

# FCC Radio Test Report

## FCC ID: RWO-RC30030702

**This report concerns: Original Grant**

**Project No.** : 1907C135  
**Equipment** : Mechanical Keyboard  
**Brand Name** : RAZER  
**Test Model** : RC30-030702  
**Series Model** : N/A  
**Applicant** : Razer Inc.  
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**Manufacturer** : Razer (Asia-Pacific) Pte.,Ltd.  
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**Date of Receipt** : Jul. 25, 2019  
**Date of Test** : Jul. 29, 2019 ~ Sep. 29, 2019  
**Issued Date** : Apr. 17, 2020  
**Report Version** : R01  
**Test Sample** : Engineering Sample No.: DG190726119 for conducted, DG190726121 for radiated.  
**Standard(s)** : FCC Part15, Subpart C (15.247)  
ANSI C63.10-2013  
FCC KDB 558074 D01 DTS Meas Guidance v05r02

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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**REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Oct. 12, 2019
R01	Changed the product name, the address of applicant.	Apr. 17, 2020

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part15, Subpart C (15.247)				
Standard(s) Section	Test Item	Test Result	Judgment	Remark
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS	-----
15.247(a)(2)	Bandwidth	APPENDIX E	PASS	-----
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX G	PASS	-----
15.247(e)	Power Spectral Density	APPENDIX H	PASS	-----
15.203	Antenna Requirement	-----	PASS	Note(2)

NOTE:

- (1)" N/A" denotes test is not applicable to this device.
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

## 1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's Test Firm Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

## 1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

The BTL measurement uncertainty as below table:

A. AC power line conducted emissions Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 kHz ~ 30 MHz	2.32

B. Radiated emissions Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB03	CISPR	9kHz ~ 30MHz	V	3.79
		9kHz ~ 30MHz	H	3.57
		30MHz ~ 200MHz	V	4.88
		30MHz ~ 200MHz	H	4.14
		200MHz ~ 1,000MHz	V	4.62
		200MHz ~ 1,000MHz	H	4.80
		1GHz ~ 6GHz	-	4.58
		6GHz ~ 18GHz	-	5.18
		18GHz ~ 26.5GHz	-	3.80
		26.5GHz ~ 40GHz	-	4.30

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

## 1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	25°C	53%	AC 120V/60Hz	Laughing Zhang
Radiated Emissions -9K-30MHz	25°C	60%	DC 5V	Laughing Zhang
Radiated Emissions -30 MHz to 1GHz	24°C	68%	DC 5V	Berton Luo
Radiated Emissions -Above 1000 MHz	24°C	68%	DC 5V	Berton Luo
Bandwidth	24°C	60%	DC 3.7V	Jonas Chen
Maximum Output Power	24°C	60%	DC 3.7V	Jonas Chen
Conducted Spurious Emission	24°C	60%	DC 3.7V	Jonas Chen
Power Spectral Density	24°C	60%	DC 3.7V	Jonas Chen

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Mechanical Keyboard
Brand Name	RAZER
Test Model	RC30-030702
Series Model	N/A
Model Difference(s)	The system's model name is RZ03-0307XXXX-XXXX (X: Can be 0-9, A-Z), and the system is contain a Mechanical Keyboard (Model name: RC30-030702) and USB Dongle (Model name: DGRFG6).
Hardware Version	Ver:1.6
Software Version	Ver:1.0.0.2
Power Source	1# Supplied from USB port. 2# Supplied from battery.
Power Rating	1# DC 5V, 1200mA 2# DC 3.7V, 1100mAh
Operation Frequency	2403 MHz ~ 2479 MHz
Modulation Technology	GFSK
Bit Rate of Transmitter	2 Mbps
Max. Output Power	1.77 dBm (0.0015 W)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

## 2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2403	27	2429	53	2455
02	2404	28	2430	54	2456
03	2405	29	2431	55	2457
04	2406	30	2432	56	2458
05	2407	31	2433	57	2459
06	2408	32	2434	58	2460
07	2409	33	2435	59	2461
08	2410	34	2436	60	2462
09	2411	35	2437	61	2463
10	2412	36	2438	62	2464
11	2413	37	2439	63	2465
12	2414	38	2440	64	2466
13	2415	39	2441	65	2467
14	2416	40	2442	66	2468
15	2417	41	2443	67	2469
16	2418	42	2444	68	2470
17	2419	43	2445	69	2471
18	2420	44	2446	70	2472
19	2421	45	2447	71	2473
20	2422	46	2448	72	2474
21	2423	47	2449	73	2475
22	2424	48	2450	74	2476
23	2425	49	2451	75	2477
24	2426	50	2452	76	2478
25	2427	51	2453	77	2479
26	2428	52	2454		

## 3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	3.24

## 2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>
Mode 2	TX Mode Channel 01

Following mode(s) as (were) found to be the worst case(s) and selected for the final test.

<b>AC power line conducted emissions test</b>	
Final Test Mode	Description
Mode 2	TX Mode Channel 01

<b>Radiated emissions test - Below 1GHz</b>	
Final Test Mode	Description
Mode 2	TX Mode Channel 01

<b>Radiated emissions test - Above 1GHz</b>	
Final Test Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>

<b>Conducted test</b>	
Final Test Mode	Description
Mode 1	TX Mode <b>NOTE (1)</b>

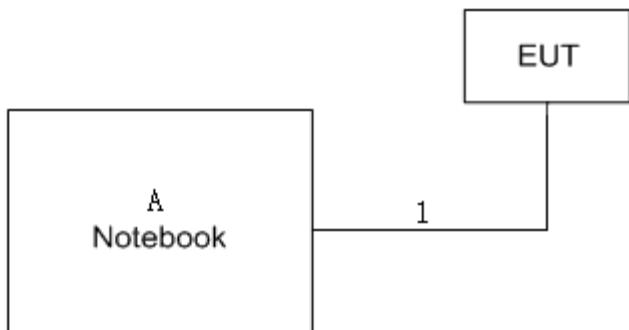
Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) For radiated emission above 1 GHz test, 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

### 3.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test Software Version	N/A		
Frequency (MHz)	2403	2440	2479
Parameters	N/A	N/A	N/A

**3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED****3.5 DESCRIPTION OF SUPPORT UNITS**

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model No.	Series No.
A	Notebook	ASUS	K45VD	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	NO	NO	0.8m

### 3. AC POWER LINE CONDUCTED EMISSIONS TEST

#### 3.1 LIMIT

Frequency of Emission (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56*	56 to 46*
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

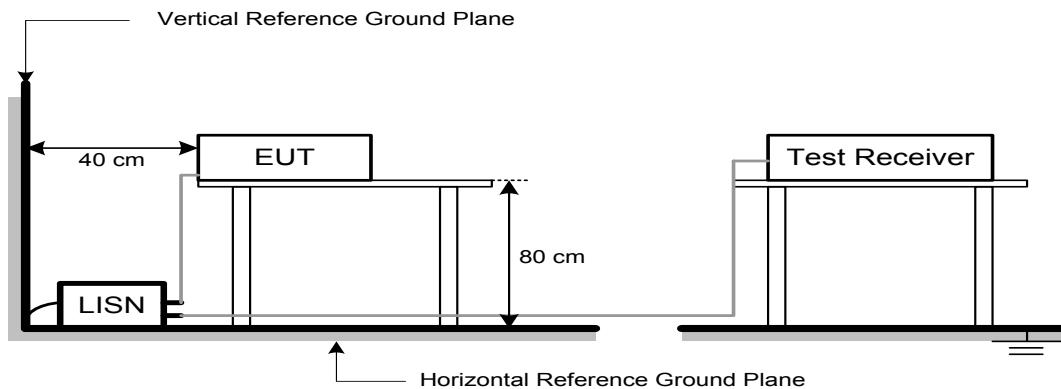
#### 3.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.4 TEST SETUP



### 3.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

### 3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a “\*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.

## 4. RADIATED EMISSION TEST

### 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

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

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

#### Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1 MHz VBW 3 MHz peak detector for Pk value RMS detector for AV value

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector

#### 4.2 TEST PROCEDURE

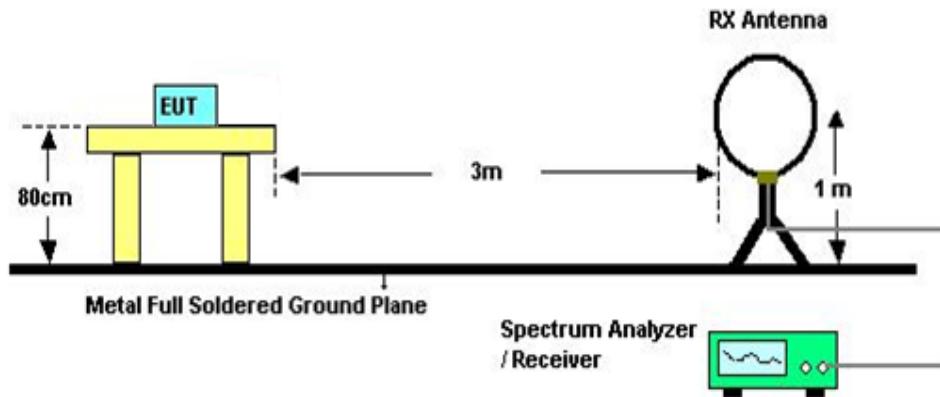
- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1 GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.3 DEVIATION FROM TEST STANDARD

