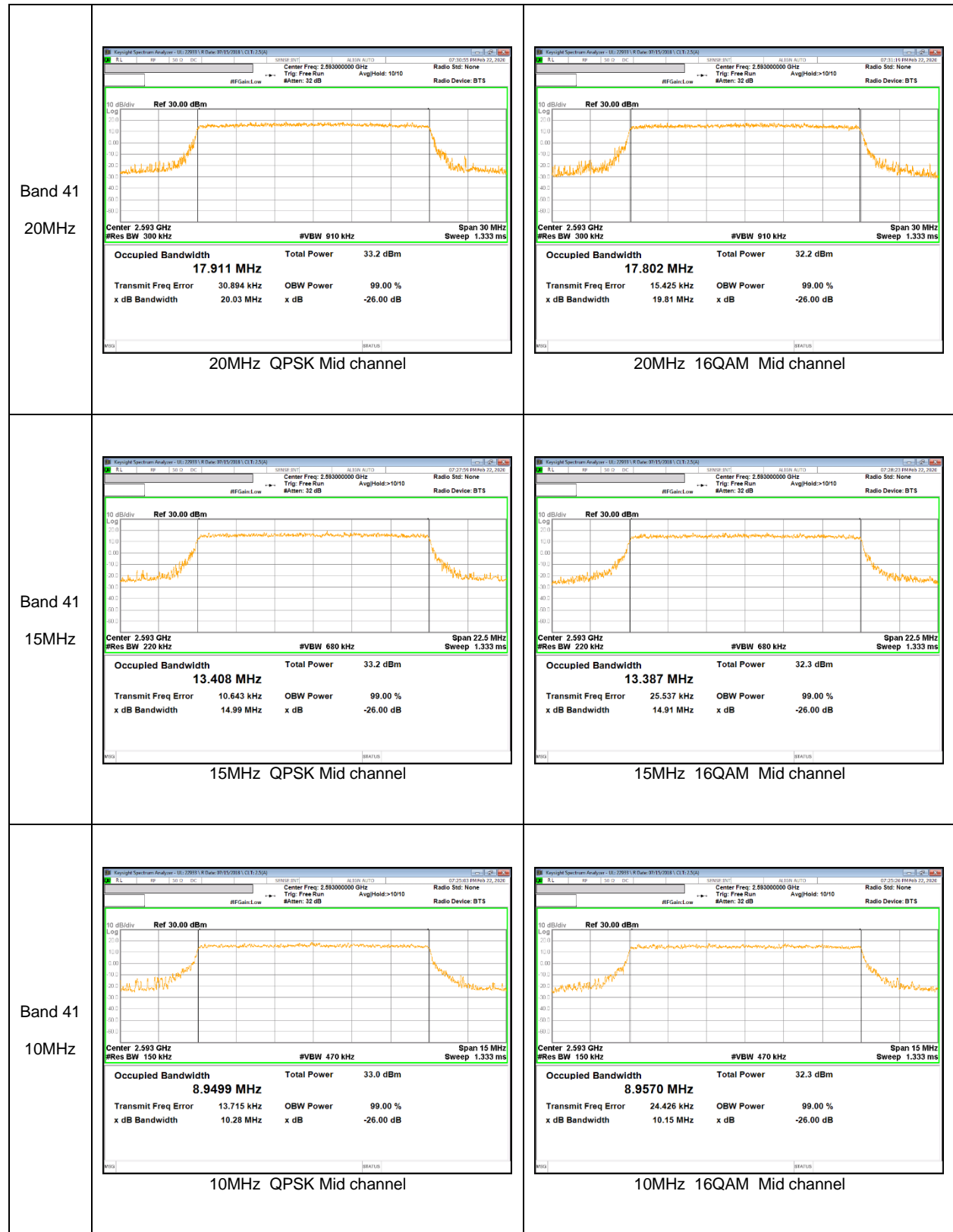
The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

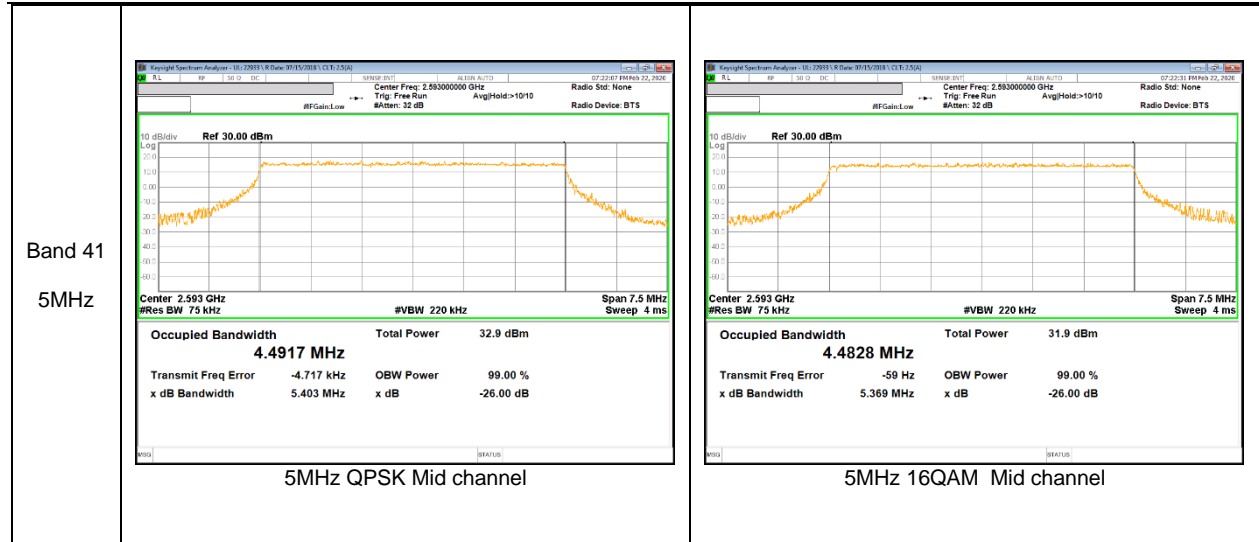
(KDB 971168 D01 Power Meas License Digital Systems v03r01)

