



**FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2**

CERTIFICATION TEST REPORT

For

Camera

MODEL NUMBER: SBDC1

**FCC ID: CNFSBDC1
IC: 10193A-SBDC1**

REPORT NUMBER: 4788004529.1-3

ISSUE DATE: August 3, 2017

Prepared for

**GoPro, Inc.
3000 Clearview Way, San Mateo, CA 94402, USA**

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/3/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a)	Complied
2	Peak Conducted Output Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	Complied
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	Complied
4	Conducted Bandedge and Spurious Emission	FCC 15.247 (d) RSS-247 Clause 5.5	Complied
5	Radiated Bandedge and Spurious Emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied
Remark: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device.			

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: GoPro, Inc.
Address: 3000 Clearview Way, San Mateo, CA 94402, USA

Manufacturer Information

Company Name: GoPro, Inc.
Address: 3000 Clearview Way, San Mateo, CA 94402, USA

Factory Information

Company Name: Chicony Electronics (Dongguan) Co., Ltd.
Address: San Zhong Quan Li Qu, Qingxi, Dongguan, Guangdong, China 523651

EUT Name: Camera
Model: SBDC1
Sample Status: Normal
Sample ID: 1018135

Brand: GoPro
Sample Received: May 25, 2017
Date of Tested: May 26, 2017~ August 3, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 4	PASS

Tested By : 

Leo Liu
Engineer
Approved By:



Stephen Guo
Laboratory Manager

Check By: 

Shawn Wen
Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

Test Location	Dongguan Dongdian Testing Service Co., Ltd
Address	No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Dongguan City, Guangdong Province, 523808, China
Accreditation Certificate	Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until January 31, 2018. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 270092, Renewal date March 11, 2015, valid time is until March 11, 2018. The 3m Alternate Test Site of Dongguan Dongdian Testing Service Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 10288A on April 23, 2015, valid time is until April 23, 2018.

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 recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB(10 MHz $\leq$ f < 3.6GHz);
	1.38dB(3.6GHz $\leq$ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Dwell Time	0.6%
Conducted spurious emissions	0.86dB(10 MHz $\leq$ f < 3.6GHz);
	1.40dB(3.6GHz $\leq$ f < 8GHz)
	1.66dB(8GHz $\leq$ f < 22GHz)
Uncertainty for radio frequency (RBW<20KHz)	3 $\times$ 10 ⁻⁸
Temperature	0.4°C
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-25GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-25Gz)
Uncertainty for Power line conduction emission test	3.32dB (150kHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Camera
Model Name	SBDC1
Radio Technology	IEEE802.11b/g/n HT20/n HT40
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz IEEE 802.11n HT40: 2422MHz—2452MHz
Modulation	IEEE 802.11b: DSSS(CCK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Battery	3.8Vdc,2620mAh,9.95Wh
Power Adapter	N/A

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Bluetooth Mode	Frequency (MHz)	Channel Number	Max PK Conducted Power (dBm)
2400-2483.5	1	IEEE 802.11b	2412-2462	1-11[11]	12.24
2400-2483.5	1	IEEE 802.11g	2412-2462	1-11[11]	14.80
2400-2483.5	1	IEEE 802.11nHT20	2412-2462	1-11[11]	14.96
2400-2483.5	1	IEEE 802.11nHT40	2422-2452	3-9[7]	14.94

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2425	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	N/A	N/A

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel (MHz)
IEEE 802.11b	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11g	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11n HT20	LCH :CH01 2412
	MCH: CH06 2437
	HCH: CH11 2462
IEEE 802.11n HT40	LCH :CH03 2422
	MCH: CH06 2437
	HCH: CH09 2452

5.5. THE WORSE CASE CONFIGURATIONS

Test Software Version	QRCT (V3.0-00230) from QUALCOMM			
Test Mode	Setting TX Power	Setting data rate (Mbps)	TX Pattern	TX Power Control
IEEE 802.11b	9	CCK_1Mbps	PN7_PATTERN	TXPowerForce_OLPC
	9	CCK_1Mbps	PN7_PATTERN	TXPowerForce_OLPC
	9	CCK_1Mbps	PN7_PATTERN	TXPowerForce_OLPC
IEEE 802.11g	12	NO HT_6Mbps	PN7_PATTERN	TXPowerForce_OLPC
	12	NO HT_6Mbps	PN7_PATTERN	TXPowerForce_OLPC
	12	NO HT_6Mbps	PN7_PATTERN	TXPowerForce_OLPC
IEEE 802.11n HT20	12	HT20_MCS_0_20	PN7_PATTERN	TXPowerForce_OLPC
	12	HT20_MCS_0_20	PN7_PATTERN	TXPowerForce_OLPC
	12	HT20_MCS_0_20	PN7_PATTERN	TXPowerForce_OLPC
IEEE 802.11n HT40	12	HT40+MCS_0_40	PN7_PATTERN	TXPowerForce_OLPC
	12	HT40+MCS_0_40	PN7_PATTERN	TXPowerForce_OLPC
	12	HT40+MCS_0_40	PN7_PATTERN	TXPowerForce_OLPC

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	FPCB Antenna	2.5

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	☒ 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	☒ 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	☒ 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT40	☒ 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB Type C	shielded	0.55	N/A

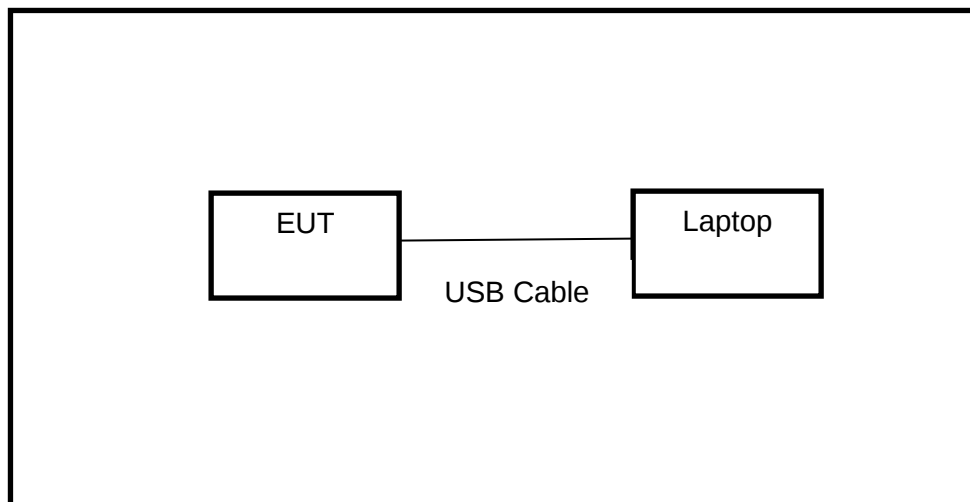
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in engineering mode with firmware QRCT from QUALCOMM through a Laptop.

SETUP DIAGRAM FOR TESTS



5.8. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument (Conducted for RF Port)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☒	Spectrum Analyzer	Agilent	E4447A	MY50180031	Jul.06, 2016	Jul.06, 2017
☒	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct.16, 2016	Oct.16, 2017
☒	Power Sensor	Agilent	U2021XA	MY55150010	Apr.04, 2017	Apr.04, 2018
☒	Power Sensor	Agilent	U2021XA	MY55150011	Apr.18, 2017	Apr.18, 2018
☒	Attenuator	Mini-Circuits	BW-S10W2	101109	Aug.18, 2016	Aug.18, 2017
☒	RF Cable	Micable	C10-01-01-1	100309	Aug.18, 2016	Aug.18, 2017
☒	Test Software	JS Tonscend	JS1120-2	Ver.2.5	N/A	N/A
☒	USB Data acquisition	Agilent	U2531A	TW55043503	N/A	N/A
☒	Auto control Unit	JS Tonscend	JS0806-2	158060010	N/A	N/A
Instrument (Radiated Tests)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☒	EMI Test Receiver	R&S	ESU8	100316	Oct.16, 2016	Oct.16, 2017
☒	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct.16, 2016	Oct.16, 2017
☒	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Oct.16, 2016	Oct.16, 2017
☒	Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct.27, 2016	Oct.27, 2017
☒	Double Ridged Horn Antenna	R&S	HF907	100276	Oct.12, 2016	Oct.12, 2017
☒	Pre-amplifier	A.H.	PAM-0118	360	Oct.16, 2016	Oct.16, 2017
☒	RF Cable	HUBSER	CP-X2	W11.03	Oct.16, 2016	Oct.16, 2017
☒	RF Cable	HUBSER	CP-X1	W12.02	Oct.16, 2016	Oct.16, 2017
☒	MI Cable	HUBSER	C10-01-01-1M	1091629	Oct.16, 2016	Oct.16, 2017
☒	Test software	Audix	E3	V 6.11111b	N/A	N/A
Instrument (Line Conducted Emission (AC Main))						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☒	Test Receiver	R&S	ESU8	100316	Oct.16, 2016	Oct.16, 2017
☒	LISN 1	R&S	ENV216	101109	Oct.16, 2016	Oct.16, 2017
☒	LISN 2	R&S	ESH2-Z5	100309	Oct.16, 2016	Oct.16, 2017

☒	Pulse Limiter	R&S	ESH3-Z2	101242	Oct.16, 2016	Oct.16, 2017
☒	CE Cable 1	HUBSER	ESU8/RF2	W10.01	Oct.16, 2016	Oct.16, 2017
☒	Test software	Audix	E3	V 6.11111b	N/A	N/A

6. MEASUREMENT METHODS

Clause	Test Items	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a)	Complied
2	Peak Conducted Output Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	Complied
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	Complied
4	Conducted Bandedge and Spurious Emission	FCC 15.247 (d) RSS-247 Clause 5.5	Complied
5	Radiated Bandedge and Spurious Emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied
Remark: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device.			

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB DTS BANDWIDTH AND 99% BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.1 (a)	6 dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

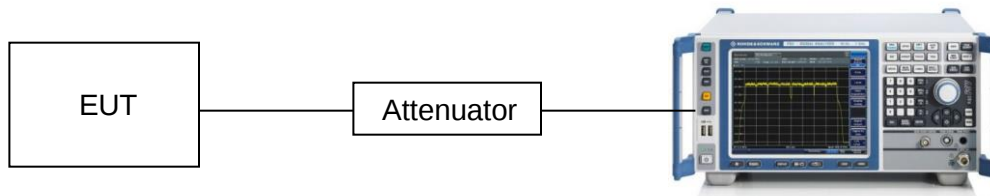
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Bandwidth : approximately $3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP



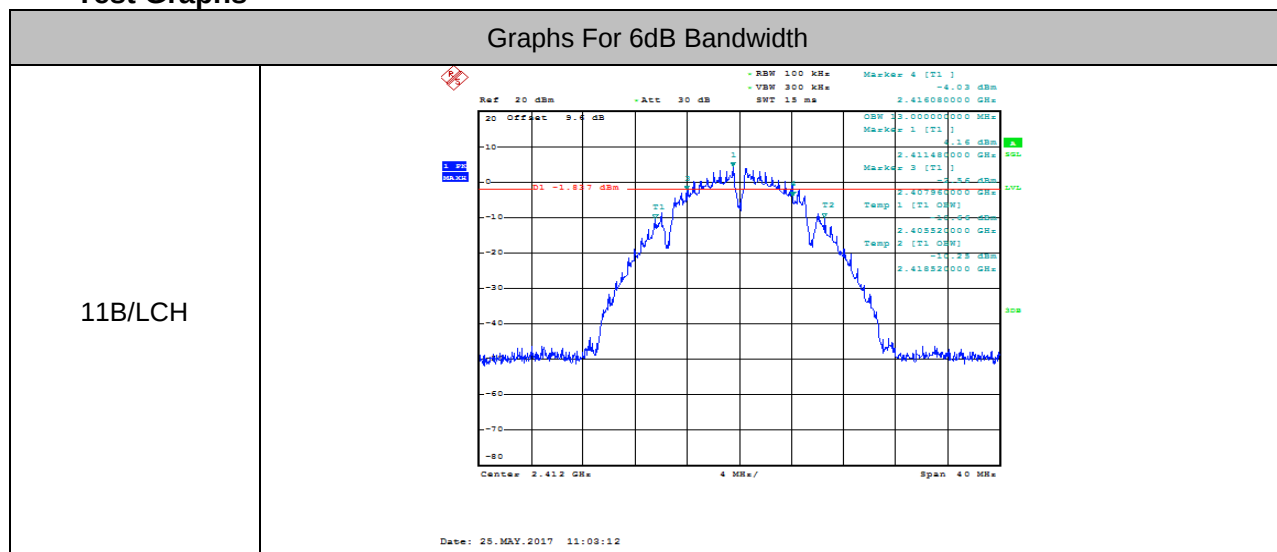
TEST CONDITIONS

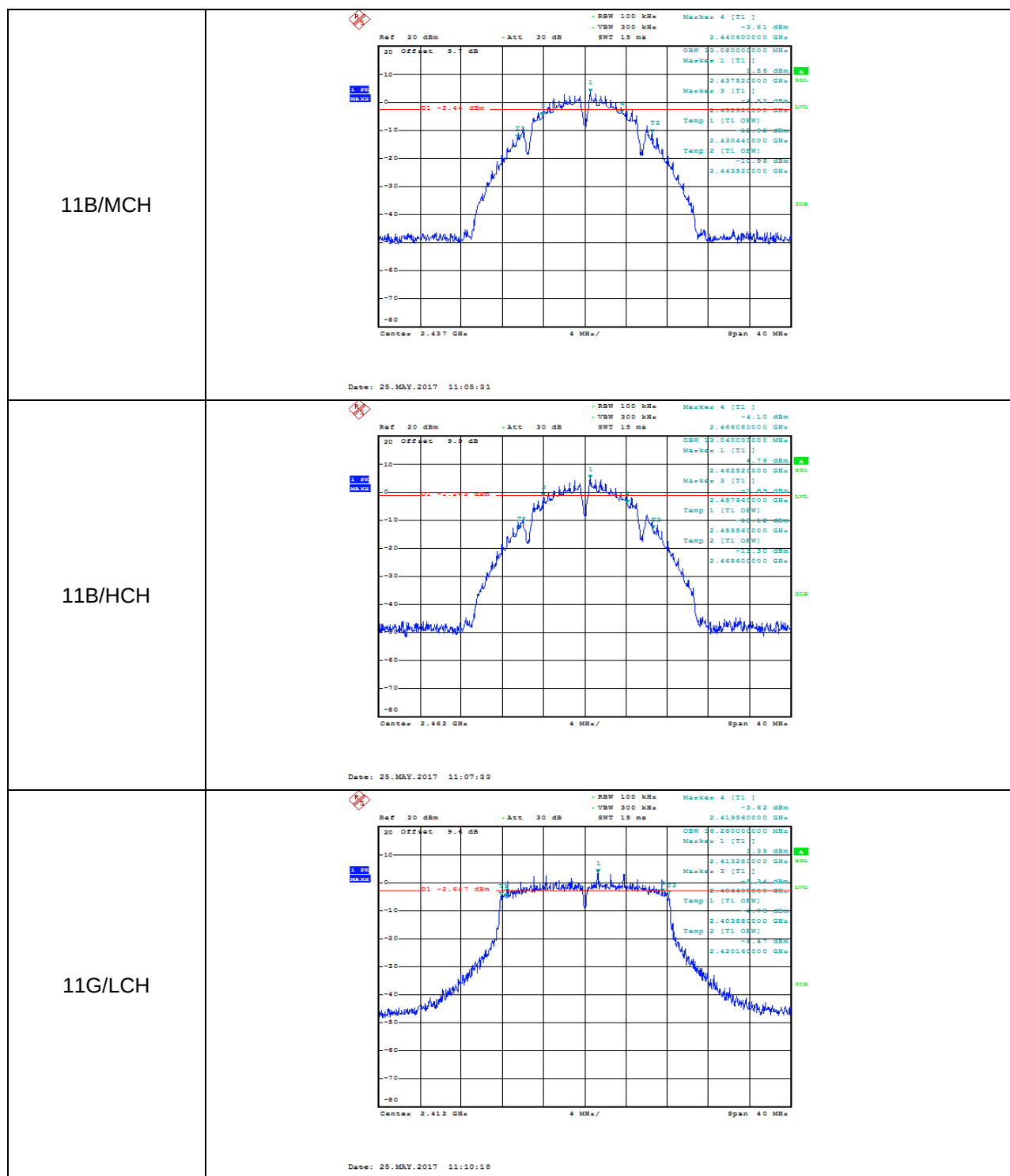
Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: 3.8Vdc

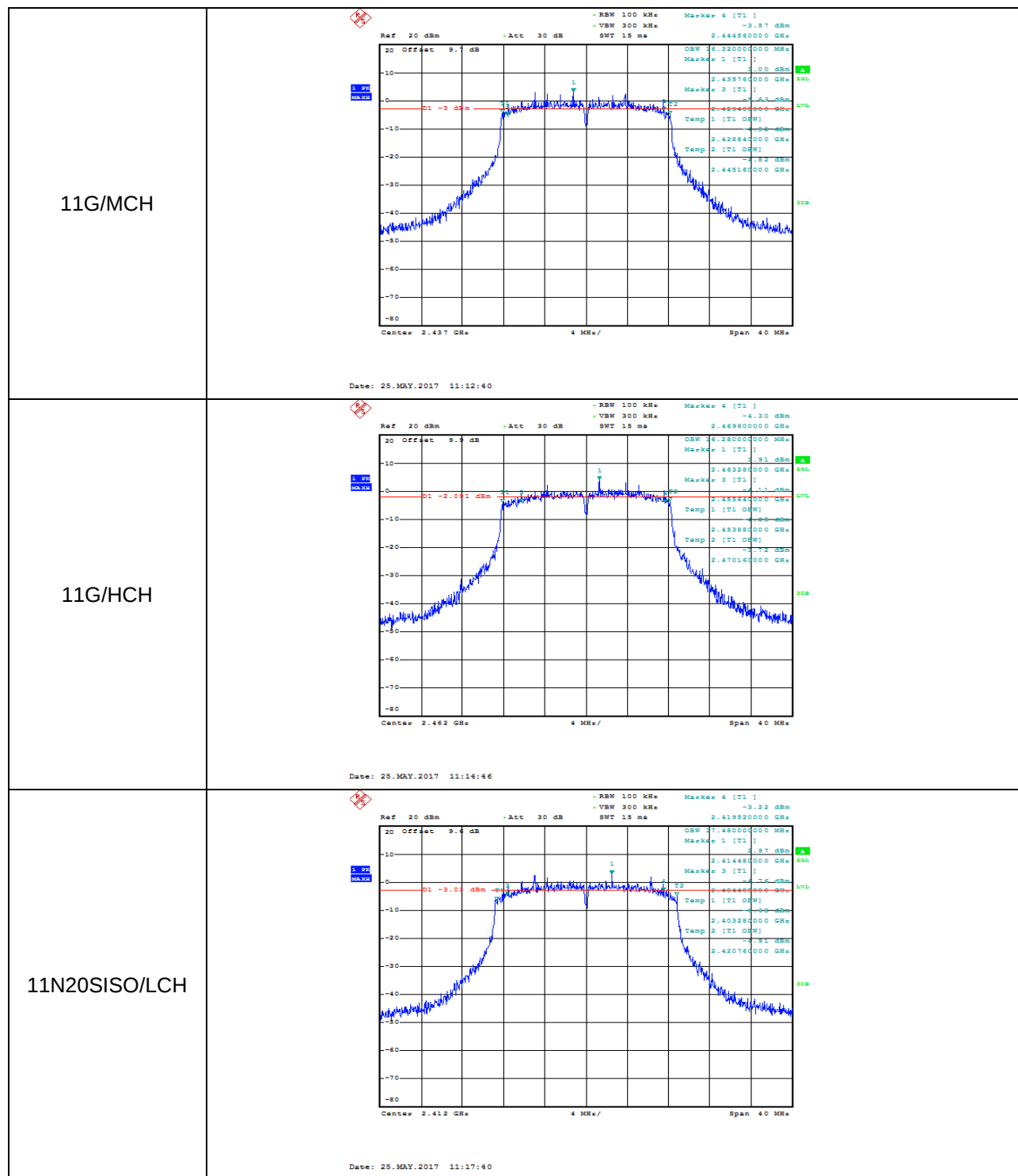
RESULTS

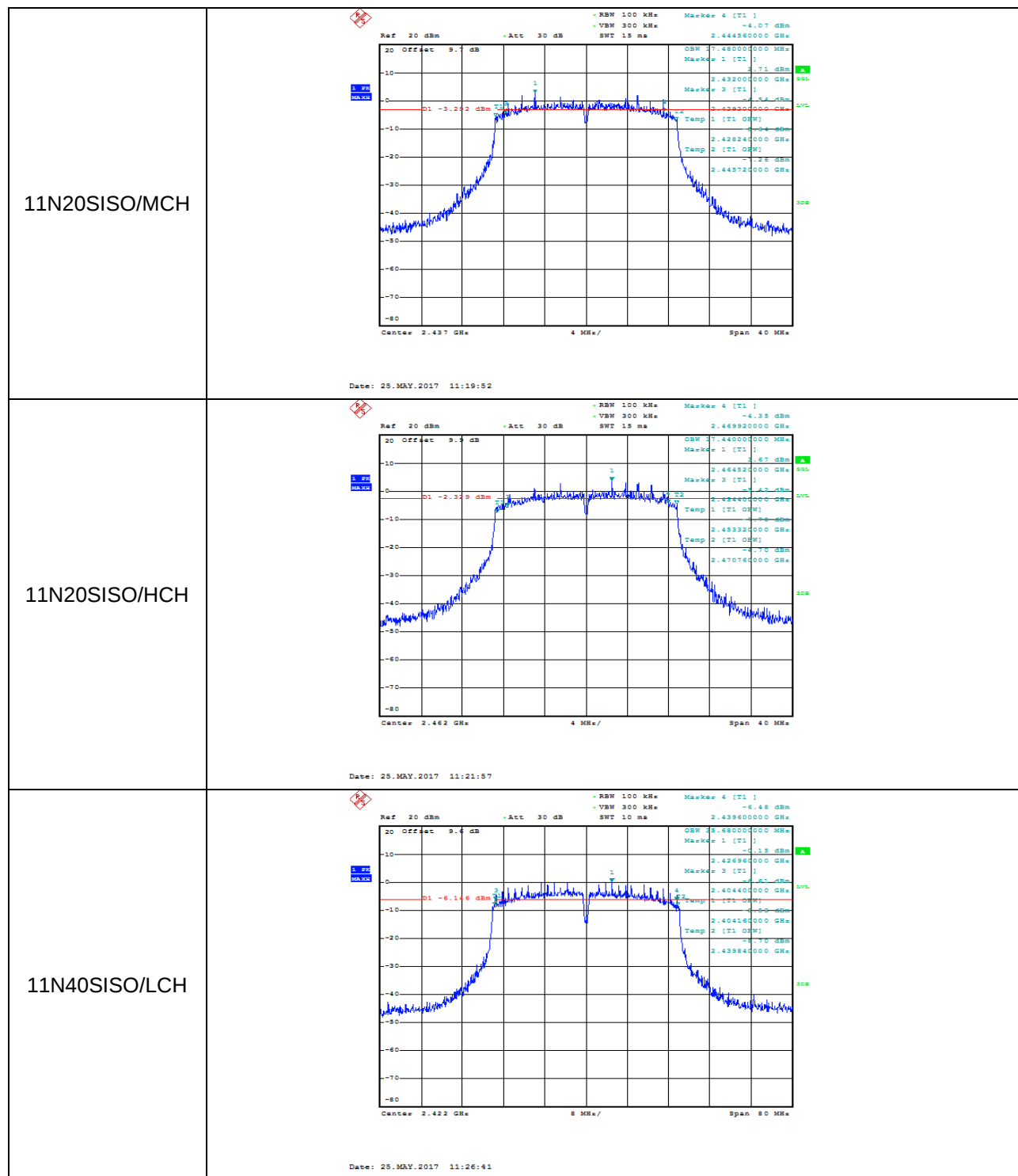
Mode	Channel	6dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
11B	LCH	8.120	13.120	PASS
11B	MCH	7.680	13.200	PASS
11B	HCH	8.120	13.200	PASS
11G	LCH	15.160	16.560	PASS
11G	MCH	15.160	16.560	PASS
11G	HCH	13.960	16.560	PASS
11N20SISO	LCH	15.120	17.600	PASS
11N20SISO	MCH	15.360	17.680	PASS
11N20SISO	HCH	15.520	17.640	PASS
11N40SISO	LCH	35.200	35.840	PASS
11N40SISO	MCH	34.000	36.080	PASS
11N40SISO	HCH	35.200	36.080	PASS

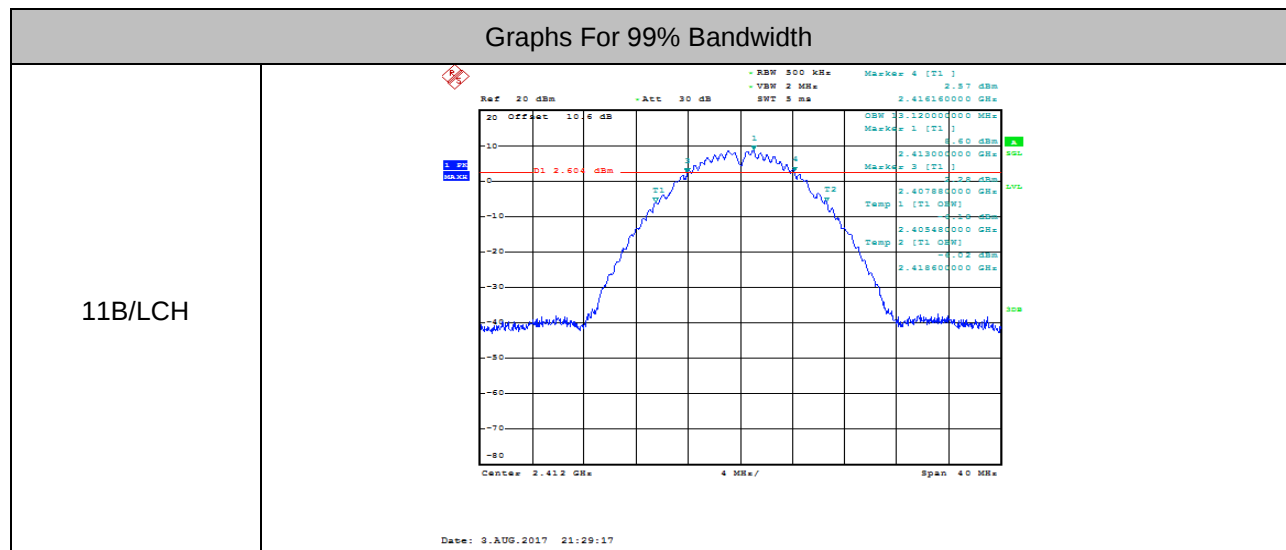
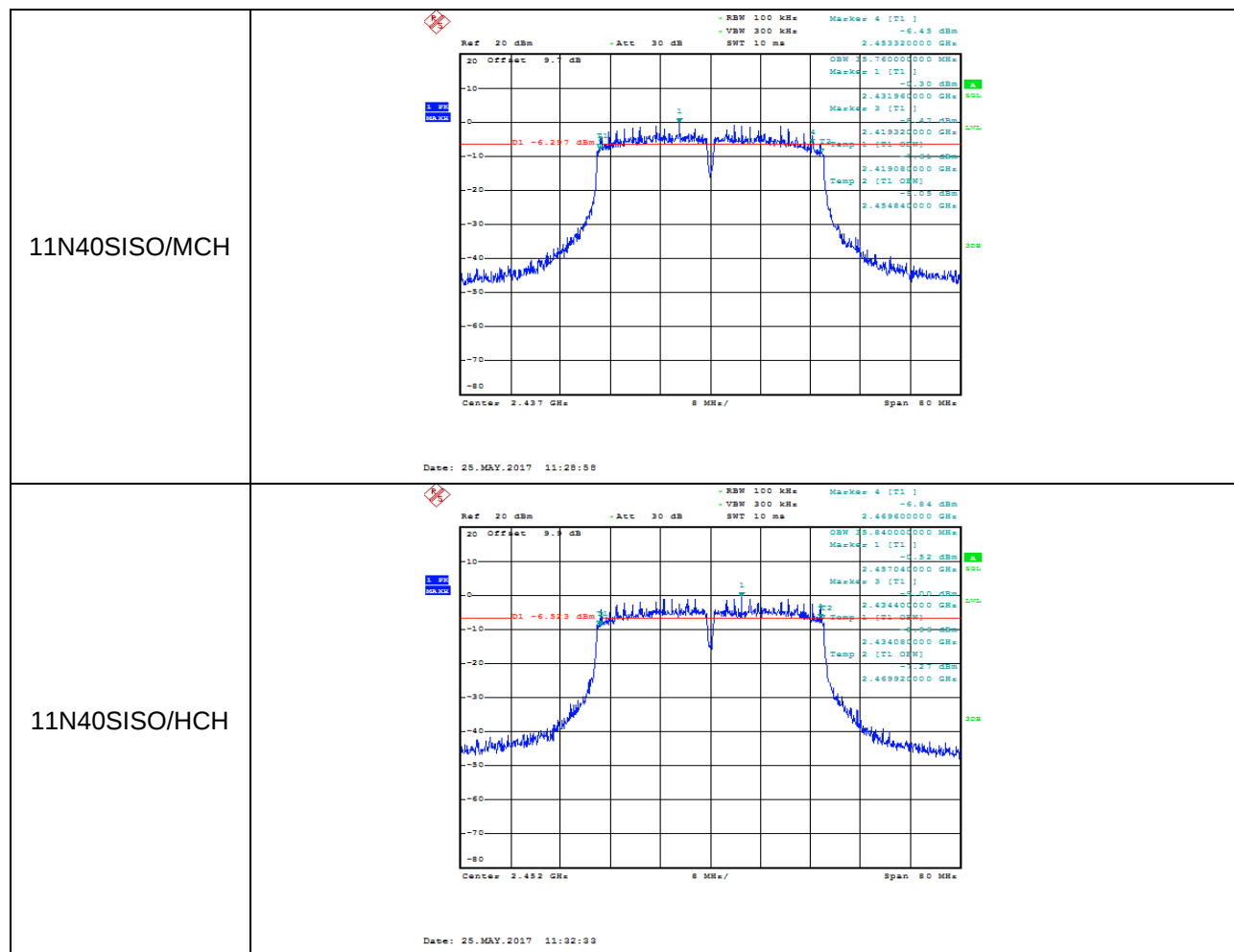
Test Graphs