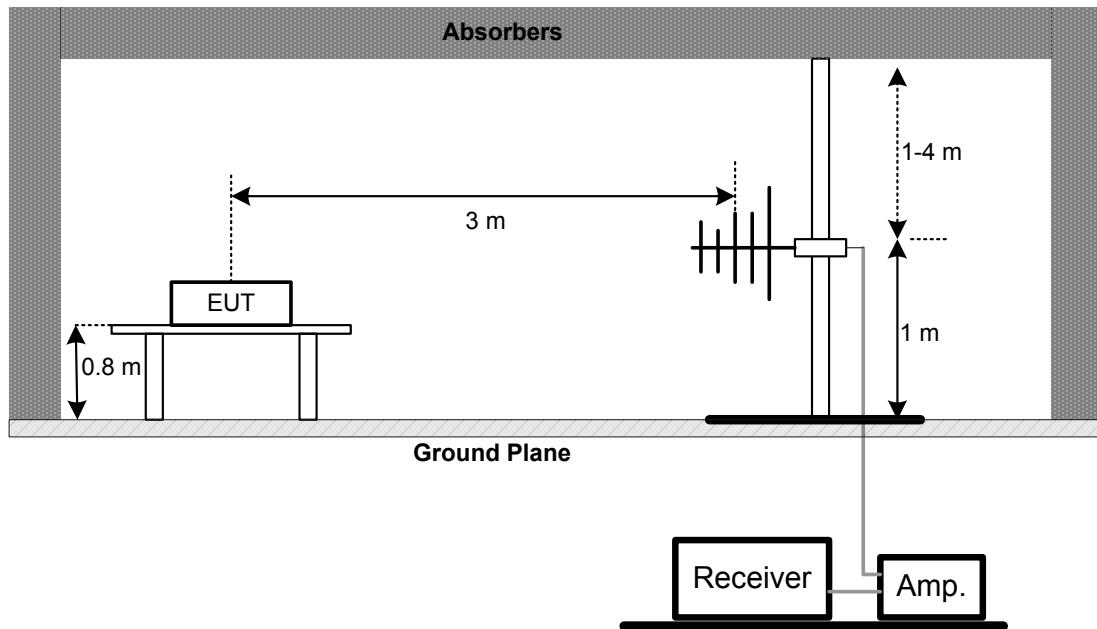
No deviation

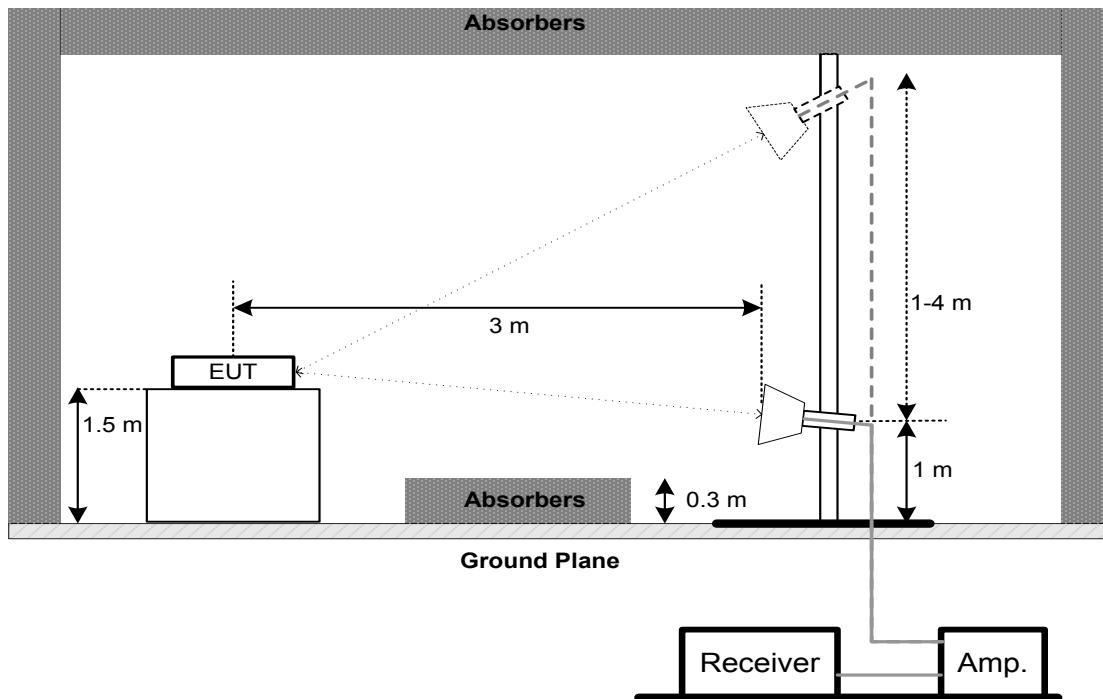
#### 4.4 TEST SETUP

**9 kHz-30 MHz**



**30 MHz to 1 GHz**



**Above 1 GHz****4.5 EUT OPERATING CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

**4.6 TEST RESULT - 9 kHz TO 30 MHz**

Please refer to the APPENDIX B.

Remark:

- (1) Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

**4.7 TEST RESULT - 30 MHz TO 1000 MHz**

Please refer to the APPENDIX C

**4.8 TEST RESULT - ABOVE 1000 MHz**

Please refer to the APPENDIX D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.  
For fundamental signal judgment was referred to Peak output test.

## 5. BANDWIDTH TEST

### 5.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(2)	6 dB Bandwidth	Minimum 500 kHz

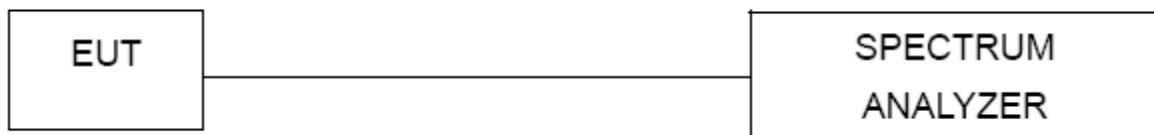
### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100 kHz, VBW=300 kHz, Sweep time = 2.5 ms.
- c. The bandwidth was performed in accordance with method 11.8.1 of ANSI C63.10-2013.

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 5.6 TEST RESULTS

Please refer to the APPENDIX E.

## 6. MAXIMUM OUTPUT POWER

### 6.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(b)(3)	Maximum Output Power	1 watt or 30 dBm

### 6.2 TEST PROCEDURE

- The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- The maximum conducted output power was performed in accordance with method 11.9.1.3 of ANSI C63.10-2013.

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



### 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 6.6 TEST RESULTS

Please refer to the APPENDIX F.

## 7. CONDUCTED SPURIOUS EMISSION

### 7.1 LIMIT

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 Output Power limits. If the transmitter complies with the Output 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 Section 15.209(a) is not required.

### 7.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting : RBW= 100 kHz, VBW=300 kHz, Sweep time = 10 ms.

### 7.3 DEVIATION FROM STANDARD

No deviation.

### 7.4 TEST SETUP



### 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 7.6 TEST RESULTS

Please refer to the APPENDIX G.

## 8. POWER SPECTRAL DENSITY TEST

### 8.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

### 8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=3 kHz, VBW=10 kHz, Sweep time = Auto.
- c. The Power Spectral Density was performed in accordance with method 11.10.2 of ANSI C63.10-2013.

### 8.3 DEVIATION FROM STANDARD

No deviation.

### 8.4 TEST SETUP



### 8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

### 8.6 TEST RESULTS

Please refer to the APPENDIX H.

**9. MEASUREMENT INSTRUMENTS LIST**

<b>AC Power Line Conducted Emissions</b>					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100382	Mar. 10, 2020
2	LISN	EMCO	3816/2	52765	Mar. 10, 2020
3	50ohm Terminator	SHX	TF5-3	15041305	Mar. 10, 2020
4	Artificial-Mains Network	Schwarzbeck	NSLK 8127	8127685	Mar. 10, 2020
5	TRANSIENT LIMITER	EM	EM-7600	772	Mar. 10, 2020
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
7	Cable	N/A	RG223	12m	Mar. 12, 2020

<b>Radiated Emissions - 9 kHz to 30 MHz</b>					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Loop Antenna	EM	EM-6876-1	230	Jan. 15, 2020
2	Cable	N/A	RG 213/U	C-102	May 31, 2020
3	EMI Test Receiver	R&S	ESCI	100895	Mar. 10, 2020
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

<b>Radiated Emissions - 30 MHz to 1 GHz</b>					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2020
2*	Amplifier	HP	8447D	2944A09673	Aug. 11, 2021
3	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020
4	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	May 24, 2020
5	Controller	CT	SC100	N/A	N/A
6	Controller	MF	MF-7802	MF780208416	N/A
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

<b>Radiated Emissions - Above 1 GHz</b>					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 09, 2020
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 23, 2020
3	Amplifier	Agilent	8449B	3008A02333	Mar. 10, 2020
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 10, 2020
5	Receiver	Agilent	N9038A	MY52130039	Aug. 03, 2020
6	Controller	CT	SC100	N/A	N/A
7	Controller	MF	MF-7802	MF780208416	N/A
8	Cable	mitron	B10-01-01-12M	18072744	Jun. 29, 2020
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

**Bandwidth &  
Power Spectral Density**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Aug. 03, 2020

**Maximum Output Power**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Peak Power Analyzer	Keysight	8990B	MY51000506	Aug. 03, 2020
2	Wideband power sensor	Keysight	N1923A	MY58310004	Aug. 03, 2020

Remark: "N/A" denotes no model name, serial no. or calibration specified.