RESULTS

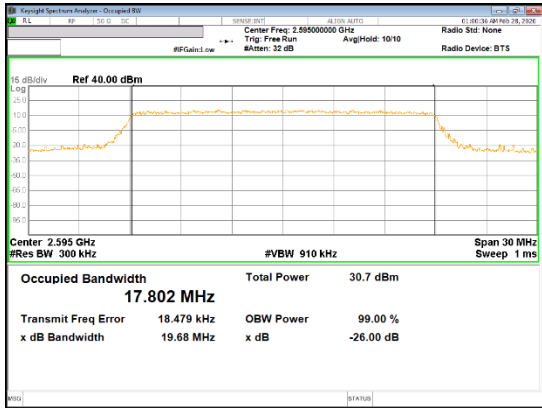
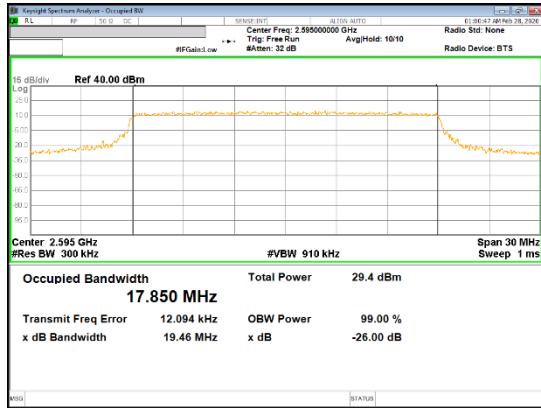
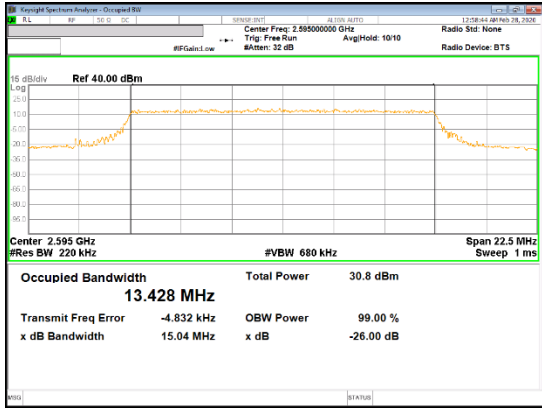
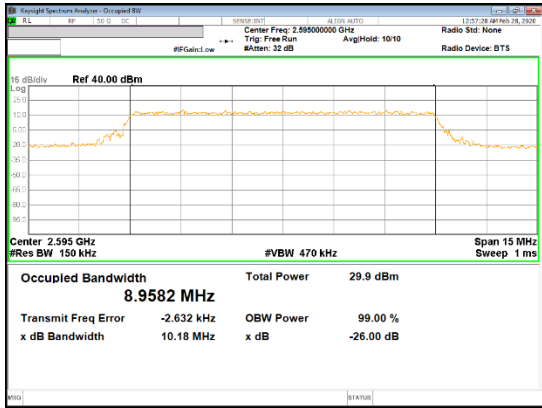
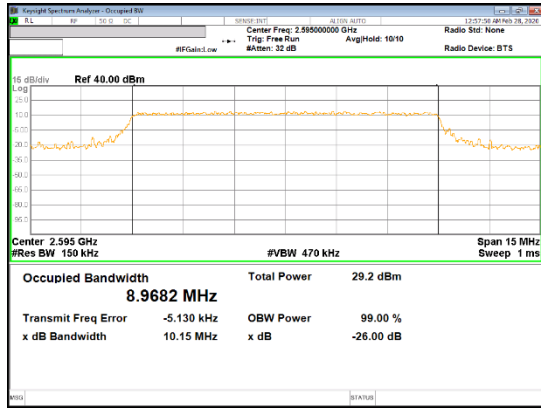
See the following pages.

