EMC Technologies Pty Ltd
ABN 82 057 105 549
176 Harrick Road, Keilor Park
Victoria 3042, Australia

Ph: +61 (0)3 9365 1000
Fax: +61 (0)3 9331 7455
E-mail: sales@emctech.com.au

RADIO REPORT FOR CERTIFICATION
to
47 CFR Part 15 Subpart C (Section 15.247) and RSS-247 Issue 2, February 2017

FCC ID:	X4K-WL100V2
IC:	8880A-WL100V2
Device under Test / PMN:	Garage Door Lock
Model Number / HVIN:	WLOCK-03
Tested For:	Automatic Technology Australia Pty. Ltd.
Report Number:	M160737-4R3 (Superseded report M150737-4R2)
Issue Date:	13 February 2018

EMC Technologies Pty Ltd reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. EMC Technologies Pty Ltd shall have no liability for any deductions, inferences or generalisations drawn by the client or others from EMC Technologies Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Technologies Pty Ltd.

RADIO REPORT
FOR CERTIFICATION

47 CFR Part 15 Subpart C (Section 15.247) and
RSS-247 Issue 2, February 2017

CONTENTS

RADIO REPORT FOR CERTIFICATION

Issued by: EMC TECHNOLOGIES PTY. LTD.
176 Harrick Road, Keilor Park, Victoria 3042, AUSTRALIA.
Phone: +61 3 9365 1000, **E-mail:** sales@emctech.com.au, **Web:** www.emctech.com.au
FCC registration number: 494713 and ISED Canada Company number: IC 3569B

Product / PMN:	Garage Door Lock
Model / HVIN:	WLOCK-03
Manufacturer:	Automatic Technology Australia Pty. Ltd.
FCC ID:	FCC ID: X4K-WL100V2
IC:	IC: 8880A-WL100V2

Tested for:	Automatic Technology Australia Pty. Ltd.
Address:	6-8 Fiveways Boulevard, Keysborough Victoria 3173, AUSTRALIA
Phone:	+61 (0)3 9791 0200
Contact:	Nikolai Klepikov
Email:	nikolai.klepikov@ata-aust.com.au

Standards:

47 CFR Part 15 – Radio Frequency Devices
Subpart C – Intentional Radiators
Section 15.247 – Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

RSS-247 Issue 2, February 2017 - *Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices*
RSS-Gen Issue 4, November 2014 - *General Requirements for Compliance of Radio Apparatus*
RSS-102 Issue 5, March 2015 - *Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)*

Test Dates:	20 April to 7th June 2017
Issue Date:	13 February 2018

Attestation: I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.

Test Engineer:

Rob Weir
Wireless Certification Manager

Authorised Signatory:

Chris Zombolas
Technical Director

RADIO REPORT FOR CERTIFICATION
to
47 CFR Part 15 Subpart C (section 15.247) and
RSS-247 Issue 2, February 2017

1.0 INTRODUCTION

Radio tests were performed on the Garage Door Lock, Model (HVIN) WLOCK-03 in accordance with the applicable requirements of 47 CFR, Part 15 Subpart C – Section 15.247 and RSS-247 Issue 2 for a Frequency Hopping Spread Spectrum transceiver (FHSS) operating within the band: 2400 MHz to 2483.5 MHz.

1.1 Test Procedure

Radio measurements were performed in accordance with the appropriate procedures of ANSI C63.10: 2013.

The measurement instrumentation conformed to the requirements of ANSI C63.2: 2009.

1.2 Summary of 47 CFR Part 15 Subpart C Results

FCC Part 15 Subpart C	Test Performed	Results
15.203	Antenna requirement	**Complied**
15.205	Restricted bands of operation	**Complied**
15.207	Conducted limits	**Complied**
15.209	Radiated emissions limits; general requirements	**Complied**
15.247 (a1)	Channel Separation	**Complied – 5 MHz**
15.247 (a1)	Number of channels and time of occupancy	**Complied – 16 channels**
15.247 (b)	Peak Output Power	**Complied – 0.006 W**
15.247 (c)	Antenna Gain > 6 dBi	**Not Applicable** Antenna gain < 6 dBi
15.247 (d)	Out of Band Emissions	**Complied**
15.247 (e)	Peak Power Spectral Density	**Not Applicable**
15.247 (f)	Hybrid Systems	**Not Applicable** Did not employ a hybrid system
15.247 (g)	Frequency hopping channel selection	**Complied**
15.247 (h)	Simultaneous occupancy of individual hopping frequencies	**Not Applicable**
15.247 (i)	Radio Frequency Hazard	**Complied** Evaluation exempt
2.1049	Occupied Bandwidth	**1.756 MHz**

1.3 Summary of RSS-247 Results

RSS	Test Performed	Results
RSS-Gen (8.3)	Antenna requirement	**Complied**
RSS-Gen (8.8)	Conducted emissions limits	**Complied**
RSS-Gen (8.9)	Radiated Emission Limits (General requirements)	**Complied**
RSS-Gen (8.10)	Operation in restricted Band	**Complied**
RSS-247 (5.1)	Frequency hopping channel selection	**Complied**
RSS-247 (5.1)	Simultaneous occupancy of individual hopping frequencies	**Not Applicable**
RSS-247 (5.1(b))	Channel Separation	**Complied**
RSS-247 (5.1(d))	Number of channels and time of occupancy	**Complied**
RSS-247 (5.2)	Digital transmission systems	**Not Applicable**
RSS-247 (5.4(d))	Peak Output Power	**Complied – 0.006 W**
RSS-247 (5.5)	Out of Band Emissions	**Complied**
RSS-Gen (3.2) RSS-102	Radio Frequency Hazard	**Complied** Evaluation exempt
RSS-Gen (6.6)	Occupied Bandwidth	**1.756 MHz**

1.4 Modifications by EMC Technologies

No modifications were performed.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT (Transmitter) Details

Device under Test / PMN: Garage Door Lock
Model Number / HVIN: WLOCK-03
Radio: Frequency Hopping Spread Spectrum
Frequency Band: 2400 to 2483.5 MHz
Frequency Range: 2405 to 2480 MHz
Modulation: GFSK
Emission Designator: F1D
Number of Channels: 16
Antenna type and gain: ¼ wavelength monopole, soldered to PCB
Rated Supply Voltage: 2 x C-type batteries

2.2 EUT (Host) Details

Host Marketing Name (HMN): Auto-Lock

Manufacturer: Automatic Technology Australia Pty. Ltd.

The host device is an automatic door lock. The radio communicates with a garage door base allowing it to change state, locked or unlocked. The radio had two modes having the same GFSK modulation, declared as mode 0 and mode 1 by the manufacturer. No transmission is intended in mode 0.

2.2.1 Hopping Channel List

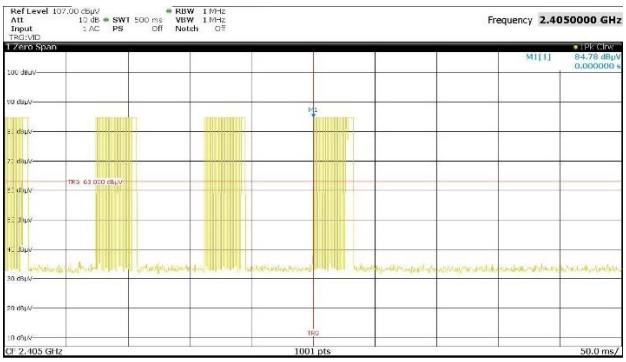
Channel Centre Frequency [MHz]
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
2465
2470
2475
2480

2.2.2 Transition period and mode 1

The customer advised that it may be possible for a transmission to occur in a transition period when switching between the modes. A synchronisation line was provided with the sample that triggered when the modes changed. Emissions were observed on a receiver triggered by the sample to determine the output during transition period. Switching to and in mode 1 was also investigated.

Result: Any transmissions were investigated and conformed with applicable requirements.

Transition Mode 0 to 1



Transition Mode 1 to 0

2.2.3 Hopping frequency selection

The selection of hopping frequency was in a pseudo-random order. The following is an example provided by the customer. Each number represents the frequency of the channel, e.g. 2.4xx GHz, where xx is the number in the table.

```
65 20 15 20 75 65 60 65 45 35 70 55 80 20 20 10 55
05 25 80 70 25 25 15 15 25 30 15 20 30 50 55 20 55
15 35 80 75 25 10 65 80 20 45 60 45 45 45 35 05 75
45 35 35 75 55 40 15 65 75 60 55 45 20 35 15 70 55
60 50 25 20 50 35 70 40 30 15 50 35 05 70 35 20 65
55 45 30 80 05 60 55 45 05 75 15 70 15 50 10 15 50
25 80 30 55 35 25 60 15 25 25 65 50 80 75 30 75 25
20 20 55 55 75 10 30 60 30 40 60 05 20 35 80 10 20
30 45 45 10 75 45 20 20 60 70 05 55 10 35 55 55 50
60 15 30 20 05 60 75 10 65 05 50 15 45 15 55 40 65
```

```
25  80  65  35  70  35  10  70  70  75  25  15  10  15  40  05  10
80  55  20  60  55  75  35  75  60  05  60  25  05  80  50  20  05
45  35  25  05  35  20  80  55  05  60  45  20  35  30  55  50  15
50  45  45  25  80  30  15  50  55  75  15  05  60  05  45  65  75
80  65  25  10  35  65  55  50  15  65  35  15  05  40  60  25  20
55  50  10  20  10  55  25  20  35  05  50  50  10  60  05  35  75
20  10  70  40  60  40  70  45  20  75  65  70  45  75  35  55  50
30  60  35  15  80  60  20  60  35  25  20  75  75  80  75  40  20
30  05  55  70  40  70  05  55  15  30  75  50  35  55  20  65  45
50  75  30  30  30  20  80  35  25  30  05  10  75  15  45  15  35
35  15  05  35  50  25  25  75  10  55  10  70  ……
```

2.3 Test Configuration

The was configured to operate on each channel individual and transmit a modulated signal continuously. Flying leads with switches were connected to the device under test to change the transmitter parameters.

2.4 Test Facility

2.4.1 General

EMC Technologies Pty Ltd has also been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies indoor open are test site (iOATS) have been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS-Gen, Issue 8 - **Industry Canada iOATS number - IC 3569B-2**

Measurements in this report were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.4.2 NATA Accreditation

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A^2LA).

EMC Technologies is accredited in Australia by the National Association of Testing Authorities (NATA). All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation.

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au

2.5 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-10-2 (R-139)	22/03/2017	22/03/2018	1 Year, *1
EMI Receiver	R&S ESW26 2 Hz – 26.5 GHz Sn: 101306 (R-143)	31/03/2017	31/03/2018	1 Year, *2
	R&S ESU40 20 Hz – 40 GHz Sn: 100392 (R-140)	23/02/2017	23/02/2018	1 Year, *2
	R&S ESCI 9 kHz – 3 GHz Sn: 100011 (R-028)	25/05/2016	25/05/2017	1 Year, *2, *3
Antennas	EMCO 6502 Active Loop 9 kHz – 30 MHz Sn. 9311-2801 (A-231)	20/07/2015	20/07/2018	3 Year, *2
	SUNOL JB6 Biconilog 30 – 6000 MHz Sn: A012312 (A-363)	26/05/2016	26/05/2018	2 Year, *2
	EMCO 3115 Double Ridge Horn 1 – 18 GHz Sn: 8908-3282 (A-004)	15/07/2016	15/07/2019	3 Year, *1
	ETS-Lindgren 3160-09 Std Gain Horn 18 – 26.5 GHz Sn: 66032 (A-307)	31/05/2016	31/05/2019	3 Year, *1
Cables	Room 12 inbuilt cable Panel 1 to 10 m (C-422)	31/05/2017	31/05/2018	1 Year, *1
	Room 12 inbuilt cable Panel 1 to 3 m (C-421)	31/05/2017	31/05/2018	1 Year, *1
	Room 12 Antenna cable (C-437)	31/05/2017	31/05/2018	1 Year, *1
	Sucoflex 104 Huber & Suhner 18 GHz, 5 m cable (C-337)	03/01/2017	03/01/2018	1 Year, *1
	Sucoflex 102 Huber & Suhner 40 GHz, 3 m cable (C-273)	04/01/2017	04/01/2018	1 Year, *1
Pre-amplifier	PRA1G2-35B Radio Technology 30 - 1000 MHz (A-098)	15/07/2016	15/07/2017	1 Year, *1
	SG18-B3015 Electronic Development Sales 1-18 GHz (A-288)	03/08/2016	03/08/2017	1 Year, *1

Note *1. Internal NATA calibration.
Note *2. External NATA / A2LA calibration
Note *3. Testing performed with this equipment was performed when the equipment was within valid calibration period.

3.0 TEST RESULTS

3.1 §15.203/RSS-Gen 8.3 Antenna Requirement

The antenna was integral to the device ensuring that it could not be replaced. A ¼ wavelength monopole antenna was used and it was soldered directly onto the circuit board.

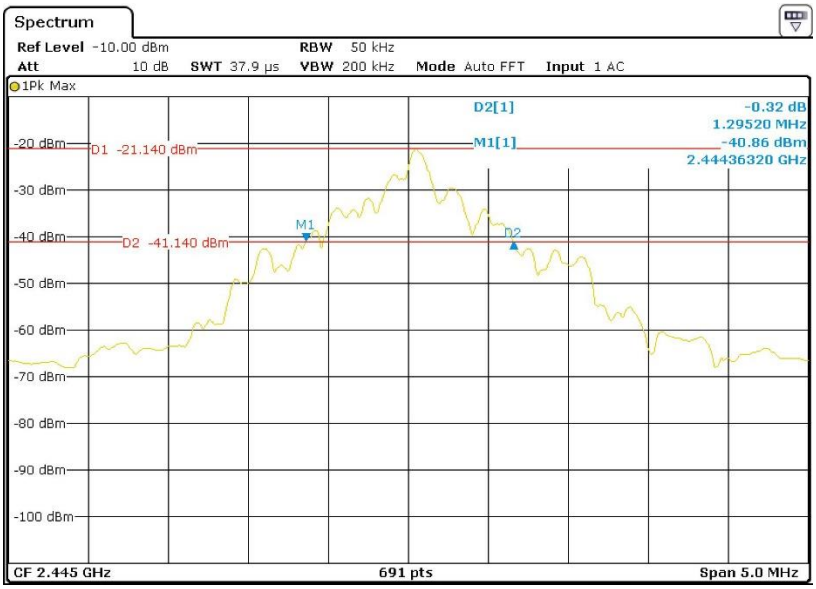
3.2 §15.207/RSS-Gen 8.8 Conducted Limits

Not applicable, the device did not connect directly or indirectly to the AC mains as it was battery powered.

3.3 §15.247(a1)/RSS-247 5.1(b) Channel Separation

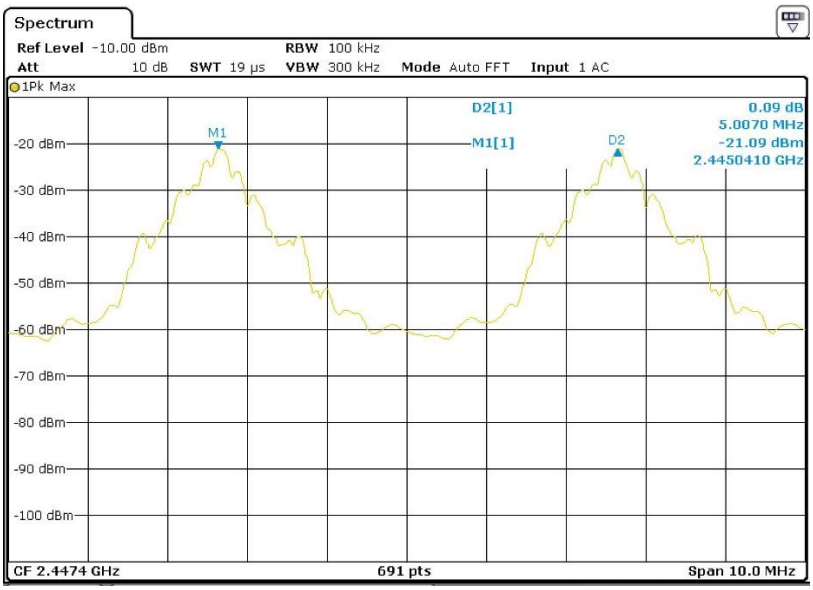
In the band 2400.0 – 2483.5 MHz, the channel separation must be greater than 25 kHz or the 20 dB bandwidth, which ever is greater.

Mode 0:
20 dB Emission Bandwidth = 1.295 MHz



Channel Separation

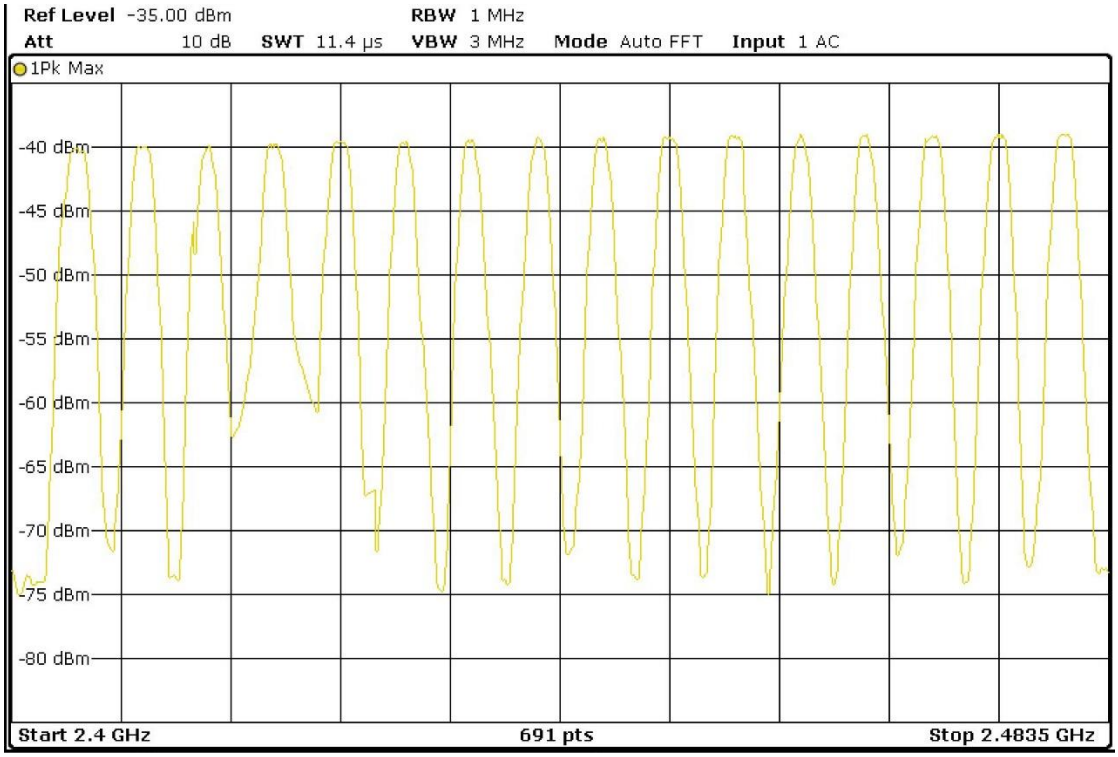
Channel Separation [kHz]	Limit [kHz]	Result
5007	1295	Complied



3.4 §15.247(a1)/RSS-247 5.1(d) Number of channels and time of occupancy

There must be at least 15 hopping channels employed by devices operating in the band 2400-2483.5 MHz.

The WLOCK-03 utilised 16 channels:



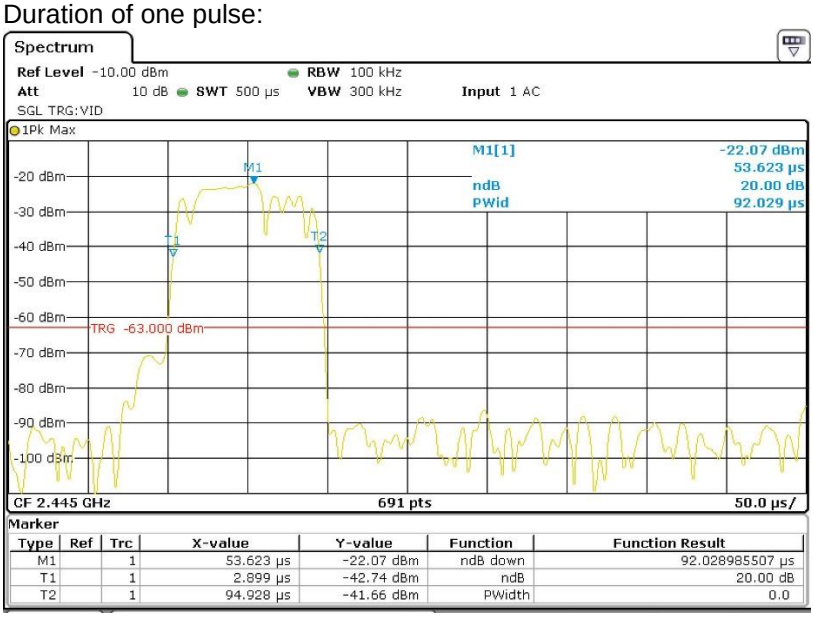
Time of Occupancy

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

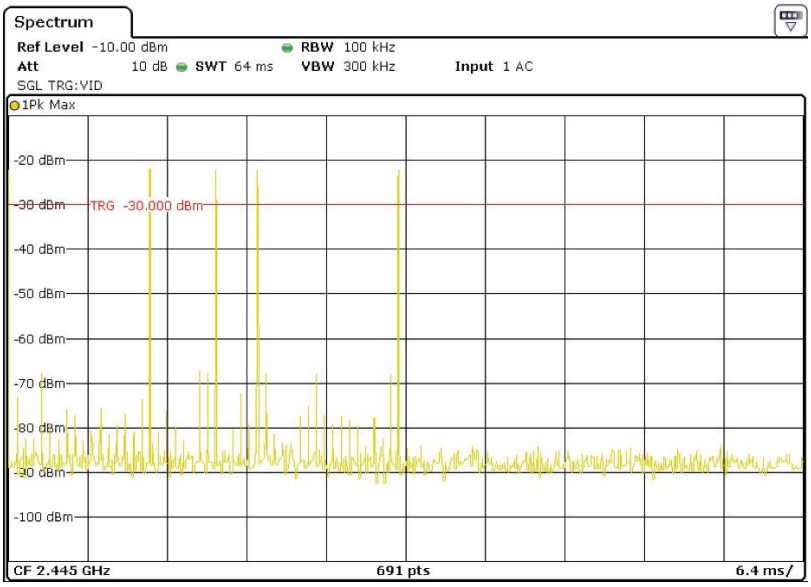
Time of occupancy in 0.4 × 16 = 6.4 seconds ≤ 0.4 seconds.

On time of one pulse	= 92 µs
Number of pulses in 64 ms	= 5
Number of pulses in 6.4 seconds	= 500
Total on time in 6.4 seconds	= 500 × 0.092 ms
	= **46 ms** (limit = 400 ms)

Duration of one pulse:

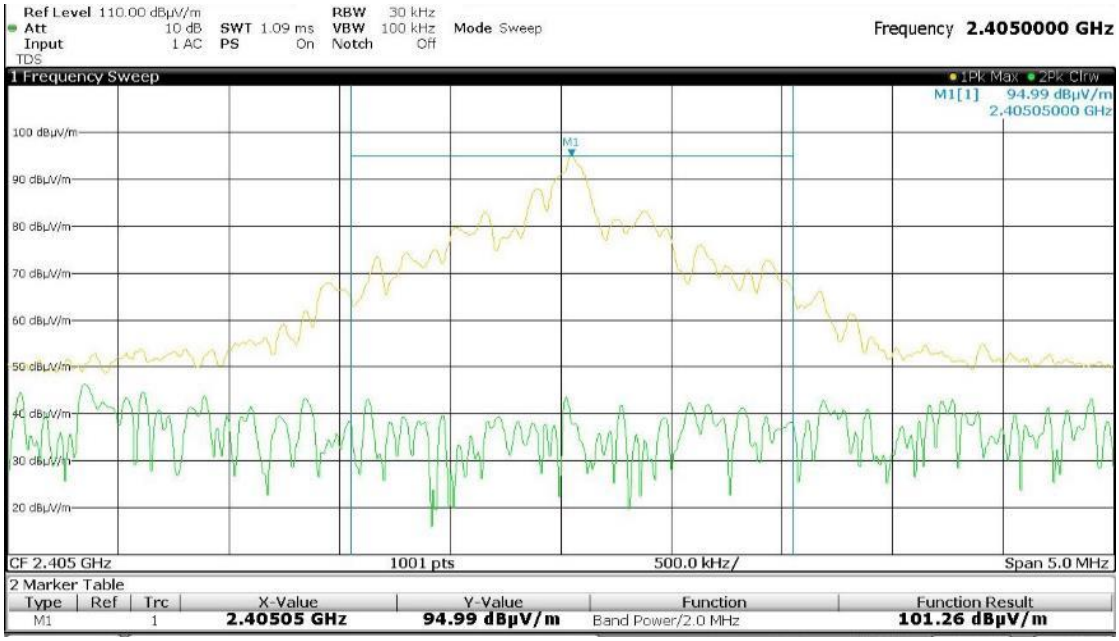


Pulses in 64 ms:

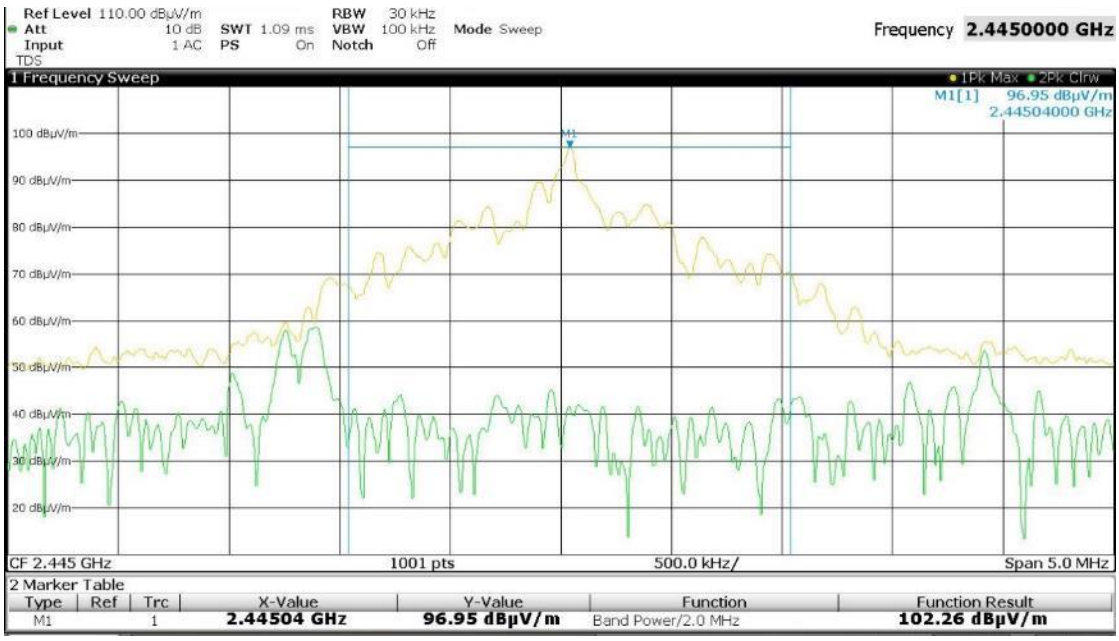


3.5 §15.247(b)/RSS-247 5.4(d) Peak Output power

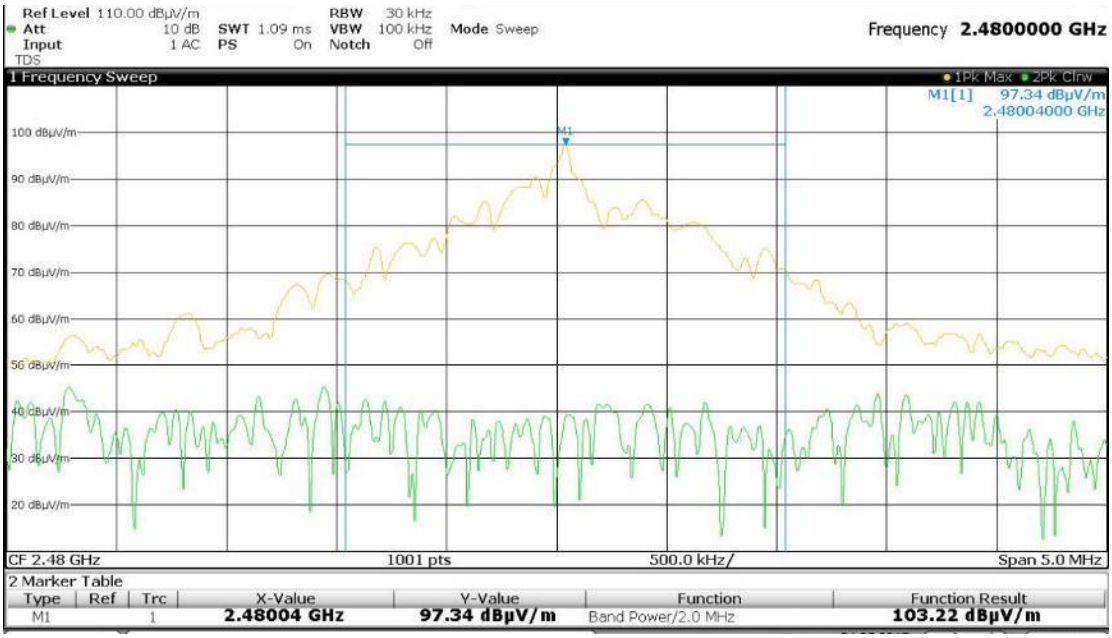
Testing was performed in a semi-anechoic chamber at a distance of 3 metres. Different configurations of EUT and antenna polarization were investigated to produce highest emission EIRP and the EUT was set to transmit in continuous transmission mode.



Channel 2405 MHz



Channel 2445 MHz



Channel 2480 MHz

Results:

Frequency (MHz)	Measured EIRP			EIRP Limit (W)	Conducted Limit (W)	Margin (W)	Result
	(dBµV/m)	(dBm)	(W)				
2405	101.3	6.1	0.004	0.500	0.125	0.121	Complied
2445	102.3	7.1	0.005	0.500	0.125	0.120	Complied
2480	103.2	8.0	0.006	0.500	0.125	0.119	Complied

The radiated power was compared directly to the conducted power limit as a worse case condition. As the measured EIRP did not exceed the conducted limit the antenna gain was not considered.

The antenna gain of an ideal ¼ wave monopole is 5.1 dBi and therefore the gain of the sample's antenna would not exceed 6 dBi.

Electric field to power conversion:

$$E = 20log\left(\frac{\sqrt{30P}}{d}\right) + 120$$

Where:
E = electric field strength (dBµV/m)
P = EIRP in Watts
d = measurement distance in metres

3.6 §15.205/RSS-Gen 8.10 Restricted Bands of Operation

The restricted band limits were applied across the applicable spectrum and therefore complied with the restricted band requirements.

3.7 §15.209/RSS-Gen 8.9 Radiated emission limits; general requirements

The limits given in §15.247 and RSS-247 applied, however attenuation below the general levels was not required.

3.8 §15.247(d)/RSS-247 5.5 Out of Band Emissions

3.8.1 Radiated Spurious Measurements

Radiated spurious emission measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	10	0.6 metre loop antenna
0.150 to 30	9	10	
30 to 1000	120	10	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broad band horns
18 000 to 40 000	1000	1	

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. Devices design for a fixed position were tested in that position, portable devices were tested in three orthogonal orientations.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

Calculation of field strength

The field strength was calculated automatically by software using pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L

Where:

E = Radiated Field Strength in dBµV/m.
V = EMI Receiver Voltage in dBµV. (measured value)
AF = Antenna Factor in dB. (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

Average value of pulsed emissions

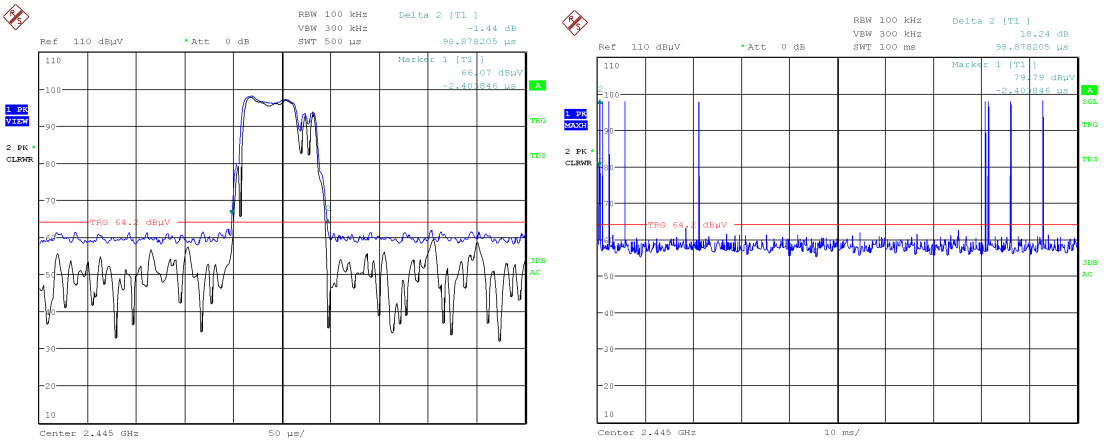
The transmitted signal was pulsed. The following duty cycle correction was applied to the peak levels to calculate average emissions at frequcncies above 1 GHz.

$$\delta\ (dB) = 20\log(\Delta)$$

δ = duty cycle correction factor
Δ = duty cycle

Duty cycle:

On time = 100 µs
Pulses in 100 ms = 10
Δ = 0.01



Duty cycle correction:

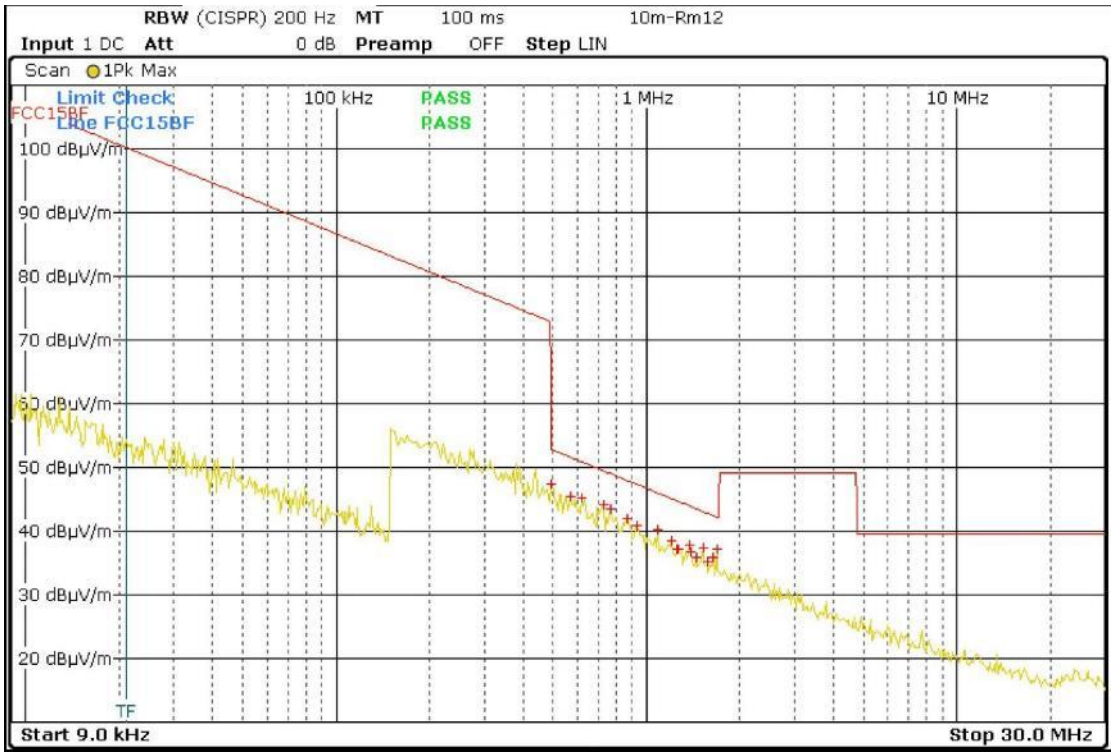
$\delta = 20\log(0.01)$
$\delta = -40.0\ dB$

3.8.2 Conclusion

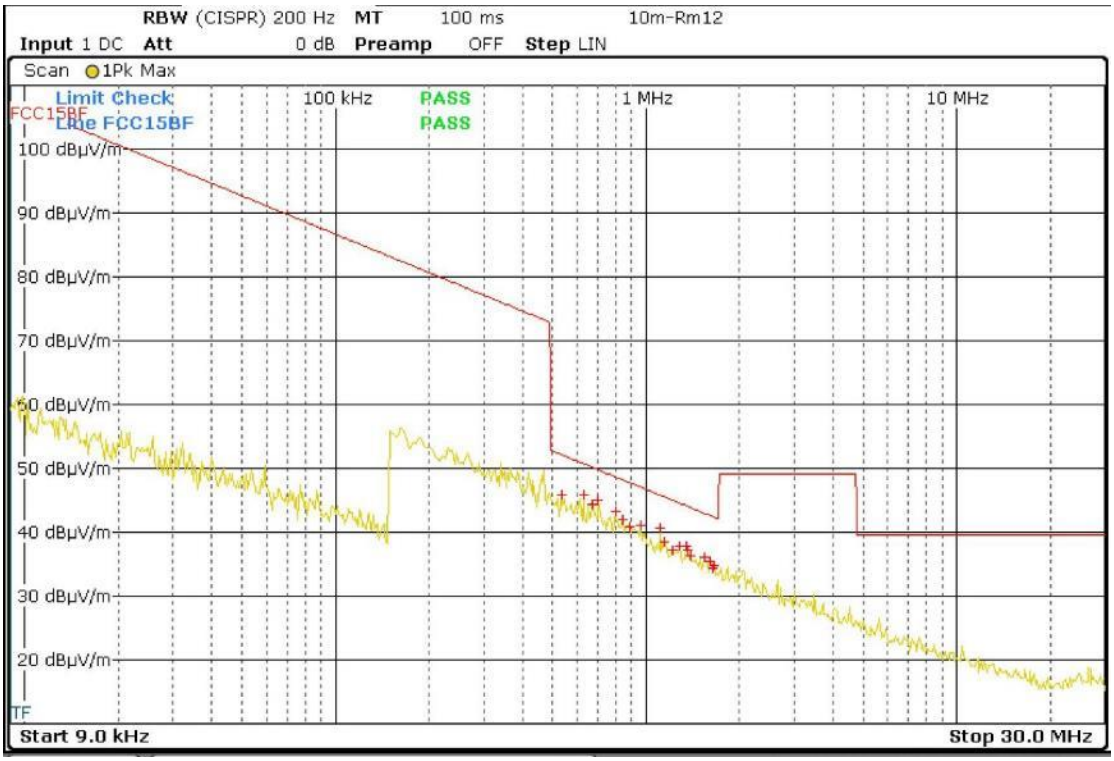
The sample complied with the applicable radiated spurious emission limits §15.247 and RSS-247. Refer to the following graphs for the results.

Frequency Band: 9 kHz - 30 MHz

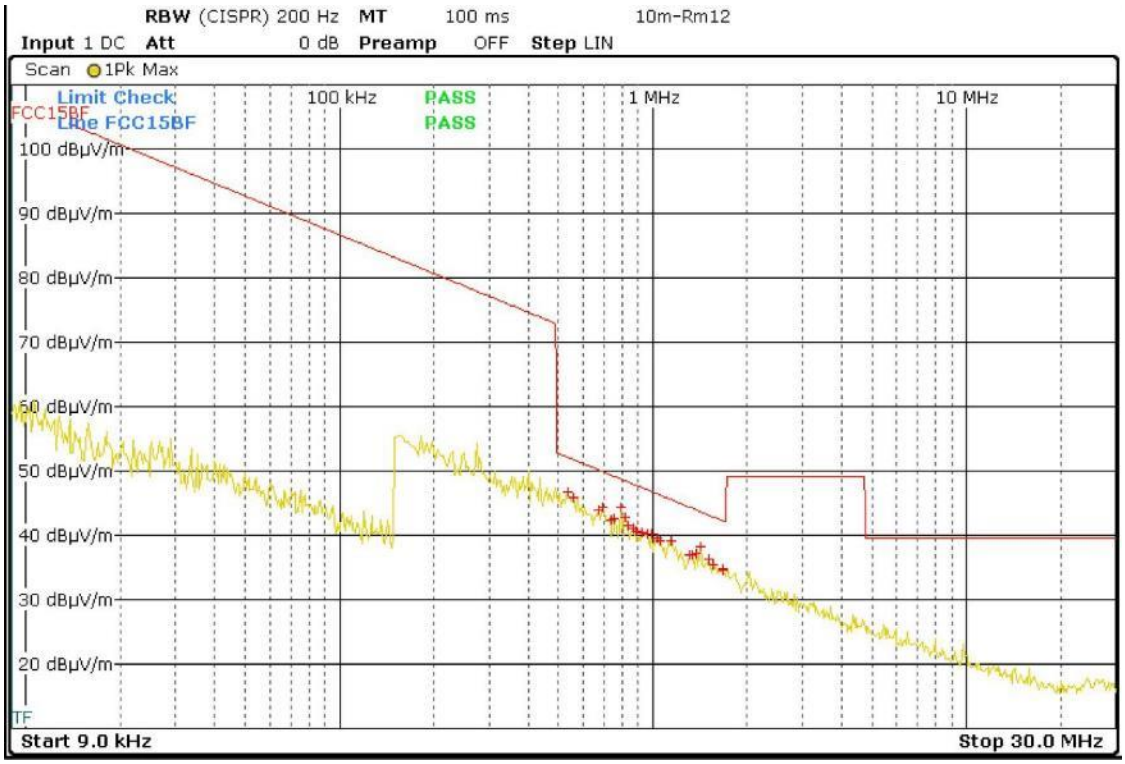
Measurements were made at a distance of 10 metres. The measurement of emissions between 9 kHz – 150 kHz were made with a resolution bandwidth (RBW) of 200 Hz and the video bandwidth (VBW) of 3 kHz, 150 kHz – 30 MHz were measured with the resolution bandwidth (RBW) of 9 kHz and the video bandwidth (VBW) of 30 kHz.



Channel 2405 MHz



Channel 2445 MHz



Channel 2480 MHz

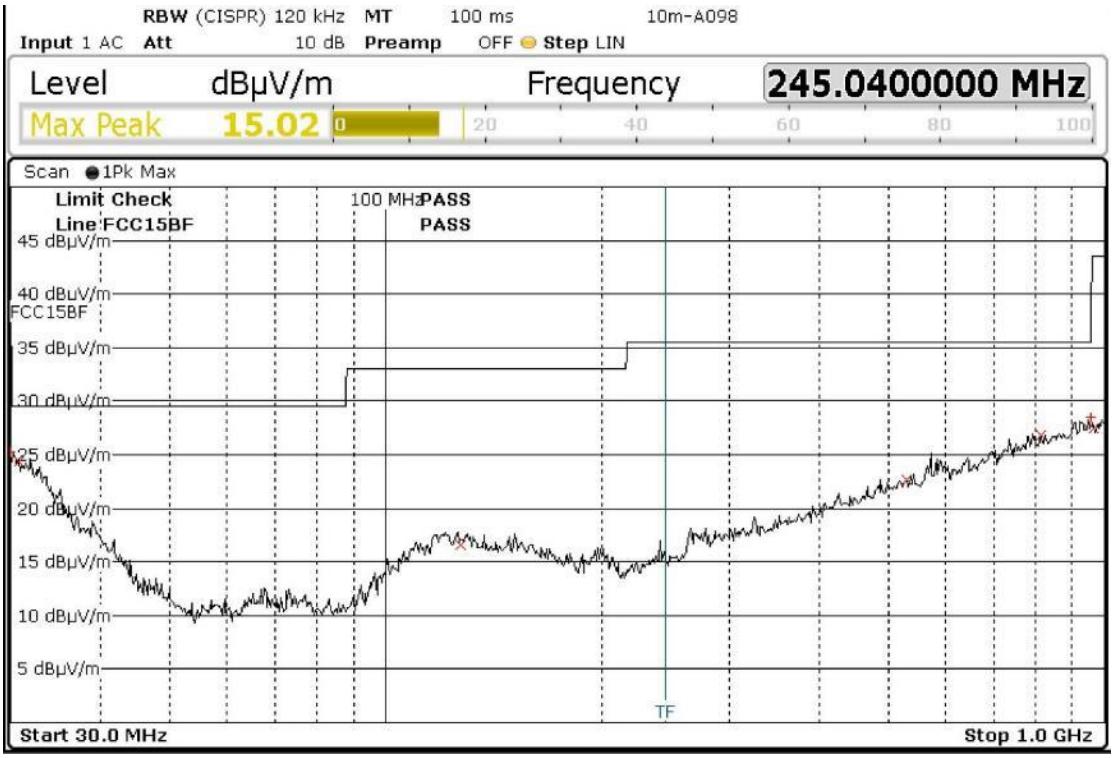
Frequency Band: 30 - 1000 MHz

Measurements were made at a distance of 10 metres. The measurement of emissions between 30 - 1000 MHz were made with a resolution bandwidth (RBW) of 120 kHz and the video bandwidth (VBW) of 300 kHz.

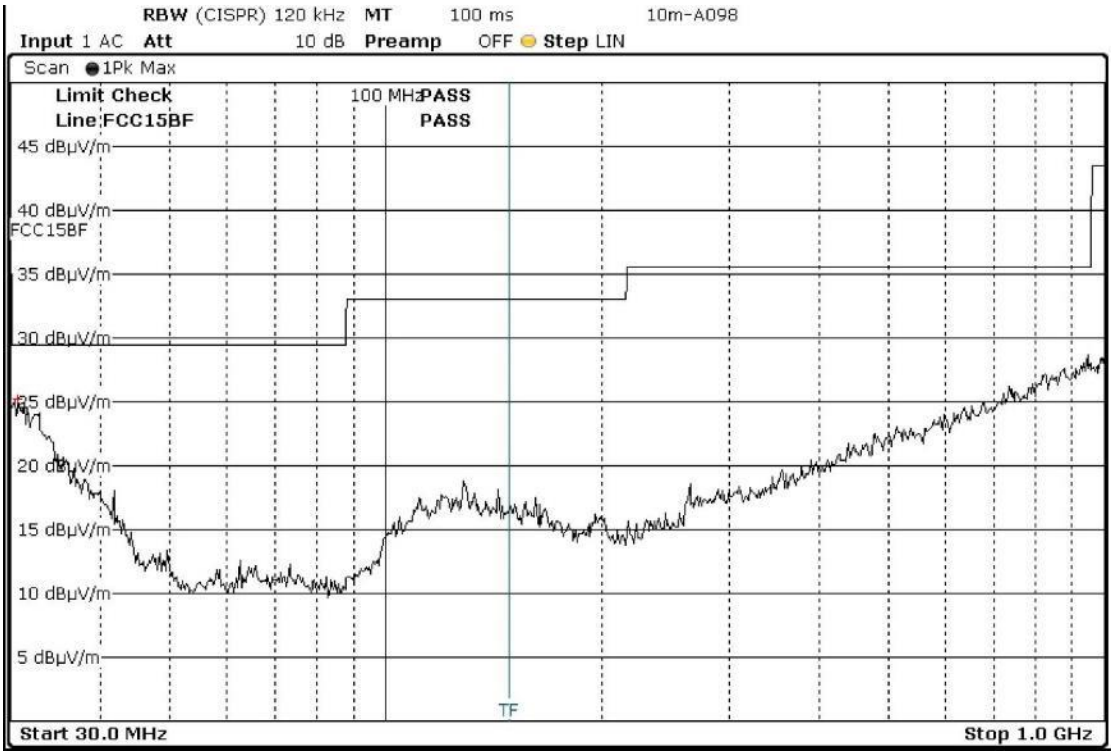
The §15.209 and RSS-Gen 8.10 limits were applied.

Maximum Results:

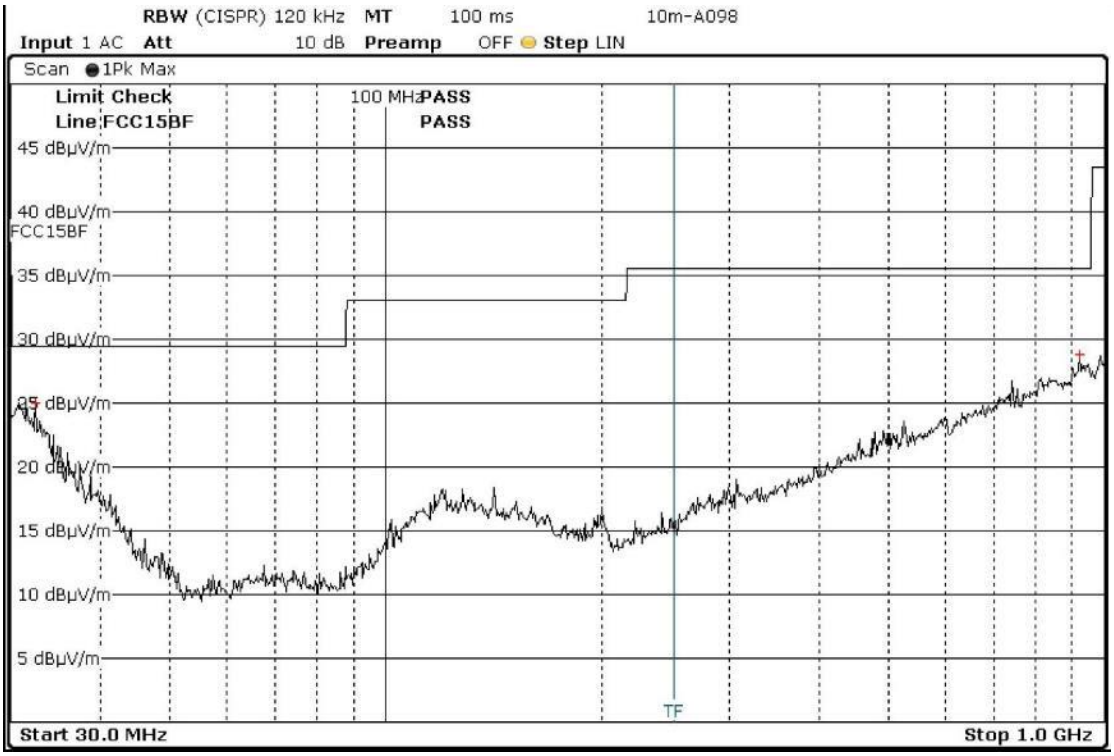
No emissions were detected above the measurement system noise floor.



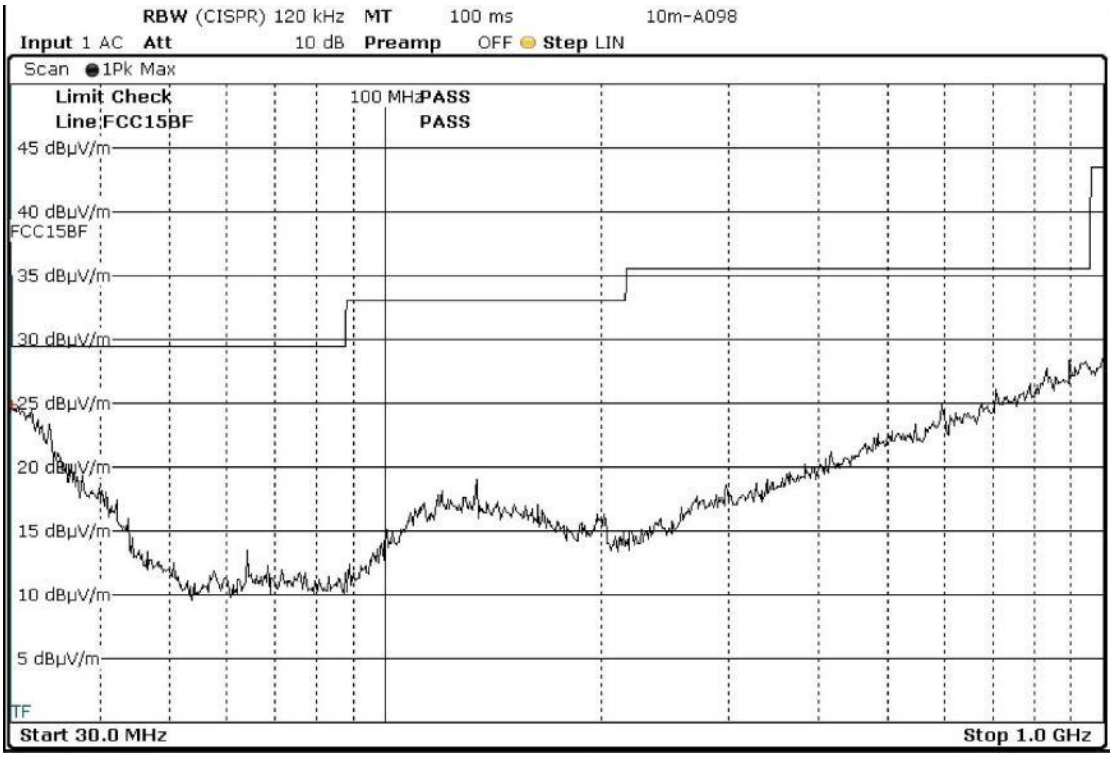
Channel 2405, Vertical Polarisation



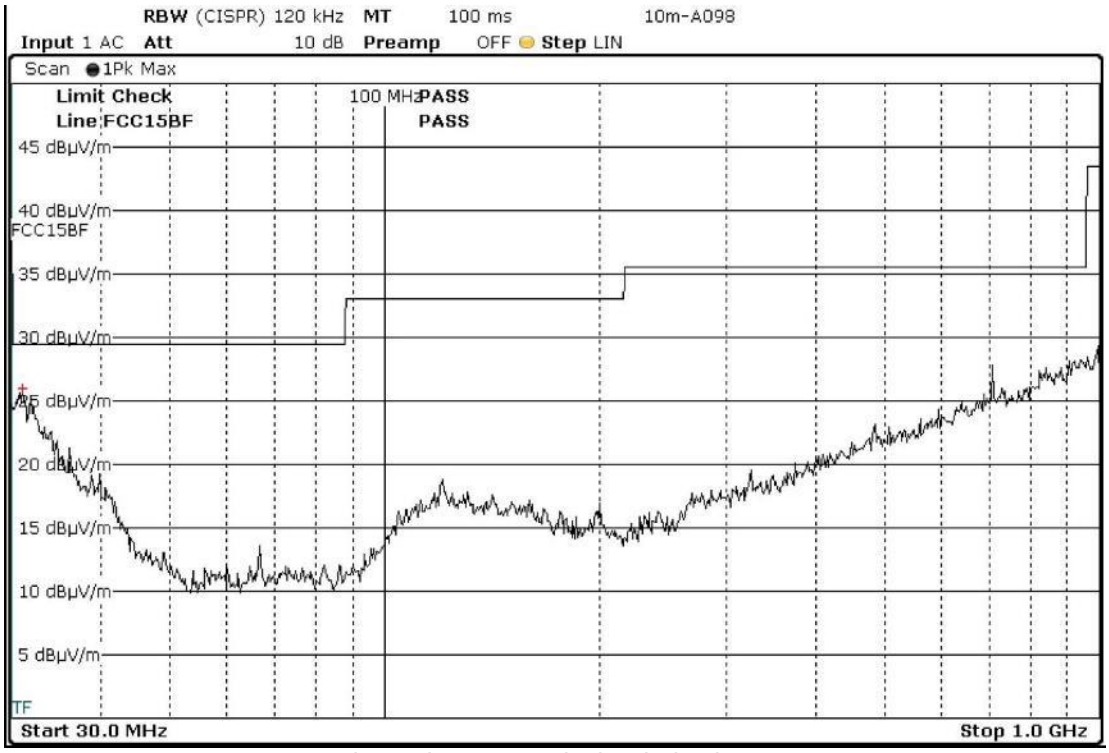
Channel 2405, Horizontal Polarisation



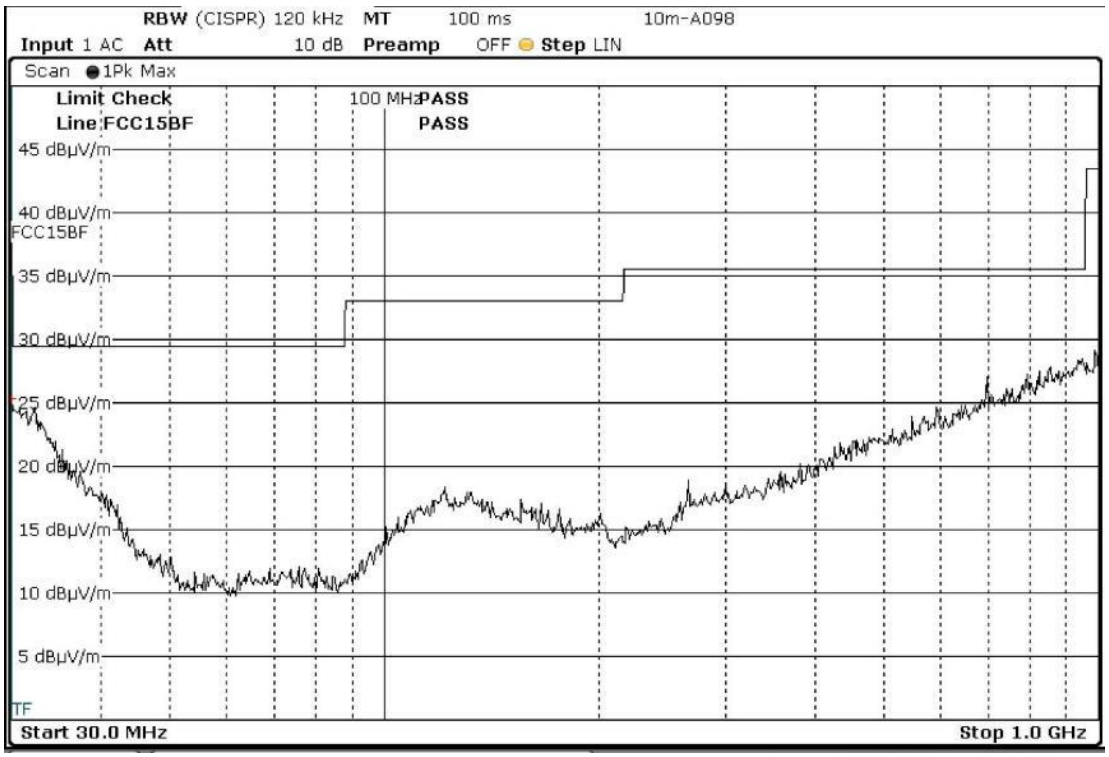
Channel 2445, Vertical Polarisation



Channel 2445, Horizontal Polarisation



Channel 2480, Vertical Polarisation



Channel 2480, Horizontal Polarisation

Frequency Band: 1 000 – 25 000 MHz

Measurements to 18 GHz were made at a distance of 3 metres and 18 to 25 GHz at 1 metre. The measurements were made with a resolution bandwidth (RBW) of 1000 kHz and the video bandwidth (VBW) of 1000 kHz.

The §15.209 and RSS-Gen 8.10 limits were applied.

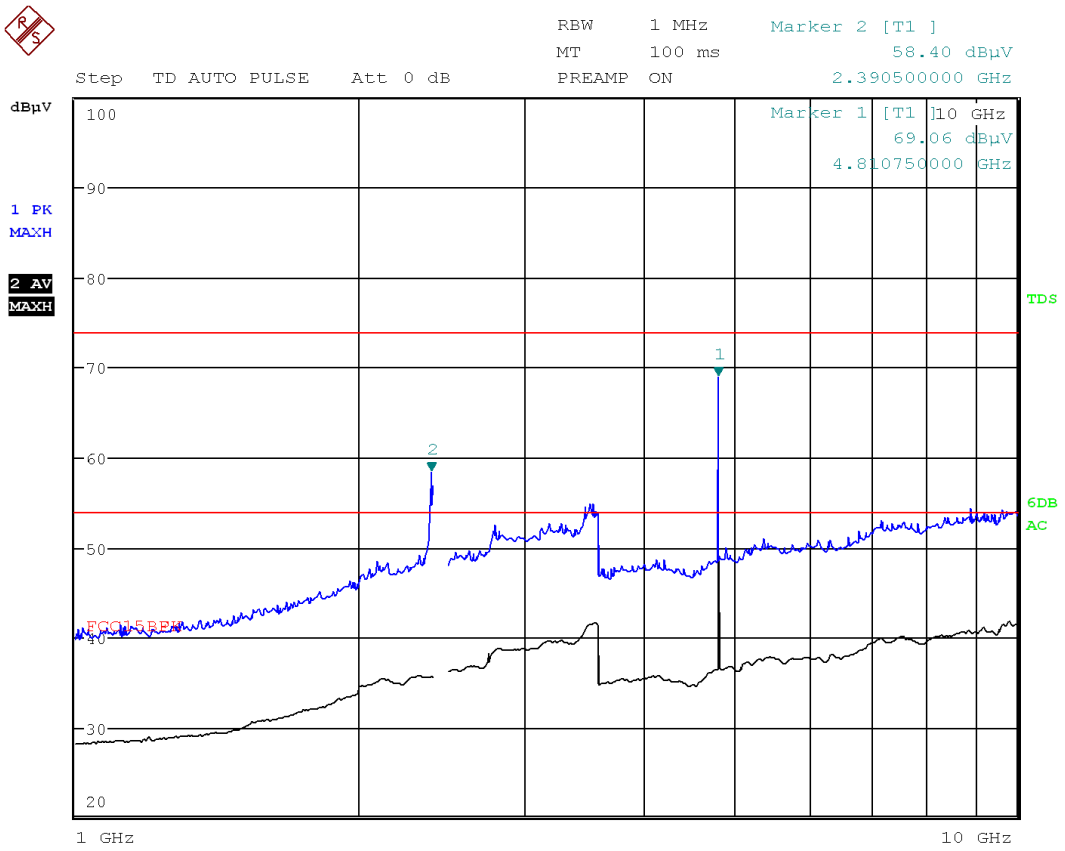
Maximum Peak Results:

Channel	Frequency [MHz]	Peak [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2395.00	63.1	74.0	-10.9
	4810.00	70.0	74.0	-4.0
2445 MHz	4890.00	69.4	74.0	-4.6
2480 MHz	4960.00	65.9	74.0	-8.1

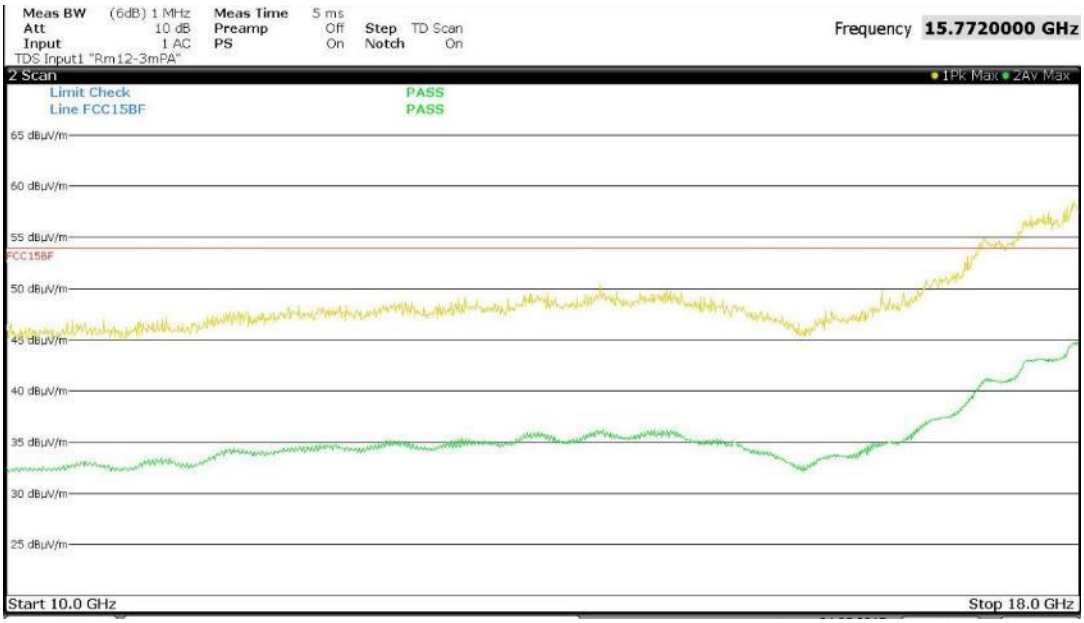
Maximum Average Results, correction factor of -40.0 dB to peak:

Channel	Frequency [MHz]	Peak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2395.00	63.1	23.1	54.0	-30.9
	4810.00	70.0	30.0	54.0	-24.0
2445 MHz	4890.00	69.4	29.4	54.0	-24.6
2480 MHz	4960.00	65.9	25.9	54.0	-28.1

Channel 2405 MHz – Vertical, 1 to 18 GHz

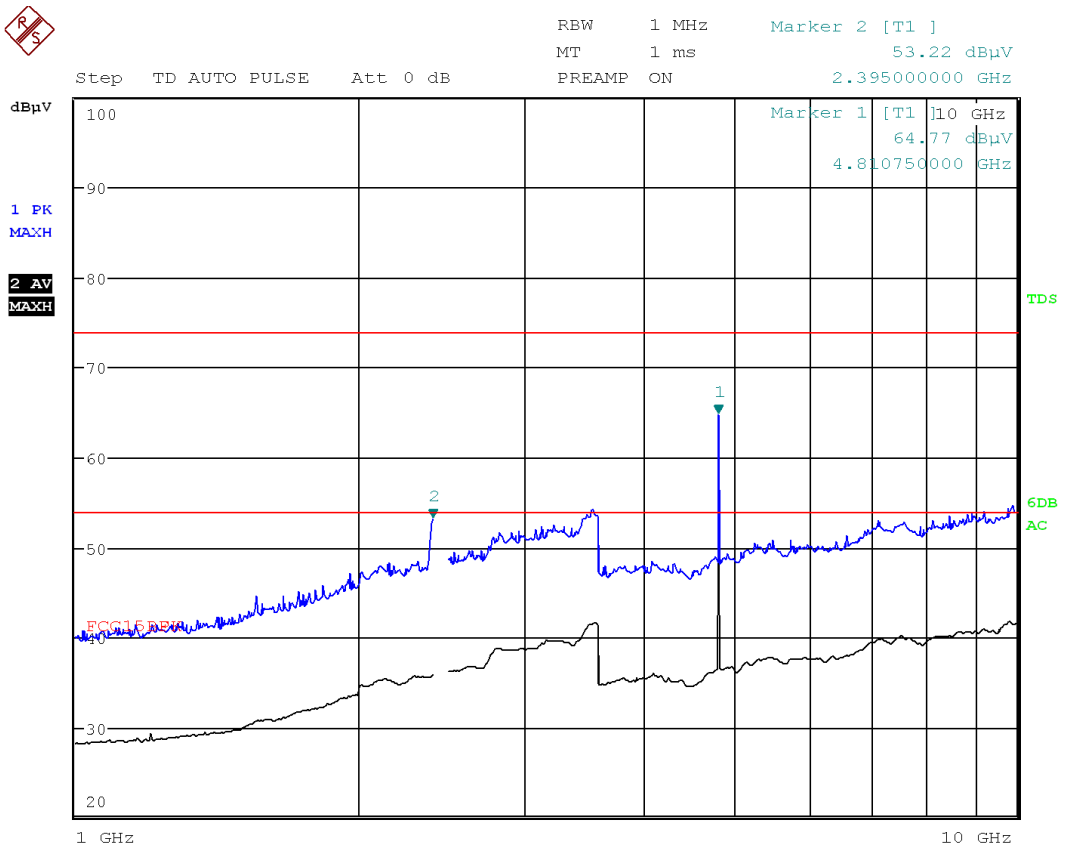


1 to 10 GHz

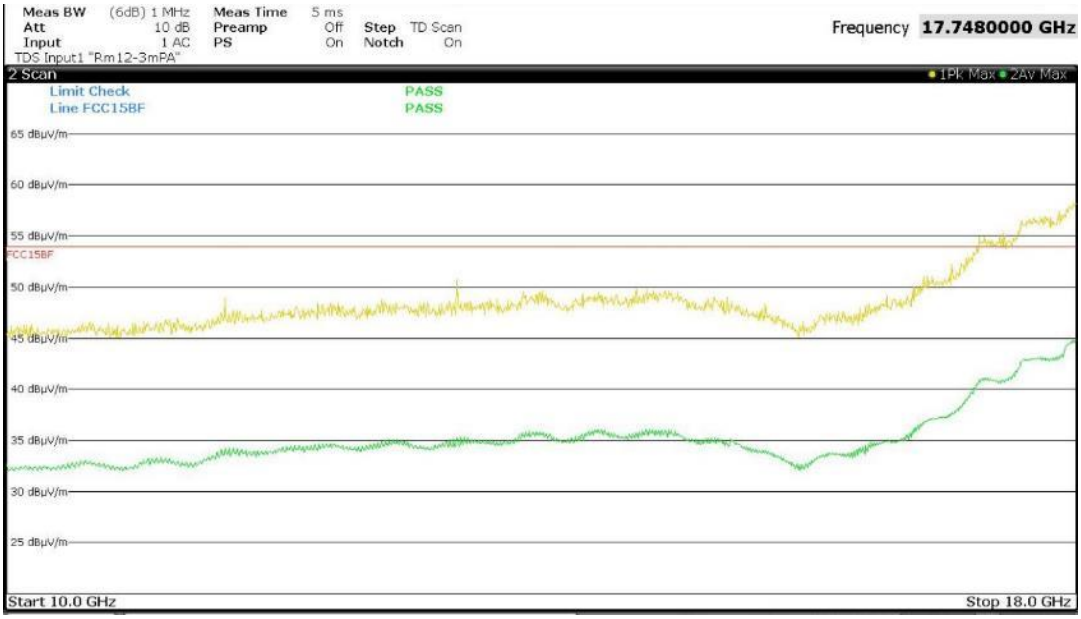


10 to 18 GHz

Channel 2405 MHz – Horizontal, 1 to 18 GHz

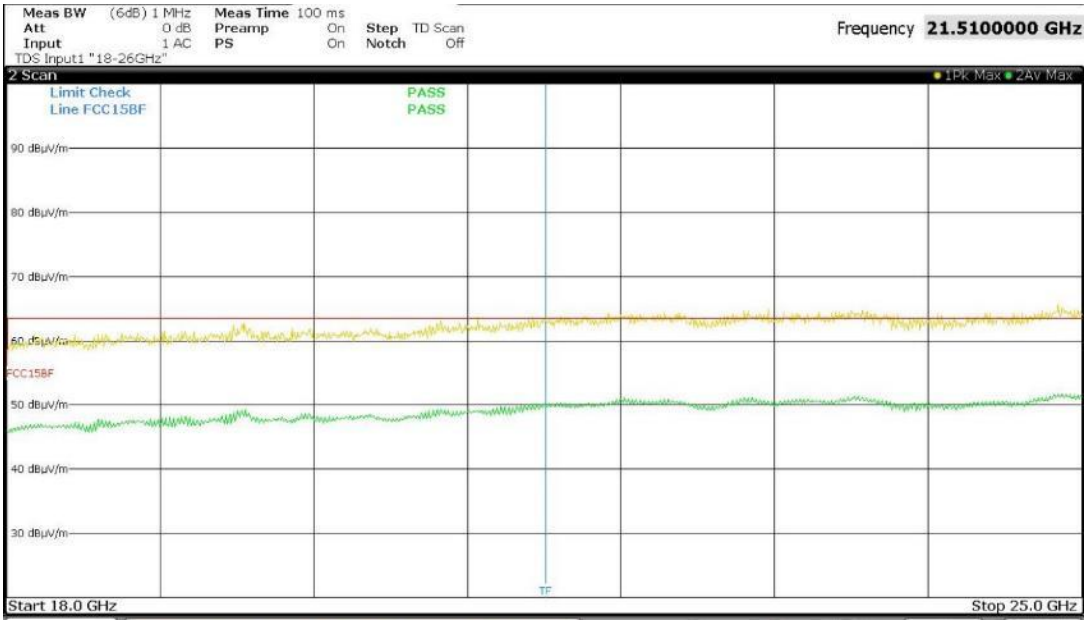


1 to 10 GHz

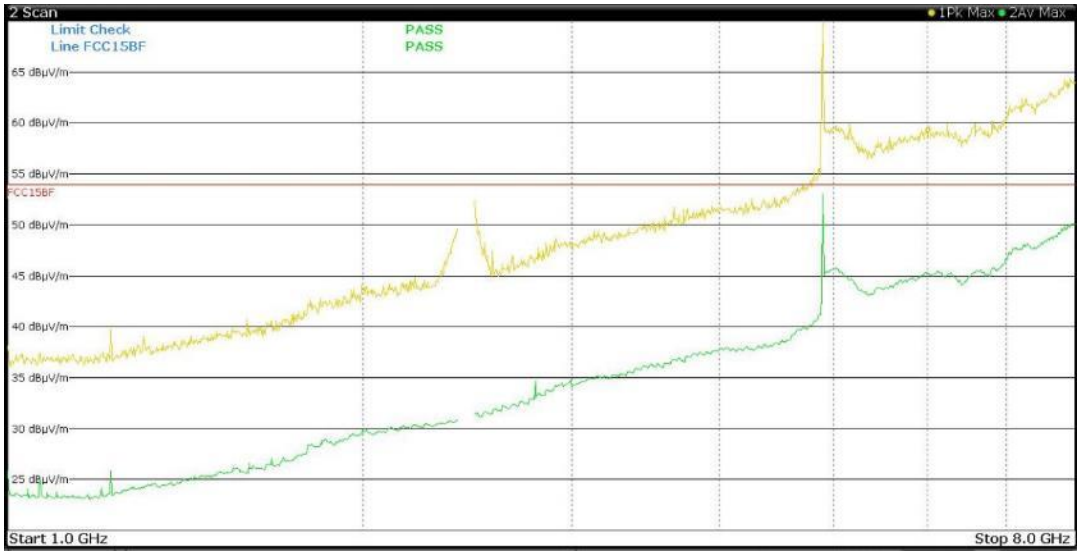


10 to 18 GHz

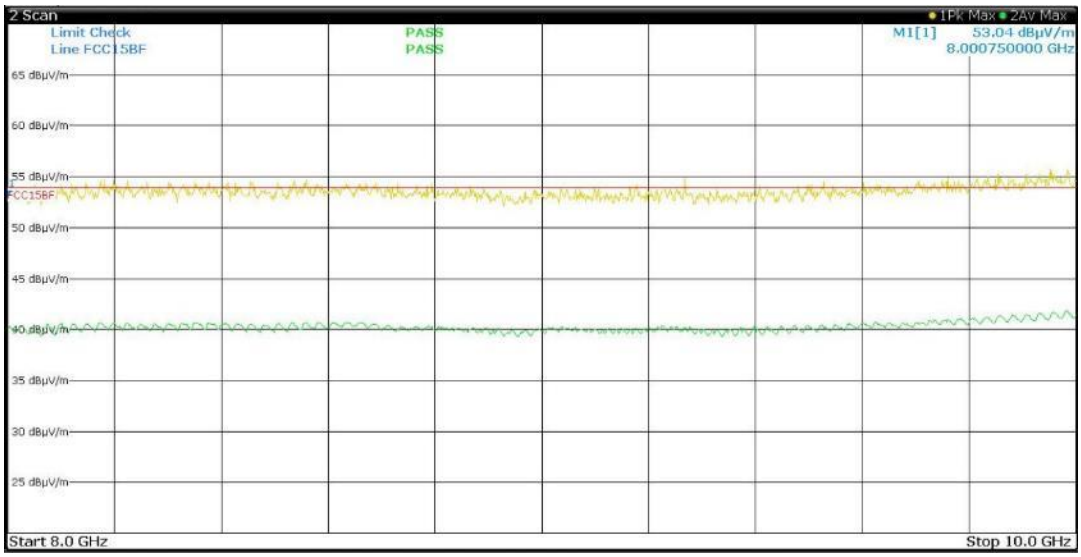
Channel 2405 MHz – Vertical and Horizontal Combined 18 to 25 GHz



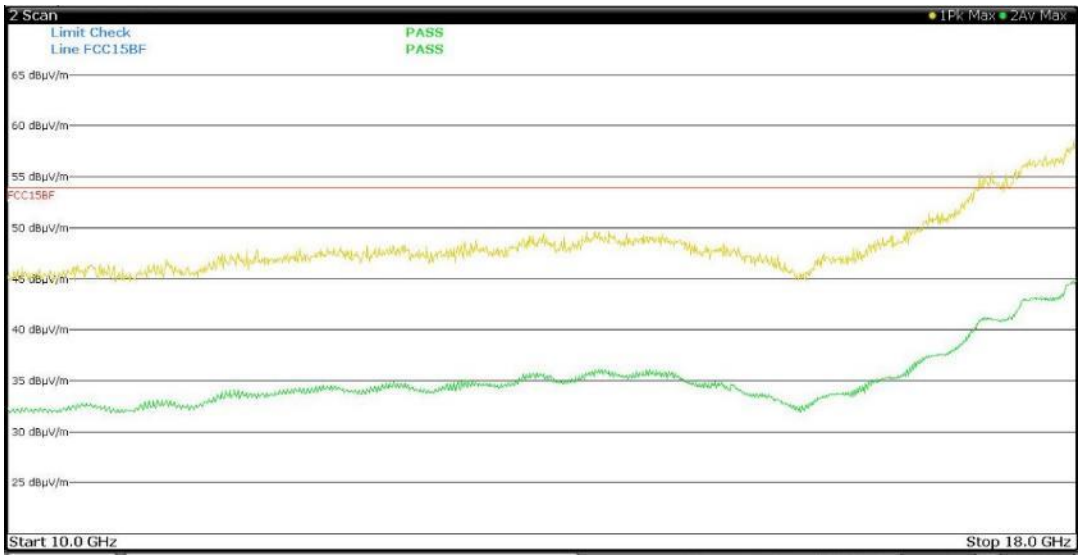
Channel 2445 MHz – Vertical, 1 to 18 GHz



1 to 8 GHz

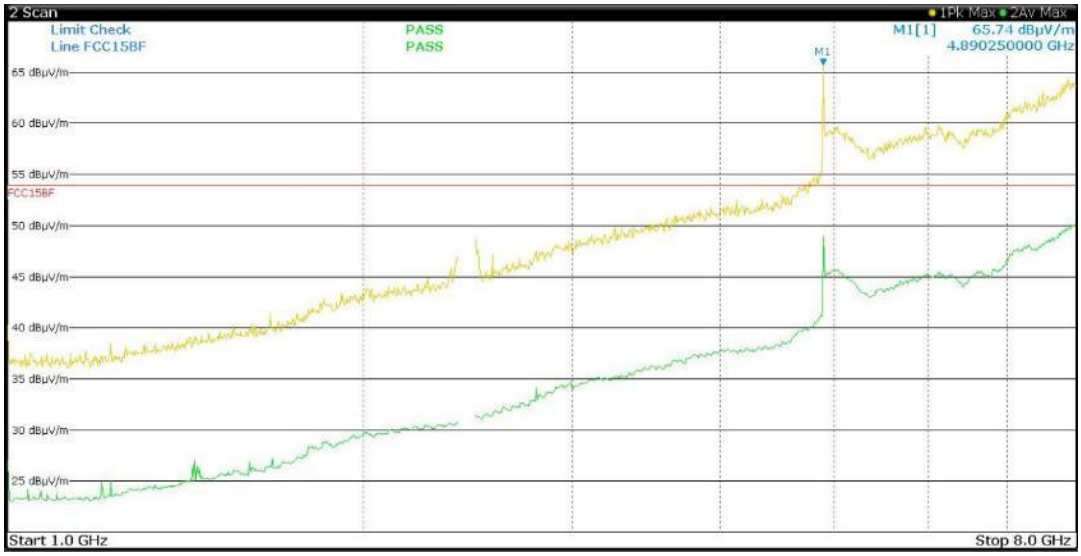


8 to 10 GHz

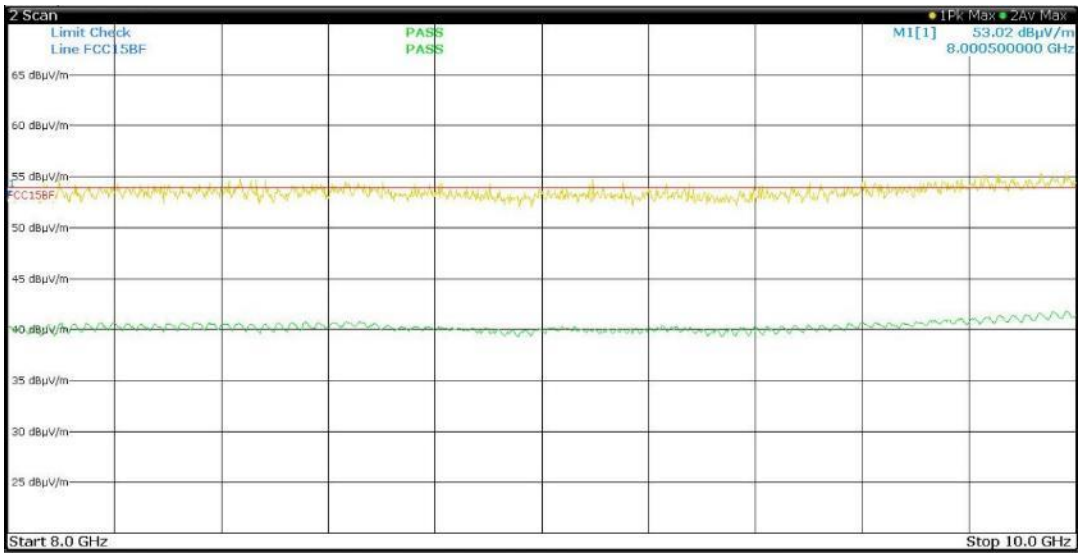


10 to 18 GHz

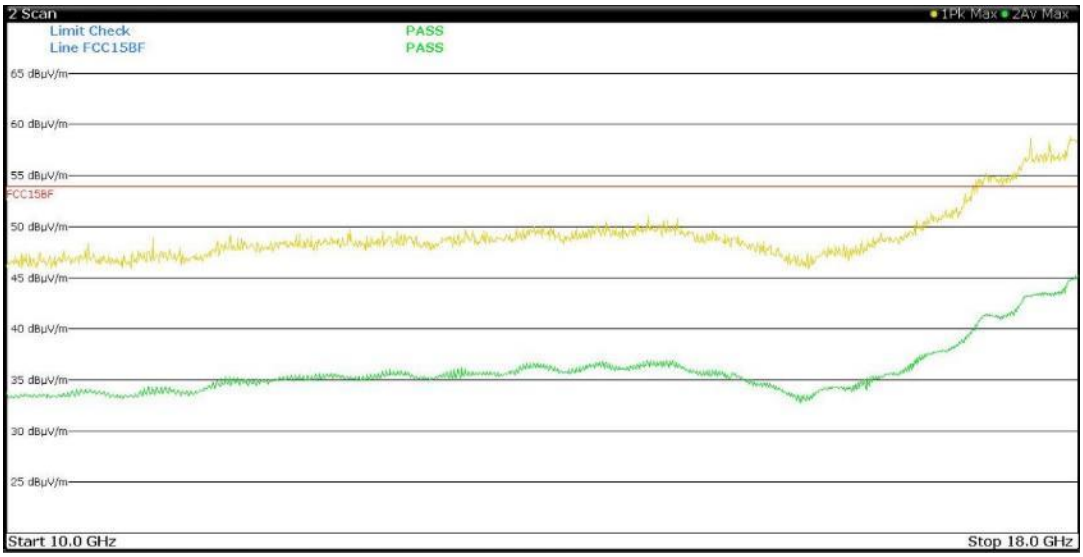
Channel 2445 MHz – Horizontal, 1 to 18 GHz



1 to 8 GHz

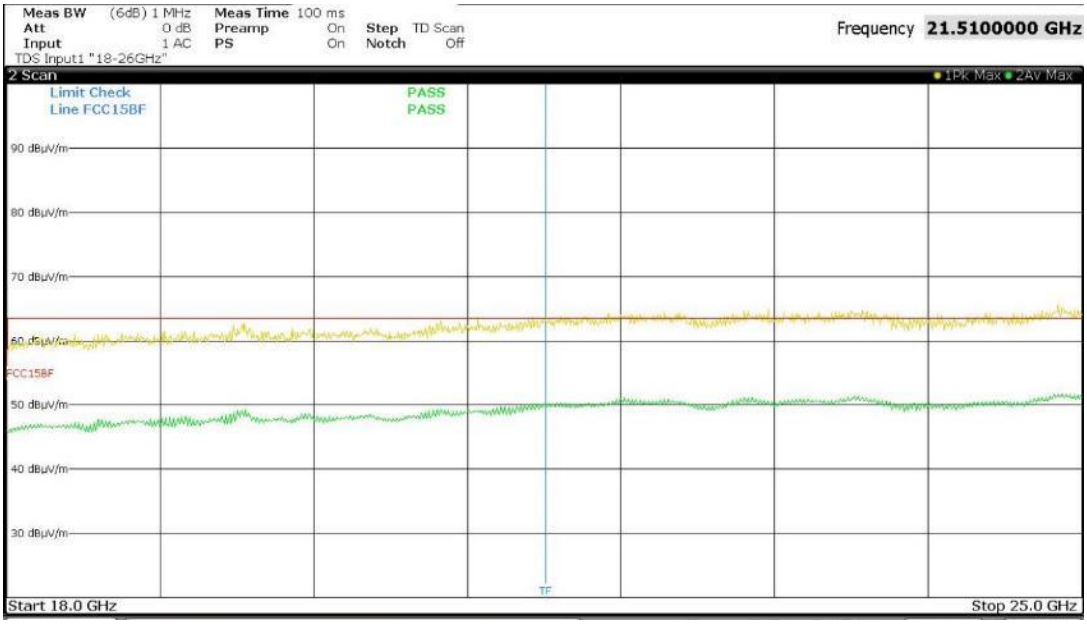


8 to 10 GHz

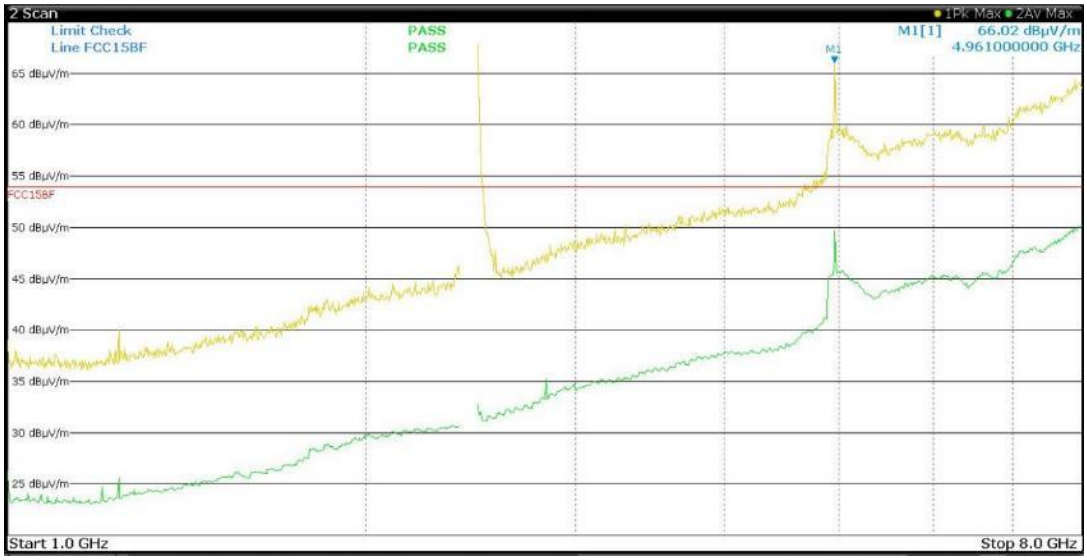


10 to 18 GHz

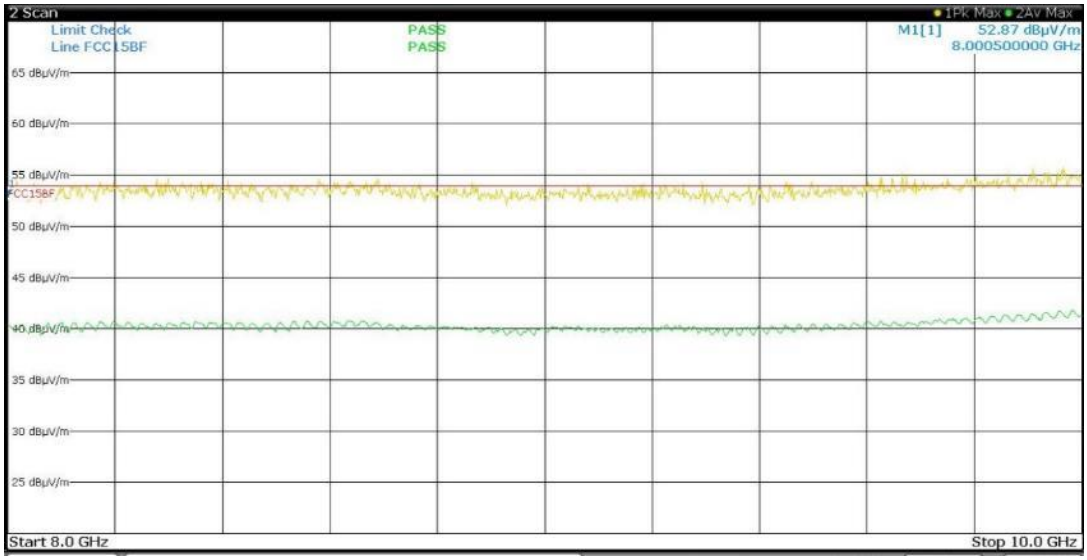
Channel 2445 MHz – Vertical and Horizontal Combined 18 to 25 GHz



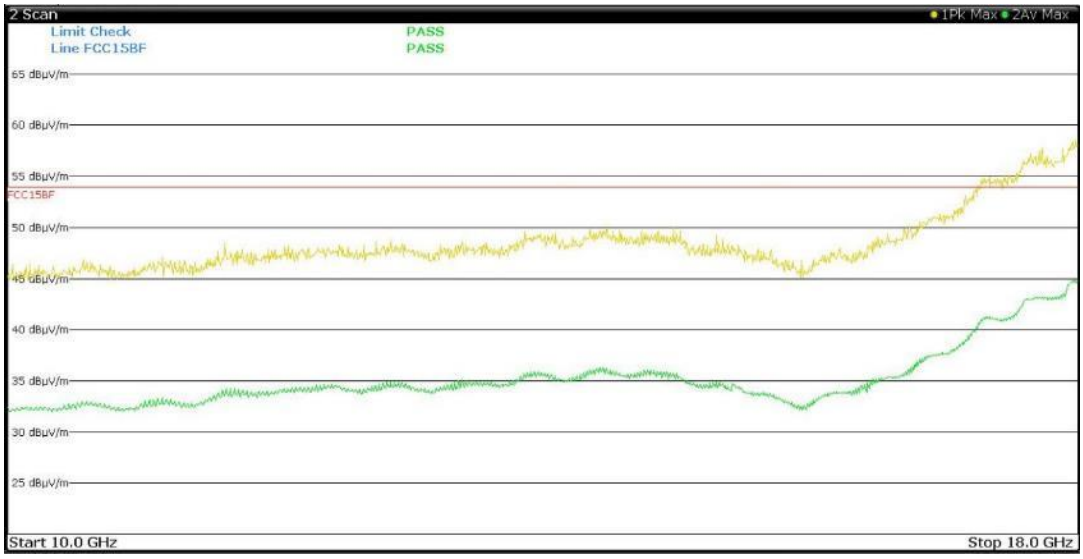
Channel 2480 MHz – Vertical, 1 to 18 GHz



1 to 8 GHz

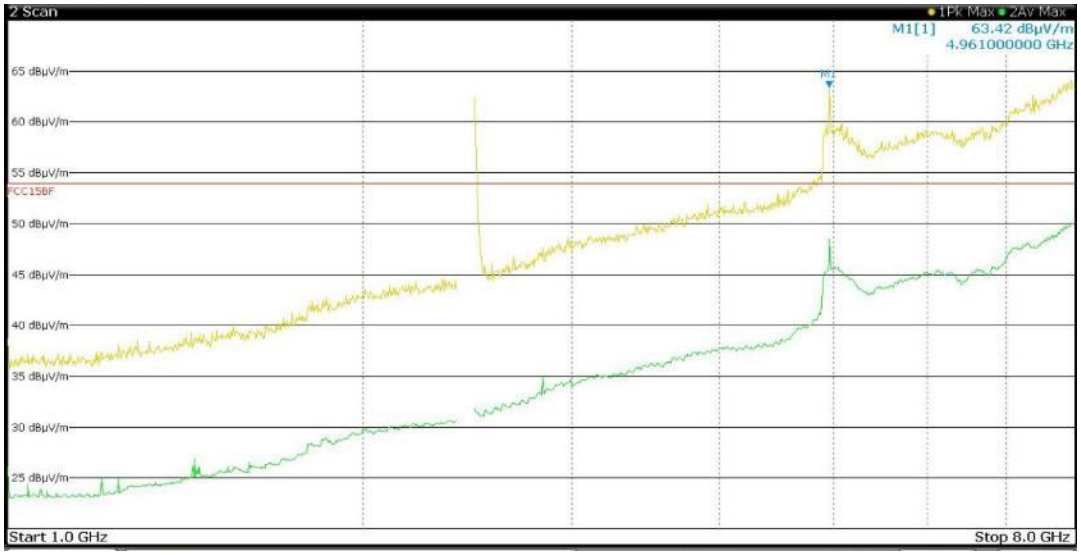


8 to 10 GHz

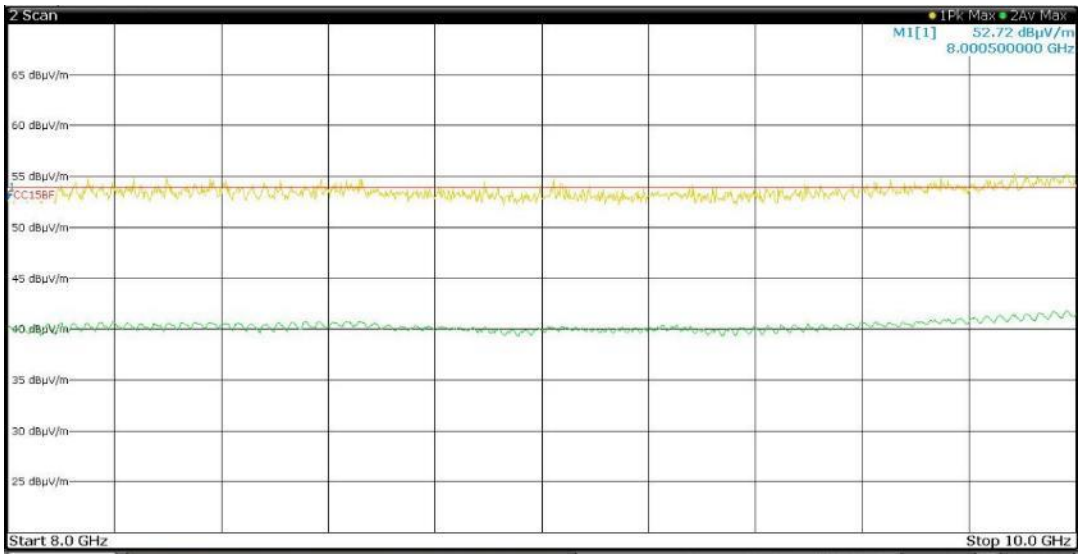


10 to 18 GHz

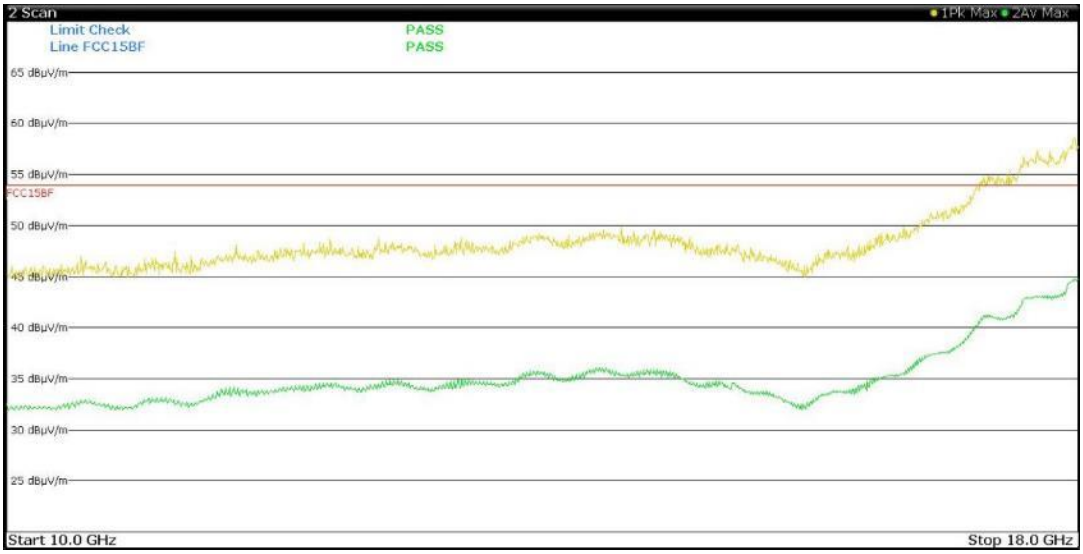
Channel 2480 MHz – Horizontal, 1 to 18 GHz



1 to 8 GHz

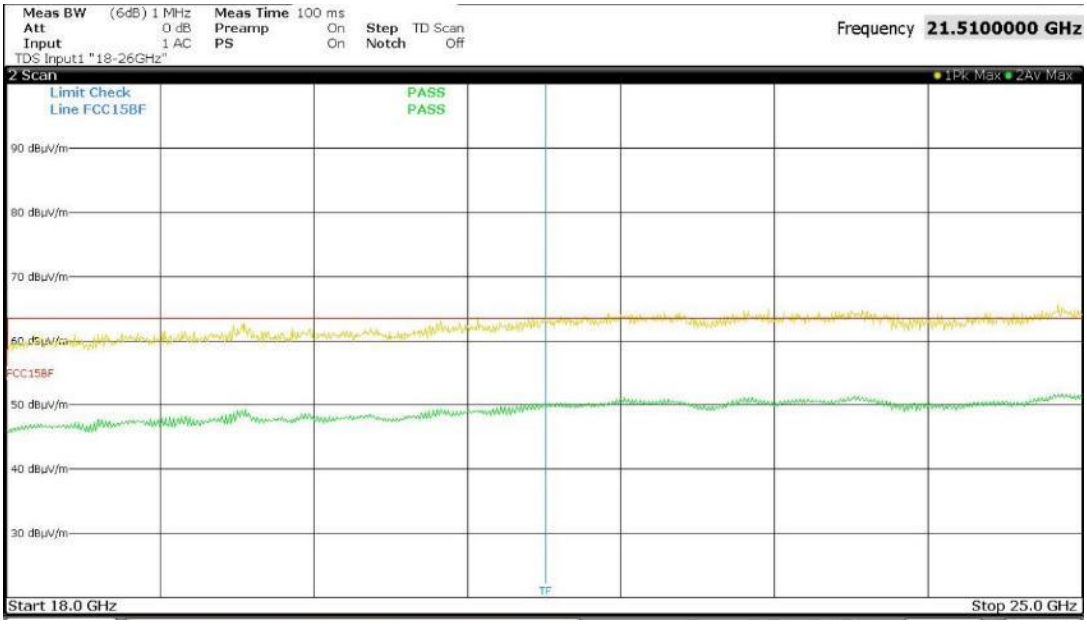


8 to 10 GHz



10 to 18 GHz

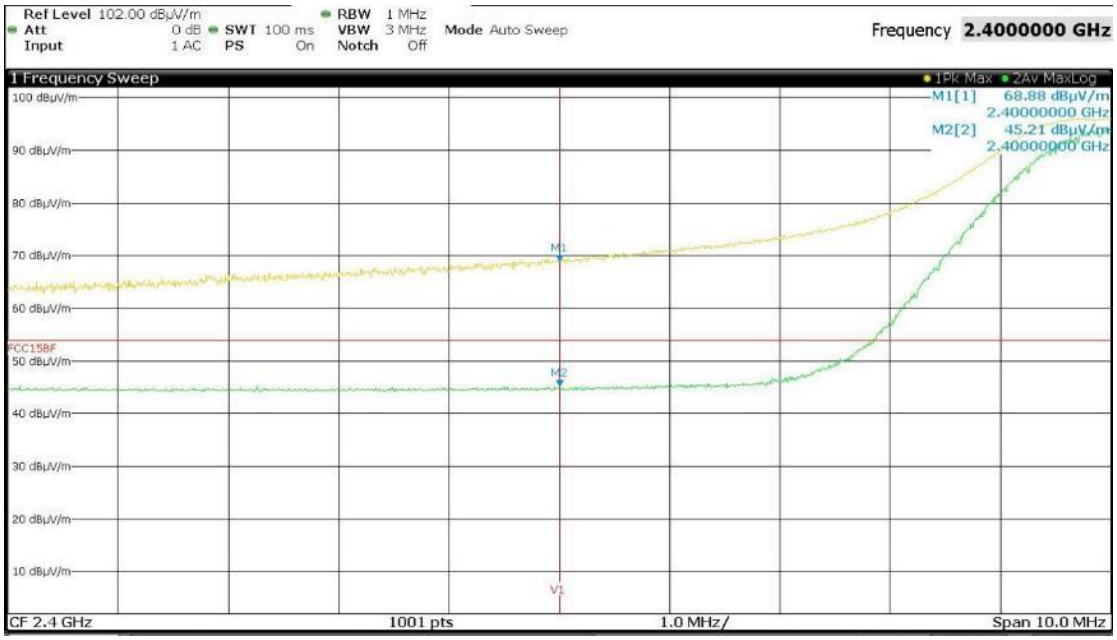
Channel 2480 MHz – Vertical and Horizontal Combined 18 to 25 GHz



3.8.3 Band-Edge Emission Measurements

Emissions within 5 MHz of an authorised band edge were measured.

Channel 2405 MHz, Lower Band Edge:



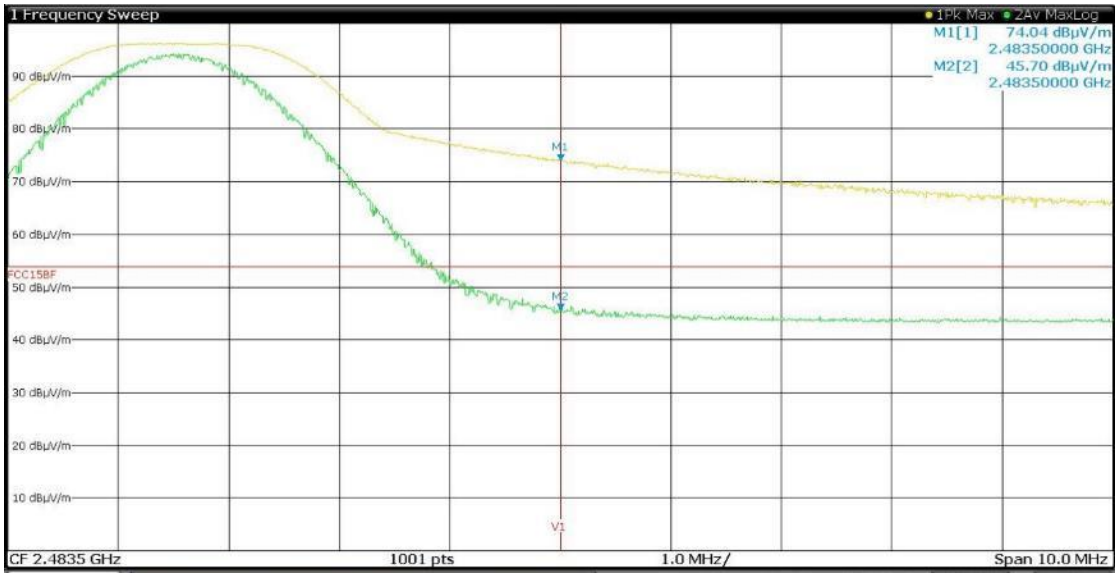
Maximum Peak Results:

Channel	Frequency [MHz]	Peak [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2400.00	68.9	74.0	-5.1

Maximum Average Results, correction factor of -40.0 dB to peak:

Channel	Frequency [MHz]	Average [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2400.00	28.9	54.0	-25.1

Channel 2480 MHz, Upper Band Edge:



Maximum Peak Results:

Channel	Frequency [MHz]	Peak [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2480 MHz	2483.50	74.0	74.0	0.0

Maximum Average Results:

Channel	Frequency [MHz]	Average [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2480 MHz	2483.50	34.0	54.0	-20.0

3.9 §15.247(i) Maximum Permissible Exposure

The Maximum Permissible Exposure (MPE) limit defined in §1.1310 for a transmitter operating at 2400 MHz is:

MPE limit = 1 mW/cm^2
= **1 mW/cm^2 = 61.4 V/m** (V/m) = √(1200×π×mW/cm^2)

Field strength = [√(30× transmitter EIRP, mW)] ÷ [minimum separation distance, metres] V/m
= [√(30×0.006)] ÷ 0.2 V/m
= **2.1 V/m = 0.001 mW/cm^2** (mW/cm^2) = (V/m)^2 ÷ (1200×π)

As the calculated field strength generated by the transmitter is less than the limit the Garage Door Lock, Model (HVIN) WLOCK-03 is deemed to comply with the radio frequency exposure requirements.

3.10 RSS-Gen 3.2/RSS-102 Maximum Permissible Exposure

The Garage Door Lock, Model (HVIN) WLOCK-03 was considered a mobile device and not intended to be operated within 20 cm of user or nearby person.

RF exposure evaluation is exempt if the following criteria is met:

Time averaged e.i.r.p. ≤ $1.31\times10^{-2} \times [f_{(MHz)}]^{0.6834}$ W

$1.31\times10^{-2} \times [f_{(MHz)}]^{0.6834}$ = **2.7 W**

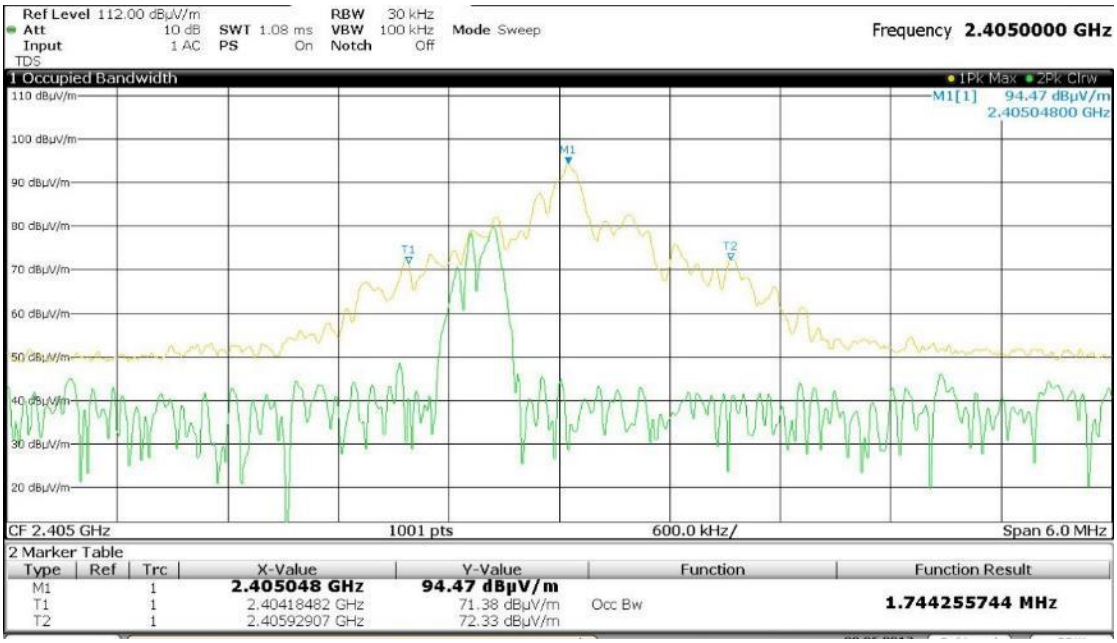
The measured e.i.r.p. (not time averaged) was **0.006 W**

As the radiated power generated by the transmitter was less than the limit the Garage Door Lock, Model (HVIN) WLOCK-03 is deemed to comply with the radio frequency exposure requirements.

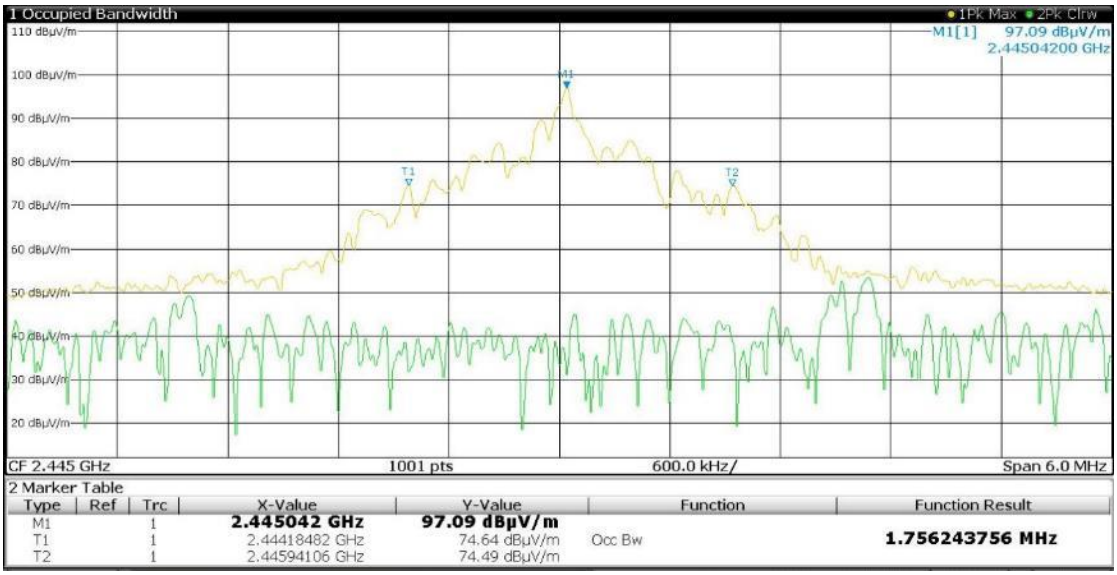
3.11 §2.1049/RSS-Gen 6.6 Occupied bandwidth – 99% power

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

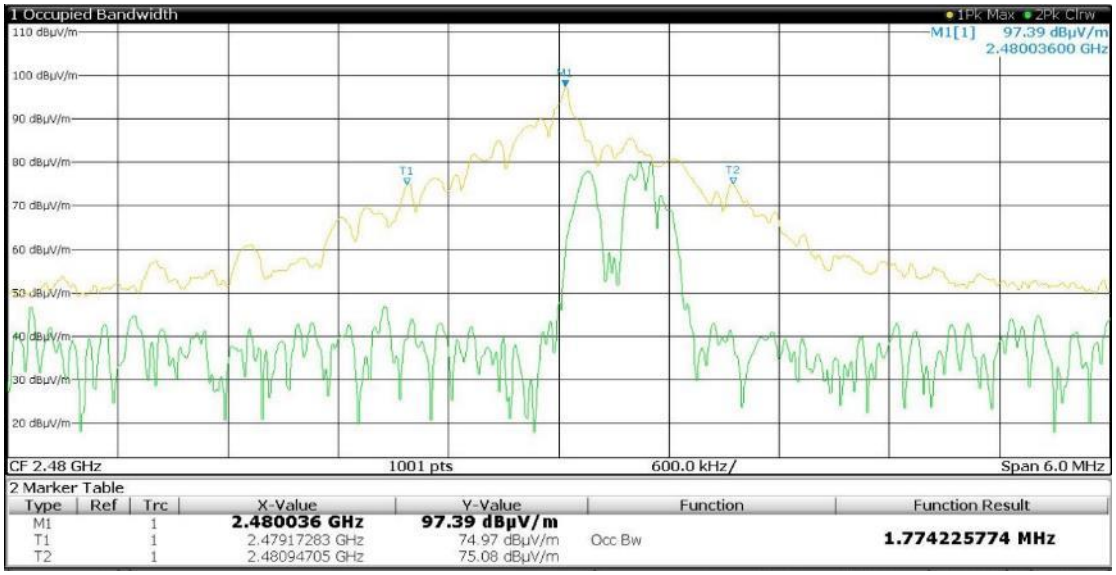
The 99% power bandwidth was **1.756 MHz**.



Channel 2405 MHz



Channel 2445 MHz



Channel 2480 MHz

4.0 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	9 kHz to 30 MHz	±4.1 dB
	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB
Peak Output Power:		±1.5 dB
Peak Power Spectral Density:		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

5.0 COMPLIANCE STATEMENT

The Garage Door Lock, Model (HVIN) WLOCK-03 tested on behalf of Automatic Technology Australia **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators) and RSS-247 Issue 2 for a Frequency Hopping Spread Spectrum transceiver (FHSS) operating within the band: 2400 MHz to 2483.5 MHz.