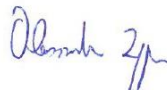



## Test Report

### 47 CFR FCC Part 15 subpart C Intentional Radiators

<b>Report reference no.</b> ..... :	28111086 005
<b>FCC Designation Number</b> .....	IT0008
<b>FCC Test Firm Registration #</b> .....	804595
<b>Tested by (name + signature)</b> ..... :	Alessandro Zappa \ Tester 
<b>Approved by (name + signature)</b> ..... :	Giovanni Molteni \ TM 
<b>Date of issue</b> .....	15-Jan-2018
<b>Total number of pages</b> .....	61 Pages
<b>Testing Laboratory</b> .....	TÜV Rheinland Italia S.r.l.
<b>Address</b> .....	Via Mattei 3 - 20010 - Pogliano Milanese (MI) – Italy
<b>Applicant's name</b> .....	GSK Consume Healthcare
<b>Address</b> .....	184 Liberty Corner Rd Warren. NJ 07059, U.S.A
<b>Test item description</b> .....	Wearable Data Logger with BLE 4.1 Module
<b>Trade Mark</b> .....	myQuit
<b>Manufacturer</b> .....	GSK Consumer Health
<b>Model/Type reference</b> .....	MQB1
<b>Ratings</b> .....	Batteries Operated – 3V
<b>Sample</b> .....	Wearable Data Logger with BLE 4.1 Module
<b>Samples received on</b> .....	10-Nov-2017
<b>TUV reference samples</b> .....	---
<b>Samples tested n.</b> .....	1
<b>Testing</b> .....	
<b>Start Date:</b> .....	10-Nov-2017
<b>End Date:</b> .....	14-Nov-2017
<p><i>The results in this Test Report are exclusively referred to the tested samples. Without the written authorization of TÜV Rheinland Italia S.r.l., this document can be reproduced only integrally Compliance with performed tests and recorded in this technical report does not give presumption of compliance to all requirements of the reference standard</i></p>	

## SUMMARY

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RELEASE CONTROL RECORD		
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
28111086_002	Original release	15-jan-2018
28111086_004	Removal of EUT photo documentation for short-term confidentiality. Updated reference standards. Removed band edge from radiated emission paragraph and added 'spurious near restricted band' in spurious emission paragraph. Added test procedure for Output Power. Corrected Radiated Antenna Port spurious emission using 100kHz RBW for fundamental and spurious emissions. Removal of word "head" in RF exposure requirements.	26-feb-2018
28111086_005	Removal of test set-up photo documentation for short-term confidentiality. Added radiated emission band edge with 1MHz RBW. Converted radiated power to equivalent conducted power (average values).	05-mar-2018

1. Reference Standards	
Standard	Description
FCC Part 15 (Subpart C)	§15.247 Operation within the bands 902-928 MHz, 2400-2483,5 MHz, and 5725-5850 MHz.
FCC Part 15 (Subpart C)	§15.207 Conducted Limits
FCC Part 15 (Subpart C)	§15.209 Radiated emission limits; general requirements
FCC Part 15 (Subpart C)	§15.203 Antenna Requirement
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
FCC GUIDE 15.247 (DTS): April 8, 2016	Guidance for performing compliance measurements on digital transmission systems (dts) operating under §15.247

<b>2. Summary of testing:</b>			
<b>FCC Rule Part</b>	<b>Test Item</b>	<b>Result</b>	<b>Remarks</b>
15.207	AC POWER CONDUCTED EMISSION	N/A	Batteries Operated
15.205 15.209 15.247(d)	RADIATED EMISSIONS	PASS	Meet the requirement of limit
15.247(a)(2)	6dB BANDWIDTH	PASS	Meet the requirement of limit
15.247(b)(3)	OUTPUT POWER (internal antenna)	PASS	Meet the requirement of limit
15.247(d)	RADIATED SPURIOUS EMISSIONS	PASS	Meet the requirement of limit
15.247(e)	POWER SPECTRAL DENSITY	PASS	Meet the requirement of limit
15.203	ANTENNA REQUIREMENT	PASS	Integral Antenna
§ 15.247 (i) (§ 47CFR 1.1307(b)(1))	RF HUMAN EXPOSURE	PASS	Meet the requirement of limit

**Possible test case verdicts:**

- test case does not apply to the test object .....: N/A
- test object does meet the requirement .....: PASS
- test object does not meet the requirement .....: FAIL

**General remarks:**

**The test results presented in this report relate only to the object tested.**

**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

**3. PHOTOGRAPHIC DOCUMENTATION**

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**4. General product information**

Wearable Data Logger with BLE 4.1 Module

## 5. General Chipset information

Bluetooth Low Energy Chipset; NORDIC Semiconductor; nRF52832

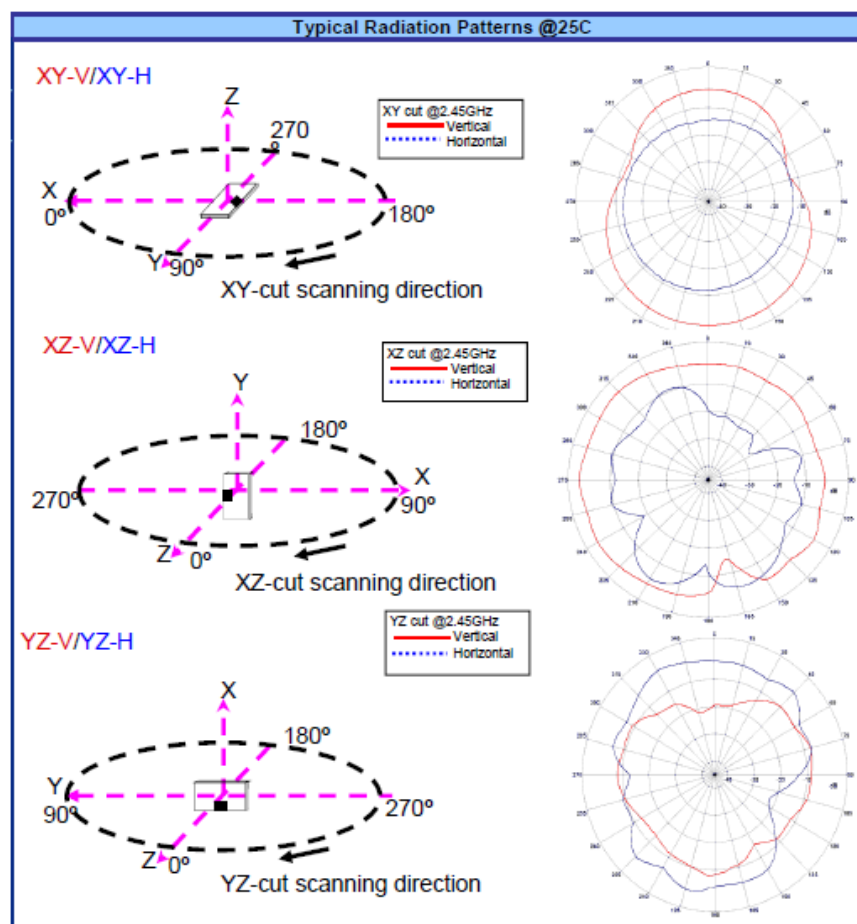
Key features	Applications
<ul style="list-style-type: none"> <li>2.4 GHz transceiver <ul style="list-style-type: none"> <li>-96 dBm sensitivity in Bluetooth® low energy mode</li> <li>2 Mbps Bluetooth® low energy mode</li> <li>1 Mbps, 2 Mbps supported data rates</li> <li>TX power -20 to +4 dBm in 4 dB steps</li> <li>Single-pin antenna interface</li> <li>5.3 mA peak current in TX (0 dBm)</li> <li>5.4 mA peak current in RX</li> <li>RSSI (1 dB resolution)</li> </ul> </li> <li>ARM® Cortex®-M4 32-bit processor with FPU, 64 MHz <ul style="list-style-type: none"> <li>215 EEMBC CoreMark® score running from flash memory</li> <li>58 µA/MHz running from flash memory</li> <li>51.6 µA/MHz running from RAM</li> <li>Data watchpoint and trace (DWT), embedded trace macrocell (ETM), and instrumentation trace macrocell (ITM)</li> <li>Serial wire debug (SWD)</li> <li>Trace port</li> </ul> </li> <li>Flexible power management <ul style="list-style-type: none"> <li>Supply voltage range 1.7 V–3.6 V</li> <li>Fully automatic LDO and DC/DC regulator system</li> <li>Fast wake-up using 64 MHz internal oscillator</li> <li>0.3 µA at 3 V in OFF mode</li> <li>0.7 µA at 3 V in OFF mode with full 64 kB RAM retention</li> <li>1.9 µA at 3 V in ON mode, no RAM retention, wake on RTC</li> </ul> </li> <li>Memory <ul style="list-style-type: none"> <li>512 kB flash/64 kB RAM</li> <li>256 kB flash/32 kB RAM</li> </ul> </li> <li>Nordic SoftDevice ready</li> <li>Support for concurrent multi-protocol</li> <li>Type 2 near field communication (NFC-A) tag with wakeup-on-field and touch-to-pair capabilities</li> <li>12-bit, 200 ksp/s ADC - 8 configurable channels with programmable gain</li> <li>64 level comparator</li> <li>15 level low power comparator with wakeup from System OFF mode</li> <li>Temperature sensor</li> <li>32 general purpose I/O pins</li> <li>3x 4-channel pulse width modulator (PWM) units with EasyDMA</li> <li>Digital microphone interface (PDM)</li> <li>5x 32-bit timers with counter mode</li> <li>Up to 3x SPI master/slave with EasyDMA</li> <li>Up to 2x I2C compatible 2-Wire master/slave</li> <li>I2S with EasyDMA</li> <li>UART (CTS/RTS) with EasyDMA</li> <li>Programmable peripheral interconnect (PPI)</li> <li>Quadrature decoder (QDEC)</li> <li>AES HW encryption with EasyDMA</li> <li>Autonomous peripheral operation without CPU intervention using PPI and EasyDMA</li> <li>3x real-time counter (RTC)</li> <li>External system <ul style="list-style-type: none"> <li>Single crystal operation</li> <li>On-chip balun (single-ended RF)</li> <li>Few external components</li> </ul> </li> <li>Package variants <ul style="list-style-type: none"> <li>QFN48 package, 6 × 6 mm</li> <li>WLCS package, 3.0 × 3.2 mm</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Internet of Things (IoT) <ul style="list-style-type: none"> <li>Home automation</li> <li>Sensor networks</li> <li>Building automation</li> <li>Industrial</li> <li>Retail</li> </ul> </li> <li>Personal area networks <ul style="list-style-type: none"> <li>Health/fitness sensor and monitor devices</li> <li>Medical devices</li> <li>Key fobs and wrist watches</li> </ul> </li> <li>Interactive entertainment devices <ul style="list-style-type: none"> <li>Remote controls</li> <li>Gaming controllers</li> </ul> </li> <li>Beacons <ul style="list-style-type: none"> <li>A4WP wireless chargers and devices</li> </ul> </li> <li>Remote control toys</li> <li>Computer peripherals and I/O devices <ul style="list-style-type: none"> <li>Mouse</li> <li>Keyboard</li> <li>Multi-touch trackpad</li> <li>Gaming</li> </ul> </li> </ul>

## 6. General Antennas information

### 1\_CHIPSET ANTENNA

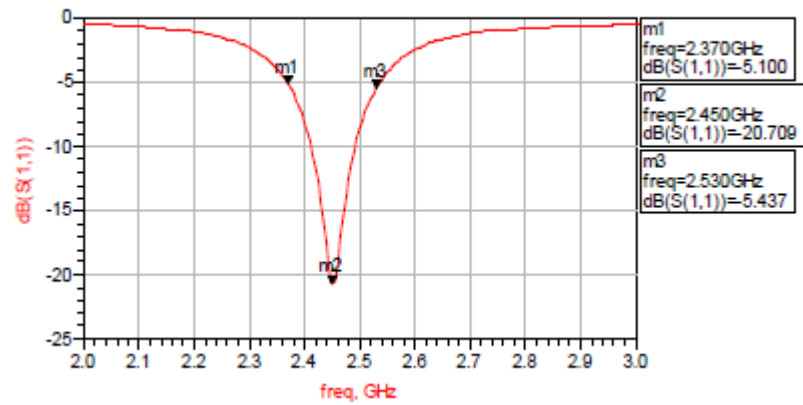
#### Ultra-Miniature 2.4GHz Chip antenna 0.37mm max Thickness P/N 2450AT07A0100

General Specifications			
Part Number	2450AT07A0100	Input Power	2W max. (CW)
Frequency (MHz)	2400~2500	Storage Temperature	-40 to +85°C
Peak Gain (dBi typ.)	1.0 (XZ-Total)	Operating Temperature	-40 to +125°C
Average Gain (dBi typ.)	-1.5 (XZ-Total)	Recommended Storage	+5 ~ +35 °C, 18 mos max.
Return Loss	6.5 dB min.	Conditions of unused	Humidity 45~75%RH
Impedance	50 $\Omega$	product on T&R	





Return Loss / Without Matching Circuits



7. Photographic documentation	
---	---

8. Equipment Used During Test				
Use*	Product Type	Manufacturer	Model	Comments
EUT	Wearable Data Logger with BLE 4.1 Module	GSK Consumer Health	MQB1	---
AE	PC	Dell	---	Used to set Bluetooth Channels
<p>Note:</p> <p>* Use :</p> <p>EUT - Equipment Under Test,  AE - Auxiliary/Associated Equipment, or  SIM - Simulator (Not Subjected to Test)</p> <p>No other Auxiliary/Associated Equipment was connected/installed on the EUT</p>				

9. Input/Output Ports:				
CONNECTIONS				
Port	Description	Connection	Cable length	
1	Enclosure	Plastic	---	---
2	AC Power Port	AC	Not Present	---
3	DC Power Port	DC	Batteries Operated – 3V	---
4	LAN	TP	Not Present	---
5	USB	I/O	Not Present	---
<p>*Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical  I/O = Signal Input or Output Port (Not Involved in Process Control)  TP = Telecommunication Ports</p>				

10. Power Interface						
Mode #	Voltage (Vdc)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	3	--	--	--	--	---

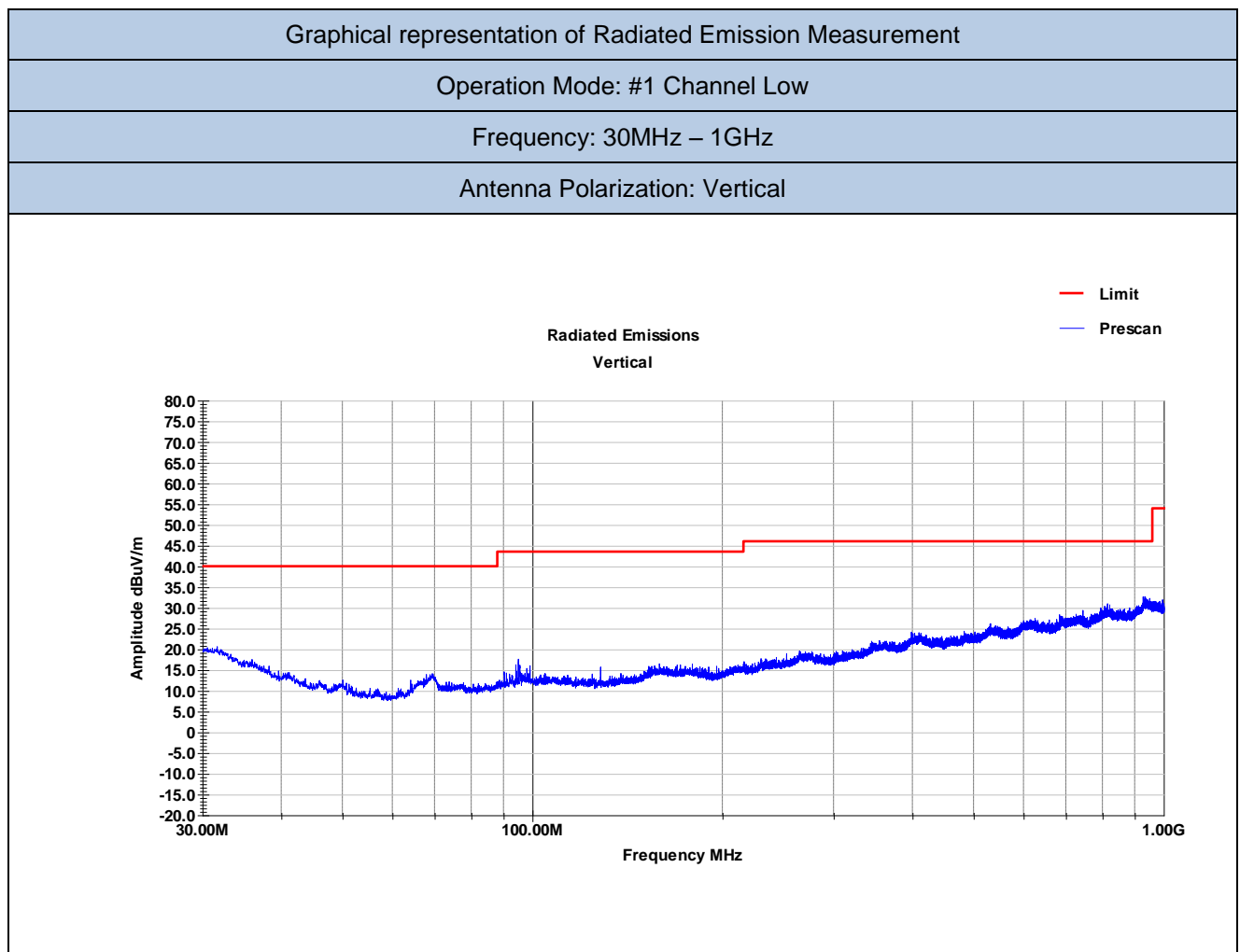
11. EUT Operation Modes	
Operation mode	Description
#1	EUT turn on with BLE Module in transmission mode on Internal Antenna

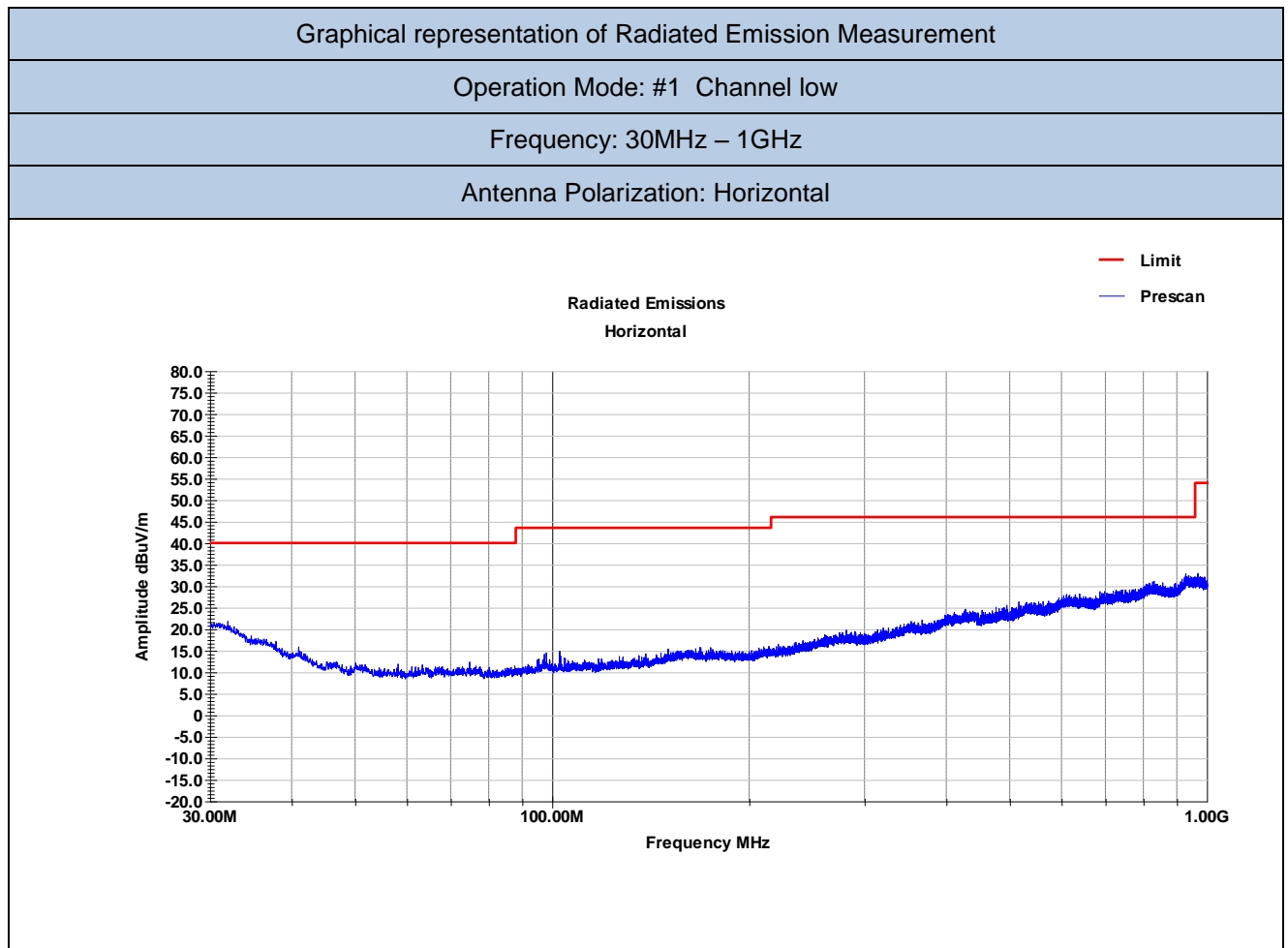
12. EUT Configuration Modes	
Mode #	Description
---	---

### 13. Test Conditions and Results – RADIATED EMISSION

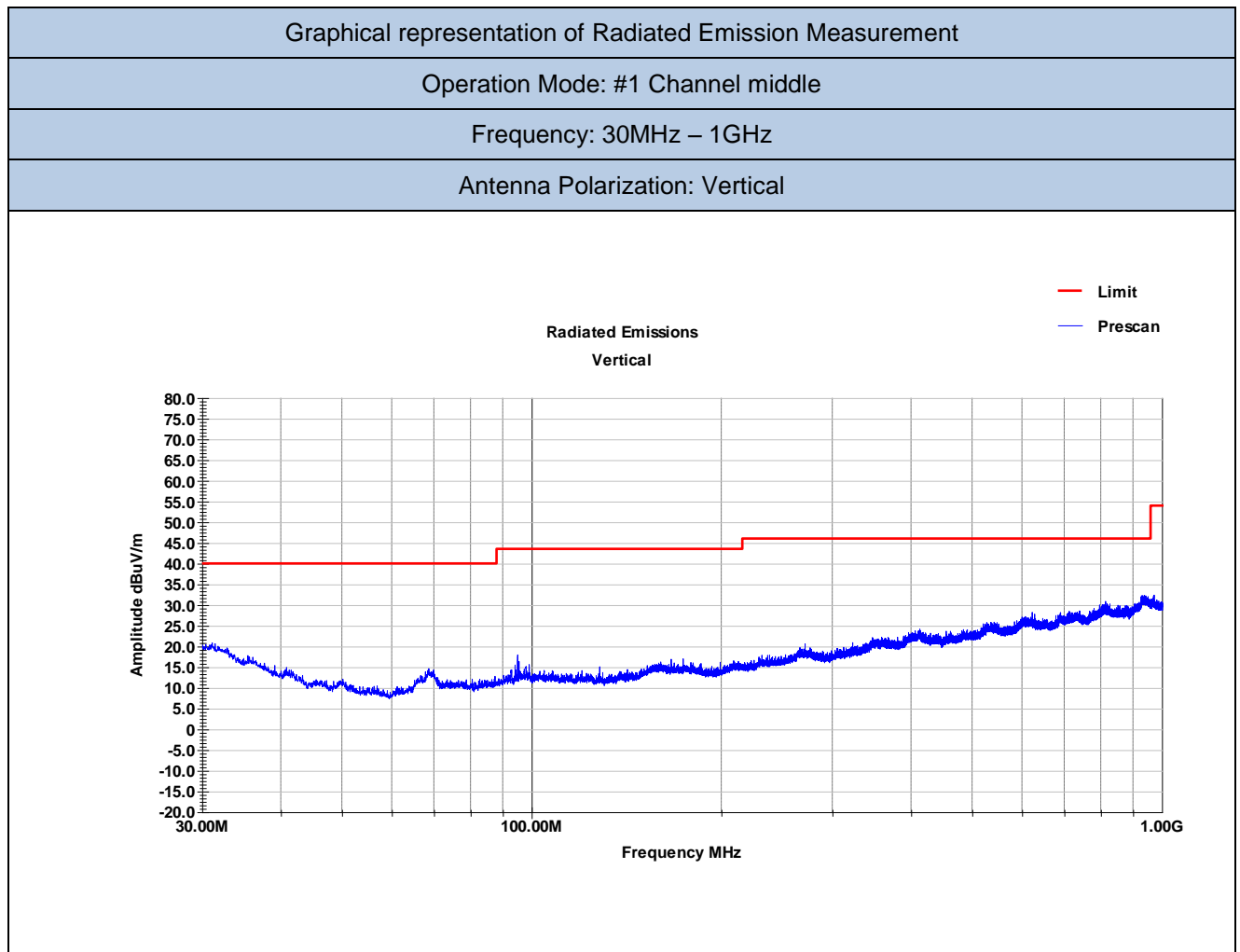
13	TEST: Radiated Emission		PASS																								
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C																									
	Relative Humidity (%)	30 to 60 %																									
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22°C																									
	Relative Humidity (%)	54%																									
	Air pressure (hPa)	1020																									
—	Power Mode	Application Point																									
Fully configured sample tested at the power line frequency	Batteries Operated	Enclosure																									
Equipment mode:	Operation mode	#1																									
FCC Standard	§15.205; §15.209; §15.247																										
Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :																											
<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100**</td><td>3</td></tr><tr><td>88-216</td><td>150**</td><td>3</td></tr><tr><td>216-960</td><td>200**</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table>				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	Above 960	500	3
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																									
Above 960	500	3																									
**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.																											
Further information to test setup	<div><div>EMI Receiver &amp; Controller</div><div><div>EMI receiver</div><div><div>3m semi-anechoic chamber (Shield Room with absorbing materials)</div><div><div>Antenna Tower</div><div>3m</div><div>1 to 4 m</div><div>Metal Plate</div><div>360°</div><div>EUT</div></div></div></div></div>																										

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	06/2017	06/2018
EMI Test Receiver	R&S	ESW44	87020967	06/2017	06/2018
Antenna BiConiLog	ETS Lindgren	3124E	87020457	04/2017	04/2020
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020
2xAntenna Horn with Preamplifier	ETS Lindgren	114514	87020459	04/2017	04/2020
		120722	87020460		

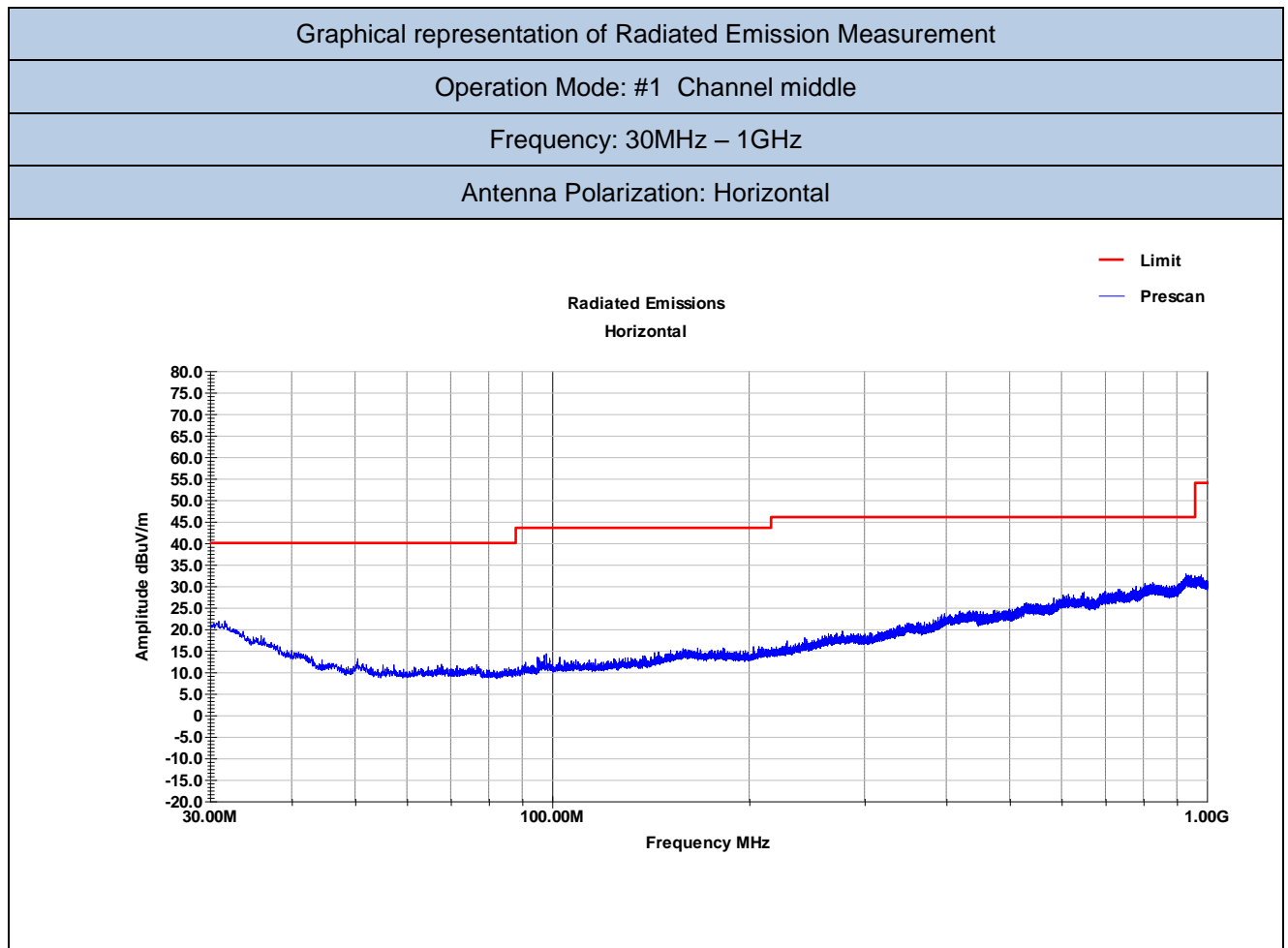




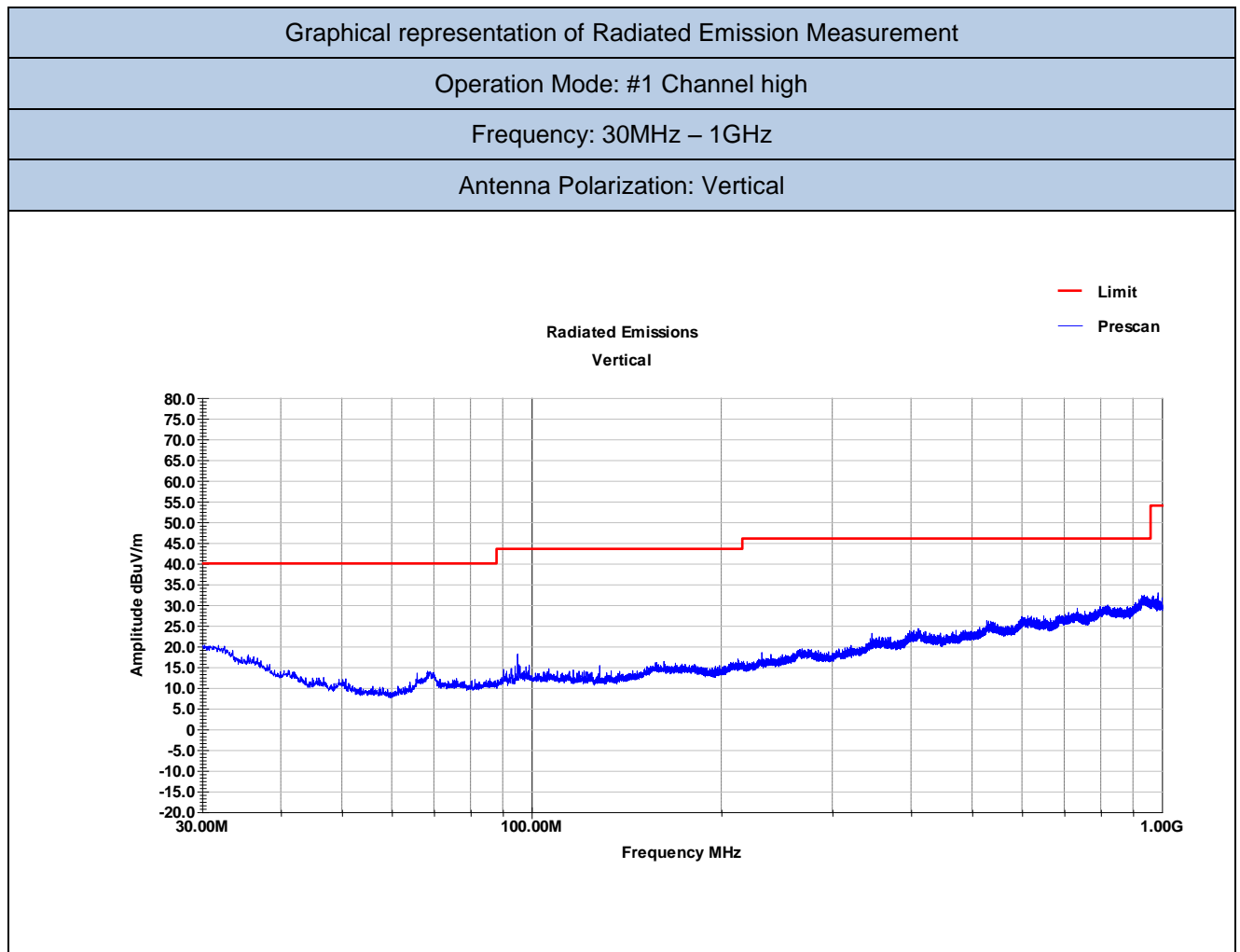
Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel low
Frequency: 30MHz – 1GHz
---

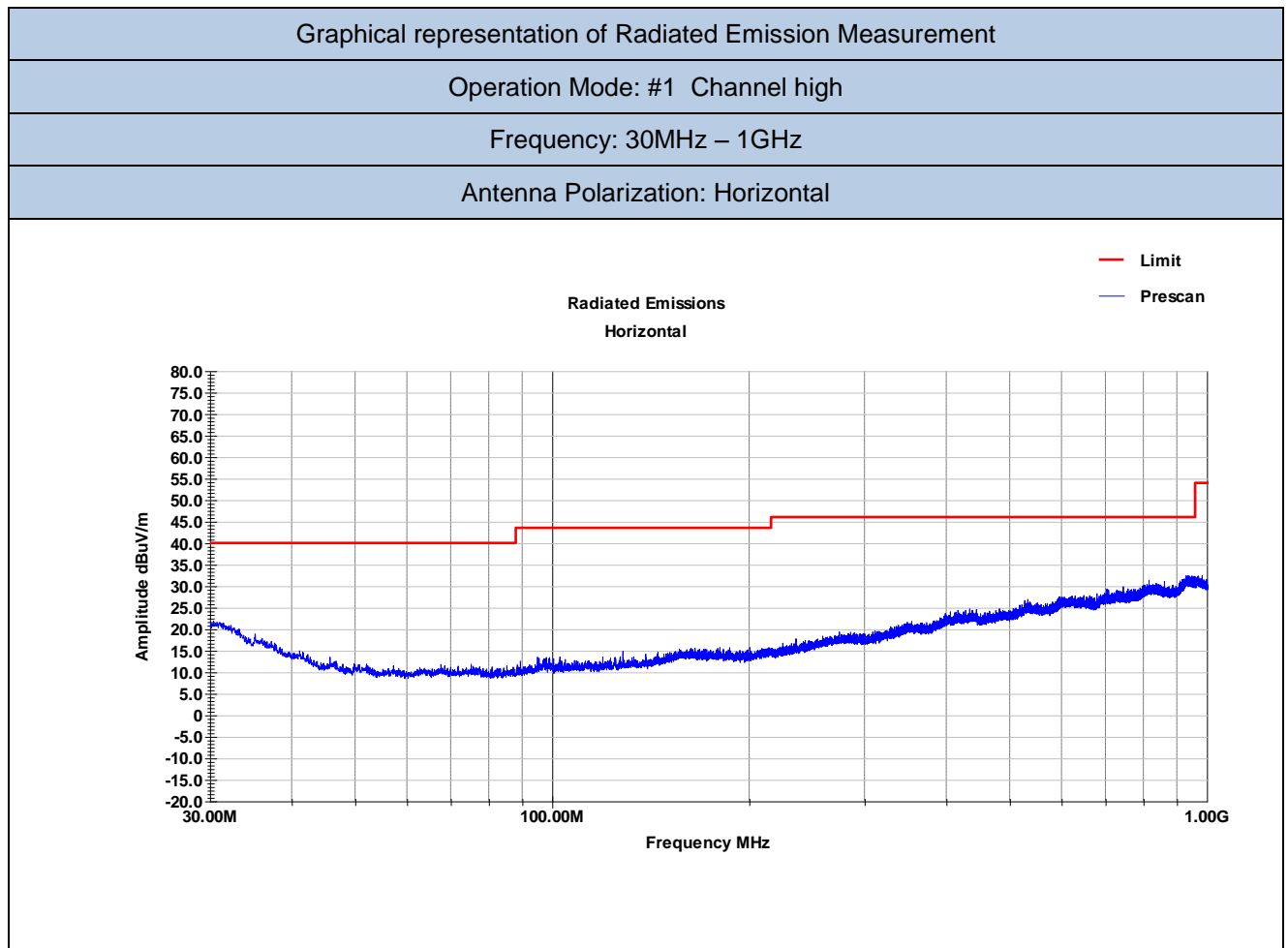






Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel middle
Frequency: 30MHz – 1GHz
---





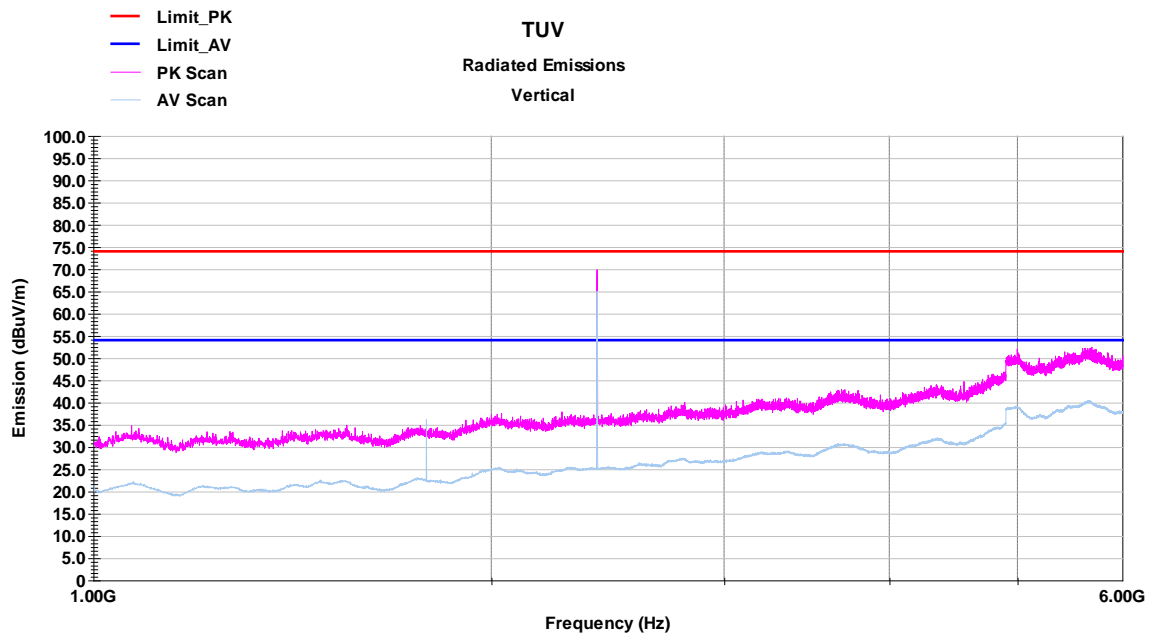
Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel high
Frequency: 30MHz – 1GHz
---

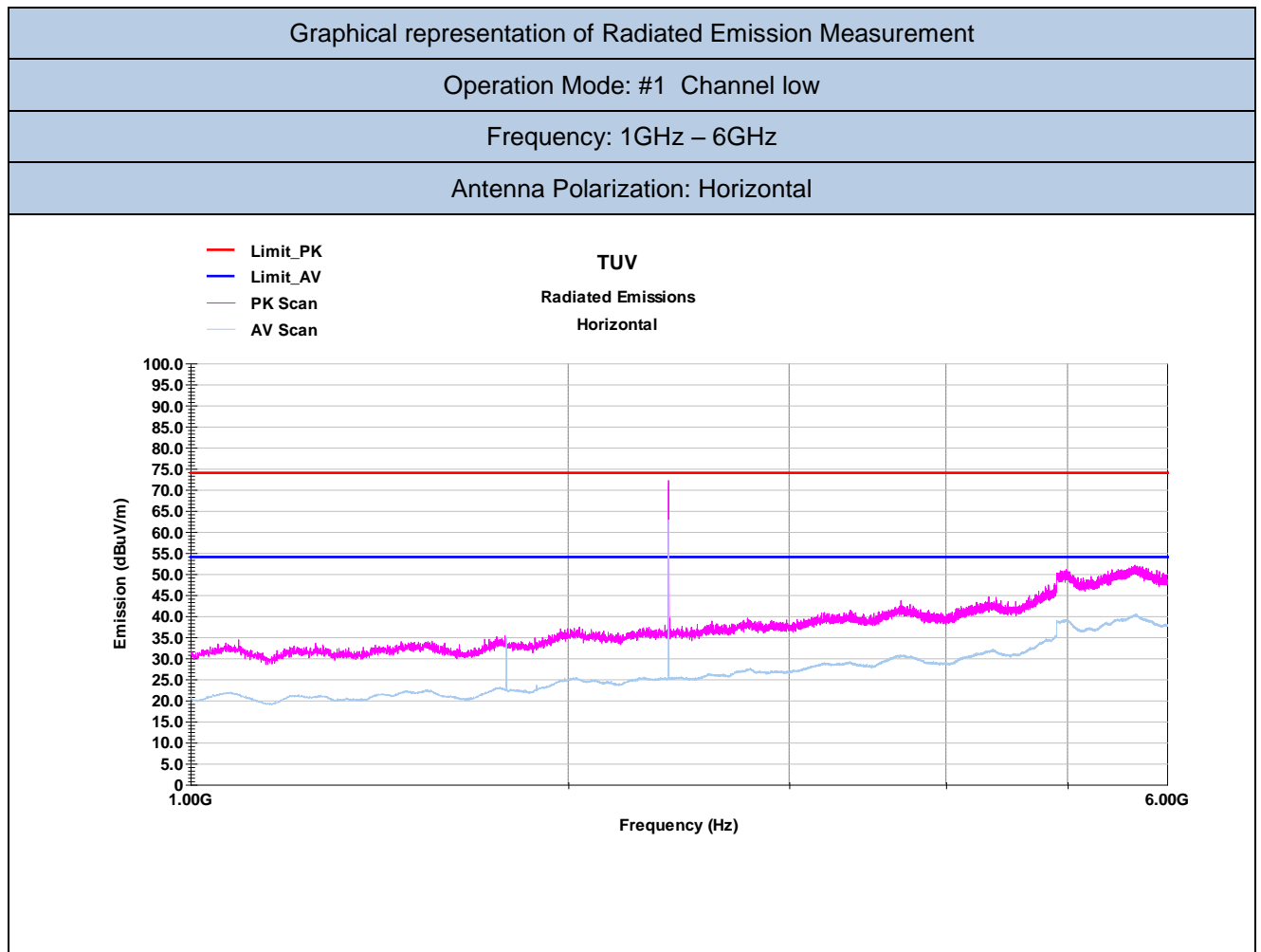
## Graphical representation of Radiated Emission Measurement

Operation Mode: #1 Channel low

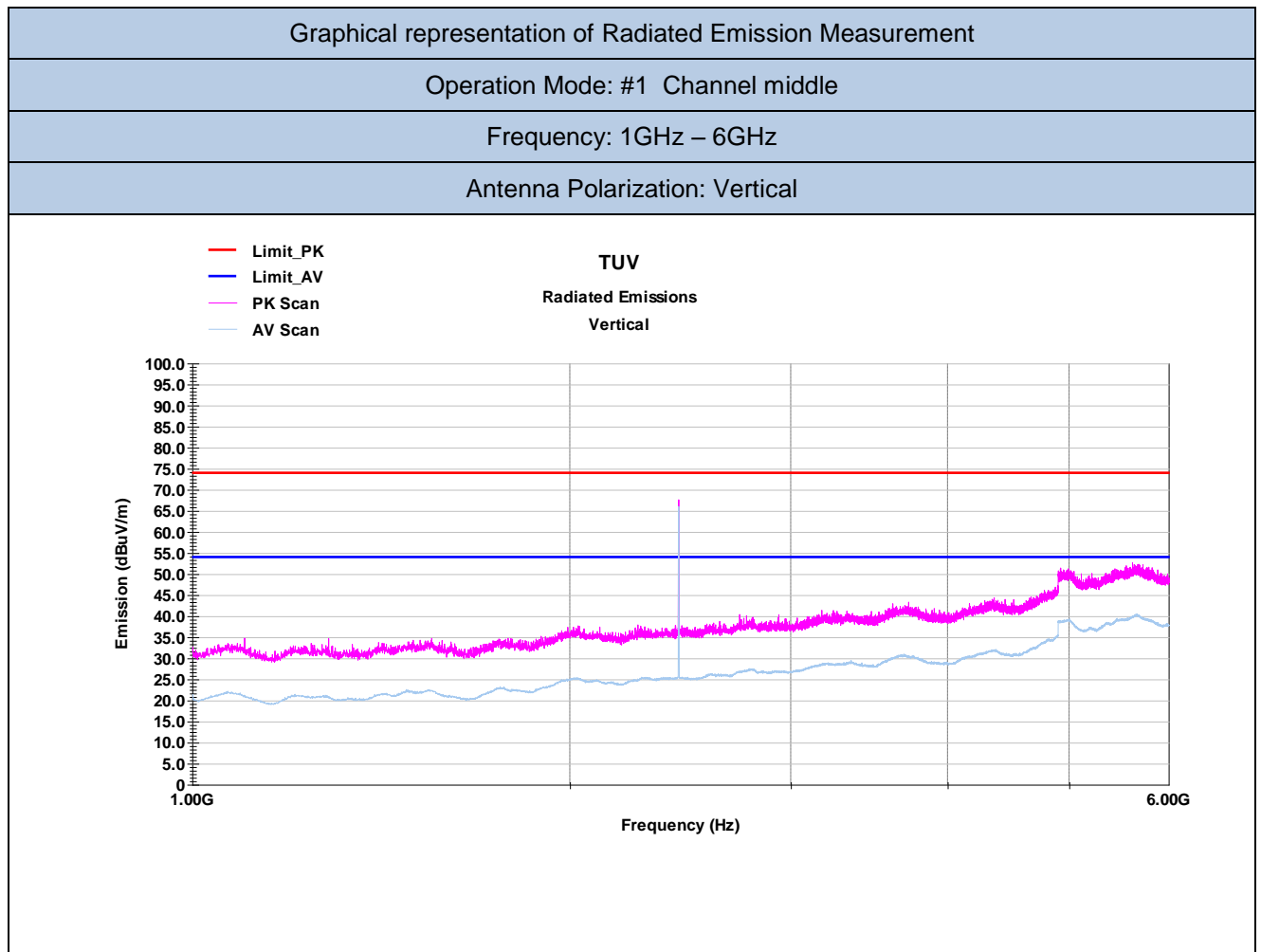
Frequency: 1GHz – 6GHz

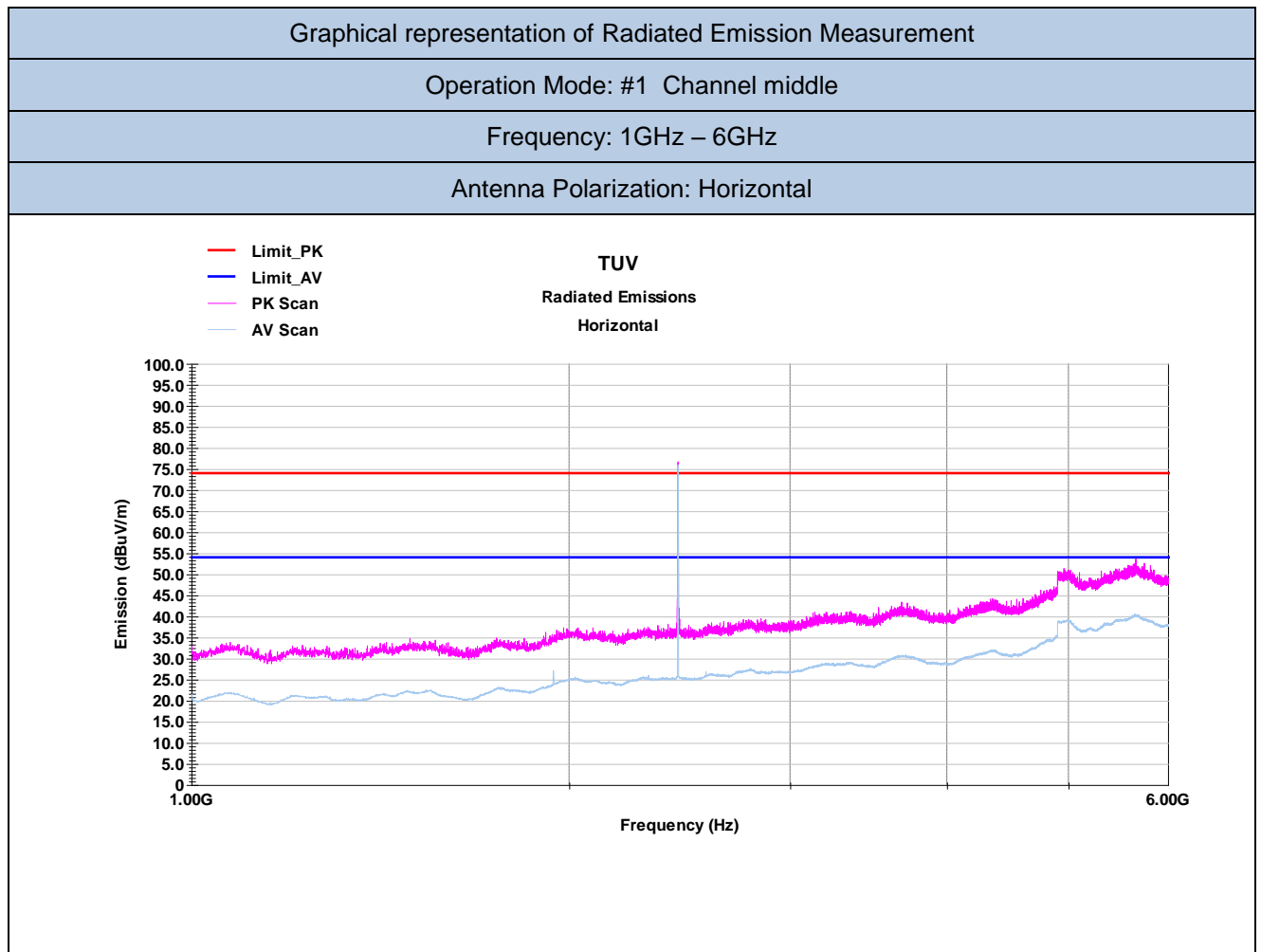
Antenna Polarization: Vertical



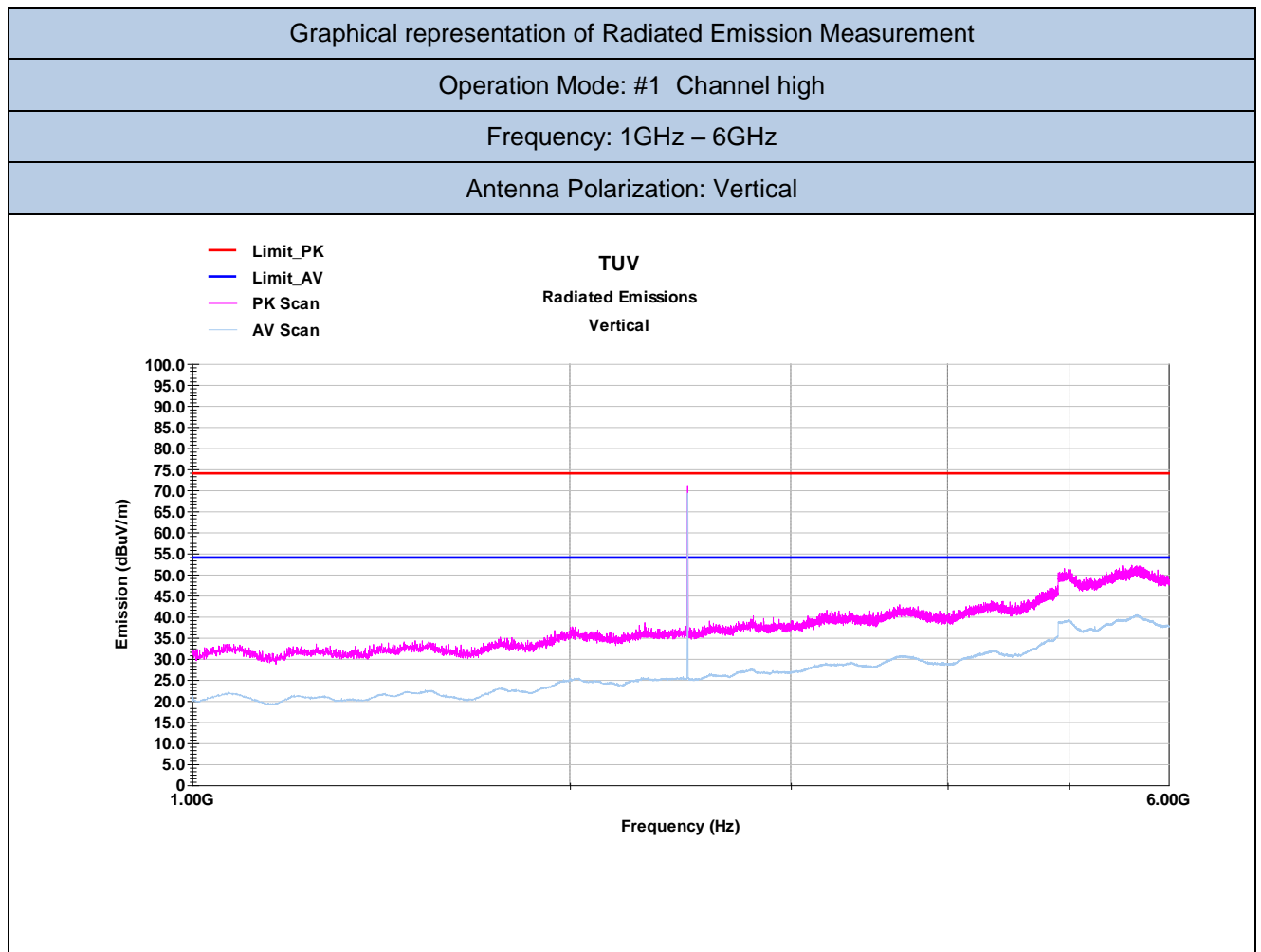


Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel low
Frequency: 1GHz - 6GHz
---

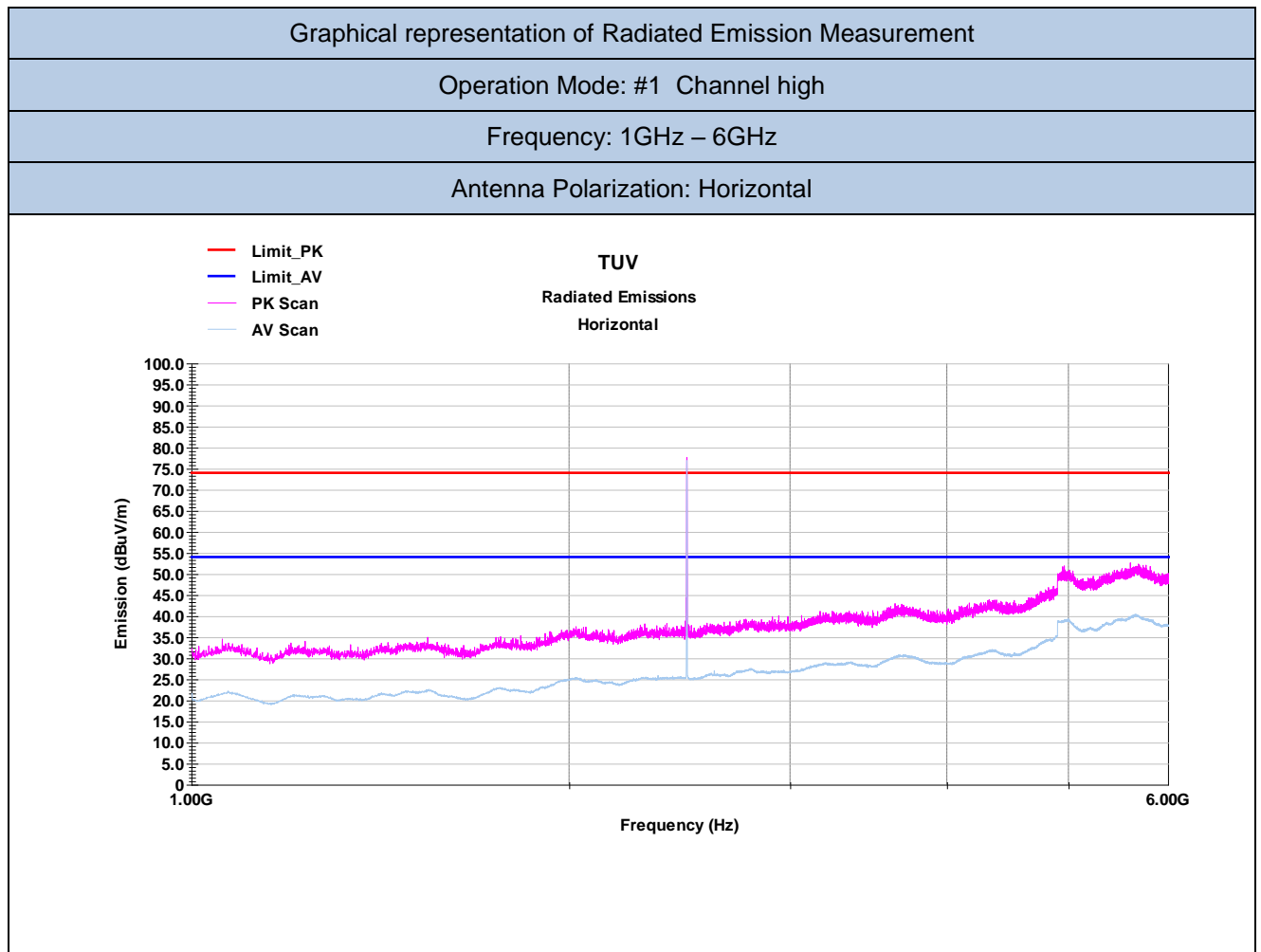




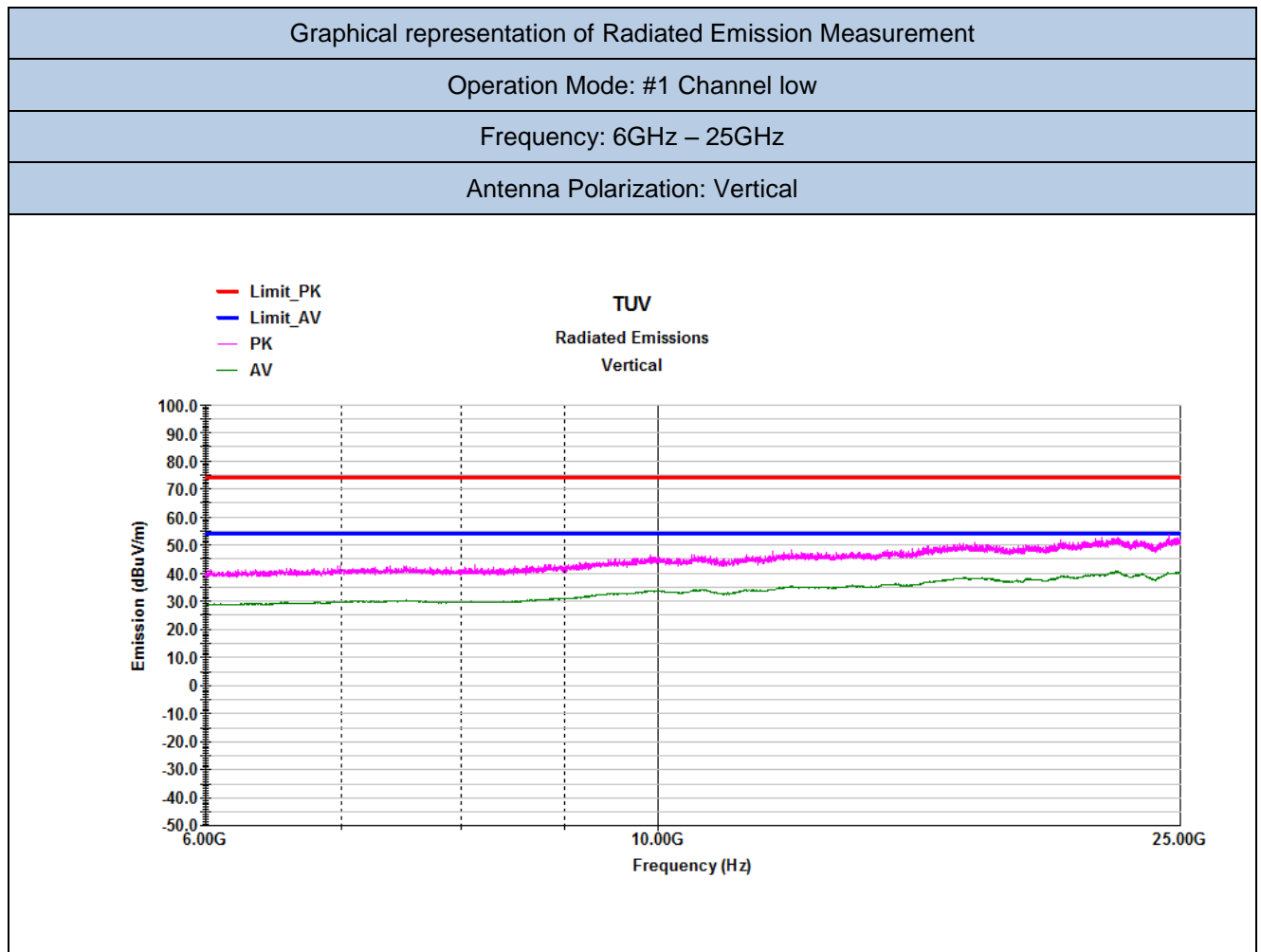
Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel middle
Frequency: 1GHz - 6GHz
---

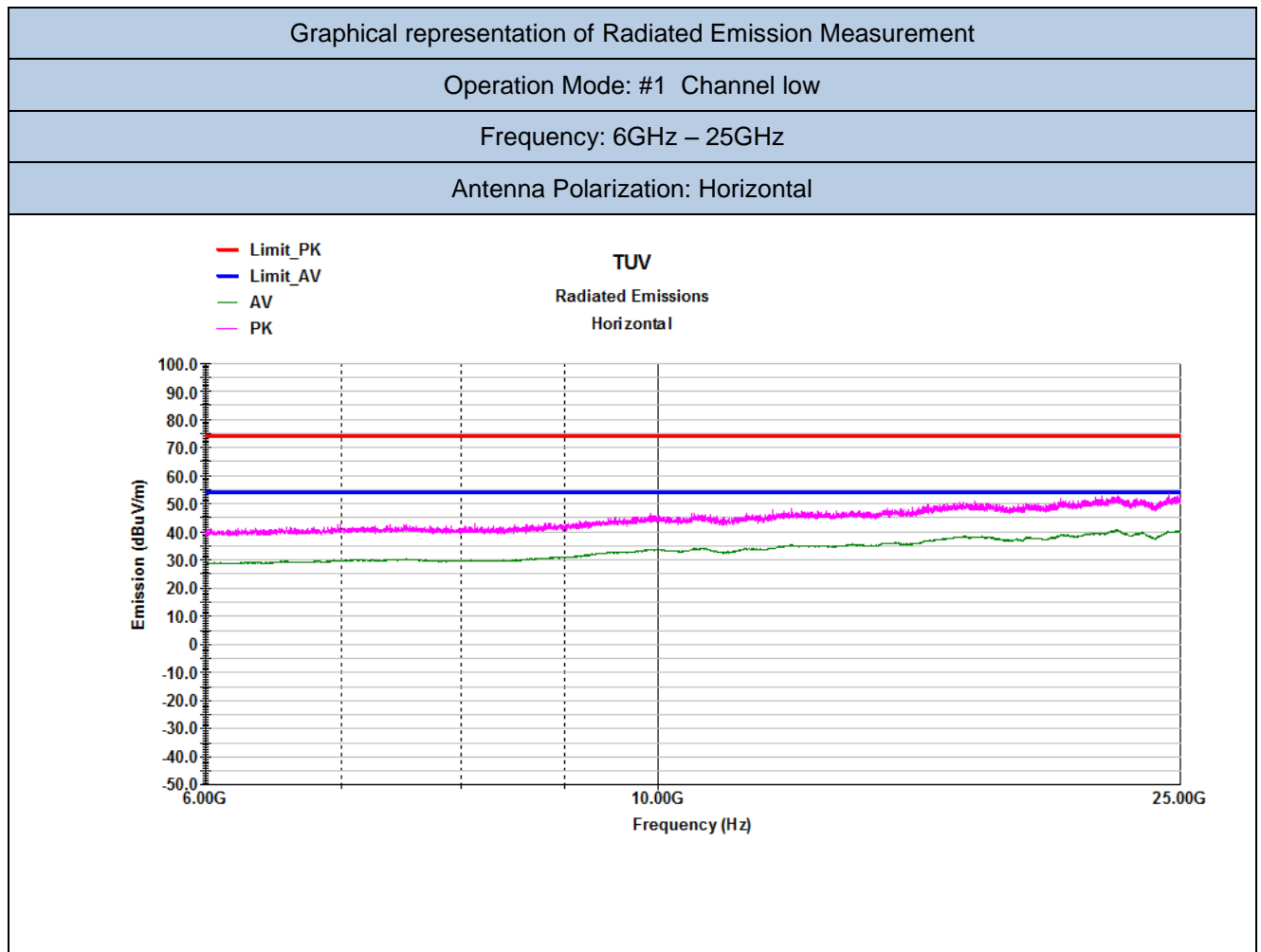




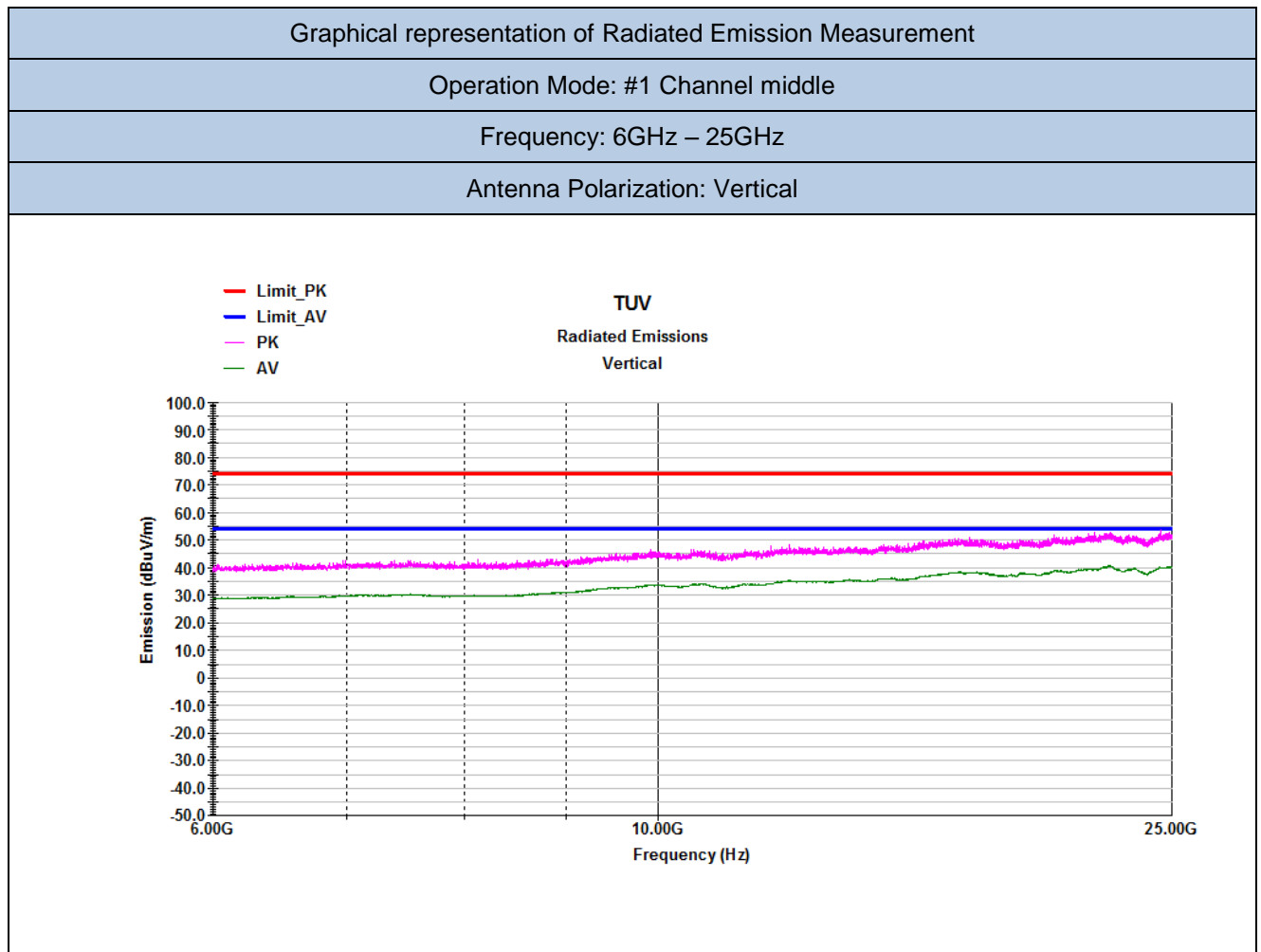


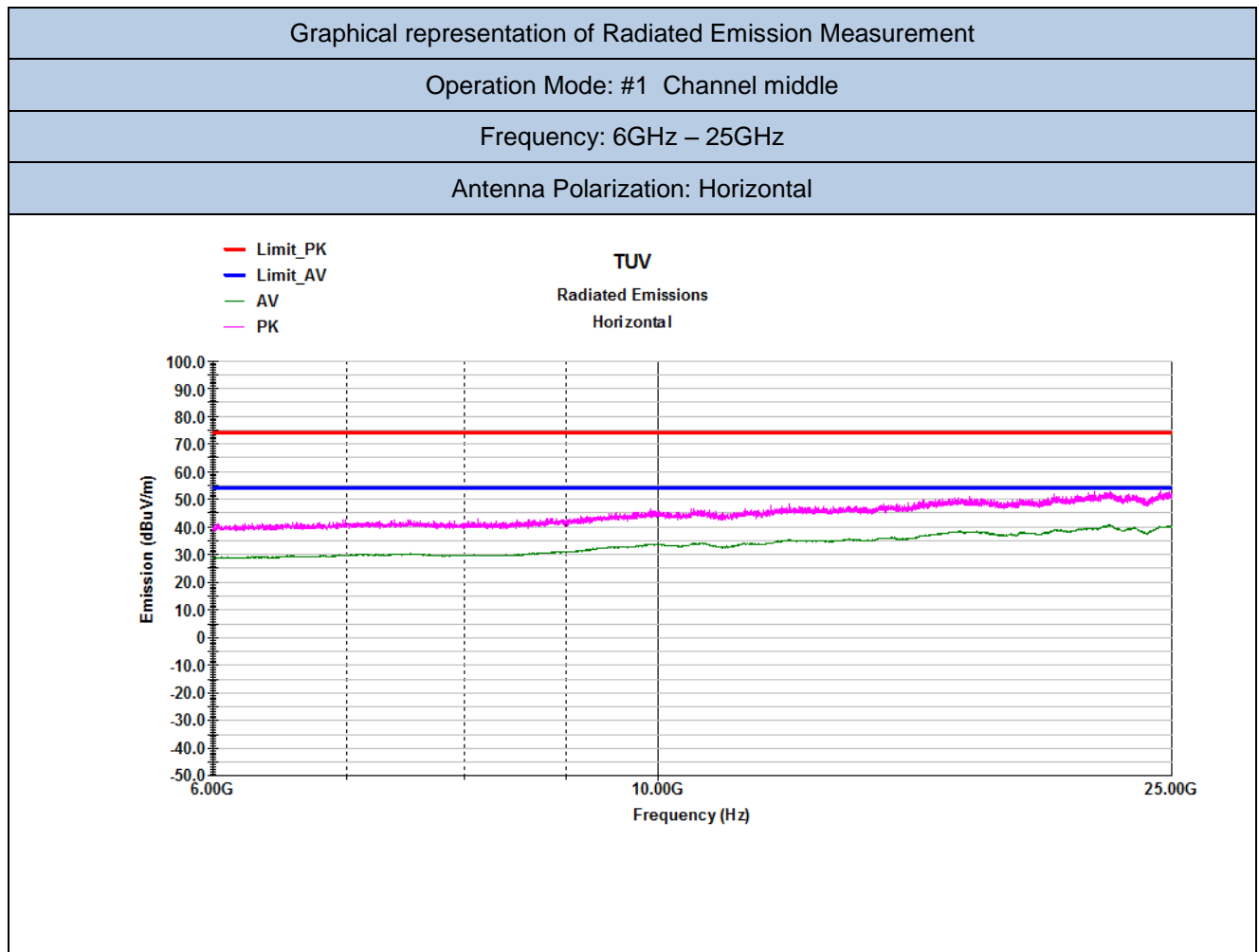
Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel high
Frequency: 1GHz - 6GHz
---



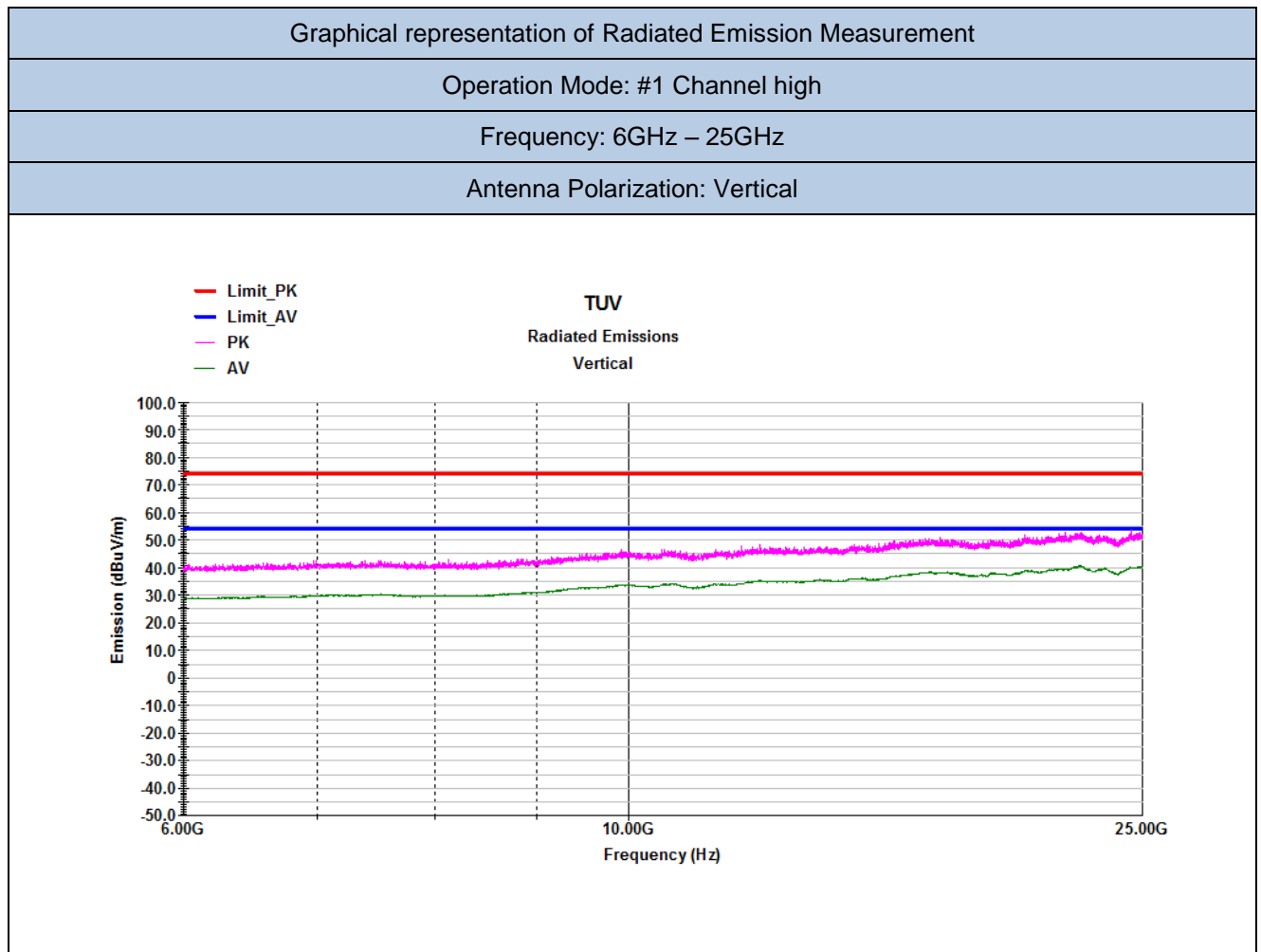


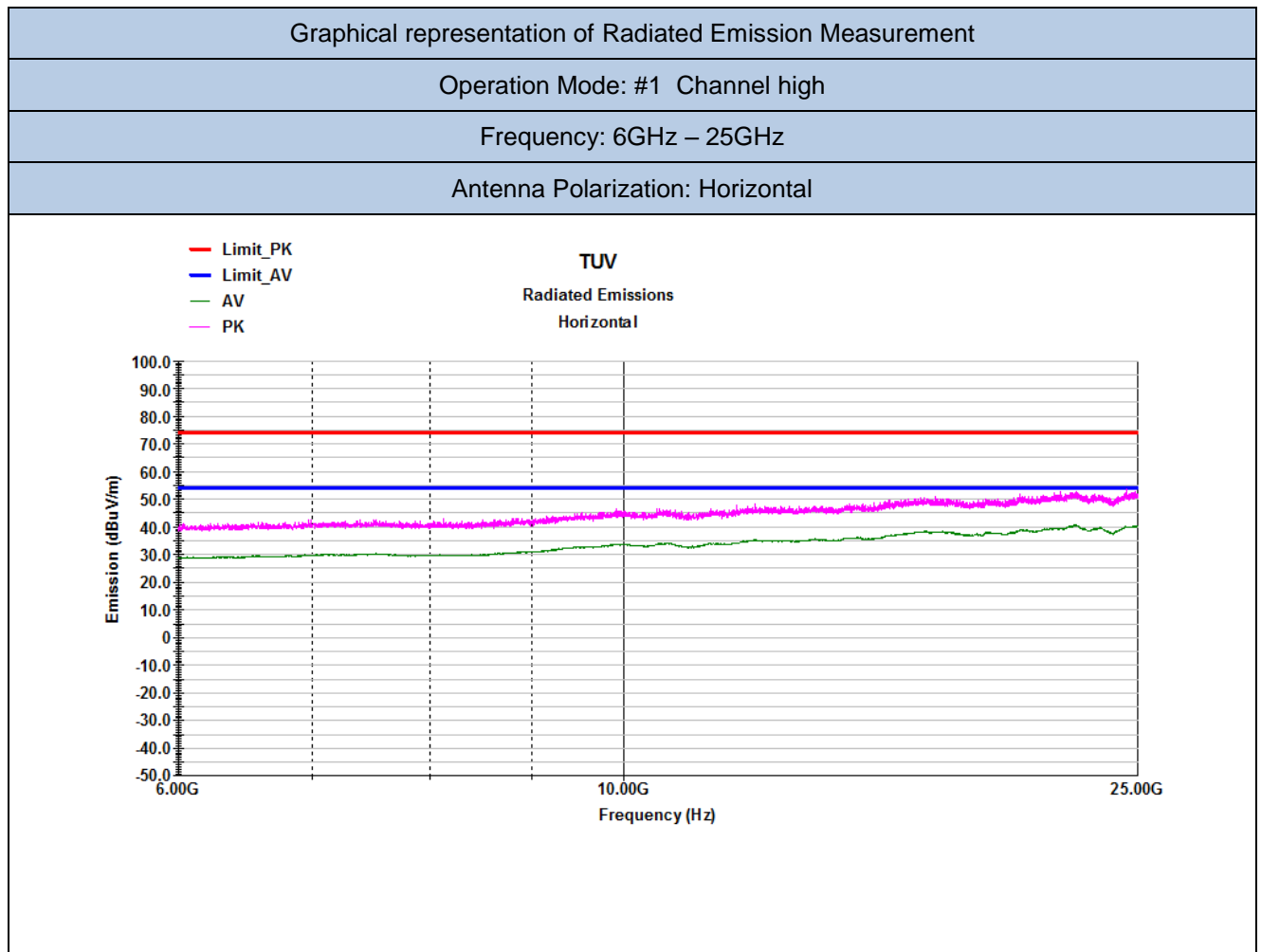
Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel low
Frequency: 6GHz - 25GHz
---





Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel middle
Frequency: 6GHz - 25GHz
---

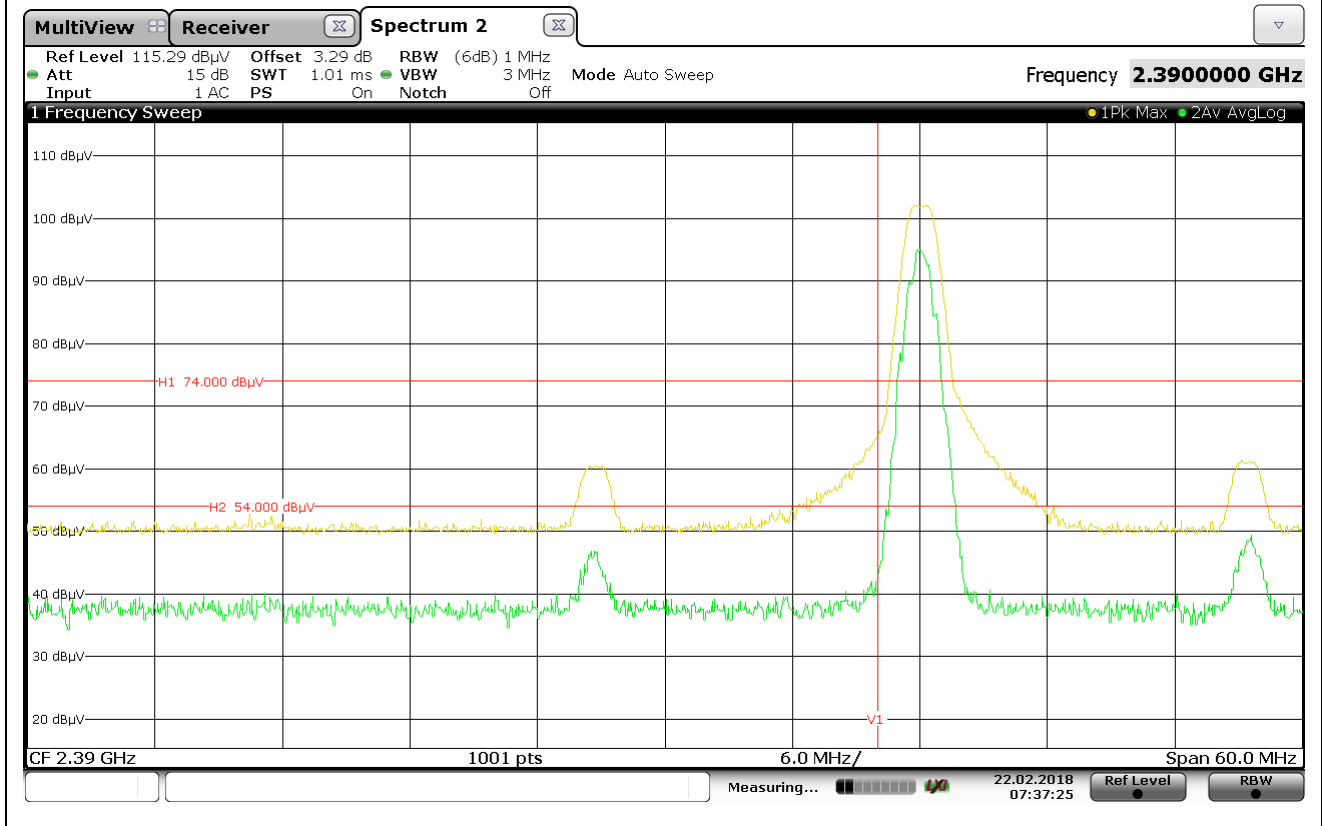




Tabulated results of Radiated Emission Measurement
Operation Mode: #1 Channel high
Frequency: 6GHz - 25GHz
---

## Graphical representation of Radiated Emission Measurement

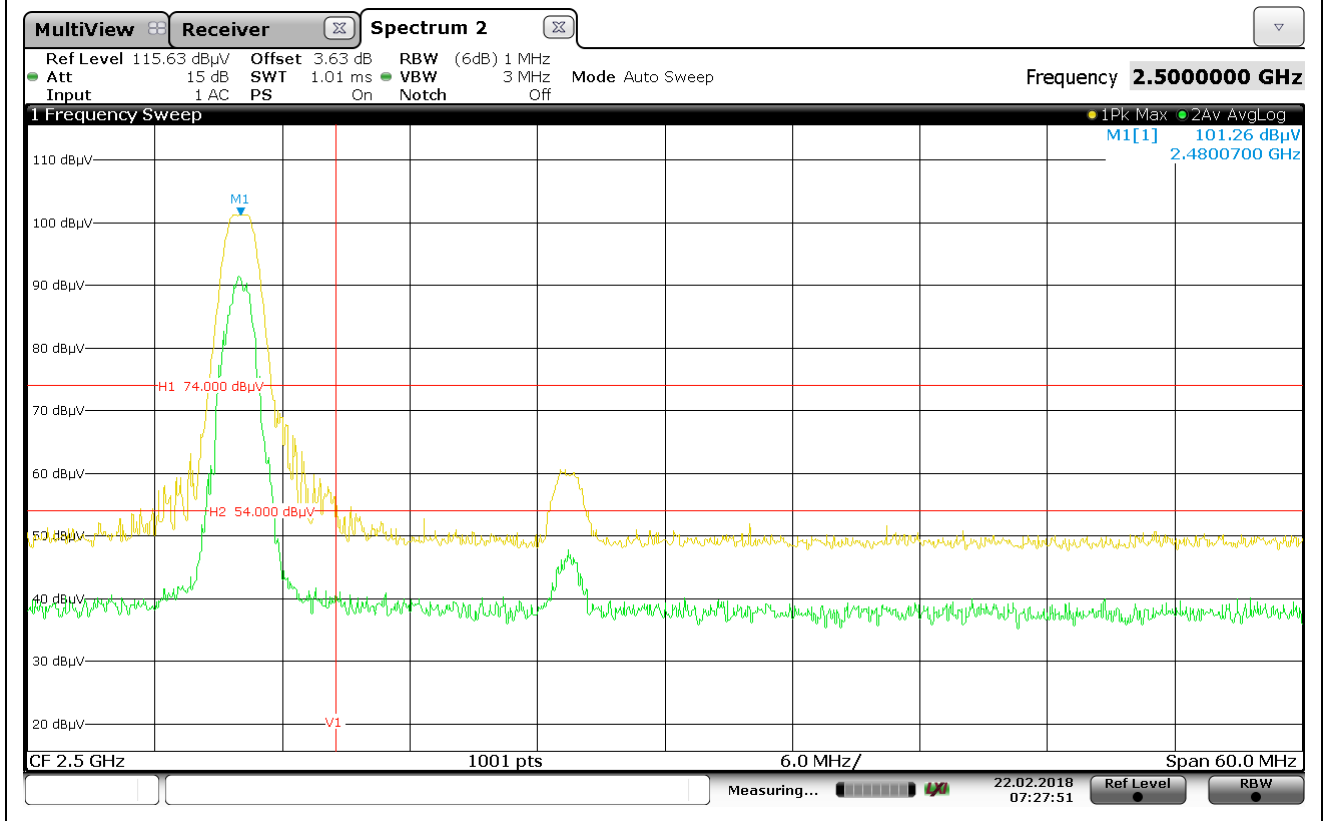
## BAND EDGE LOW





## Graphical representation of Radiated Emission Measurement

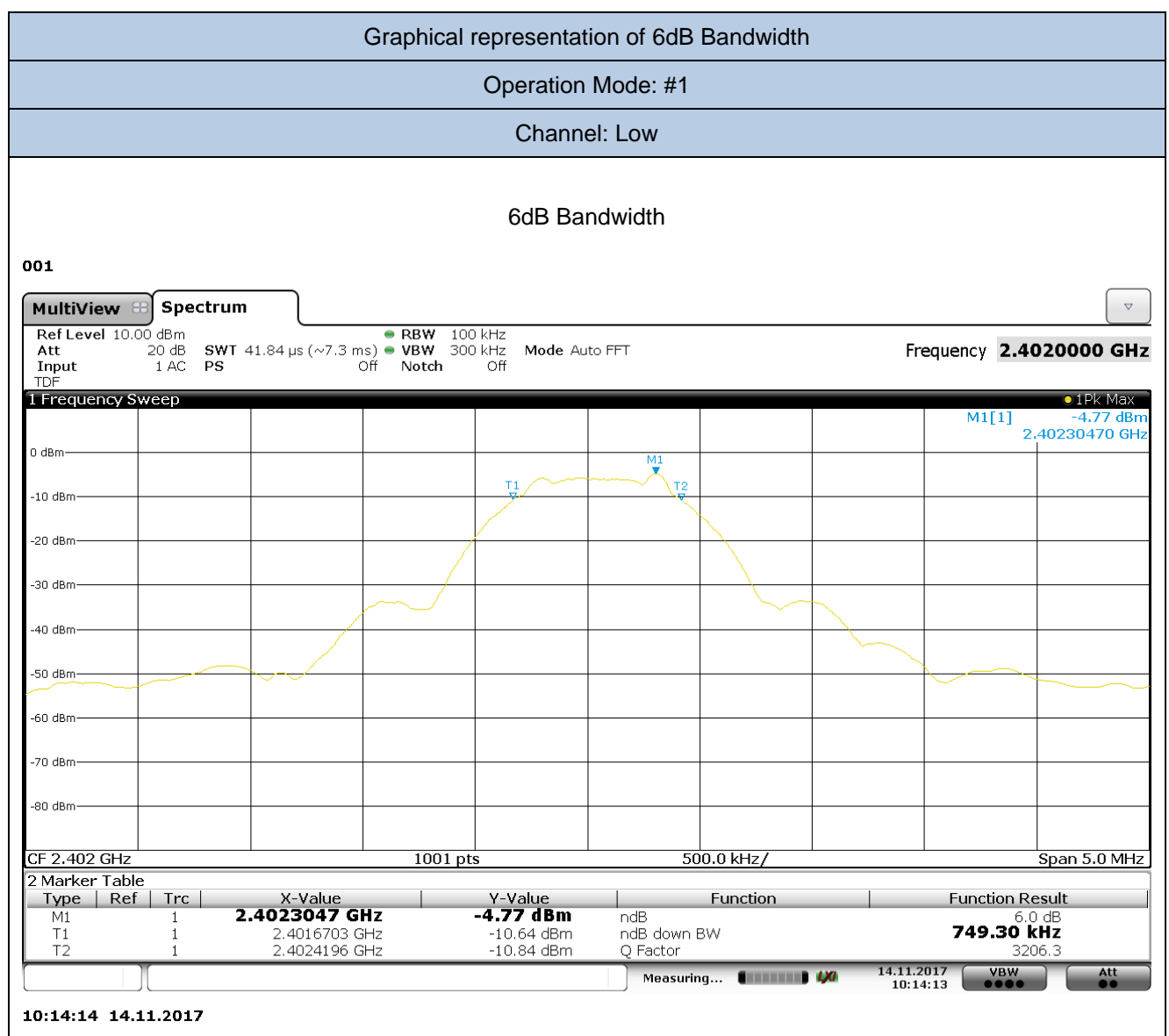
## BAND EDGE HIGH

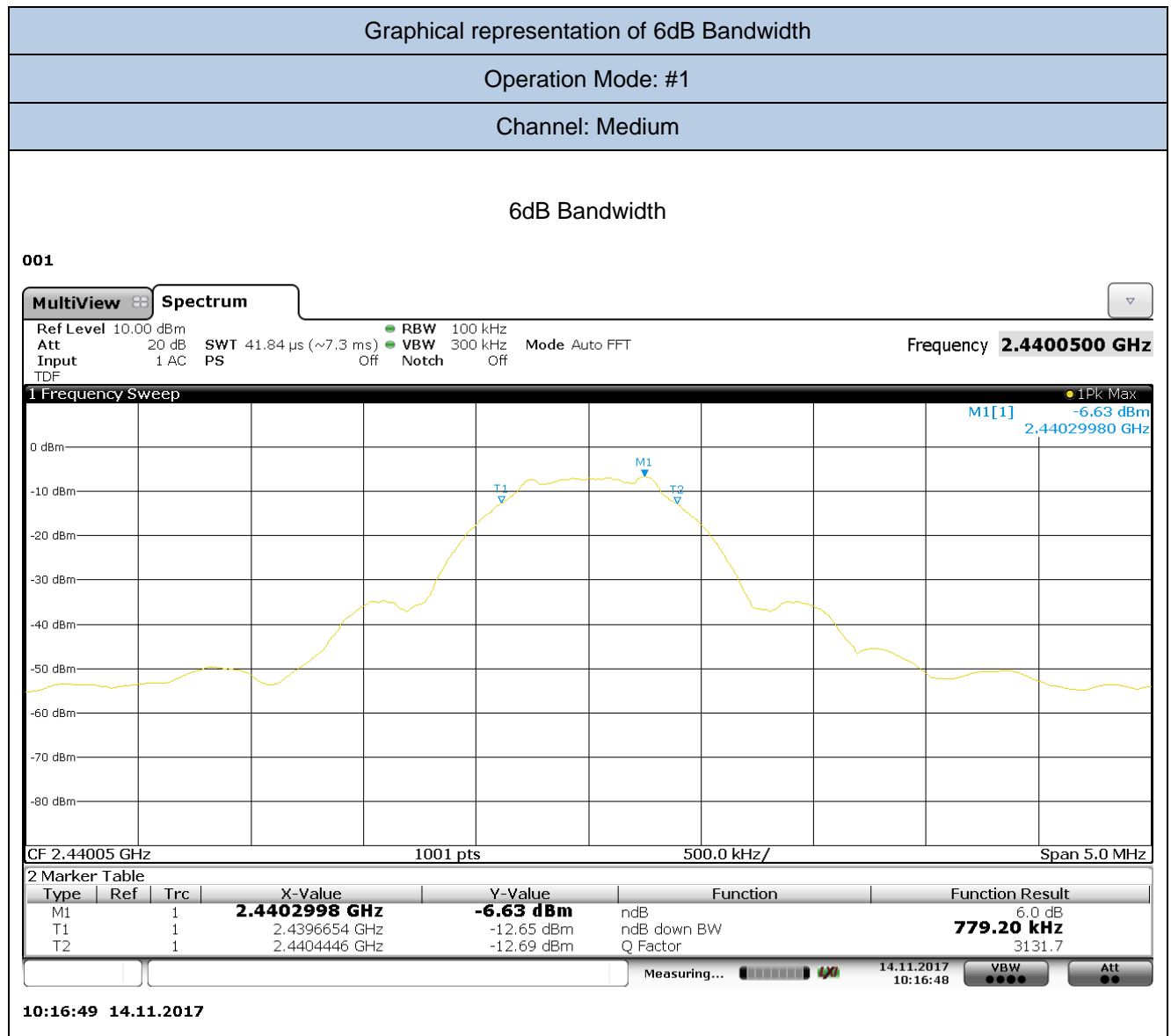


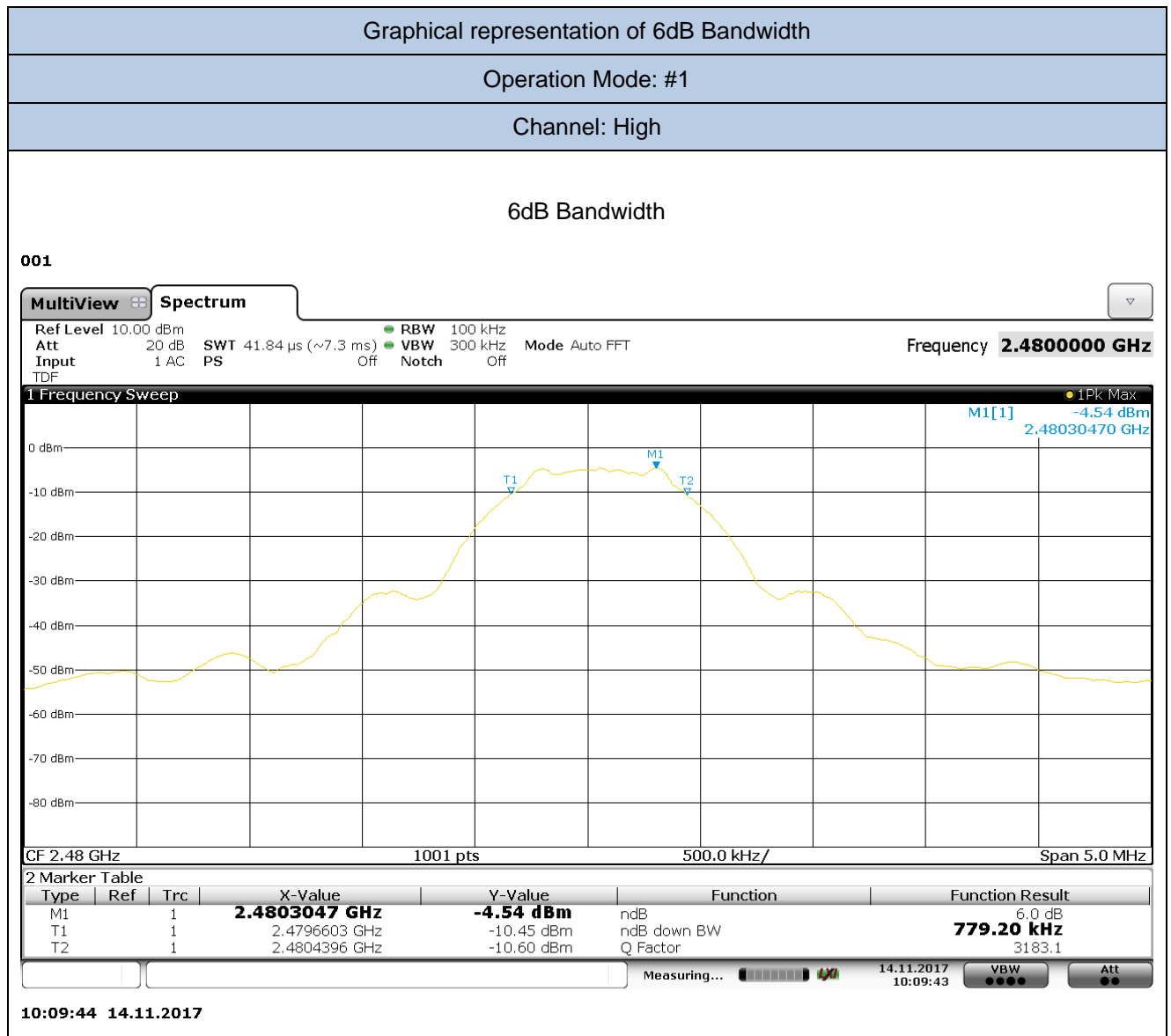
#### 14. Test Conditions and Results – 6dB BANDWIDTH

14	TEST: 6dB Bandwidth		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C	
	Relative Humidity (%)	48%	
	Air pressure (hPa)	1020	
—	Power Mode	Application Point	
Fully configured sample tested at the power line frequency	Batteries Operated	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.247		
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.			
Further information to test setup	<div><div>EMI Receiver &amp; Controller</div><div><div>EMI receiver</div><div><div>3m semi-anechoic chamber (Shield Room with absorbing materials)</div><div><div>Antenna Tower</div><div>3m</div><div>1 to 4 m</div><div>Metal Plate</div><div>360°</div><div>EUT</div></div></div></div></div>		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	06/2017	06/2018
EMI Test Receiver	R&S	ESW44	87020967	06/2017	06/2018
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020

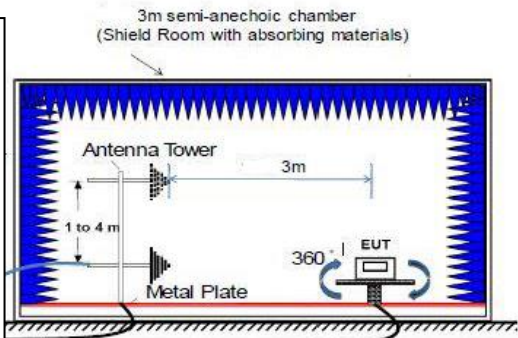






Frequency (MHz)	Channel	6dB BW (MHz)
2402	Low	0.749
2440	Middle	0.779
2480	High	0.779

### 15. Test Conditions and Results – OUTPUT POWER

15	TEST: Output Power 1 (integral antenna)		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	22,5°C	
	Relative Humidity (%)	51%	
	Air pressure (hPa)	1020	
—	Power Mode	Application Point	
Fully configured sample tested at the power line frequency	Batteries Operated	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.247		
<p>(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:</p> <p>(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.</p> <p>(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.</p> <p>(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.</p> <p>(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.</p>			
Further information to test setup:	<div><div><div>Fast Power sensor (wideband gated RF power meter)</div></div><div></div></div>		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	10/2016	10/2017
Fast power sensor	R&S	NRP-Z81	87020796	03/2017	03/2018
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020

Method of measure
<b>9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)</b> <p>Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.</p>

### Test result of Average Output Power

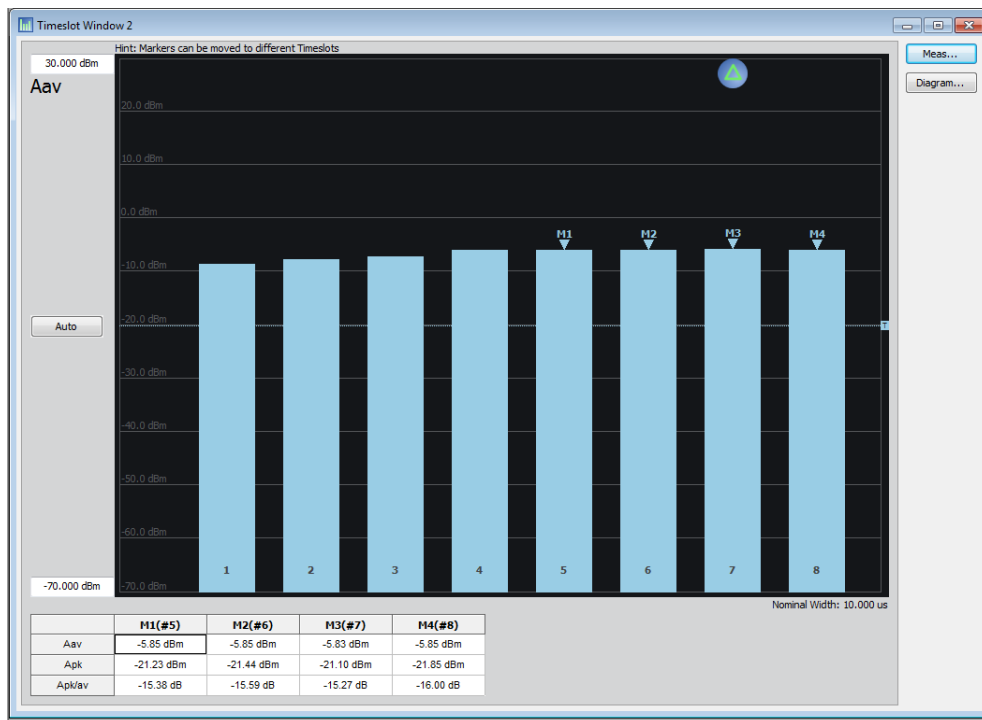
Channel	Channel Frequency (MHz)	Output power (Radiated)	Antenna GAIN	Output power (conducted)	Output power (conducted)	Limit	Limit
		(dBm)		(dBm)	(W)		
Low Channel	2402	-5.83	+1	-6.83	0.0002074	30	1
Middle Channel	2440	-6.38	+1	-7.38	0.0001828	30	1
High Channel	2480	-6.27	+1	-7.27	0.0001874	30	1



## Graphical representation of RF Output Power

Operation Mode: #1

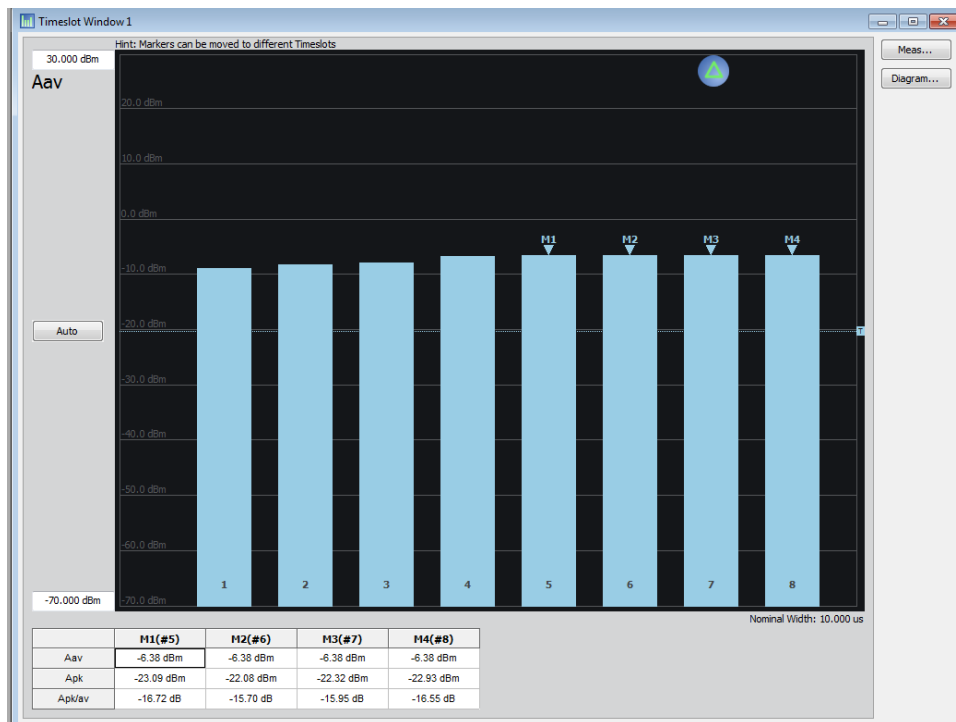
Channel: Low



## Graphical representation of RF Output Power

Operation Mode: #1

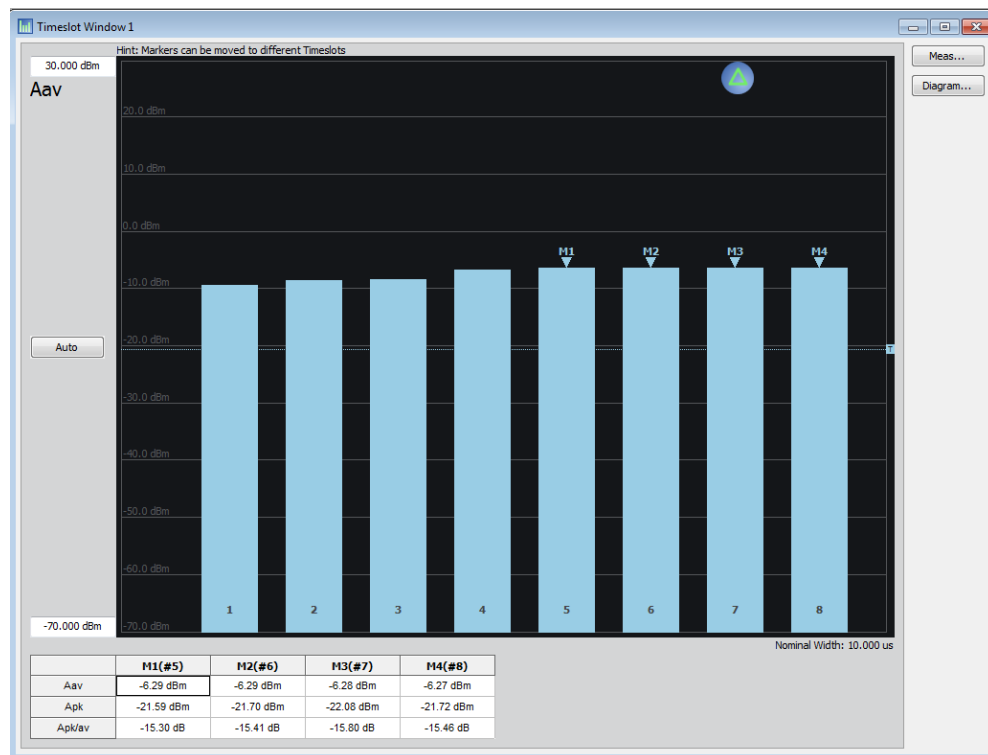
Channel: Middle



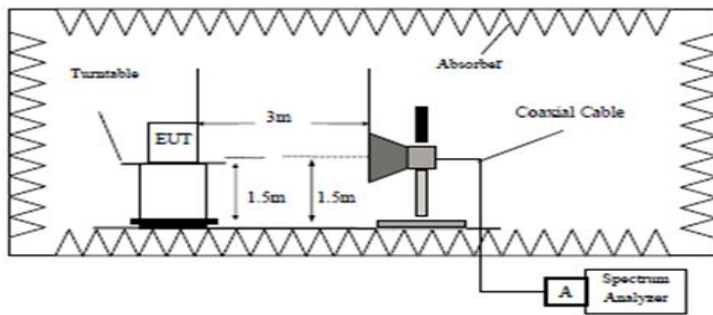
## Graphical representation of RF Output Power

Operation Mode: #1

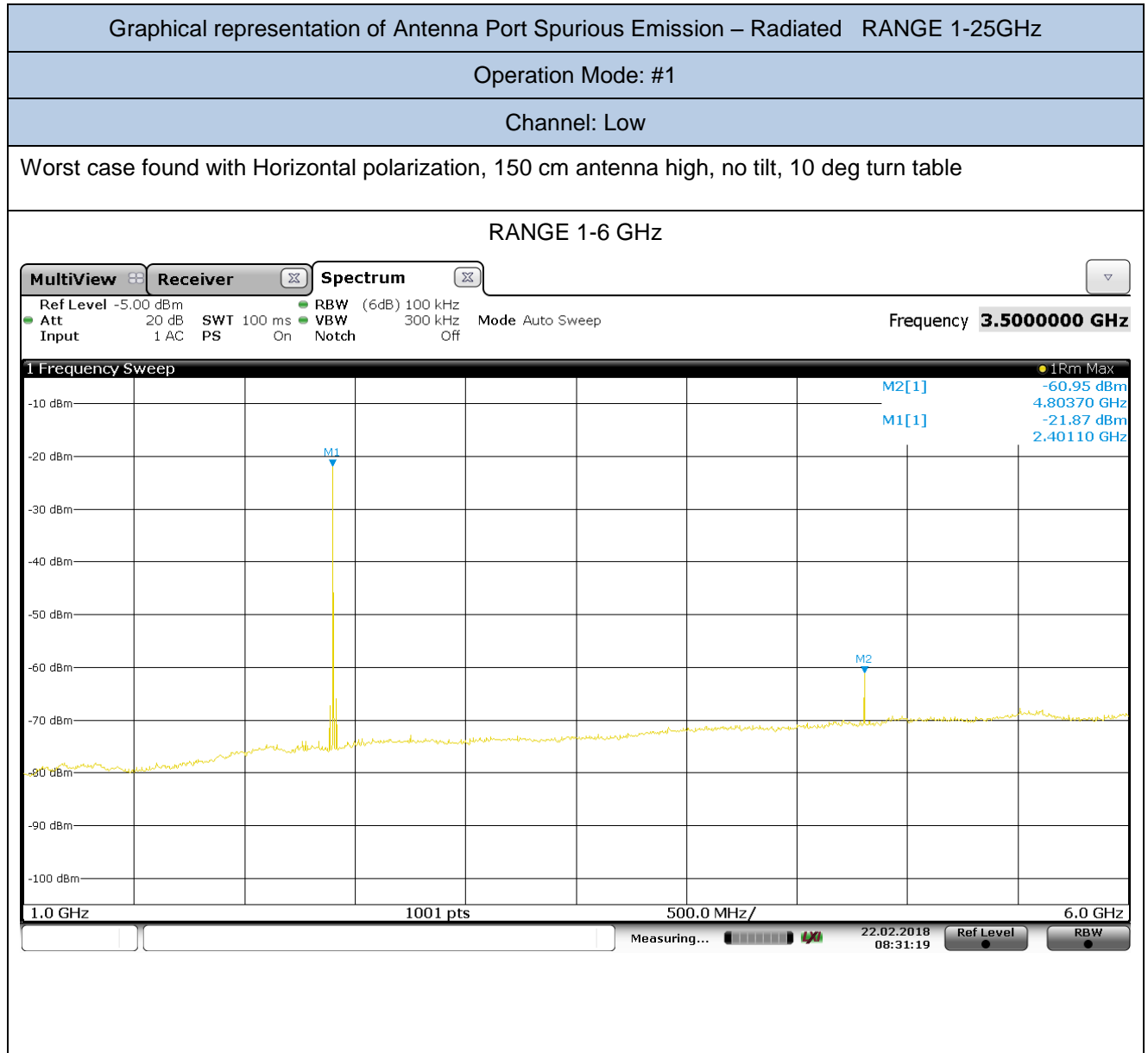
Channel: High

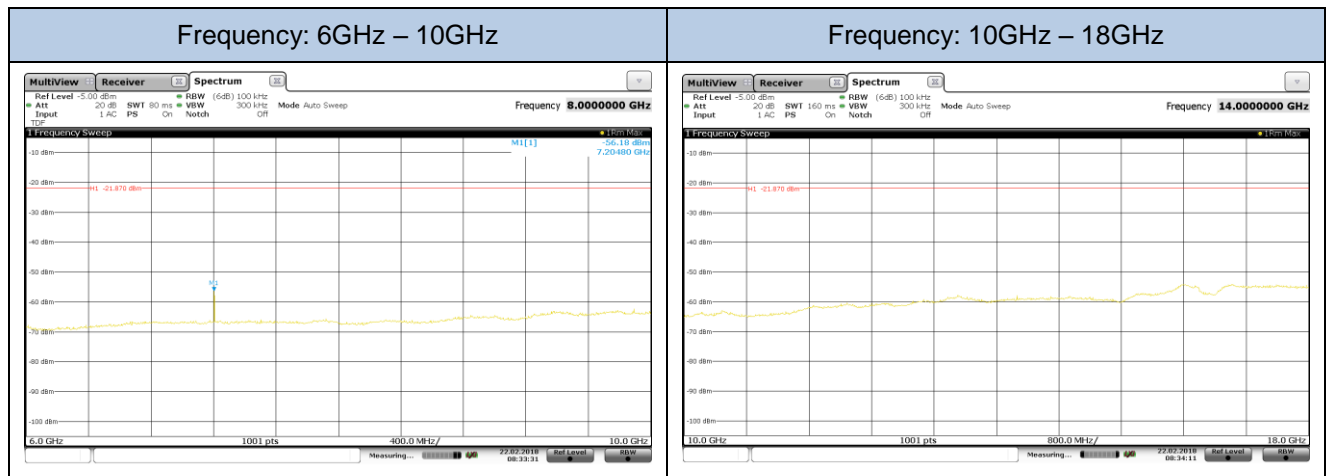


## 16. Test Conditions and Results – Radiated Antenna Port Spurious Emission

16	TEST: Radiated Antenna Port Spurious Emission (internal antenna)		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	21°C	
	Relative Humidity (%)	49%	
	Air pressure (hPa)	1020	
—	Power Mode	Application Point	
Fully configured sample tested at the power line frequency	Batteries Operated	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.247		
<p>(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).</p> <p>Test Procedure used as per KDB 558074 section 11.2 12.3</p>			
Further information to test setup			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	03/2016	3/2018
EMI Test Receiver	R&S	ESW44	87020967	04/2017	04/2018
Antenna BiConiLog	ETS Lindgren	3124E	87020457	04/2017	04/2020
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020
2xAntenna Horn with Preamplifier	ETS Lindgren	114514	87020459	04/2017	04/2020
		120722	87020460		





Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / measured power (dB)	Peak Limit at PK power -20 dB (dBm)	result
4803,70	-60,95	-21,87	39,08	-41,87	compliant
7204,80	-56,18		34,31		compliant

**No evidence of spurious emission in the range 10-25GHz**

## Graphical representation of Antenna Port Spurious Emission – Radiated RANGE 1-25GHz

Operation Mode: #1

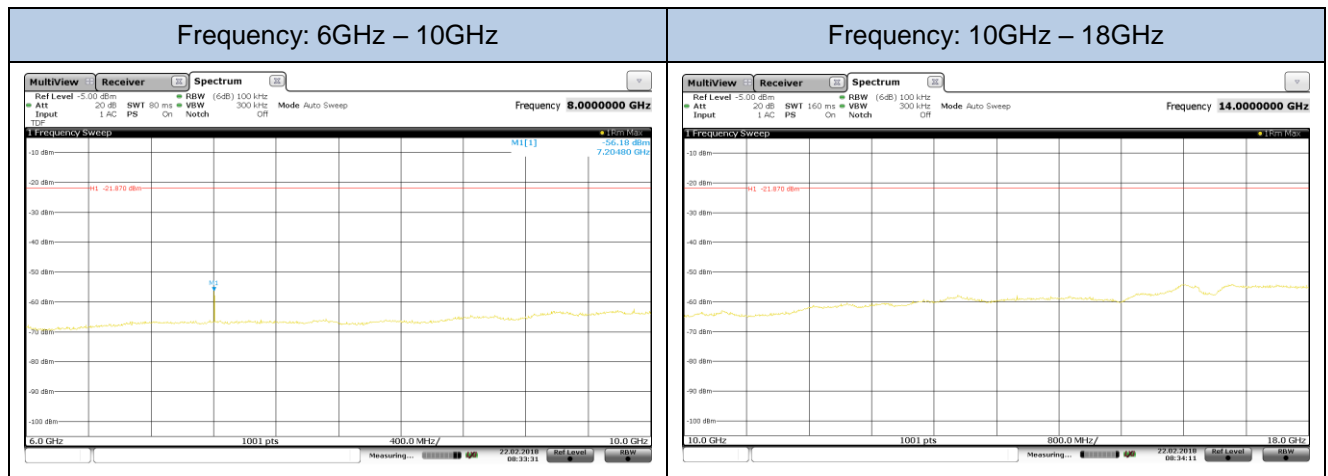
Channel: Middle

Worst case found with Horizontal polarization, 150 cm antenna high, no tilt, 10 deg turn table

RANGE 1-6 GHz







Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / measured power (dB)	Peak Limit at PK power –20 dB (dBm)	result
4878,60	-62.90	-22.87	40.03	-42.87	compliant
7204,80	-56.18		33.31		compliant

**No evidence of spurious emission in the range 10-25GHz**

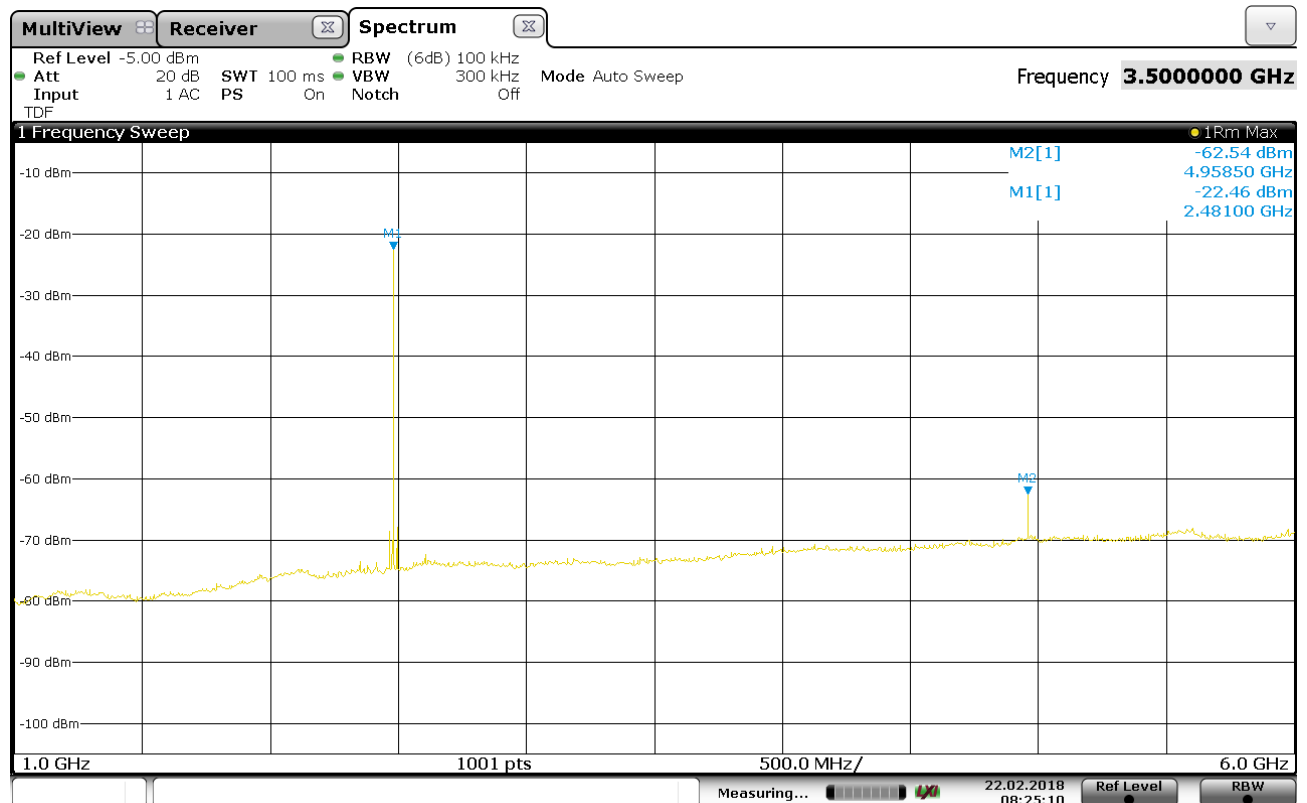
## Graphical representation of Antenna Port Spurious Emission – Radiated RANGE 1-25GHz

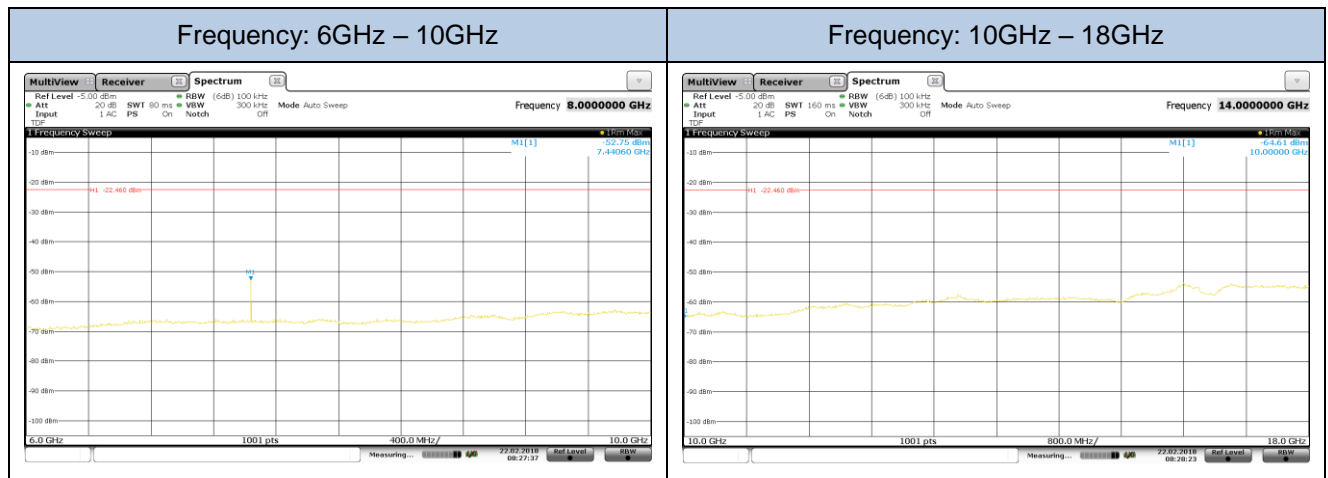
Operation Mode: #1

Channel: High

Worst case found with Horizontal polarization, 150 cm antenna high, no tilt, 10 deg turn table

## RANGE 1-6 GHz





Frequency (MHz)	Measured power (dBm)	Fundamental Level (dBm)	Difference Peak / measured power (dB)	Peak Limit at PK power -20 dB (dBm)	result
4958.50	-62.54	-22.46	40.08	-42.46	compliant
7440.60	-52.75		30.29		compliant

**No evidence of spurious emission in the range 10-25GHz**

## Graphical representation of Antenna Port Spurious Emission - Radiated

Operation Mode: #1

Channel: Low

**SPURIOUS NEAR RESTRICTED BAND**


## Graphical representation of Antenna Port Spurious Emission - Radiated

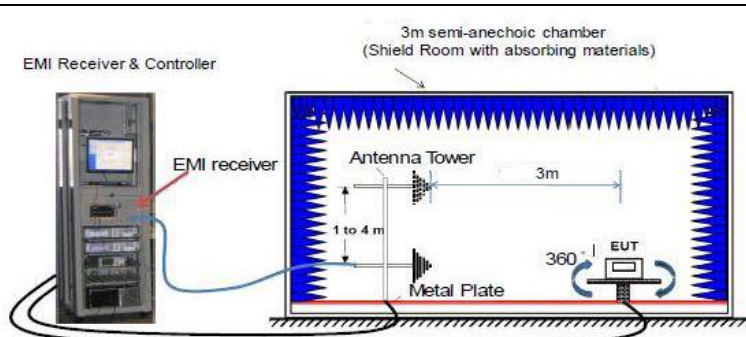
Operation Mode: #1

Channel: High

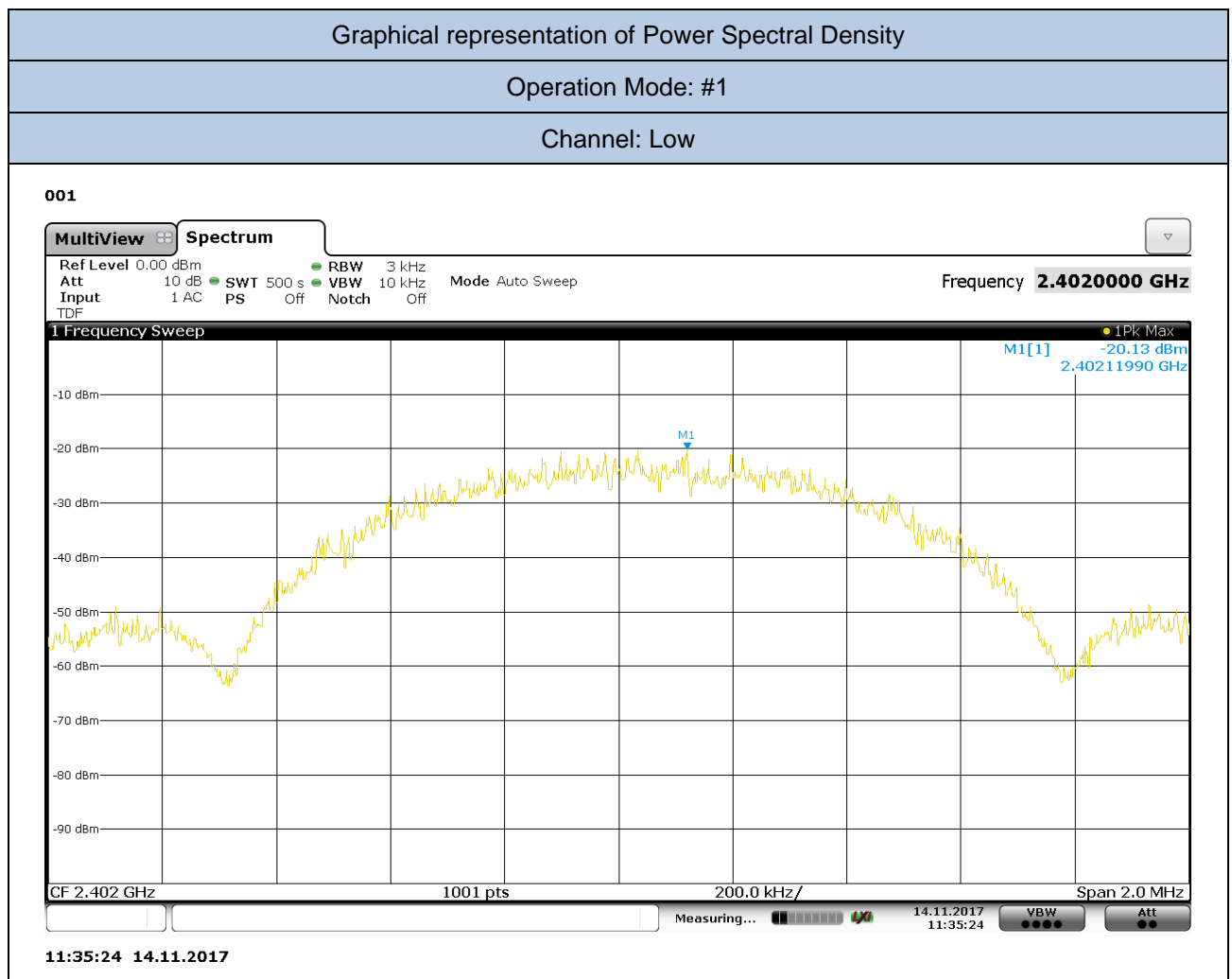
## SPURIOUS NEAR RESTRICTED BAND

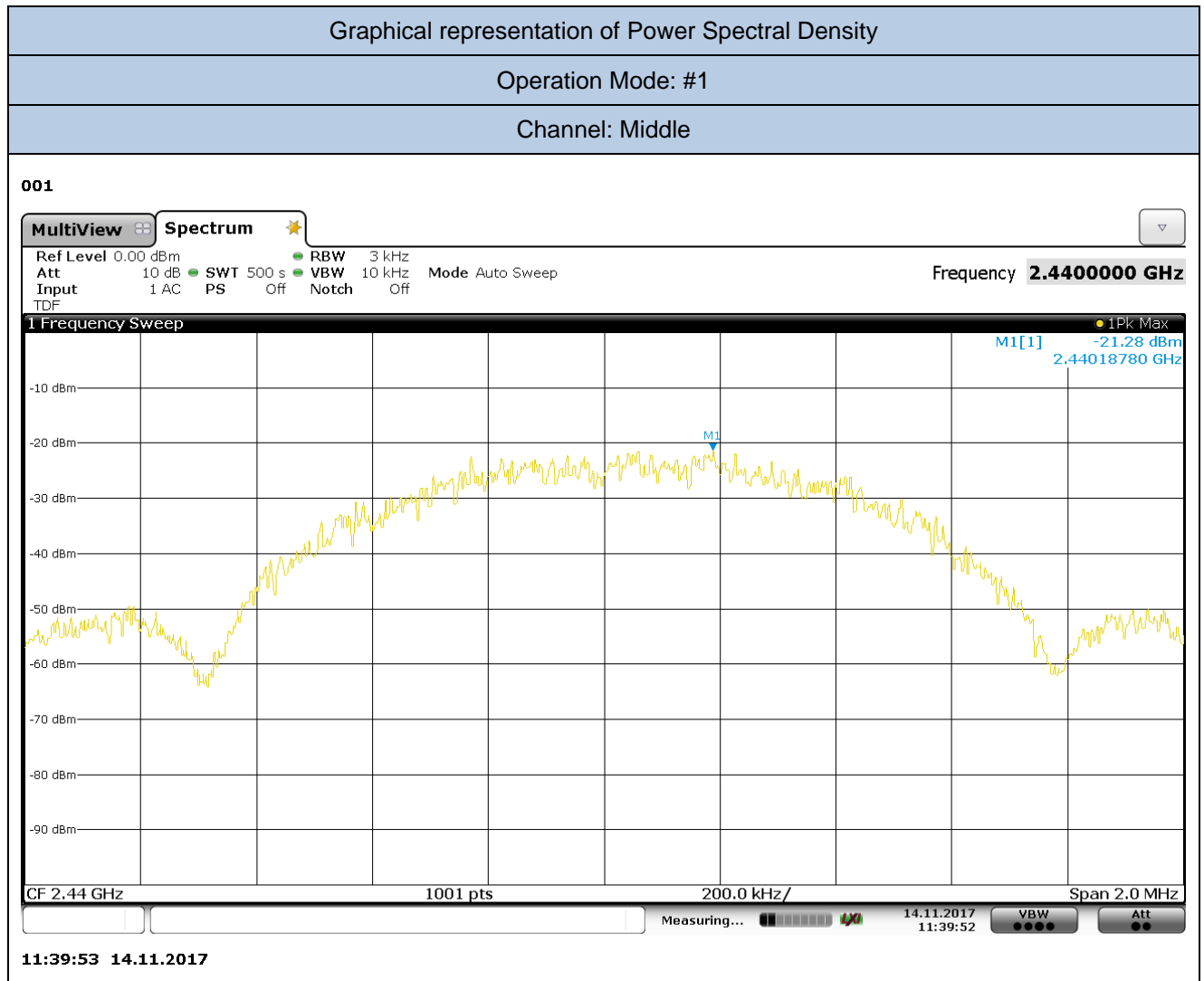


## 17. Test Conditions and Results – POWER SPECTRAL DENSITY

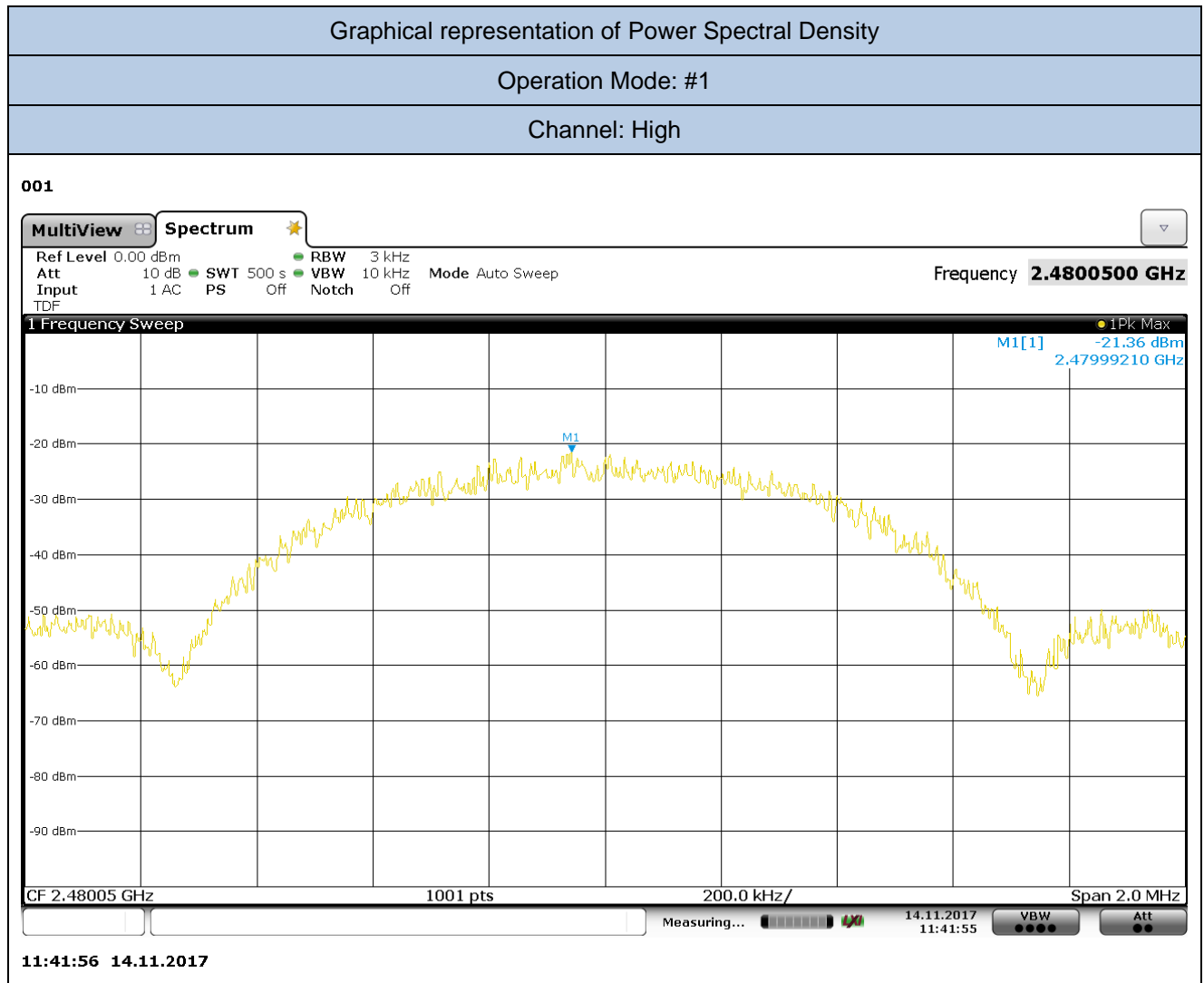
17	TEST: Power Spectral Density		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C	
	Relative Humidity (%)	30 to 60 %	
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	24°C	
	Relative Humidity (%)	37%	
	Air pressure (hPa)	1020	
—	Power Mode	Application Point	
Fully configured sample tested at the power line frequency	Batteries Operated	Enclosure	
Equipment mode:	Operation mode	#1	
FCC Standard	§15.247		
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.			
Further information to test setup	<div><div>EMI Receiver &amp; Controller</div><div>EMI receiver</div><div>3m semi-anechoic chamber (Shield Room with absorbing materials)</div><div>Antenna Tower</div><div>3m</div><div>1 to 4 m</div><div>Metal Plate</div><div>360°</div><div>EUT</div></div>		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Calibration date	Calibration due
CSSA	ETS Lindgren	FACT3	87020484	06/2017	06/2018
EMI Test Receiver	R&S	ESW44	87020967	06/2017	06/2018
Antenna Horn with Preamplifier	ETS Lindgren	3117-PA	87020458	04/2017	04/2020









Frequency (MHz)	Channel	PSD (dBm)
2402	Low	-20.13
2440	Middle	-21.28
2480	High	-21.36

18 TEST: RF Exposure Requirements		PASS
Parameters required prior to the test	Laboratory Ambient Temperature (°C)	15 to 35 °C
	Relative Humidity (%)	30 to 60 %
Parameters recorded during the test	Laboratory Ambient Temperature (°C)	---
	Relative Humidity (%)	---
	Air pressure (hPa)	1020
—	Frequency	Application Point
Fully configured sample tested at the power line frequency	3V Internal batteries operated	Enclosure
Equipment mode:	Operation mode	#1
FCC Standard	§ 1.1310 (1) (B)	
Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1310, table (1) (b)		
EUT classification (fixed, mobile or portable devices)	Portable according to § 2.1093(b) of this Chapter	
Limit	According to § 2.1093 of this Chapter, by means of the following guidelines: OET Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies (447498 D01 General RF Exposure Guidance v06)	

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm						
447498 D01 General RF Exposure Guidance v06 – Appendix A						
MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
<b>2450</b>	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

The test separation distances= 5 mm is applied to determine SAR test exclusion.

## SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

**447498 D01 General RF Exposure Guidance v06 – Appendix A**

Channel No.	Frequency (MHz)	Radiated Output Power	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(dBm)	(mW)	(mm)		
<b>Low</b>	<b>2402</b>	<b>-5.83</b>	<b>0.261</b>	<b>5</b>	<b>0.0809</b>	≤ 3.0 for 1-g SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	Radiated Output Power	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(dBm)	(mW)	(mm)		
<b>Middle</b>	<b>2440</b>	<b>-6.38</b>	<b>0.230</b>	<b>5</b>	<b>0.0718</b>	≤ 3.0 for 1-g SAR or ≤ 7.5 for 10-g extremity SAR

Channel No.	Frequency (MHz)	Radiated Output Power	E.I.R.P.	Distance	$\frac{\text{max. power (mW)}}{\text{min. distance (mm)}} \times \sqrt{f(\text{GHz})}$	Limits
		(dBm)	(mW)	(mm)		
<b>High</b>	<b>2480</b>	<b>-6.27</b>	<b>0.236</b>	<b>5</b>	<b>0.0743</b>	≤ 3.0 for 1-g SAR or ≤ 7.5 for 10-g extremity SAR

**TEST RESULT**

This value is less than the low threshold limit. No SAR test is required.

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