



# **TEST REPORT**

APPLICANT	: Shenzhen Tinno Mobile Technology Corp.	
PRODUCT NAME	: onn. 10.4" Tablet Pro	
MODEL NAME	<ul> <li>TBSPG100097968, TBGGL100097968, TBMMS100097968, TBBGD100097968,</li> <li>TBSPG100110603, TBGGL100110603, TBMMS100110603, TBBGD100110603, 100097968, 100110603</li> </ul>	
BRAND NAME	: onn.	
FCC ID	: XD6T5100A	
STANDARD(S)	: 47 CFR Part 15 Subpart C	
RECEIPT DATE	: 2022-09-20	
TEST DATE	: 2022-09-21 to 2022-11-03	
ISSUE DATE	: 2022-11-09	

Edited by:

Zeng Xiaoying (Rappo

Approved by:

Shen Junsheng (Supervisor)

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Change History			
Version Date		Reason for change	
1.0	2022-11-09	First edition	



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# 1. Summary of Test Result

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle of Test Signal	Sep. 21, 2022	Su Xiaoxian	PASS	No deviation
3	15.247(b)	Maximum Peak Conducted Output Power	Sep. 24, 2022	Su Xiaoxian	PASS	No deviation
4	15.247(b)	Maximum Average Conducted Output Power	Sep. 24, 2022	Su Xiaoxian	PASS	No deviation
5	15.247(a)	Bandwidth	Oct. 11, 2022	Su Xiaoxian	PASS	No deviation
6	15.247(d)	Conducted Spurious Emission and Band Edge	Oct. 11, 2022	Su Xiaoxian	PASS	No deviation
7	15.247(e)	Power Spectral Density	Oct. 11, 2022	Su Xiaoxian	PASS	No deviation
8	15.207	Conducted Emission	Oct. 19, 2022	Fan Zehang	PASS	No deviation
9	15.247(d)	Restricted Frequency Bands	Oct. 08, 2022	Su Zhan	PASS	No deviation
10	15.209, 15.247(d)	Radiated Emission	Oct. 09, 2022	Su Zhan	PASS	No deviation

**Note 1:** The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 v05r02.

**Note 2:** Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

**Note 3:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.





### **1.1. Testing Applied Standards**

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

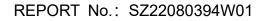
• 47 CFR Part 15 Subpart C Radio Frequency Devices



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### 1.2. Test Equipment List

#### **1.2.1 Conducted Test Equipments**

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
EXA Signal	MY53470836	N9010A	Agilopt	2022.03.01	2023.02.28
Analzyer	INI 1 5347 0630	N9010A	Agilent	2022.03.01	2023.02.20
RF Cable		RF01	Morlab	N1/A	NI/A
(30MHz-26GHz)	CB01	REUI	INIOLIAD	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

#### **1.2.2 Conducted Emission Test Equipments**

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2022.03.03	2023.03.02
LISN	8127449	NSLK 8127	Schwarzbeck	2022.03.03	2023.03.02
Pulse Limiter	VTSD 9561	VTSD	Schwarzbeck	2022.07.06	2023.07.05
(10dB)	F-B #206	9561-F	Schwarzbeck	2022.07.00	2023.07.03
Coaxial					
Cable(BNC)	CB01	EMC01	Morlab	N/A	N/A
(30MHz-26GHz)					

#### 1.2.3 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	2.0.0.0
Morlab EMCR V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0



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#### 1.2.4 Radiated Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2022.07.06	2023.07.05
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2022.05.25	2025.05.24
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2022.02.11	2025.02.10
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2022.07.13	2025.07.12
Test Antenna – Horn	BBHA9170#7 73	BBHA 9170	Schwarzbeck	2022.07.14	2025.07.13
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L32 03	Tonscend	2022.07.08	2023.07.07
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2022.07.08	2023.07.07
26-40GHz pre-Amplifier	56774	S40M400L40 02	Tonscend	2022.07.08	2023.07.07
Notch Filter	N/A	WRCG-2400- 2483.5-60SS	Wainwright	2022.07.08	2023.07.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

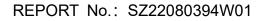


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### **1.3. Measurement Uncertainty**

Test Items	Uncertainty	Remark
Peak Output Power	±2.22dB	Confidence levels of 95%
Power Spectral Density	±2.22dB	Confidence levels of 95%
Bandwidth	±5%	Confidence levels of 95%
Conducted Spurious Emission	±2.77dB	Confidence levels of 95%
Restricted Frequency Bands	±5%	Confidence levels of 95%
Radiated Emission	±2.95dB	Confidence levels of 95%
Conducted Emission	±2.44dB	Confidence levels of 95%

### 1.4. Testing Laboratory

Laboratory Name	Shenzhen Morlab Communications Technology Co., Ltd.		
	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road,		
Laboratory Address	Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R.		
	China		
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# 2. General Description

### 2.1. Information of Applicant and Manufacturer

Applicant	Shenzhen Tinno Mobile Technology Corp.
	27-001, South Side of Tianlong Mobile Headquarters Building,
Applicant Address	Tongfa South Road, Xili Community, Xili Street, Nanshan District,
	Shenzhen ,PRC
Manufacturer	Shenzhen Tinno Mobile Technology Corp.
	27-001, South Side of Tianlong Mobile Headquarters Building,
Manufacturer Address	Tongfa South Road, Xili Community, Xili Street, Nanshan District,
	Shenzhen ,PRC

### 2.2. Information of EUT

Product Name:	onn. 10.4" Tablet	Pro	
Sample No.:	1#		
Hardware Version:	V0.3		
Software Version:	100110603_2022	21015	
Equipment Type:	Bluetooth LE		
Bluetooth Version:	5.0		
Modulation Type:	GFSK		
Data Rate:	1Mbps, 2Mbps		
Operating Frequency Range:	2402MHz-2480MHz		
Antenna Type:	PIFA Antenna		
Antenna Gain:	1.5dBi		
	Battery		
	Brand Name:	N/A	
	Model No.:	U309395PV-1S2P	
A access on a Information	Serial No.:	N/A	
Accessory Information:	Capacity:	7300mAh	
	Rated Voltage:	3.8V	
	Charge Limit:	4.35V	
	Manufacturer:	SHENZHEN UTILITY ENERGY CO., LTD.	





	AC Adapter				
	Brand Name:	Onn.			
	Model No.:	LACA216			
	Serial No.:	N/A			
Accessory Information	Rated Output:	5V2A			
Accessory Information:	Rated Input:	100-240V~50/60Hz, 0.3A			
	Manufacturer:	ASAP Technology(Jiangxi) Co., Ltd			
	USB Cable				
	Model No.:	WIABLK100008354			
	Manufacturer:	Luxshare-ICT			

**Note 1:** According to the certificate holder, they declared that the models (TBSPG100097968 (32G), TBGGL100097968 (32G), TBMMS100097968 (32G), TBBGD100097968 (32G), TBSPG100110603 (64G), TBGGL100110603 (64G), TBMMS100110603 (64G),

TBBGD100110603 (64G), 100097968 (32G), 100110603 (64G)) are identical in circuitry and electrical, mechanical and physical construction; the only differences are the appearance, trade name, model name and memory room for trading purpose. The difference appearance is for color and silk-screen only. The main measuring model is TBSPG100110603, only the results for TBSPG100110603 were recorded in this report.

Note 2: We use the dedicated software to control the EUT continuous transmission.

**Note 3:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



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### 2.3. Channel List of EUT

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Note 1: The black bold channels were selected for test.



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### 2.4. Test Configuration of EUT

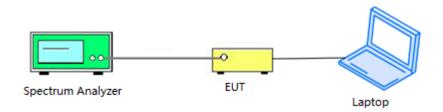
Test mode is used to control the EUT under the maximum power level during test.