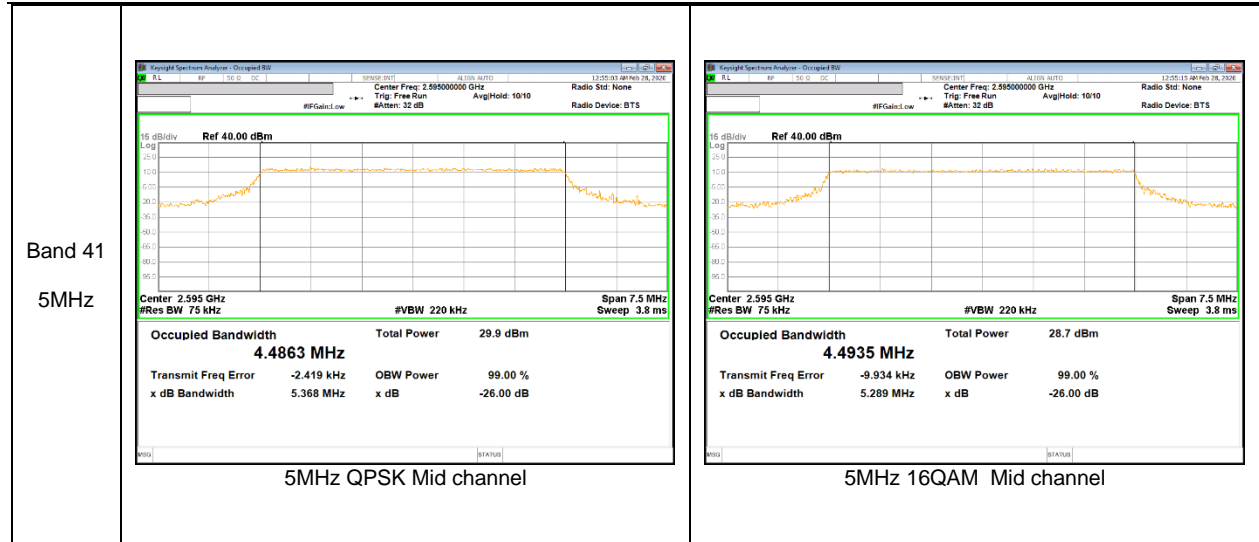
9.1.1. OCCUPIED BANDWIDTH RESULTS
LTE Band 41(FCC)





LTE Band 41(IC)

<p>Band 41 20MHz</p>	 <p>20MHz QPSK Mid channel</p>	 <p>20MHz 16QAM Mid channel</p>
<p>Band 41 15MHz</p>	 <p>15MHz QPSK Mid channel</p>	 <p>15MHz 16QAM Mid channel</p>
<p>Band 41 10MHz</p>	 <p>10MHz QPSK Mid channel</p>	 <p>10MHz 16QAM Mid channel</p>



9.2. EMISSION MASK

RULE PART(S)

FCC: §§27. 53 (m)
ISED : RSS-199, 4.5

LIMITS

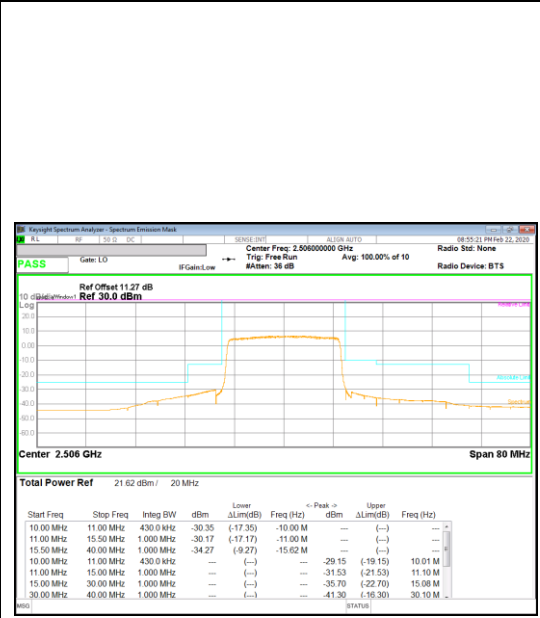
(m) (4) For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

RESULTS

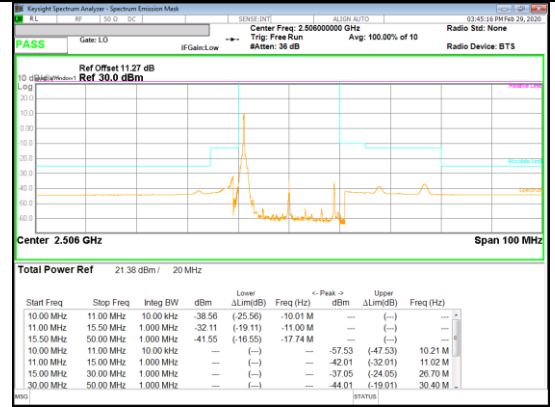
See the following pages.

LTE Band 41(FCC)