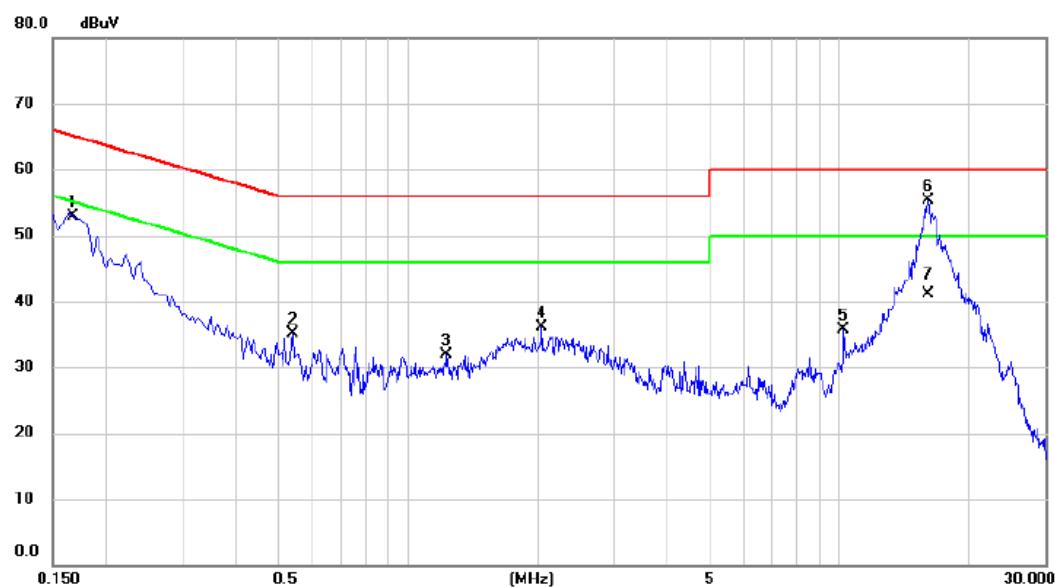
"\*" calibration period of equipment list is three year.

Except \* item, all calibration period of equipment list is one year.

**APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**

Test Mode: TX Mode Channel 01

## Line

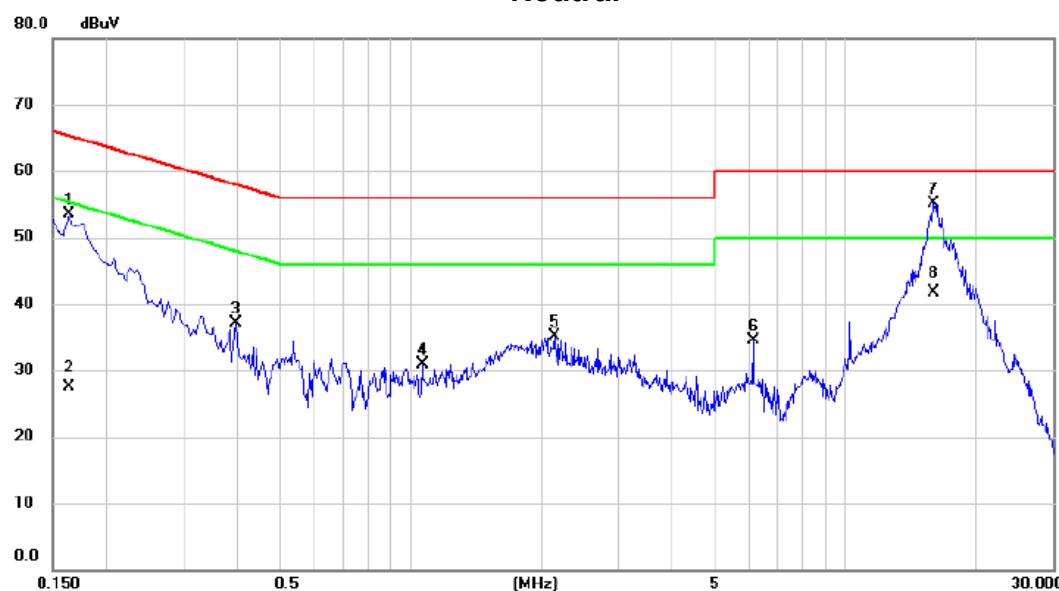


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Margin Detector	Comment
1		0.1668	43.13	9.82	52.95	65.12	-12.17	peak
2		0.5415	25.16	9.88	35.04	56.00	-20.96	peak
3		1.2300	21.96	9.94	31.90	56.00	-24.10	peak
4		2.0445	26.20	10.00	36.20	56.00	-19.80	peak
5		10.2390	25.25	10.51	35.76	60.00	-24.24	peak
6	*	16.0935	44.53	10.83	55.36	60.00	-4.64	peak
7		16.0935	30.30	10.83	41.13	50.00	-8.87	AVG

## REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 01

**Neutral**

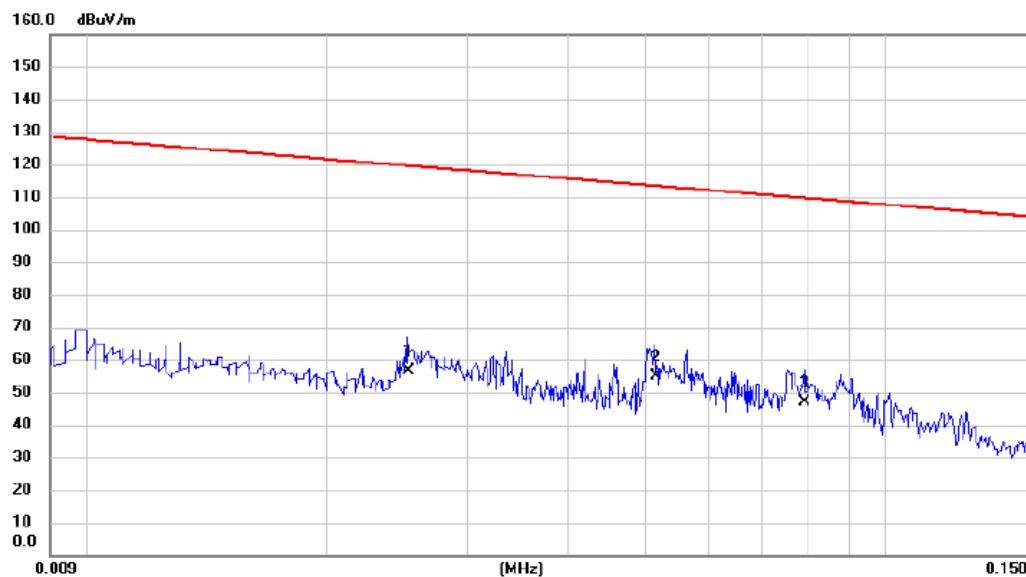
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dB			
1		0.1635	43.57	9.91	53.48	65.28	-11.80	peak	
2		0.1635	17.58	9.91	27.49	55.28	-27.79	AVG	
3		0.3975	27.17	10.01	37.18	57.91	-20.73	peak	
4		1.0635	20.80	10.12	30.92	56.00	-25.08	peak	
5		2.1480	24.99	10.20	35.19	56.00	-20.81	peak	
6		6.1440	24.03	10.51	34.54	60.00	-25.46	peak	
7	*	15.9540	43.92	11.16	55.08	60.00	-4.92	peak	
8		15.9540	30.51	11.16	41.67	50.00	-8.33	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

**APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ**

Test Mode: TX Mode Channel 01

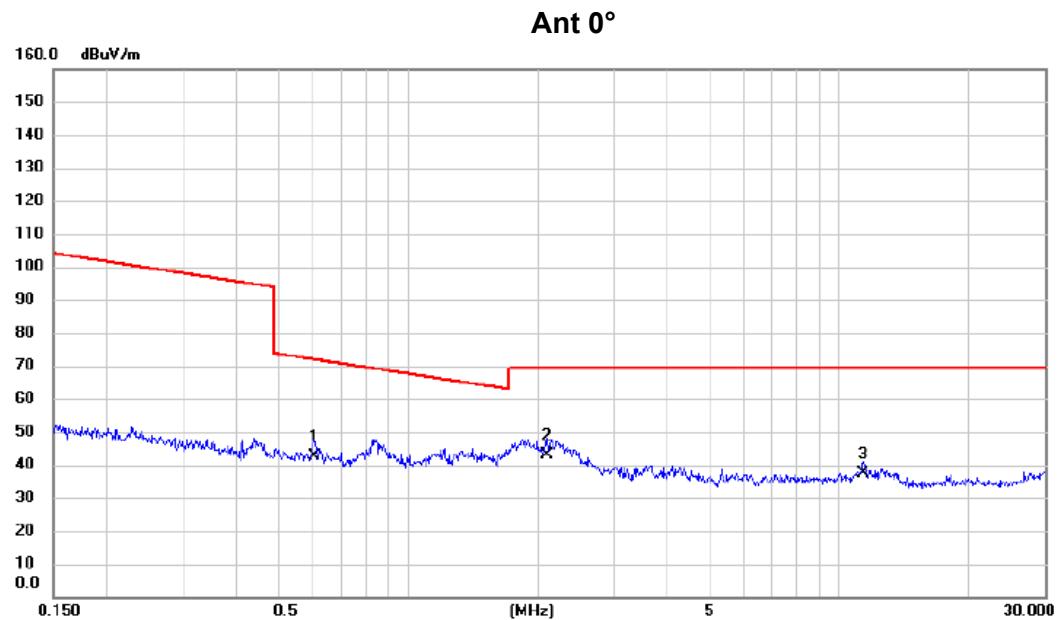
**Ant 0°**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.0253	42.87	13.84	56.71	119.54	-62.83	AVG	
2	*	0.0515	41.18	13.91	55.09	113.37	-58.28	AVG	
3		0.0790	33.64	13.54	47.18	109.65	-62.47	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 01