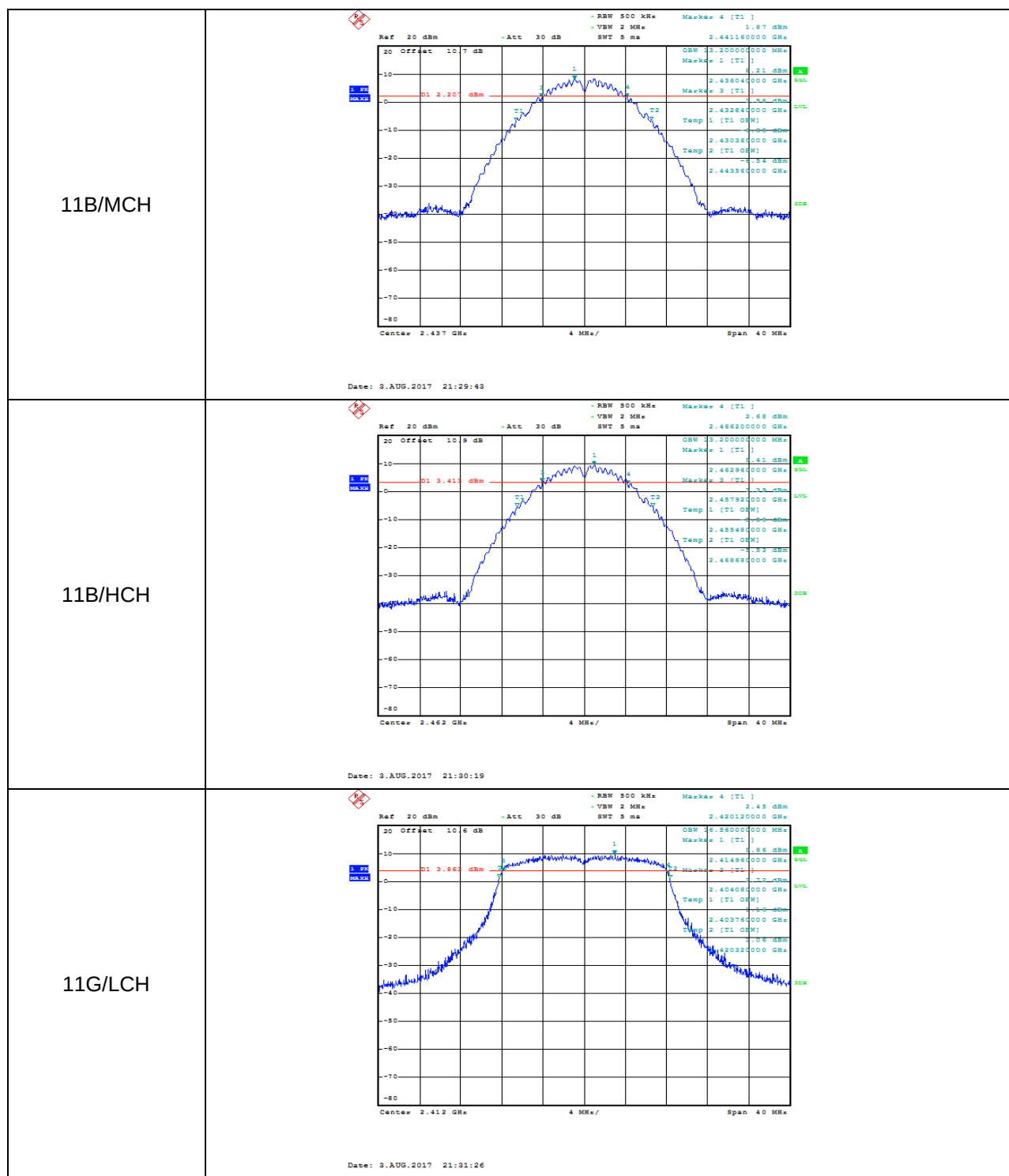


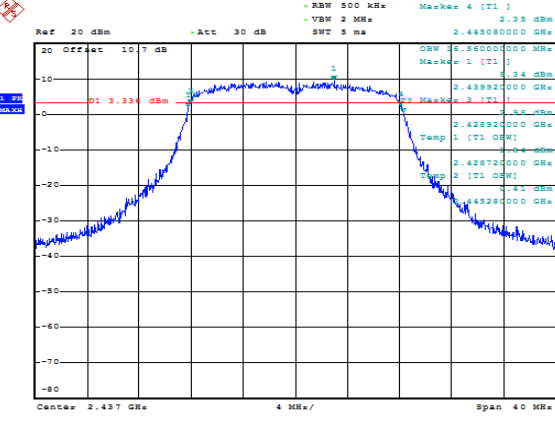
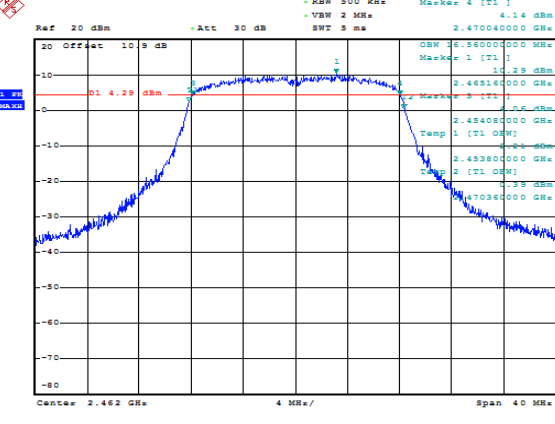
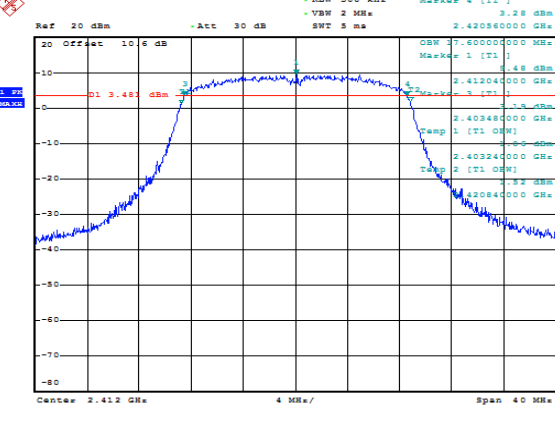


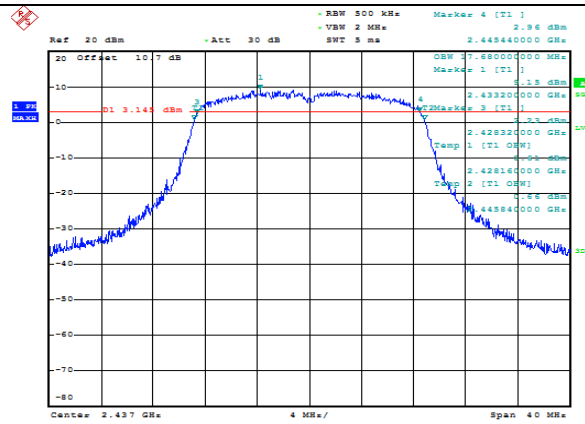








11G/MCH	 Ref 20 dBm - Att 30 dB - RBW 500 kHz - Marker 4 [T1] - VBW 2 MHz - 2.39 dBm SWT 5 ms 2.44900000 GHz 20 Offset 10.7 dB -10 -20 -30 -40 -50 -60 -70 -80 D1 3.33 dBm Marker 1 [T1] Marker 2 [T1] Marker 3 [T1] Marker 4 [T1] Temp 1 [T1 ON] Temp 2 [T1 ON] Temp 3 [T1 ON] Temp 4 [T1 ON] Center 2.437 GHz 4 MHz Span 40 MHz Date: 3.AUG.2017 21:31:50
11G/HCH	 Ref 20 dBm - Att 30 dB - RBW 500 kHz - Marker 4 [T1] - VBW 2 MHz - 4.14 dBm SWT 5 ms 2.47000000 GHz 20 Offset 10.9 dB -10 -20 -30 -40 -50 -60 -70 -80 D1 4.29 dBm Marker 1 [T1] Marker 2 [T1] Marker 3 [T1] Marker 4 [T1] Temp 1 [T1 ON] Temp 2 [T1 ON] Temp 3 [T1 ON] Temp 4 [T1 ON] Center 2.462 GHz 4 MHz Span 40 MHz Date: 3.AUG.2017 21:32:30
11N20SISO/LCH	 Ref 20 dBm - Att 30 dB - RBW 500 kHz - Marker 4 [T1] - VBW 2 MHz - 3.26 dBm SWT 5 ms 2.42000000 GHz 20 Offset 10.6 dB -10 -20 -30 -40 -50 -60 -70 -80 D1 3.48 dBm Marker 1 [T1] Marker 2 [T1] Marker 3 [T1] Marker 4 [T1] Temp 1 [T1 ON] Temp 2 [T1 ON] Temp 3 [T1 ON] Temp 4 [T1 ON] Center 2.412 GHz 4 MHz Span 40 MHz Date: 3.AUG.2017 21:36:59

[illegible]

Ref 20 dBm -Att 30 dB SNT 3 ms 2.439200000 GHz

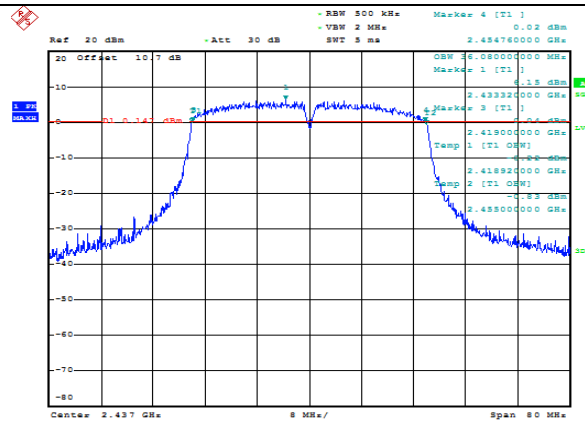
SWW 500 MHz -0.17 dBm Marker 4 [T1]
 VSW 2 MHz
 Marker 1 [T1]
 Marker 2 [T1]
 Marker 3 [T1]
 Marker 4 [T1]
 Temp 1 [T1 SWW]
 Temp 2 [T1 SWW]
 Temp 3 [T1 SWW]
 Temp 4 [T1 SWW]

01 1.268 dBm
 02 2.27 dBm

Center 2.422 GHz Span 80 MHz

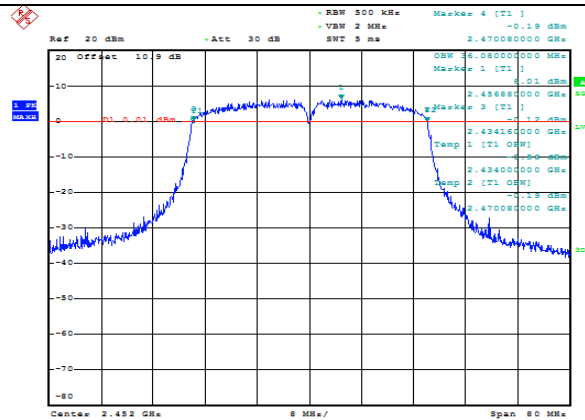
11N40SISO/LCH

11N40SISO/MCH



Date: 3.AUG.2017 21:40:29

11N40SISO/HCH



Date: 3.AUG.2017 21:40:52

7.2. PEAK CONDUCTED OUTPUT POWER

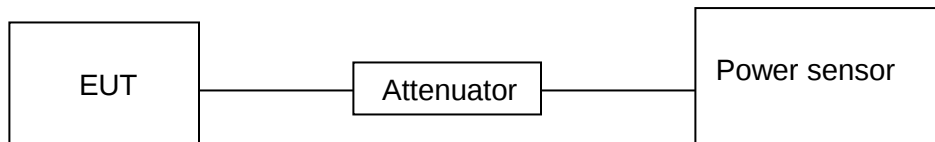
LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) RSS-247 5.4 (e)	Peak Output Power	1 watt or 30dBm	2400-2483.5

TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure peak power each channel.

TEST SETUP



TEST CONDITIONS

Temperature: 26.6°C
Relative Humidity: 58%
Test Voltage: 3.8Vdc

RESULTS

Mode	Channel	Peak.Power [dBm]	Verdict
11B	LCH	12.24	PASS
11B	MCH	12.03	PASS
11B	HCH	12.08	PASS
11G	LCH	14.79	PASS
11G	MCH	14.80	PASS
11G	HCH	14.65	PASS
11N20SISO	LCH	14.96	PASS
11N20SISO	MCH	14.87	PASS
11N20SISO	HCH	14.59	PASS
11N40SISO	LCH	14.71	PASS
11N40SISO	MCH	14.94	PASS
11N40SISO	HCH	14.79	PASS

7.3. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

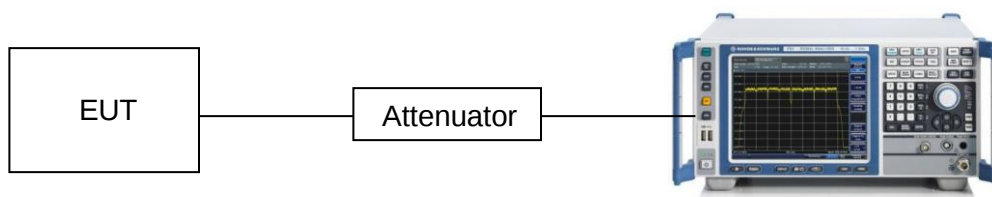
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



TEST CONDITIONS

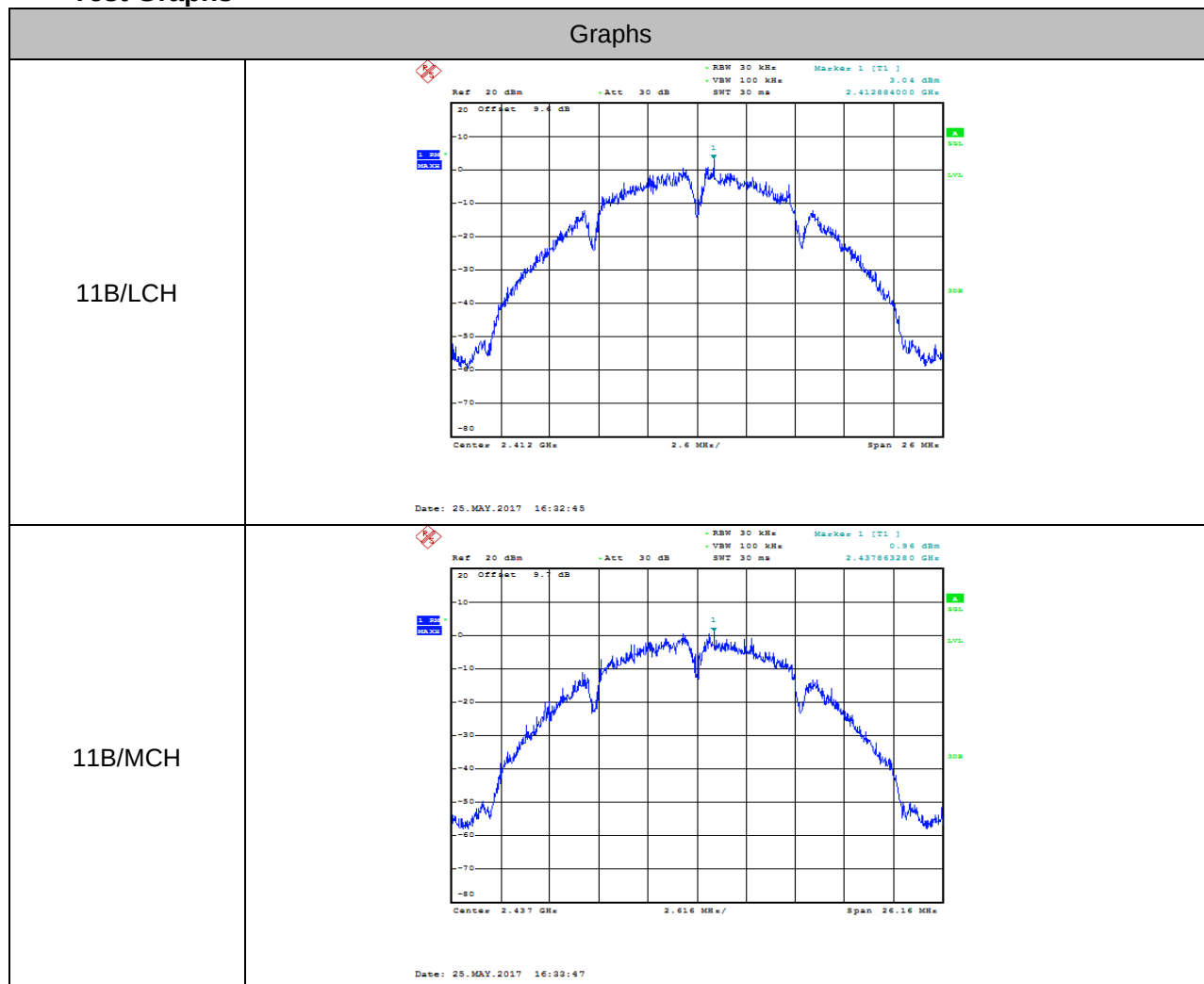
Temperature: 27°C
Relative Humidity: 60%

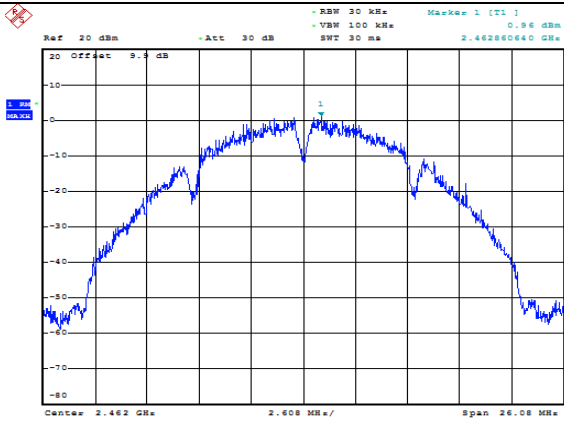
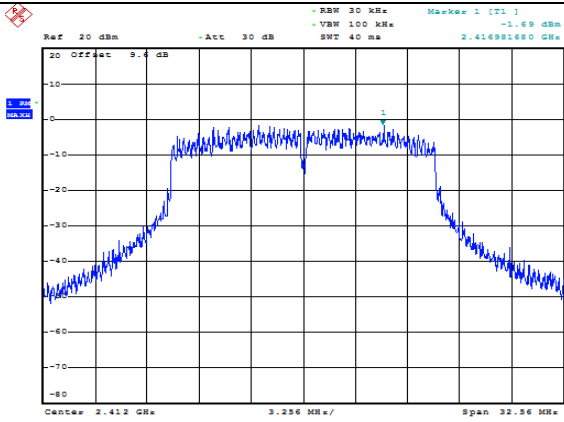
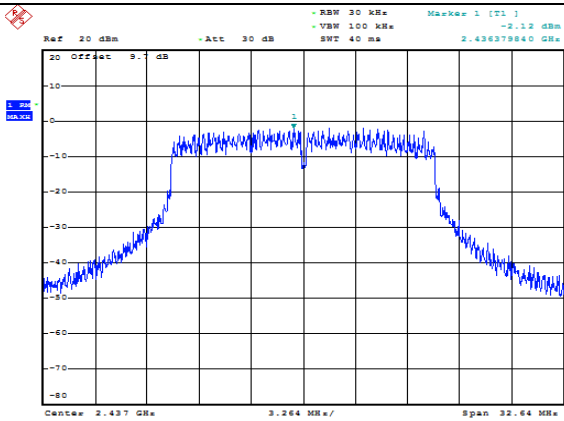
Test Voltage: 3.8Vdc

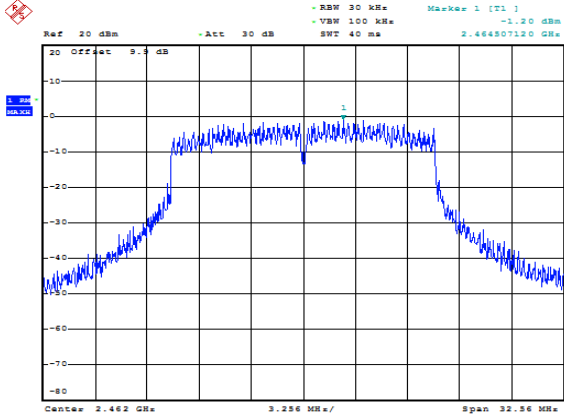
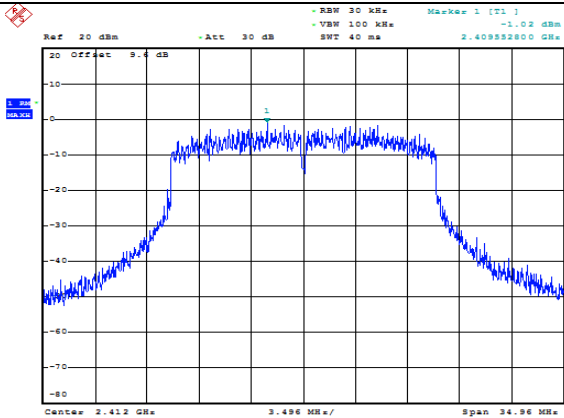
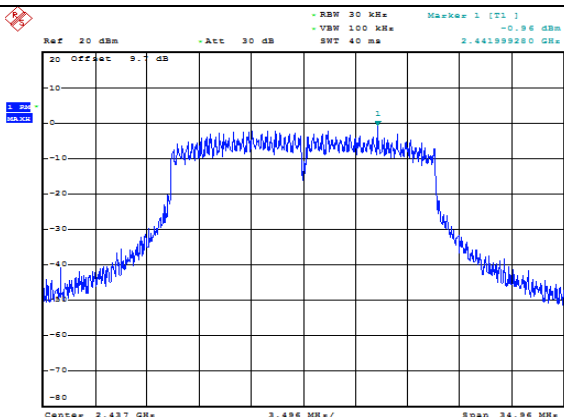
RESULTS

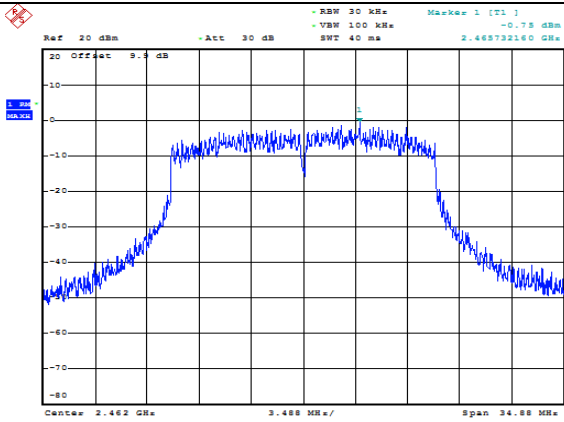
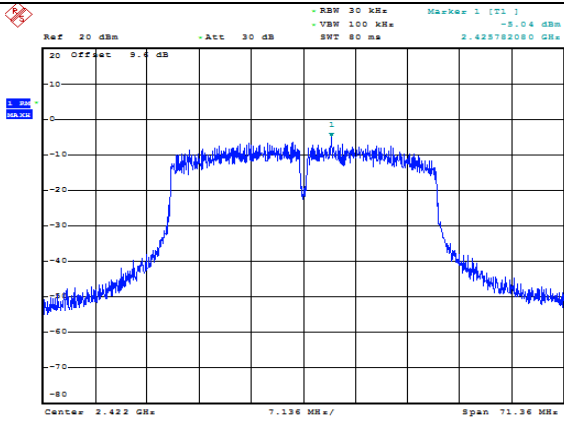
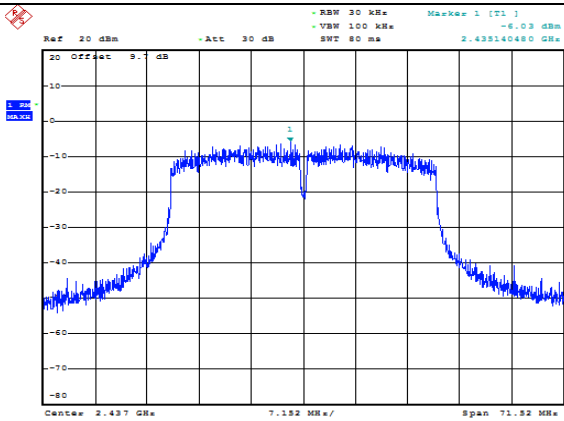
Mode	Channel	Meas.Level [dBm/30kHz]	Verdict
11B	LCH	3.040	PASS
11B	MCH	0.960	PASS
11B	HCH	0.960	PASS
11G	LCH	-1.690	PASS
11G	MCH	-2.120	PASS
11G	HCH	-1.200	PASS
11N20SISO	LCH	-1.020	PASS
11N20SISO	MCH	-0.960	PASS
11N20SISO	HCH	-0.750	PASS
11N40SISO	LCH	-5.040	PASS
11N40SISO	MCH	-6.030	PASS
11N40SISO	HCH	-6.780	PASS