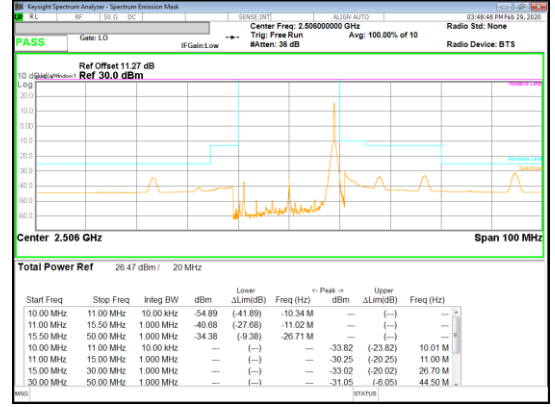
Band 41
 20MHz
 QPSK



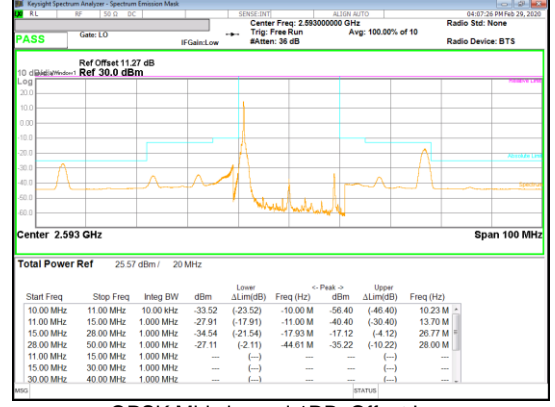
QPSK Low channel FRB



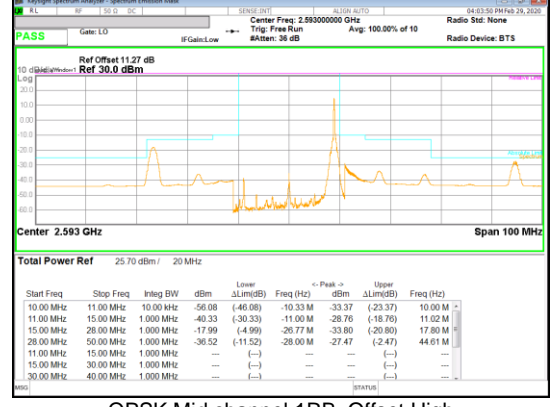
QPSK Low channel 1RB_Offset Low



QPSK Low channel 1RB_Offset High

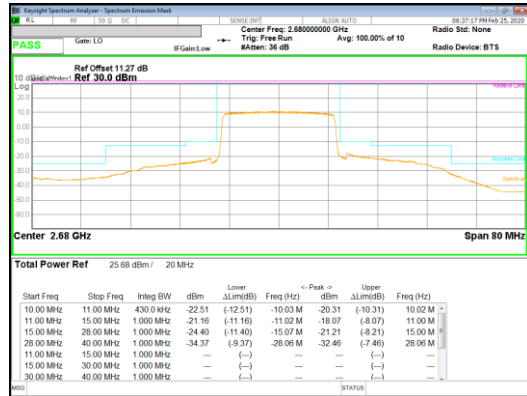


QPSK Mid channel 1RB_Offset Low

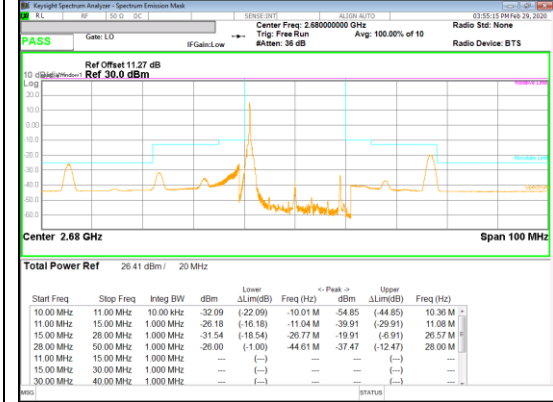


