

<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>CN21SJ39 001</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	<b>244375663</b>	Seite 1 von 33 Page 1 of 33
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	<b>2275901</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>2021-11-19</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>Solowii (Beijing) Technology Development Co., Ltd</b> 2002A,Bldg. 1,Yard 2,Ronghua South Rd.,Beijing Economic and Technological Development Zone			
<b>Prüfgegenstand:</b> <i>Test item:</i>	5th Wheel Scooter M2			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	5LCHM02 FCC ID: 2A33E5LCHM02			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Complete test			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	FCC CFR47 Part 15, Subpart C Section 15.247 ANSI C63.10: 2013			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2021-12-12			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003181800-001			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	Refer to test report			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von:</b> <i>tested by:</i>	<u>X Weidong Wang</u>			
<b>Datum:</b> <i>Date:</i>	2022-01-11 <small>Signed by: Weidong Wang</small>	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2022-01-11 <small>Signed by: Hongfei Wu</small>	
<b>Stellung / Position:</b>	PE	<b>Stellung / Position:</b>	Reviewer	
<b>Sonstiges /</b> <i>Other:</i>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>  <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

## TEST SUMMARY

**5.1.1 ANTENNA REQUIREMENT***RESULT: Pass***5.1.2 6dB & 99% BANDWIDTH***RESULT: Pass***5.1.3 PEAK OUTPUT POWER***RESULT: Pass***5.1.4 POWER SPECTRAL DENSITY***RESULT: Pass***5.1.5 CONDUCTED BAND EDGE AND OUT-OF BAND EMISSIONS***RESULT: Pass***5.2.1 CONDUCTED EMISSION***RESULT: Pass***5.3.1 RADIATED BAND-EDGE***RESULT: Pass***5.3.2 RADIATED SPURIOUS EMISSION***RESULT: Pass*

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## 1. General Remarks

### 1.1 Complementary Materials

Null.

## 2. Test Sites

### 2.1 Test Facilities

TÜV Rheinland (Shanghai) Co., Ltd.

Shanghai TUV Rheinland Building No. 177, 178 Lane 777, West Guangzhong Rd, Jing'an District, Shanghai, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 958801.

The Innovation, Science and Economic Development Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 2932F.

## 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
3m modified semi-anechoic chamber	Frankonia	SAC3	G1811378	2022-06-27
Bilog antenna	Teseq	CBL 6112D	G1811425	2023-03-10
EMI test receiver	Rohde & Schwarz	ESCI	G1811402	2022-09-01
Spectrum analyser	Rohde & Schwarz	FSV40	G1822702	2023-11-04
Preamplifier	Taiwan EMCI	EMC184045SE	G1825372	2023-05-14
Log periodic antenna	Rohde & Schwarz	HL050	G1811417	2023-03-10
Broadband Horn Antenna	Schwarzbeck	BBHA 9170	9170-305	2023-07-08
Preamplifier	Taiwan EMCI	EMC051845SE	G1825371	2023-05-14
EMI test receiver	Rohde & Schwarz	ESR3	9023229	2022-03-22
Artificial mains network	Rohde & Schwarz	ENV216	G1811403	2022-04-11
Spectrum Analyzer	Keysight	N9020A	MY54500180	2022-09-08

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

**Table 2: Measurement Uncertainty**

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Conducted Emission	150kHz - 30MHz	±3.39dB
Radiated Emission	9kHz - 30MHz	±2.93dB
	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a Wheel Electric Scooter which supports Bluetooth LE.

The aim of this report is to evaluate the RF characteristic of the Bluetooth LE of the EUT. For details refer to the User Manual and Circuit Diagram.

#### 3.2 Ratings and System Details

**Table 3: Technical Specification of EUT**

General Description of EUT	
Product Name:	5th Wheel Scooter M2
Model No.:	5LCHM02
Rated Voltage:	DC 36V (Lithium battery)
Test Voltage:	DC 3.3V for Conducted Test and Radiated Spurious Emission test AC120V/60Hz for Conducted Emission test
Technical Specification of BLE	
Frequency Range:	2400MHz~2480MHz
Modulation Type:	GFSK
Data Rate:	1Mbps(GFSK)
Antenna Type:	PCB Antenna
Antenna Gain:	0 dBi (Provided by the Client)

### 3.3 Independent Operation Modes

**Table 4: Independent Operation Modes**

Test Mode	Channel	Frequency	Data Rate
TM1	00	2402	1 MB/s
TM2	19	2440	1 MB/s
TM3	39	2480	1 MB/s
TM4	Charging Mode		

### 3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

### 3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label



## 4. Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

Test Software used: MacroGiga Test Ver 2.2

**Table 5: Power parameter value**

Operating Mode	Power Parameter Value
BLE	0dB

### 4.3 Special Accessories and Auxiliary Equipment

**Table 6: Auxiliary Equipment**

Product Name	Model Name	Manufactory
Laptop	T450	Thinkpad

### 4.4 Countermeasures to achieve EMC Compliance

Null.

## 5. Test Results

### 5.1 Conducted Testing at Antenna Port

#### 5.1.1 Antenna Requirement

**RESULT:** **Pass**

According to the manufacturer declared, the EUT has one PCB antenna, the directional gain of antenna is 0 dBi and the antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

**Table 7: Antenna Requirement**

#### FCC 15.203 – Antenna Requirement 1

Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	Antenna type:	PCB antenna
Verdict:	Pass	

#### FCC 15.204 – Antenna Requirement 2

Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one PCB antenna can be used	
Verdict:	Pass	