Test Graphs

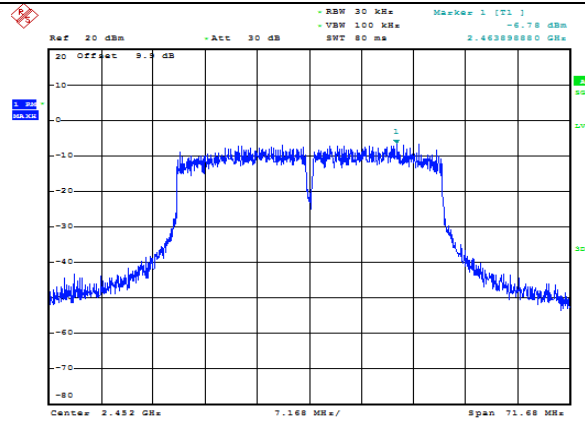


11B/HCH	 Ref 20 dBm -Att 30 dB -RBW 30 kHz Marker 1 [T1] -VBW 100 kHz 0.96 dBm SWT 30 ms 2.462860640 GHz 20 Offset 9.4 dB Center 2.462 GHz 2.608 MHz/ Span 26.08 MHz Date: 25.MAY.2017 16:34:19
11G/LCH	 Ref 20 dBm -Att 30 dB -RBW 30 kHz Marker 1 [T1] -VBW 100 kHz -1.69 dBm SWT 40 ms 2.412981680 GHz 20 Offset 9.4 dB Center 2.412 GHz 3.256 MHz/ Span 32.56 MHz Date: 25.MAY.2017 16:36:13
11G/MCH	 Ref 20 dBm -Att 30 dB -RBW 30 kHz Marker 1 [T1] -VBW 100 kHz -2.12 dBm SWT 40 ms 2.436379840 GHz 20 Offset 9.4 dB Center 2.437 GHz 3.264 MHz/ Span 32.64 MHz Date: 25.MAY.2017 16:37:15

11G/HCH	 Ref 20 dBm - Att 30 dB - RBW 30 KHz Marker 1 [T1] - VBW 100 KHz -1.20 dBm SWT 40 ms 2.42507120 GHz 20 Offset 9.4 dB Center 2.425 GHz 3.256 MHz/ Span 32.56 MHz Date: 25.MAY.2017 16:38:10
11N20SISO/LCH	 Ref 20 dBm - Att 30 dB - RBW 30 KHz Marker 1 [T1] - VBW 100 KHz -1.02 dBm SWT 40 ms 2.409552800 GHz 20 Offset 9.4 dB Center 2.412 GHz 3.496 MHz/ Span 34.96 MHz Date: 25.MAY.2017 16:39:46
11N20SISO/MCH	 Ref 20 dBm - Att 30 dB - RBW 30 KHz Marker 1 [T1] - VBW 100 KHz -0.96 dBm SWT 40 ms 2.441999280 GHz 20 Offset 9.4 dB Center 2.437 GHz 3.496 MHz/ Span 34.96 MHz Date: 25.MAY.2017 16:42:05

11N20SISO/HCH	 Ref 20 dBm - Att 30 dB - RBW 30 kHz - VBW 100 kHz - Span 34.68 MHz Marker 1 [T1] -5.75 dBm - 2.46232160 GHz 20 Offset 9.4 dB Center 2.462 GHz 3.468 MHz/ Date: 25.MAY.2017 16:43:25
11N40SISO/LCH	 Ref 20 dBm - Att 30 dB - RBW 30 kHz - VBW 100 kHz - Span 71.36 MHz Marker 1 [T1] -5.04 dBm - 2.425782080 GHz 20 Offset 9.4 dB Center 2.422 GHz 7.136 MHz/ Date: 25.MAY.2017 16:46:06
11N40SISO/MCH	 Ref 20 dBm - Att 30 dB - RBW 30 kHz - VBW 100 kHz - Span 71.52 MHz Marker 1 [T1] -6.03 dBm - 2.435140480 GHz 20 Offset 9.4 dB Center 2.437 GHz 7.152 MHz/ Date: 25.MAY.2017 16:46:57

11N40SISO/HCH



7.4. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2		
Section	Test Item	Limit
FCC §15.247 (d) RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

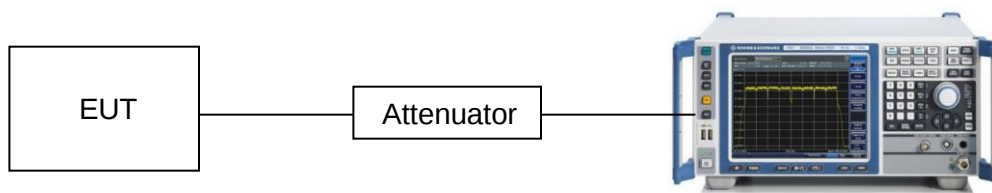
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

TEST SETUP

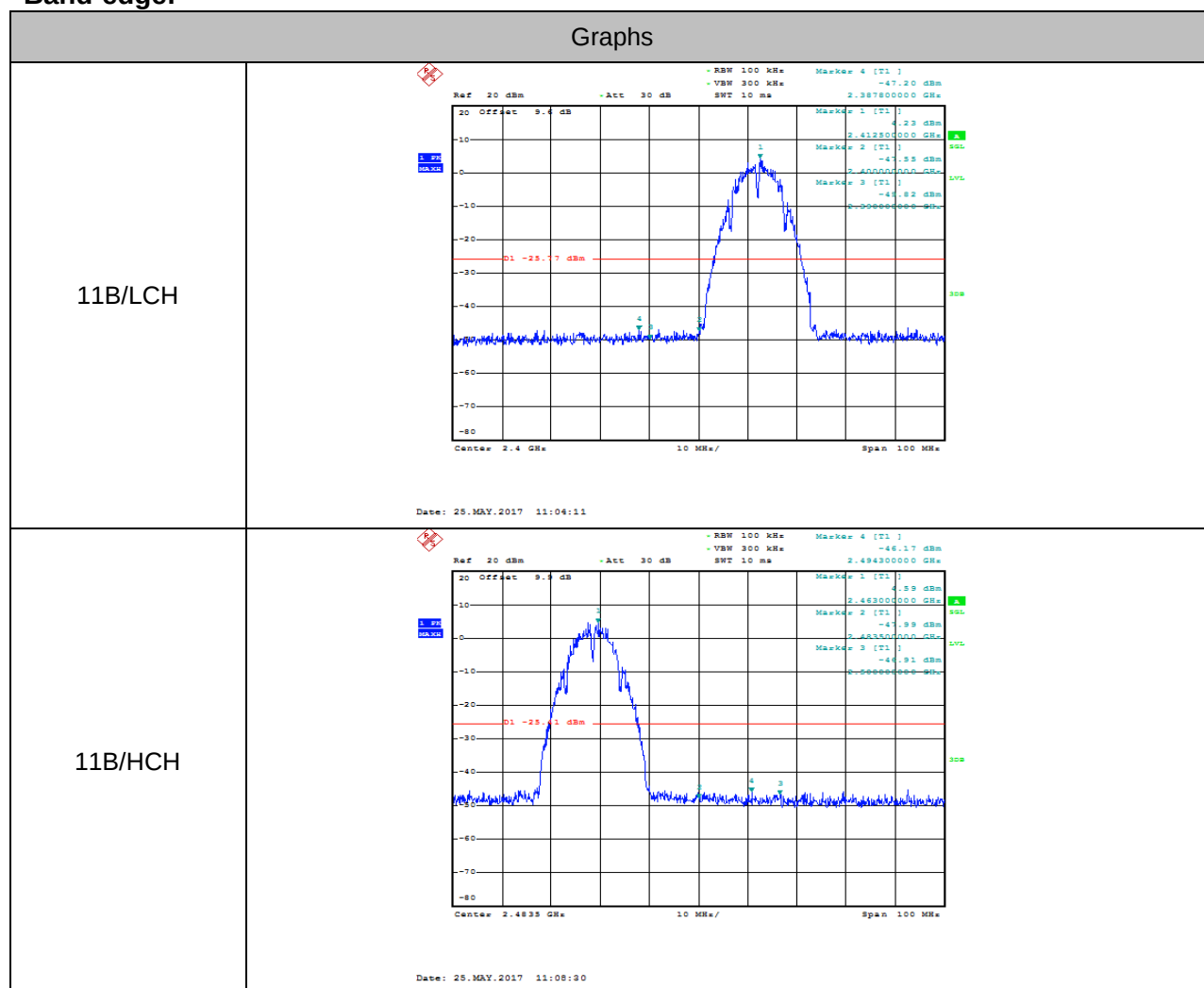


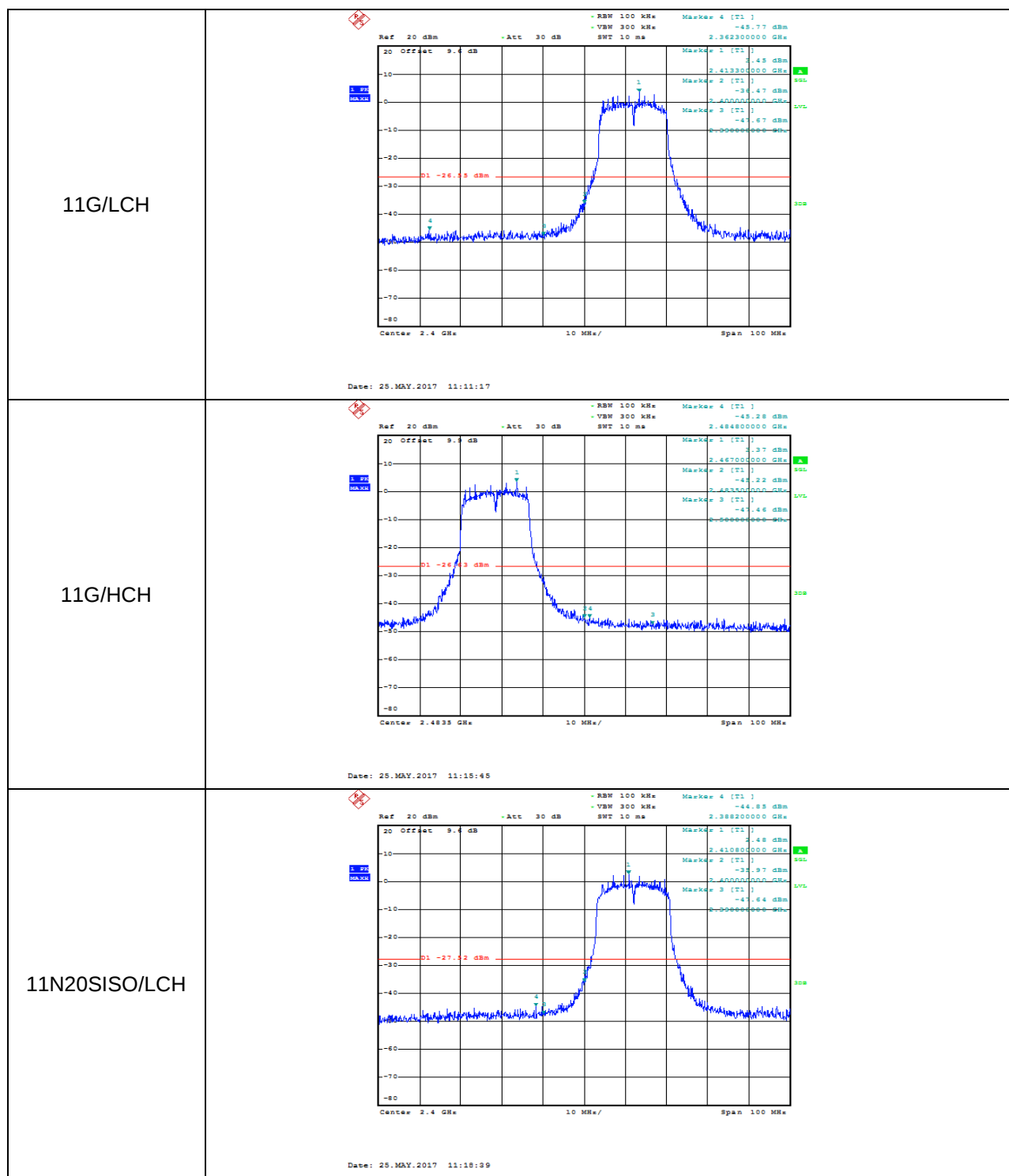
TEST CONDITIONS

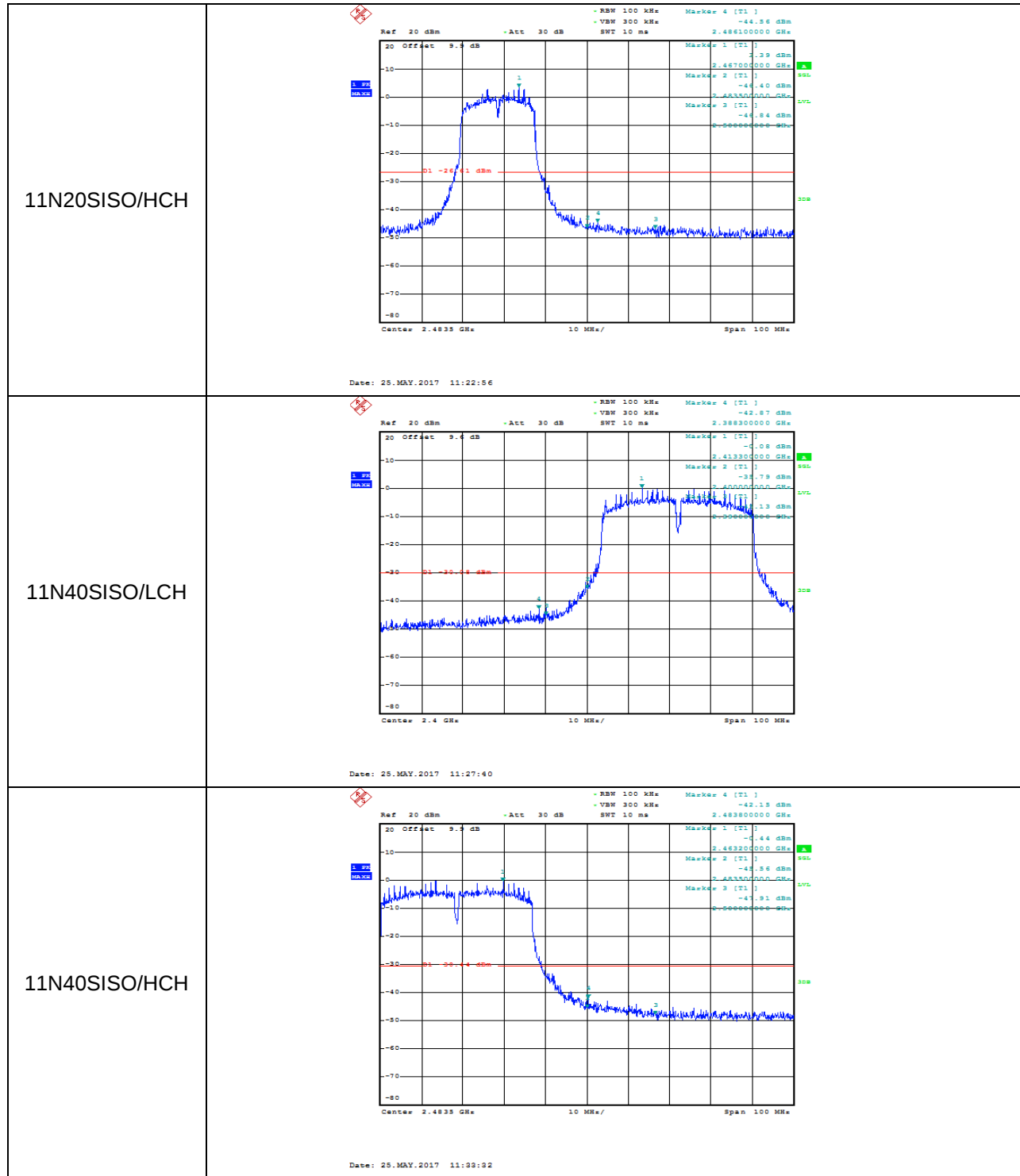
Temperature: 27°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

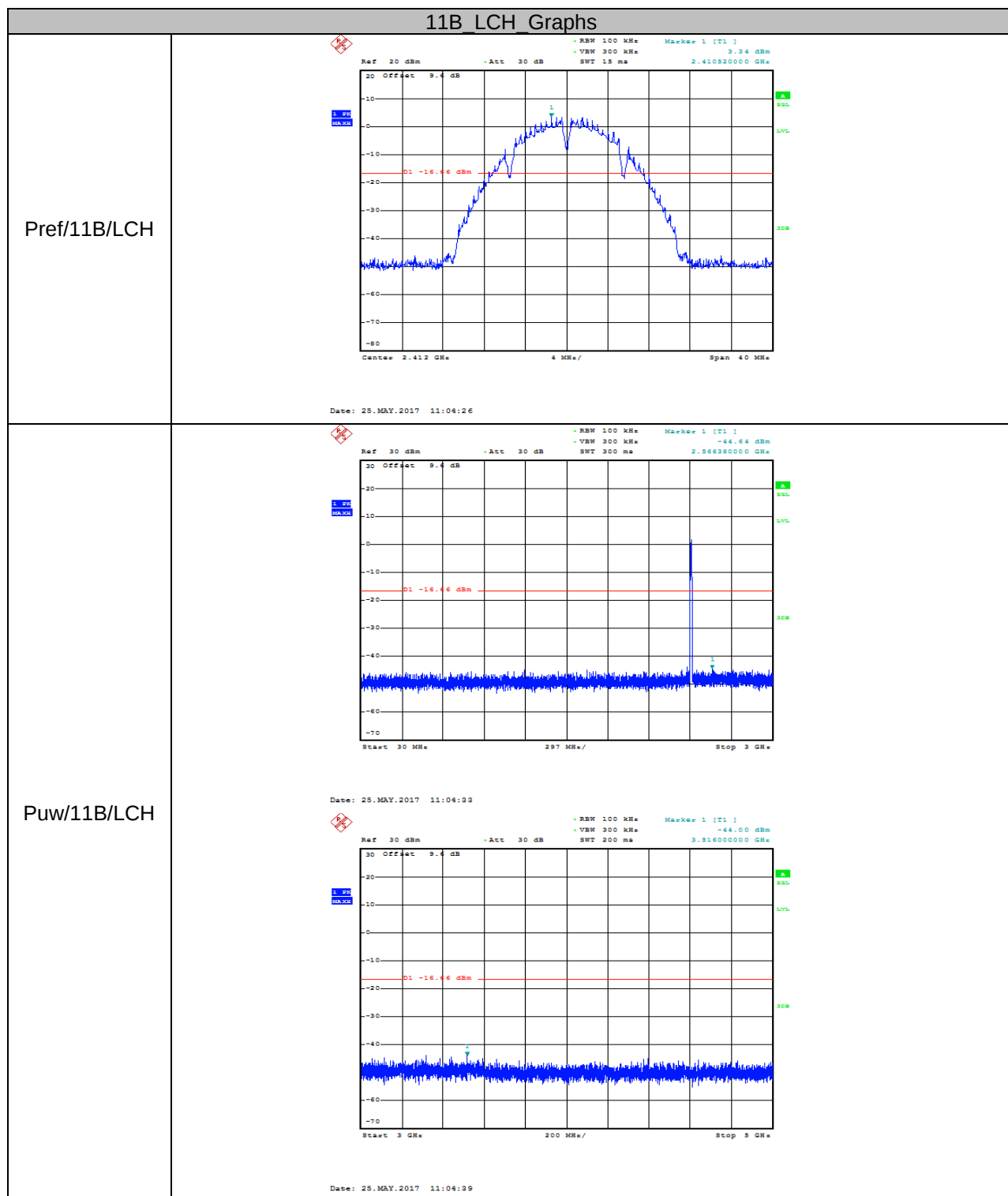
Band-edge:

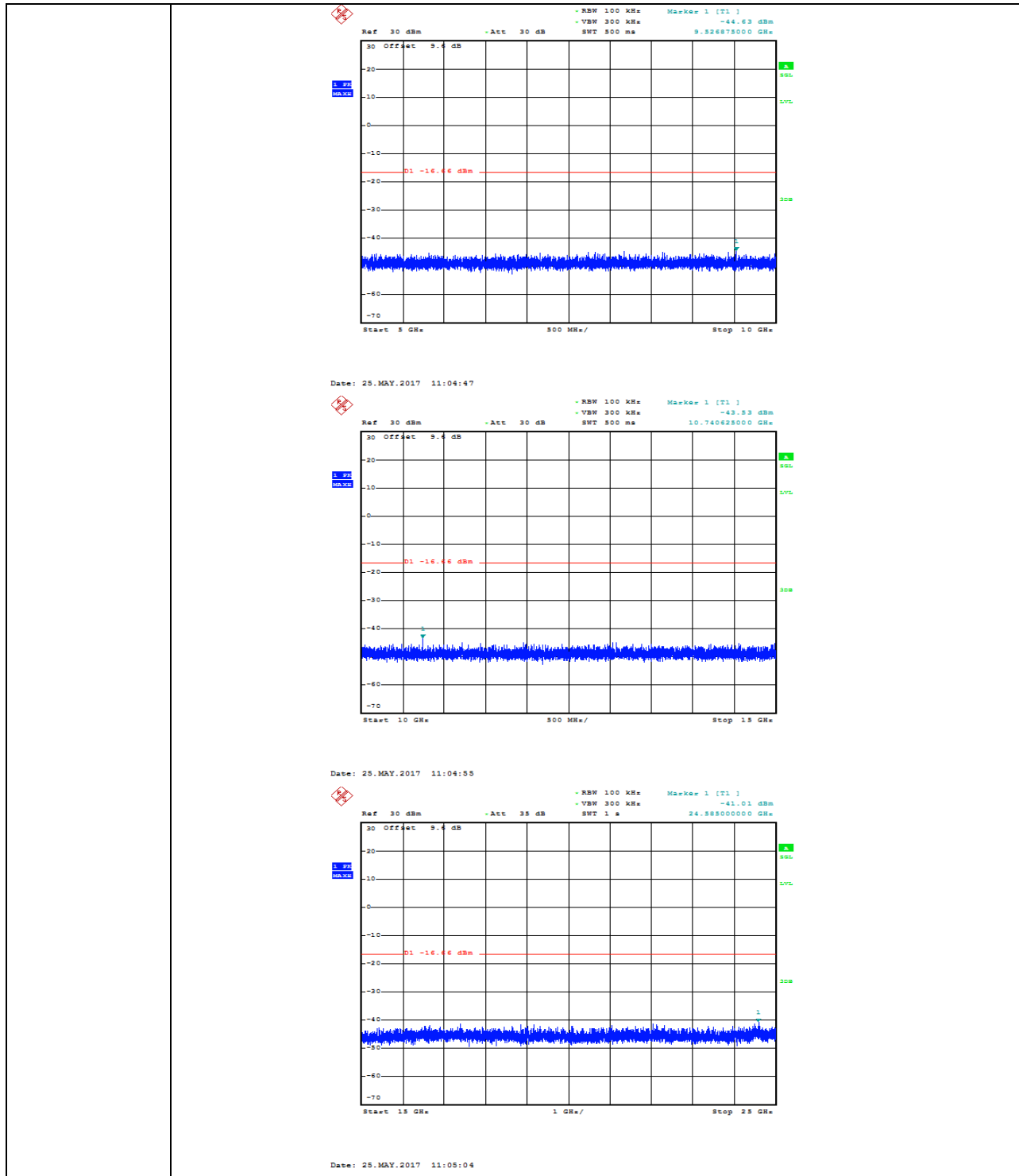


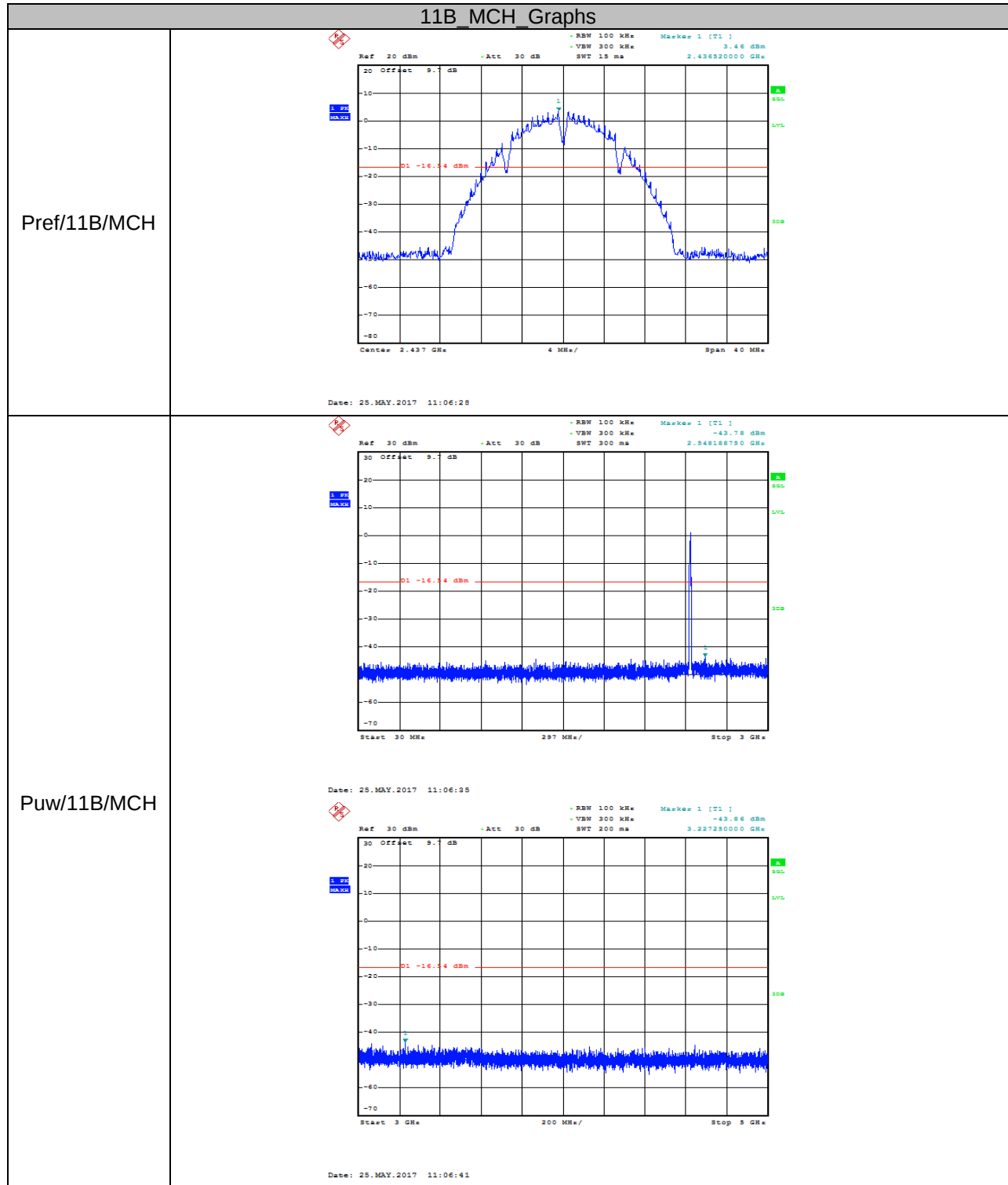


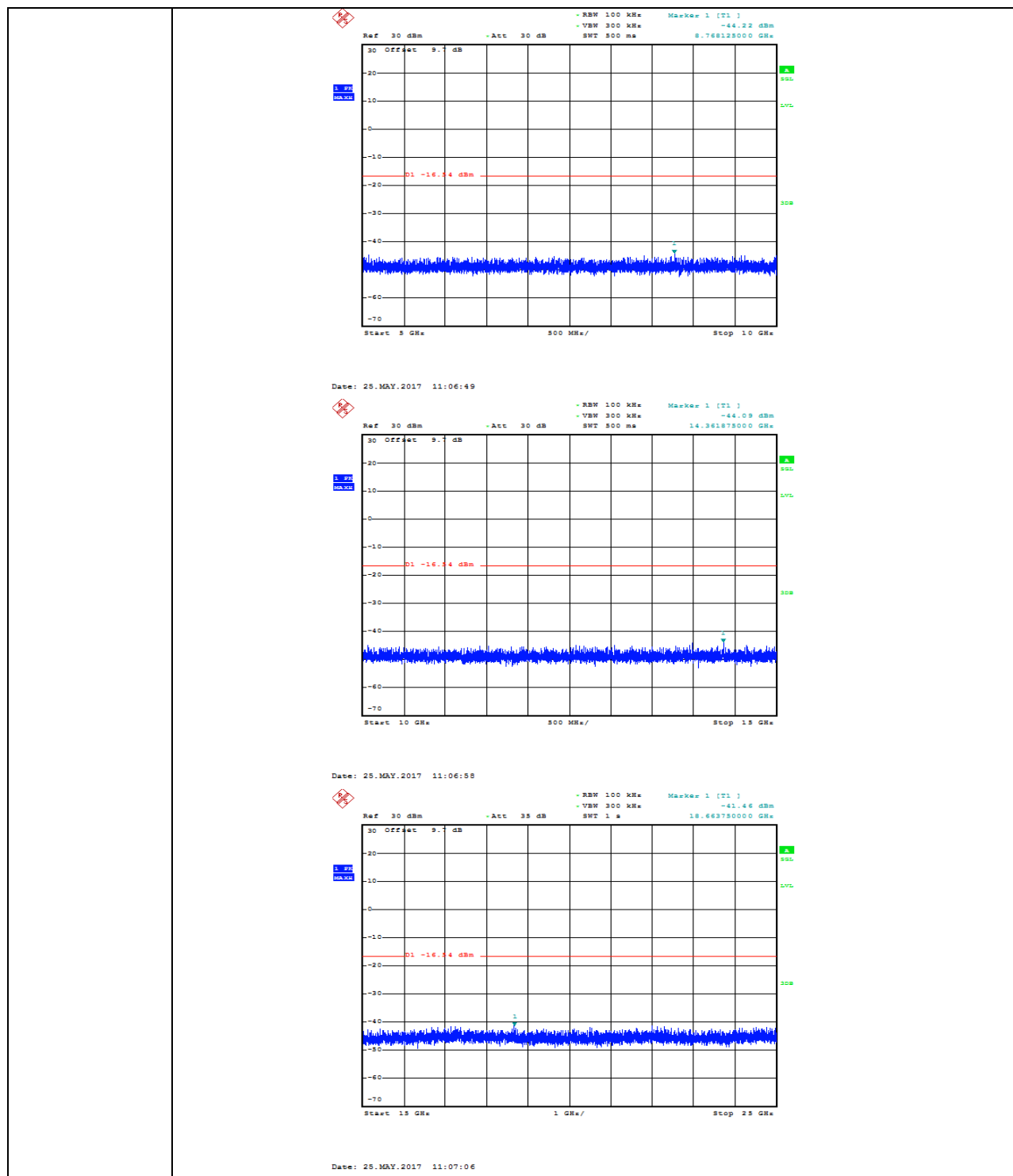


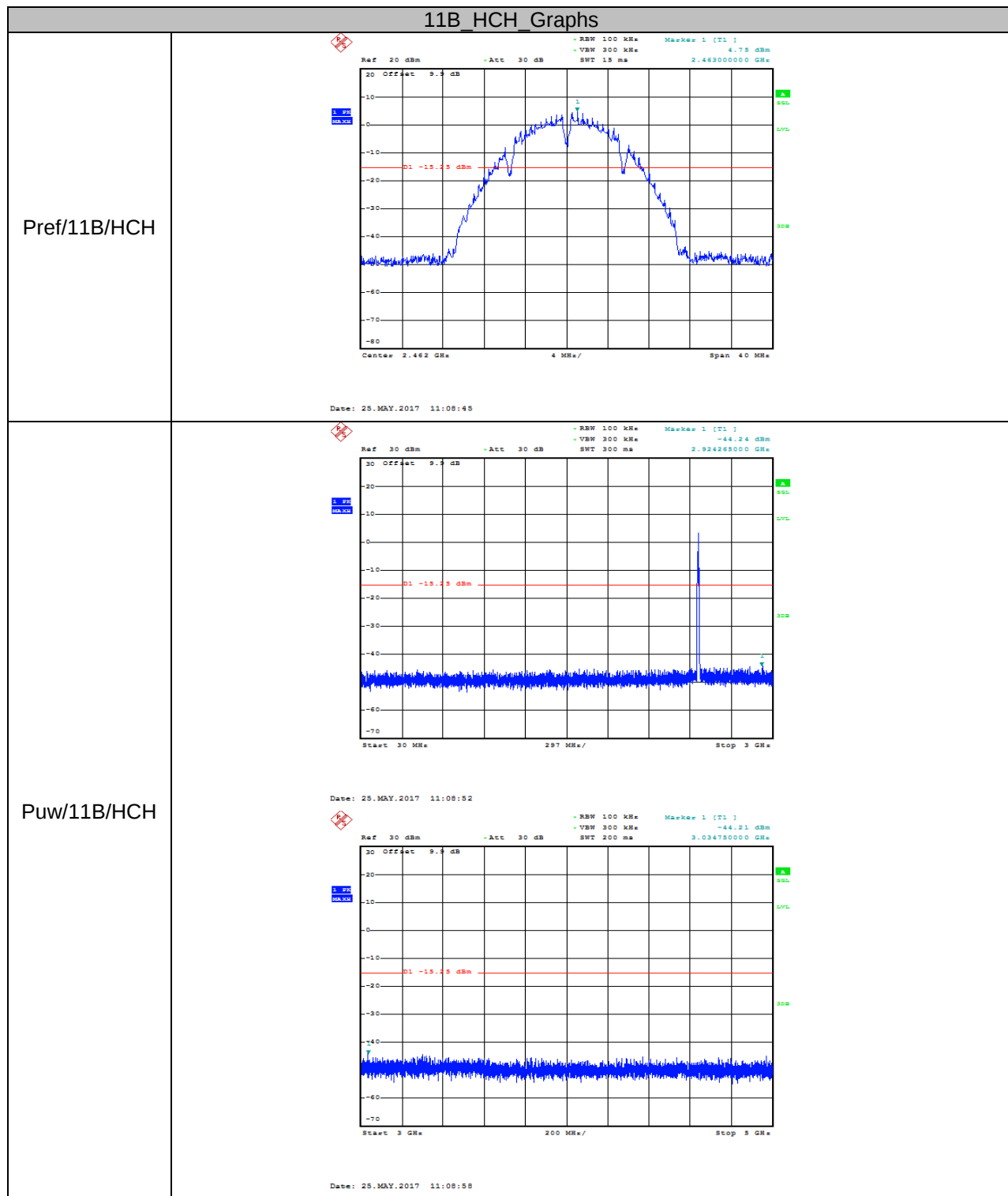
Spurious Emissions:

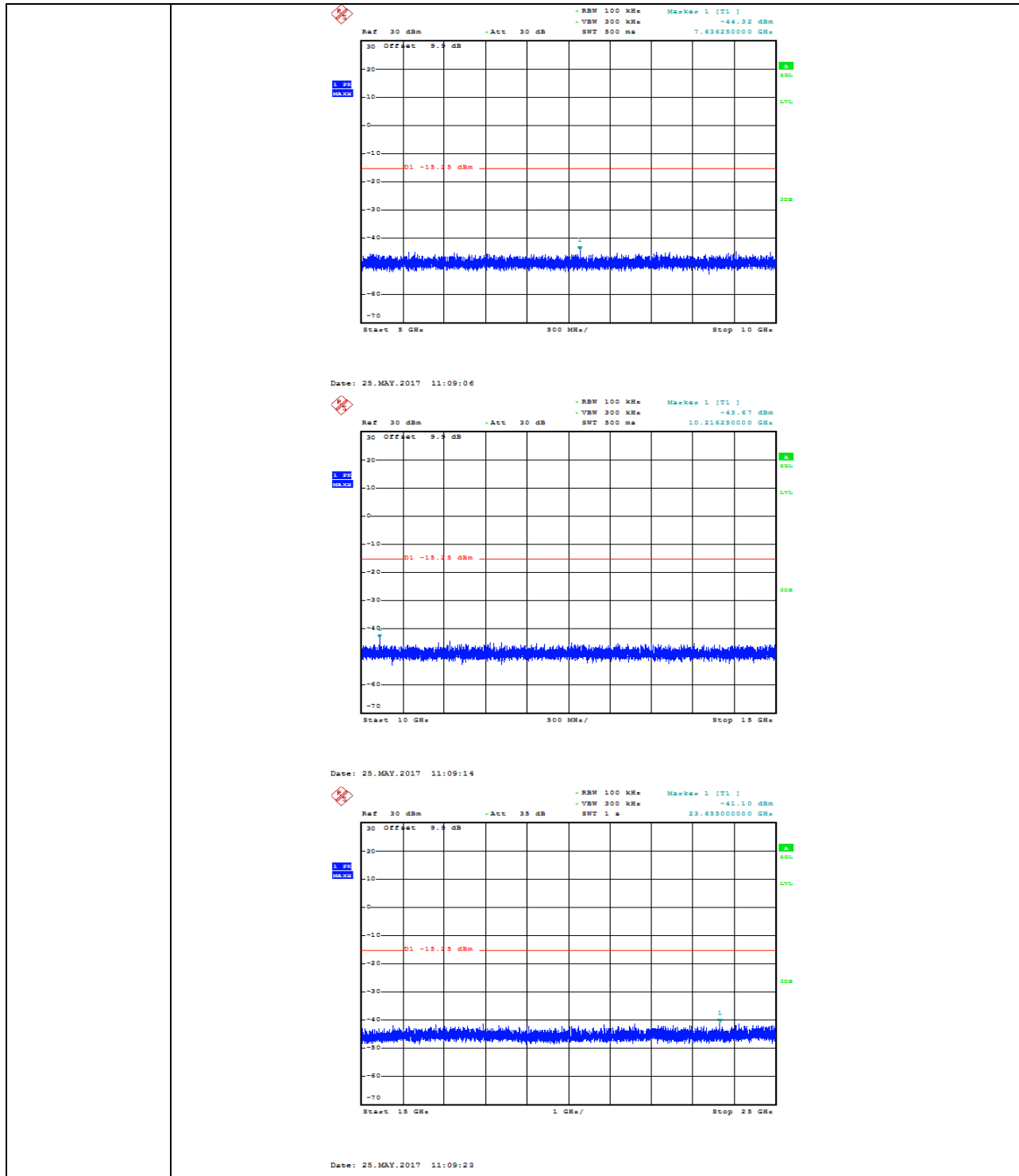


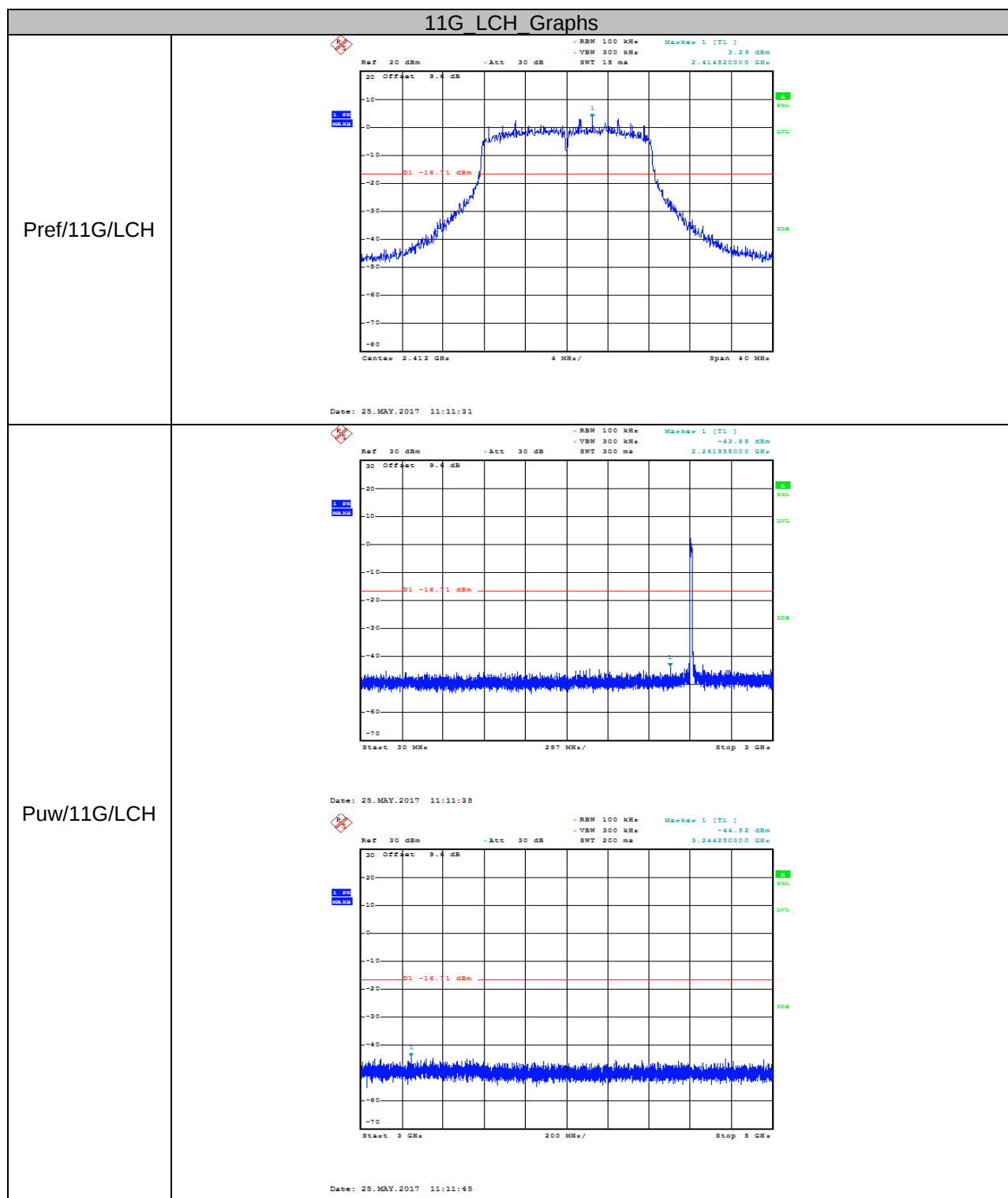


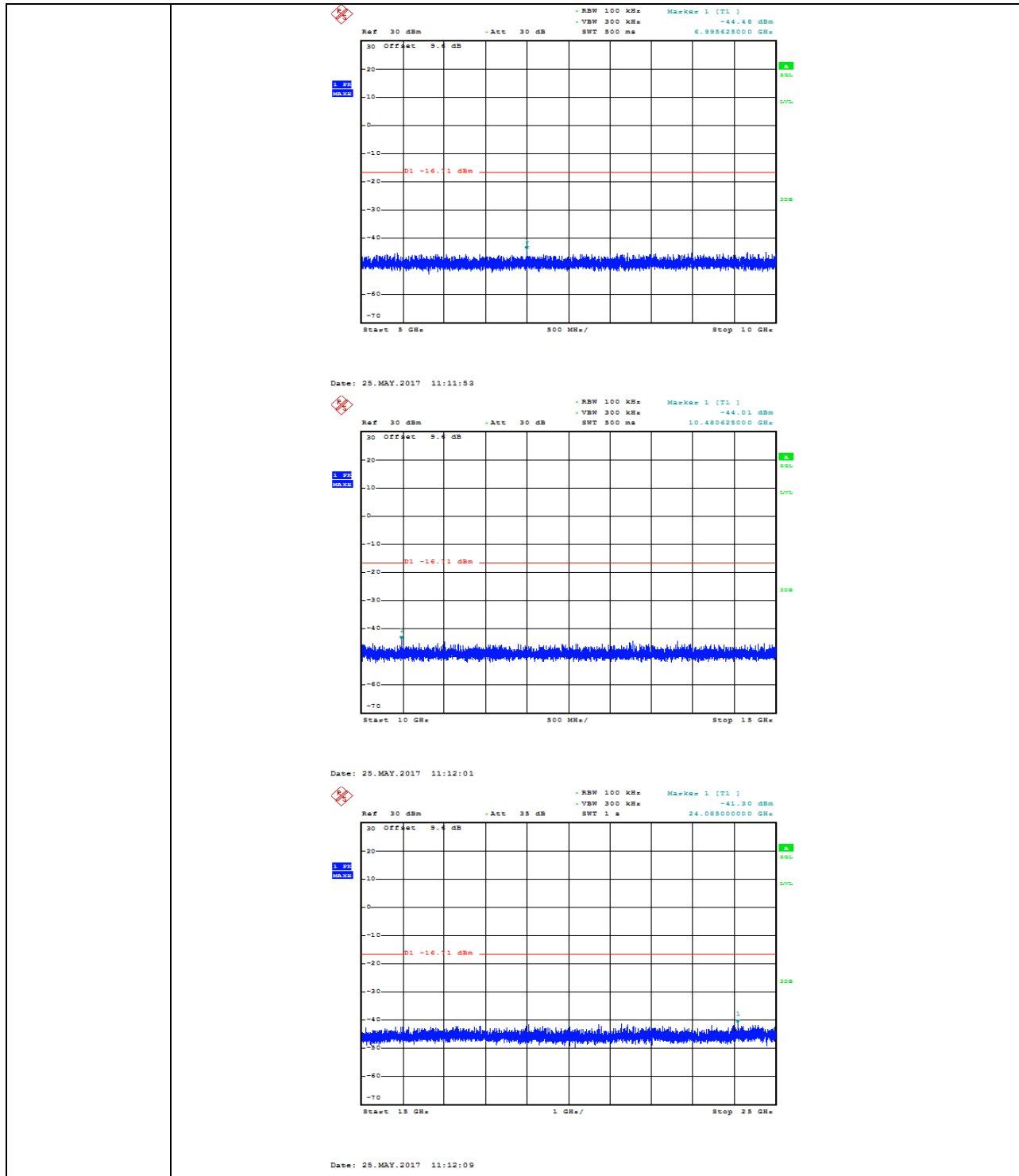




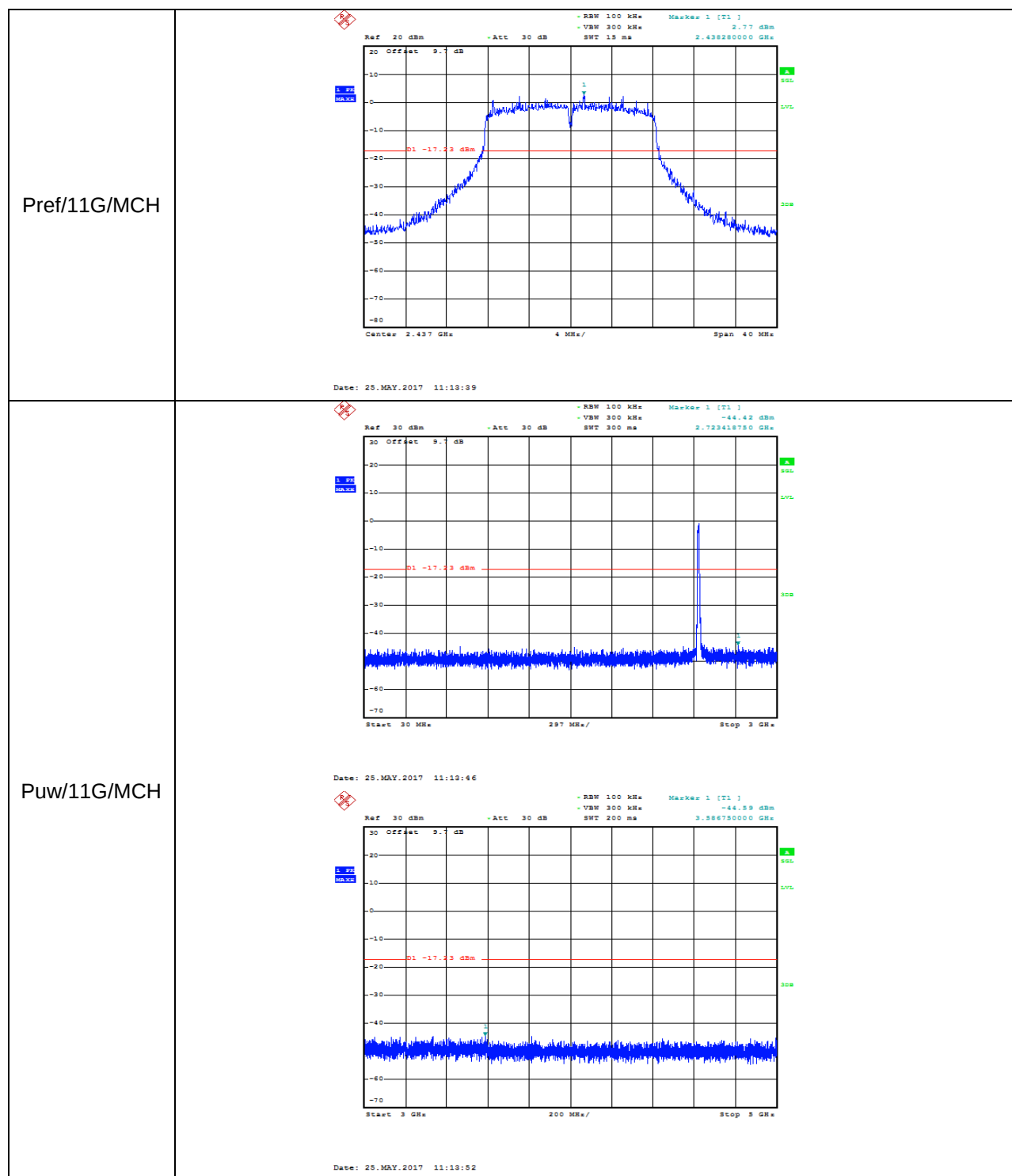




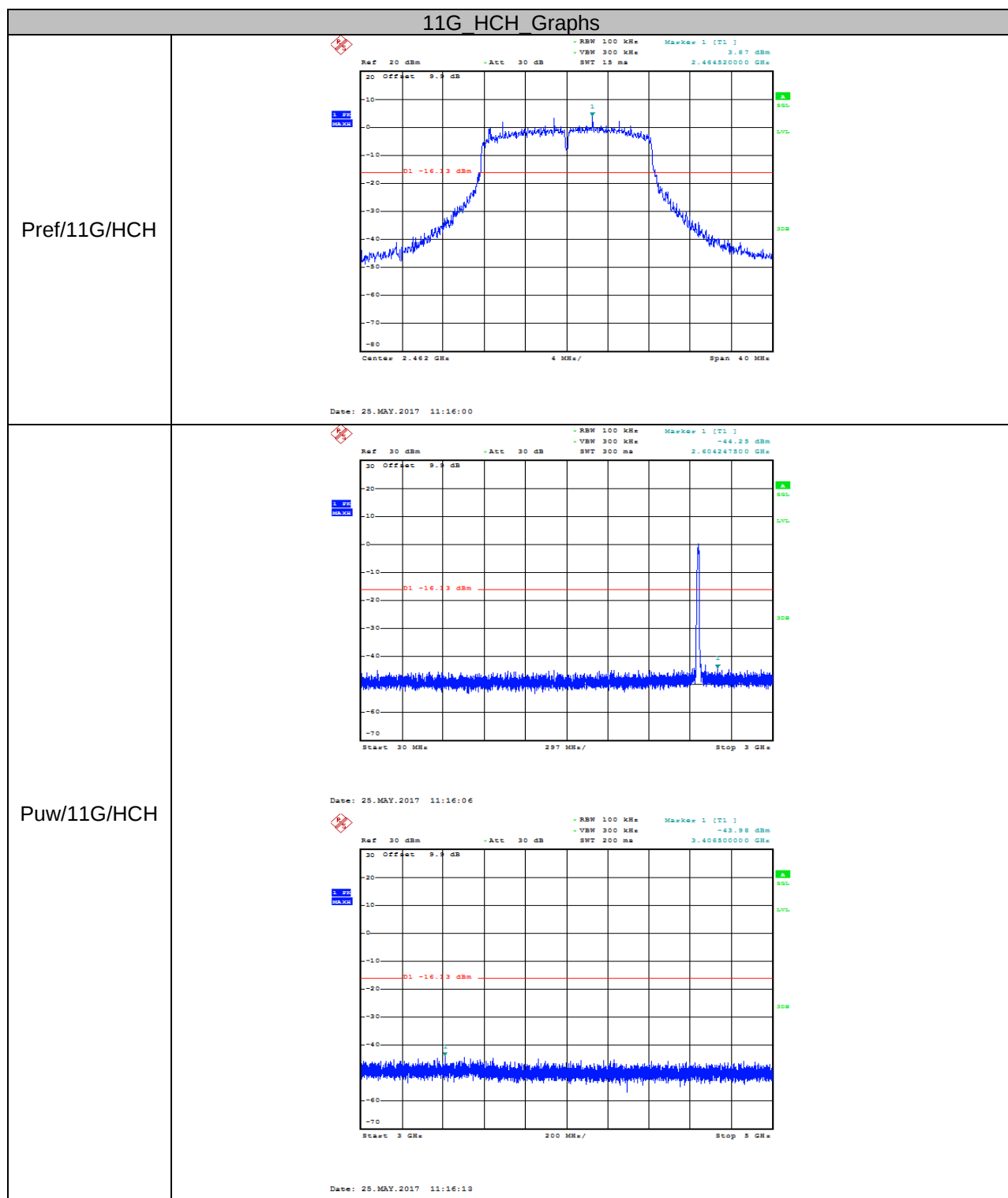


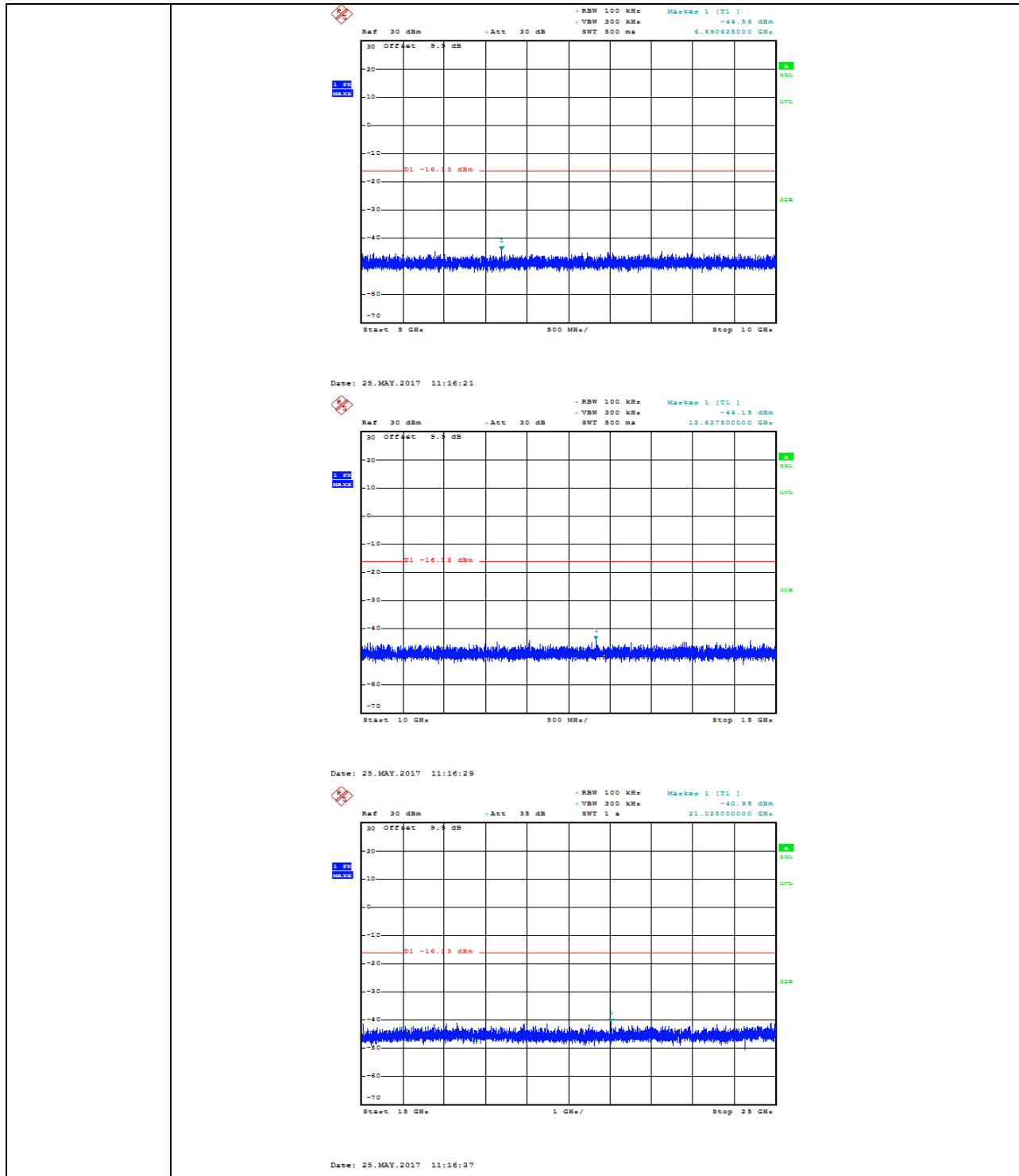


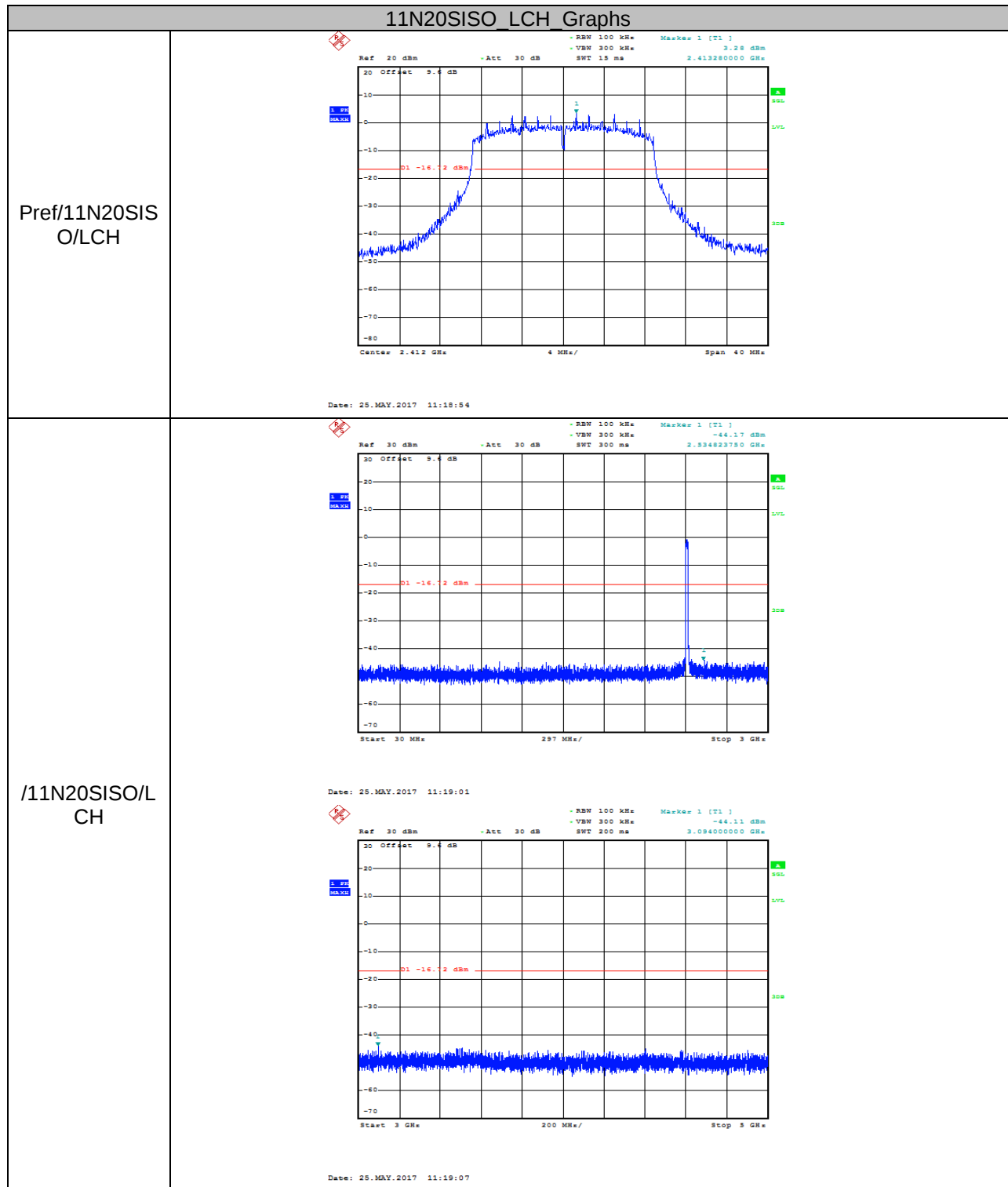
11G_MCH_Graphs

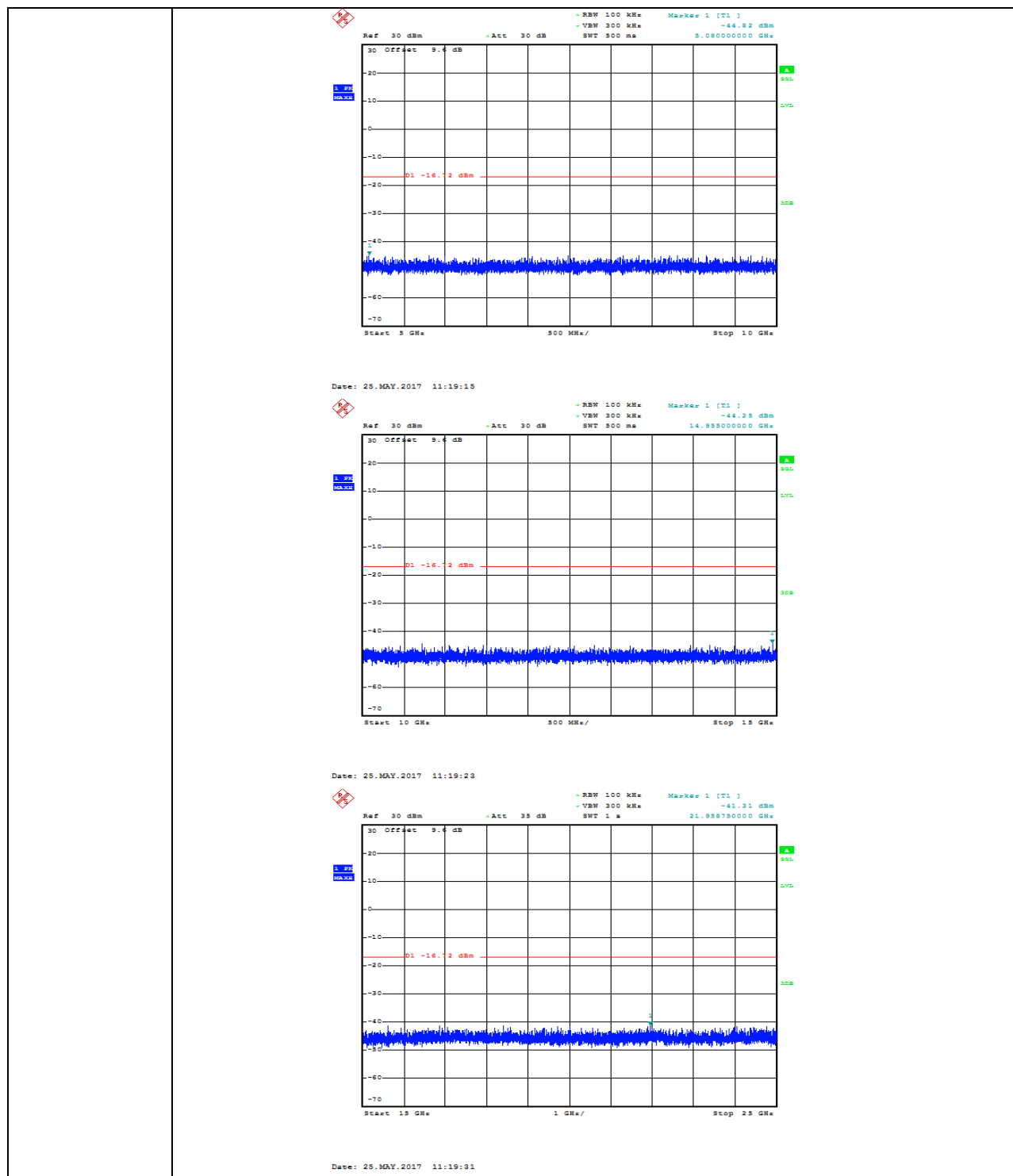


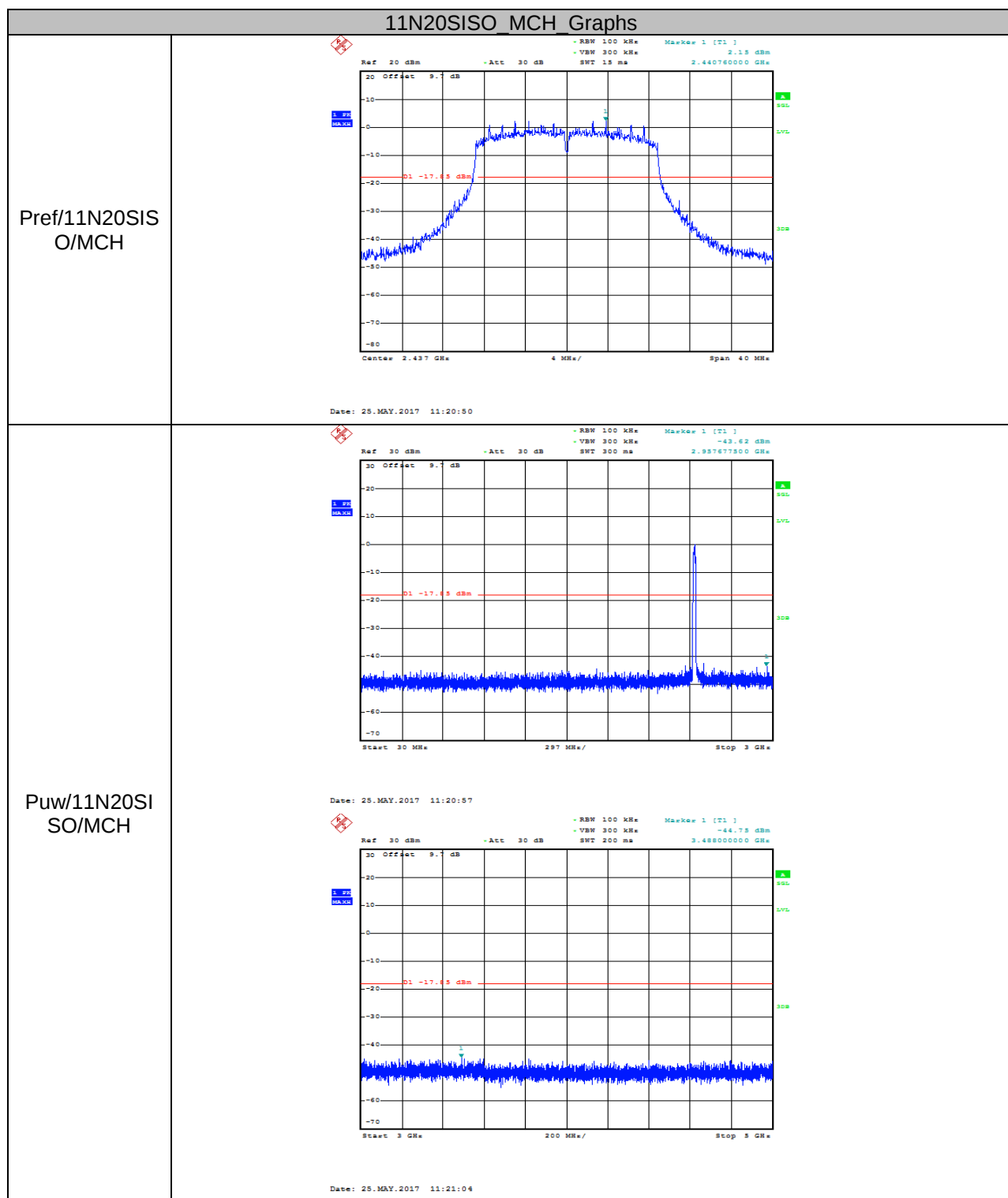


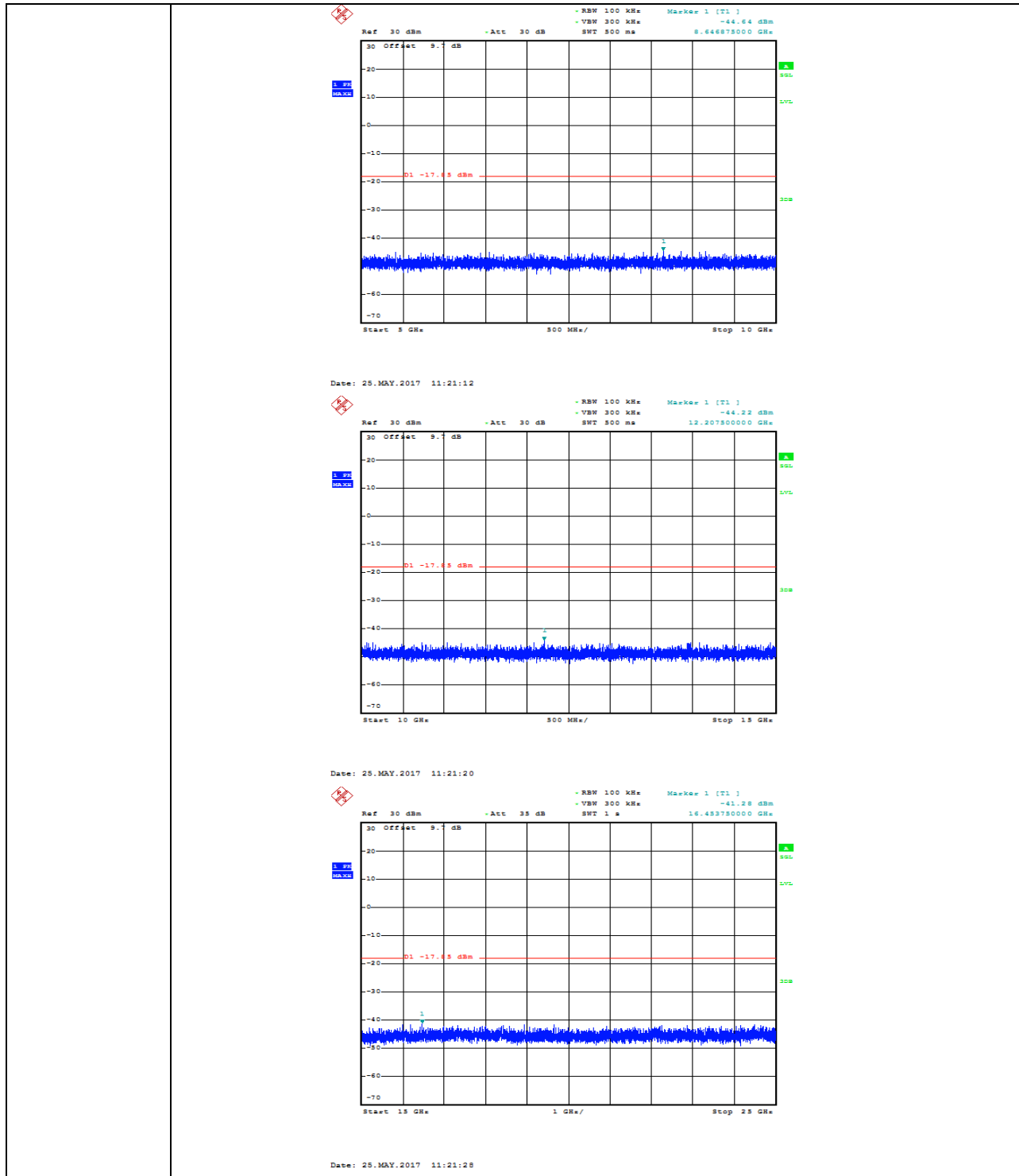


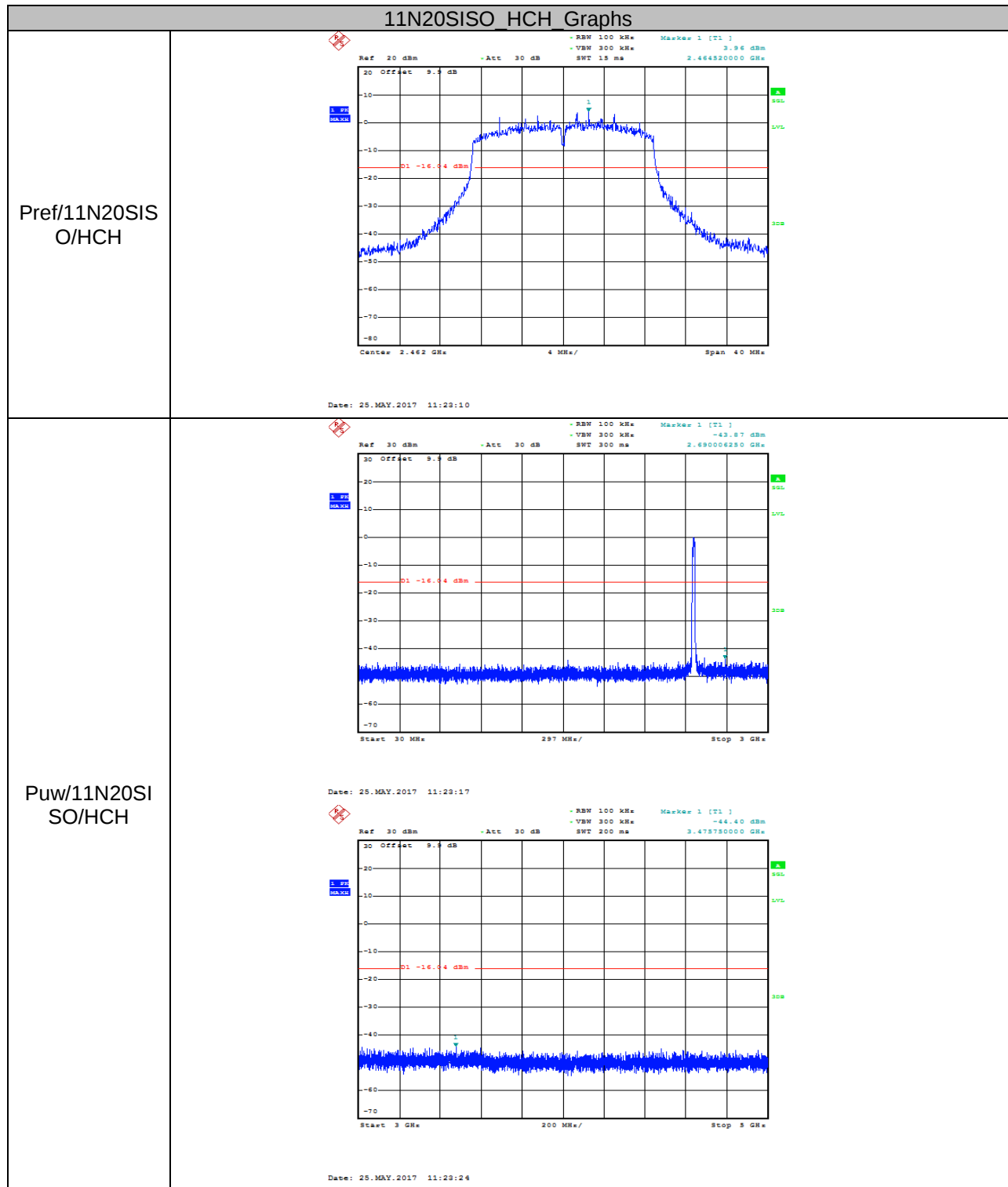


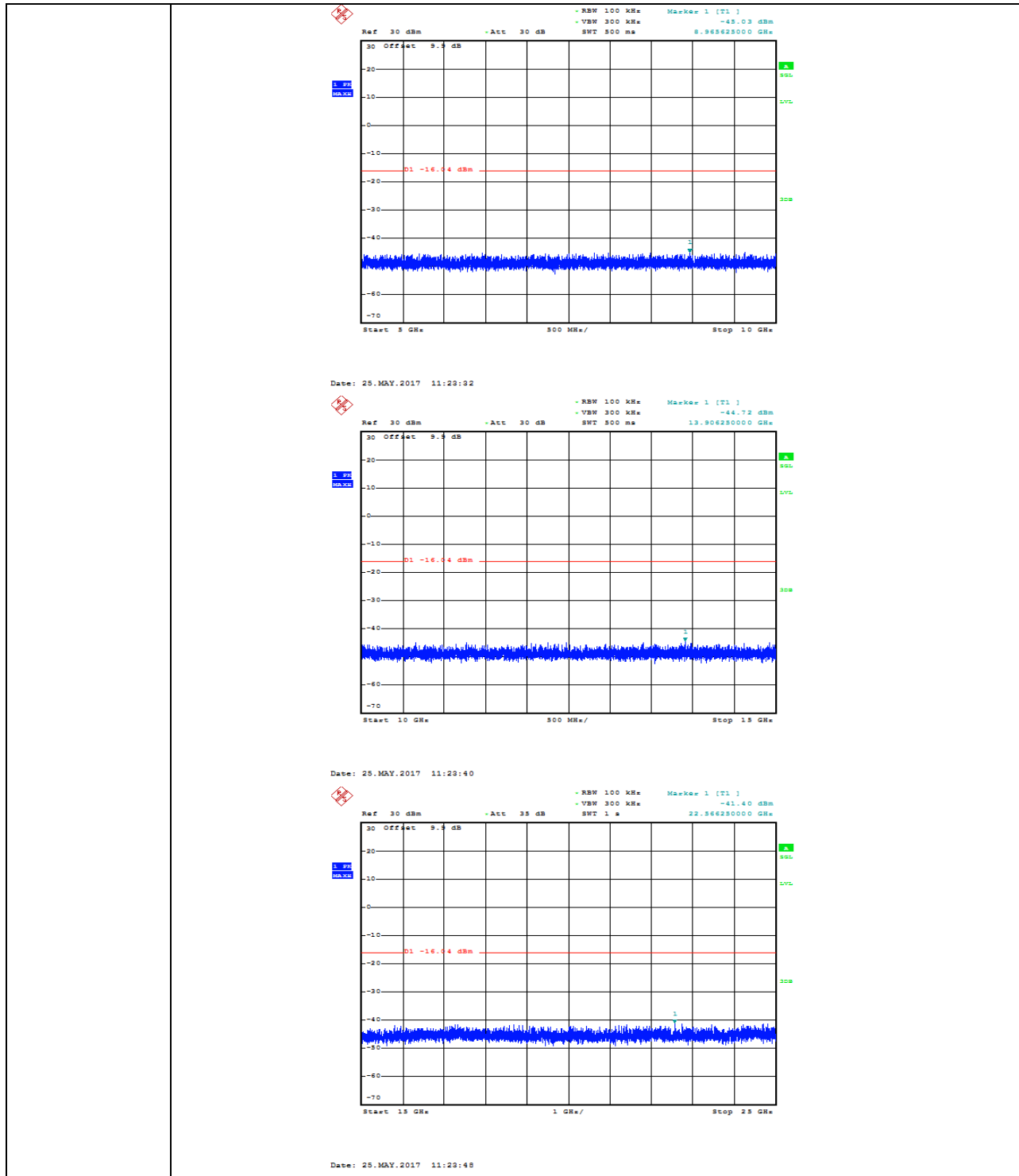


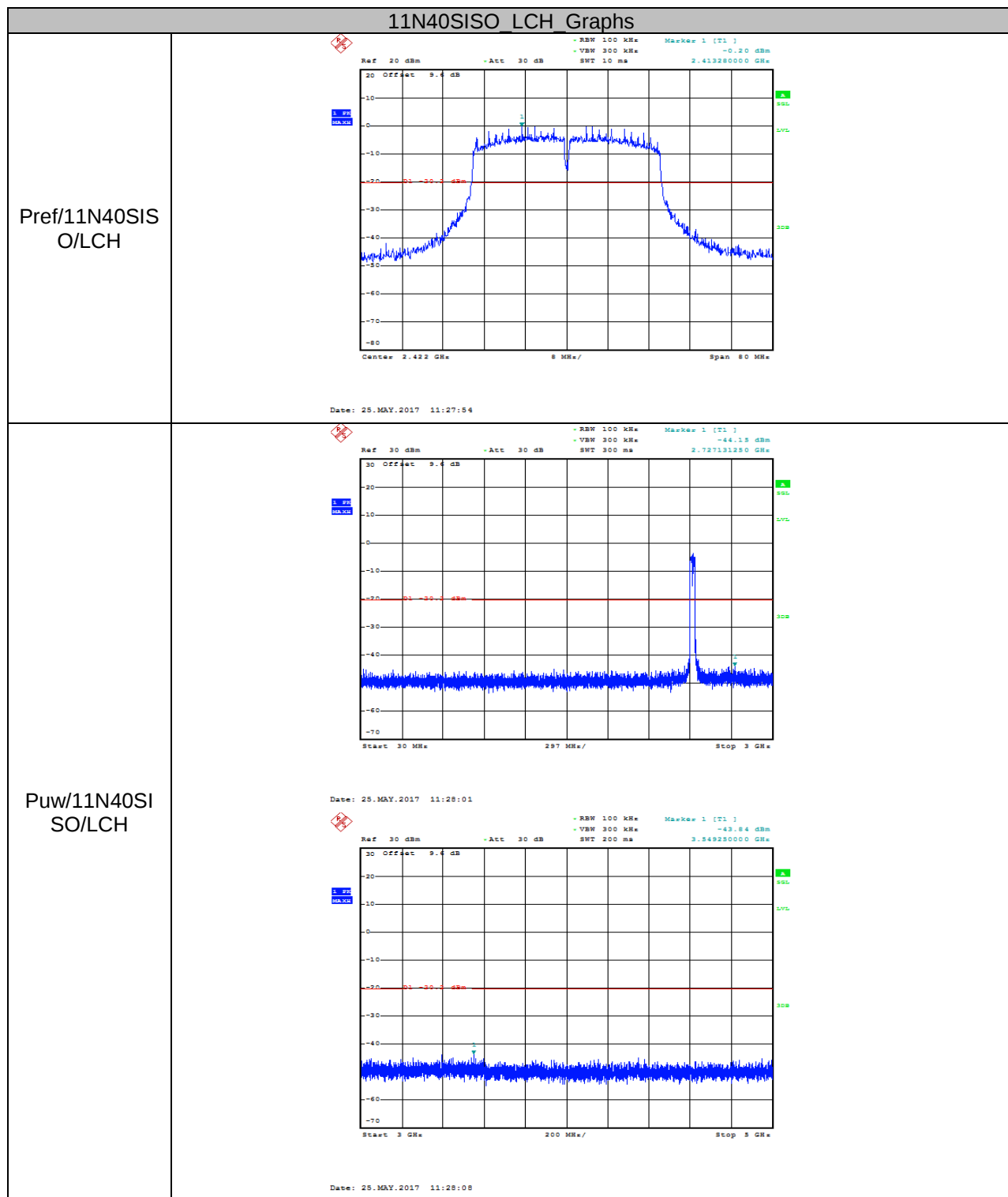


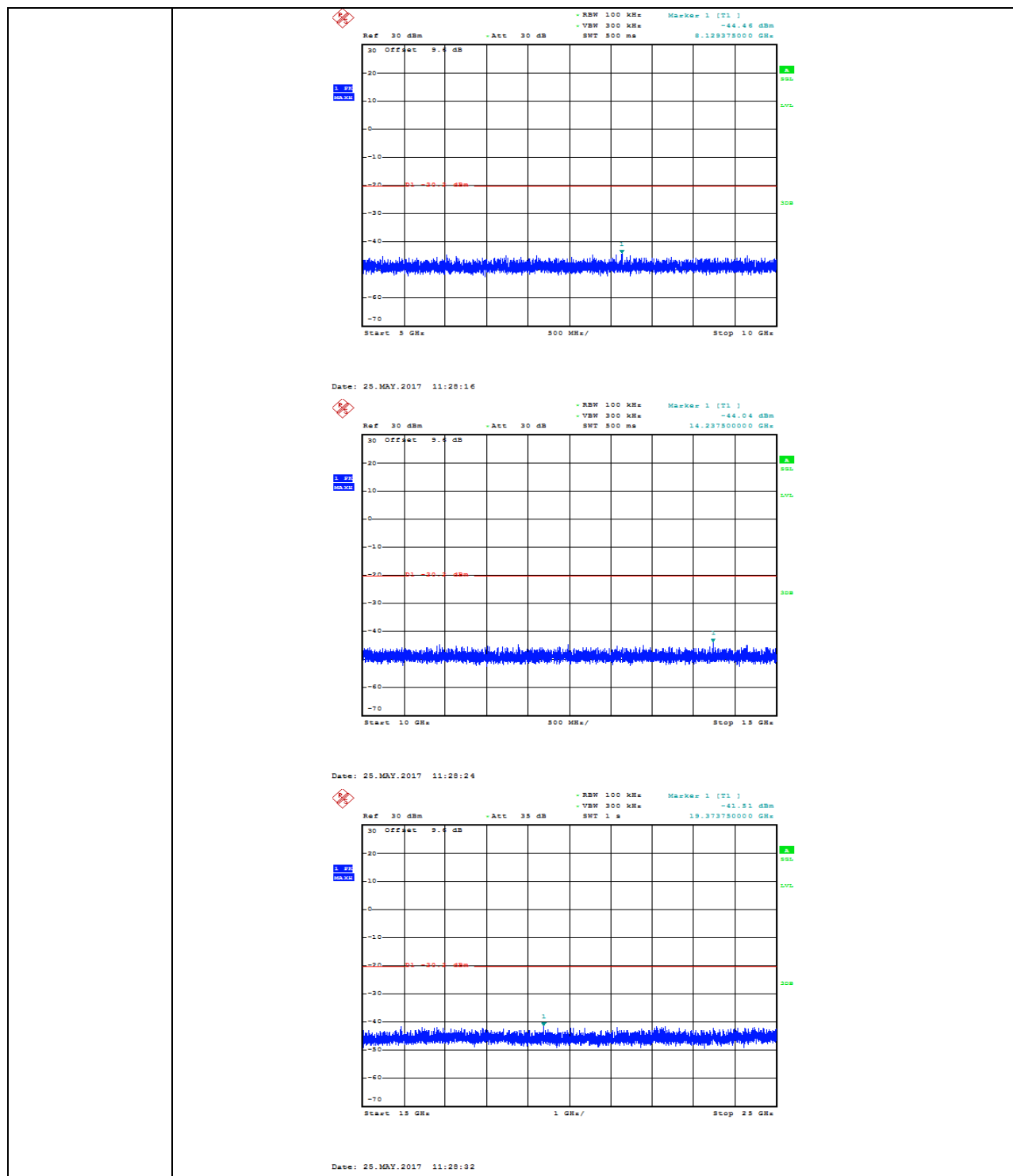


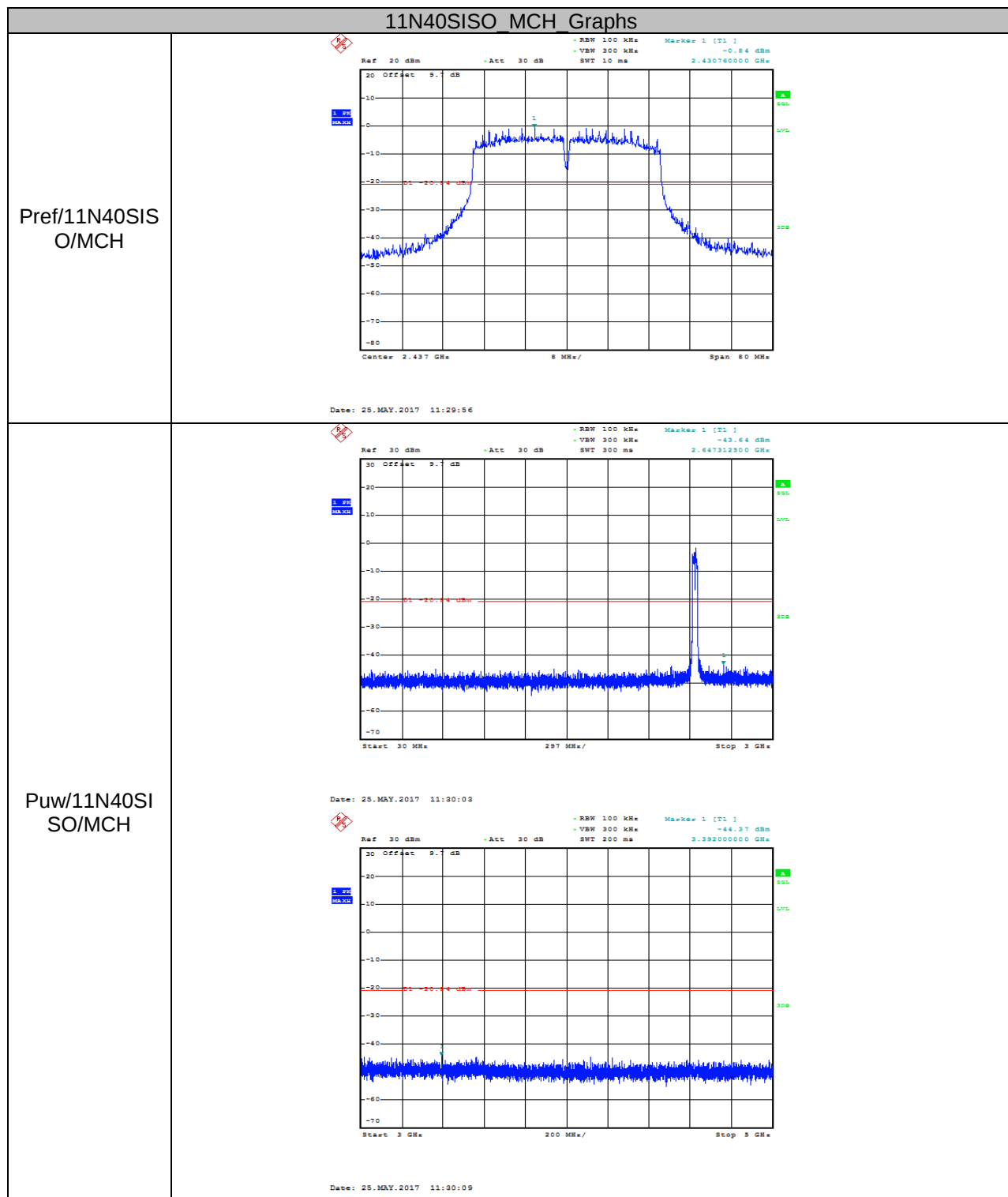


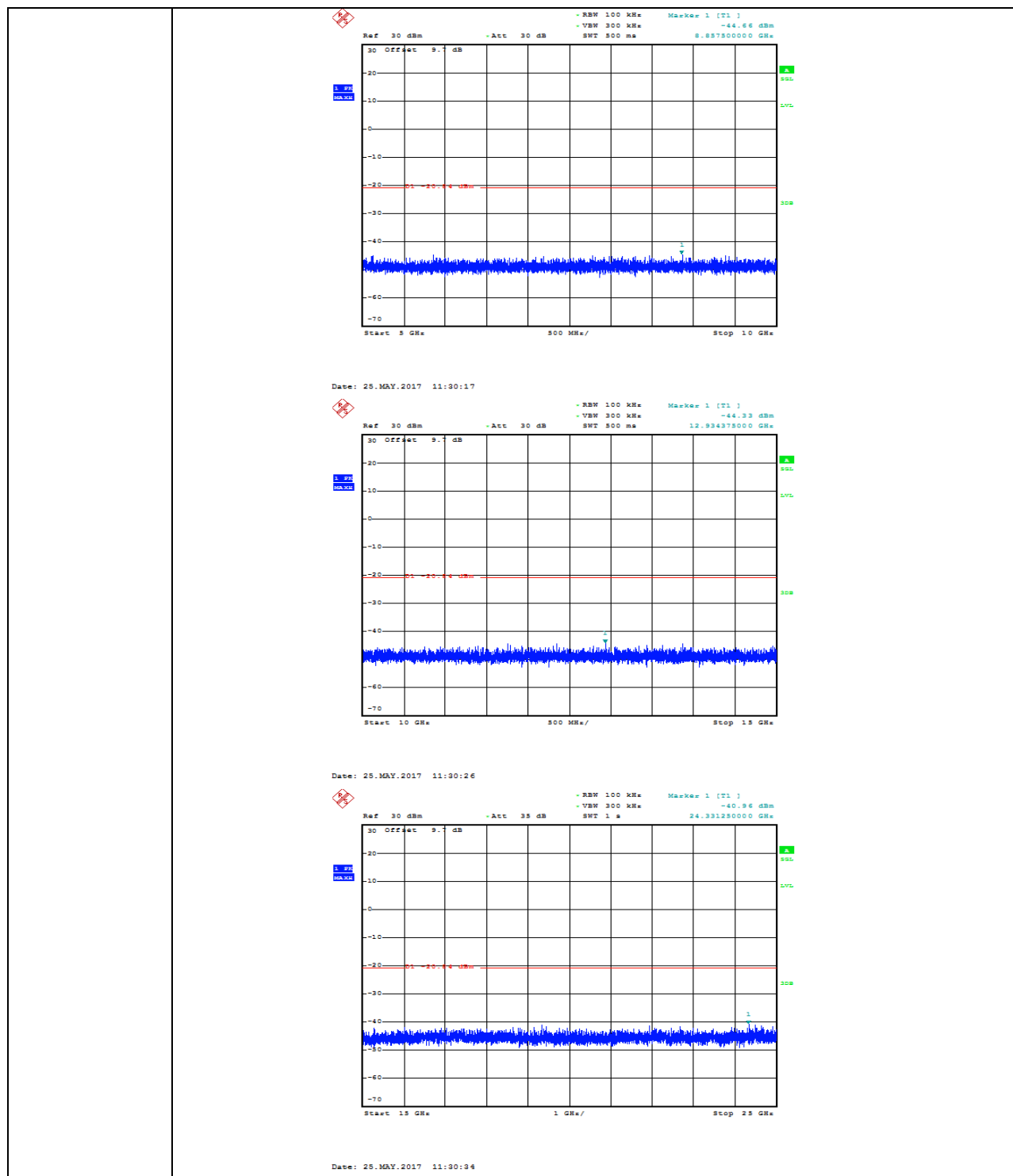


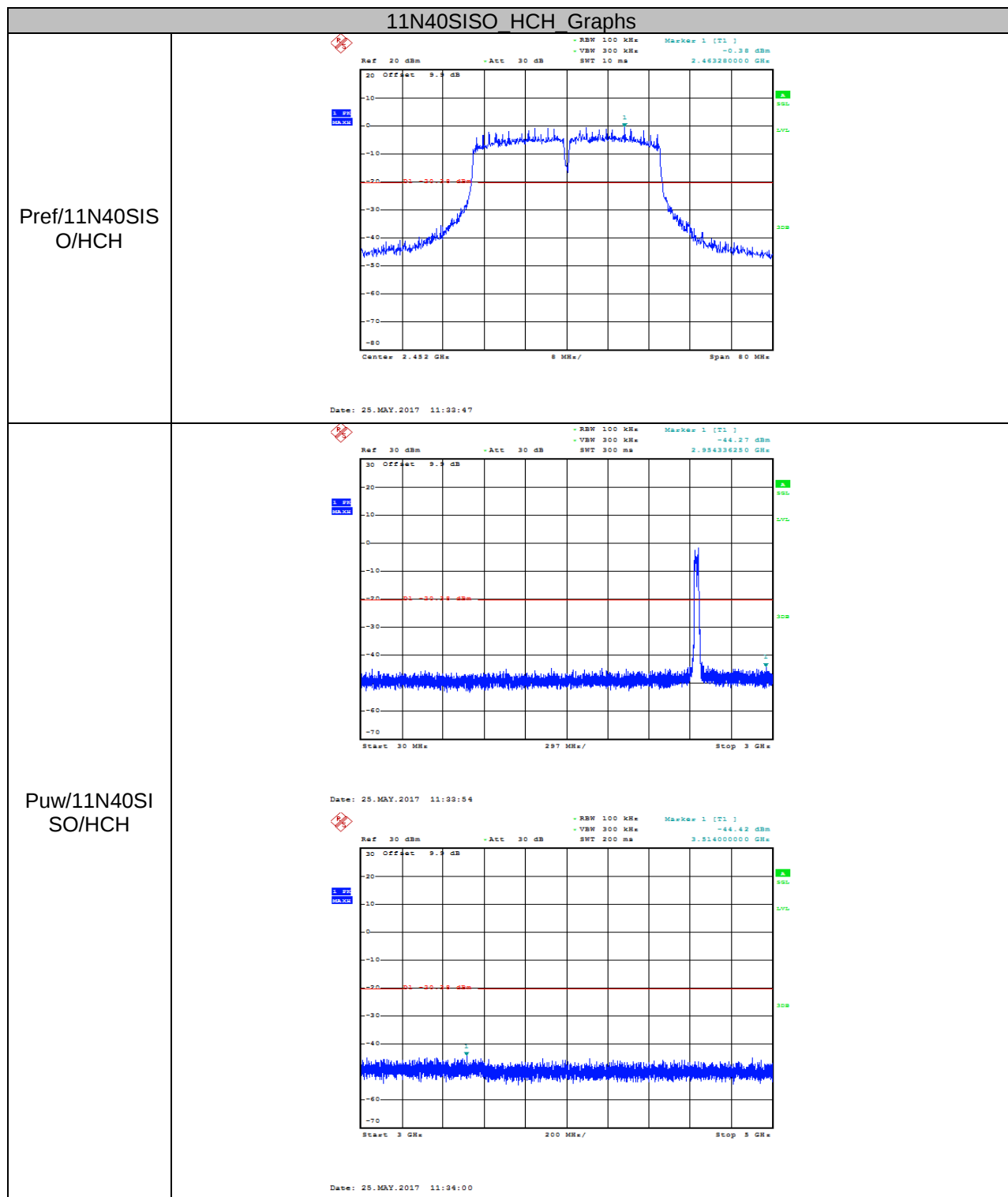


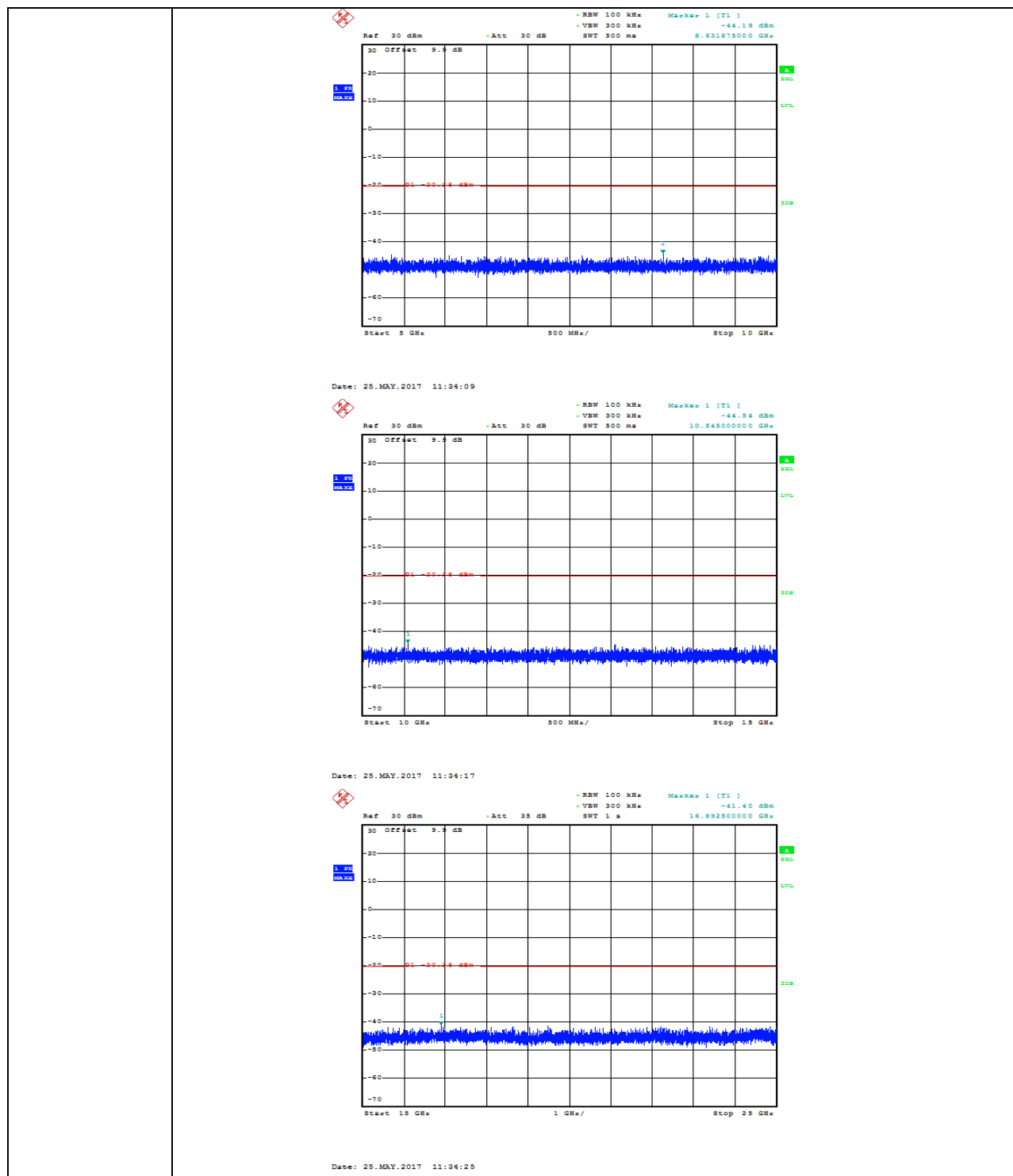












8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

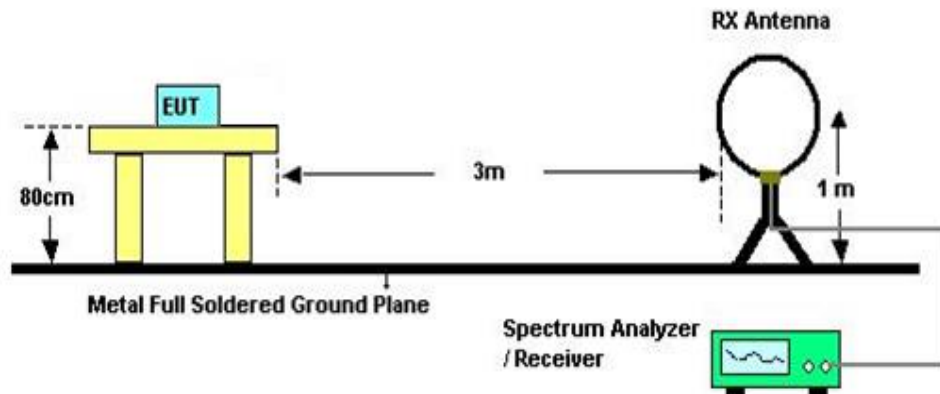