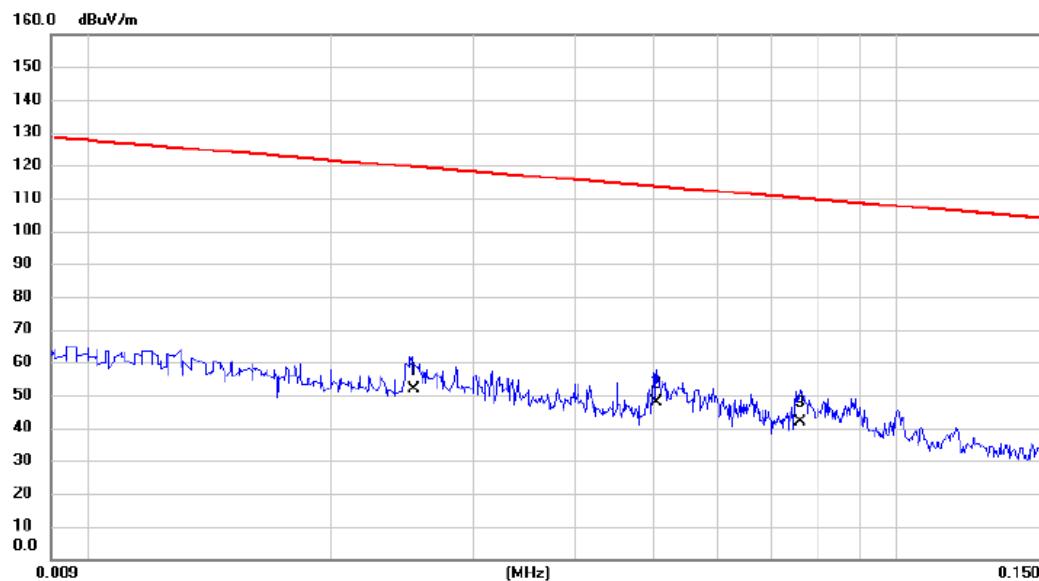


No. Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector	Comment
		dBuV	dB	dBuV/m	dBuV/m	dB		
1	0.6075	29.89	12.86	42.75	71.93	-29.18	QP	
2 *	2.0990	31.27	11.76	43.03	69.54	-26.51	QP	
3	11.3771	25.64	11.61	37.25	69.54	-32.29	QP	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 01

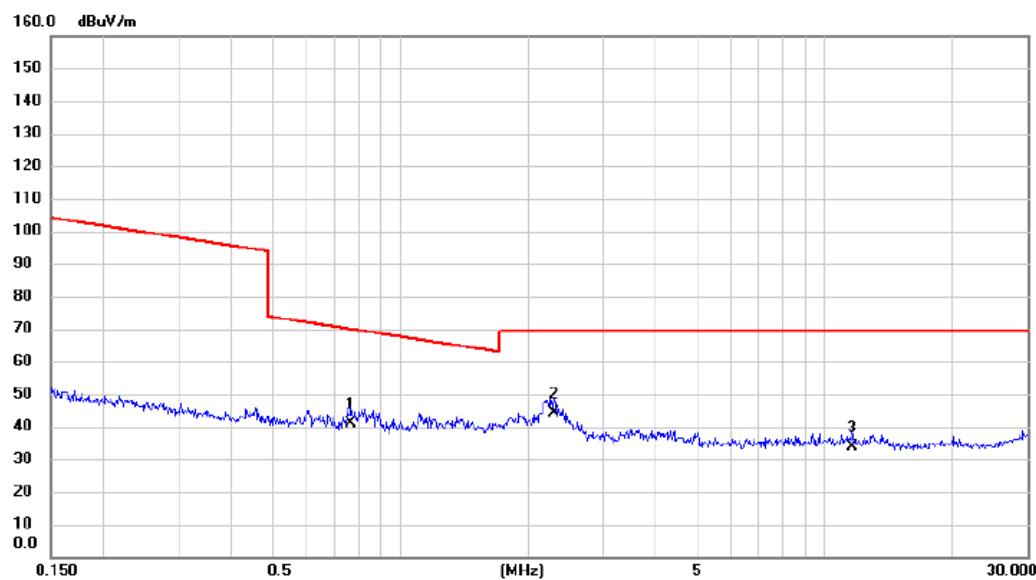
**Ant 90°**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		0.0253	37.94	13.84	51.78	119.54	-67.76	AVG	
2	*	0.0505	33.79	13.92	47.71	113.54	-65.83	AVG	
3		0.0760	28.14	13.53	41.67	109.99	-68.32	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 01

**Ant 90°**

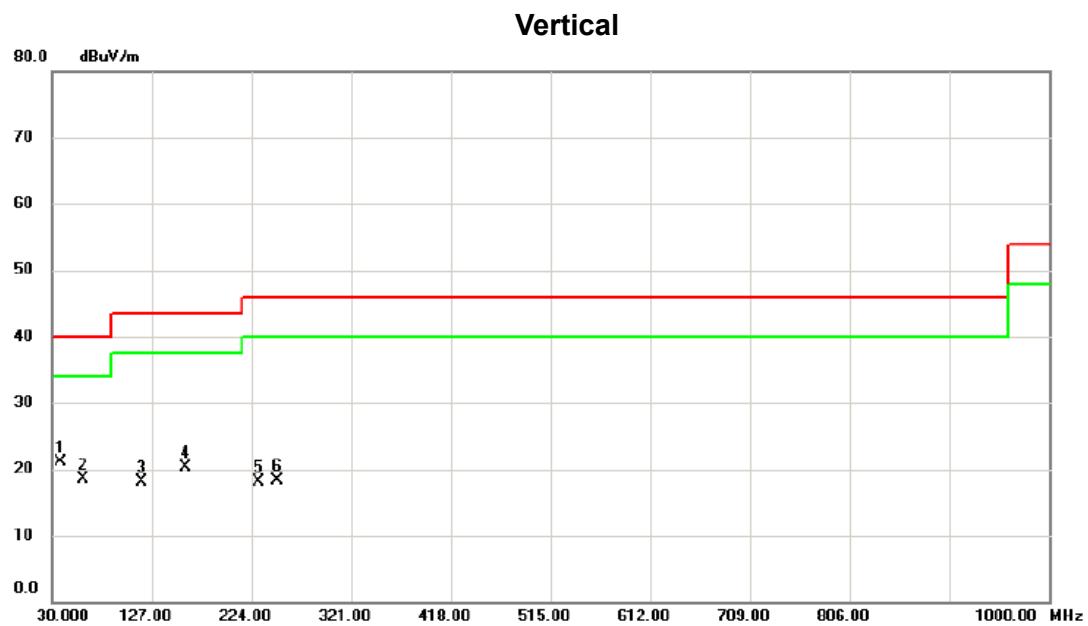
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1		0.7670	28.61	12.57	41.18	69.91	-28.73	QP
2	*	2.2968	32.57	11.64	44.21	69.54	-25.33	QP
3		11.6208	22.27	11.61	33.88	69.54	-35.66	QP

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

**APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ**

Test Mode: TX Mode Channel 01

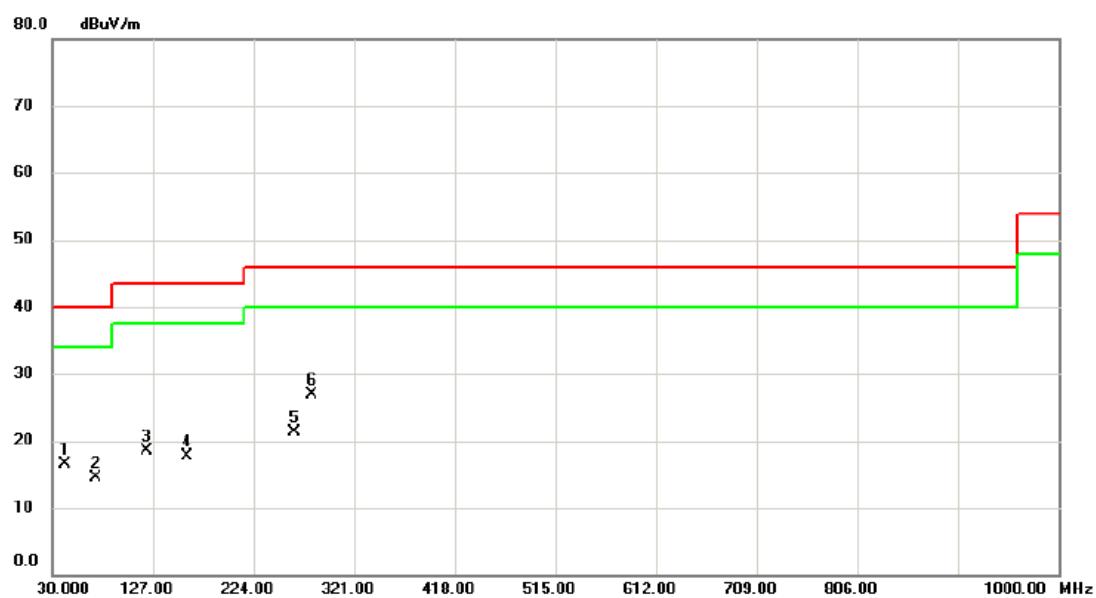


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	38.730	35.48	-14.30	21.18	40.00	-18.82	peak
2		60.070	33.43	-14.84	18.59	40.00	-21.41	peak
3		117.300	31.60	-13.43	18.17	43.50	-25.33	peak
4		159.980	31.30	-11.00	20.30	43.50	-23.20	peak
5		231.275	32.40	-14.23	18.17	46.00	-27.83	peak
6		248.735	32.11	-13.77	18.34	46.00	-27.66	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode: TX Mode Channel 01