QPSK Mid channel 1RB_Offset High

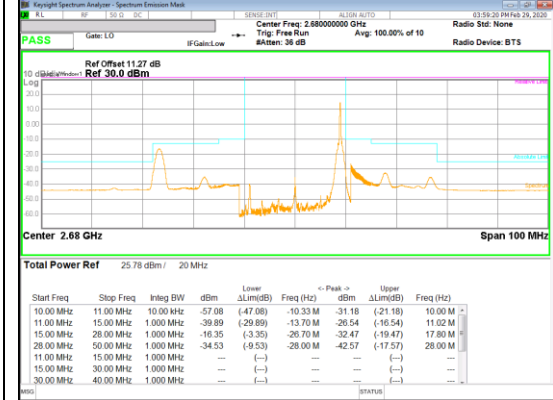
Band 41
 20MHz
 QPSK



QPSK High channel FRB



QPSK High channel 1RB_Offset Low

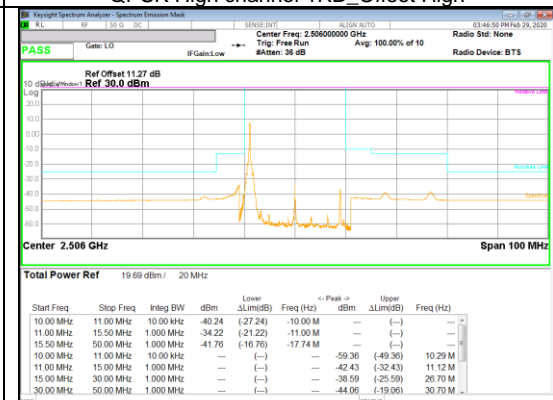


QPSK High channel 1RB_Offset High

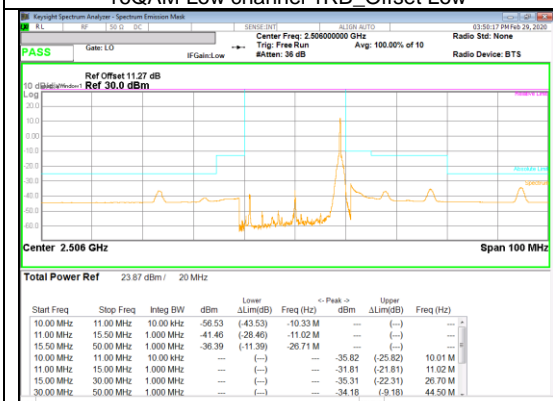
Band 41
 20MHz
 16QAM



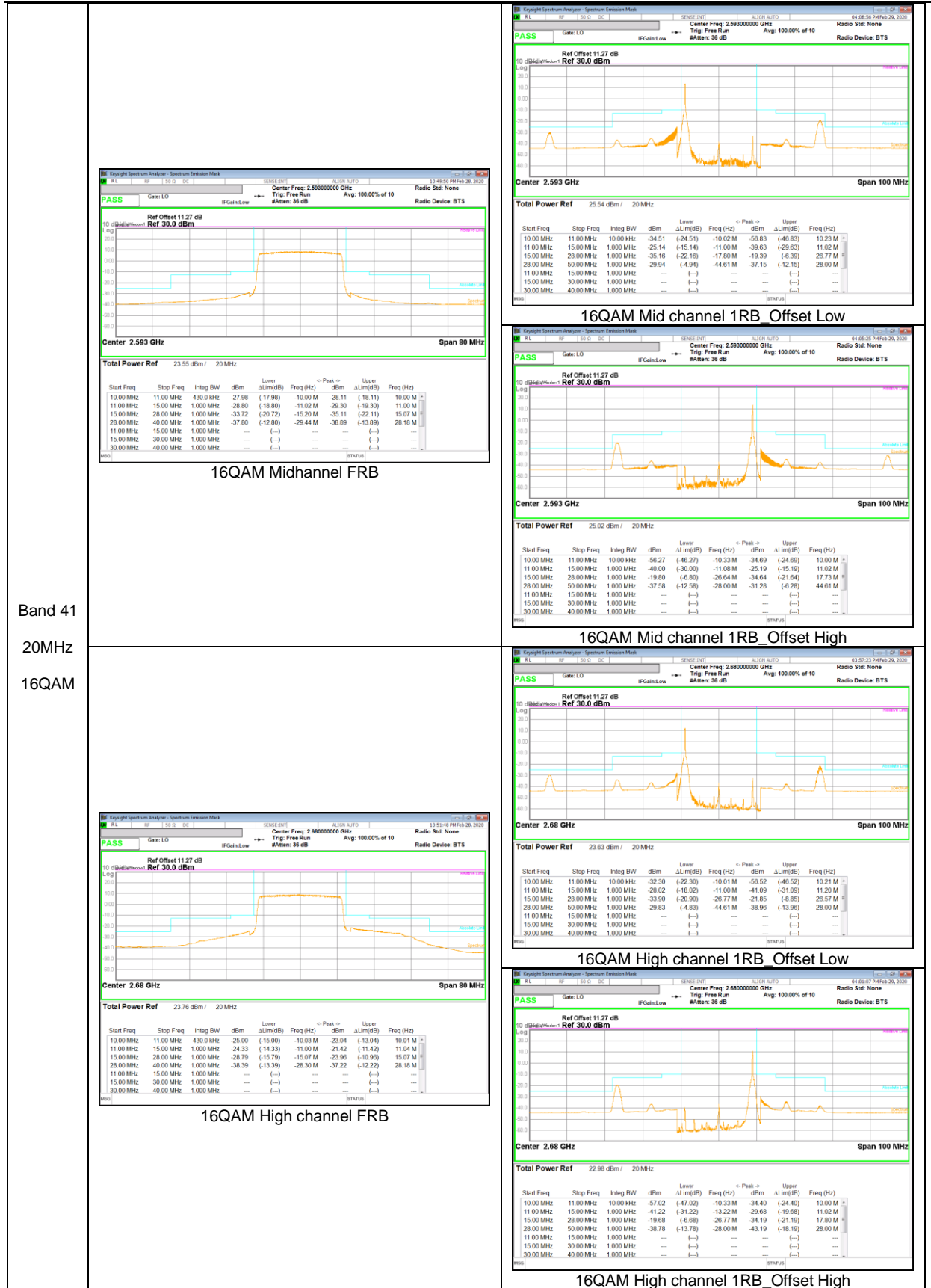
16QAM Low channel FRB



16QAM Low channel 1RB_Offset Low