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST SETUP AND PROCEDURE

Below 30MHz

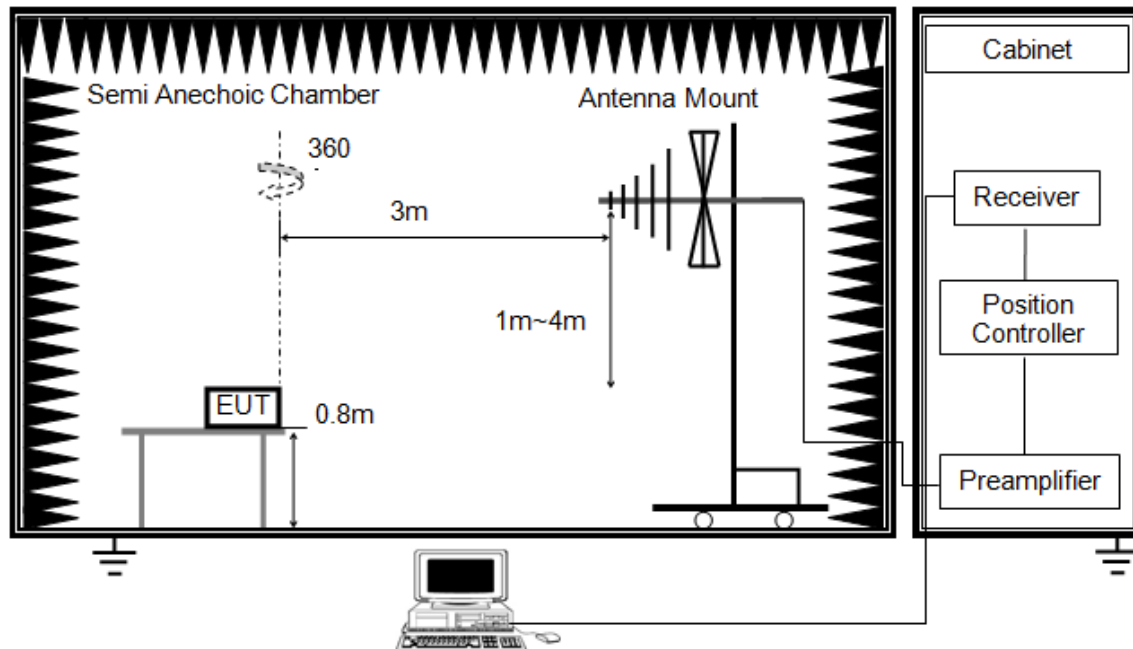


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G

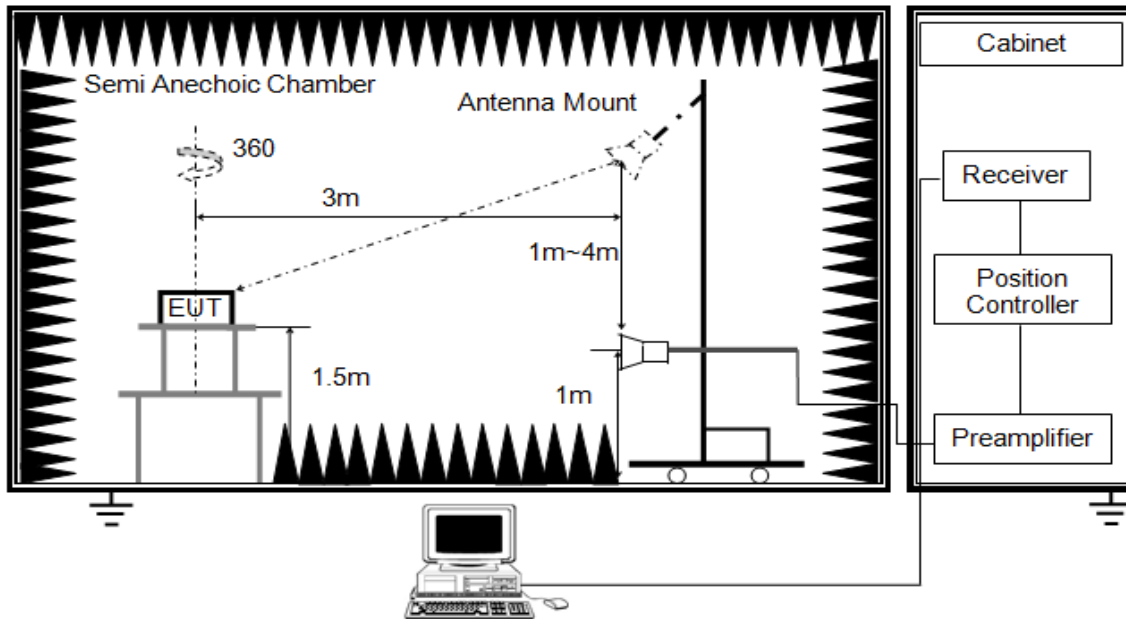


The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M
VBW	3M
Sweep	Auto
Detector	Peak and CISPR Average
Trace	Max hold

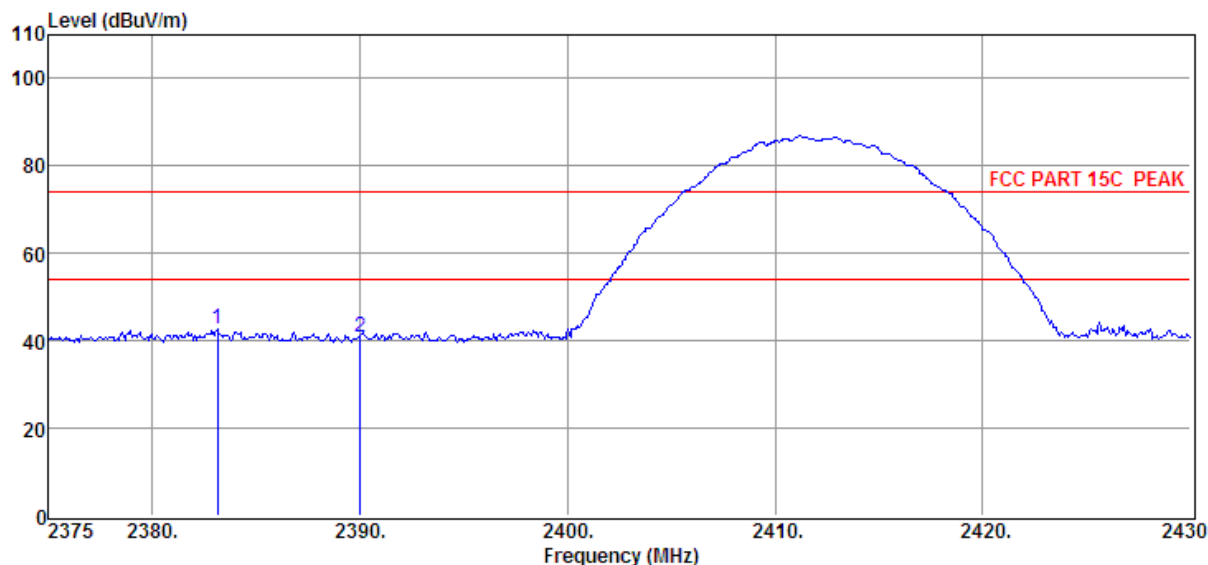
1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

TEST CONDITIONS

Temperature: 23.5°C
Relative Humidity: 59.2%
Test Voltage: 3.8Vdc

8.2. RESTRICTED BANDEDGE

RESTRICTED BANDEDGE (11b LOW CHANNEL, HORIZONTAL)

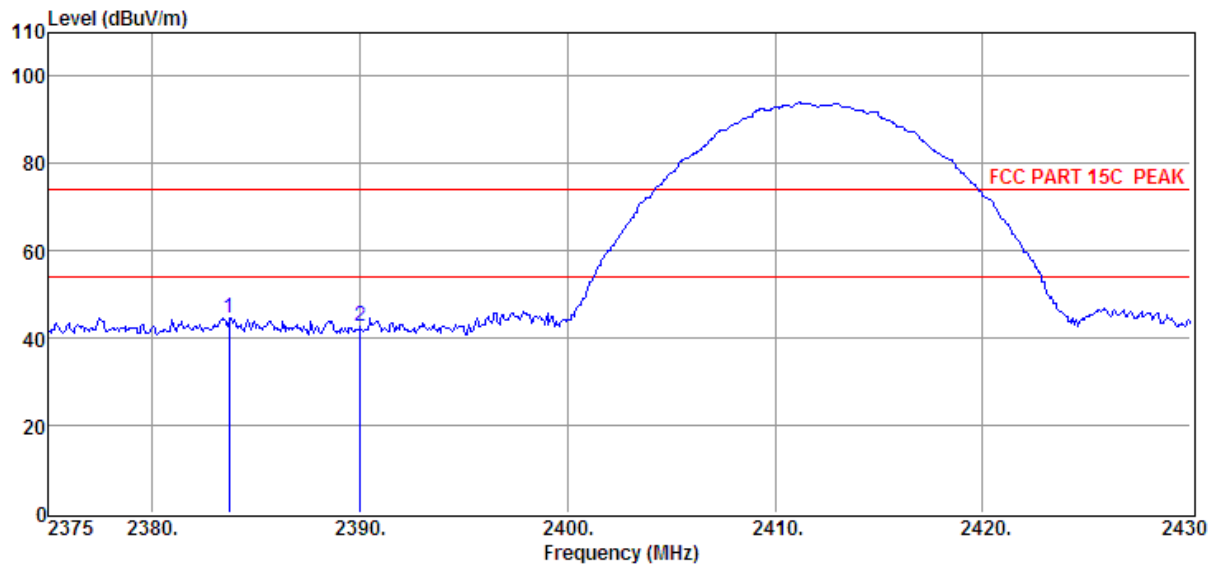


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2383.14	36.23	29.75	29.41	6.01	42.58	74.00	-31.42	Peak	HORIZONTAL
2	2390.00	34.58	29.78	29.42	6.03	40.97	74.00	-33.03	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11b LOW CHANNEL, VERTICAL)