### 2.5. Test Conditions

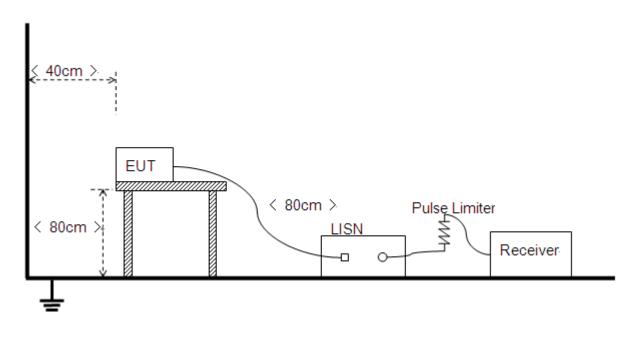
Temperature (°C)	15-35
Relative Humidity (%)	30-60
Atmospheric Pressure (kPa)	86-106

### 2.6. Test Setup Layout Diagram

#### 2.6.1.Conducted Measurement



#### 2.6.2.Conducted Emission Measurement





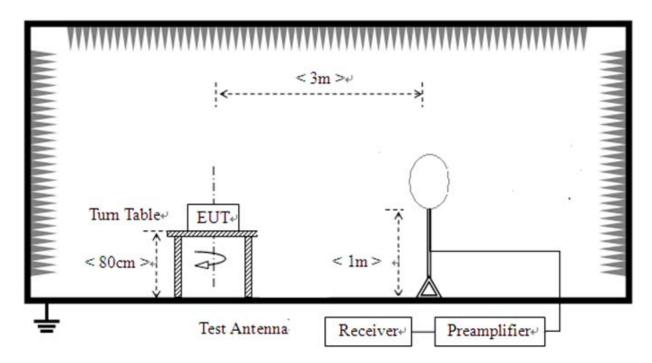
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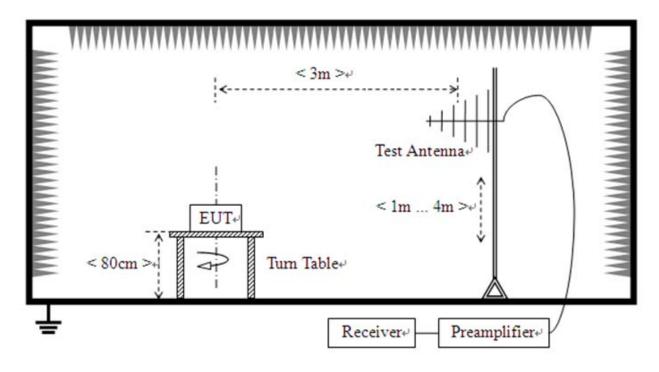


#### 2.6.3.Radiation Measurement

1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



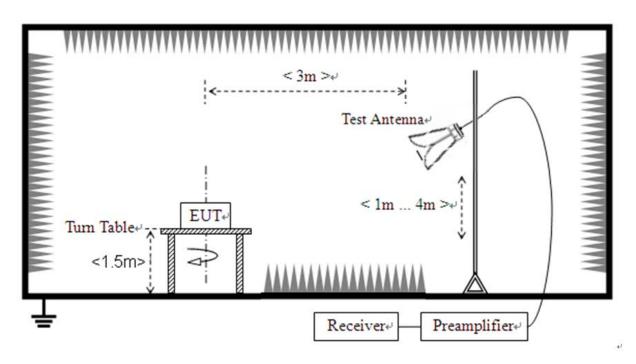


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3) For radiated emissions above 1GHz



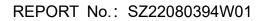


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### 3.1. Antenna Requirement

#### 3.1.1.Requirement

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### 3.1.2.Test Result

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT photos.

### 3.2. Duty Cycle of Test Signal

#### 3.2.1.Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration(T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than  $\pm 2\%$ ; otherwise, the duty cycle is considered to be non constant.



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#### 3.2.2.Test Result

Refer to Annex A.1 in this report.

### 3.3. Maximum Peak Conducted Output Power

#### 3.3.1.Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

#### 3.3.2.Test Procedures

KDB 558074 Section 8.3.1 was used in order to prove compliance.

#### 3.3.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

#### 3.3.4.Test Result

Refer to Annex A.2 in this report.



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### 3.4. Maximum Average Conducted Output Power

#### 3.4.1.Requirement

According to FCC section 15.247(b)(3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum average conducted output power of the intentional radiator shall not exceed 1 Watt.

#### 3.4.2.Test Procedures

KDB 558074 Section 8.3.2 was used in order to prove compliance.

#### 3.4.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

#### 3.4.4.Test Result

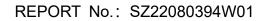
Refer to Annex A.3 in this report.



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#### 3.5.1.Requirement

According to FCC section 15.247(a) (2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

#### 3.5.1.Test Procedures

The steps for the first option are as follows:

- a) Set analyzer center frequency to channel center frequency
- b) Set RBW to100kHz
- c) Set VBW to 300kHz
- d) Detector = peak.
- e) Trace mode = max hold
- f) Sweep time = auto couple
- g) Allow the trace to fully stabilize

h) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by6 dB relative to the maximum level measured in the fundamental emission

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW  $\geq$  3  $\times$  RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq$ 6 dB.

#### 3.5.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

#### 3.5.3.Test Result

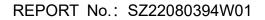
Refer to Annex A.4 in this report.



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### 3.6. Conducted Spurious Emissions and Band Edge

#### 3.6.1.Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### 3.6.2.Test Procedures

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.

#### 3.6.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

#### 3.6.4.Test Result

Refer to Annex A.5 and A.6 in this report.



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### 3.7. Power Spectral Density

#### 3.7.1.Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm 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.

#### 3.7.2.Test Procedures

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

- a) Set analyzer center frequency to channel center frequency
- b) Set span to1.5 times DTS
- c) Set RBW to 3kHz
- d) Set VBW to 10kHz
- e) Detector = peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize

i) Use the peak marker function to determine the maximum amplitude level within the RBW

#### 3.7.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

#### 3.7.4.Test Result

Refer to Annex A.7 in this report.



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### 3.8. Conducted Emission

#### 3.8.1.Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a  $50\mu$ H/ $50\Omega$  line impedance stabilization network (LISN).

Fraguanes (MHz)	Conducted Limit (dBµV)				
Frequency Range (MHz)	Quai-peak	Average			
0.15 - 0.50	66 to 56	56 to 46			
0.50 - 5	56	46			
5 - 30	60	50			

Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

#### 3.8.2.Test Procedures

The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

#### 3.8.3.Test Setup Layout

Refer to chapter 2.6.2 in this report.

#### 3.8.4.Test Result

Refer to Annex A.8 in this report.



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### 3.9. Restricted Frequency Bands

#### 3.9.1.Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. 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).

#### 3.9.2.Test Procedures

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \ge 1$ GHz, 100 kHz for f < 1GHz

VBW = 3 MHzSweep = auto Detector function = peak/average Trace = max hold Allow the trace to stabilize

#### 3.9.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

#### 3.9.4.Test Result

Refer to Annex A.8 in this report.





### 3.10. Radiated Emission

#### 3.10.1.Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), 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:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
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

**Note1:** For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. **Note2:**For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).



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#### 3.10.2.Test Procedures

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR guasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

#### 3.10.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

#### 3.10.4.Test Result

Refer to Annex A.9 in this report.



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# **Annex A Test Data and Result**

#### A.1. Duty Cycle of Test Signal

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	61.36	2.12	2.61
NVNT	BLE 2M	2402	Ant1	31.92	4.96	5.01



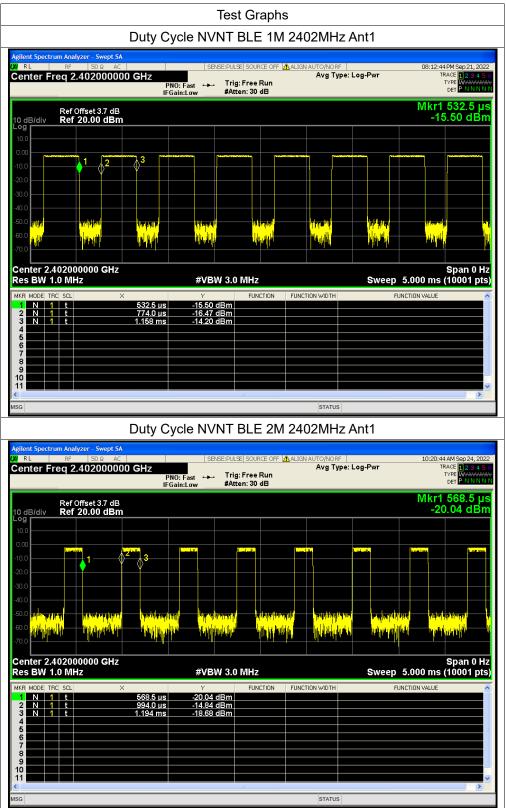
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#### A.2. Maximum Peak Conducted Output Power

Condition Mode	Frequency	Antenna	Conducted	Duty Factor	Total Power	Limit	Verdict	
Condition		(MHz)	Antenna	Power (dBm)	(dB)	(dBm)	(dBm)	veruici
NVNT	BLE 1M	2402	Ant1	-1.68	0	-1.68	30	Pass
NVNT	BLE 1M	2440	Ant1	-1.27	0	-1.27	30	Pass
NVNT	BLE 1M	2480	Ant1	-1.57	0	-1.57	30	Pass
NVNT	BLE 2M	2402	Ant1	-1.71	0	-1.71	30	Pass
NVNT	BLE 2M	2440	Ant1	-1.31	0	-1.31	30	Pass
NVNT	BLE 2M	2480	Ant1	-1.59	0	-1.59	30	Pass



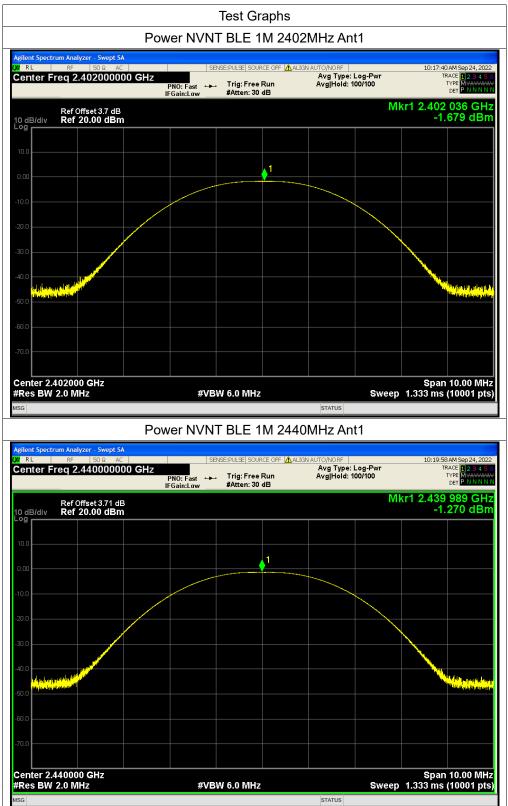
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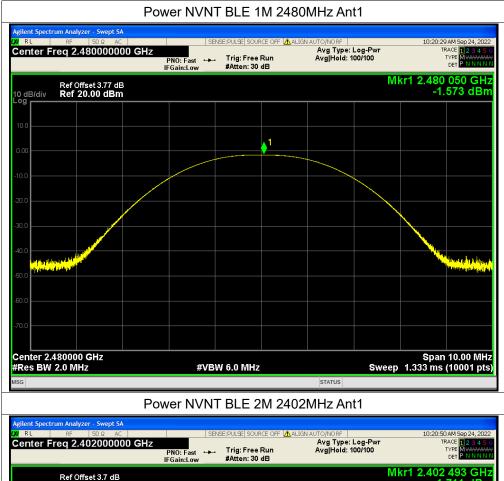


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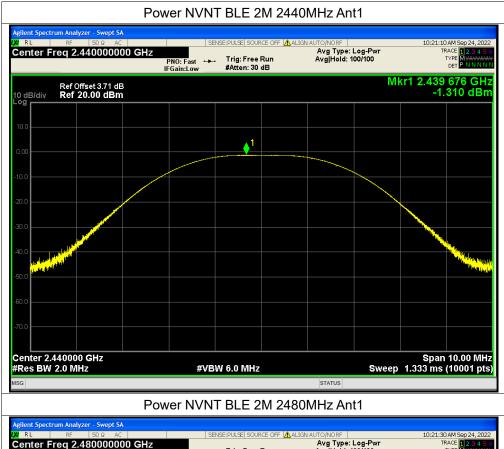




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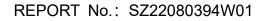




### Center Freq 2.480000000 GHz TYPE M MANANA DET P N N N N Avg Type: Log-Pwr Avg|Hold: 100/100 PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.479 656 GHz -1.593 dBm Ref Offset 3.77 dB Ref 20.00 dBm 10 dB/div 1 al de la L. M Center 2.480000 GHz #Res BW 2.0 MHz Span 10.00 MHz Sweep 1.333 ms (10001 pts) #VBW 6.0 MHz STATUS



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#### A.3. Maximum Average Conducted Output Power

Condition Mode	Frequency	Antonno	Conducted	<b>Duty Factor</b>	Total Power	Limit	Verdict	
Condition	wode	(MHz)	Antenna	Power (dBm)	(dB)	(dBm)	(dBm)	verdict
NVNT	BLE 1M	2402	Ant1	-3.98	2.12	-1.86	30	Pass
NVNT	BLE 1M	2440	Ant1	-3.56	2.12	-1.44	30	Pass
NVNT	BLE 1M	2480	Ant1	-3.88	2.12	-1.76	30	Pass
NVNT	BLE 2M	2402	Ant1	-7.29	4.96	-2.33	30	Pass
NVNT	BLE 2M	2440	Ant1	-7.01	4.96	-2.05	30	Pass
NVNT	BLE 2M	2480	Ant1	-7.09	4.96	-2.13	30	Pass



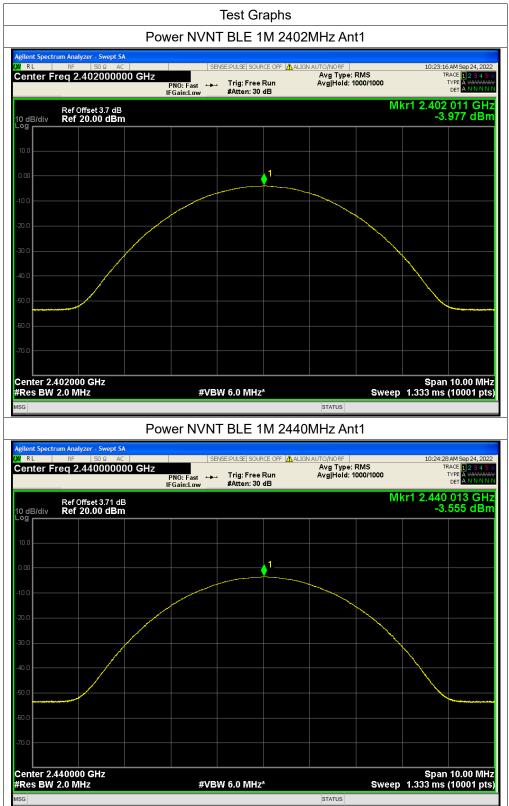
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#### Power NVNT BLE 2M 2402MHz Ant1

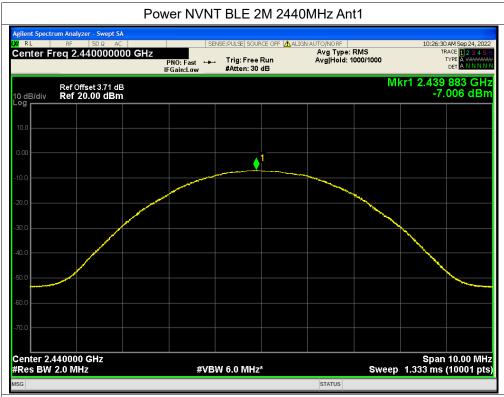




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#### Power NVNT BLE 2M 2480MHz Ant1



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#### A.4. 6 dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.666	0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.675	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.688	0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.118	0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.157	0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.147	0.5	Pass



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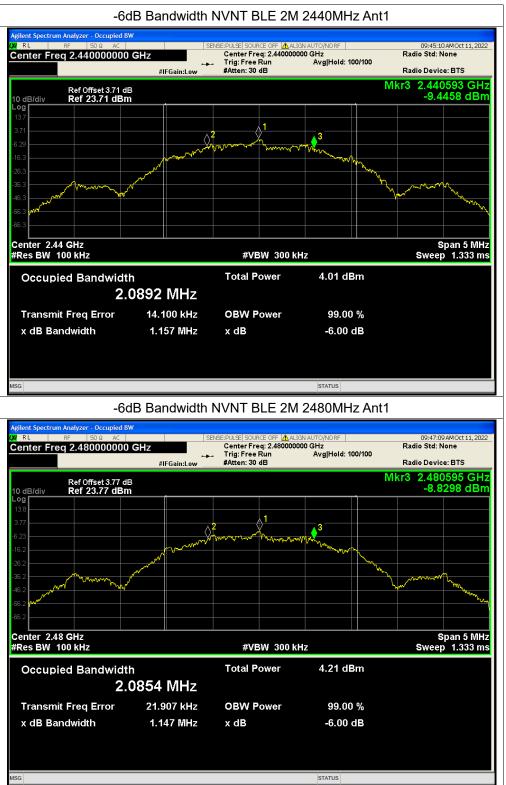




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## A.5. Conducted Spurious Emissions

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-35.40	-20	Pass
NVNT	BLE 1M	2440	Ant1	-35.91	-20	Pass
NVNT	BLE 1M	2480	Ant1	-35.78	-20	Pass
NVNT	BLE 2M	2402	Ant1	-35.28	-20	Pass
NVNT	BLE 2M	2440	Ant1	-36.20	-20	Pass
NVNT	BLE 2M	2480	Ant1	-35.92	-20	Pass



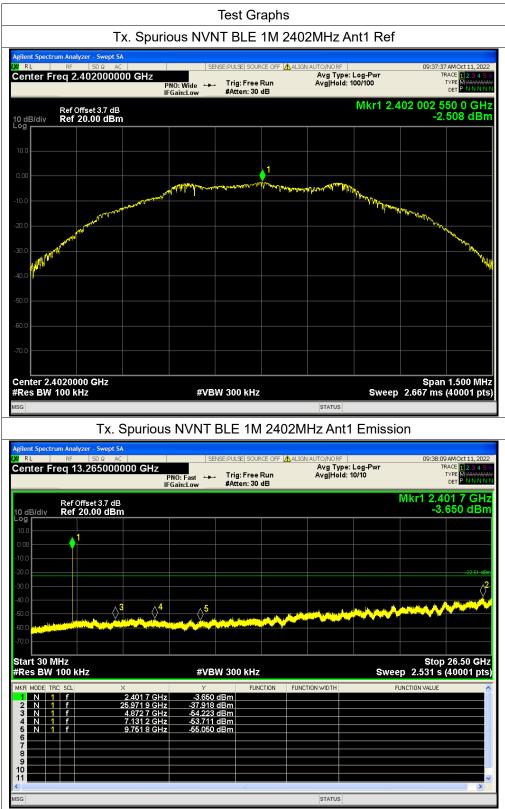
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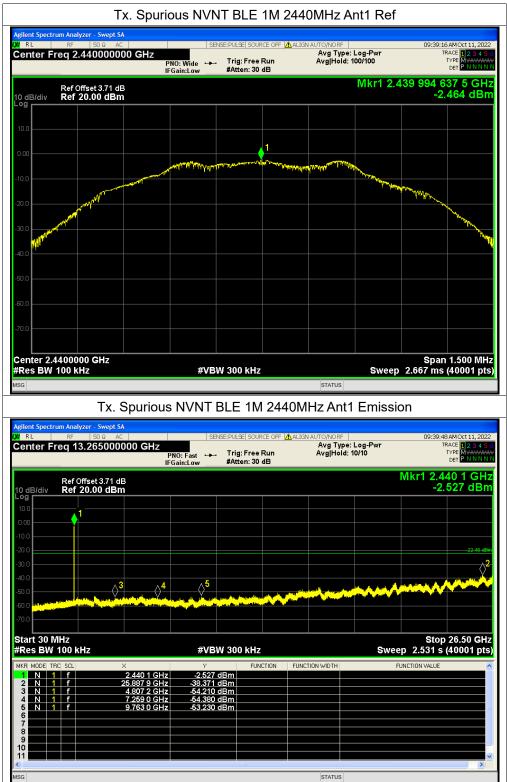






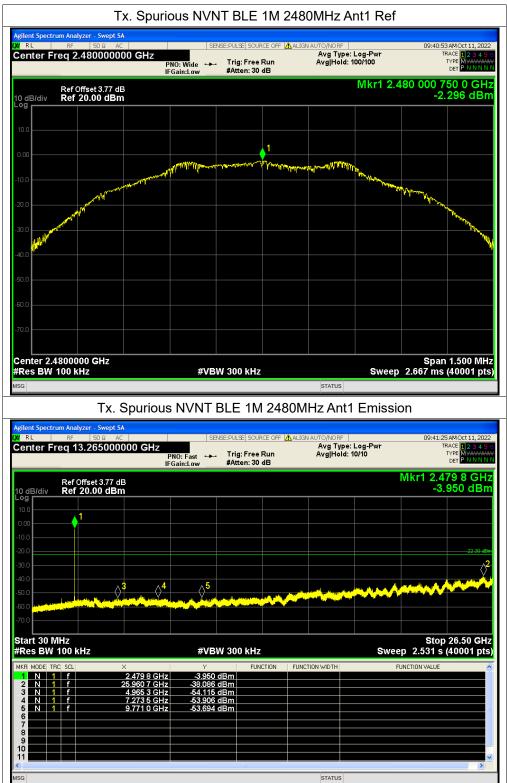
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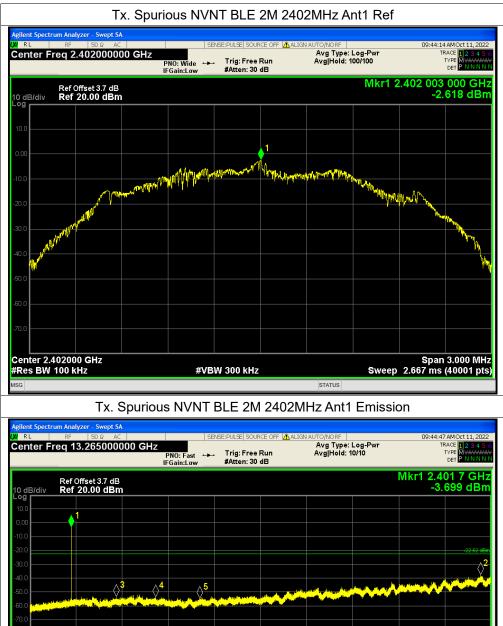


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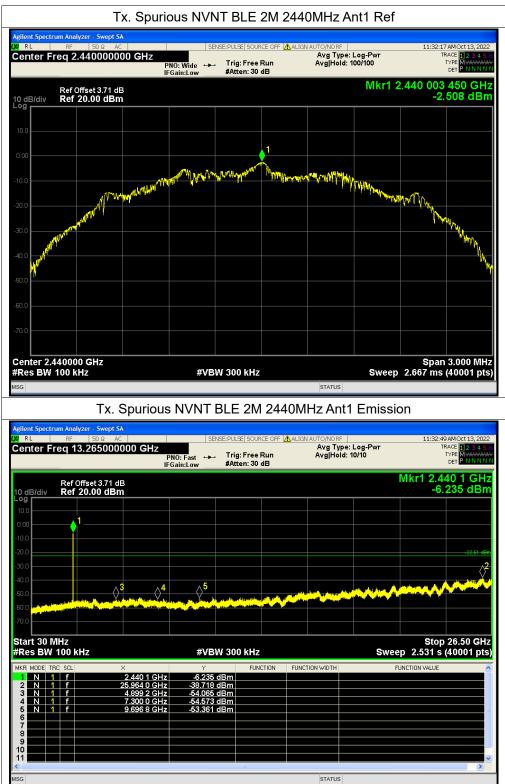


Stop 26.50 GHz Sweep 2.531 s (40001 pts) Start 30 MHz #Res BW 100 kHz #VBW 300 kHz FUNCTION WIDTH FUNCTION MKR FUNCTION VALU -17 GHz -5.908 4 GHz 4.977 2 GHz 7.241 8 f 1 f 1 f 1 f 1 f 37.901 dBm 6 dBm 7.241 8 GHz 9.771 0 GHz -54.129 dBm -55.008 dBm N 5 10 11 STATUS

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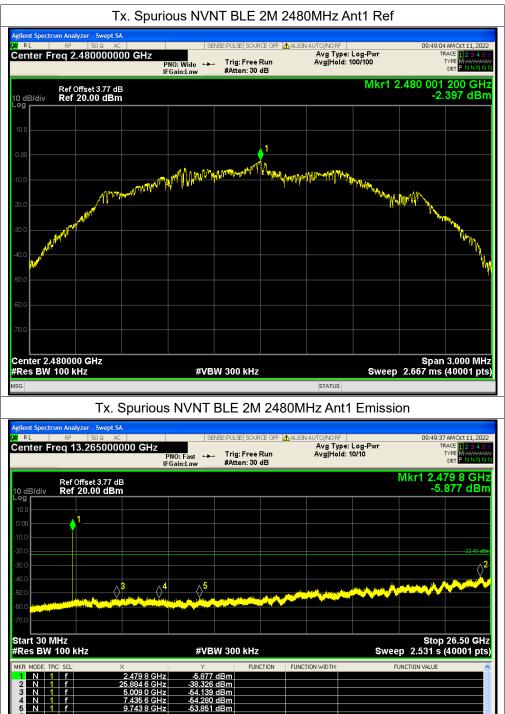


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STATUS



### A.6. Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-52.58	-20	Pass
NVNT	BLE 1M	2480	Ant1	-52.6	-20	Pass
NVNT	BLE 2M	2402	Ant1	-30.84	-20	Pass
NVNT	BLE 2M	2480	Ant1	-52.85	-20	Pass



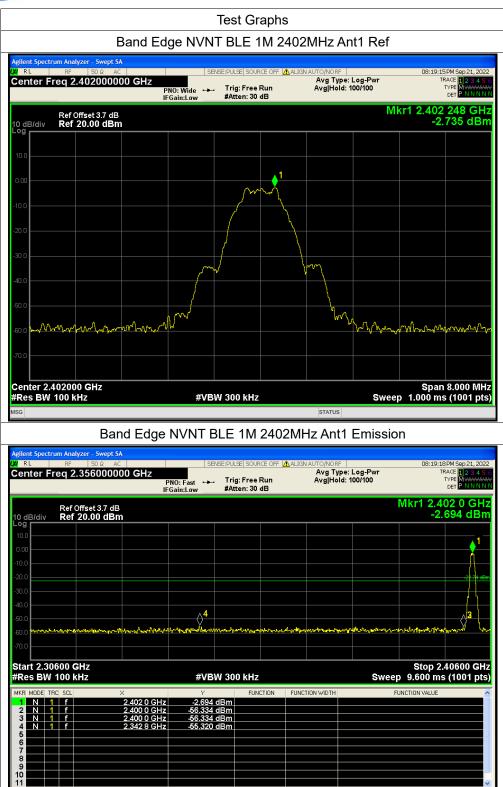
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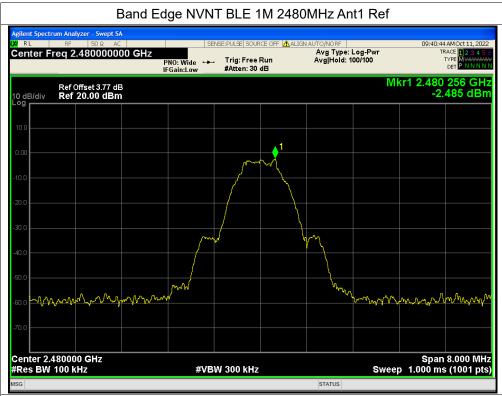


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#### Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

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50.0 <mark>4 2 70.0 Start 2.47</mark>				300 kHz	MarlayPht-MrTyt	ner telsepetinen inpu			.57600 GH
50.0 441 70.0	7600 GHz 100 kHz Rd SCL	X	#VBW	300 kHz		<del>กรากสูญสมาณกัญม</del> STION WIDTH	Swee	Stop 2	.57600 GH
50.0 44 70.0	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz	#VBW -2.309 dE	300 kHz Functi 3m			Swee	Stop 2 p 9.600 m	.57600 GH
50.0 70.0 Start 2.47 Res BW	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz 2.500 0 GHz	#VBW -2.309 dE -56.760 dE -57.482 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH
50.0 4.4 70.0 5 5 6 6 7 7 7 7 7 7 7 8 7 8 8 8 8 8 7 8 7 8	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz	#VBW -2.309 dE -56,760 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH
an of the second	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz 2.500 0 GHz	#VBW -2.309 dE -56.760 dE -57.482 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH
50.0         4.4           70.0	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz 2.500 0 GHz	#VBW -2.309 dE -56.760 dE -57.482 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH
50 0         4           50 1         4           51 art 2.47         3           Res BW         4           1         1           3         N           4         N           5         5           6         7           8         9	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz 2.500 0 GHz	#VBW -2.309 dE -56.760 dE -57.482 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH
50.0 4 1 50.0 5 5 5 5 5 6 7 8 5 5 5 5 5 5 5 5 5 5 5 5 5	7600 GHz 100 kHz Rd SCL	× 2.480 0 GHz 2.483 5 GHz 2.500 0 GHz	#VBW -2.309 dE -56.760 dE -57.482 dE	300 kHz FUNCTI 3m 3m 3m			Swee	Stop 2 p 9.600 m	.57600 GH

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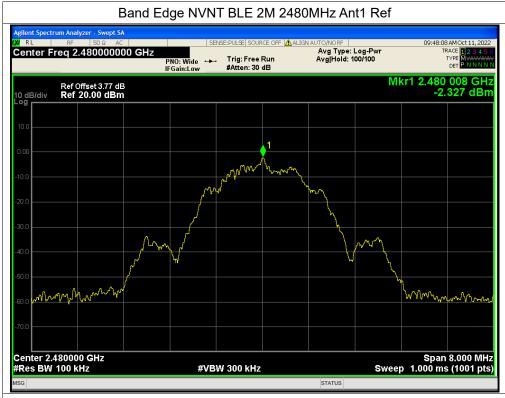
#### Band Edge NVNT BLE 2M 2402MHz Ant1 Emission

RL Center F			NO: Fast ++ T	rig: Free Run Atten: 30 dB	ALIGN AUTO/NORF Avg Type Avg Hold	: Log-Pwr : 100/100	09:44:08 AMOct 11, 202 TRACE 1 2 3 4 5 TYPE MWWWW DET P N N N
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70.0	600 GHz						Stop 2.40600 GH
Res BW	100 kHz		#VBW 3	00 kHz			9.600 ms (1001 pt
IKR MODE TH	RC SCL	× 2.402 0 GHz	-2.630 dBn -33.745 dBn		FUNCTION WIDTH	FU	NCTION VALUE
2 N 1 3 N 1	f	2.400 0 GHz 2.400 0 GHz	-33,745 dBn	า			
2 N 1	f f		-33.745 dBn -33.745 dBn -33.745 dBn	า			
2 N 1 3 N 1 4 N 1 5 6 7 8 9		2.400 0 GHz	-33,745 dBn	า			
2 N 1 3 N 1 4 N 1 5 6 7 8		2.400 0 GHz	-33,745 dBn	า			

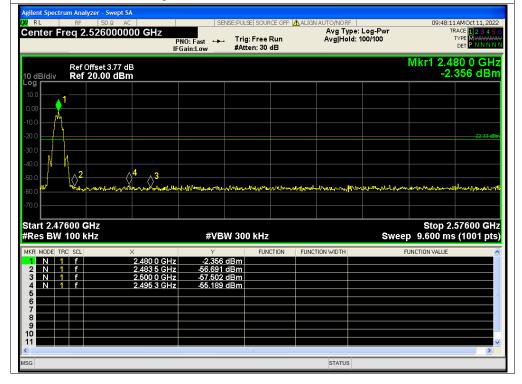
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#### Band Edge NVNT BLE 2M 2480MHz Ant1 Emission



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## A.7. Power Spectral Density

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-16.67	0	-16.67	8	Pass
NVNT	BLE 1M	2440	Ant1	-16.57	0	-16.57	8	Pass
NVNT	BLE 1M	2480	Ant1	-16.44	0	-16.44	8	Pass
NVNT	BLE 2M	2402	Ant1	-19.3	0	-19.3	8	Pass
NVNT	BLE 2M	2440	Ant1	-19.2	0	-19.2	8	Pass
NVNT	BLE 2M	2480	Ant1	-19.02	0	-19.02	8	Pass



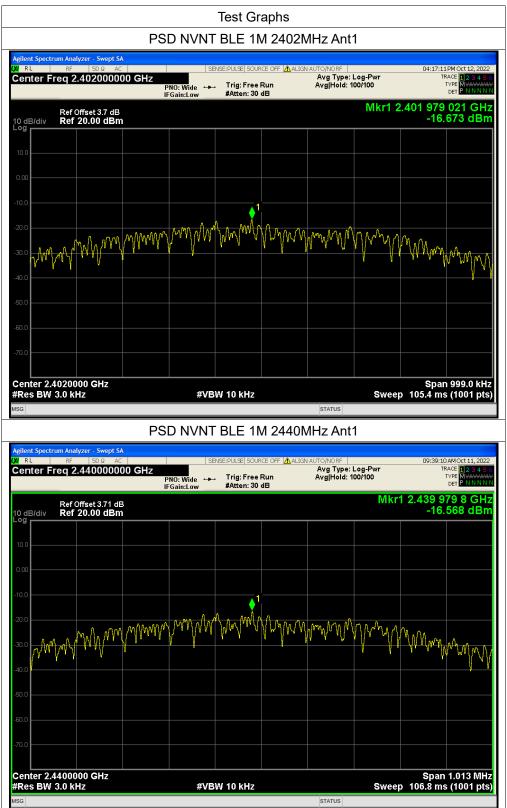
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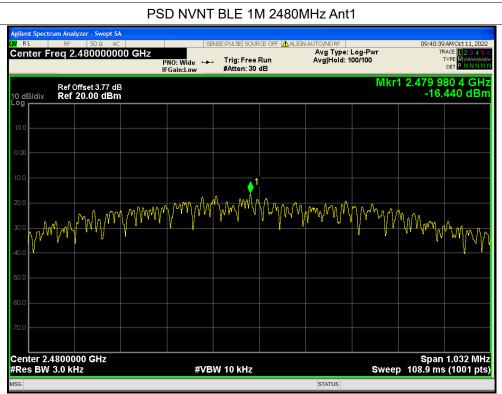




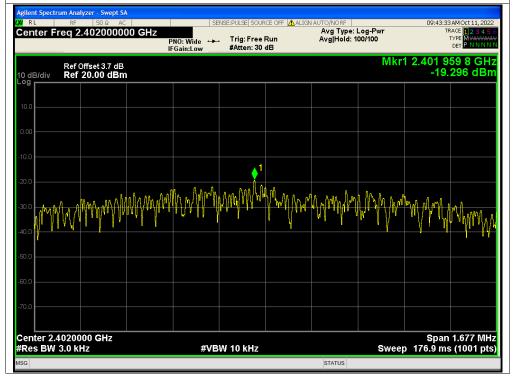
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#### PSD NVNT BLE 2M 2402MHz Ant1

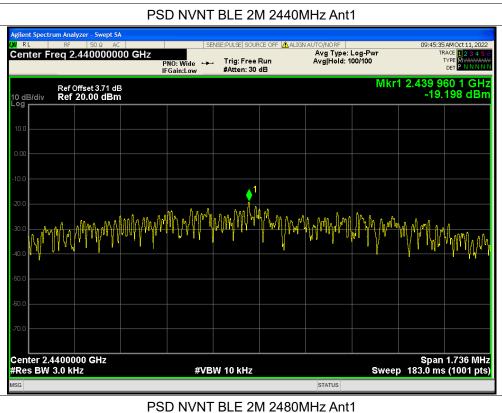




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# eilent Spectrum Analyzer - Swept SA RL E:PULSE SOURCE OFF 🔥 Center Freq 2.480000000 GHz Avg Type: Log-Pwr Avg|Hold: 100/100 PNO: Wide ---- Trig: Free Run IFGain:Low #Atten: 30 dB TYPE DE1 Mkr1 2.479 960 4 GHz -19.019 dBm Ref Offset 3.77 dB Ref 20.00 dBm 10 dB/div Ma Marina Man Man Man Marina Ma Center 2.4800000 GHz #Res BW 3.0 kHz Span 1.721 MHz Sweep 181.5 ms (1001 pts) #VBW 10 kHz STATUS



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### A.8. Conducted Emission

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

**Note:** Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

#### A. Test Setup:

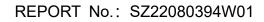
Test Mode: <u>EUT + Adapter + Earphone + BT TX</u> Test voltage: <u>AC 120V/60Hz</u> The measurement results are obtained as below: E [dB $\mu$ V] =U<sub>R</sub> + L<sub>Cable loss</sub> [dB] + A<sub>Factor</sub> U<sub>R</sub>: Receiver Reading A<sub>Factor</sub>: Voltage division factor of LISN



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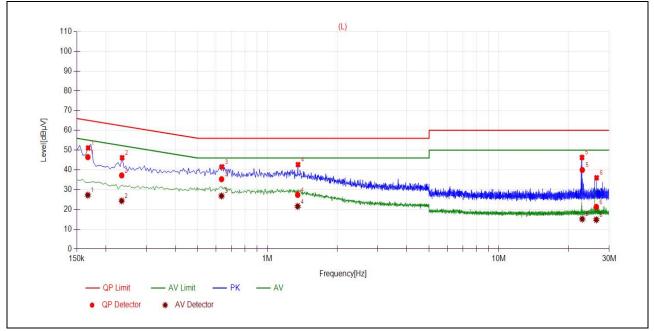
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#### B. Test Plot:



#### (L Phase)

No.	Fre.	Emission L	Emission Level (dBµV)		dBµV)	Power-line	Verdict
	(MHz)	Quai-peak	Average	Quai-peak	Average		
1	0.1674	46.46	27.22	65.09	55.09		PASS
2	0.2345	37.20	24.33	62.29	52.29		PASS
3	0.6334	35.27	26.80	56.00	46.00	Line	PASS
4	1.3514	27.32	21.55	56.00	46.00	Line	PASS
5	22.9462	39.95	15.12	60.00	50.00		PASS
6	26.3931	21.29	14.78	60.00	60.00 50.00		PASS



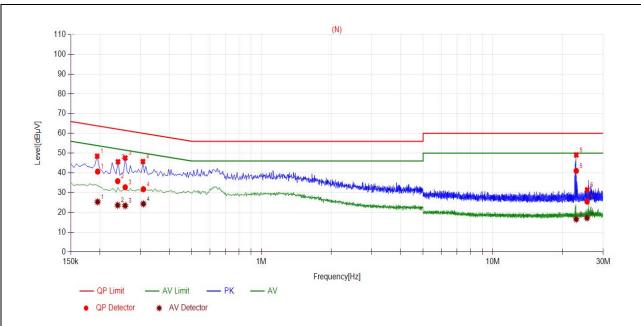
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(N	Phase)	
----	--------	--

No.	Fre.	Emission Level (dBµV)		Limit (	dBµV)	Power-line	Verdict
	(MHz)	Quai-peak	Average	Quai-peak	Quai-peak Average		
1	0.1959	40.66	25.33	63.78	53.78		PASS
2	0.2392	35.80	23.64	62.12	52.12		PASS
3	0.2577	32.73	23.41	61.50	51.50	Neutral	PASS
4	0.3089	31.75	24.31	60.00	50.00	neuliai	PASS
5	22.9420	41.03	16.56	60.00	50.00		PASS
6	25.5502	25.49	17.22	60.00	50.00		PASS



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### A.9. Restricted Frequency Bands

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$ 

A<sub>T</sub>: Total correction Factor except Antenna

U<sub>R</sub>: Receiver Reading

G<sub>preamp</sub>: Preamplifier Gain

A<sub>Factor</sub>: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

Channel	Frequency	Detector	Receiver Reading	A <sub>T</sub>	A <sub>Factor</sub>	Max. Emission	Limit	Verdict
	(MHz)	PK/ AV	U <sub>R</sub> (dBµV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	Voraiot
0	2359.90	PK	23.19	6.74	27.20	57.13	74	PASS
0	2389.54	AV	10.45	6.74	27.20	44.39	54	PASS
39	2495.40	PK	23.55	6.74	27.20	57.49	74	PASS
39	2483.59	AV	10.02	6.74	27.20	43.96	54	PASS

#### 1Mbps



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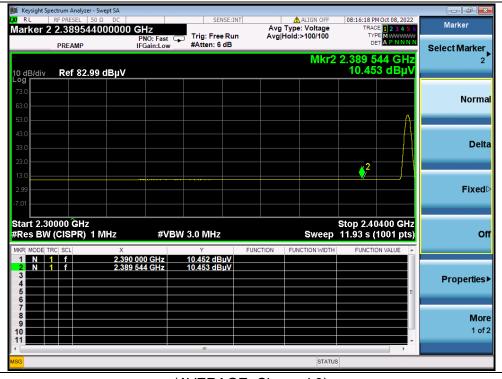
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							1		n Analyzer - S		
Marker	Oct 08, 2022 <b>123456</b> MWWWWW	TRAC	ALIGN OFF ype: Voltage old:>100/100	Avg Avg	SE:INT	Trig: Free	GHz PNO: Fast	000000	RESEL 50 9		<sup>RL</sup> arker
Select Marker		DE				#Atten: 6	IFGain:Low		EAMP	PR	
2	04 GHz 1 dBµV	2.359 9 23.19	Mkr2					∋dBµV	ef 82.99	R	dB/div
Norma											
Norma	n										3.0 <b></b>
											3.0
Delta		1		2							3.0
	enner f	••,	-h-+#4-17/1-h			na fadin din din kanalang	all and a share of the second s	ayan da kana tang sa	Jan Maria Maria	urra larr	3.0 <b></b> 3.0 <b></b>
Fixed											.99
Of	400 GHz 1001 pts)	Stop 2.40 .000 ms ('	Sweep 1			3.0 MHz	#VBW	MHz	) GHz SPR) 1 I		art 2.: Res Bl
	N VALUE	FUNCTIO	FUNCTION WIDTH	NCTION		Y		Х	_		R MODE
						22.074 dB 23.191 dB	000 GHz 904 GHz	2.390 (		1	1 N 2 N
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	=										6 7
More											B
1 of 2	-										0
	•					m					
		3	STATU								3

(PEAK, Channel 0)



### (AVERAGE, Channel 0)

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								sight Spectrum
6 Marker	08:22:03 PM Oct 08, 2022 TRACE 123456 TYPE MWWWWW	ALIGN OFF Type: Voltage Hold:>100/100	A	SENSE:I		00000 GH	ESEL 50 Ω 9540200	
Select Marker	DET P P N N N N		n A	#Atten: 6 dB	IO: Fast 😱 Gain:Low		AMP	PRE
2	2.495 402 GHz 23.554 dBµV	Mkr2				IBμV	f 82.99 c	3/div <b>R</b> e
Norma								
Norma								
Delta	2					1		
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Fixed▷								
							011-	2.47800
Off	Stop 2.50000 GHz 000 ms (1001 pts)	Sweep 1.		.0 MHz	#VBW	Hz		5 BW (CIS
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	γ 1.127 dBμV		× 2.483 50	L	IODE TRC SC
_				3.554 dBµV		2.495 402		N 1 f
Properties▶	E							
More								
1 of 2	-							
	•	STATUS		III				

## (PEAK, Channel 39)



## (AVERAGE, Channel 39)

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#### 2Mbps

Channel	Frequency	Detector	Receiver Reading	A <sub>T</sub>	A <sub>Factor</sub>	Max. Emission	Limit	Verdict
Onanner	(MHz)	PK/ AV	U <sub>R</sub> (dB) (dBµV)		(dB@3m)	E (dBµV/m)	(dBµV/m)	Verdice
0	2386.53	PK	22.98	6.74	27.20	56.92	74	PASS
0	2387.88	AV	10.46	6.74	27.20	44.40	54	PASS
39	2488.03	PK	22.88	6.74	27.20	56.82	74	PASS
39	2483.65	AV	10.06	6.74	27.20	44.00	54	PASS

larker 2	RF PRESEL 50 2 2.386528 PREAMP	000000 G	HZ NO: Fast Gain:Low				ALIGN OFF e: Voltage :>100/100	TRA T)	PM Oct 08, 2022 CE 123456 (PE MWWWWW DET PPNNNN	Marker Select Marker	
0 dB/div og	Ref 82.99	dBµV					Mkr2	2.386 22.98	528 GHz 33 dBµV	2	
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53.0 <b></b> 43.0 <b></b>											
33.0 23.0	netteretere			an all ann the same the short	<sup>ก</sup> ัดรับ <sup>1</sup> -ฟักษณฑิสารปกล	at own and a way a law to be	alara, and the star	2 √ <sup>1</sup>		Delt	
3.0 2.99										Fixed	
Res BW	0000 GHz (CISPR) 1		#VB	W 3.0 MHz			-	.000 ms	0400 GHz (1001 pts)	O	
3 4		× 2.390 00 2.386 52	0 GHz 8 GHz	Y 21.073 d⊟ 22.983 d⊟			VCTION WIDTH	FUNCT	ION VALUE	Properties	
5 6 7 8										Mor	
9										1 of	

(PEAK, Channel 0)



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- F ×								nalyzer - Swept SA		
Marker	E 1 2 3 4 5 6	TRAC	ALIGN OFF Type: Voltage Hold:>100/100	Avg	SENSE:II	Triat		EL 50 Ω DC 788000000		x <mark>/</mark> RL Marke
Select Marker	APNNNN	DE	1010.2100/100	Avg	n: 6 dB		PNO: Fast IFGain:Low	MP	PREA	
2	80 GHz 8 dBµV	2.387 8 10.45	Mkr2					82.99 dBµV	div Ref	10 dB/c
Norma										73.0
Norma										63.0 53.0
	$- \wedge$									43.0
Delta										33.0 —
		<mark>♦</mark> 21								23.0
Fixed										2.99
										-7.01
Of	1400 GHz 1001 pts)	Stop 2.40 11.93 s (	Sweep		IHz	BW 3.0 N	#V	GHZ PR) 1 MHZ	2.30000 BW (CISI	
	ON VALUE	FUNCTIO	FUNCTION WIDTH	FUNCTION	dBuV	Y 10 443	0 000 GHz	×		MKR MO
Properties					B dBµV	10.458	37 880 GHz	2.3	1 f	2 N 3
Troperaco	E									4 5 6
Mor										7 8
1 of:										9 10 11
	•									•
		3	STATUS							SG

(AVERAGE, Channel 0)



(PEAK, Channel 39)

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		07:59:21 PM Oct 08, 2	ALIGN OFF		SENSE:		DC	Analyzer - Swe ESEL 50 Ω	RF PI	RL .
Marker Select Marker	456 WWW NNN	TRACE 1 2 3 4 TYPE MWWW DET A P N N	Type: Voltage  Hold:>100/100		Trig: Free Ru #Atten: 6 dB	HZ NO: Fast Gain:Low		8365400		ke
2	iHz μV	2.483 654 GI 10.063 dBj	Mkr2				lBµV	ef 82.99 d	v R	B/d
Norm										ŀF
De										
							<u>/</u> 2			$\neq$
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c		Stop 2.50000 G 2.523 s (1001 p			V 3.0 MHz	#VI	Hz	GHz PR) 1 M	47800 W (CI	
		FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	۲ 10.047 dBµV	0 GHz	× 2.483 50		TRC S	MOD N
Propertie					10.063 dBµV	4 GHz	2.483 65			N
	E									
<b>M</b> c 1 c										
	+	,								
		3	STATUS							

(AVERAGE, Channel 39)



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### A.10. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$ 

A<sub>T</sub>: Total correction Factor except Antenna

U<sub>R</sub>: Receiver Reading

G<sub>preamp</sub>: Preamplifier Gain

A<sub>Factor</sub>: Antenna Factor at 3m

During the test, the total correction Factor  $A_T$  and  $A_{Factor}$  were built in test software.

**Note1:** All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

**Note2:** For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

**Note3:** For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

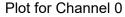


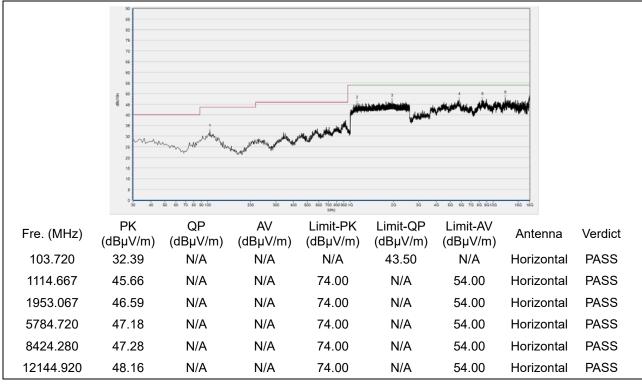
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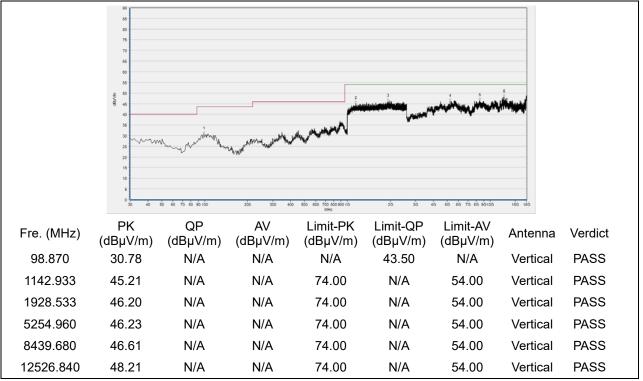


#### 1Mbps





(Antenna Horizontal, 30MHz to 18GHz)



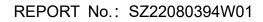
(Antenna Vertical, 30MHz to 18GHz)



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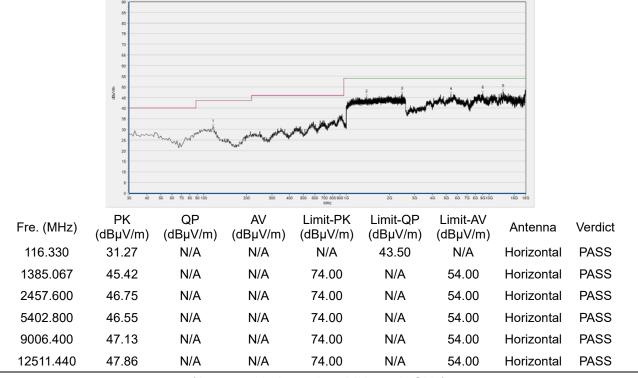
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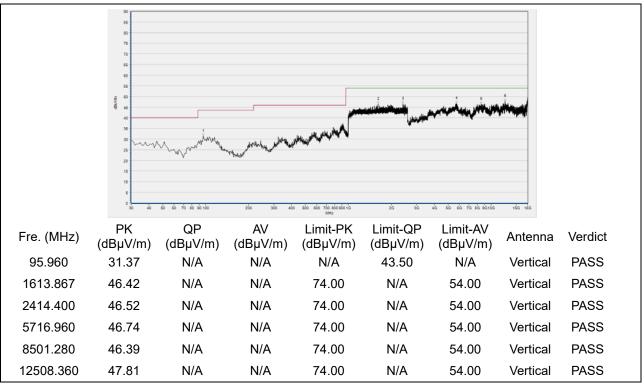




#### Plot for Channel 19



(Antenna Horizontal, 30MHz to 18GHz)



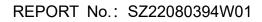
(Antenna Vertical, 30MHz to 18GHz)



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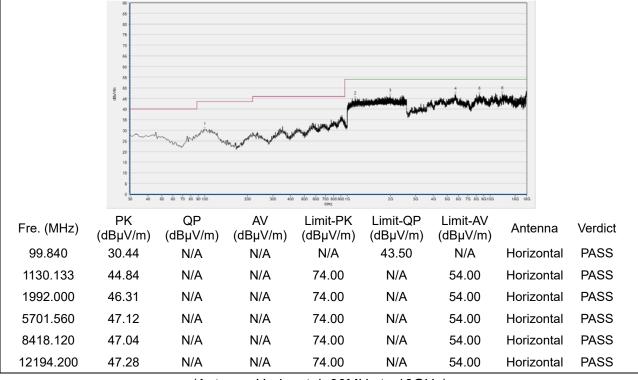
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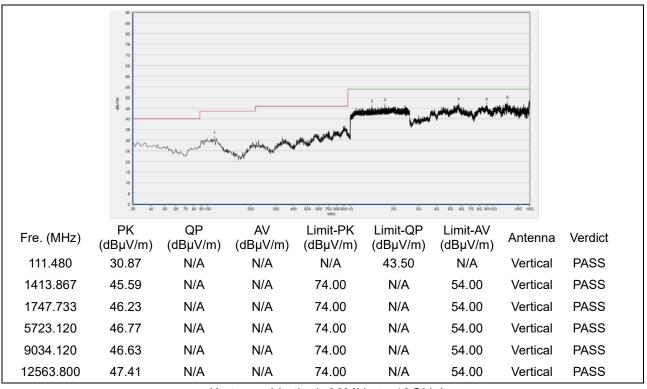




#### Plot for Channel 39



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



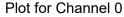
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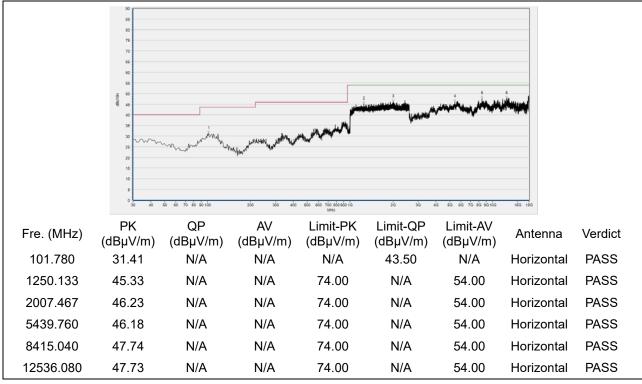
Fax: 86-755-36698525 E-mail: service@morlab.cn

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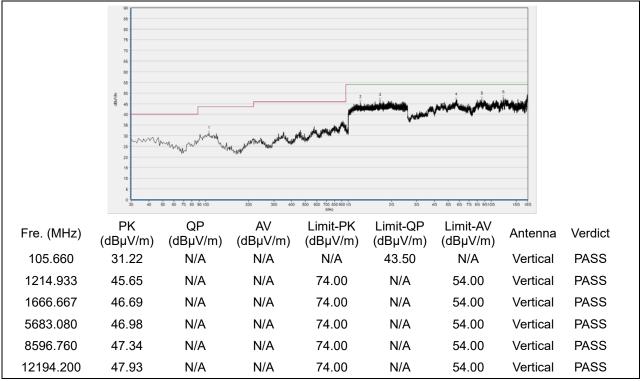


#### 2Mbps





(Antenna Horizontal, 30MHz to 18GHz)



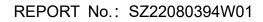
(Antenna Vertical, 30MHz to 18GHz)



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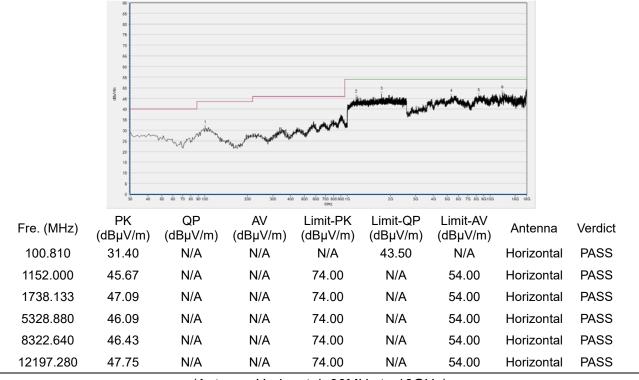
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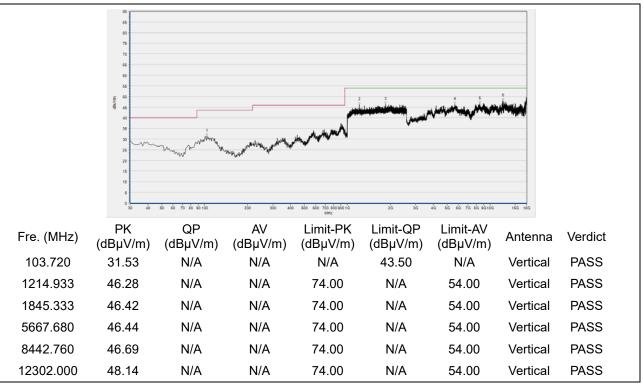




#### Plot for Channel 19



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



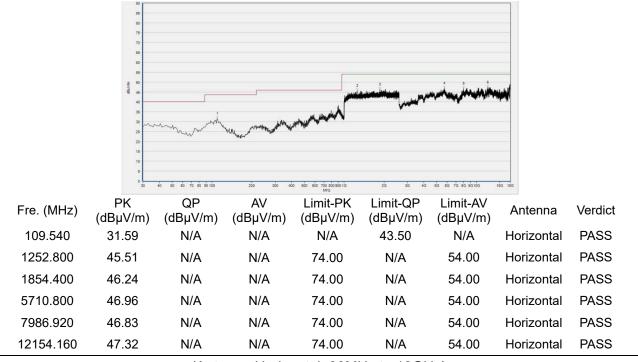
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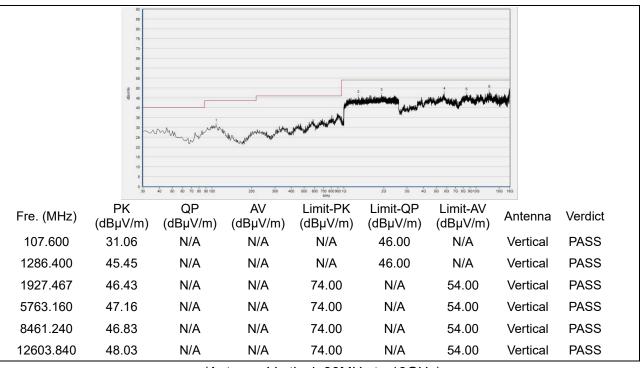
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#### Plot for Channel 39



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

#### END OF REPORT



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