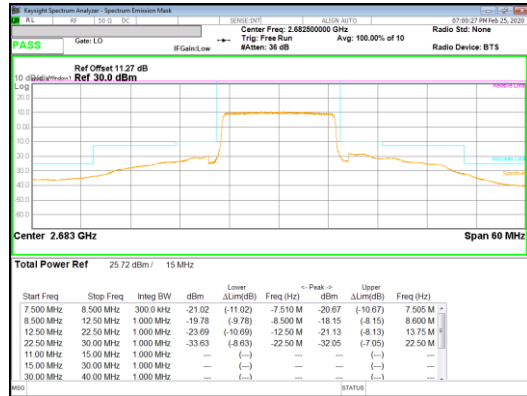


16QAM Low channel 1RB_Offset High

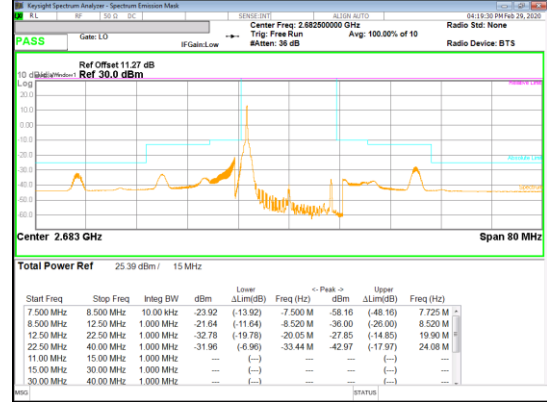




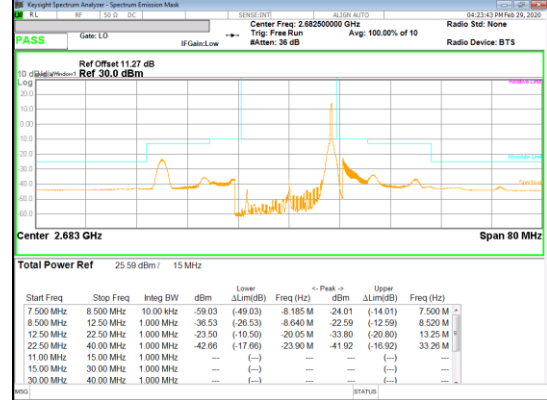
Band 41
 15MHz
 QPSK



QPSK High channel FRB



QPSK High channel 1RB_Offset Low

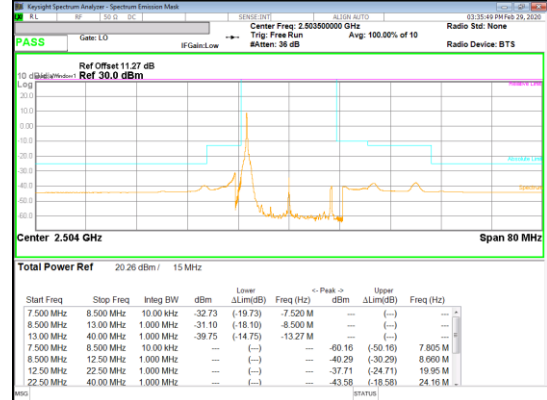


QPSK High channel 1RB_Offset High

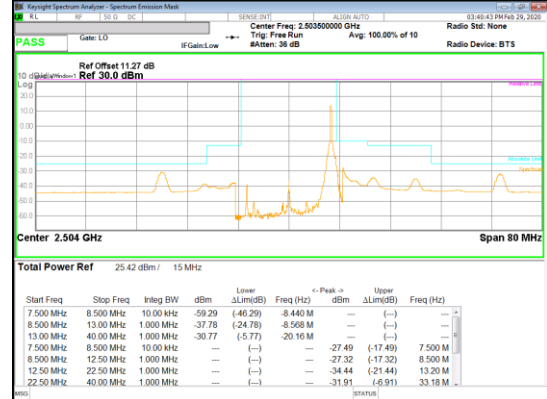
