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Project Number: 16E086-4d

Prepared for:

IP Access Ltd

By

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Clonross Lane

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FCC Site Registration: 92592

FCC ID: QGGIPA248M

Date

30th June 2016

FCC EQUIPMENT AUTHORISATION

Test Report

EUT Description

Indoor Base Station.

Authorised :
John McAuley

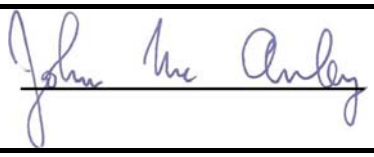


Exhibit A – Technical Report

Table of Contents

1.0 EUT Operation

Operating Conditions during Test:

The EUT is an indoor base station powered from a 12v dc mains adapter operating on the following bands

Frequency Plan

Operating Band	Operating Band	Uplink	Downlink	Channel bandwidths	Modulations
		MHz	MHz	MHz	
2	PCS	1850– 1910	1930 – 1990	5, 10, 15, 20	QPSK, 16QAM, 64QAM
4	AWS	1710– 1755	2110 – 2155	5, 10, 15, 20	QPSK, 16QAM, 64QAM
13	LTE Upper Band	777– 787	746 – 756	5, 10	QPSK, 16QAM, 64QAM
17	LTE Lower band	704– 716	734 – 746	5, 10	QPSK, 16QAM, 64QAM

Table 1

This report covers Band 13

Centre Frequencies for Bottom Middle and Top channels Band 13

	Bottom	Middle	Top
	MHz	MHz	MHz
5MHz Bandwidth Channels =>	748.5	n/a	753.5
10MHz Bandwidth Channels =>	n/a	751	n/a

The EUT was powered from 12V DC adapter
Manufacturer Phihong Model PSAA30R-120

For Conducted Measurements on antenna port the un-used port was terminated in 50 ohm termination.

Environmental conditions
During the measurement the environmental conditions were within the listed ranges:
☒ Normal
Temperature: +15 to +35 ° C
Humidity: 20-75 %

2.Results summary

Band 13

Description	FCC Part 27	FCC part2	Test Result
Transmitter Carrier power	27.50 b	2.1046	Pass
Transmitter Occupied Bandwidth		2.1049	Pass
Transmitter Conducted Emissions	27.53 c1,c5,f	2.1051	Pass
Transmitter Conducted Emissions at band edges	27.53 c1,c5,	2.1051	Pass
Transmitter Radiated Spurious Emissions	27.53 c1,c5,f	2.1053	Pass
Transmitter Frequency Stability(Temperature/ Voltage Variation)	27.54 .	2.1055	Pass
Frequency Plan	27.5b	27.2b	Pass
Modulation Characteristics		2.1047	Pass

3 Emissions Measurements

3.1 Transmitter Carrier power Conducted

Channel	Bandwidth	Modulation	Antenna port TX1 dBm	Antenna port TX2 dBm	Total Conducted power mW	Total Conducted power dBm
TOP	BW5MHz	QPSK	21.1	21.09	257.35	24.11
TOP	BW5MHz	64QAM	21.28	21.24	267.32	24.27
TOP	BW5MHz	16QAM	21.16	21.03	257.38	24.11
MIDDLE	BW5MHz	QPSK	21.01	21.09	254.71	24.06
MIDDLE	BW5MHz	64QAM	20.92	21.16	254.21	24.05
MIDDLE	BW5MHz	16QAM	21.12	21.31	264.63	24.23
BOTTOM	BW5MHz	QPSK	21.06	20.97	252.67	24.03
BOTTOM	BW5MHz	64QAM	21.04	21.06	254.70	24.06
BOTTOM	BW5MHz	16QAM	21.04	21.04	254.11	24.05
MIDDLE	BW10MHz	QPSK	20.93	20.83	244.94	23.89
MIDDLE	BW10MHz	64QAM	20.94	20.72	242.20	23.84
MIDDLE	BW10MHz	16QAM	20.99	20.97	250.63	23.99

Max Level for TX1 Antenna port = 21.28dBm
Max Level for TX2 Antenna port = 21.31dBm
`

Antenna gain =2.3dBi

Max ERP = 24.27dBm +2.3 dBi -2.15 = 24.42 dBm = 276.7 mW

Ref appendix A for Scans

Test Result Pass

Max Power

Max	Antenna	ERP factor	Total dBm	mW	Bandwidth
24.27	2.3	2.15	24.42	276.69	5MHz
24.11	2.3	2.15	24.26	266.68	10MHz

3.2 Occupied Bandwidth Conducted

Channel	Bandwidth	Modulation	Antenna port TX1 OBW MHz
BOTTOM	BW5MHz	16QAM	4.472
BOTTOM	BW5MHz	64QAM	4.486
BOTTOM	BW5MHz	QPSK	4.486
MIDDLE	BW5MHz	16QAM	4.486
MIDDLE	BW5MHz	64QAM	4.486
MIDDLE	BW5MHz	QPSK	4.5
TOP	BW5MHz	16QAM	4.486
TOP	BW5MHz	64QAM	4.515
TOP	BW5MHz	QPSK	4.515
MIDDLE	BW10MHz	16QAM	8.943
MIDDLE	BW10MHz	64QAM	8.943
MIDDLE	BW10MHz	QPSK	8.943

Max OBW measurements for TX1 =4.515MHz for 5MHz Bandwidth
Max OBW measurements for TX1 =8.943 MHz for 10MHz Bandwidth

Ref appendix B for Scans

Test Result Pass

3.3 Spurious Emissions Conducted

Ref Appendix C for Scans

Test Result Pass

3.3 Band Edge Emissions Conducted

Ref Appendix D for Scans

Band Edge	Bandwidth	Modulation	Antenna port TX1	Antenna port TX2	Total Conducted power	Total Conducted power
			dBm	dBm	mW	dBm
Lower	BW5MHz	QPSK	-27.09	-26.64	0.0028	-25.46
Lower	BW5MHz	64QAM	-27.18	-30.31	0.0029	-25.44
Lower	BW5MHz	16QAM	-28.06	-28.88	0.0005	-33.44
Lower	BW10MHz	QPSK	-35.8	-37.21	0.0007	-31.72
Lower	BW10MHz	64QAM	-34.59	-34.88	0.0005	-33.44
Lower	BW10MHz	16QAM	-35.89	-37.09	0.0041	-23.92
Upper	BW5MHz	QPSK	-25.43	-29.24	0.0030	-25.23
Upper	BW5MHz	64QAM	-27.97	-28.52	0.0026	-25.80
Upper	BW5MHz	16QAM	-28.45	-29.21	0.0002	-36.96
Upper	BW10MHz	QPSK	-38.88	-41.43	0.0002	-36.44
Upper	BW10MHz	64QAM	-40.56	-38.56	0.0003	-35.72
Upper	BW10MHz	16QAM	-39.27	-38.25	0.0041	-23.85

Band Edge Max = -23.85dBm

Limit = -13dBm

Test Result Pass

4 Radiated Emissions

4.1 Results for Radiated emissions

Appendix E shows the results of the scans in the anechoic chamber.

4.1.1 Spurious Emissions Measurements (30MHz to 1GHz)

No peaks evident

4.1.2 Horn antenna measurements >1GHz

Frequency	Sub Antenna input	Sub Antenna gain	EIRP	Limit	Margin
GHz	dBm	dBi	dBm	dBm	dB
1.099	-70.26	6.7	-63.56	-13	50.56
1.199	-70.3	6.7	-63.6	-13	50.6
1.299	-72.19	6.7	-65.49	-13	52.49
1.399	-75.68	6.7	-68.98	-13	55.98
1.499	-68.71	9.41	-59.3	-13	46.3
1.599	-73.16	9.41	-63.75	-13	50.75

4.1.3 Horn antenna measurements dBW/MHz §27.53(f)

Frequency	Sub Antenna input	Sub Antenna gain	EIRP	* EIRP	Limit	Margin
GHz	dBm	dBi	dBm	dBW/MHz	dBm	dB
1.599	-73.16	9.41	-63.75	-83.75	-70	13.75

Where
dBm/MHz = dBm – 10*log (RBW/1MHz) (note RBW of 100KHz)
dBm/MHz = dBm +10 dB

dBW = dBm – 10*log(1000) =dBm -30 dB

=>conversion factor of -20dB to convert to dBW/MHz *

4.1.4 Substitution antenna for Band Edges Radiated

Frequency	Sub antenna input	Sub Antenna Gain	EIRP	ERP	Limit	Margin
MHz	dBm	dBi	dBm	dBm	dBm	dB
746	-37.35	6.06	-31.29	-33.45	-13	20.45
756	-38.38	6.29	-32.09	-34.25	-13	21.25

Result: Pass

Appendix A

Transmitter Output Power

Conducted

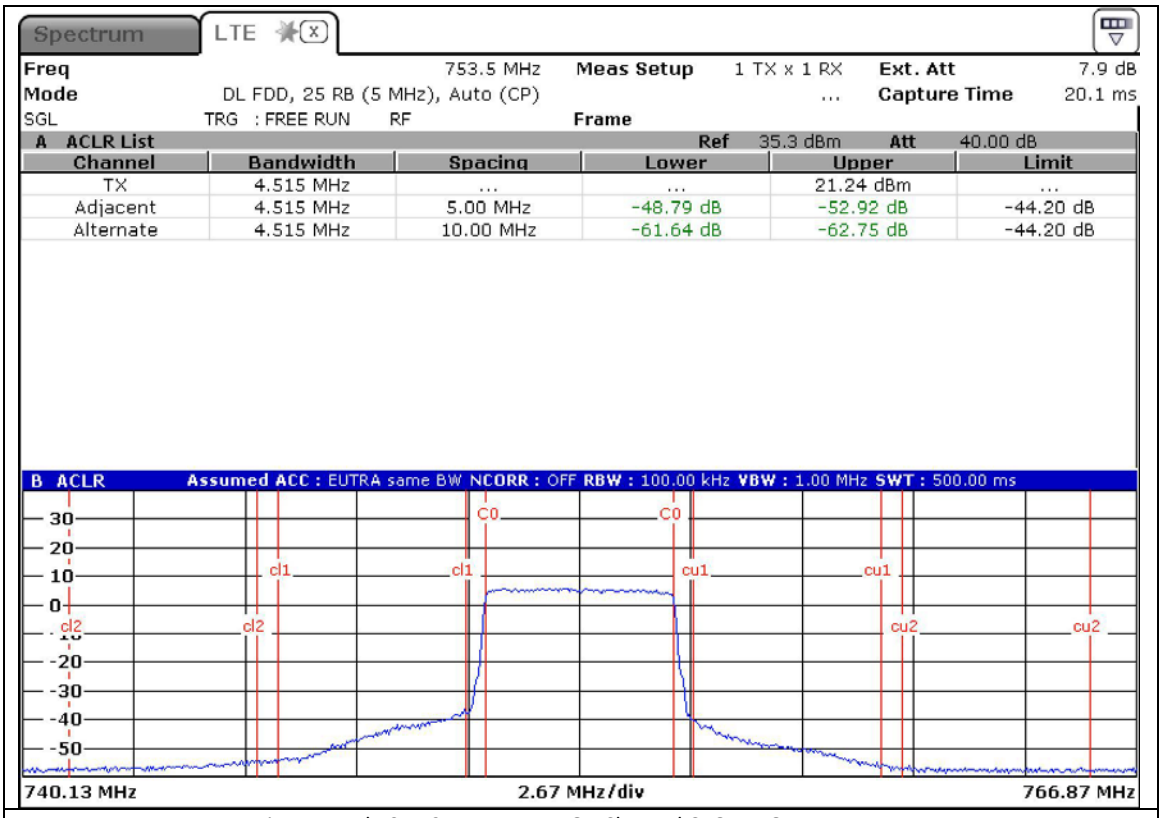
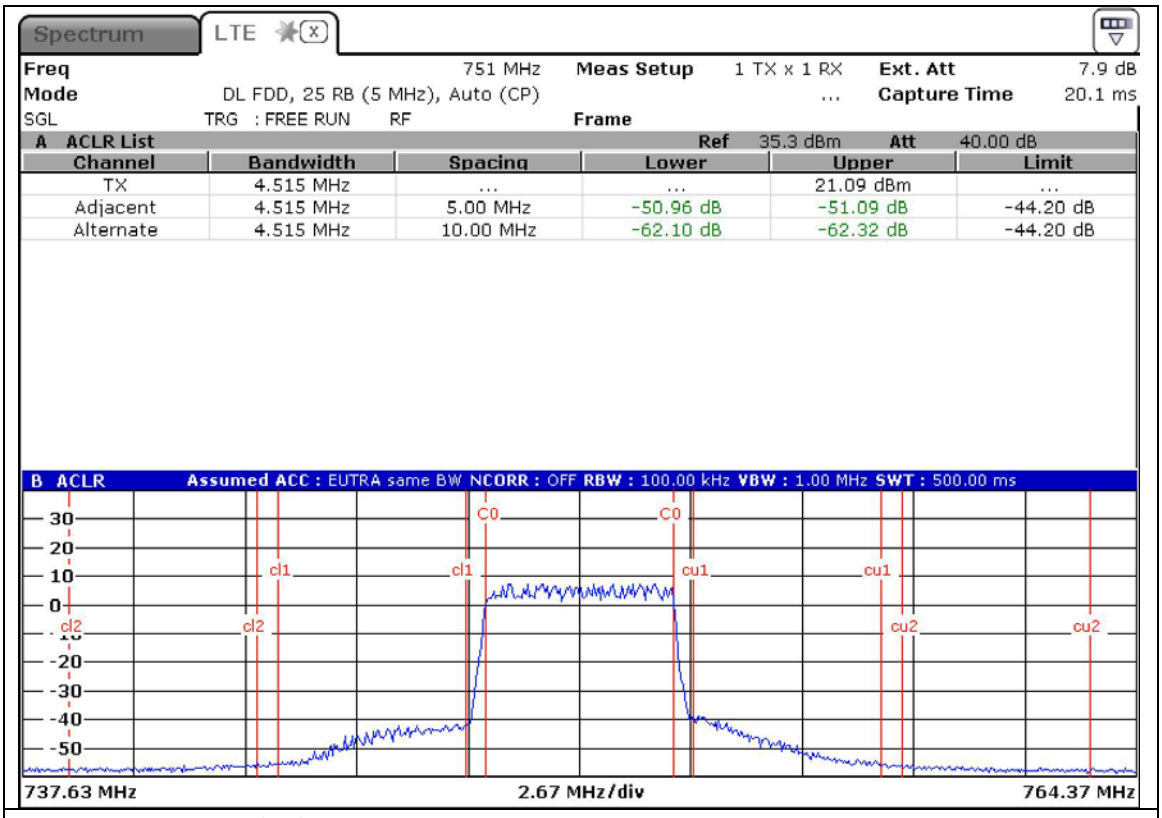
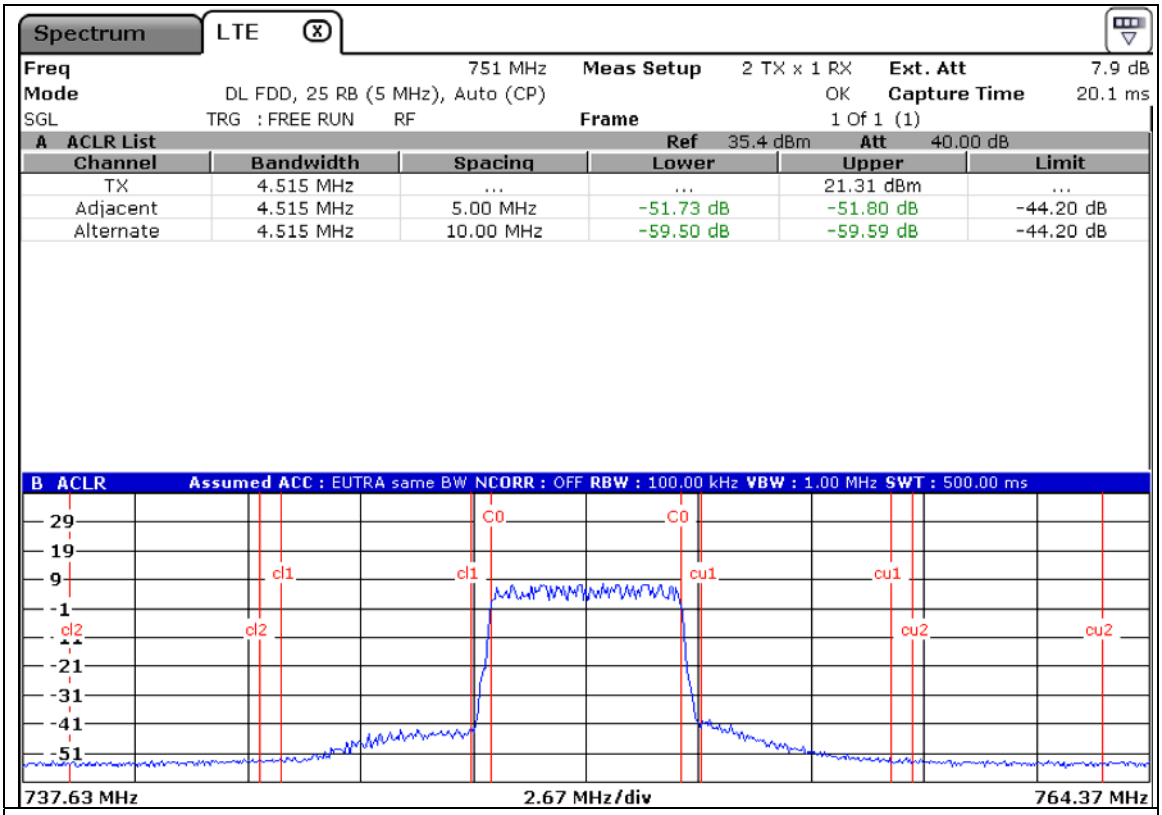


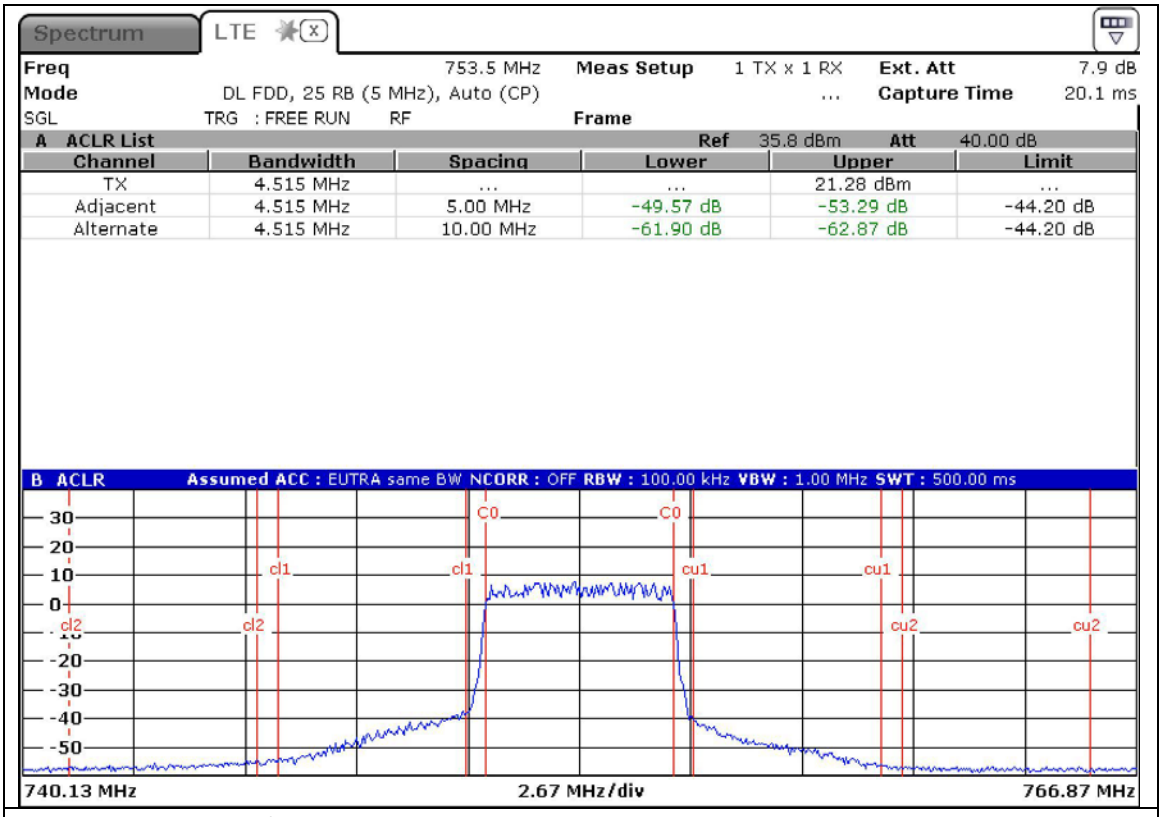
Fig A1 Band 13 TX2 - BW5MHz TOP Channel 64QAM Output Power



FigA2 Band 13 TX2 - BW5MHz MIDDLE Channel QPSK Output Power



FigA3 Band 13 TX2 - BW5MHz MIDDLE Channel 16QAM Output Power



FigA4 Band 13 TX1 - BW5MHz TOP Channel 64QAM Output Power

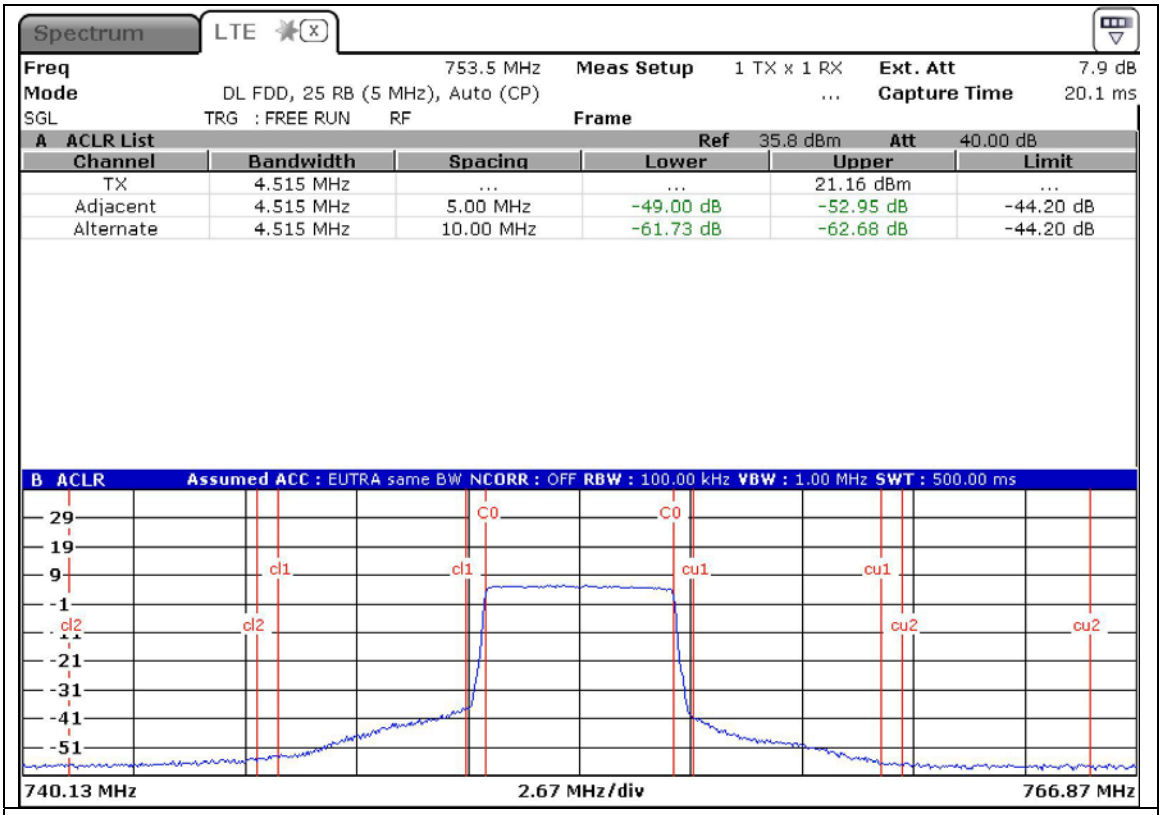


Fig A5 Band 13 TX1 - BW5MHz TOP Channel 16QAM Output Power

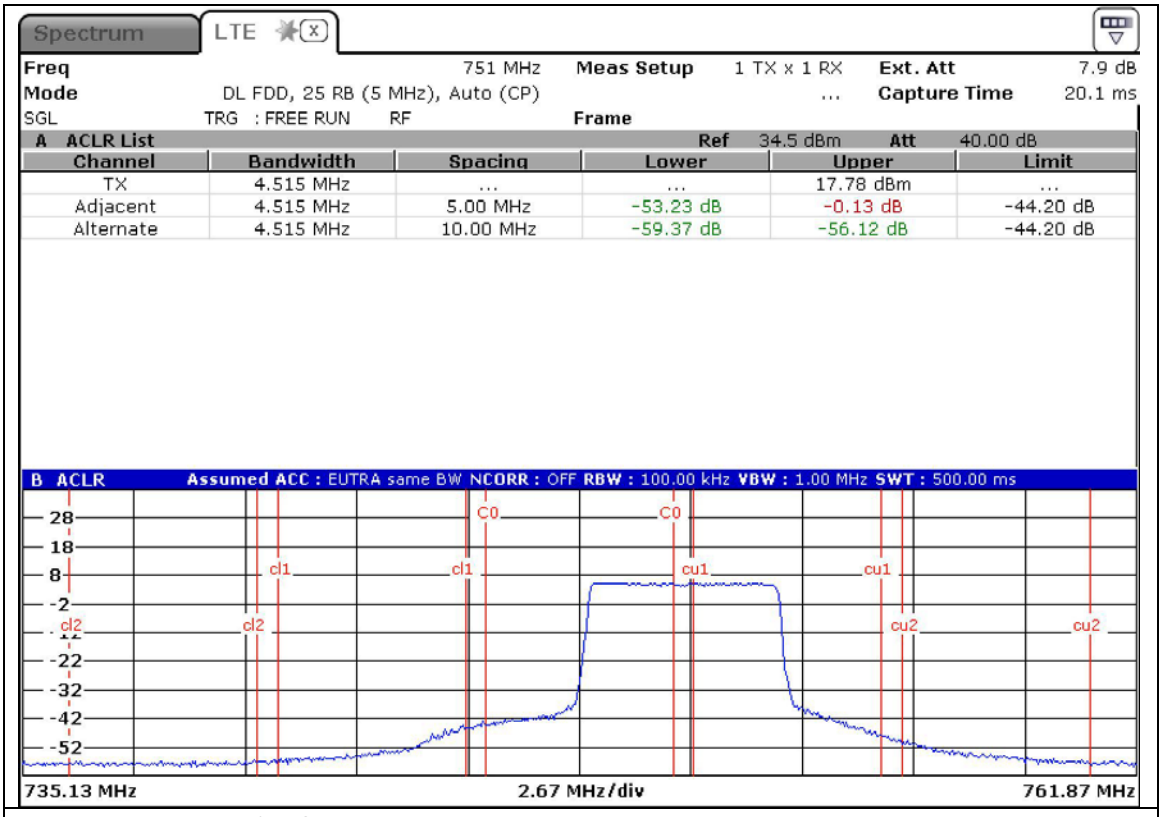


Fig A6 Band 13 TX1 - BW5MHz MIDDLE Channel QPSK Output Power

Appendix B

Occupied Bandwidth

Conducted

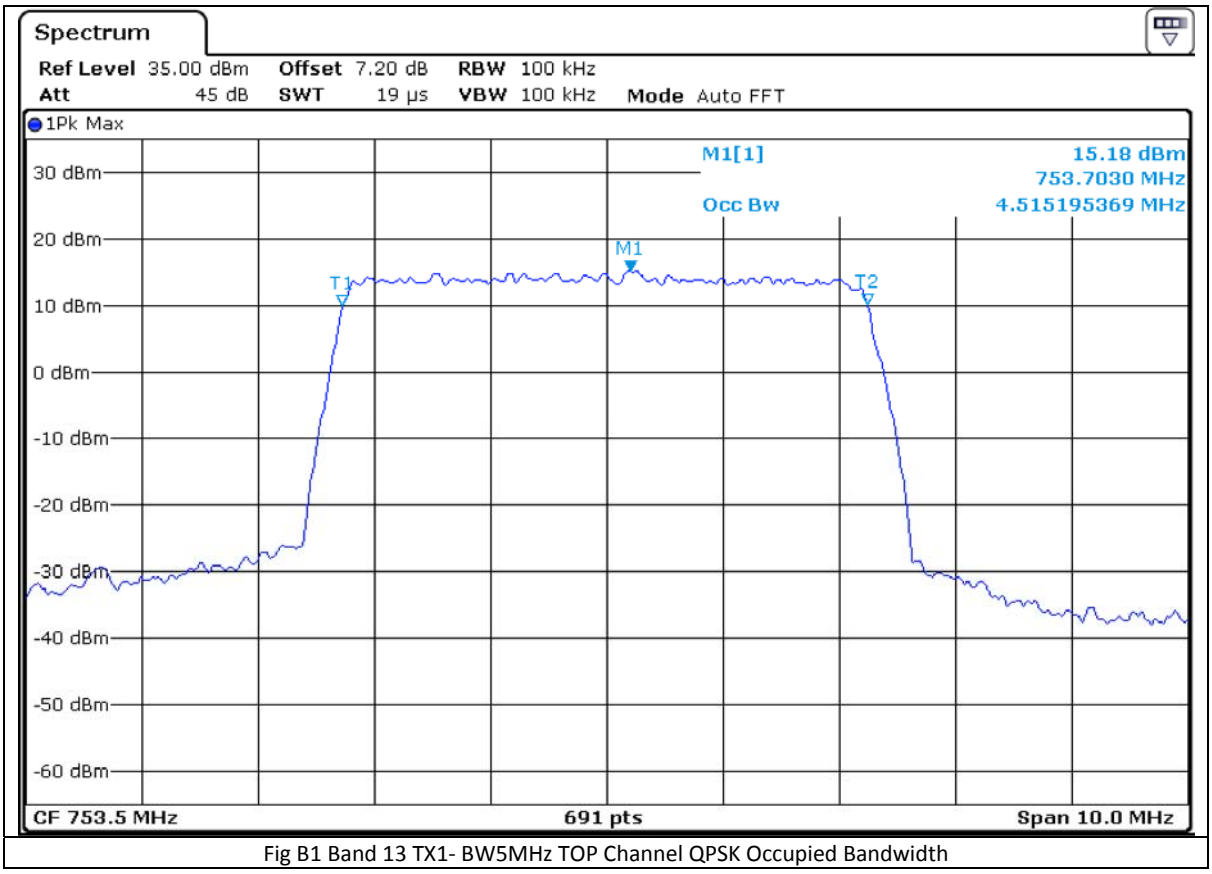


Fig B1 Band 13 TX1- BW5MHz TOP Channel QPSK Occupied Bandwidth

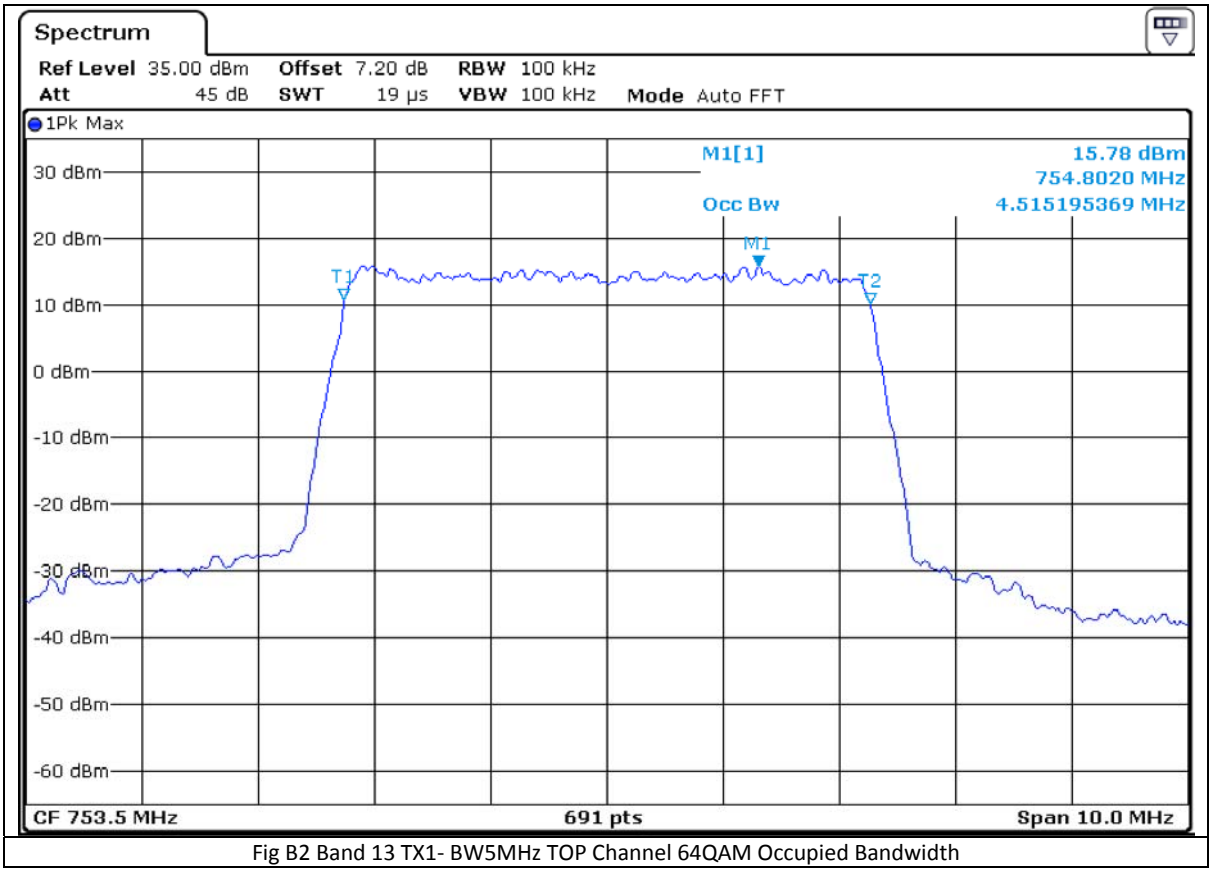


Fig B2 Band 13 TX1- BW5MHz TOP Channel 64QAM Occupied Bandwidth

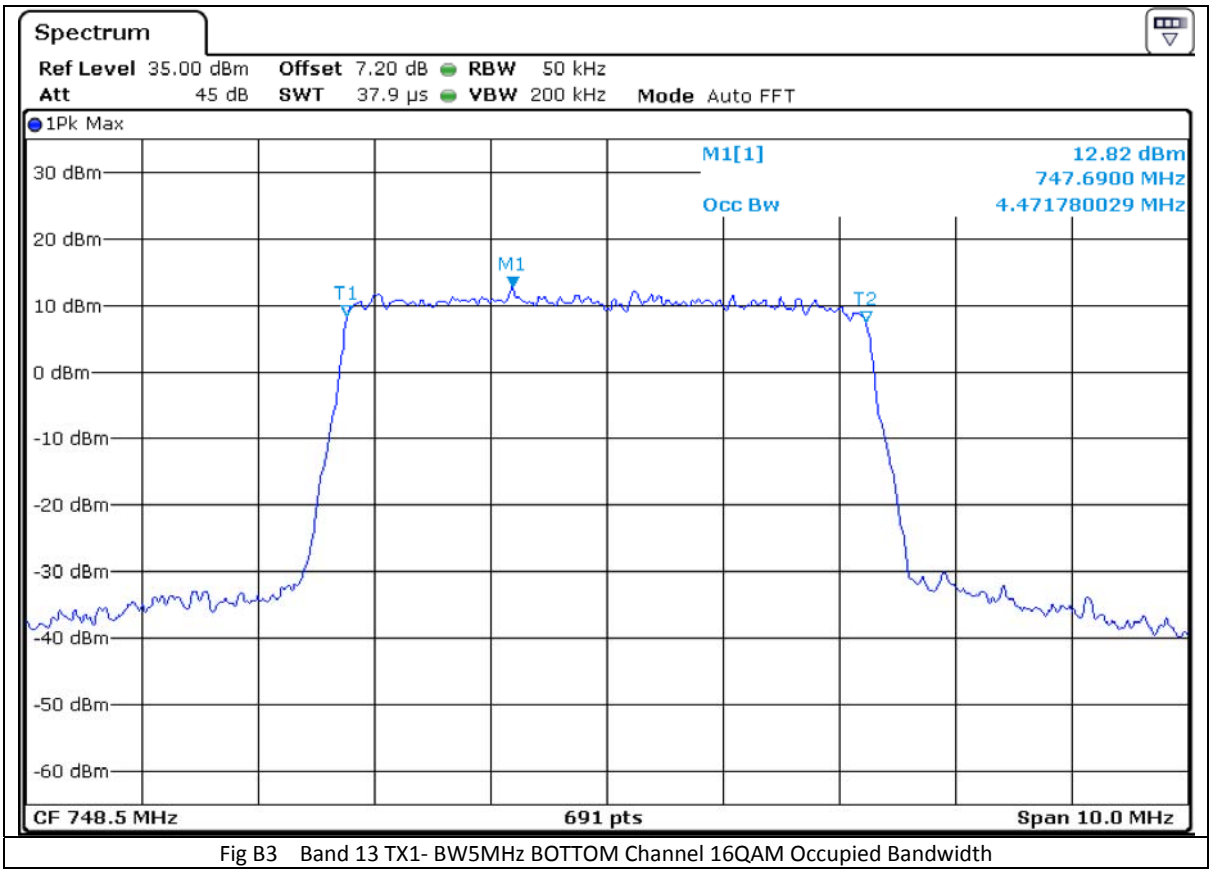


Fig B3 Band 13 TX1- BW5MHz BOTTOM Channel 16QAM Occupied Bandwidth

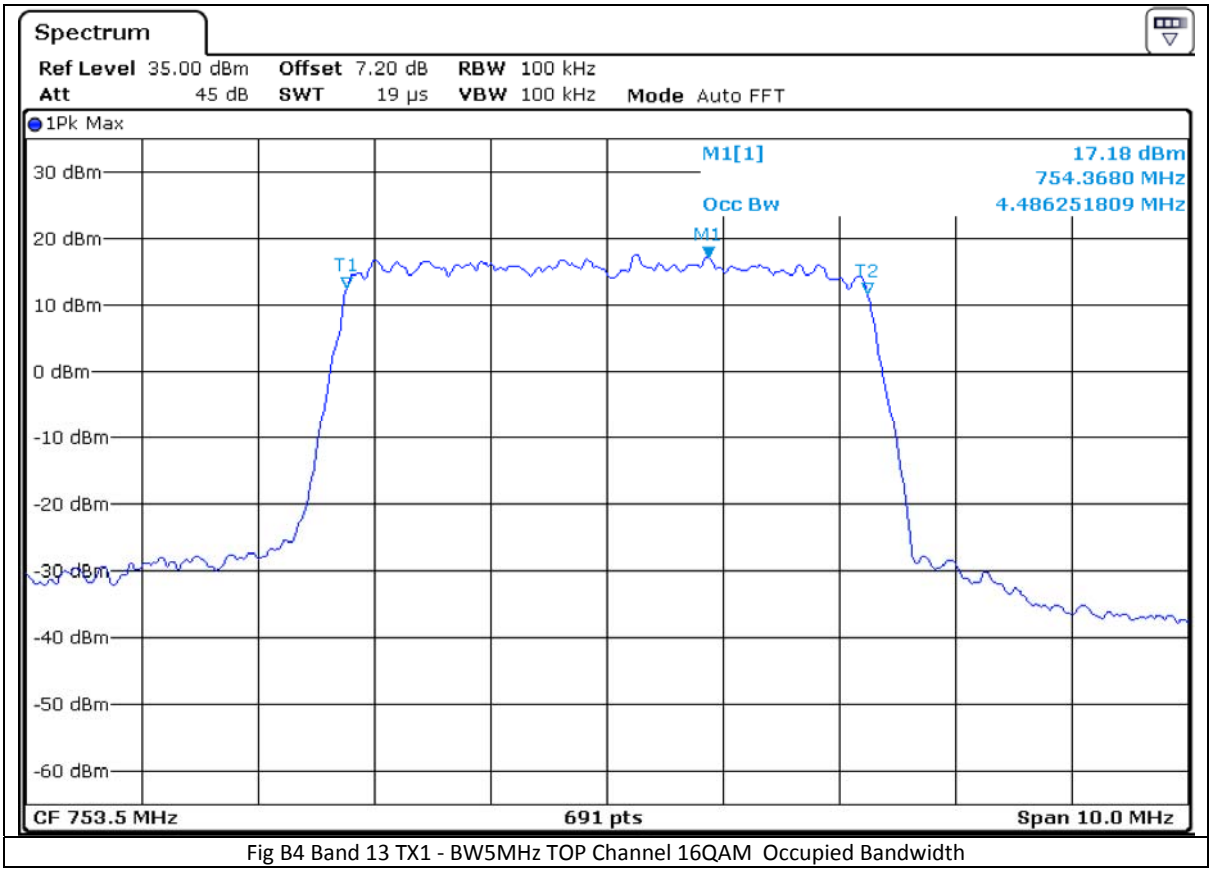


Fig B4 Band 13 TX1 - BW5MHz TOP Channel 16QAM Occupied Bandwidth

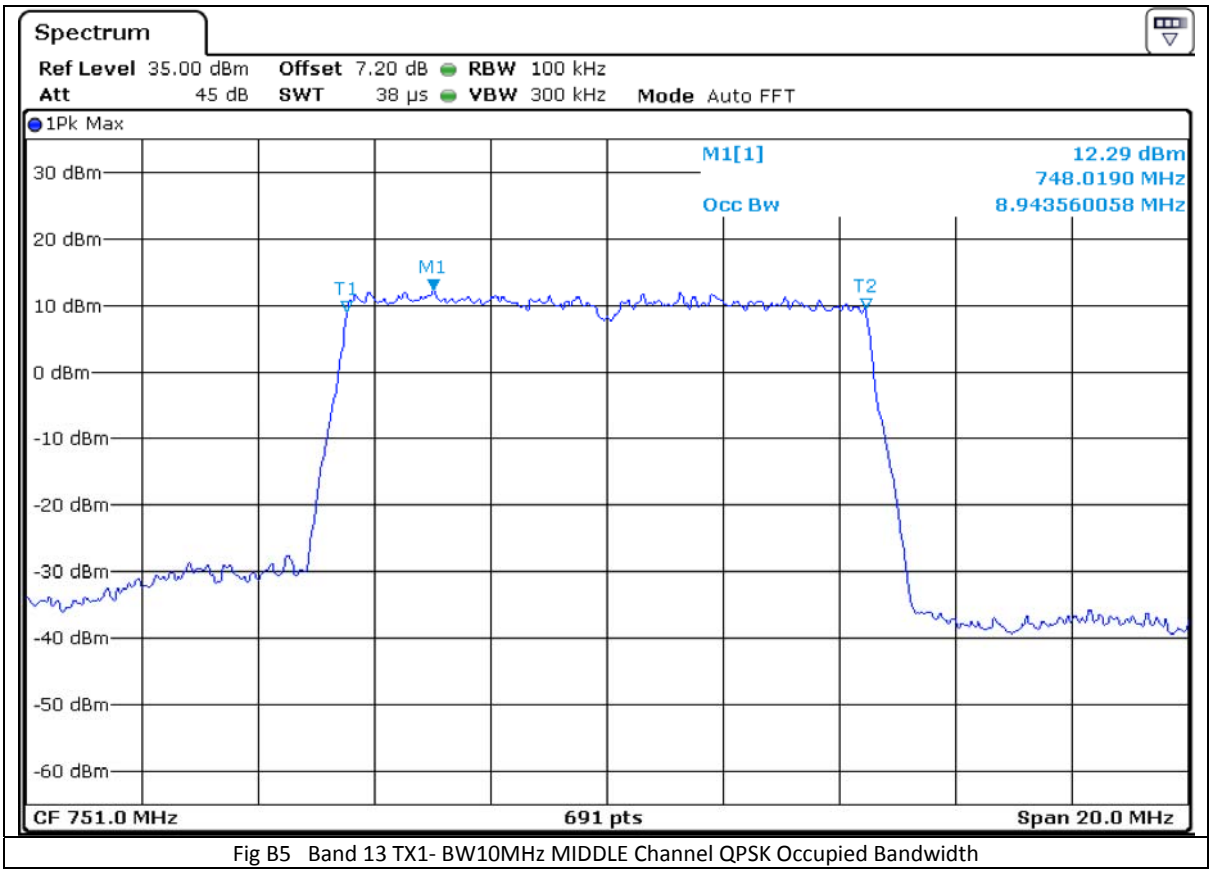


Fig B5 Band 13 TX1- BW10MHz MIDDLE Channel QPSK Occupied Bandwidth

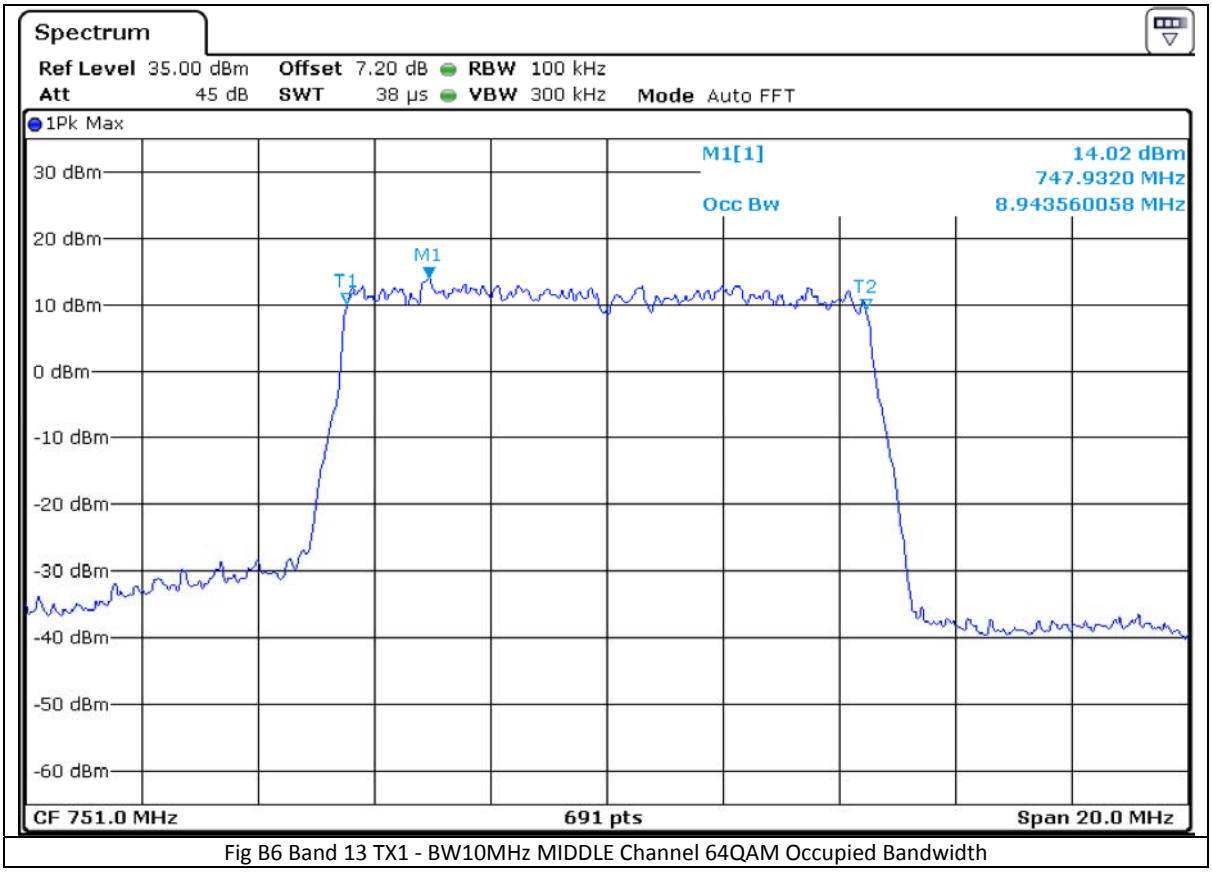


Fig B6 Band 13 TX1 - BW10MHz MIDDLE Channel 64QAM Occupied Bandwidth

Appendix C

Spurious Emissions

Conducted

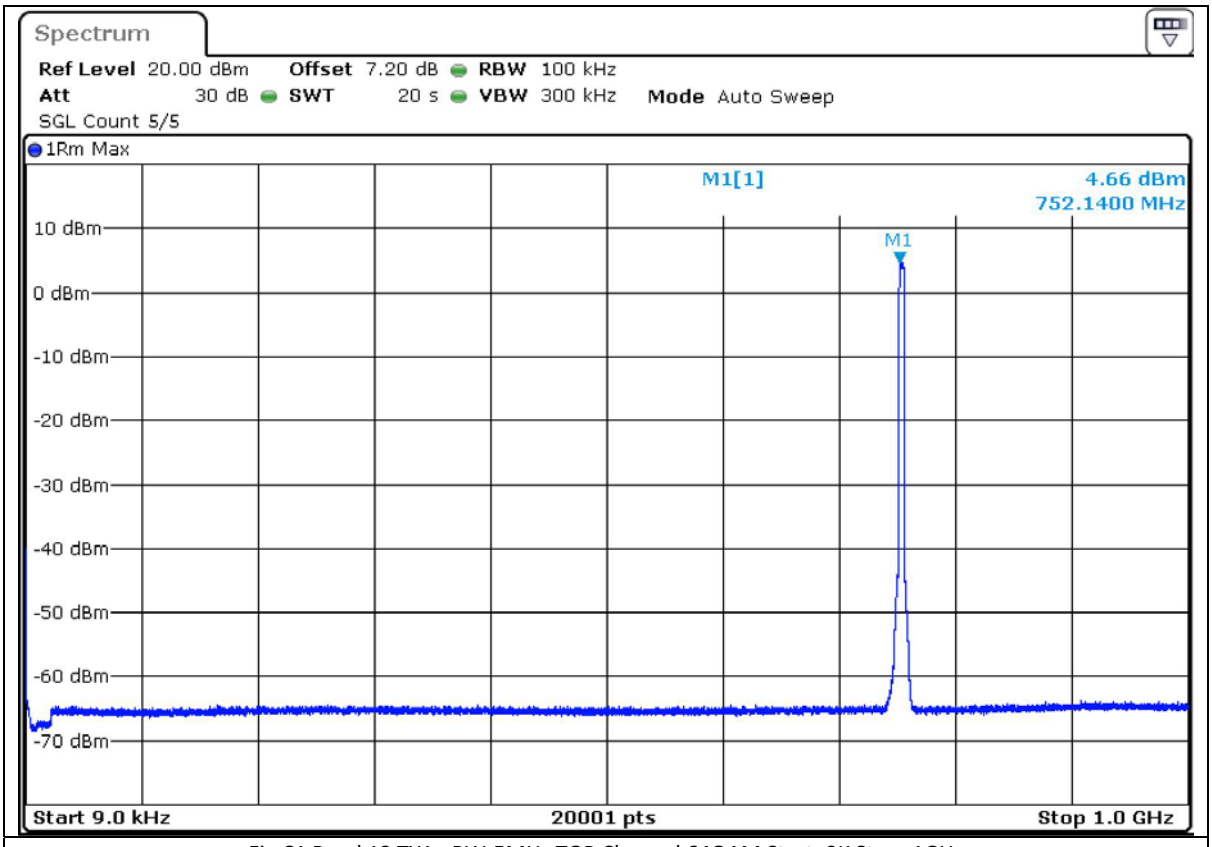


Fig C1 Band 13 TX1 - BW-5MHz TOP Channel 64QAM Start: 9K Stop: 1GHz

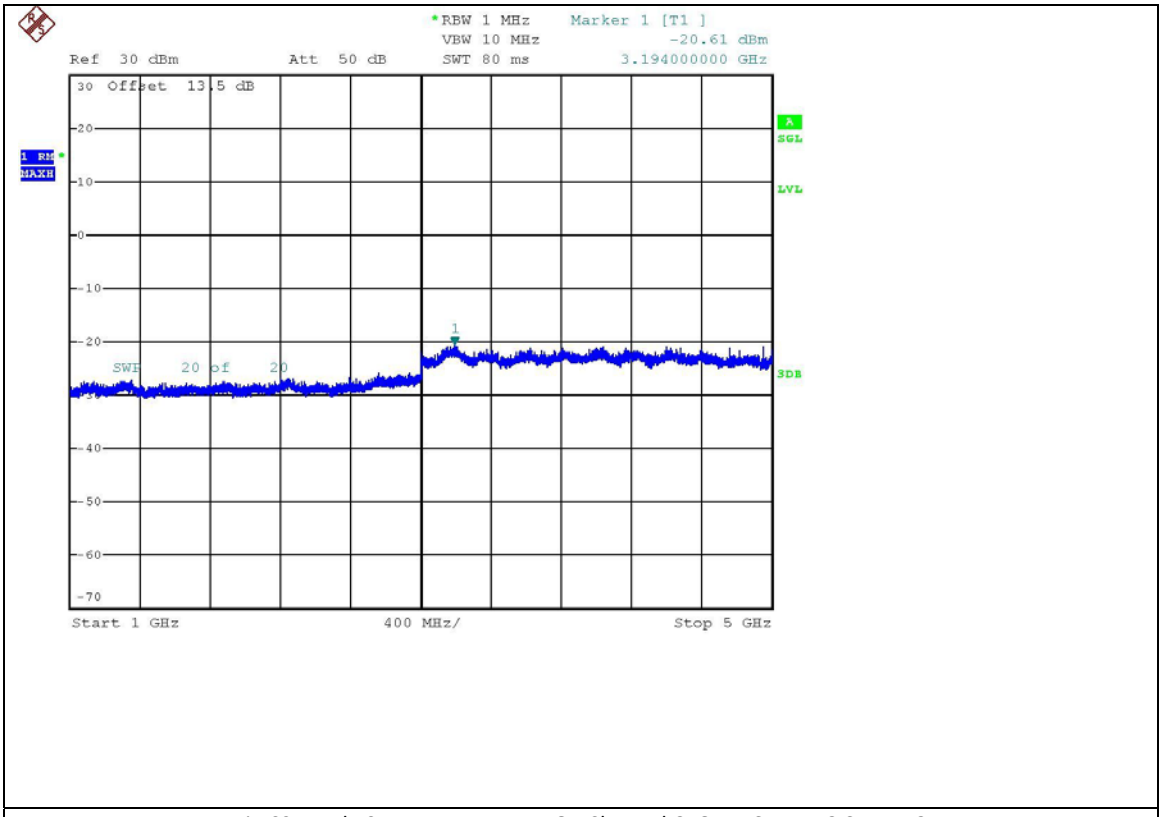


Fig C2 Band 13 TX1 - BW-5MHz TOP Channel 64QAM Start: 1G Stop: 5G

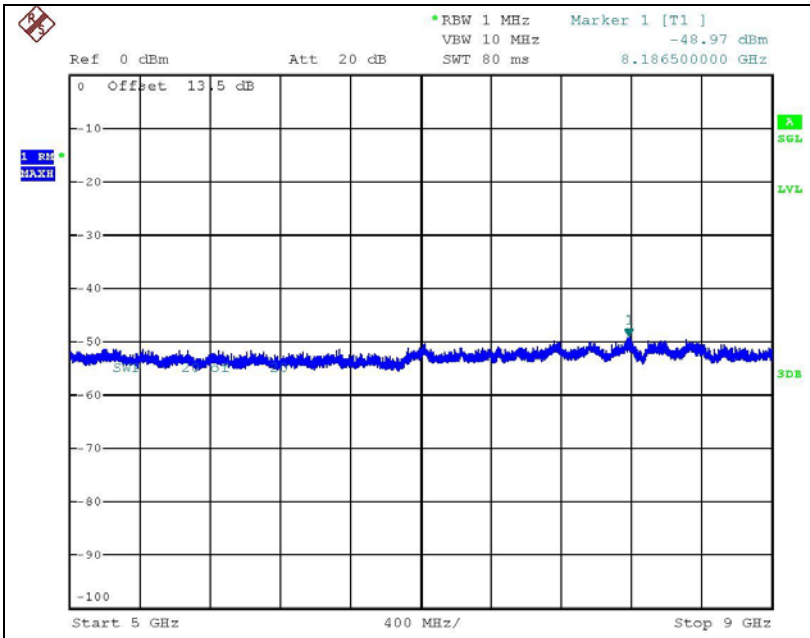


Fig C3 Band 13 TX1 - BW-5MHz TOP Channel 64QAM Start: 5G Stop: 9G

Appendix D

Band Edge Emissions

Conducted

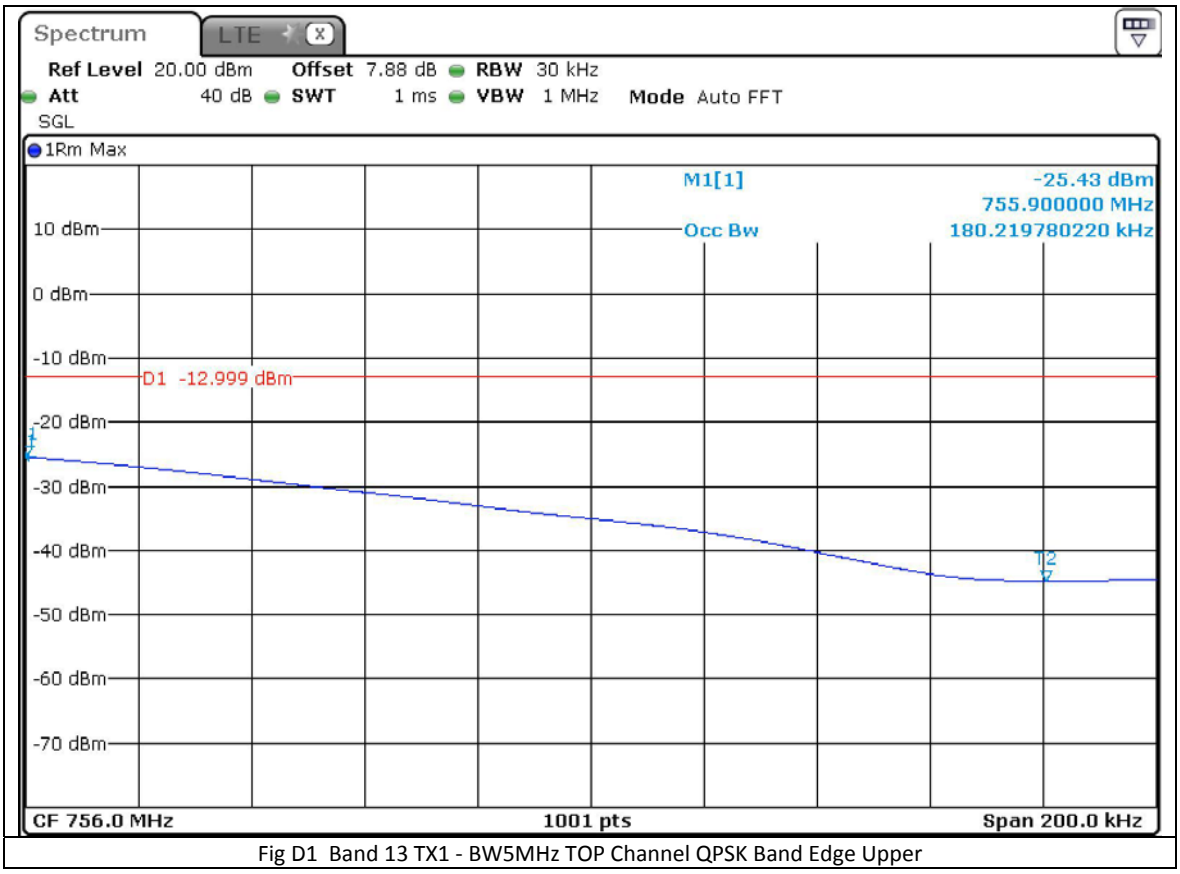


Fig D1 Band 13 TX1 - BW5MHz TOP Channel QPSK Band Edge Upper

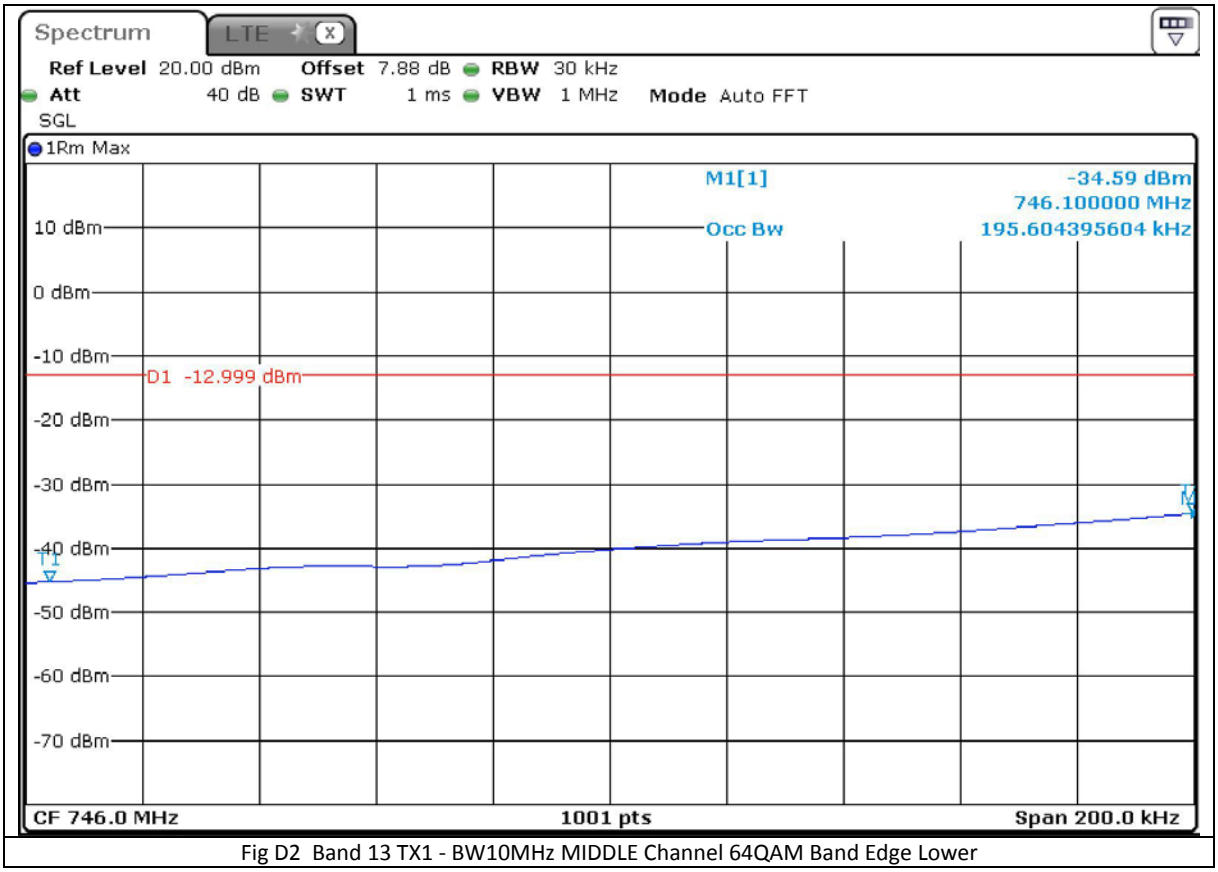


Fig D2 Band 13 TX1 - BW10MHz MIDDLE Channel 64QAM Band Edge Lower

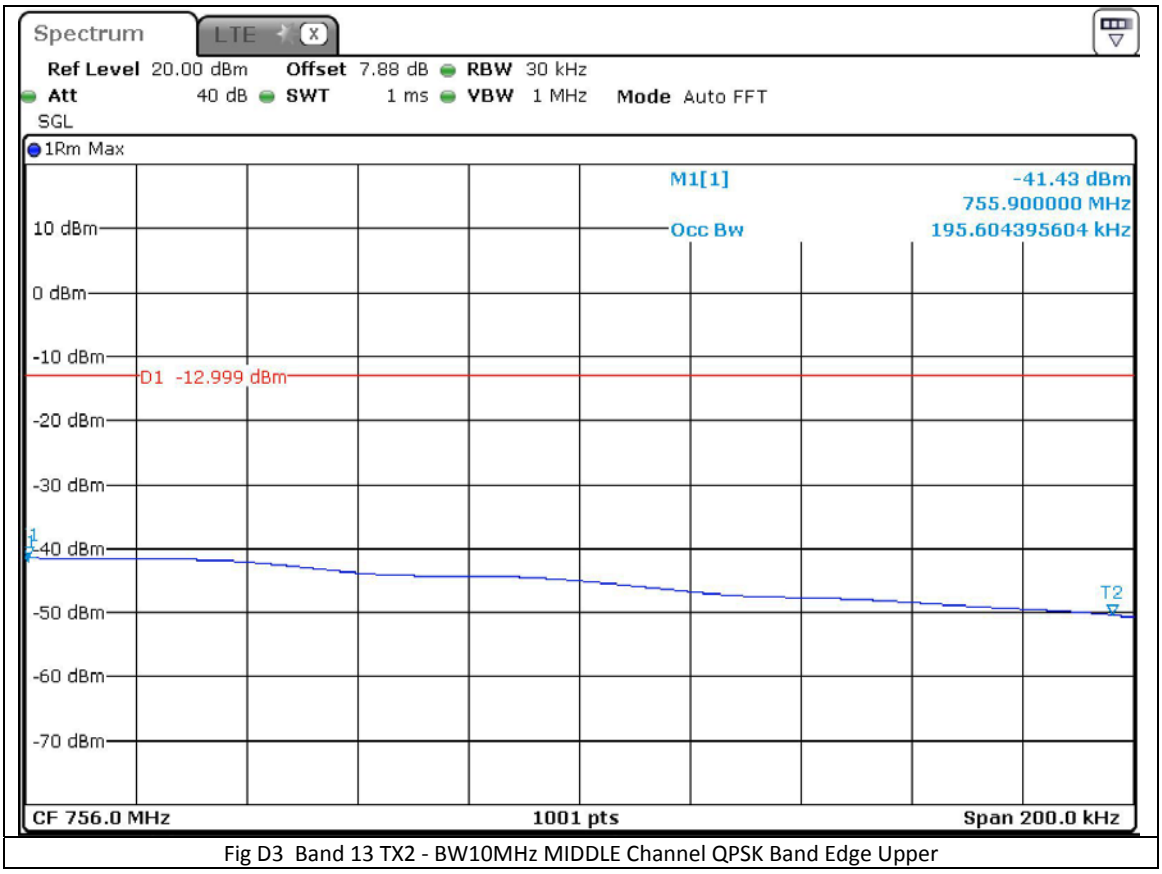


Fig D3 Band 13 TX2 - BW10MHz MIDDLE Channel QPSK Band Edge Upper

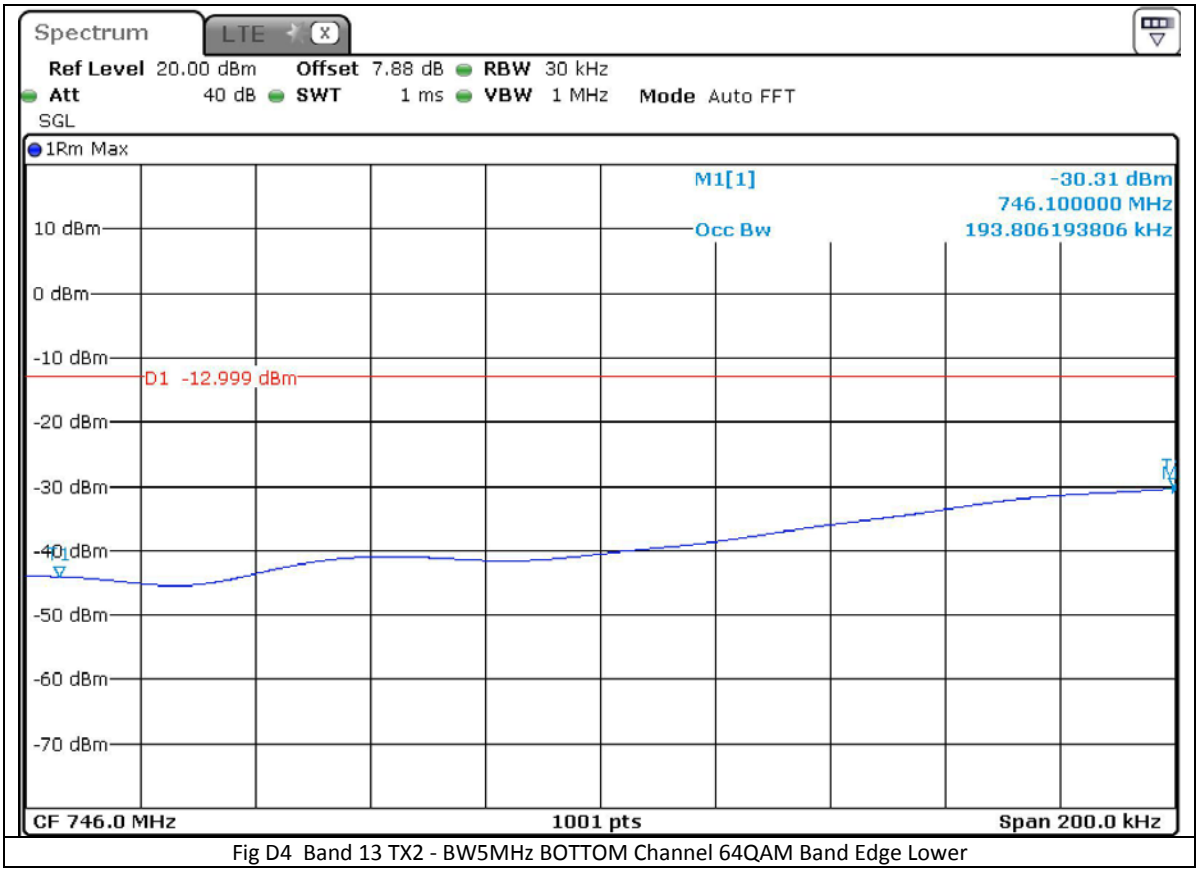


Fig D4 Band 13 TX2 - BW5MHz BOTTOM Channel 64QAM Band Edge Lower

Appendix E

Spurious Emissions

Radiated

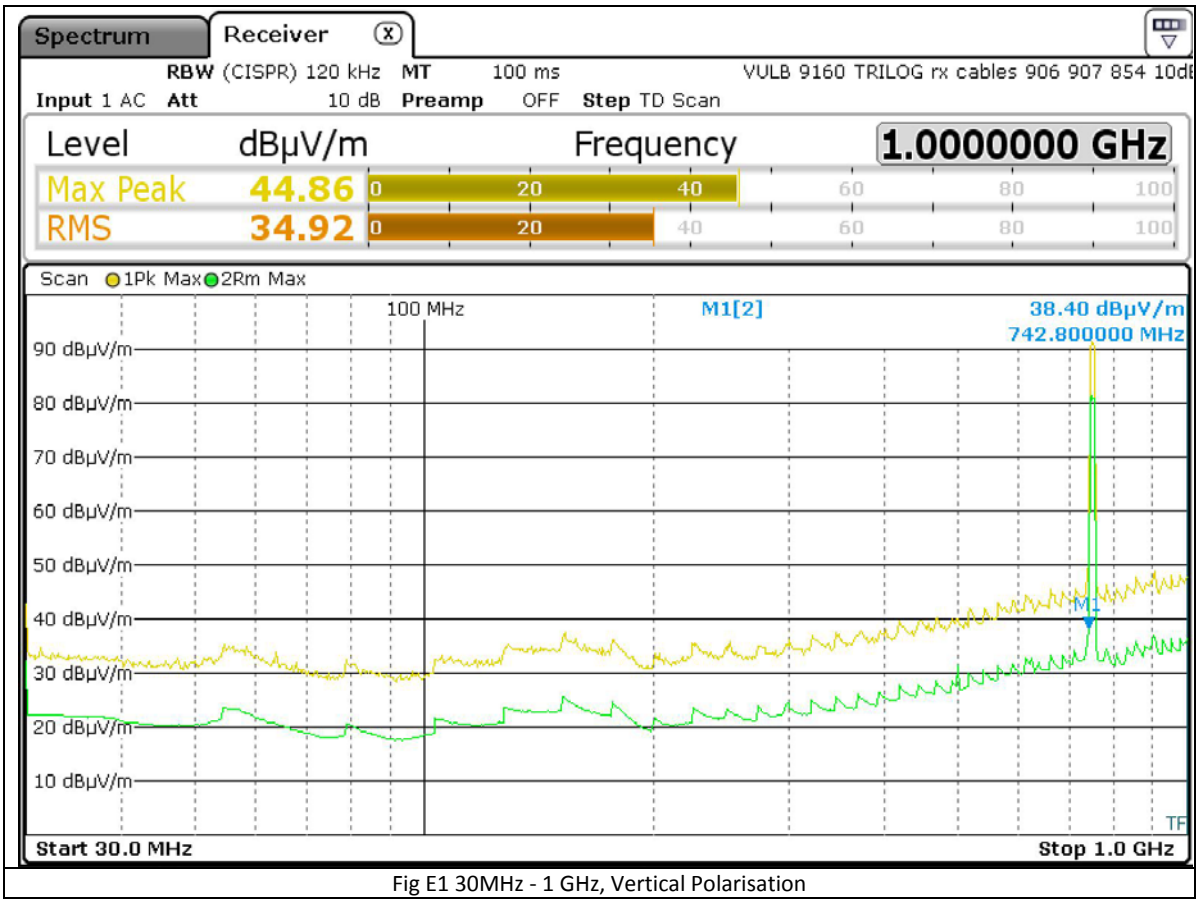


Fig E1 30MHz - 1 GHz, Vertical Polarisation

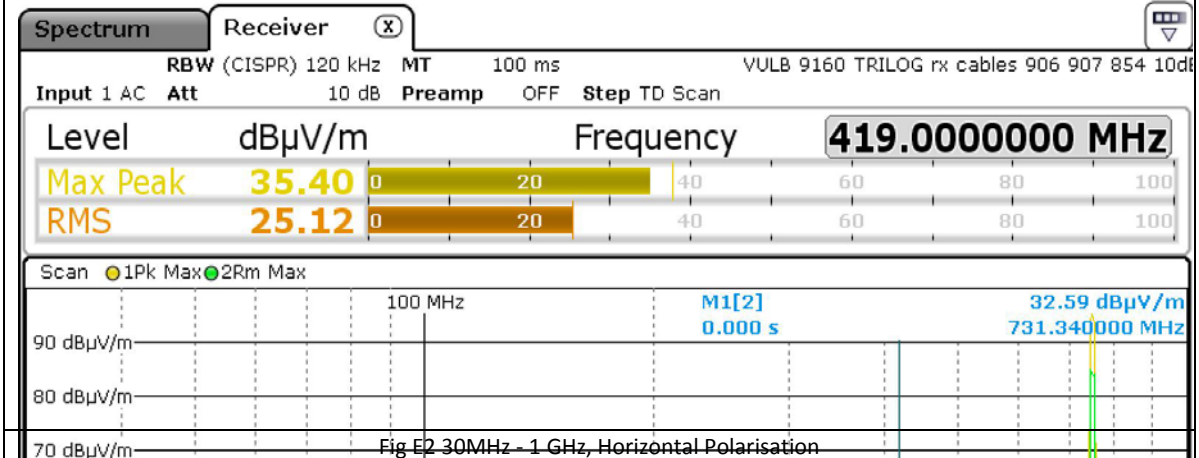


Fig E2 30MHz - 1 GHz, Horizontal Polarisation

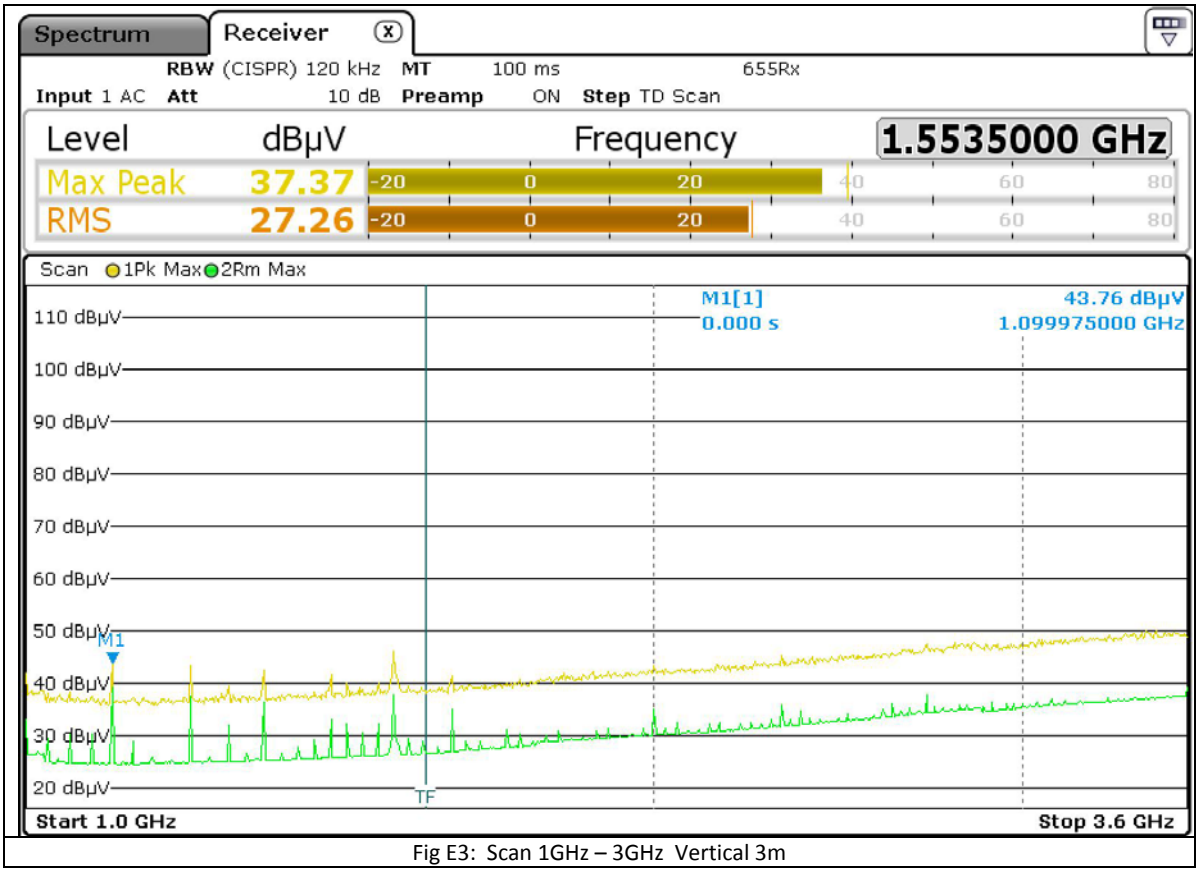


Fig E3: Scan 1GHz – 3GHz Vertical 3m

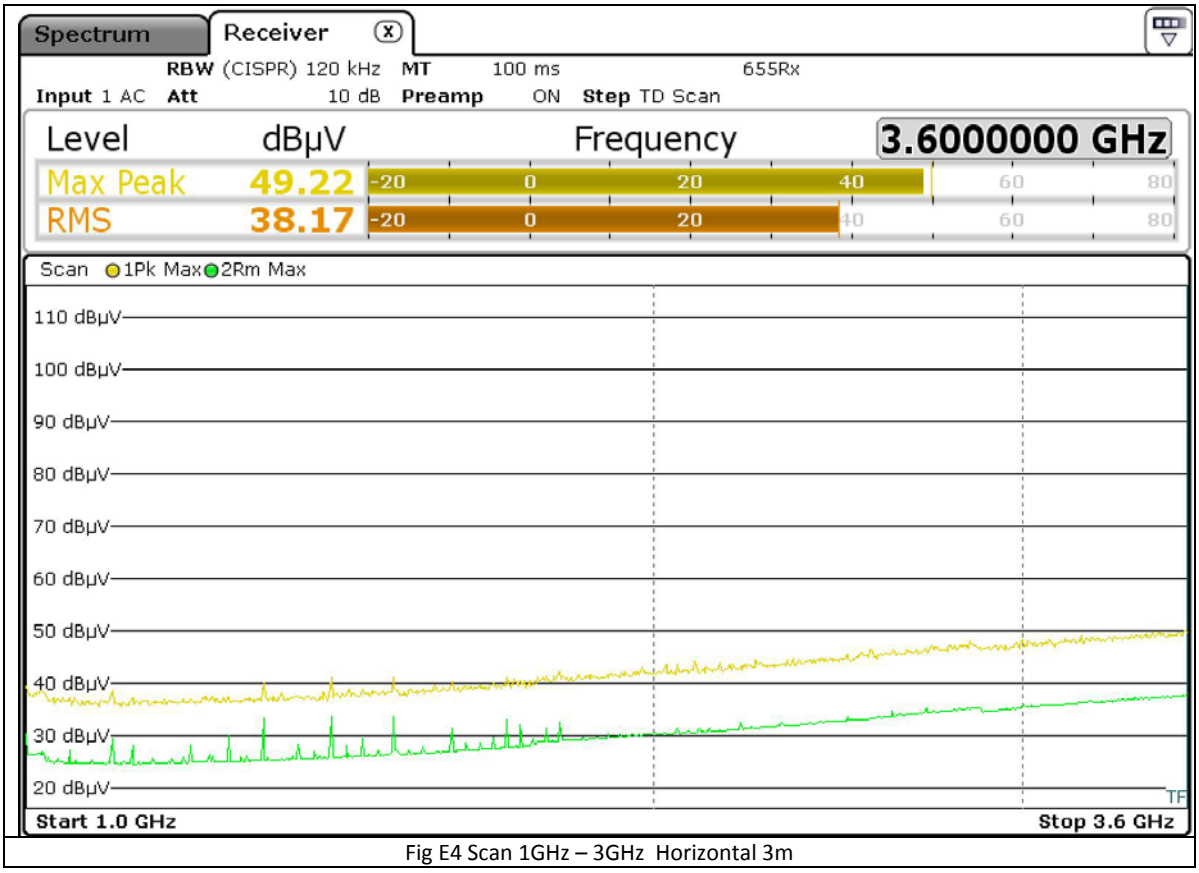


Fig E4 Scan 1GHz – 3GHz Horizontal 3m

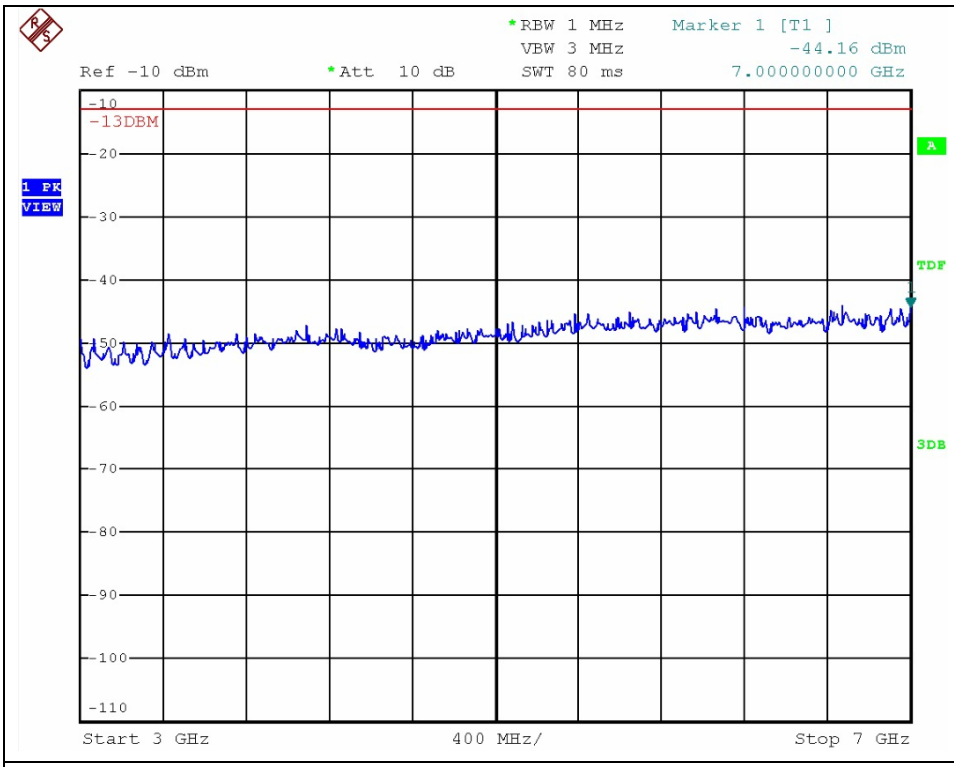


Fig E5: Scan 3GHz – 7GHz Vertical 3m

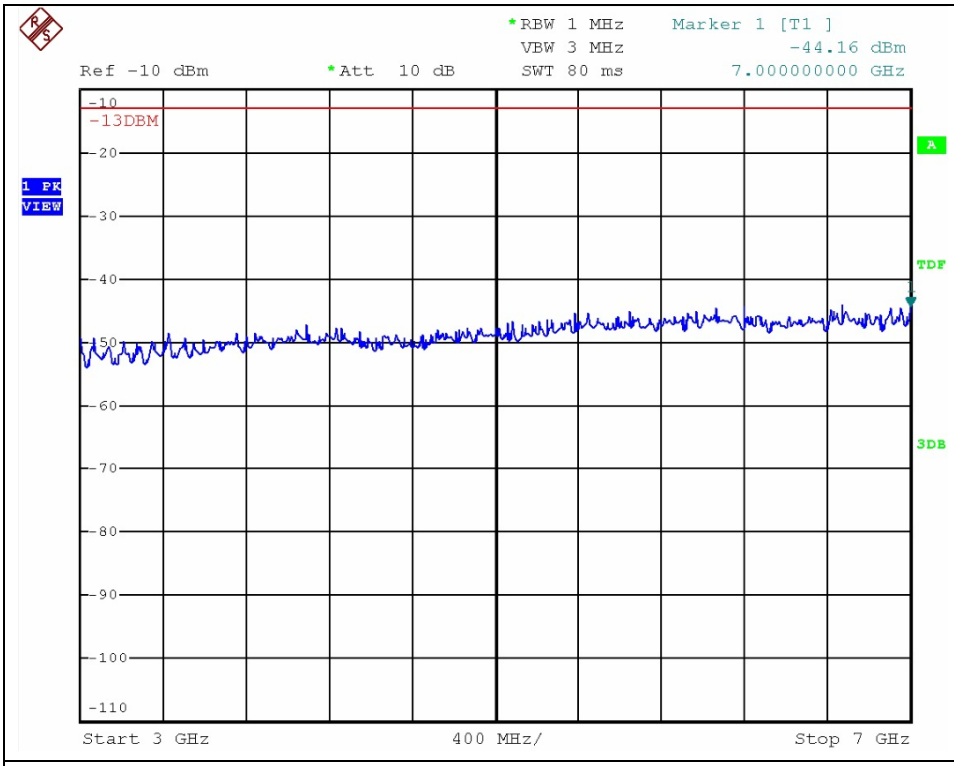


Fig E6 Scan 3GHz – 7GHz Horizontal 3m

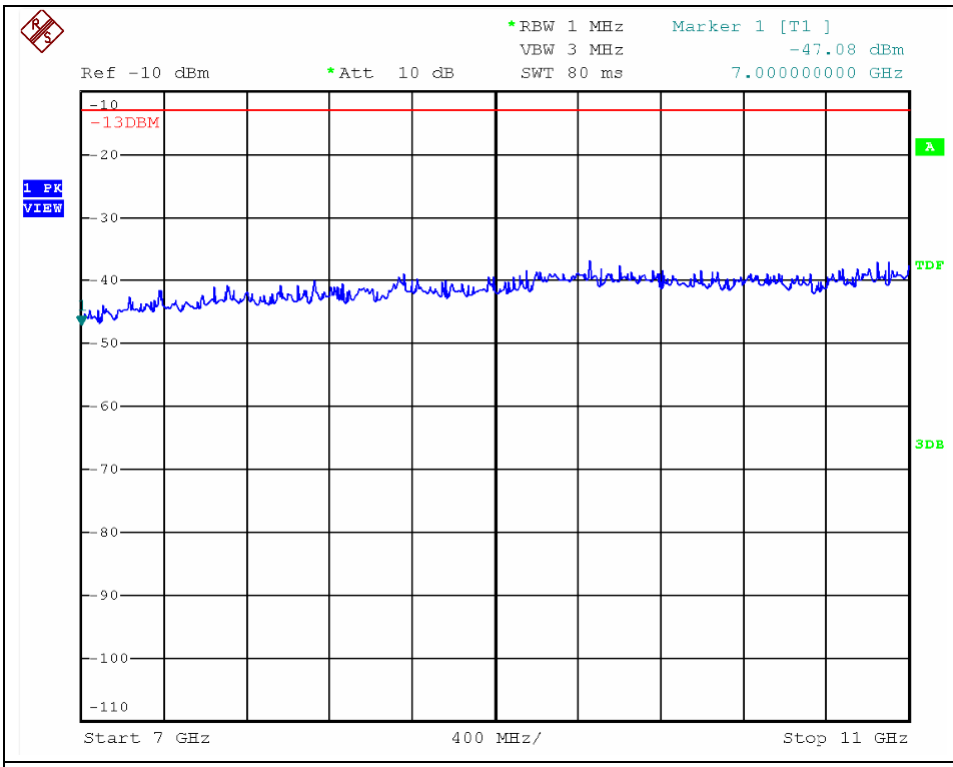


Fig E7: Scan 7GHz – 11GHz Vertical 3m

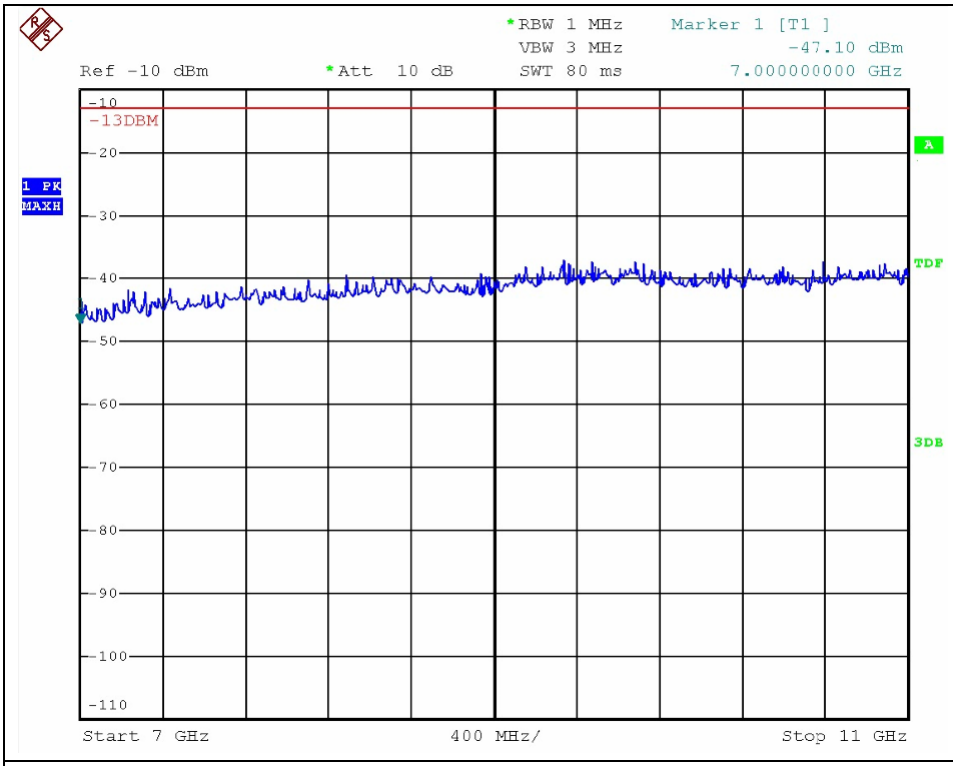


Fig E8 Scan 7GHz – 11GHz Horizontal 3m

Appendix F

Band Edge Emissions

Radiated

Band 13

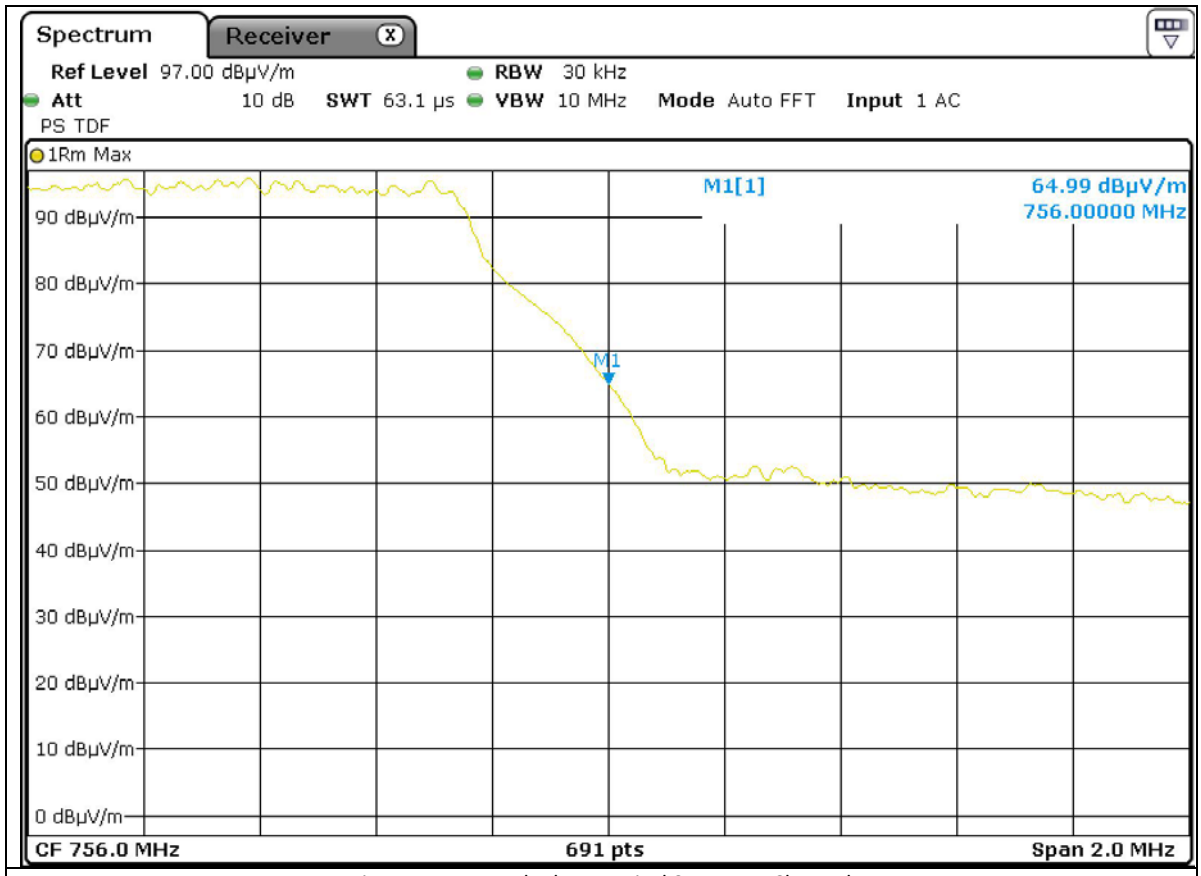


Fig F1 Upper Band Edge Vertical 3m 5MHz Channel

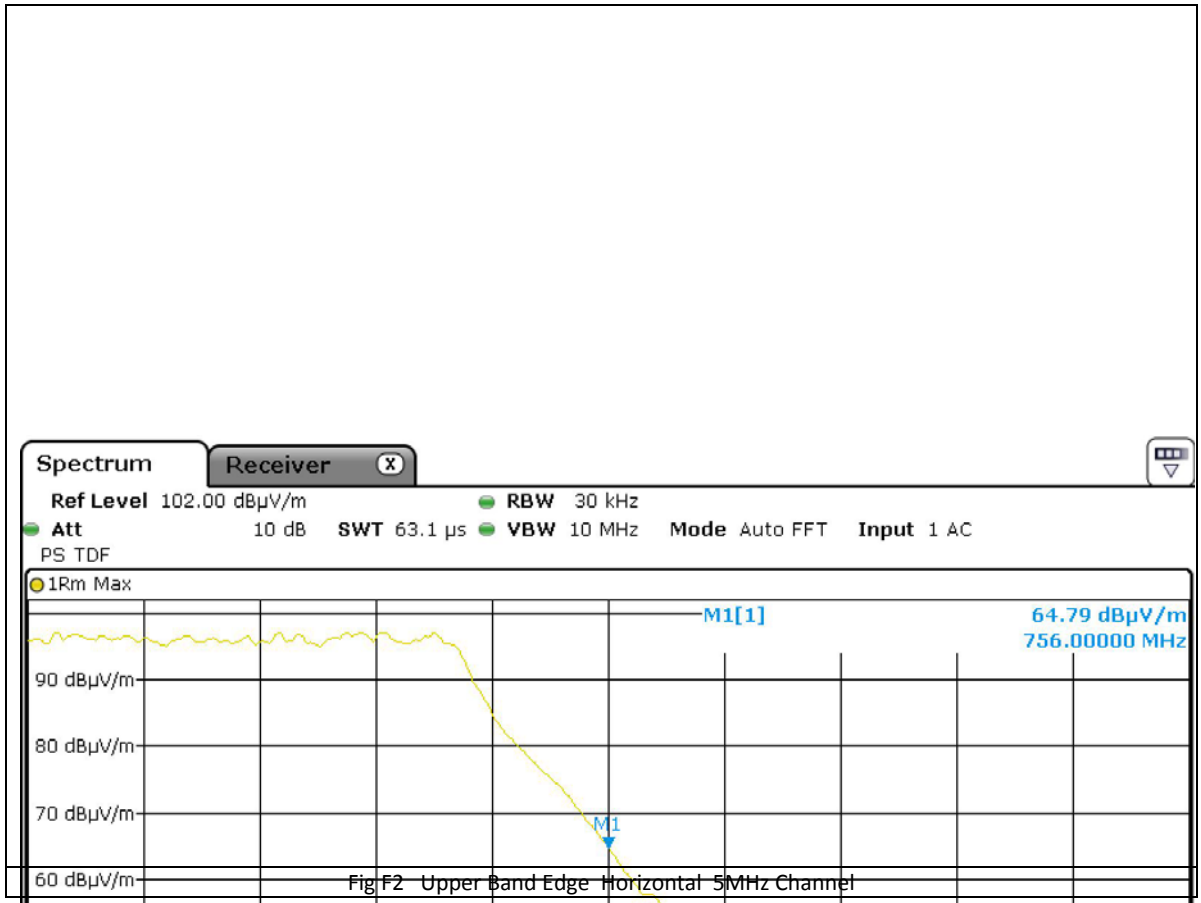


Fig F2 Upper Band Edge Horizontal 5MHz Channel

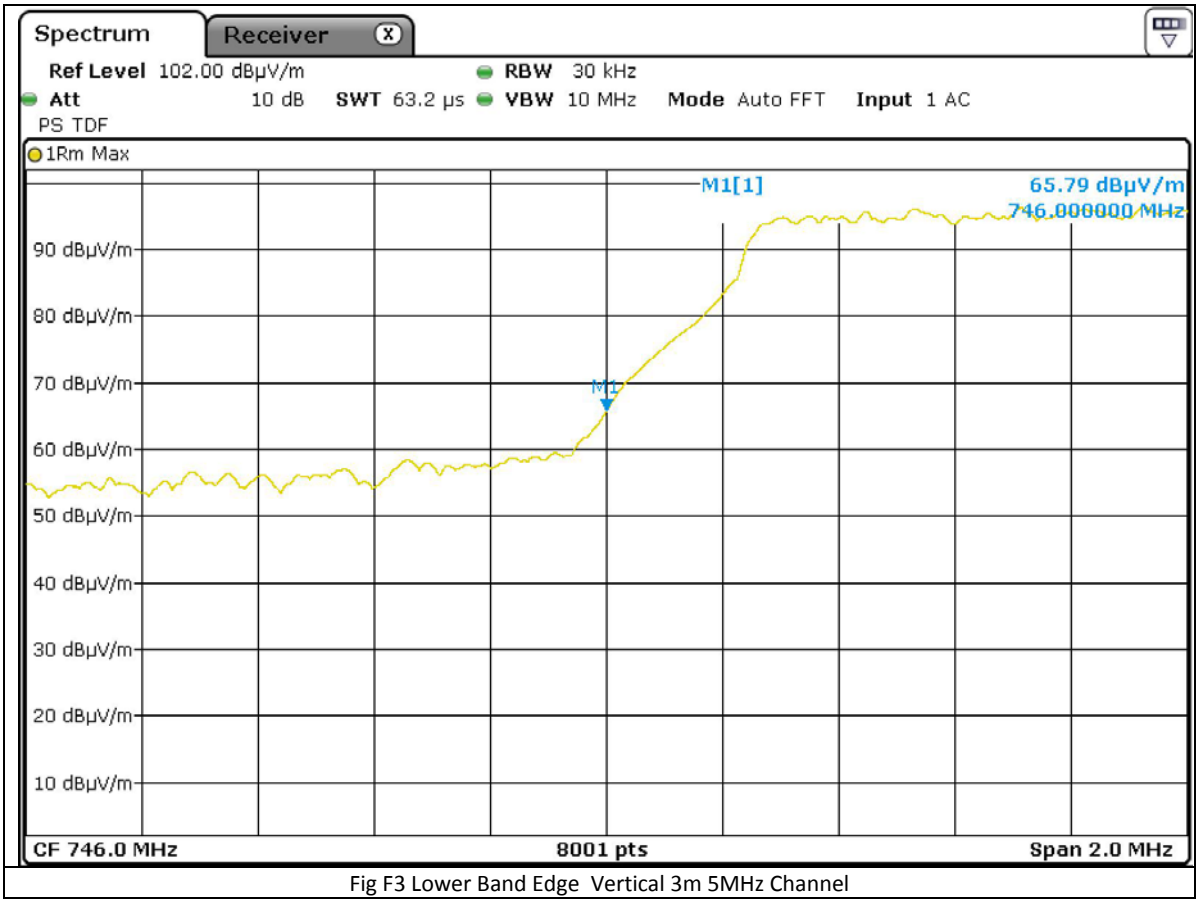


Fig F3 Lower Band Edge Vertical 3m 5MHz Channel

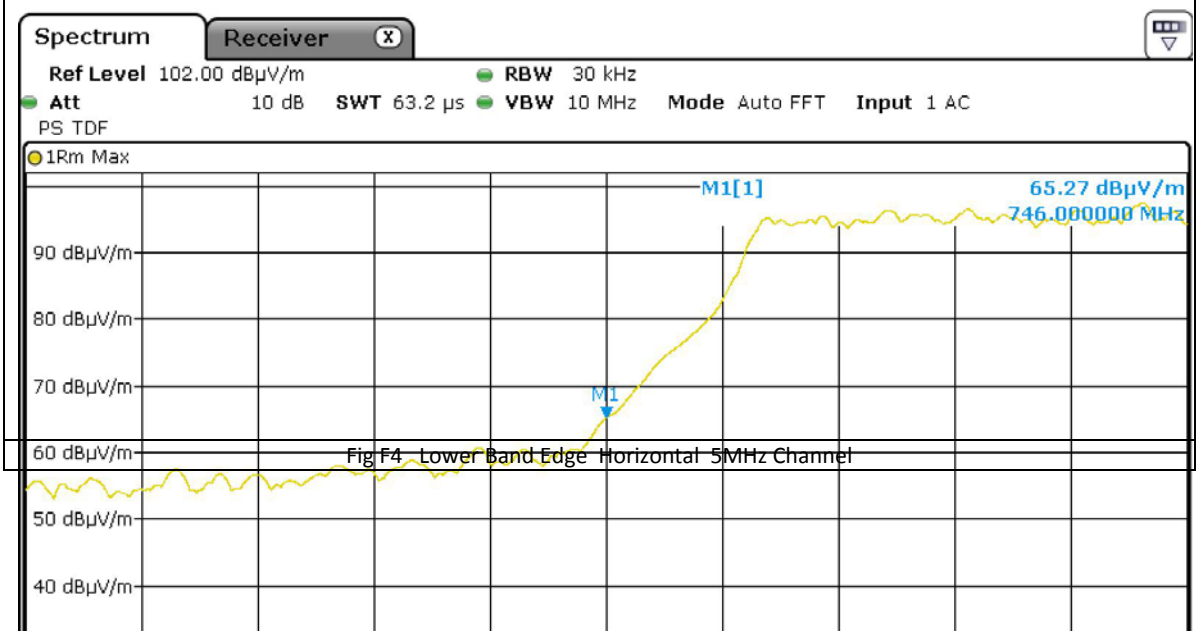


Fig F4 Lower Band Edge Horizontal 5MHz Channel

End of Report