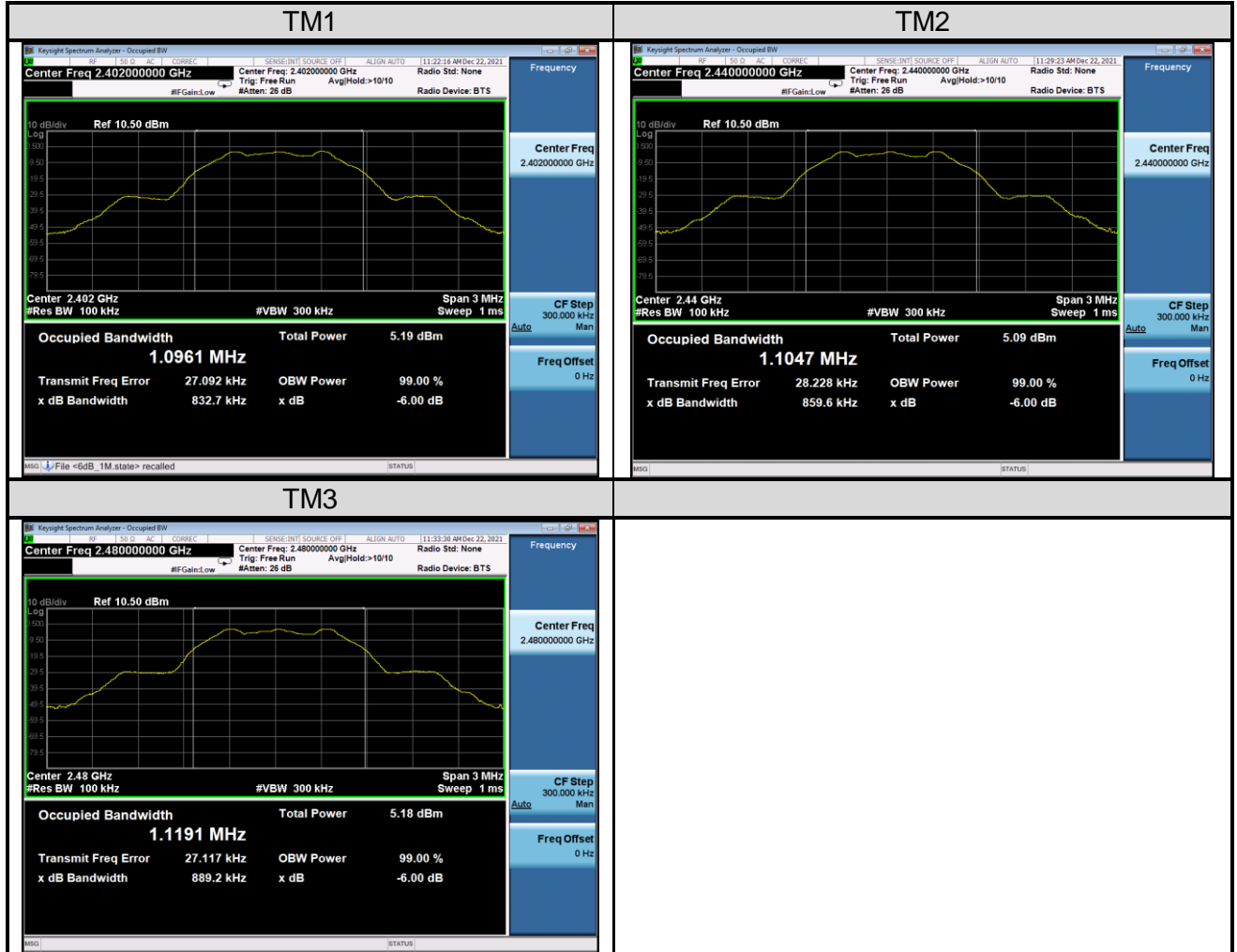
### 5.1.2 6dB & 99% Bandwidth

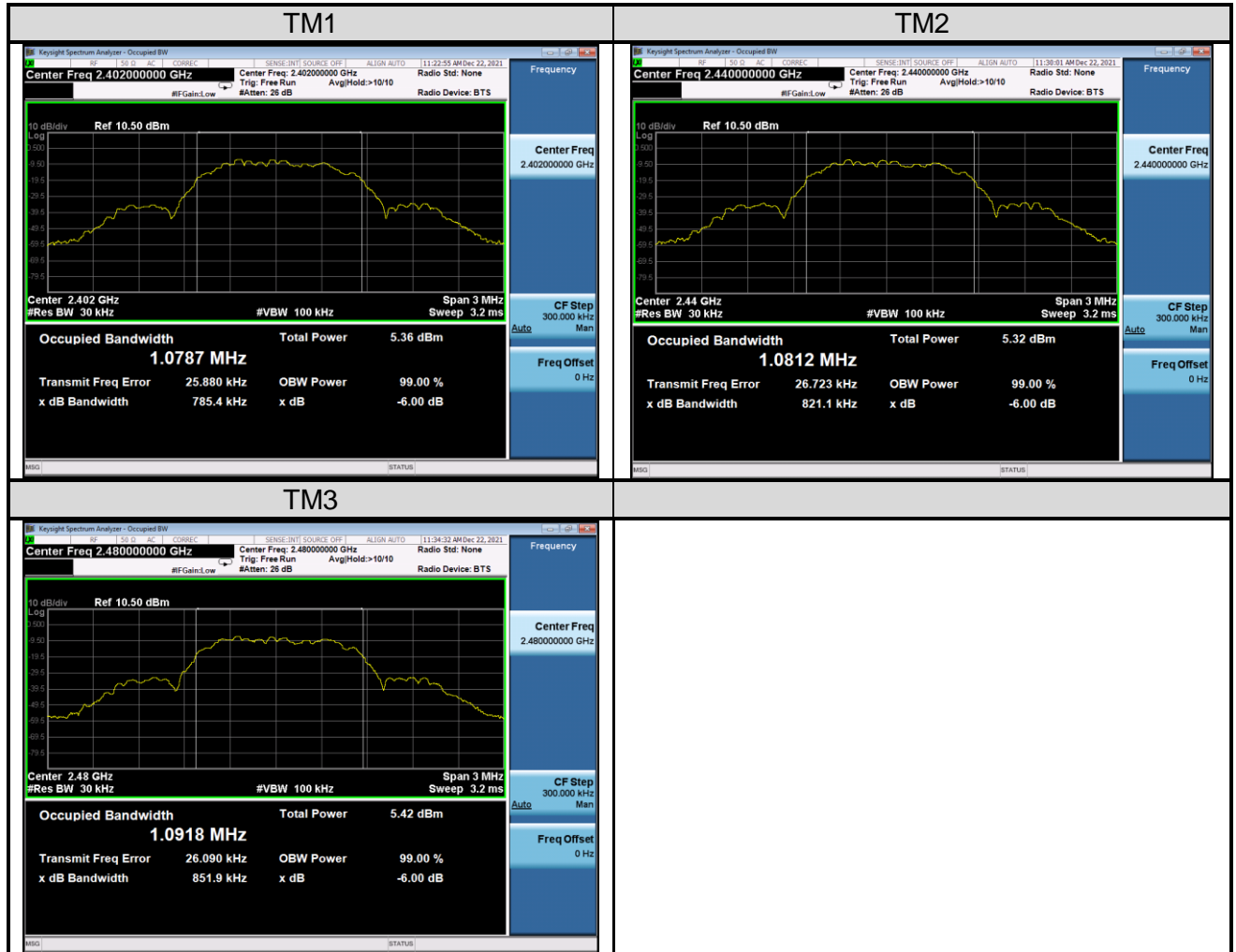
**RESULT:**
**Pass**

Date of testing : 2021-12-22  
 Ambient temperature : 20.6°C  
 Relative humidity : 48.7%  
 Atmospheric pressure : 101kPa  
 Test requirement : FCC Part 15.247(a)(2)  
 Test procedure : ANSI C63.10: 2013  
 Test voltage : DC 3.3V  
 Test modes applied : TM1 to TM3

**Table 8: 6dB & 99% Bandwidth**

Test Mode	CH.	Freq. [MHz]	6dB Bandwidth [MHz]	6dB Bandwidth limit [kHz]	99% Bandwidth [MHz]
TM1	00	2402	832.7	≥500	1.0787
TM2	19	2440	859.6	≥500	1.0812
TM3	39	2480	889.2	≥500	1.0918

**Figure 1: 6dB Bandwidth**


**Figure 2: 99% Bandwidth**


### 5.1.3 Peak Output Power

**RESULT:**
**Pass**

Date of testing : 2021-12-22  
 Ambient temperature : 20.6°C  
 Relative humidity : 48.7%  
 Atmospheric pressure : 101kPa  
 Test requirement : FCC Part 15.247(b)(3)  
 Test procedure : ANSI C63.10: 2013  
 Test voltage : DC 3.3V  
 Test modes applied : TM1 to TM3

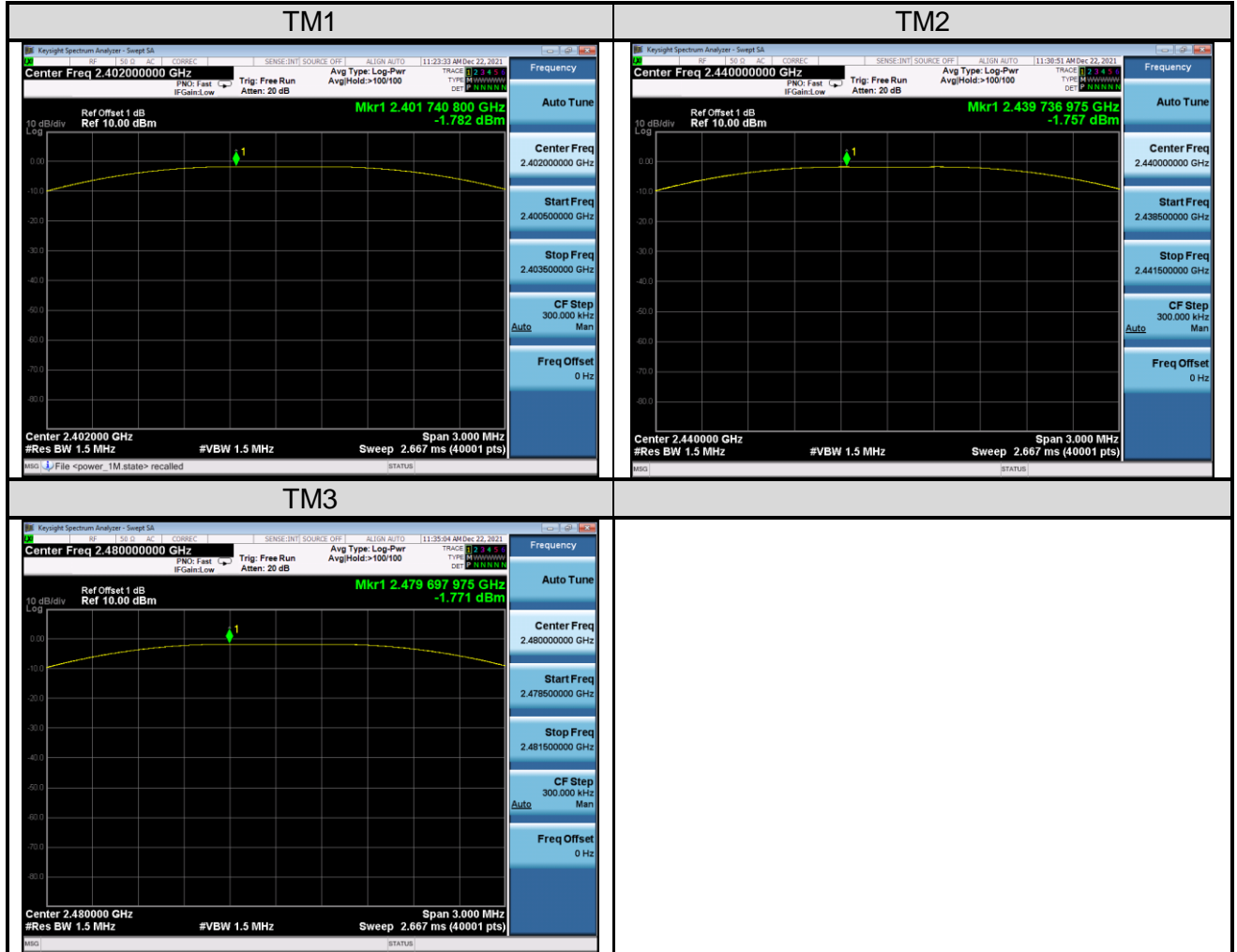
**Table 9: Peak Output Power**

Mode	Antenna Gain [dBi]	CH.	Freq. [MHz]	Maximum Peak Conducted Output Power [dBm]	Peak Conducted Output Power Limit [dBm]	Maximum EIRP [dBm]	EIRP Limit [dBm]
TM1	0	00	2402	-1.782	30	-1.782	36
TM2		19	2440	-1.757	30	-1.757	36
TM3		39	2480	-1.771	30	-1.771	36

Note:

EIRP=Peak Conducted Output Power + Antenna Gain

The cable loss=1dB was provided by the client, and was factored in the result Peak Conducted Output Power

**Figure 3: Peak Output Power**


### 5.1.4 Power Spectral Density

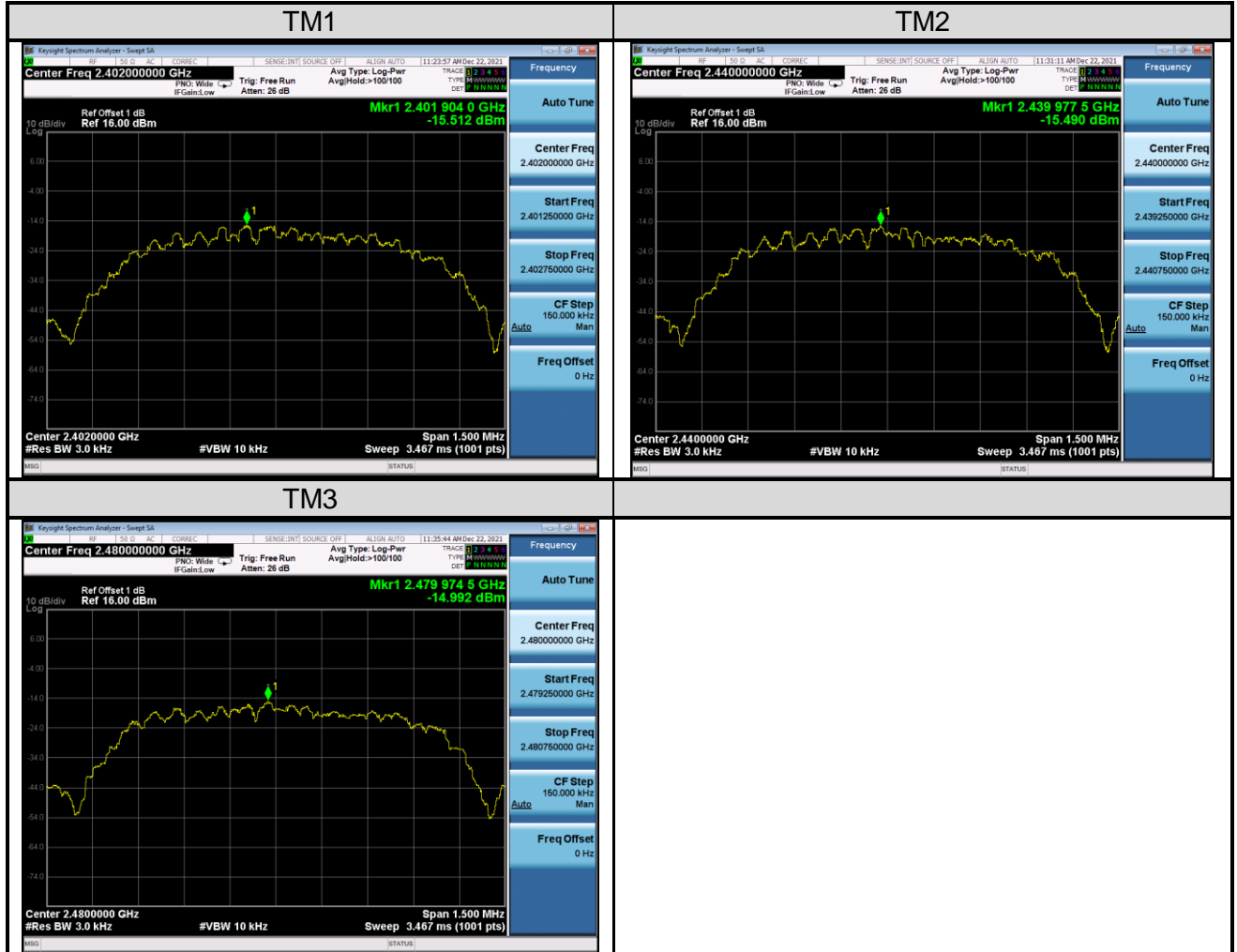
**RESULT:****Pass**

Date of testing : 2021-12-22  
Ambient temperature : 20.6°C  
Relative humidity : 48.7%  
Atmospheric pressure : 101kPa  
Test requirement : FCC Part 15.247(e)  
Test procedure : ANSI C63.10: 2013  
Test voltage : DC 3.3V  
Test modes applied : TM1 to TM3

**Table 10: Power Spectral Density**

Mode	CH.	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]
TM1	00	2402	-15.512	8
TM2	19	2440	-15.490	8
TM3	39	2480	-14.992	8

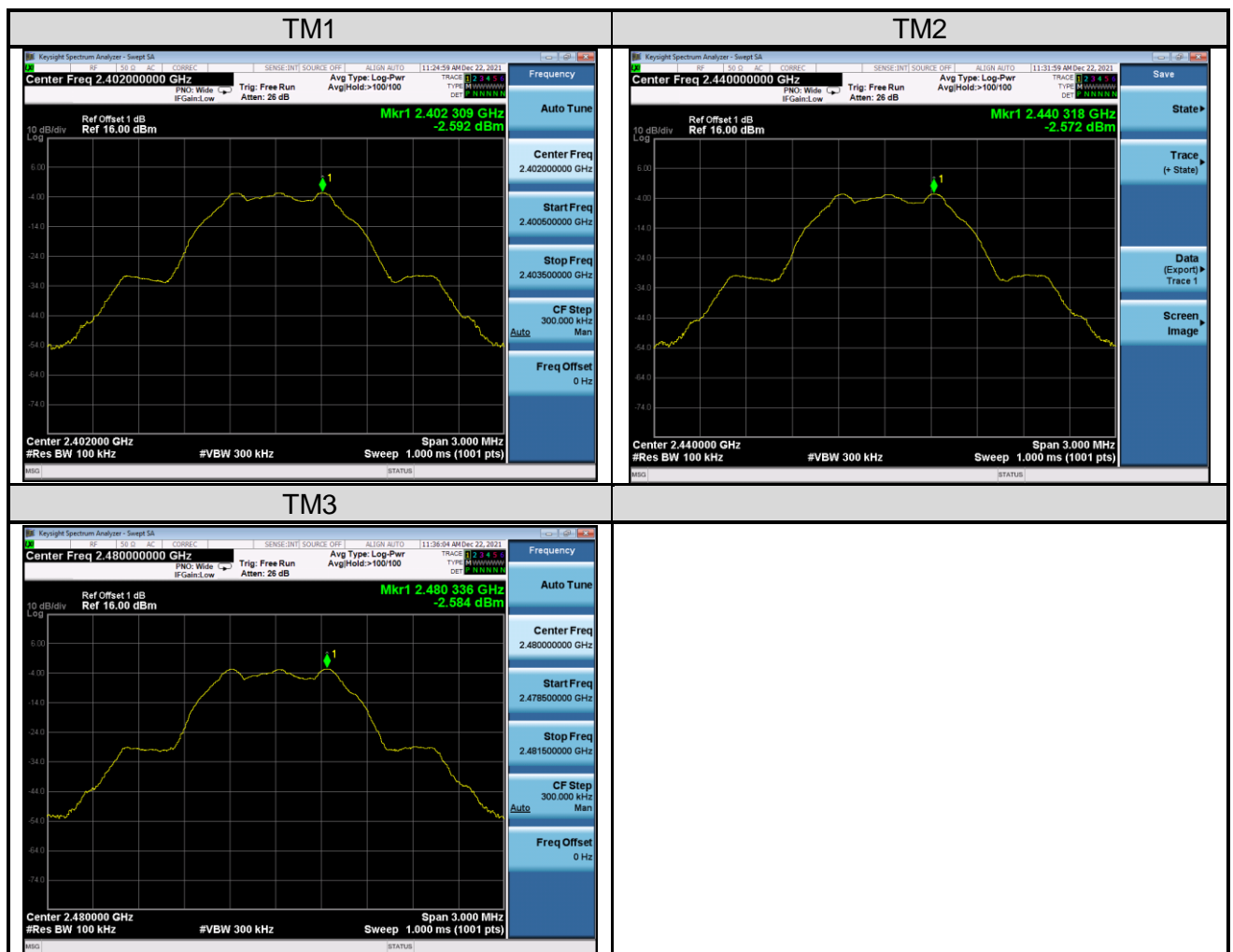


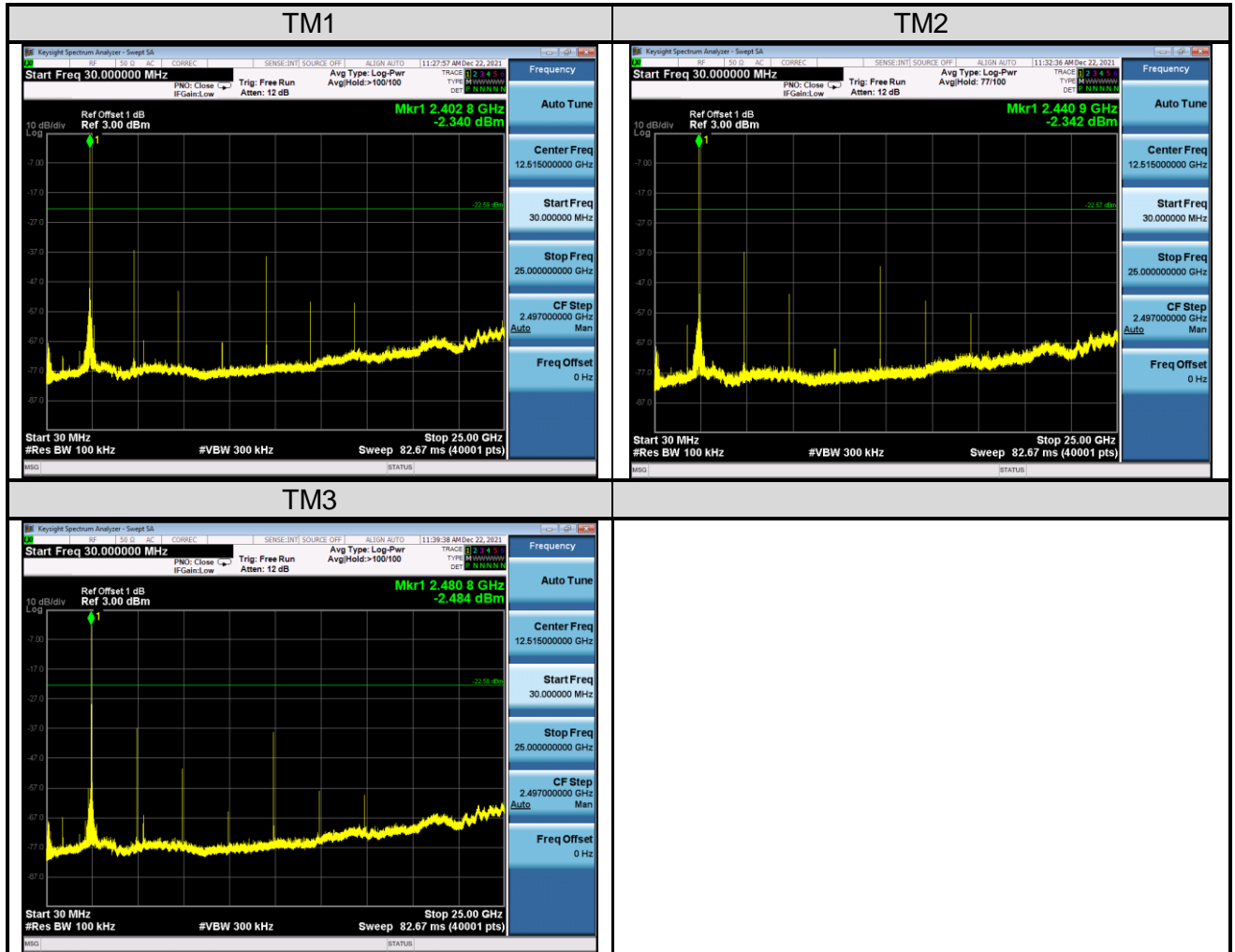
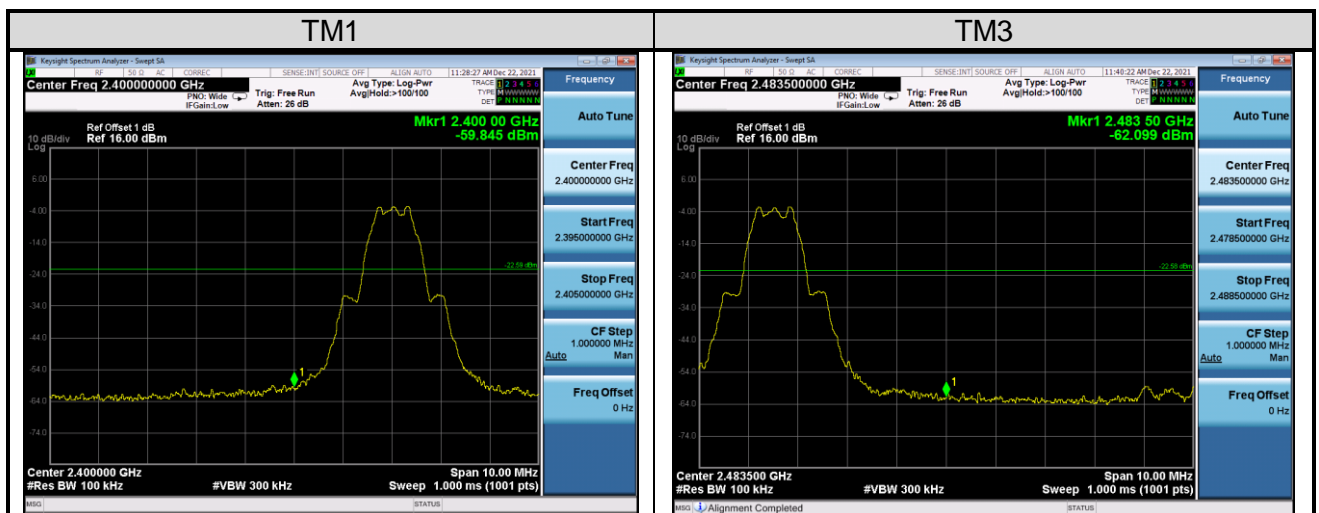
**Figure 4: Power Spectral Density**


### 5.1.5 Conducted Band Edge and out-of Band Emissions

**RESULT:**
**Pass**

Date of testing : 2021-12-22  
 Ambient temperature : 20.6°C  
 Relative humidity : 48.7%  
 Atmospheric pressure : 101kPa  
 Test requirement : FCC Part 15.247(d)  
 Test procedure : ANSI C63.10: 2013  
 Test voltage : DC 3.3V  
 Test modes applied : TM1 to TM3

**Figure 5: Reference level**


**Figure 6: Conducted Spurious Emission**

**Figure 7: Conducted Band Edge**


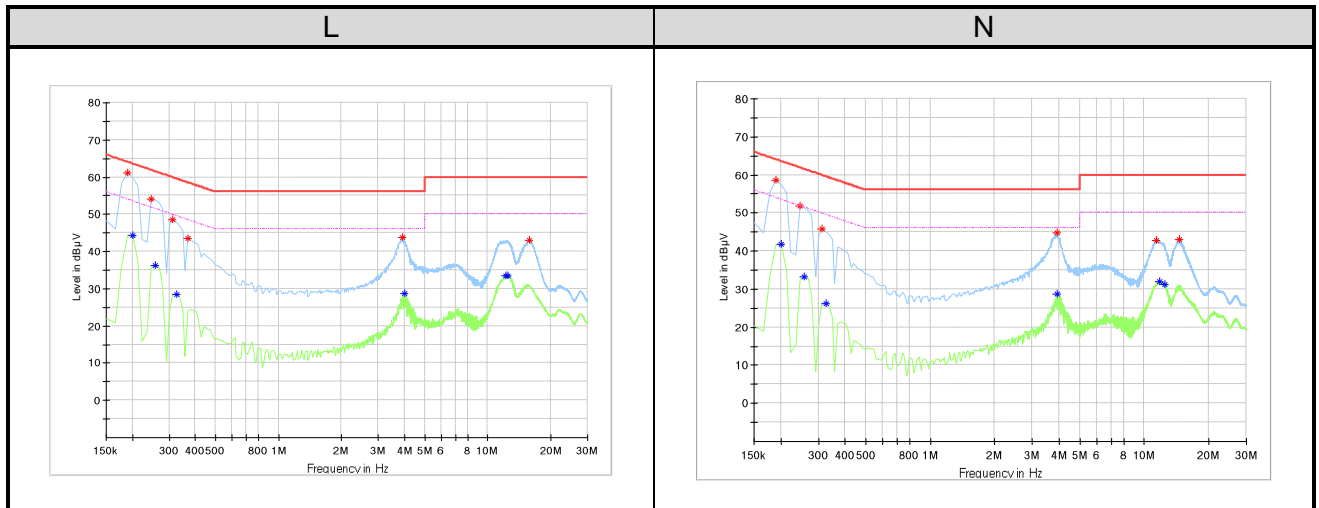
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## 5.2 Emission in the Frequency Range up to 30MHz

### 5.2.1 Conducted Emission

**RESULT:****Pass**

Date of testing	: 2021-12-24
Ambient temperature	: 20.7°C
Relative humidity	: 49.3%
Atmospheric pressure	: 101kPa
Test requirement	: FCC Part 15.207 (a)
Test procedure	: ANSI C63.10: 2013
Test voltage	: AC120V/60Hz
Test modes applied	: TM4

**Figure 8: Conducted Emission**

**Final\_Result\_QPK**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.189375	61.14	64.06	2.92	L
0.245625	54.17	61.90	7.73	L
0.313125	48.46	59.89	11.43	L
0.369375	43.50	58.52	15.02	L
3.901875	43.78	56.00	12.22	L
15.804375	43.17	60.00	16.83	L
0.189375	58.51	64.06	5.56	N
0.245625	51.77	61.90	10.14	N
0.313125	45.85	59.89	14.04	N
3.913125	44.75	56.00	11.25	N
11.394375	42.79	60.00	17.21	N
14.555625	43.04	60.00	16.96	N

**Final\_Result\_AV**

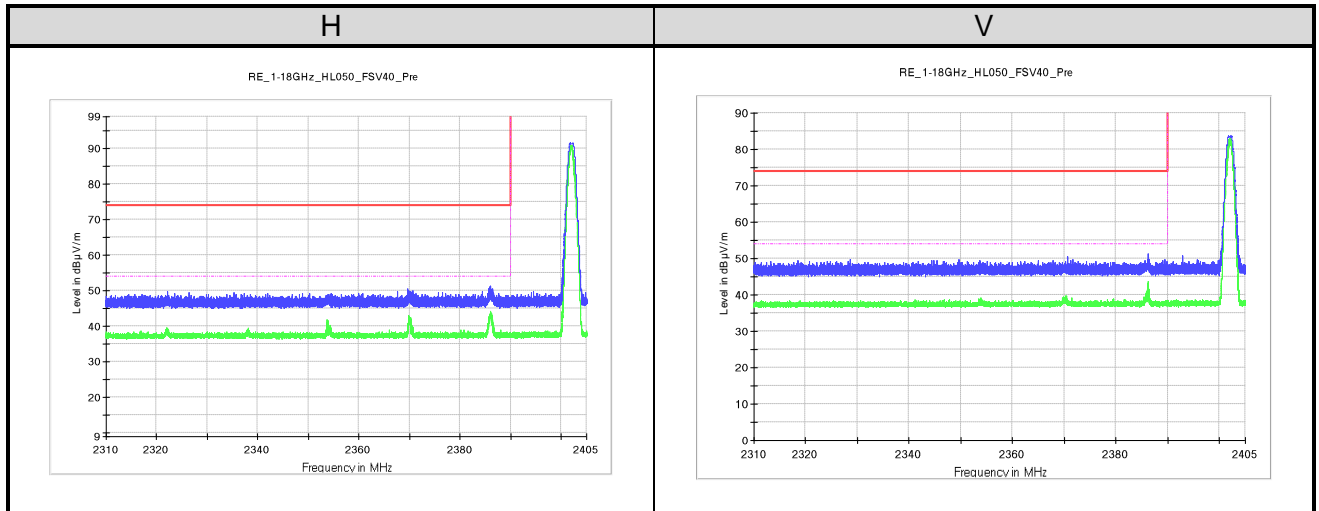
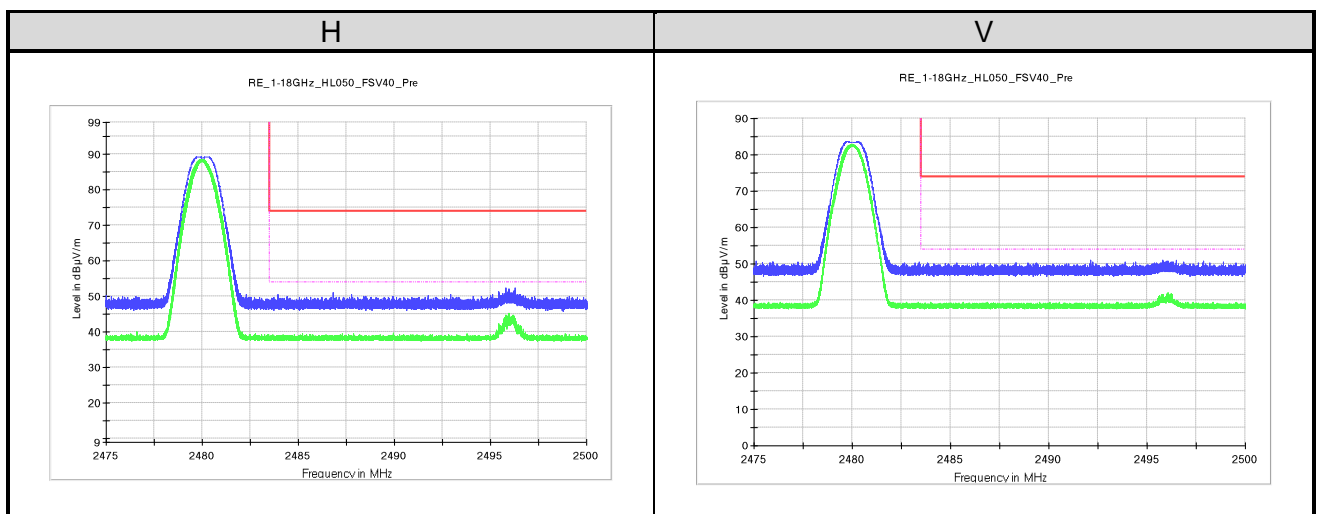
Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.324375	28.48	49.59	21.12	L
4.025625	28.70	46.00	17.30	L
12.440625	33.47	50.00	16.53	L
12.249375	33.61	50.00	16.39	L
0.256875	36.38	51.53	15.15	L
0.200625	44.29	53.59	9.29	L
0.324375	26.10	49.59	23.50	N
3.913125	28.64	46.00	17.36	N
12.418125	31.24	50.00	18.76	N
11.821875	32.04	50.00	17.96	N
0.256875	33.32	51.53	18.21	N
0.200625	41.75	53.59	11.83	N

## 5.3 Emission in the Frequency Range above 30MHz

### 5.3.1 Radiated Band-Edge

**RESULT:****Pass**

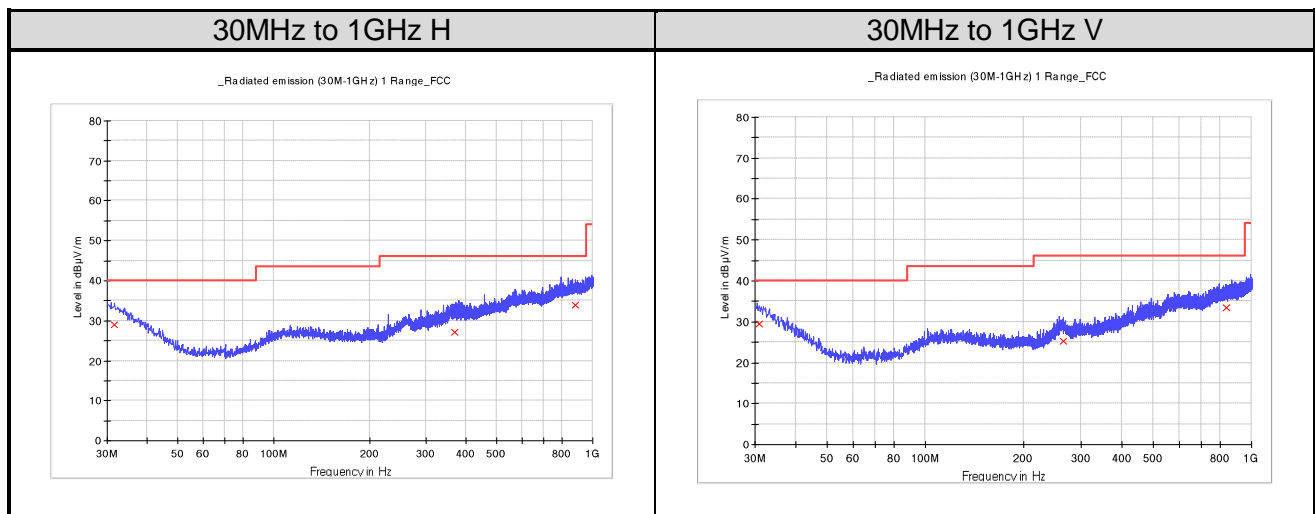
Date of testing : 2021-12-23  
Ambient temperature : 21.1°C  
Relative humidity : 52.3%  
Atmospheric pressure : 101kPa  
Test requirement : FCC Part 15.247(d)  
FCC Part 15.205(a)  
FCC Part 15.209(a)  
Test procedure : ANSI C63.10: 2013  
Test voltage : DC 3.3V  
Test modes applied : TM1, TM3

**Figure 9: Radiated Band-Edge, TM1**

**Figure 10: Radiated Band-Edge, TM3**


### 5.3.2 Radiated Spurious Emission

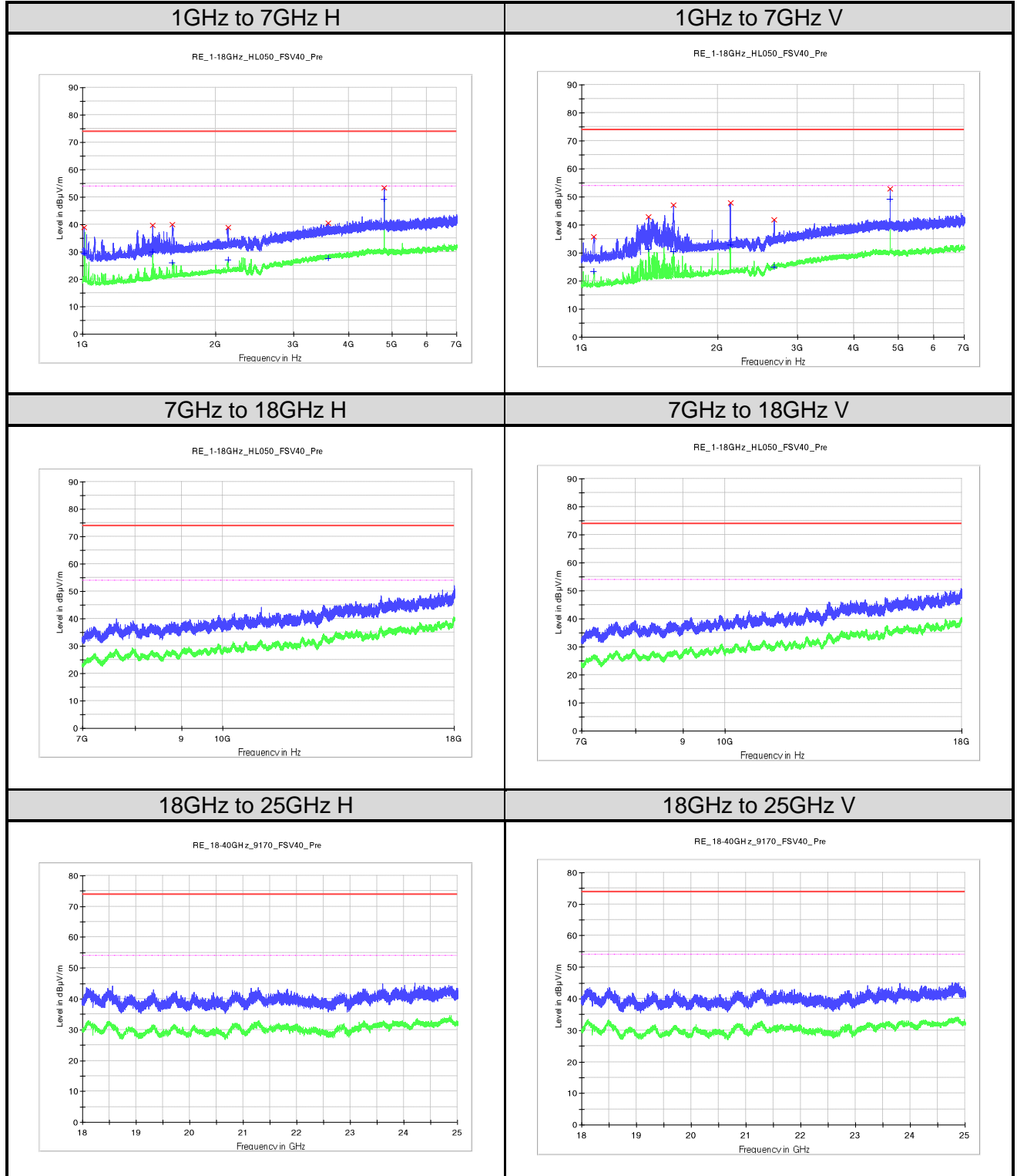
**RESULT:**
**Pass**

Date of testing : 2021-12-24 ~ 2021-12-27  
 Ambient temperature : 20.7°C  
 Relative humidity : 49.3 %  
 Atmospheric pressure : 101kPa  
 Test requirement : FCC Part 15.247(d)  
 FCC Part 15.209(a)  
 Test procedure : ANSI C63.10: 2013  
 Test voltage : DC 3.3V  
 Test modes applied : TM1 to TM3

**Figure 11: Radiated Spurious Emission, TM1, 30MHz to 1GHz**

**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.697500	29.1	H	24.6	10.9	40.0
368.651250	27.1	H	21.8	18.9	46.0
885.055000	34.0	H	28.0	12.0	46.0
30.970000	29.4	V	24.9	10.6	40.0
265.467500	25.3	V	20.6	20.7	46.0
839.465000	33.5	V	27.6	12.5	46.0



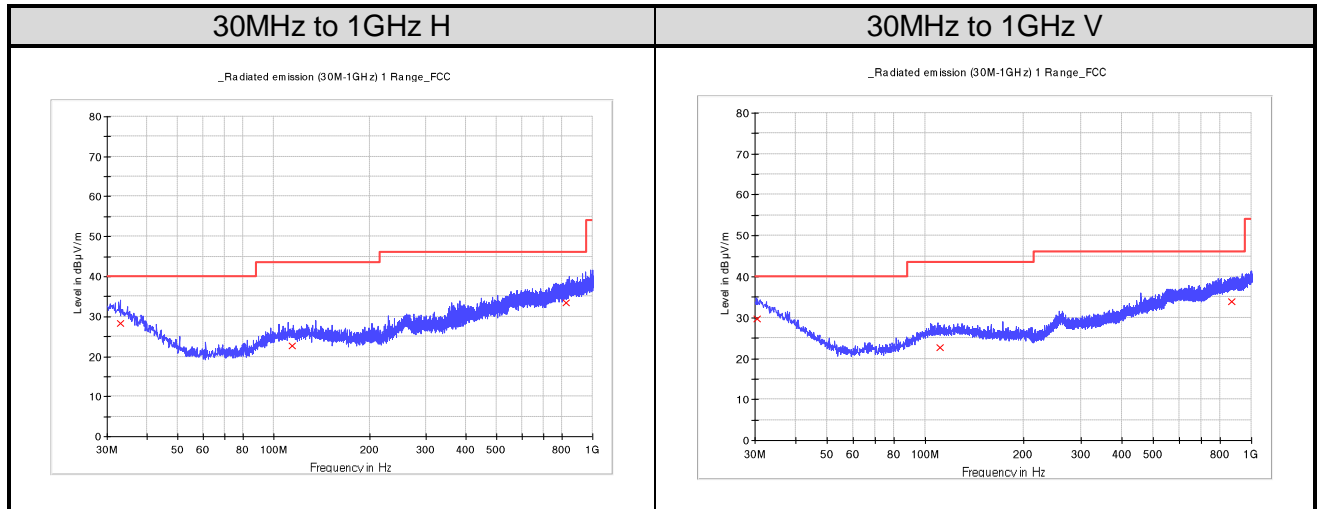
**Figure 12: Radiated Spurious Emission, TM1, 1GHz to 25GHz**


**Limit and Margin**
**PK**

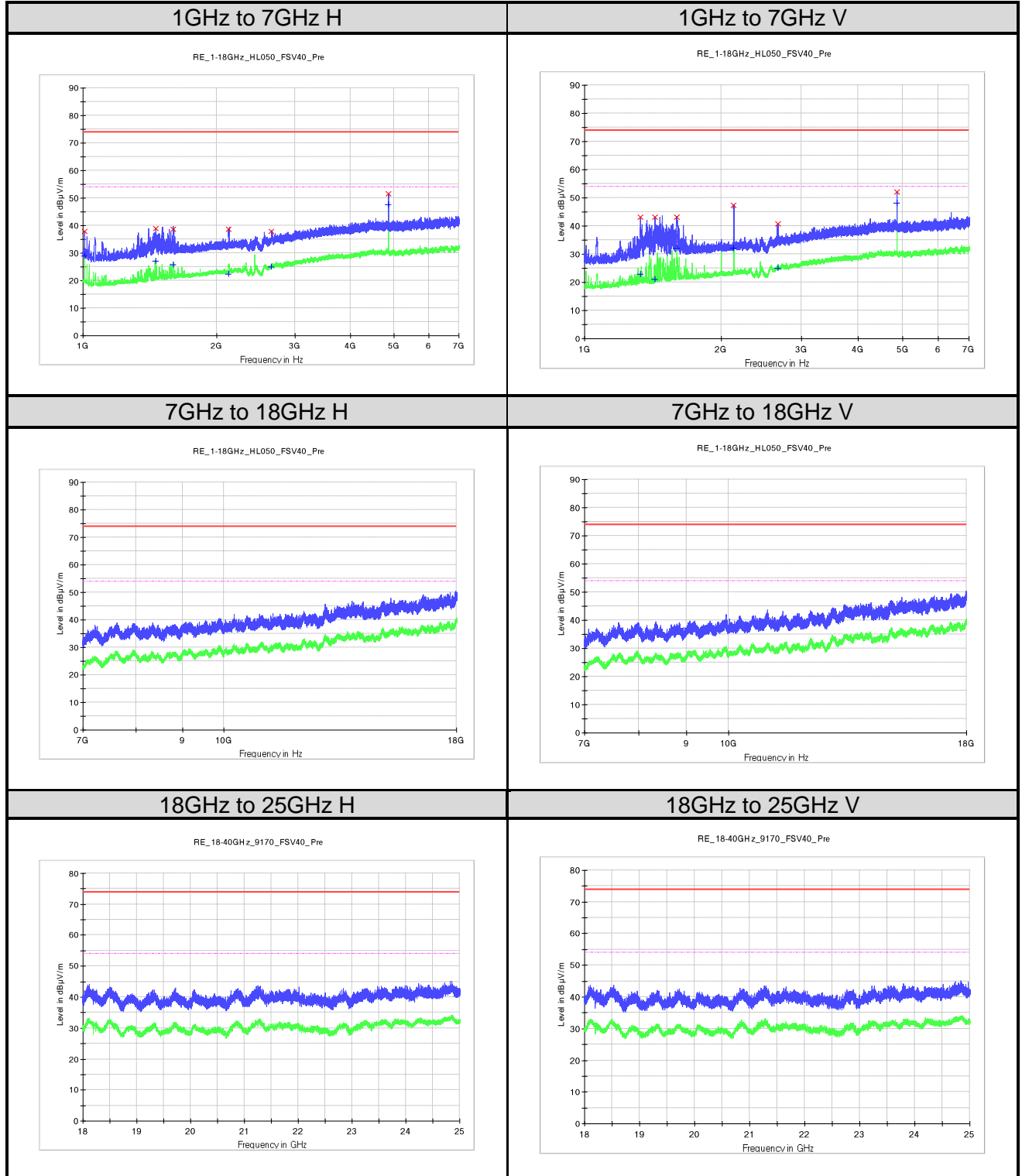
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dB $\mu$ V/m)
1008.100000	38.9	H	-22.4	35.1	74.0
1439.800000	39.8	H	-19.4	34.2	74.0
1595.200000	39.9	H	-18.4	34.1	74.0
2130.400000	38.9	H	-15.7	35.1	74.0
3586.300000	40.5	H	-9.3	33.5	74.0
4803.700000	53.3	H	-6.5	20.7	74.0
1064.800000	35.8	V	-22.1	38.2	74.0
1405.900000	42.9	V	-19.7	31.1	74.0
1592.800000	47.0	V	-18.4	27.0	74.0
2130.100000	47.8	V	-15.7	26.2	74.0
2661.700000	41.9	V	-13.3	32.1	74.0
4803.700000	52.8	V	-6.5	21.2	74.0

**AV**

Frequency (MHz)	Average (dB $\mu$ V/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dB $\mu$ V/m)
1008.100000	29.6	H	-22.4	24.4	54.0
1439.800000	30.1	H	-19.4	23.9	54.0
1595.200000	26.1	H	-18.4	27.9	54.0
2130.400000	27.1	H	-15.7	26.9	54.0
3586.300000	27.6	H	-9.3	26.4	54.0
4803.700000	49.3	H	-6.5	4.7	54.0
1064.800000	23.3	V	-22.1	30.7	54.0
1405.900000	31.4	V	-19.7	22.6	54.0
1592.800000	30.4	V	-18.4	23.6	54.0
2130.100000	32.9	V	-15.7	21.1	54.0
2661.700000	24.9	V	-13.3	29.1	54.0
4803.700000	49.1	V	-6.5	4.9	54.0

**Figure 13: Radiated Spurious Emission, TM2, 30MHz to 1GHz**

**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.910000	28.3	H	23.9	11.7	40.0
114.511250	22.7	H	18.6	20.9	43.5
824.793750	33.4	H	27.5	12.6	46.0
30.485000	29.6	V	25.2	10.4	40.0
110.752500	22.7	V	18.5	20.8	43.5
871.475000	33.9	V	28.0	12.1	46.0

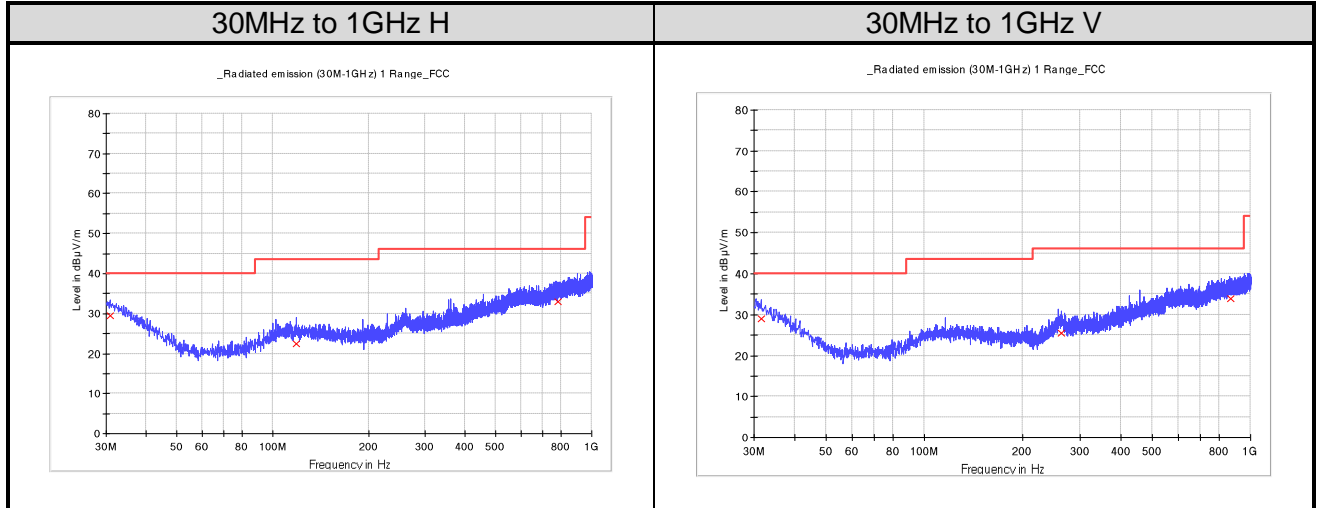
**Figure 14: Radiated Spurious Emission, TM2, 1GHz to 25GHz**


**Limit and Margin**
**PK**

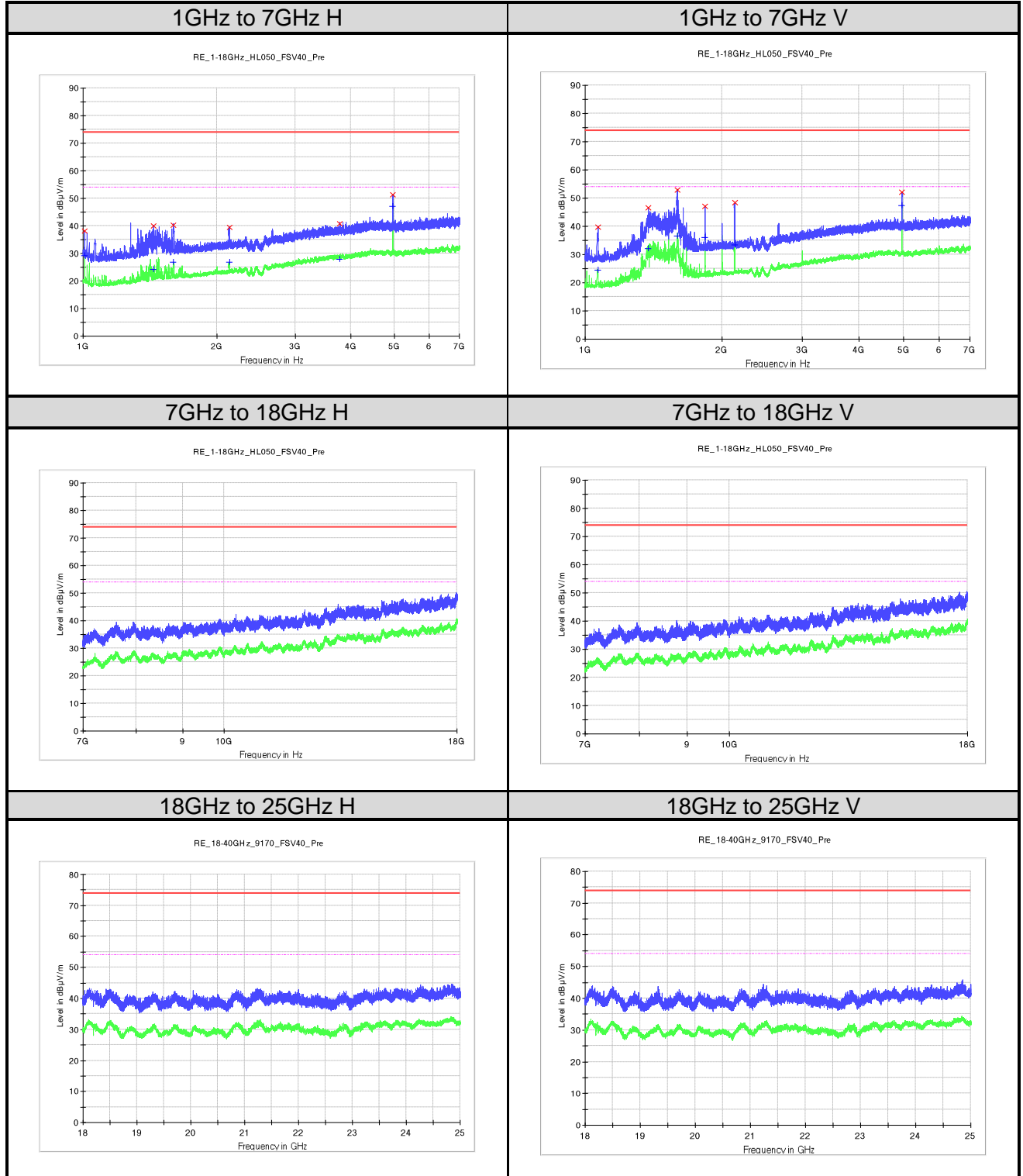
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dB $\mu$ V/m)
1007.800000	37.8	H	-22.4	36.2	74.0
1457.500000	38.9	H	-19.2	35.1	74.0
1597.300000	38.7	H	-18.3	35.3	74.0
2125.300000	38.7	H	-15.8	35.3	74.0
2656.300000	37.8	H	-13.3	36.2	74.0
4867.300000	51.6	V	-6.5	22.4	74.0
1326.700000	43.1	V	-20.2	30.9	74.0
1428.100000	43.1	V	-19.5	30.9	74.0
1595.200000	43.2	V	-18.4	30.8	74.0
2126.500000	47.4	V	-15.8	26.6	74.0
2665.900000	40.8	V	-13.3	33.2	74.0
4865.800000	52.1	V	-6.5	21.9	74.0

**AV**

Frequency (MHz)	Average (dB $\mu$ V/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dB $\mu$ V/m)
1007.800000	29.0	H	-22.4	25.0	54.0
1457.500000	27.0	H	-19.2	27.0	54.0
1597.300000	25.8	H	-18.3	28.2	54.0
2125.300000	22.4	H	-15.8	31.6	54.0
2656.300000	25.1	H	-13.3	28.9	54.0
4867.300000	47.6	V	-6.5	6.4	54.0
1326.700000	22.8	V	-20.2	31.2	54.0
1428.100000	21.1	V	-19.5	32.9	54.0
1595.200000	32.0	V	-18.4	22.0	54.0
2126.500000	32.0	V	-15.8	22.0	54.0
2665.900000	24.9	V	-13.3	29.1	54.0
4865.800000	48.2	V	-6.5	5.8	54.0

**Figure 15: Radiated Spurious Emission, TM3, 30MHz to 1GHz**

**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.848750	29.5	H	25.0	10.5	40.0
118.391250	22.5	H	18.5	21.0	43.5
783.811250	33.1	H	27.4	12.9	46.0
31.576250	29.1	V	24.7	10.9	40.0
262.678750	25.4	V	20.7	20.6	46.0
868.565000	33.8	V	27.9	12.2	46.0

**Figure 16: Radiated Spurious Emission, TM3, 1GHz to 25GHz**


**Limit and Margin**
**PK**

Frequency (MHz)	MaxPeak (dBμV/m)	Pol	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
1007.800000	38.1	H	-22.4	35.9	74.0
1438.000000	40.1	H	-19.4	33.9	74.0
1593.700000	40.4	H	-18.4	33.6	74.0
2131.300000	39.6	H	-15.7	34.4	74.0
3772.900000	40.9	H	-8.8	33.1	74.0
4959.700000	51.2	V	-6.6	22.8	74.0
1066.600000	39.8	V	-22.1	34.2	74.0
1377.700000	46.5	V	-19.9	27.5	74.0
1595.500000	52.8	V	-18.3	21.2	74.0
1833.400000	47.1	V	-17.2	26.9	74.0
2130.400000	48.3	V	-15.7	25.7	74.0
4960.600000	52.2	V	-6.6	21.8	74.0

**AV**

Frequency (MHz)	Average (dBμV/m)	Pol	Corr. (dB/m)	Margin - AVG (dB)	Limit - AVG (dBμV/m)
1007.800000	29.3	H	-22.4	24.7	54.0
1438.000000	24.1	H	-19.4	29.9	54.0
1593.700000	26.9	H	-18.4	27.1	54.0
2131.300000	26.9	H	-15.7	27.1	54.0
3772.900000	27.9	H	-8.8	26.1	54.0
4959.700000	47.0	V	-6.6	7.0	54.0
1066.600000	24.6	V	-22.1	29.4	54.0
1377.700000	32.0	V	-19.9	22.0	54.0
1595.500000	36.5	V	-18.3	17.5	54.0
1833.400000	36.0	V	-17.2	18.0	54.0
2130.400000	33.5	V	-15.7	20.5	54.0
4960.600000	47.5	V	-6.6	6.5	54.0



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