Band 41
 15MHz
 16QAM



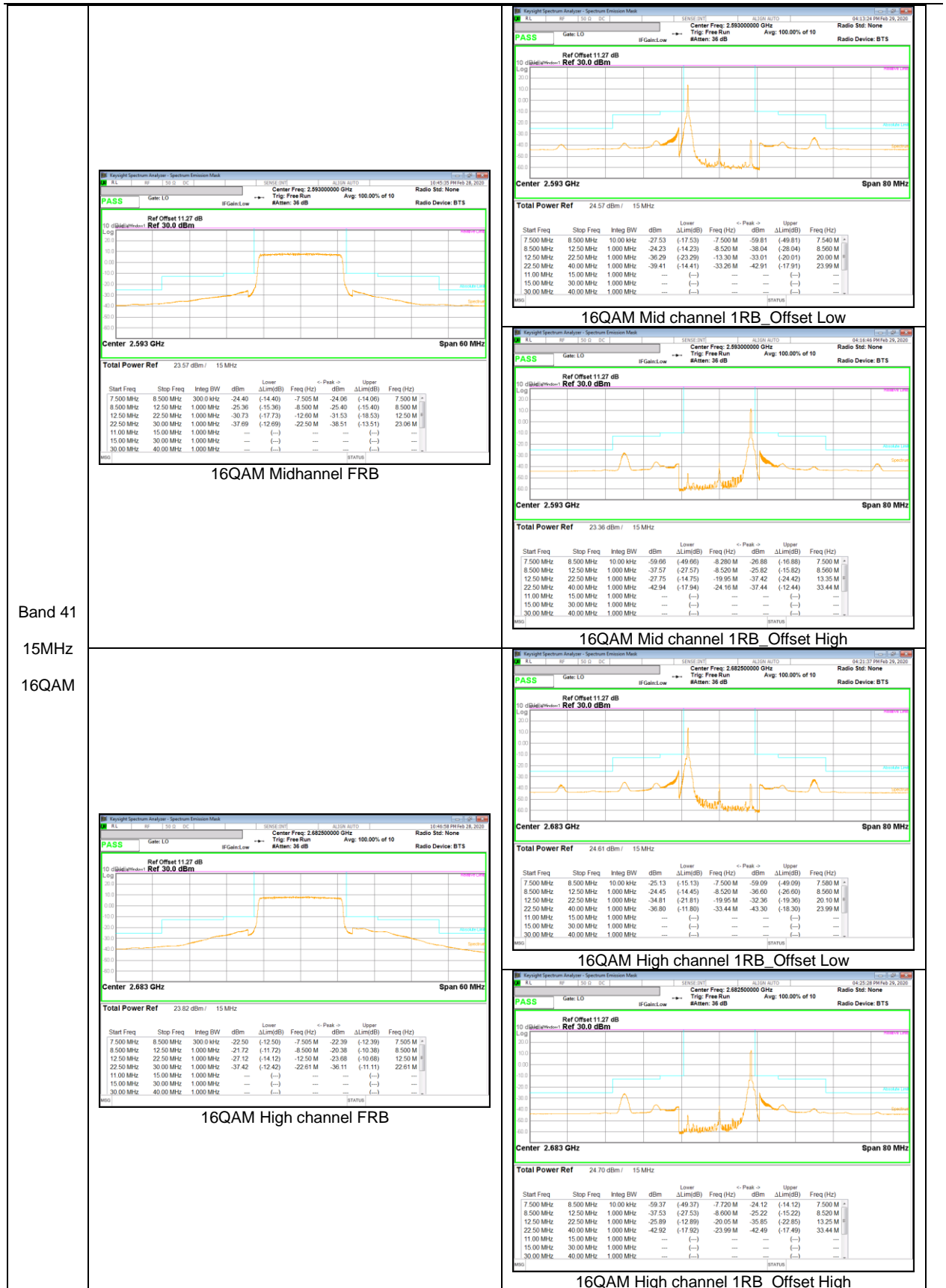
16QAM Low channel FRB



16QAM Low channel 1RB_Offset Low



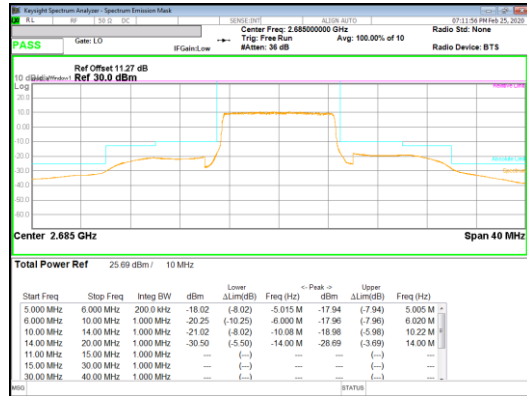
16QAM Low channel 1RB_Offset High



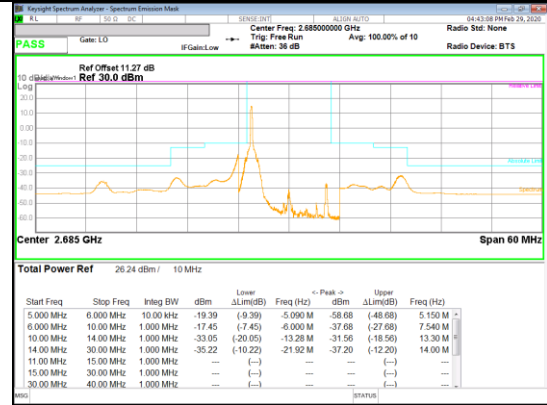


Band 41
 10MHz
 QPSK

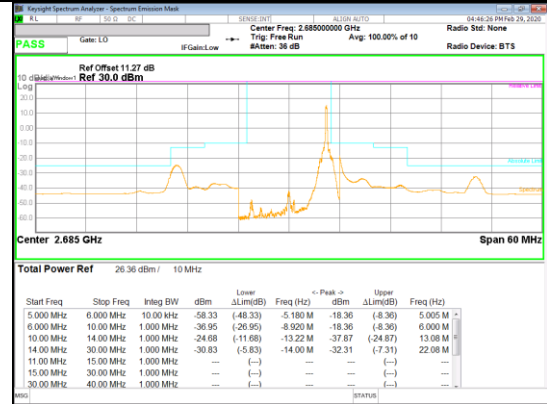
Band 41
 10MHz
 QPSK



QPSK High channel FRB

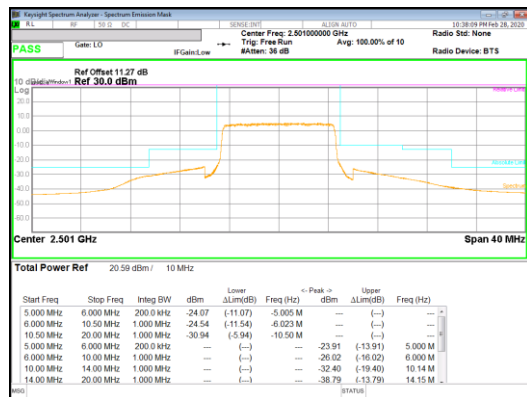


QPSK High channel 1RB_Offset Low

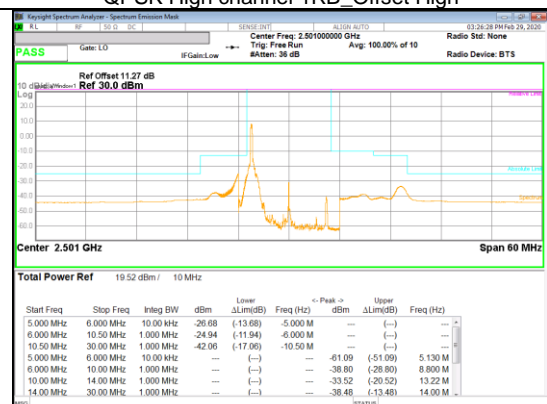


QPSK High channel 1RB_Offset High

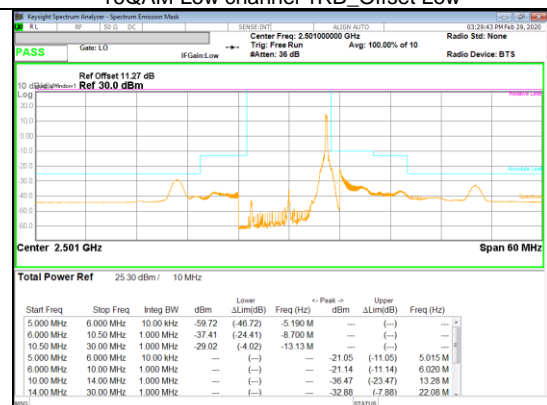
Band 41
 10MHz
 16QAM



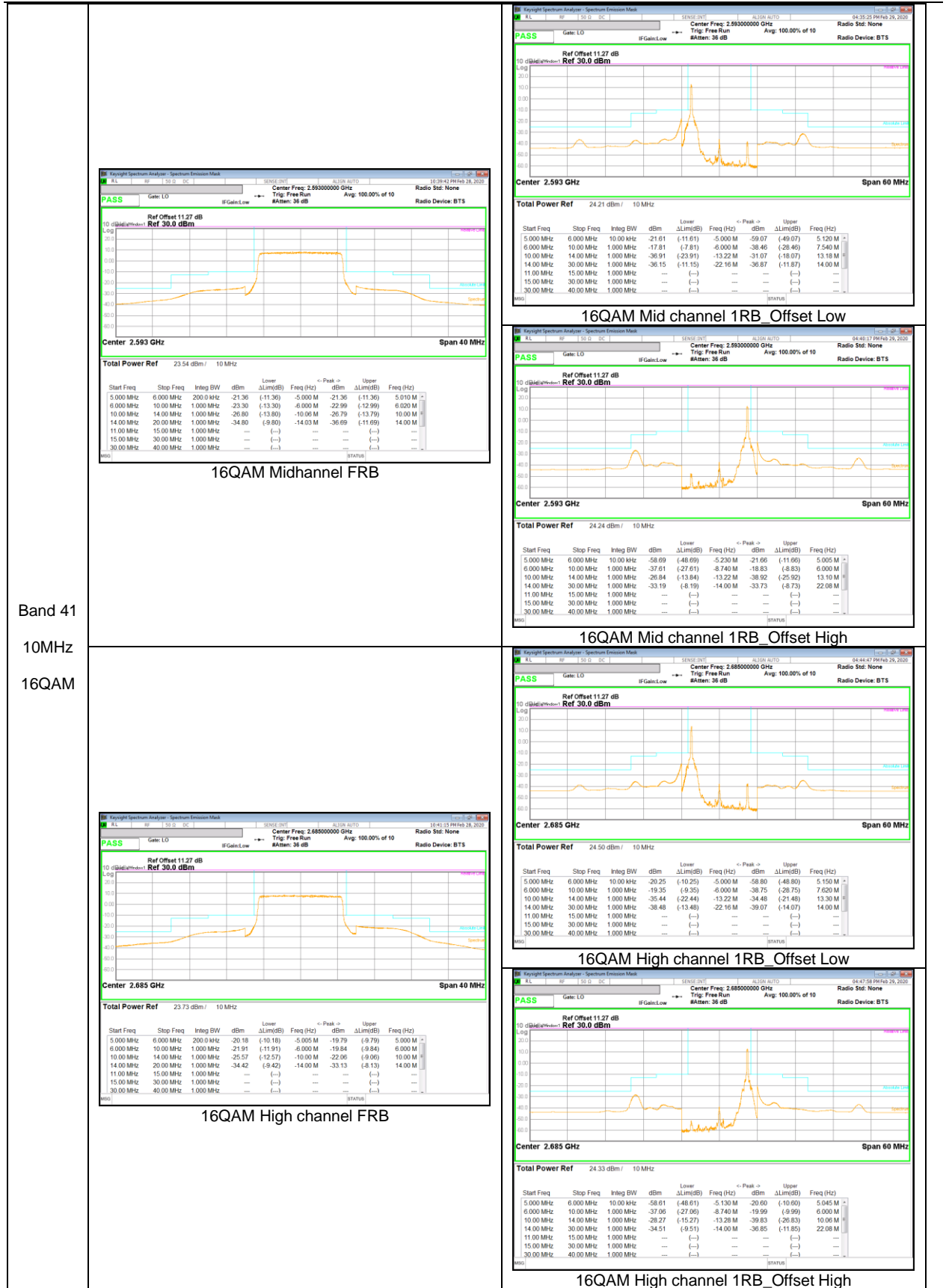
16QAM Low channel FRB



16QAM Low channel 1RB_Offset Low



16QAM Low channel 1RB_Offset High



Band 41
 10MHz
 16QAM