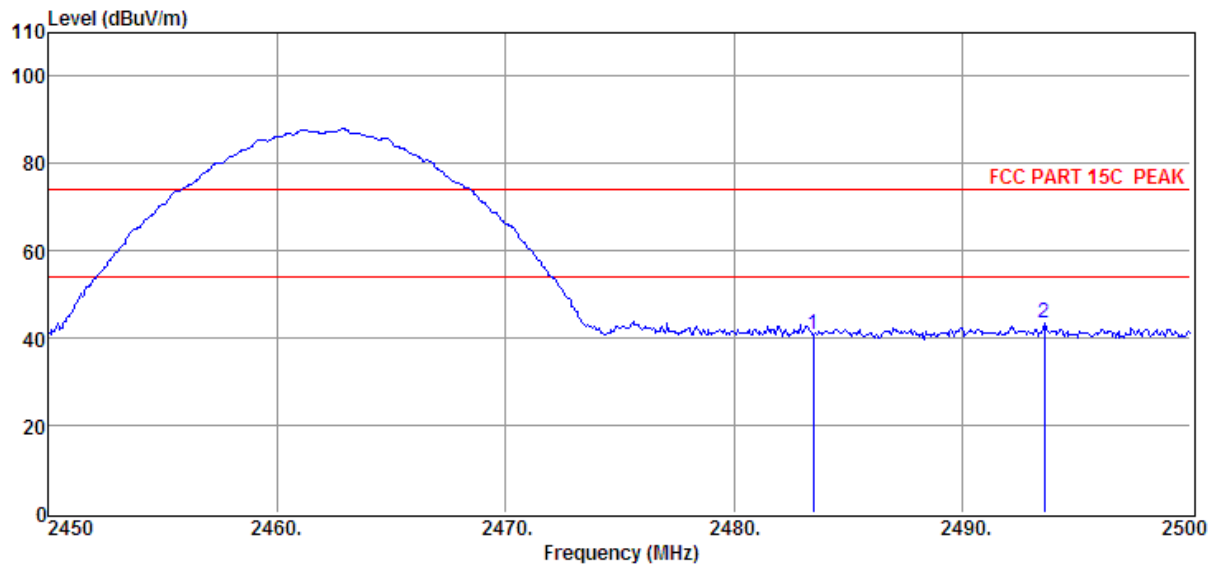


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2383.69	38.42	29.75	29.41	6.01	44.77	74.00	-29.23	Peak	VERTICAL
2	2390.00	36.21	29.78	29.42	6.03	42.60	74.00	-31.40	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11b HIGH CHANNEL, HORIZONTAL)

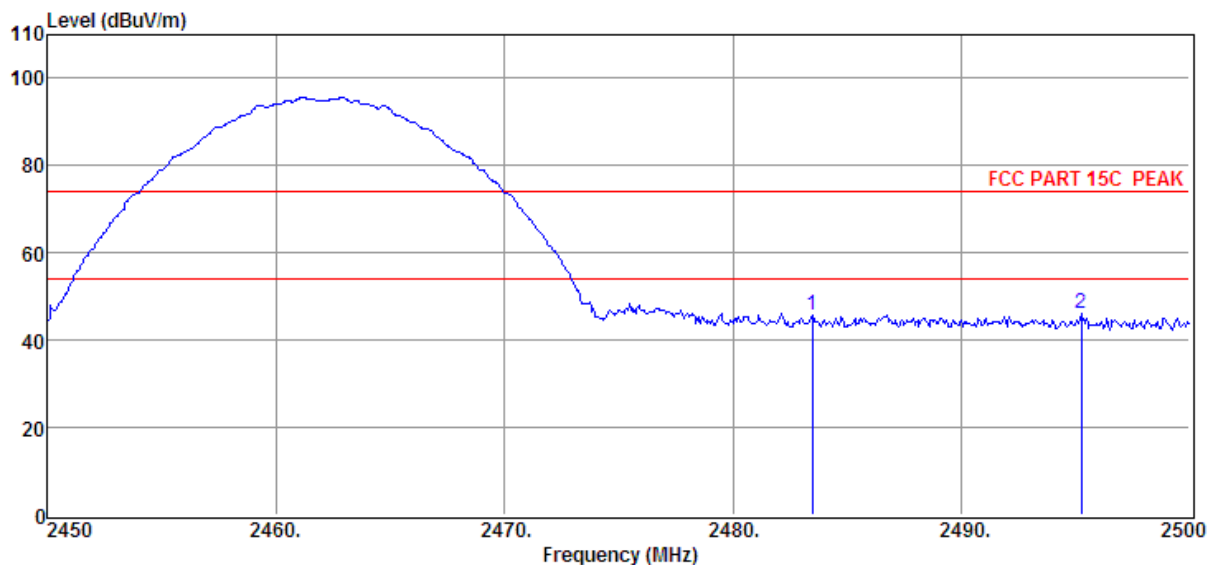


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	34.20	30.14	29.71	6.13	40.76	74.00	-33.24	Peak	HORIZONTAL
2	2493.60	36.93	30.18	29.73	6.17	43.55	74.00	-30.45	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11b HIGH CHANNEL, VERTICAL)

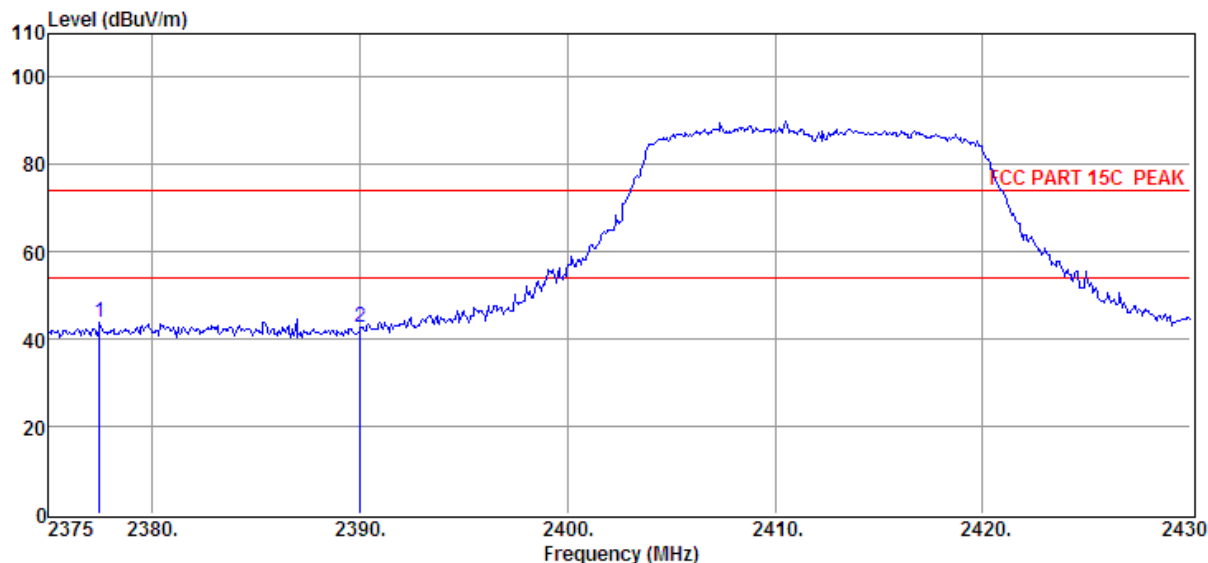


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	39.15	30.14	29.71	6.13	45.71	74.00	-28.29	Peak	VERTICAL
2	2495.25	39.39	30.18	29.73	6.17	46.01	74.00	-27.99	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11g LOW CHANNEL, HORIZONTAL)

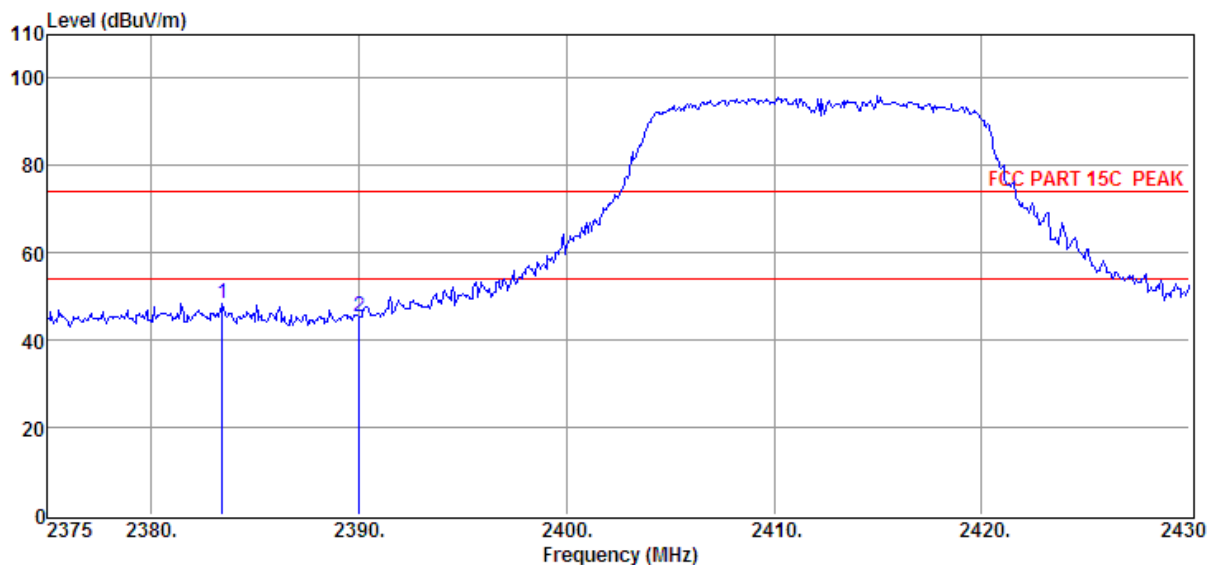


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2377.48	37.53	29.73	29.39	6.01	43.88	74.00	-30.12	Peak	HORIZONTAL
2	2390.02	36.15	29.78	29.42	6.03	42.54	74.00	-31.46	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11g LOW CHANNEL, VERTICAL)

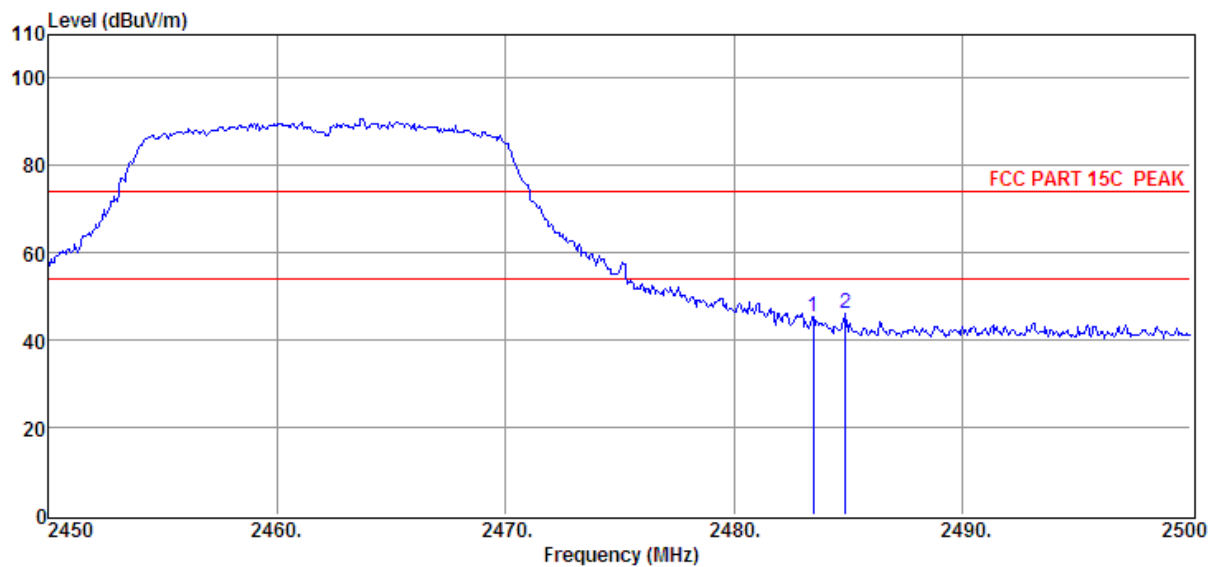


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2383.42	41.94	29.75	29.41	6.01	48.29	74.00	-25.71	Peak	VERTICAL
2	2390.00	38.87	29.78	29.42	6.03	45.26	74.00	-28.74	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11q HIGH CHANNEL, HORIZONTAL)

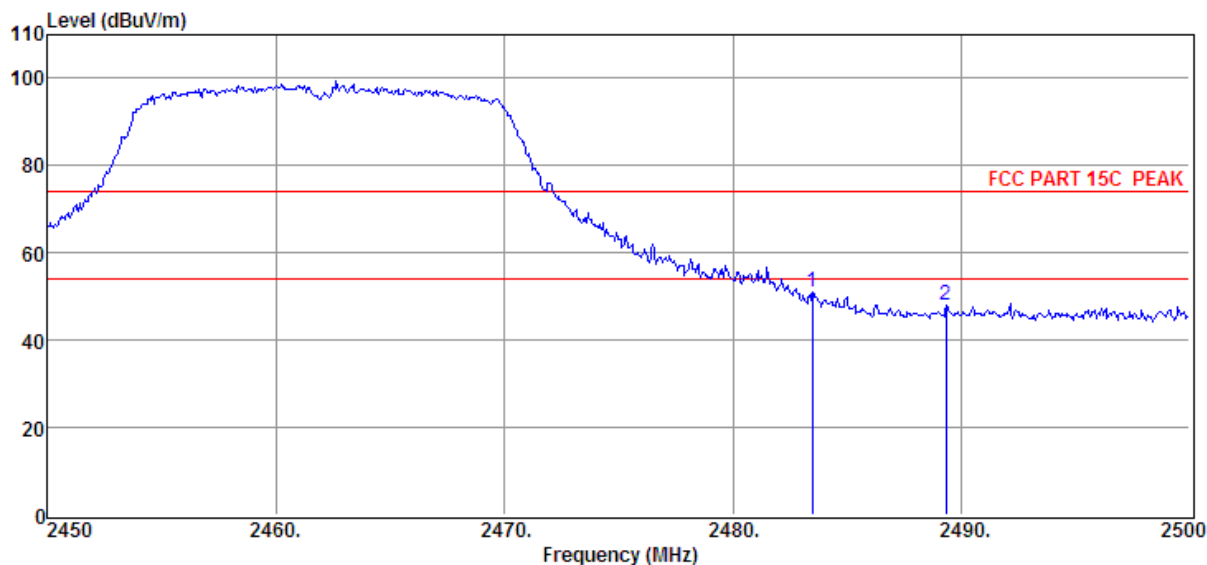


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	38.96	30.14	29.71	6.13	45.52	74.00	-28.48	Peak	HORIZONTAL
2	2484.90	39.47	30.14	29.71	6.13	46.03	74.00	-27.97	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11g HIGH CHANNEL, VERTICAL)

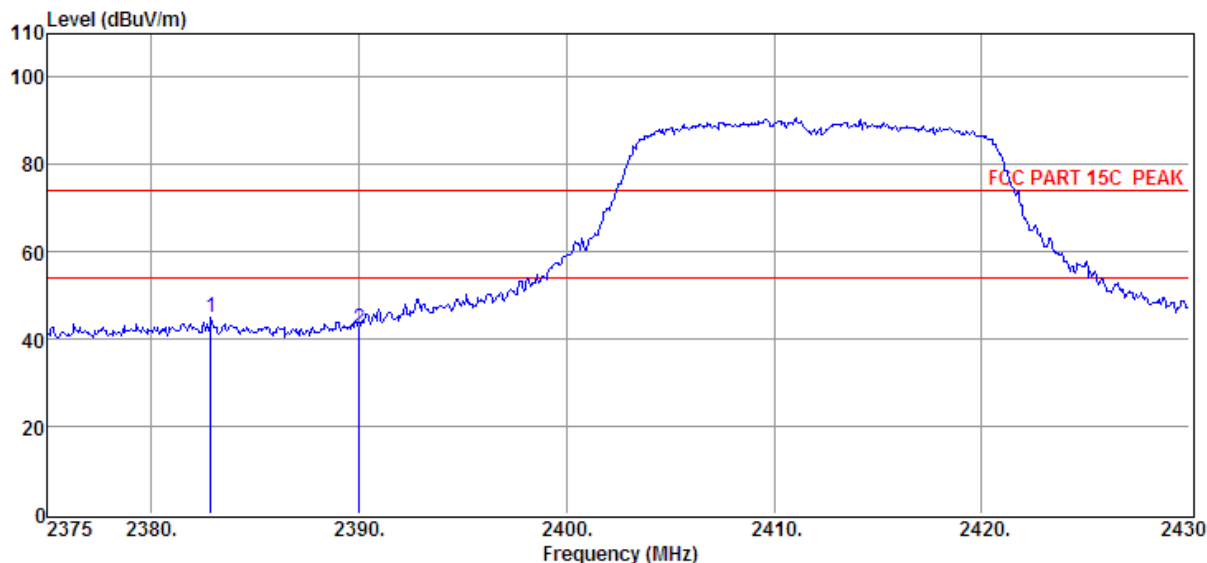


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	44.45	30.14	29.71	6.13	51.01	74.00	-22.99	Peak	VERTICAL
2	2489.35	41.55	30.16	29.71	6.13	48.13	74.00	-25.87	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/20 LOW CHANNEL, HORIZONTAL)

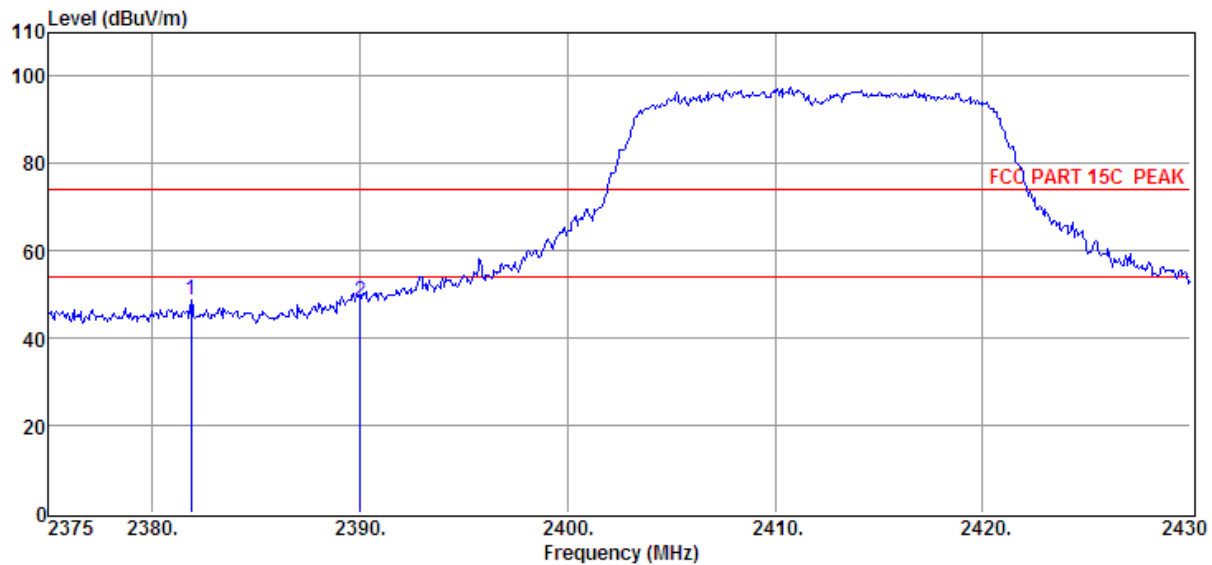


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2382.87	38.47	29.75	29.41	6.01	44.82	74.00	-29.18	Peak	HORIZONTAL
2	2390.00	35.93	29.78	29.42	6.03	42.32	74.00	-31.68	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/20 LOW CHANNEL, VERTICAL)

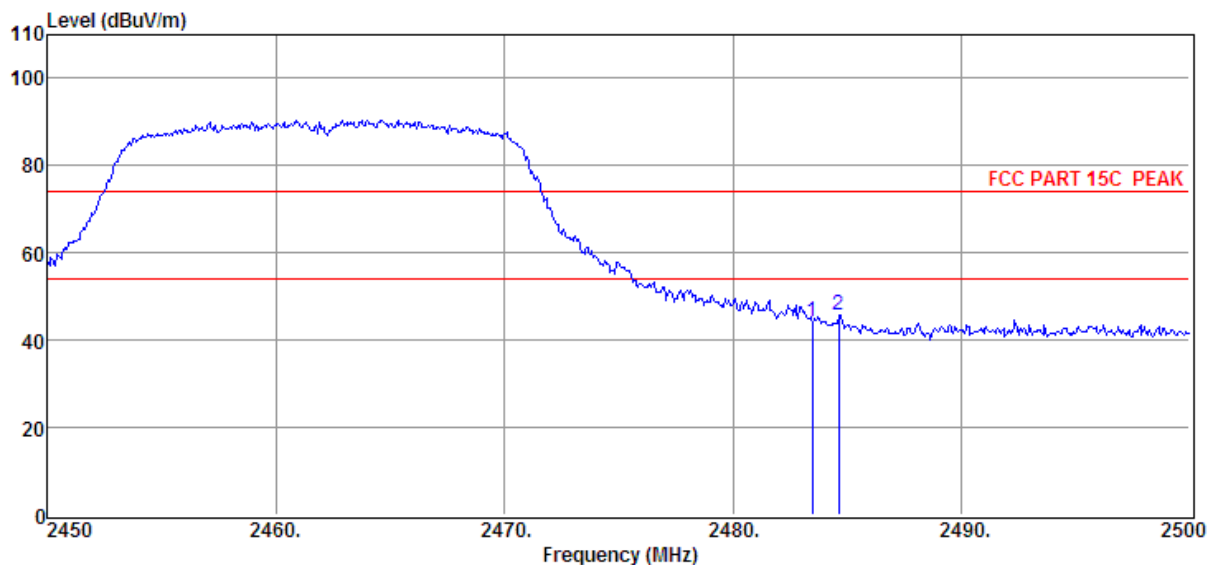


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2381.88	42.33	29.74	29.41	6.01	48.67	74.00	-25.33	Peak	VERTICAL
2	2390.00	41.92	29.78	29.42	6.03	48.31	74.00	-25.69	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/20 HIGH CHANNEL, HORIZONTAL)

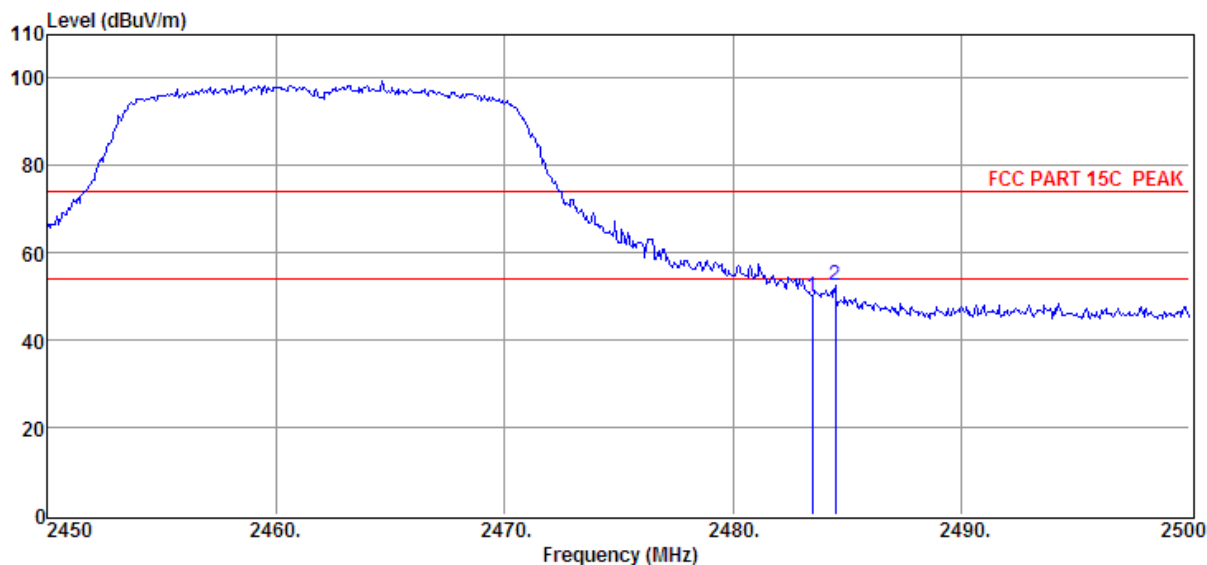


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	37.53	30.14	29.71	6.13	44.09	74.00	-29.91	Peak	HORIZONTAL
2	2484.65	39.12	30.14	29.71	6.13	45.68	74.00	-28.32	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/20 HIGH CHANNEL, VERTICAL)

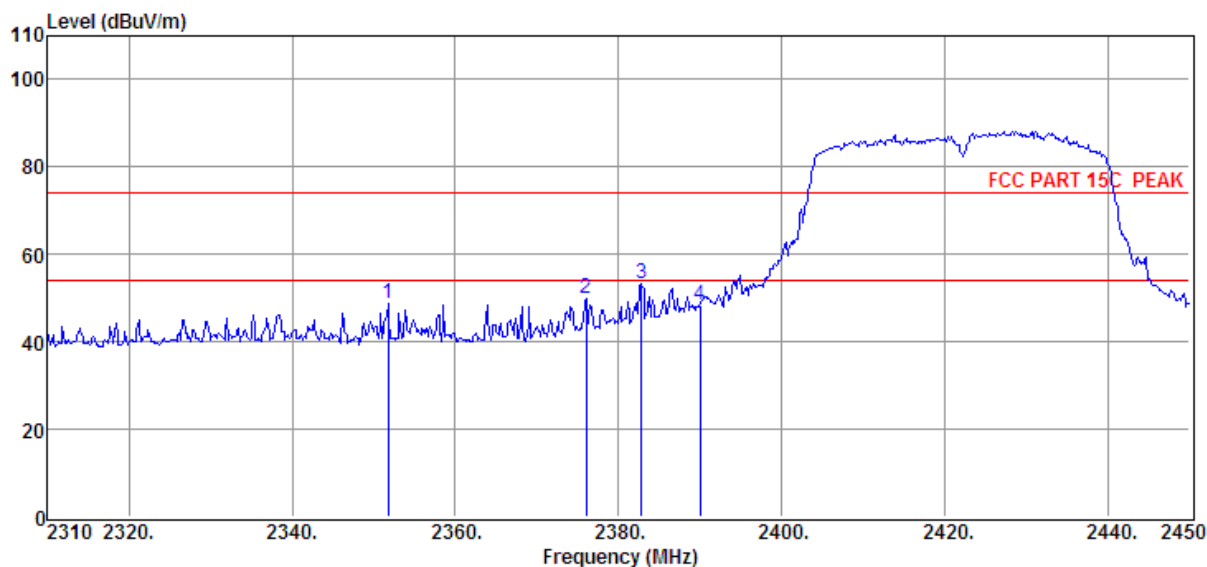


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	43.50	30.14	29.71	6.13	50.06	74.00	-23.94	Peak	VERTICAL
2	2484.50	46.09	30.14	29.71	6.13	52.65	74.00	-21.35	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/40 LOW CHANNEL, HORIZONTAL)