**Horizontal**

No.	Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit dB	Margin Detector	Comment
			dBuV	dB	dBuV/m			
1		42.610	30.96	-14.49	16.47	40.00	-23.53	peak
2		71.710	31.00	-16.54	14.46	40.00	-25.54	peak
3		121.180	31.60	-13.03	18.57	43.50	-24.93	peak
4		159.980	28.69	-11.00	17.69	43.50	-25.81	peak
5		263.770	34.06	-12.81	21.25	46.00	-24.75	peak
6 *		279.775	39.56	-12.62	26.94	46.00	-19.06	peak

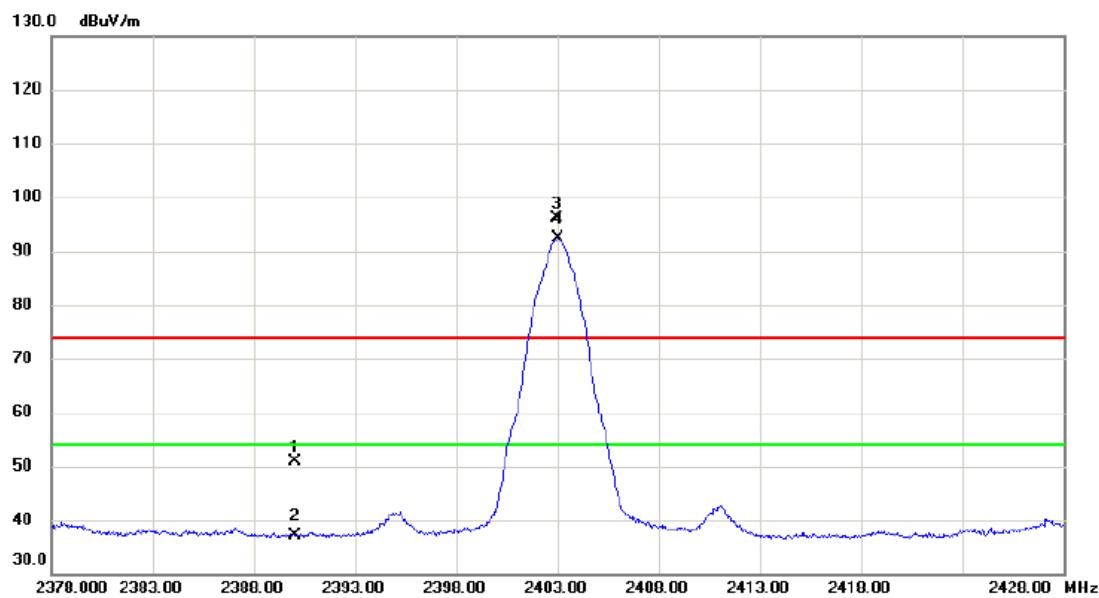
**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

**APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ**

Test Mode TX 2403 MHz\_CH 01

## Vertical

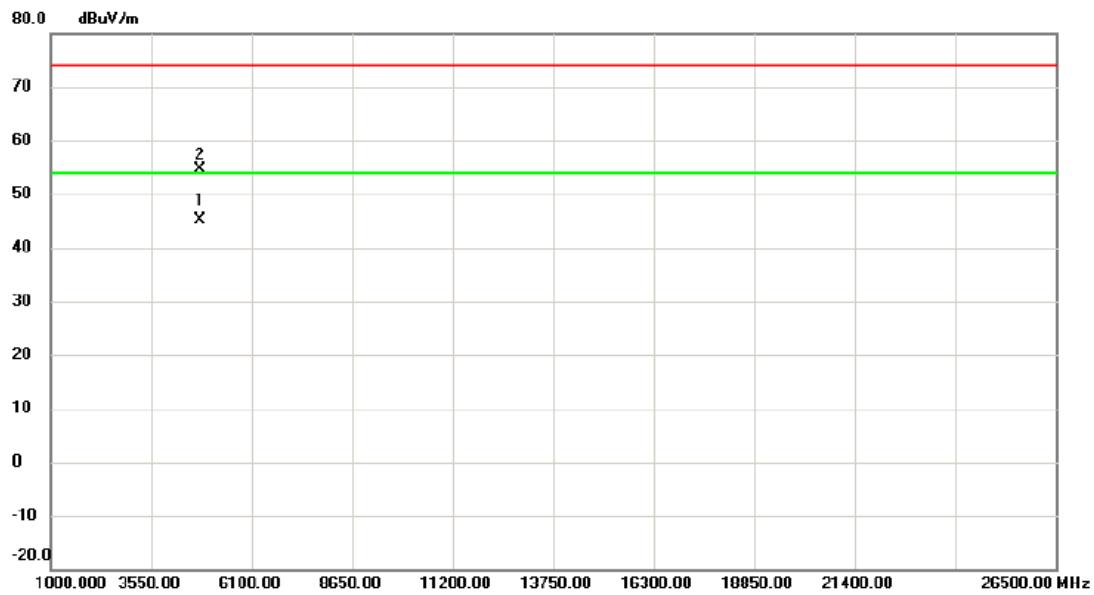


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	44.34	6.53	50.87	74.00	-23.13	peak	
2		2390.000	30.66	6.53	37.19	54.00	-16.81	AVG	
3	X	2402.975	89.61	6.51	96.12	74.00	22.12	peak	No Limit
4	*	2403.000	85.80	6.51	92.31	54.00	38.31	AVG	No Limit

## REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2403 MHz\_CH 01

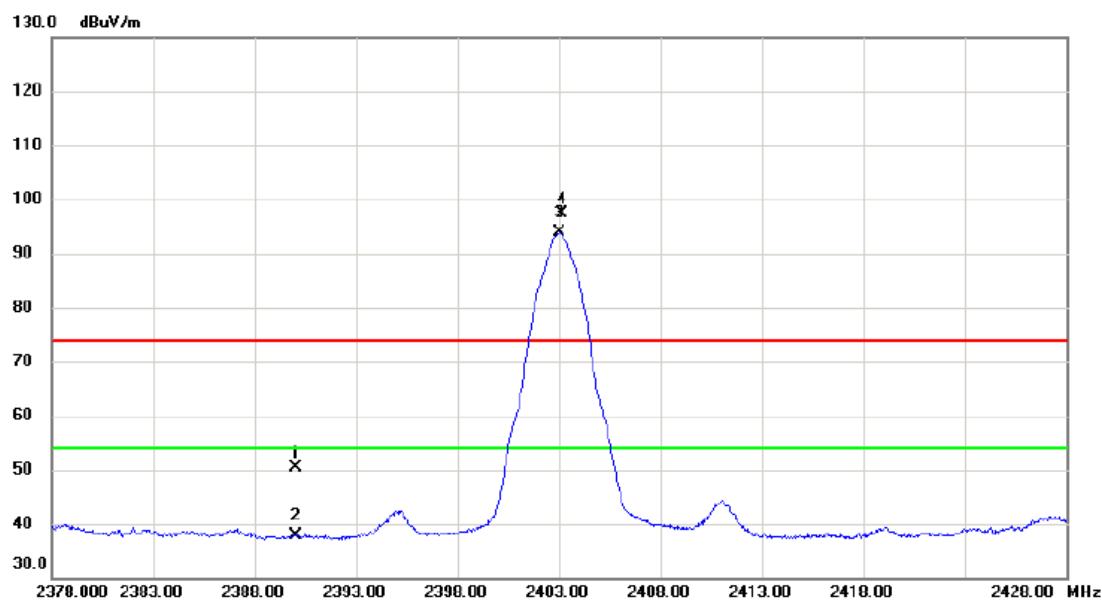
**Vertical**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dB			
1	*	4805.920	41.82	3.38	45.20	54.00	-8.80	AVG	
2		4806.020	51.35	3.38	54.73	74.00	-19.27	peak	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2403 MHz\_CH 01

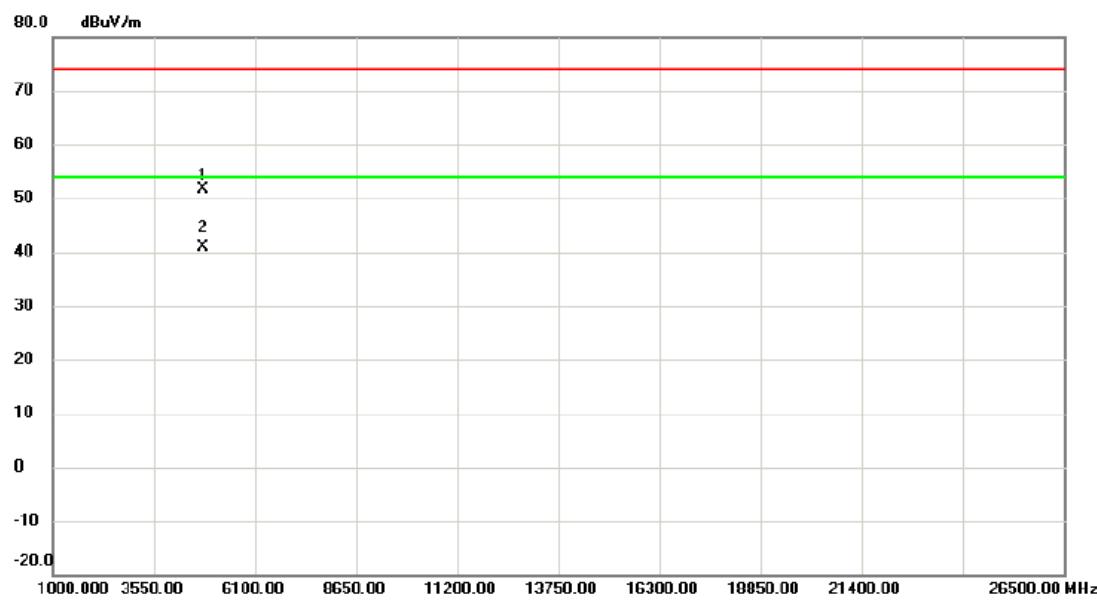
**Horizontal**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1		2390.000	43.86	6.53	50.39	74.00	-23.61	peak
2		2390.000	31.30	6.53	37.83	54.00	-16.17	AVG
3	*	2403.025	87.28	6.51	93.79	54.00	39.79	AVG No Limit
4	X	2403.150	90.81	6.51	97.32	74.00	23.32	peak No Limit

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2403 MHz\_CH 01

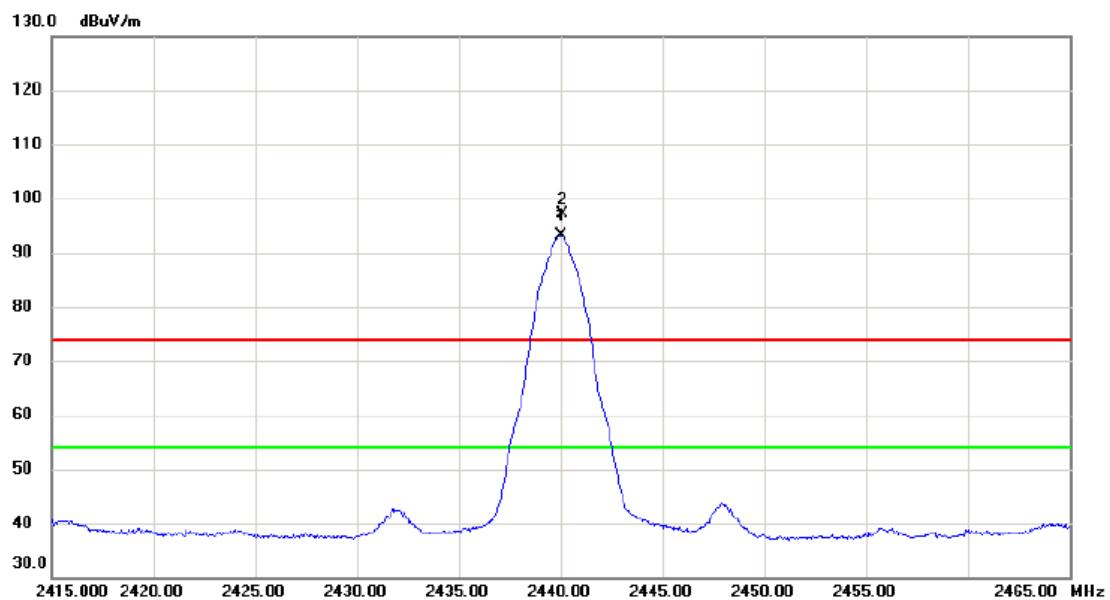
**Horizontal**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4806.075	48.16	3.38	51.54	74.00	-22.46	peak
2 *		4806.250	37.41	3.38	40.79	54.00	-13.21	AVG

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2440 MHz\_ CH 38

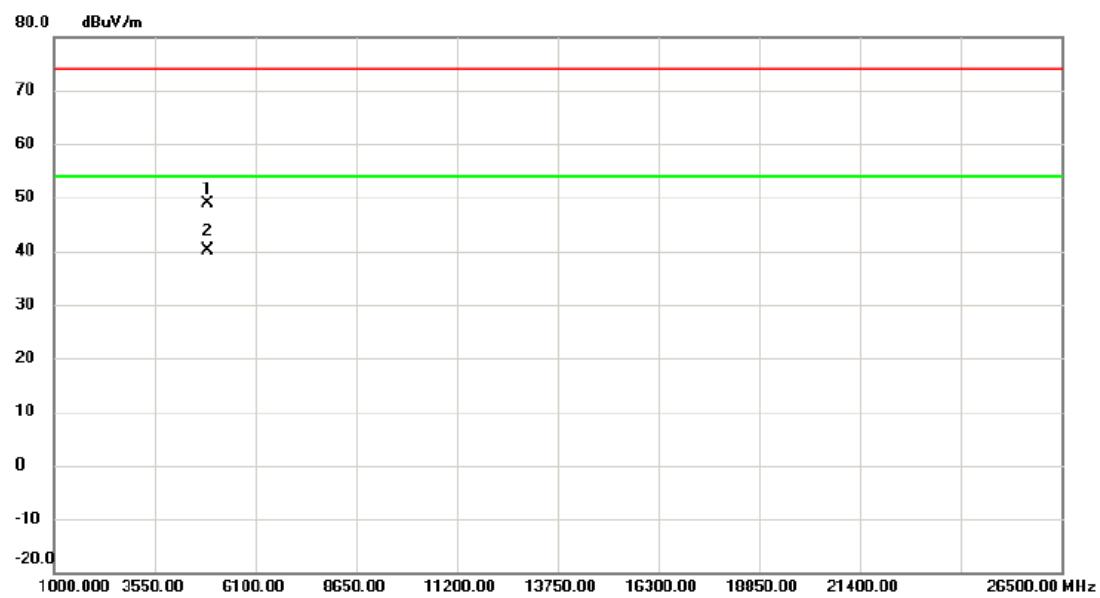
**Vertical**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	2440.025	86.78	6.47	93.25	54.00	39.25	AVG No Limit
2	X	2440.100	90.57	6.47	97.04	74.00	23.04	peak No Limit

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2440 MHz\_ CH 38

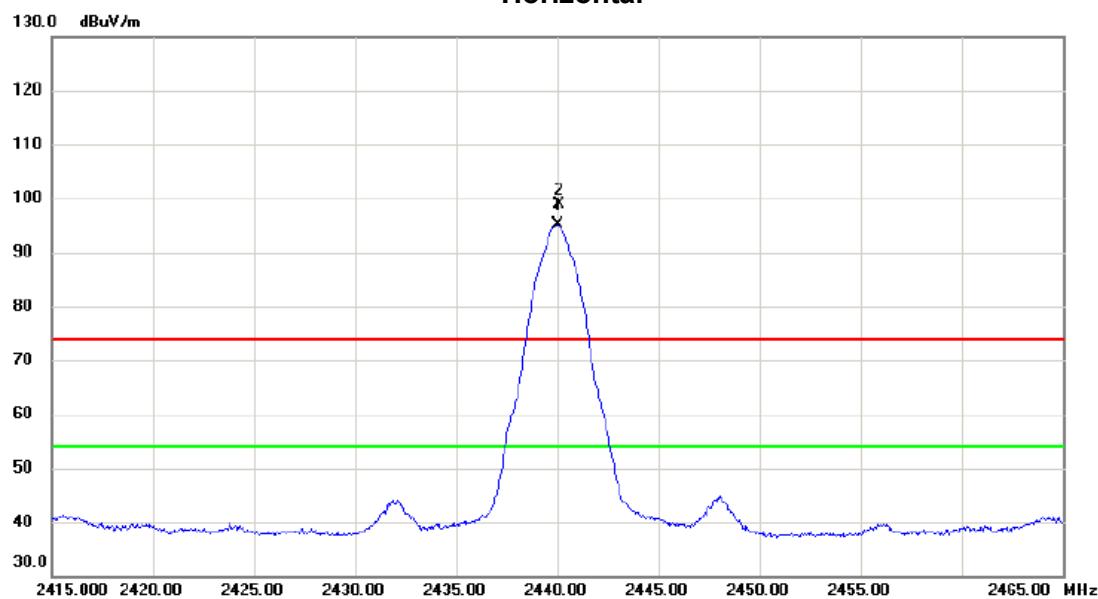
**Vertical**

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		4879.935	45.30	3.60	48.90	74.00	-25.10	peak	
2 *		4880.000	36.45	3.60	40.05	54.00	-13.95	AVG	

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2440 MHz\_CH 38

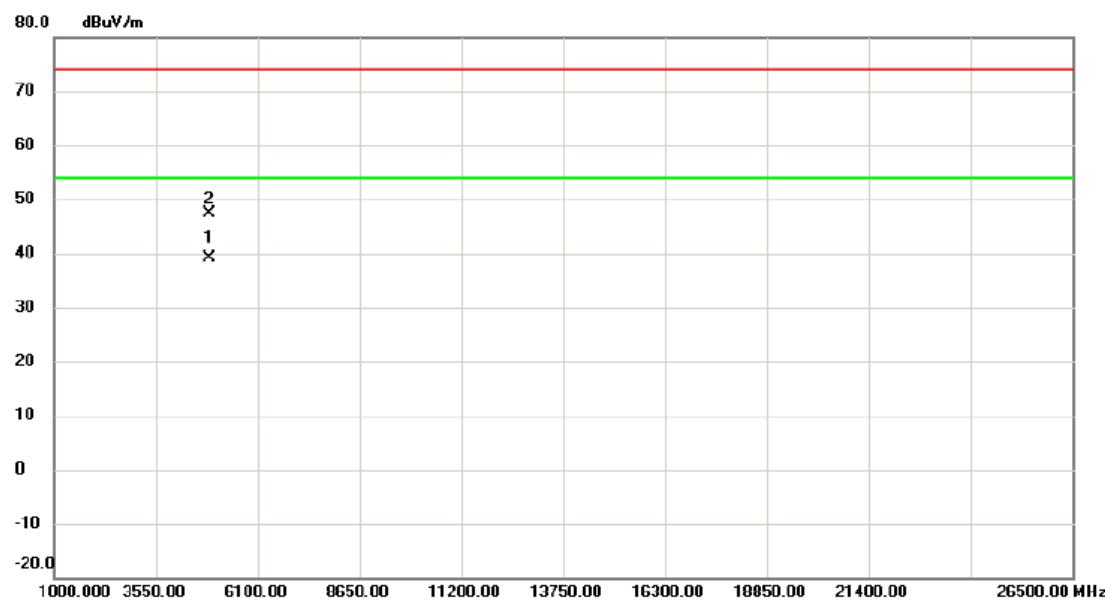
**Horizontal**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1	*	2440.000	88.60	6.47	95.07	54.00	41.07	AVG No Limit
2	X	2440.100	92.51	6.47	98.98	74.00	24.98	peak No Limit

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2440 MHz\_CH 38

**Horizontal**

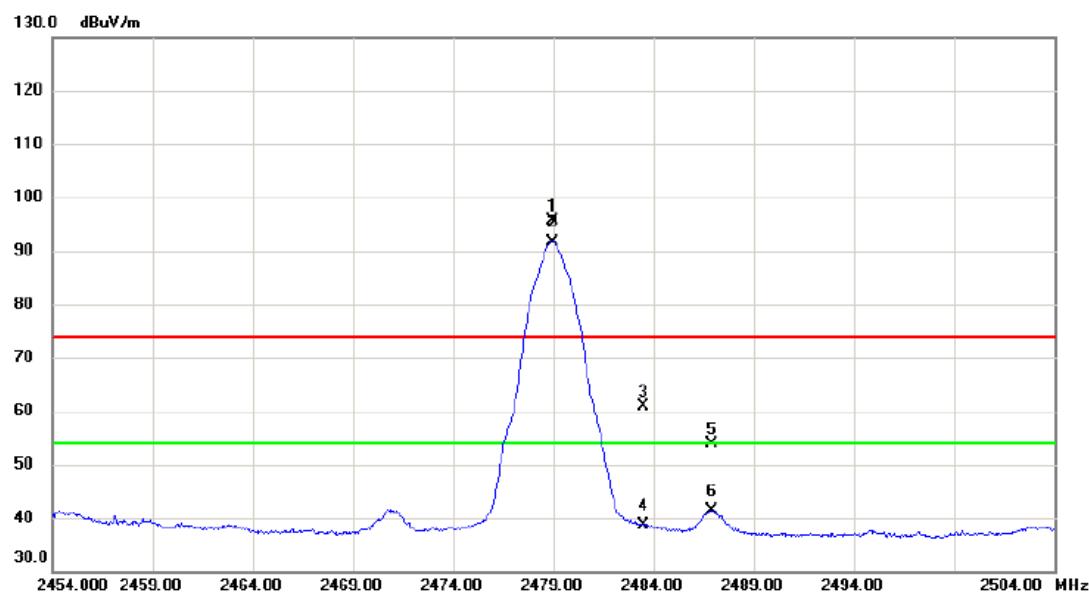
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1	*	4879.980	35.42	3.60	39.02	54.00	-14.98	AVG
2		4880.020	43.86	3.60	47.46	74.00	-26.54	peak

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2479 MHz\_CH 77

## Vertical

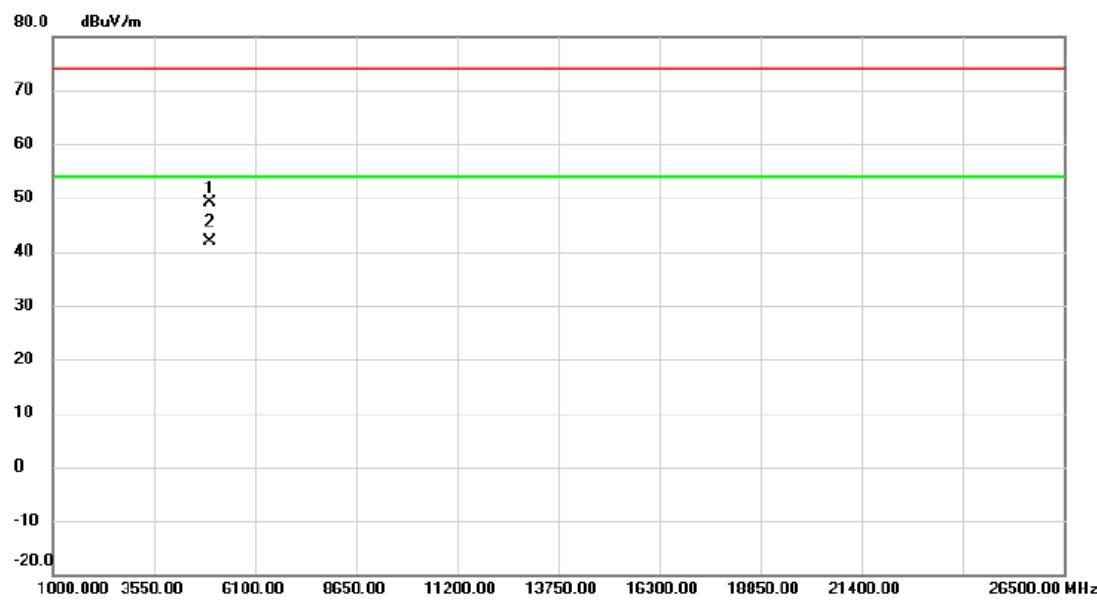


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2478.950	89.23	6.43	95.66	74.00	21.66	peak	No Limit
2	*	2478.975	85.23	6.43	91.66	54.00	37.66	AVG	No Limit
3		2483.500	54.50	6.43	60.93	74.00	-13.07	peak	
4		2483.500	32.27	6.43	38.70	54.00	-15.30	AVG	
5		2486.875	47.53	6.42	53.95	74.00	-20.05	peak	
6		2486.925	34.99	6.42	41.41	54.00	-12.59	AVG	

## REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2479 MHz\_CH 77

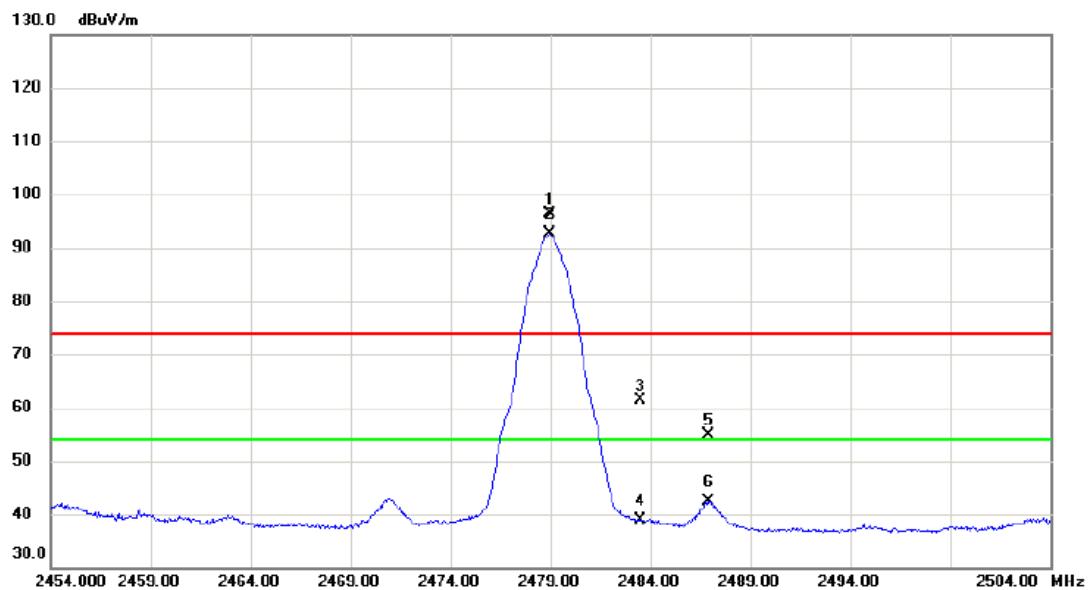
**Vertical**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector Comment
1		4957.210	45.39	3.83	49.22	74.00	-24.78	peak
2	*	4957.910	38.05	3.83	41.88	54.00	-12.12	AVG

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2479 MHz\_CH 77

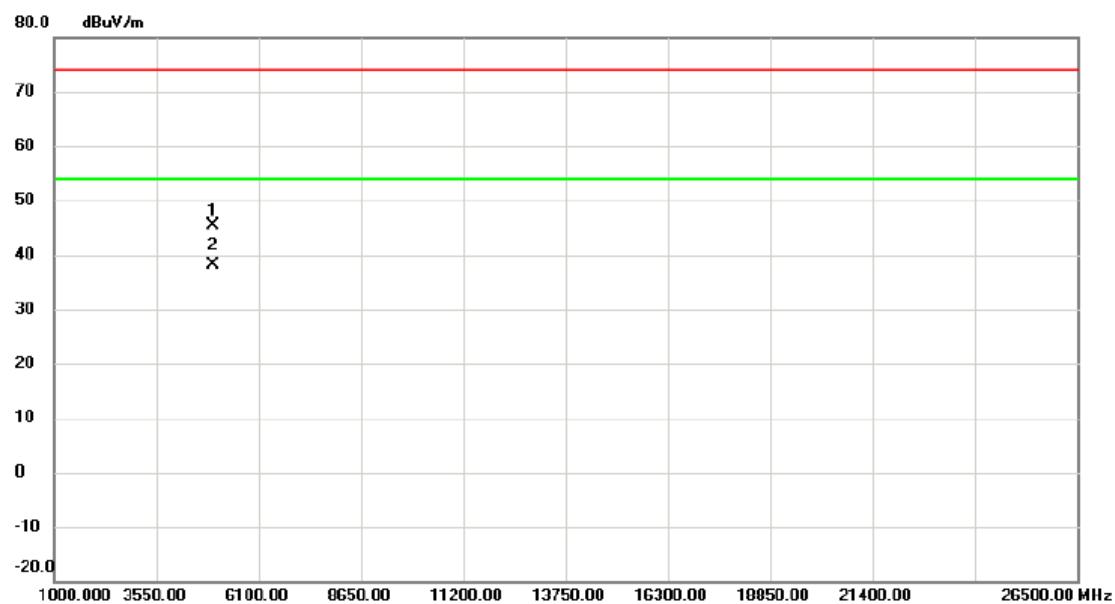
**Horizontal**

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor	Measure- ment dBuV/m	Limit dB	Margin Detector	Comment
1	X	2478.950	90.06	6.43	96.49	74.00	22.49	peak No Limit
2	*	2478.950	86.11	6.43	92.54	54.00	38.54	AVG No Limit
3		2483.500	55.05	6.43	61.48	74.00	-12.52	peak
4		2483.500	32.46	6.43	38.89	54.00	-15.11	AVG
5		2486.875	48.40	6.42	54.82	74.00	-19.18	peak
6		2486.875	36.00	6.42	42.42	54.00	-11.58	AVG

**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode TX 2479 MHz\_CH 77

**Horizontal**

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB	Detector	Comment
1		4957.950	41.55	3.83	45.38	74.00	-28.62	peak
2 *		4957.995	34.26	3.83	38.09	54.00	-15.91	AVG

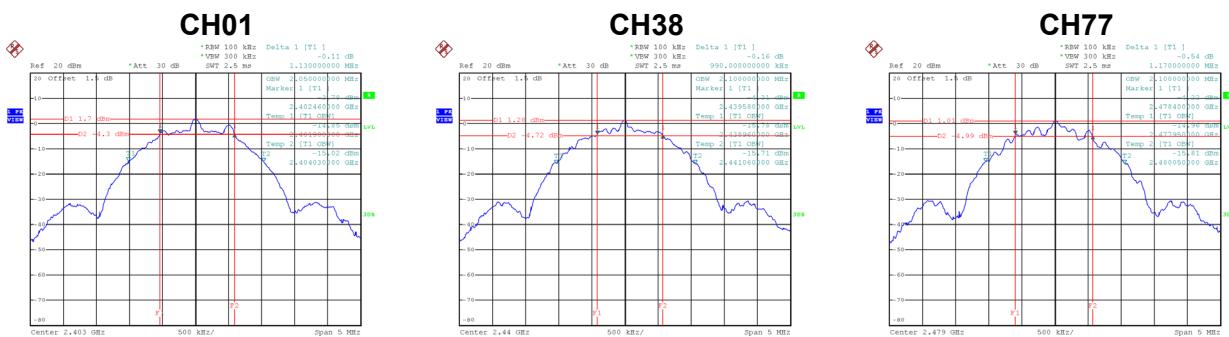
**REMARKS:**

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

## **APPENDIX E - BANDWIDTH**

Test Mode: CH01, CH38 , CH77

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Emission Bandwidth (MHz)	6 dB Bandwidth Min. Limit (kHz)	Result
01	2403	1.130	2.050	500	Complies
38	2440	0.990	2.100	500	Complies
77	2479	1.170	2.100	500	Complies



Date: 17.AUG.2019 15:40:06

Date: 17.AUG.2019 15:42:35

Date: 17.AUG.2019 15:44:13

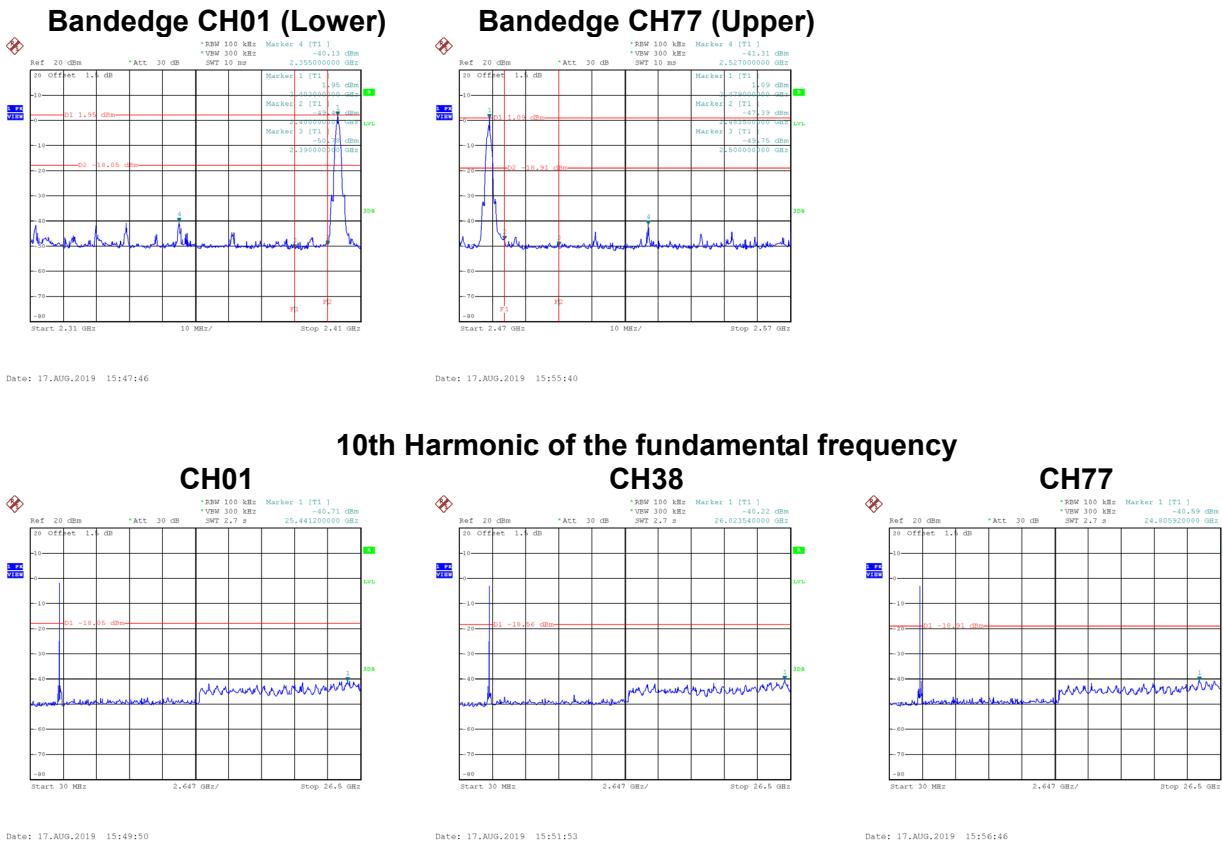
**APPENDIX F - MAXIMUM OUTPUT POWER**

Test Mode :	CH01, CH38 , CH77
-------------	-------------------

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Result
01	2403	1.77	0.0015	30.00	1.0000	Complies
38	2440	1.39	0.0014	30.00	1.0000	Complies
77	2479	1.11	0.0013	30.00	1.0000	Complies

**APPENDIX G - CONDUCTED SPURIOUS EMISSION**

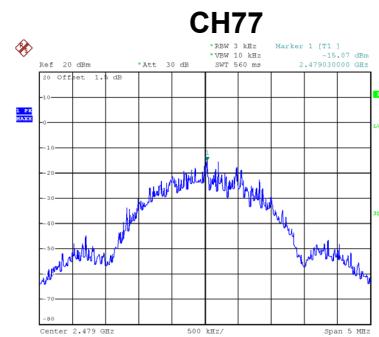
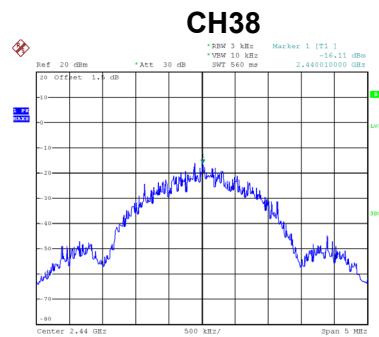
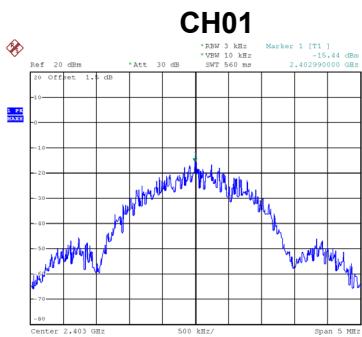
Test Mode : CH01, CH38 , CH77



**APPENDIX H - POWER SPECTRAL DENSITY**

Test Mode: CH01, CH38 , CH77

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
01	2401	-15.440	8	Complies
38	2440	-16.110	8	Complies
77	2479	-15.070	8	Complies



Date: 17.AUG.2019 15:29:23

Date: 17.AUG.2019 15:31:55

Date: 17.AUG.2019 15:33:43

**End of Test Report**