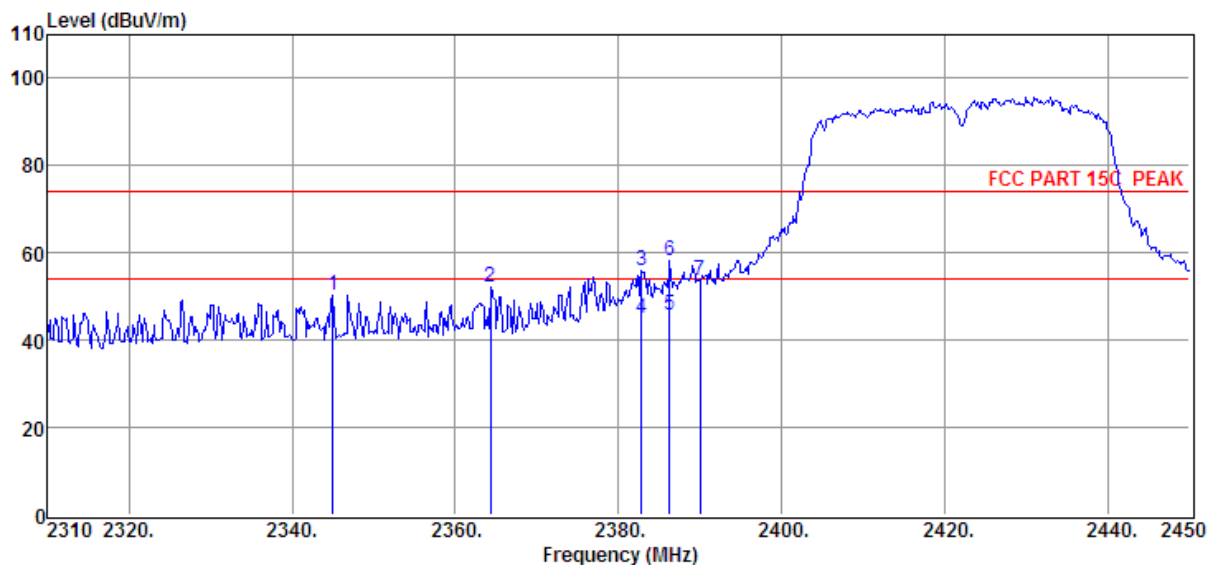


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2351.72	42.41	29.62	29.34	5.96	48.65	74.00	-25.35	Peak	HORIZONTAL
2	2376.08	43.65	29.72	29.39	6.01	49.99	74.00	-24.01	Peak	HORIZONTAL
3	2382.80	46.99	29.75	29.41	6.01	53.34	74.00	-20.66	Peak	HORIZONTAL
4	2390.00	41.88	29.78	29.42	6.03	48.27	74.00	-25.73	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/40 LOW CHANNEL, VERTICAL)

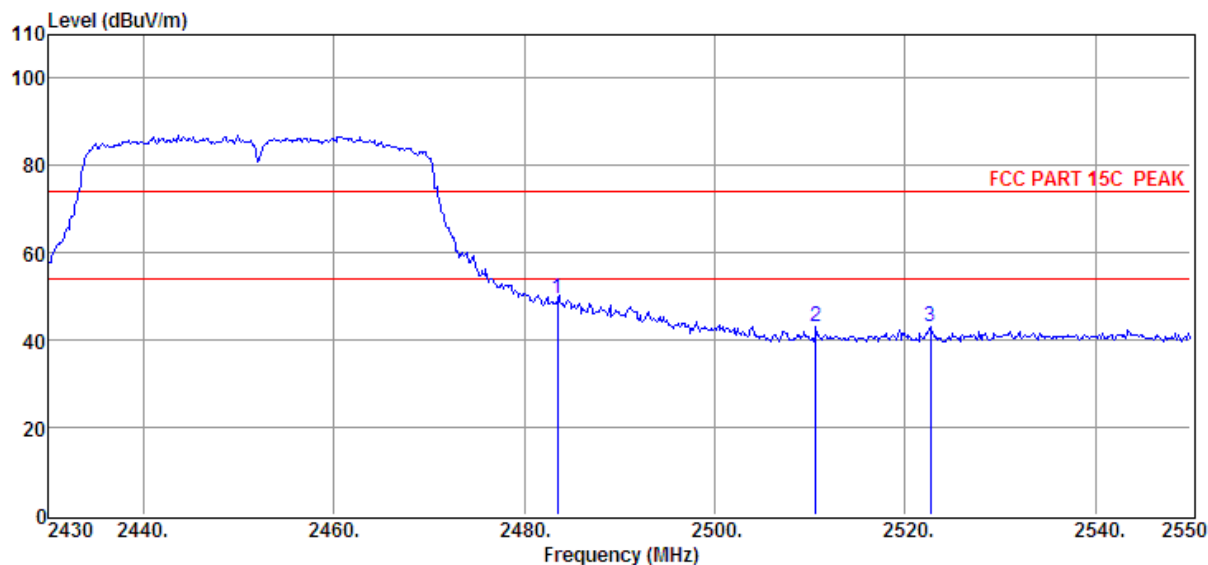


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2345.00	44.08	29.60	29.33	5.96	50.31	74.00	-23.69	Peak	VERTICAL
2	2364.32	46.03	29.67	29.35	5.96	52.31	74.00	-21.69	Peak	VERTICAL
3	2382.80	49.59	29.75	29.41	6.01	55.94	74.00	-18.06	Peak	VERTICAL
4	2382.80	38.45	29.75	29.41	6.01	44.80	74.00	-29.20	QP	VERTICAL
5	2386.30	39.54	29.76	29.41	6.01	45.90	54.00	-8.10	Average	VERTICAL
6	2386.30	51.69	29.76	29.41	6.01	58.05	74.00	-15.95	Peak	VERTICAL
7	2390.00	47.16	29.78	29.42	6.03	53.55	74.00	-20.45	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/40 HIGH CHANNEL, HORIZONTAL)

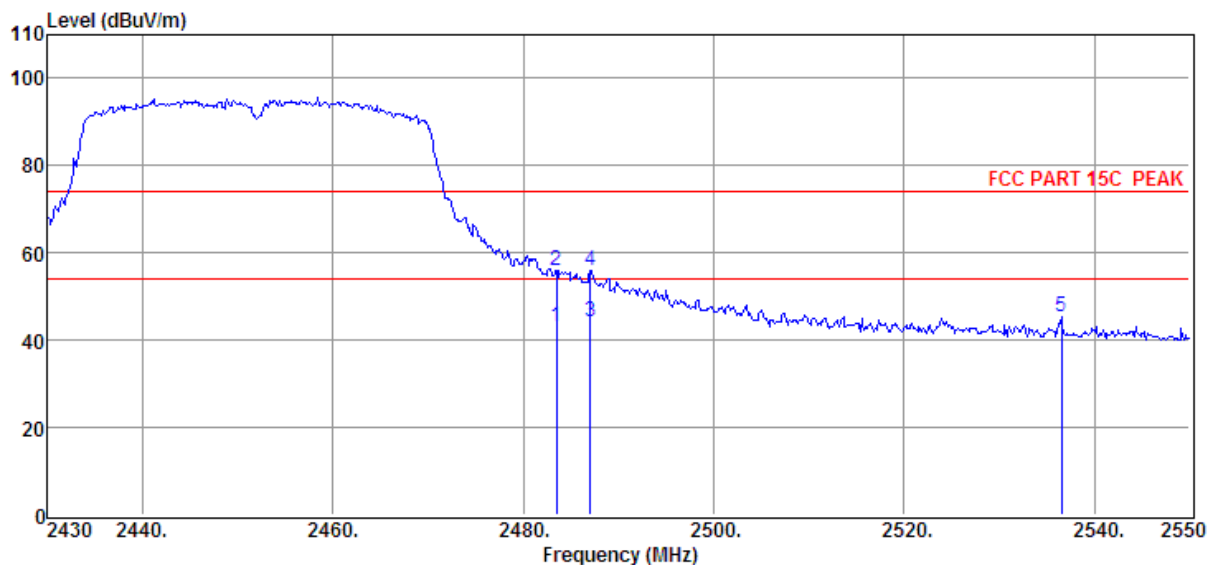


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.52	42.80	30.14	29.71	6.13	49.36	74.00	-24.64	Peak	HORIZONTAL
2	2510.64	36.59	30.23	29.78	6.17	43.21	74.00	-30.79	Peak	HORIZONTAL
3	2522.64	36.27	30.27	29.80	6.19	42.93	74.00	-31.07	Peak	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

RESTRICTED BANDEDGE (11n/40 HIGH CHANNEL, VERTICAL)



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	36.52	30.14	29.71	6.13	43.08	54.00	-10.92	Average	VERTICAL
2	2483.50	49.38	30.14	29.71	6.13	55.94	74.00	-18.06	Peak	VERTICAL
3	2487.00	37.57	30.15	29.71	6.13	44.14	54.00	-9.86	Average	VERTICAL
4	2487.00	49.31	30.15	29.71	6.13	55.88	74.00	-18.12	Peak	VERTICAL
5	2536.56	38.49	30.32	29.82	6.19	45.18	74.00	-28.82	Peak	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report

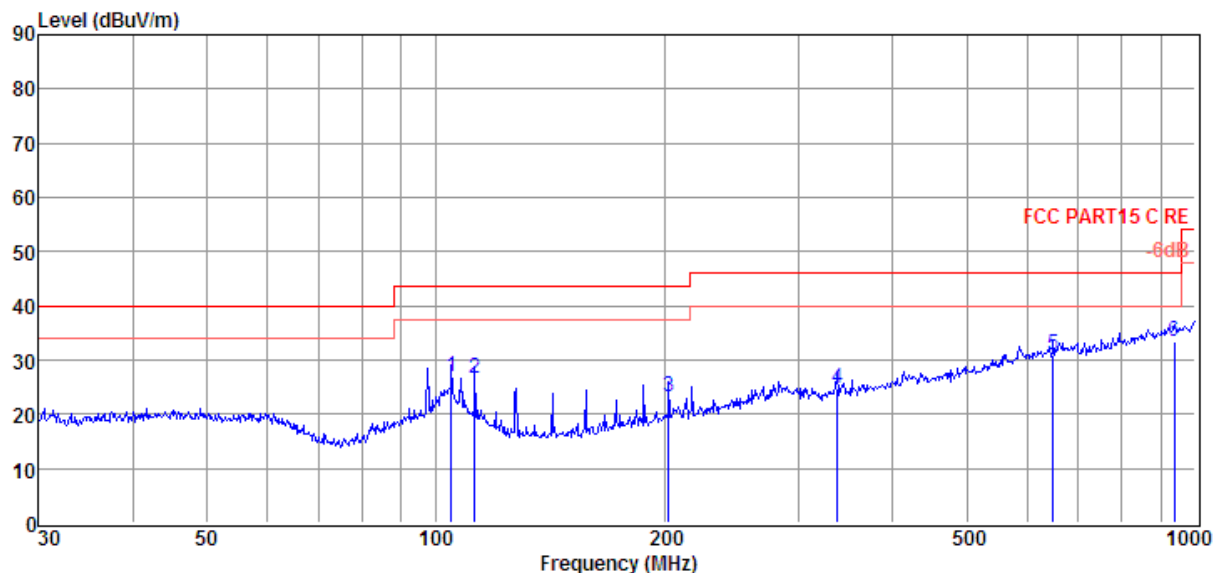
8.3. SPURIOUS EMISSIONS (1~25GHz)

HARMONICS AND SPURIOUS EMISSION

Freq (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
11n20 LCH									
4824.00	32.21	33.73	29.32	8.50	45.12	54.00	-8.88	Average	VERTICAL
4824.00	44.99	33.73	29.32	8.50	57.90	74.00	-16.10	Peak	VERTICAL
6916.00	34.97	36.13	30.33	10.37	51.14	74.00	-22.86	Peak	VERTICAL
7936.00	35.28	36.69	31.11	11.10	51.96	74.00	-22.04	Peak	VERTICAL
8990.00	34.11	37.46	32.32	11.81	51.06	74.00	-22.94	Peak	VERTICAL
12220.00	33.62	37.91	34.95	14.41	50.99	74.00	-23.01	Peak	VERTICAL
4451.00	33.52	33.76	29.19	8.10	46.19	74.00	-27.81	Peak	HORIZONTAL
4876.00	34.42	33.72	29.33	8.56	47.37	74.00	-26.63	Peak	HORIZONTAL
6270.00	33.18	35.44	29.44	9.82	49.00	74.00	-25.00	Peak	HORIZONTAL
7936.00	35.46	36.69	31.11	11.10	52.14	74.00	-21.86	Peak	HORIZONTAL
9160.00	34.47	37.14	32.39	12.01	51.23	74.00	-22.77	Peak	HORIZONTAL
12101.00	33.94	37.74	34.87	14.30	51.11	74.00	-22.89	Peak	HORIZONTAL
11n20 MCH									
3890.00	34.84	33.09	29.10	7.54	46.37	74.00	-27.63	Peak	HORIZONTAL
4791.00	34.42	33.74	29.31	8.46	47.31	74.00	-26.69	Peak	HORIZONTAL
7375.00	34.36	36.50	30.65	10.75	50.96	74.00	-23.04	Peak	HORIZONTAL
8004.00	35.14	36.69	31.13	11.13	51.83	74.00	-22.17	Peak	HORIZONTAL
9194.00	33.95	37.07	32.40	12.03	50.65	74.00	-23.35	Peak	HORIZONTAL
12985.00	34.48	38.79	35.70	14.67	52.24	74.00	-21.76	Peak	HORIZONTAL
4874.00	36.54	33.72	29.33	8.56	49.49	54.00	-4.51	Average	VERTICAL
4874.00	46.87	33.72	29.33	8.56	59.82	74.00	-14.18	Peak	VERTICAL
6865.00	34.85	36.09	30.28	10.31	50.97	74.00	-23.03	Peak	VERTICAL
7290.00	35.71	36.44	30.55	10.68	52.28	74.00	-21.72	Peak	VERTICAL
9041.00	34.03	37.41	32.34	11.87	50.97	74.00	-23.03	Peak	VERTICAL
10741.00	33.33	37.08	33.55	13.08	49.94	74.00	-24.06	Peak	VERTICAL
11n20 HCH									
4060.00	34.53	33.45	29.05	7.67	46.60	74.00	-27.40	Peak	HORIZONTAL
5709.00	33.48	34.83	29.22	9.38	48.47	74.00	-25.53	Peak	HORIZONTAL
6916.00	34.65	36.13	30.33	10.37	50.82	74.00	-23.18	Peak	HORIZONTAL
7936.00	35.55	36.69	31.11	11.10	52.23	74.00	-21.77	Peak	HORIZONTAL
8956.00	33.73	37.31	32.28	11.79	50.55	74.00	-23.45	Peak	HORIZONTAL
10996.00	33.28	37.79	33.98	13.48	50.57	74.00	-23.43	Peak	HORIZONTAL
4924.00	36.56	33.71	29.34	8.60	49.53	54.00	-4.47	Average	VERTICAL
4924.00	46.40	33.71	29.34	8.60	59.37	74.00	-14.63	Peak	VERTICAL
6916.00	34.83	36.13	30.33	10.37	51.00	74.00	-23.00	Peak	VERTICAL
8089.00	34.91	36.44	31.20	11.23	51.38	74.00	-22.62	Peak	VERTICAL
8990.00	33.89	37.46	32.32	11.81	50.84	74.00	-23.16	Peak	VERTICAL
10826.00	33.10	37.32	33.64	13.19	49.97	74.00	-24.03	Peak	VERTICAL
Result: Pass									
Note : 1. 30MHz~25GHz: (Scan with 11b, 11g and 11n HT20, the worst case is 11n20 Mode) 2. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor. 3. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.									

8.4. SPURIOUS EMISSIONS 30M ~ 1 GHz

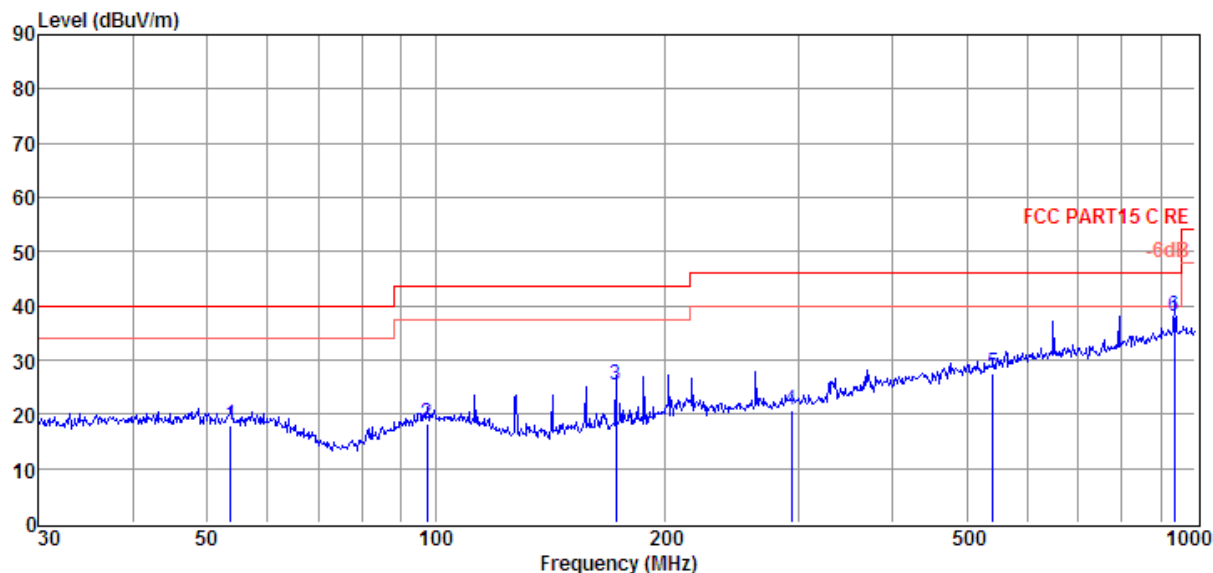
SPURIOUS EMISSIONS 30 TO 1000 MHz



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	104.90	11.08	11.61	4.33	27.02	43.50	-16.48	QP	HORIZONTAL
2	112.52	11.58	10.69	4.38	26.65	43.50	-16.85	QP	HORIZONTAL
3	202.81	7.70	10.47	4.91	23.08	43.50	-20.42	QP	HORIZONTAL
4	338.40	4.75	14.57	5.54	24.86	46.00	-21.14	QP	HORIZONTAL
5	649.66	4.68	19.49	6.67	30.84	46.00	-15.16	QP	HORIZONTAL
6	938.83	2.88	22.97	7.52	33.37	46.00	-12.63	QP	HORIZONTAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	53.69	2.41	11.70	3.93	18.04	40.00	-21.96	QP	VERTICAL
2	97.46	2.14	11.80	4.28	18.22	43.50	-25.28	QP	VERTICAL
3	172.60	11.83	8.66	4.74	25.23	43.50	-18.27	QP	VERTICAL
4	294.11	1.86	13.42	5.35	20.63	46.00	-25.37	QP	VERTICAL
5	541.37	2.93	18.21	6.31	27.45	46.00	-18.55	QP	VERTICAL
6	938.83	7.55	22.97	7.52	38.04	46.00	-7.96	QP	VERTICAL

Note:

1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Note 1: All the modulation and channels had been tested, but only the worst data recorded in the report.

Note 2: EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

8.5. SPURIOUS EMISSIONS BELOW 30M

Note: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

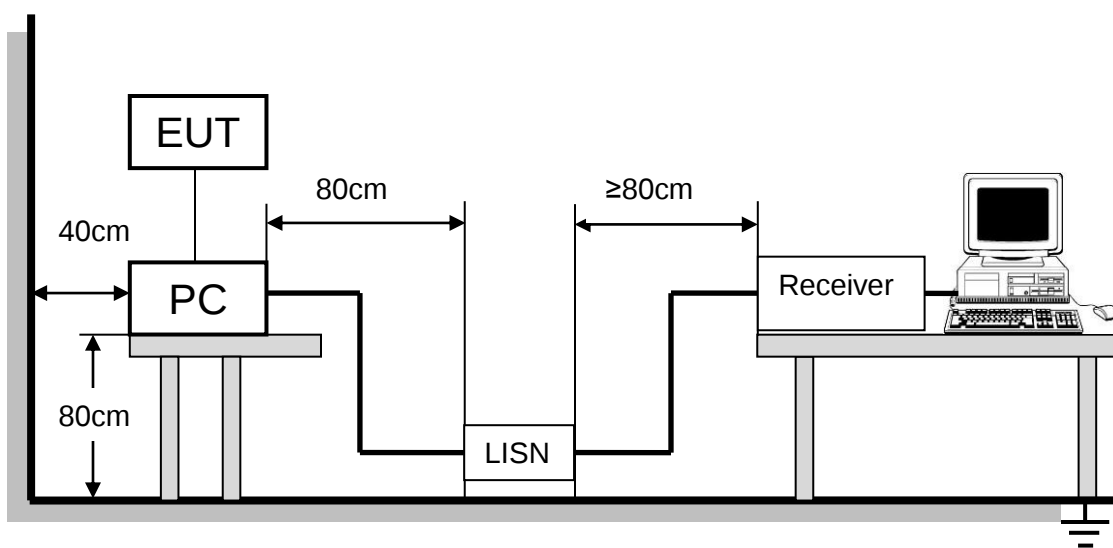
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE

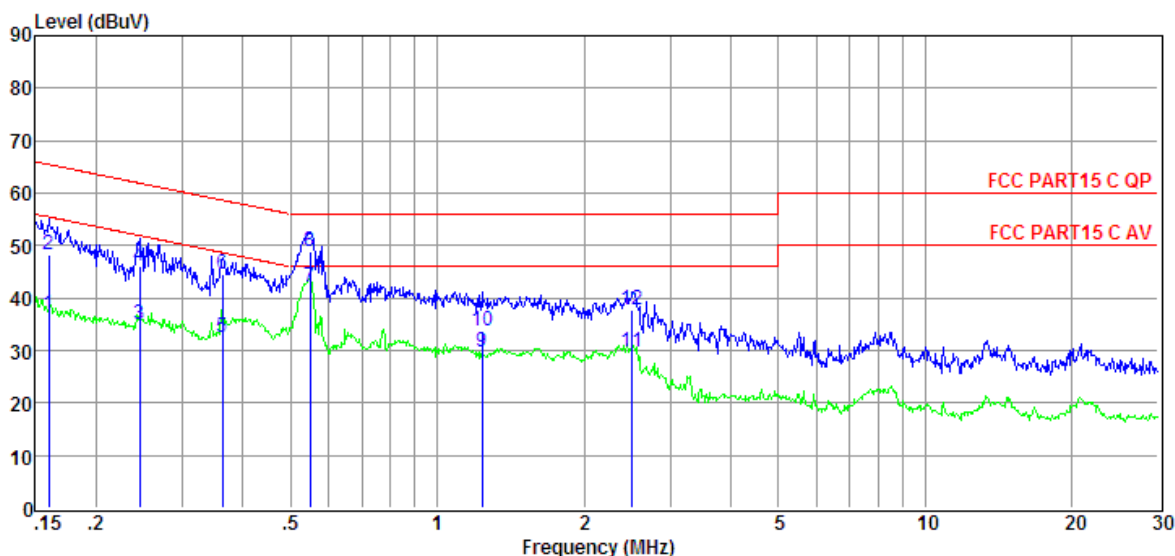


The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS

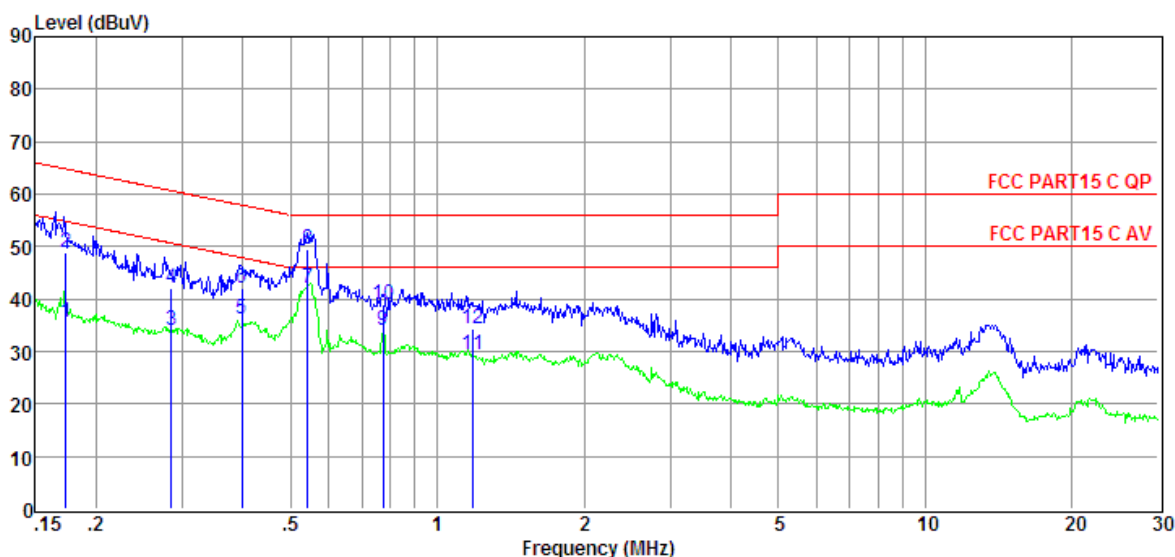
Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Tx Mode	Phase :	L
Remark:	N/A		



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.16	17.35	9.61	0.02	9.86	36.84	55.47	-18.63	Average	LINE
2	0.16	28.77	9.61	0.02	9.86	48.26	65.47	-17.21	QP	LINE
3	0.25	15.37	9.61	0.02	9.86	34.86	51.91	-17.05	Average	LINE
4	0.25	26.61	9.61	0.02	9.86	46.10	61.91	-15.81	QP	LINE
5	0.36	12.97	9.61	0.02	9.86	32.46	48.65	-16.19	Average	LINE
6	0.36	25.13	9.61	0.02	9.86	44.62	58.65	-14.03	QP	LINE
7	0.55	22.66	9.61	0.03	9.86	42.16	46.00	-3.84	Average	LINE
8	0.55	29.46	9.61	0.03	9.86	48.96	56.00	-7.04	QP	LINE
9	1.24	10.26	9.62	0.03	9.86	29.77	46.00	-16.23	Average	LINE
10	1.24	14.35	9.62	0.03	9.86	33.86	56.00	-22.14	QP	LINE
11	2.51	10.09	9.64	0.05	9.87	29.65	46.00	-16.35	Average	LINE
12	2.51	18.18	9.64	0.05	9.87	37.74	56.00	-18.26	QP	LINE

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC 120V/60Hz
Test Mode:	Tx Mode	Phase :	N
Remark:	N/A		



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Detector	Phase
1	0.17	16.01	9.61	0.02	9.86	35.50	54.81	-19.31	Average	NEUTRAL
2	0.17	29.41	9.61	0.02	9.86	48.90	64.81	-15.91	QP	NEUTRAL
3	0.28	14.47	9.61	0.02	9.86	33.96	50.68	-16.72	Average	NEUTRAL
4	0.28	22.48	9.61	0.02	9.86	41.97	60.68	-18.71	QP	NEUTRAL
5	0.40	16.65	9.61	0.02	9.86	36.14	47.90	-11.76	Average	NEUTRAL
6	0.40	22.68	9.61	0.02	9.86	42.17	57.90	-15.73	QP	NEUTRAL
7	0.54	22.51	9.61	0.03	9.86	42.01	46.00	-3.99	Average	NEUTRAL
8	0.54	29.98	9.61	0.03	9.86	49.48	56.00	-6.52	QP	NEUTRAL
9	0.78	14.37	9.61	0.03	9.86	33.87	46.00	-12.13	Average	NEUTRAL
10	0.78	19.58	9.61	0.03	9.86	39.08	56.00	-16.92	QP	NEUTRAL
11	1.18	9.85	9.61	0.03	9.86	29.35	46.00	-16.65	Average	NEUTRAL
12	1.18	14.87	9.61	0.03	9.86	34.37	56.00	-21.63	QP	NEUTRAL

- Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ANTENNA CONNECTOR

EUT has a FPCB Antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT