

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C AND RSS 247 REQUIREMENT

	OF
Applicant:	Peloton Interactive Inc.
Applicant.	125 W 25th Street, 11 FL, New York, NY, 10001, USA
Product Name:	Peloton Console
Brand Name:	Peloton
Model No.:	PLTN-RB1VQ
Model Difference:	N/A
FCC ID:	2AA3N-RB1VQ
IC:	21377-RB1VQ
Report Number:	E2/2018/40034
FCC Rule Part:	§15.247, Cat: DTS
IC Rule:	RSS-247 issue 2 Feb. 2017
Issue Date:	May 18, 2018
Date of Test:	Apr. 20, 2018 ~ May 15, 2018
Date of EUT Received:	Apr. 20, 2018
We hereby certify that:	

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Tested By:

Approved By:

Vito Pei / Sr. Engineer

Jim Chang / Manager



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only

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# **Revision History**

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/40034	Rev.00	Initial creation of document	All	May 18, 2018	Violetta Tang

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# Contents

1	GENERAL INFORMATION	4
2	SYSTEM TEST CONFIGURATION	6
3	SUMMARY OF TEST RESULTS	8
4	DESCRIPTION OF TEST MODES	8
5	MEASUREMENT UNCERTAINTY	.10
6	CONDUCTED EMISSION TEST	. 11
7	PEAK OUTPUT POWER MEASUREMENT	.15
8	6dB & 99% BANDWIDTH MEASUREMENT	.18
9	CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT	.21
10	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT	. 29
11	PEAK POWER SPECTRAL DENSITY	. 50
12	ANTENNA REQUIREMENT	. 53

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#### **GENERAL INFORMATION** 1

## **1.1 Product Description**

#### General:

Product Name:	Peloton C	onsole		
Brand Name:	Peloton	Peloton		
Model No.:	PLTN-RB	1VQ		
Model Difference:	N/A	N/A		
Product SW/HW version:	EQL27A test-keys userdebug / 1.0			
Radio SW/HW version:	N/A / N/A			
Test SW Version:	N/A			
RF power setting in TEST SW:	N/A			
Dowor Supply:	12V from AC/DC Adapter			
Power Supply:	Adapter:	Model No.: FSP050-AHCN3, Supplier: FSP		

#### ANT+:

Frequency Range:	2.403GHz – 2.480GHz
Channel Number:	78 channels
Modulation Type:	GFSK
Transmit Power:	2.63dBm
Antenna Designation:	PIFA Antenna, Antenna Gain: -1.76dBi

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Report No.: E2/2018/40034 Page 5 of 53



### 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

KDB 558074 D01 v04 DTS Meas. Guidance

RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5 Apr. 2018

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

### **1.3 Test Facility**

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620A-5

### **1.4 Special Accessories**

There are no special accessories used while test was conducted.

### **1.5 Equipment Modifications**

There was no modification incorporated into the EUT.

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#### SYSTEM TEST CONFIGURATION 2

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

#### 2.3 Test Procedure

### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note: The spectrum analyzer offset is derived from RF cable loss 12.60dB

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### 2.5 Configuration of Tested System

## Fig. 2-1 Radiated & Conducted Emission Configuration

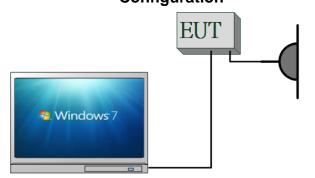


Fig 2-2 AC power line Configuration

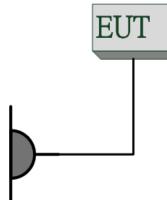


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	P0000195	N/A	N/A

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#### SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 (1) RSS-Gen §6.6	6dB & 99% Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	RSS-247 §5.2(2)	Peak Power Density	Compliant
§15.203 §15.247(b)	RSS- Gen §8.3	Antenna Requirement	Compliant

## 4 DESCRIPTION OF TEST MODES

### 4.1 Operated in 2400 ~ 2483.5MHz Band

78 channels are provided for ANT+

СН	FREQUENCY	СН	FREQUENCY	СН	FREQUENCY	CH	FREQUENCY
1	2403 MHz	21	2423 MHz	41	2443 MHz	61	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	62	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	63	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	64	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	65	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	66	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	67	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	68	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	69	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		
20	2422 MHz	40	2442 MHz	60	2462 MHz		

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### 4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

#### **RADIATED EMISSION TEST:**

RAD	RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION			
ANT+	0 to 78	0,20,78	GFSK			
RAD	IATED EMISSIO	N TEST (ABO)	/E 1 GHz)			
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION			
ANT+	0 to 78	0,20,78	GFSK			

#### Note:

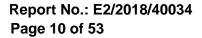
The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for ANT+ Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

#### ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION		
ANT+	0 to 78	0,20,78	GFSK		

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#### **MEASUREMENT UNCERTAINTY** 5

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

	9kHz – 30MHz: +/- 2.87 dB			
	30MHz - 167MHz: +/- 4.22dB			
Measurement uncertainty	167MHz -500MHz: +/- 3.44dB			
(Polarization : Horizontal)	0.5GHz-1GHz: +/- 3.39dB			
	1GHz - 18GHz: +/- 4.08dB			
	18GHz - 40GHz: +/- 4.08dB			

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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#### CONDUCTED EMISSION TEST 6

### 6.1 Standard Applicable:

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Lin dB(	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1. The lower limit shall apply at th	e transition frequencies	
2. The limit decreases linearly wit	h the logarithm of the frequency in	the range 0.15 MHz to 0.50
MHz.		

#### 6.2 Measurement Equipment Used:

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
EMI Test Receiver	R&S	ESCI 7		_	2018/12/23			
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	2017/08/30	2018/08/29			
LISN	Schwarzbeck	NSLK 8127	8127-648	2017/06/18	2018/06/17			
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.			

#### 6.3 EUT Setup:

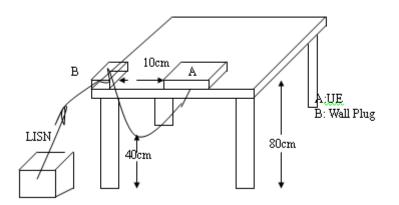
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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### 6.4 Test SET-UP (Block Diagram of Configuration)



#### **6.5 Measurement Procedure:**

- 1. The EUT was placed on a table which is 0.8m above ground plan.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed

#### 6.6 Measurement Result:

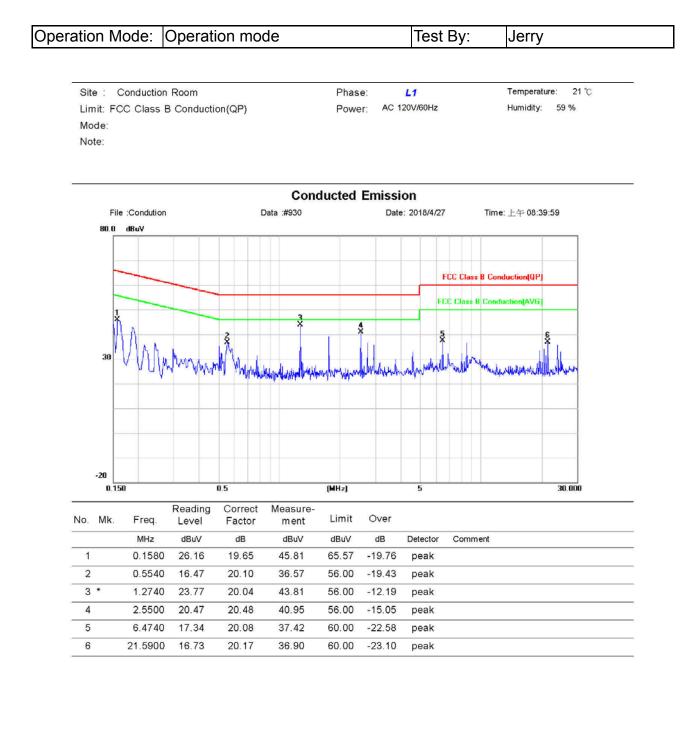
Note: Refer to next page for measurement data and plots. Note2: The \* reveals the worst-case results that closet to the limit

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## AC POWER LINE CONDUCTED EMISSION TEST DATA



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5

6

8.5340

25.4100

20.34

16.23

20.05

20.27

40.39

36.50

60.00

60.00

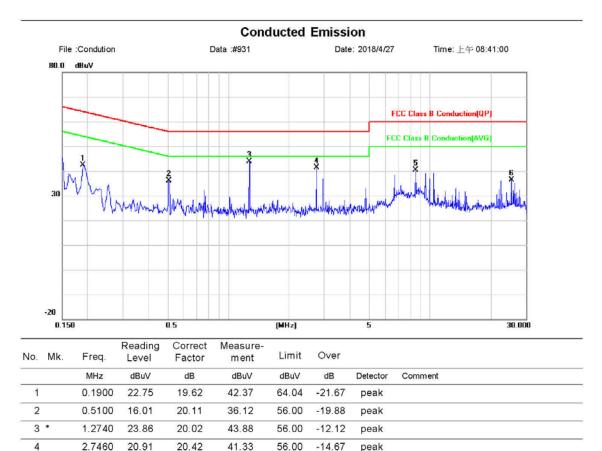
-19.61

-23.50

peak

peak

Conduction Room Temperature: 21 °C Site : Phase: N AC 120V/60Hz Humidity: 59 % Limit: FCC Class B Conduction(QP) Power: Mode Note:



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#### PEAK OUTPUT POWER MEASUREMENT 7

### 7.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

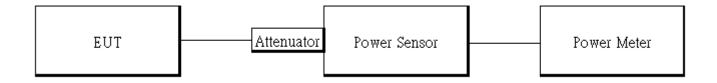
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

#### 7.2 Measurement Equipment Used:

	Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Power Meter	Anritsu	ML2496A	1326001	2017/07/26	2018/07/25				
Power Sensor	Anritsu	MA2411B	1315048	2017/07/26	2018/07/25				
Power Sensor	Anritsu	MA2411B	1315049	2017/07/26	2018/07/25				
Attenuator	Marvelous	MVE2213-10	RF31	2017/12/26	2018/12/25				
Notebook	Lenovo	L430	P0000195	N/A	N/A				

### 7.3 Test Set-up:



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### 7.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

#### **Power Meter:**

It is used as the auxiliary test equipment to conduct the output power measurement.

- Record the max. Reading as observed from Power Meter.
- 5. Repeat above procedures until all test default channel measured was complete.

### **Duty Factor:**

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
Ant +	0.90	20.47	5.56	6.00

Ref Offset 12.6 dB     ΔMKR3 20.04 ms       10 dB/div     Ref 20.00 dBm     -0.03 dB       10 dB/div     1Δ2     -0.03 dB       10 dB/div     1Δ2     3Δ4       10 dB/div     1Δ2     -0.03 dB       -0.03 dB     -0.03 dB     -0.03 dB       -0.03 dB     -0.03 dB     -0.03 dB       -0.04     -0.04     -0.04       -0.05     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.00     -0.05     -0.05       -0.05     -0.05     -0.05       -0.05     -0.05     -0.05       -0.05     -	😹 Keysight Spe	ectrum Analyze	- Swept SA										
Ref Offset 12.6 dB     ΔMkr3 20.04 ms     Auto Tune       10.0     142     344     Center Freq       10.0     142     142     144       10.0     142     144     144       10.0     142     144     144       10.0     144     144     144       10.0     144     144     144       10.0     144     144     144       10.0     144     144     144       10.0     144     144     144       10.0     144     144     144       10.0     144     144     144       11.0     144     144     144       11.0     144     144     144       144     144     144     144       144     144     144     144     144 <t< td=""><td>Center F</td><td></td><td></td><td>GHz</td><td></td><td></td><td></td><td>Avg</td><td></td><td></td><td>TRA</td><td>CE 1 2 3 4 5 6</td><td>Frequency</td></t<>	Center F			GHz				Avg			TRA	CE 1 2 3 4 5 6	Frequency
100   102   304   Center Freq     100   2   2   2   2     100   2   2   2   2     100   2   2   2   2   2     100   2   2   2   2   2   2     100   2   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3										4	Mkr3 2	0.04 ms	Auto Tune
20.0   30.0   Mar.   30.00   Mar.   40.0   Mar.   40.0<	10.0		Δ2								•3∆4		Center Freq 2.442000000 GHz
60.0     Stop Freq       70.0     1	-20.0	1041-10114			gates from	18:14:14:14:14:14:18	and and and a second	nfungaturgistary	water	وتقطيبهم	t manatematica	ing work day to give	
Res BW 8 MHz     #VBW 8.0 MHz     Sweep 30.00 ms (1001 pts)     8.000000 MHz       Δ2     1     t     Δ1     180.0 μs     Δ1     0.06 dB     4.000000 MHz     Function wouth     Function wouth     Function wouth     Function wouth     Man       1     Δ2     1     t     (Δ)     0.06 dB     1     1.000000 MHz     Auto     Man       2     F     1     t     3.990 ms     2.18 dBm     1     Function wouth     Function wouth     Function wouth     Function wouth     Fireq Offset     0 Hz     0 Hz     0 Hz     0 Hz     1 </td <td>-60.0</td> <td></td> <td></td> <td></td> <td>+</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	-60.0				+								
1     Δ2     1     t     (Δ)     180.0 µs     (Δ)     0.06 dB     Fill	Res BW 8	MHz	0 GHz	#V	'BW	8.0 MHz			_		0.00 ms	(1001 pts)	8.000000 MHz
MSG STATUS	1 Δ2 1 2 F 1 3 Δ4 F 1 5 6 7 8 9 9 10 11	t (Δ) t t (Δ)	*	3.990 ms 20.04 ms		2.18 dE -0.03 ( 2.18 dE	dB 3m 1B	UNCTION	FUN				Freq Offset 0 Hz

### Duty Cycle Factor:10\*log(1/(0.898/100))=20.47

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#### 7.5 Measurement Result:

#### Ant + mode:

СН	Frequency (MHz)	Peak Power Output (dBm)	Required Limit					
0	2403	2.21	1 Watt = 30 dBm					
20	2442	2.53	1 Watt = 30 dBm					
39	2480	2.63	1 Watt = 30 dBm					
Ant + m	Ant + mode:							
СН	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit					
0	2403	-11.23	1 Watt = 30 dBm					
20	2442	-10.98	1 Watt = 30 dBm					
39	2480	-10.86	1 Watt = 30 dBm					

\*Note: Measured by power meter, caAnt + loss as 0.45 dB that offsets on the power meter in Peak \*Note: Measured by power meter, as caAnt + loss+ Duty cycle factor that offsets on the power meter \*Note: Max. Output include tune up tolerance Power is average power

СН	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit
0	2403	-11.23	-1.76	-12.99	4W= 36 dBm
20	2442	-10.98	-1.76	-12.74	4W= 36 dBm
39	2480	-10.86	-1.76	-12.62	4W= 36 dBm

#### EIRP

\* Note: EIRP = Average Power + Gain

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#### 6DB & 99% BANDWIDTH MEASUREMENT 8

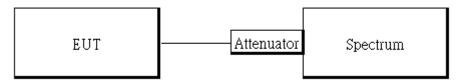
### 8.1 Standard Applicable

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 8.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Spectrum Analyzer	Agilent	N9010A	MY51440113	2017/06/21	2018/06/20			
Attenuator	Marvelous	MVE2213-10	RF31	2017/12/26	2018/12/25			
DC Block	PASTER- NACK	PE8210	RF81	2017/12/26	2018/12/25			
Notebook	Lenovo	L430	P0000195	N/A	N/A			

### 8.3 Test Set-up:



### 8.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set the spectrum analyzer as RBW=100 kHz, VBW= 3\*RBW, Span = 5MHz, Detector=Peak, Sweep=auto.
- 5. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. Turn on the 99% bandwidth function, max reading.
- 7. Repeat above procedures until all test default channel is completed

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#### 8.5 Measurement Result:

#### Ant + mode

Frequency (MHz)	6dB BW (MHz)	BW (MHz)	Result
2403	0.5003	> 0.5	PASS
2442	0.5049	> 0.5	PASS
2480	0.5514	> 0.5	PASS

#### Ant + mode

Frequency (MHz)	99%Bandwidth (MHz)
2403	1.2674
2442	1.2548
2480	1.7075

Note: Refer to next page for plots.

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#### 6dB Band Width Test Data CH-Low

RL	trum Analyzer - Occupied BW 10 50 Ω DC 9 <b>q 2.403000000</b>		SENSE:INT Center Freq: 2.403000 Frig: Free Run Atten: 20 dB		Radio Std:		Frequency
10 dB/div	Ref Offset 12.6 dE Ref 20.00 dBm			_			
.og 10.0 0.00 10.0							Center Free 2.403000000 GHz
20.0 30.0 40.0							
50.0 60.0 70.0							
Center 2.4 Res BW			#VBW 300 k	Hz		an 5 MHz ep 1 ms	CF Step 500.000 kHz
Occup	ied Bandwidt	n 0152 MHz	Total Po	ower	8.10 dBm		Auto Mar Freq Offse
	it Freq Error andwidth	33.946 kH 500.3 kH		ower	99.00 % -6.00 dB		0 Hz
90					STATUS		

### 6dB Band Width Test Data CH-Mid



### 6dB Band Width Test Data CH-High

			SENSE:INT	ALIGN AUTO	11:37:45 AM May 02, 2018	- 2
	GHz			Radio Std: None	Frequency	
	#IFGain:Low	#Atten	n: 20 dB	514. 00.00	Radio Device: BTS	
Ref Offset 12.6 dE Ref 20.00 dBm	3					
						Center Free
_						2.48000000 GH
		$\checkmark$				
- /	~~					
				1	- many	
		_				
	++					
8 GHz 100 kHz		#	VBW 300 kHz		Span 5 MHz Sweep 1 ms	CF Step
ied Bandwidt	h		Total Power	9.30	) dBm	Auto Mar
1.	5773 N	/Hz				Freq Offse
Transmit Freg Error 67.974		4 kHz	OBW Power	99	.00 %	0 H
andwidth	551.4	4 kHz	x dB	-6.	00 dB	
				STATU		
	W     360 EC       Ref 2.480000000     Ref 200000000       Ref 20.00 dBm     Ref 20.00 dBm       Is GHz     Is GHz       100 kHz     Ied Bandwidt       1, 1, tir Freq Error     1, 1	eq 2.48000000 GHz AFGain:Low Ref Orfset 12:6 AFGain:Low Ref 20:00 dBm AFG Orfset 12:6 AFG Ref 20:00 dBm AFG OFFET AFG AFG OFFET AFG A	B00 0000 GH2     C       Brg 2.48000000 GH2     Ref Offset 12.6 dB       Ref Offset 12.6 dB     Ref Offset 12.6 dB       Ref Offset 12.6 dB     Image: Comparison of the	IN SOB DE LE SERVER AND CONCOURSEL Deg 2.480000000 GHz IFGainLow Ref 00fset 12.6 dB Ref 20.00 dBm Ref 20.00 dBm I d d d d d d d d d d d d d d d d d d d	ALDMAND Deg 2.480000000 GHz BTGeinLow Arg Free Run Arg Heid: 5050 Arg Hei	by 100 EC intervention of the second

#### 99% Band Width Test Data CH-Low

DC							
0000 GHz	Center	Freq: 2.40300		ALIGN AUTO	Radio Std	M May 02, 2018 None	Frequency
#FGain:		ree Run 20 dB	Avg Hold	: 50/50	Radio Dev	vice: BTS	
J abm							
		_					Center Free 2.403000000 GH
AN ALAN T CAPTOR STATE							2.4000000000
						· · ·	
							CF Ste
	#\	/BW 1 MH	z		SW	eep 1 ms	200.000 kH Auto Ma
width		Total P	ower	5.23	dBm		Auto ma
1.2674	4 MHz						Freq Offse
or -24	.177 kHz	OBW P	ower	99	.00 %		0 H
7	77.8 kHz	x dB		-6.	00 dB		
				STATUS			
	#PGeim 12.6 dB 0 dBm 0 d	12.6 dB o dBm width 1.2674 MHz	#FGainLow     Trg: Pre-Run #Atten: 20 db       0 dBm	#FGainLow     Trig: Free Rim     Avgilled       12.6 dB     0     dB     0       0 dBm	#FGain.Low     Trig: Free Run Avg riod: 5080     Avg riod: 5080       12.6 dB o dBm	#rGain.low     Trig. Free Run Attain. 20 dB     Avgi/Hold: 50/80     Radio Devide       12.6 dB     0 <t< td=""><td>#FGain.cov Trg: Pre-Run AvglHold: 5080 Radio Device: BTS   12.6 dB 0 dBm 0 0   0 dBm 0 0 0   #VBW 1 MHz Span 2 MHz   #VBW 1 MHz Span 2 MHz   width Total Power 5.23 dBm   1.2674 MHz 0 99.00 %   ror -24.177 kHz OBW Power 99.00 %   777.8 kHz x dB -6.00 dB</td></t<>	#FGain.cov Trg: Pre-Run AvglHold: 5080 Radio Device: BTS   12.6 dB 0 dBm 0 0   0 dBm 0 0 0   #VBW 1 MHz Span 2 MHz   #VBW 1 MHz Span 2 MHz   width Total Power 5.23 dBm   1.2674 MHz 0 99.00 %   ror -24.177 kHz OBW Power 99.00 %   777.8 kHz x dB -6.00 dB

### 99% Band Width Test Data CH-Mid



### 99% Band Width Test Data CH-High

R	trum Analyzer - Occupied BW IUF 50 Ω DC eq 2.4800000000		sense:INT	ALIGN AUTO	11:48:17 AM Radio Std: I		Frequency		
enter Fr	eq 2.480000000	trig:	Trig: Free Run Avg Hold: 50/50						
		#IFGain:Low #Atte	in: 20 dB		Radio Devic	e: BTS			
10 dB/div	Ref Offset 12.6 de Ref 20.00 dBm								
10.0							Center Fre		
0.00							2.48000000 GH		
	and the second s	Ban Star Variation		1.1.1	We want	uldud. Indu	E.1000000000		
20.0	4			_		1.4			
30.0				_					
40.0									
50.0				_					
60.0						$\rightarrow$			
70.0									
Center 2.4	48 GHz				Spa	n 2 MHz			
Res BW	300 kHz		¢VBW 1 MHz			ep 1 ms	CF Ste 200.000 kH		
Occup	ied Bandwidt	h	Total Power	6.9	6 dBm		Auto Ma		
		7075 MHz					Freq Offs		
		56.454 kHz	OBW Power	91	9.00 %		01		
		1.159 MHz	x dB	-6.00 dB					
80				STATU	18				

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t (886-2) 2299-3279 台灣檢驗科技股份有限公司

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## 9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

#### 9.1 Standard Applicable

#### As per KDB 558074 D01 11.1 a)

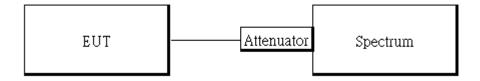
If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) & RSS-Gen §8.10 Table 6.

#### 9.2 Measurement Equipment Used:

	Conducted Emission Test Site									
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.					
Spectrum Analyzer	Agilent	N9010A	MY51440113	2017/06/21	2018/06/20					
Attenuator	Marvelous	MVE2213-10	RF31	2017/12/26	2018/12/25					
DC Block	PASTER- NACK	PE8210	RF81	2017/12/26	2018/12/25					
Notebook	Lenovo	L430	P0000195	N/A	N/A					

#### 9.3 Test SET-UP:



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### 9.4 Measurement Procedure

## **Conducted Band Edge Limit**

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 100kHz & VBW = 300 kHz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

## Conducted Band Edge:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
- 6. Mark the highest reading of the emission as the reference level measurement.
- 7. Set DL as the limit = reading on marker 1 20dBm
- 8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
- 9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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### **Conducted Spurious Emission:**

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

#### 9.5 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)								
2403	1.90	-18.10								
2480	2.25	-17.75								

### Reference Level of Limit

NOTE: cable loss as 0.45dB that offsets in the spectrum NOTE: Refer to next page for plots.

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#### Revealed to the second 11:14:46 AM May 02, 2018 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN Frequency Avg Type: Log-Pwr Trig: Free Run #Atten: 20 dB Auto Tune Mkr1 2.403 210 GHz Ref Offset 12.6 dB Ref 20.00 dBm 1.90 dBm 10 dB/div Center Freq 10.) 2.40300000 GHz ♦1 0.00 Start Freq 2.401500000 GHz 10.0 m 20.1 Stop Freq 2.404500000 GHz 30.0 CF Step 40. 300.000 kHz Auto Mar -60. iWli Freq Offset 60. 0 Hz 70.1 Start 2.401500 GHz Stop 2.404500 GHz #VBW 300 kHz #Res BW 100 kHz Sweep 1.000 ms (1001 pts) STATUS

### Power Spectral Density for Bandedge Limit (CH-Low)

### Power Spectral Density for Bandedge Limit (CH-High)



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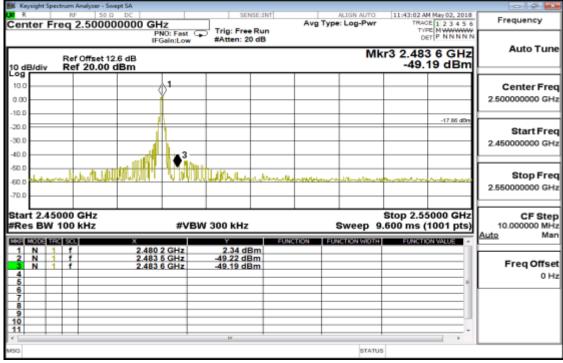
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### **Band Edges Test Data CH-Low**

Keysight Spectrum Analyzer - Swept SA			
Center Freq 2.370000000 G	SENSE:INT	ALIGN AUTO 11:21:11 AM May 02, 2018 Avg Type: Log-Pwr TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
Ref Offset 12.6 dB 10 dB/div Ref 20.00 dBm	NO: Fast - Trig: Free Run Gain:Low #Atten: 20 dB	Mkr3 2.390 00 GHz -58.87 dBm	Auto Tune
10.0 0.00 -10.0		<sup>1</sup>	Center Freq 2.370000000 GHz
-20.0		18.51 dBm	Start Freq 2.310000000 GHz
-50.0 -60.0	an andreas and an and an an and an		Stop Freq 2.43000000 GHz
Start 2.31000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.43000 GHz Sweep 11.53 ms (1001 pts)	CF Step 12.000000 MHz Auto Man
1 N 1 f 2.403 0	0 GHz 1.49 dBm 0 GHz -40.37 dBm		Freq Offset 0 Hz
MSG		STATUS	

## **Band Edges Test Data CH-High**



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## **Conducted Spurious Emission Measurement Result** CH-Low 30MHz – 3GHz

😹 Keysight Sp	ectrum Analy	vzer - Swept SA	1								- ÷ 🞫
Center F	req 1.5	50 Ω DC 150000	00 GH			NSE:INT	Avg Typ	e: Log-Pwr	TRAC	M May 02, 2018	Frequency
10 dB/div		fset 12.6 dl 0.00 dBn	IFG B	0:Fast G ain:Low	#Atten: 2			м	kr1 2.40	3 0 GHz 36 dBm	Auto Tune
10.0 0.00 -10.0									<b>●</b> <sup>1</sup>		Center Freq 1.515000000 GHz
-20.0 -30.0 -40.0										-18.54 dDn	Start Freq 30.000000 MHz
-50.0 -60.0				~			and the second s	a and the second second		allow and the	Stop Freq 3.00000000 GHz
Start 30 I #Res BW	100 kH	z	×	#VB\	V 300 kHz		ICTION FU		283.9 ms (		CF Step 297.000000 MHz <u>Auto</u> Man
1 N 2 3 4 5 6 7 7 8 9	1 1		2.403 0	GHz	1.36 d						Freq Offset 0 Hz
10 11 *					17			STATU	15		

## CH-Low 3GHz – 26.5GHz

🗱 Keysight Sp	pectrum Analyzer - Swep					
Center F	Freq 14.75000	D0000 GHz	Trig: Free Run	Aug Type: Log-Pwr	11:22:42 AM May 02, 2018 TRACE 1 2 3 4 5 6 TYPE M WARMAN	Frequency
10 dB/div	Ref Offset 12.0 Ref 20.00 di		#Atten: 20 dB	Mkr	1 25.959 5 GHz -47.32 dBm	Auto Tune
10.0 0.00						Center Free 14.750000000 GH
-20.0 -30.0 -40.0					-18.54 dBn	Start Free 3.000000000 GH
-50.0 -60.0 -70.0	en en en	nach mar an	and the second		anne-18-dae-24 desider a second	Stop Free 26.50000000 GH
Start 3.0 #Res BW	í 100 kHz	#VB	W 300 kHz	Sweep	Stop 26.50 GHz 2.246 s (1001 pts)	CF Step 2.350000000 GH <u>Auto</u> Ma
1 N 2 3 4 5 6 7		25.959 5 GHz	-47.32 dBm			Freq Offse 0 H
8 9 10 11 *			17	STATU	s	

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Report No.: E2/2018/40034 Page 27 of 53



### CH-Mid 30MHz – 3GHz

Keysight Spectrum Analyzer - Swept SA					
Center Freq 1.515000000	GHz	SENSE:INT	Aug Type: Log-Pwr	11:34:13 AM May 02, 2018 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 12.6 dB	PNO: Fast IFGain:Low	Trig: Free Run #Atten: 20 dB	Мн	r1 2.441 6 GHz 0.70 dBm	Auto Tune
10.0 10.0				↓1	Center Freq 1.51500000 GHz
-20.0				-19.30 dBn	Start Freq 30.000000 MHz
-50.0 -60.0		an a		Hine mar and	Stop Freq 3.00000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW 3		Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
1 N 1 f 2, 2 3	441 6 GHz	0.70 dBm			Freq Offset 0 Hz
4 5 6 7 7 8 9 9 10 11		19			
MSG		****	STATU	3	

#### 11:34:32 AM May 02, 2018 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N SENSE: INT Frequency Center Freq 14.750000000 GHz PNO: Fast IFGain:Low Avg Type: Log-Pwr Trig: Free Run #Atten: 20 dB Auto Tune Mkr1 26.030 0 GHz Ref Offset 12.6 dB Ref 20.00 dBm -47.80 dBm 10 dB/div 10.0 Center Freq 0.0 14.750000000 GHz 10.0 -19.30 dB -20.0 Start Freq 30.0 3.000000000 GHz 40.0 50.0 Stop Freq 60.0 26.50000000 GHz 70.1 Start 3.00 GHz Stop 26.50 GHz CF Step #VBW 300 kHz Sweep 2.246 s (1001 pts) #Res BW 100 kHz 2.350000000 GHz Man Auto EUNCTION R MODE TRC SCL EUNETRON 00.01 26.030 0 GHz -47.80 dBm N f 2 Freq Offset 0 Hz 10 11 STATUS

## CH-Mid 3GHz – 26.5GHz

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Report No.: E2/2018/40034 Page 28 of 53



## CH-High 30MHz – 3GHz

Keysight Spectrum Analyzer - Swept SA					
Center Freq 1.515000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	11:46:35 AM May 02 TRACE 1 2 3	45.6 Frequency
Ref Offset 12.6 dB	PNO: East ( )	rig: Free Run Atten: 20 dB	Mk	r1 2.480 3 G 2.32 dl	Hz Auto Tune
10.0 0.00 -10.0				<b>♦</b> <sup>1</sup>	Center Freq 1.515000000 GHz
-20.0				-17.6	Start Freq 30.000000 MHz
-50.0 -60.0 -70.0		ليطرف والمحودة والمراجع	han had an a harmon and have	and governments	Stop Freq 3.00000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW 3		Sweep 2	Stop 3.000 ( 83.9 ms (1001)	297.000000 MHz
I     I	480 3 GHz	2.32 dBm			Freq Offset 0 Hz
MSC		17	STATUS	5	, *

## CH- High 3GHz – 26.5GHz

🇱 Keysight Sp	ectrum Ana	lyzer - Swept SA									<b></b>
Center F	req 14	.7500000			ENSE:INT	Avg		og-Pwr	TRAC	M May 02, 2018	Frequency
10 dB/div		ffset 12.6 dB 20.00 dBm						Mkr	1 26.14	7 5 GHz 18 dBm	Auto Tune
10.0 0.00											Center Freq 14.750000000 GHz
-20.0 -30.0 -40.0							+			-17.60 dBm	Start Freq 3.000000000 GHz
-50.0 -60.0		4-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		uni della su della segu	*****			hander and	proprio de de Case		<b>Stop Freq</b> 26.500000000 GHz
Start 3.00 #Res BW	100 kł	łz ×		VBW 300 KH	z	FUNCTION	_	Sweep	2.246 s (	6.50 GHz 1001 pts)	CF Step 2.350000000 GHz Auto Man
1 N 2 3 4 5 6 7 8 9 10	1	2	6.147 5 GHz	-47.18 (	iBm						Freq Offset 0 Hz
11 ×					1			STATUS		, •	

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## **10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT**

#### **Standard Applicable** 10.1

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 & RSS-Gen §8.10 Table 6 limit as below.

And according to §15.33(a) (1) & RSS-Gen §8.9 Table 4 & 5, for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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#### **10.2 Measurement Equipment Used**

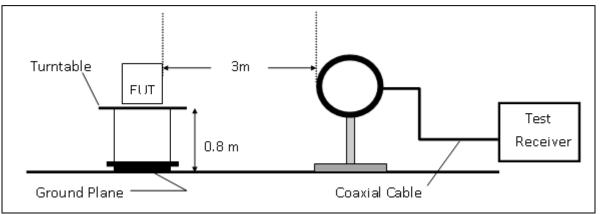
966 Chamber								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
		VULB 9168	-	_	2010/10/20			
	roadband Antenna SCHWAZBECK		9168-617		2018/10/26			
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2017/05/31	2018/05/30			
Loop Antenna	ETS.LINDGREN	6502 148045		2017/09/26	2018/09/25			
3m Site NSA	SGS	966 chamber D	N/A	2017/07/06	2018/07/05			
Spectrum Analyzer	Agilent	N9010A	MY53400256	2017/10/30	2018/10/29			
Pre-Amplifier	EMC Instru- ments	EMC184045B	980135	2017/10/27	2018/10/26			
Pre-Amplifier	EMC Instru- ments	EMC9135	980234	2017/12/26	2018/12/25			
Pre-Amplifier	Pre-Amplifier EMC Instru- ments		980271	2017/12/26	2018/12/25			
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25			
DC Block	PASTERNACK	PE8210	RF81	2017/12/26	2018/12/25			
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25			
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	2017/12/26	2018/12/25			
Coaxial Cable	Huber Suhner	EMC106-SM-S M-7200	150703	2017/12/26	2018/12/25			
Notebook	Lenovo	L420	S0012467	N/A	N/A			

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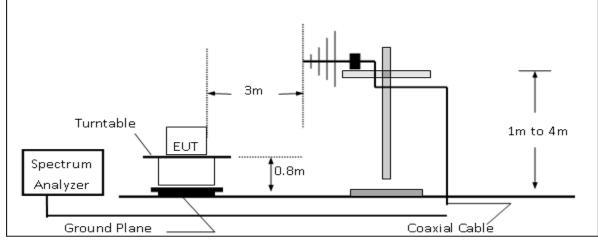


#### 10.3 Test SET-UP

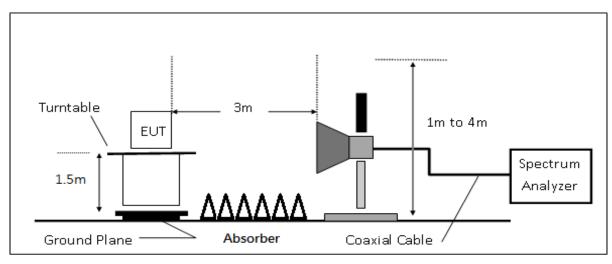
### (A) Radiated Emission Test Set-UP Frequency Below 30MHz.



### (B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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#### **10.4 Measurement Procedure**

- The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. 1. Guidance.
- The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m for frequen-2. cy> 1GHz above ground plan.
- The turn table shall rotate 360 degrees to determine the position of maximum emission level. 3.
- EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the 4. highest emissions.
- Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) 5. and Quasi-peak (QP) at frequency below 1 GHz.
- Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency 6. above 1 GHz.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- When measurement procedures for electric field radiated emissions above 1 GHz the EUT 8. measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- Maximum procedure was performed on the six highest emissions to ensure EUT compli-9. ance.
- And also, each emission was to be maximized by changing the polarization of receiving an-10. tenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
- 11. Repeat above procedures until all default test channel measured were complete.

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#### 10.5 **Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

### FS = RA + AF + CL - AG

Where	6	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

#### Note :

"F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

#### 10.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

#### 10.7 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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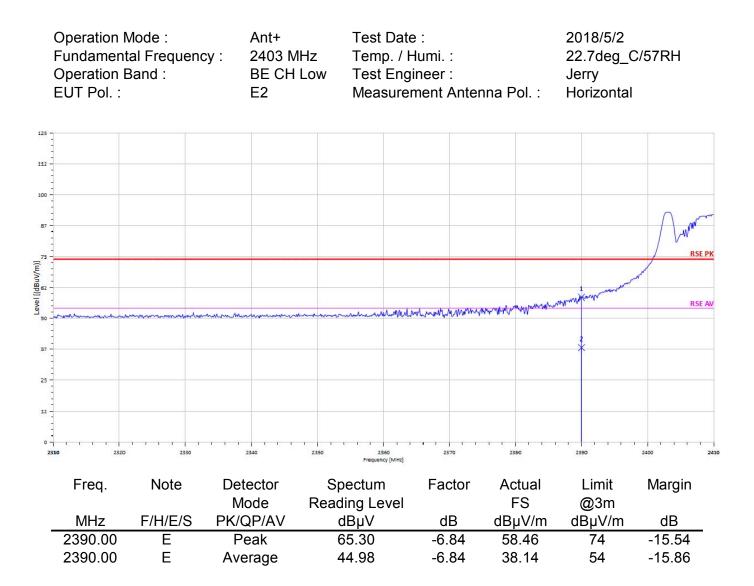
#### Radiated Band Edge Measurement Result (ANT+ mode)

	Fundament	peration Mode : undamental Frequency : peration Band : UT Pol. :		2403 MHz 1 BE CH Low 1		Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. :			2018/5/2 22.7deg_C/57RH Jerry Vertical	
125 - - - 112 -										
100 -										
87 -									RSEPK	
Level [(dBuV/m)]								1		
Level 5	nhon-manana mar	mound	mannemene		muummun	manuhana	www.ww	whenter	RSE AV	
37 -								*		
25 - -										
12 -										
0 - 23	<b>10</b> 2320	2330	2340	2350	2360 Frequency [MHz]	2370	2380	2390	2400 <b>2410</b>	
	Freq.	Note	Detector Mode	-	bectum ling Level	Factor	Actual FS	Limit @3m	Margin	
_	MHz	F/H/E/S	PK/QP/AV		dBµV	dB	dBµV/m	dBµV/m	dB	
-	2390.00 2390.00	E E	Peak Average		63.53 45.01	-6.84 -6.84	56.68 38.16	74 54	-17.32 -15.84	

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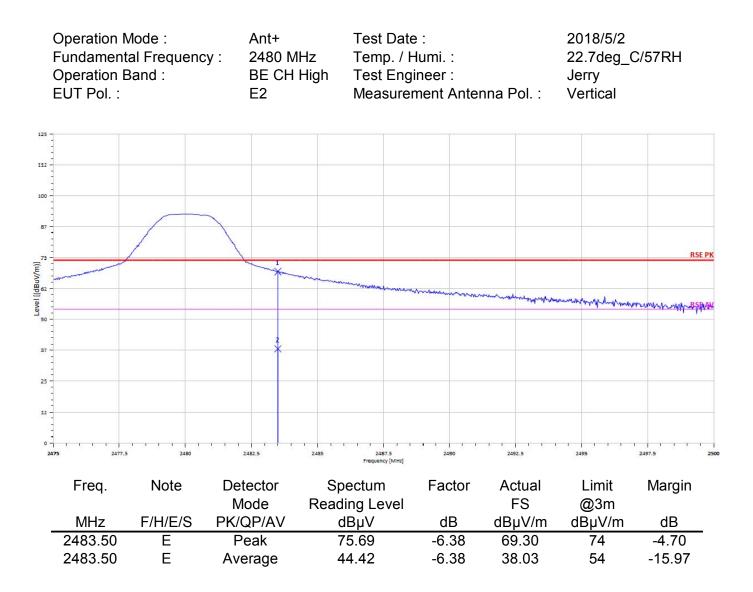
#### Report No.: E2/2018/40034 Page 35 of 53



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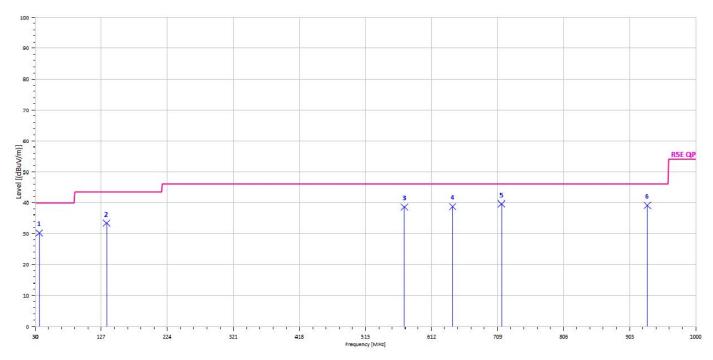
### Report No.: E2/2018/40034 Page 37 of 53

	Operation M Fundament Operation E EUT Pol. :	al Frequenc	Ant+ y : 2480 MI BE CH I E2	Hz Tem High Test	: Date : ip. / Humi. : : Engineer : surement Ante	enna Pol. :	2018/5/2 22.7deg_0 Jerry Horizontal	
125 1122 100 75 75 50 50						harry harry are		RSE PK
37 - 25 - 12 - 247	<sup>25</sup> 2477.5 Freq. MHz 2483.50 2483.50	Note F/H/E/S E E	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			2492.5 Actual FS dBµV/m 73.00 38.32	2495 Limit @3m dBµV/m 74 54	2497.5 2500 Margin dB -1.00 -15.68



## Radiated Spurious Emission Measurement Result (ANT+ mode) For Frequency form 30MHz to 1000MHz

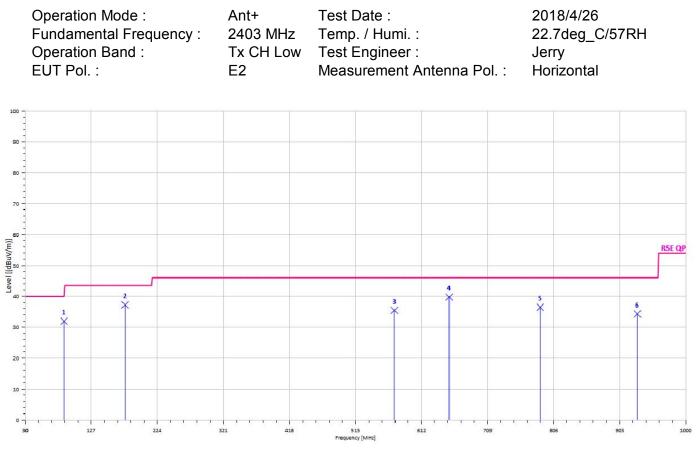
Operation Mode :	Ant+	Test Date :	2018/4/26
Fundamental Frequency :	2403 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	E2	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
35.82	S	Peak	48.04	-17.82	30.22	40	-9.78
134.76	S	Peak	50.45	-17.06	33.38	43.5	-10.12
572.23	S	Peak	48.08	-9.47	38.61	46	-7.39
643.04	S	Peak	46.82	-8.07	38.75	46	-7.25
714.82	S	Peak	47.05	-7.42	39.63	46	-6.37
929.19	S	Peak	43.91	-4.74	39.18	46	-6.82

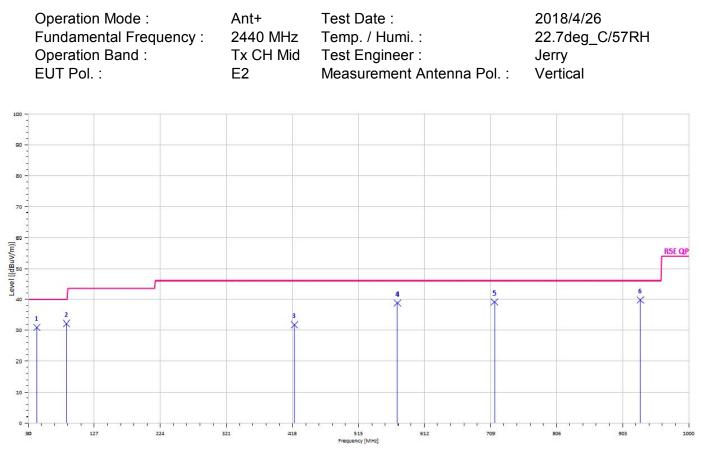
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.





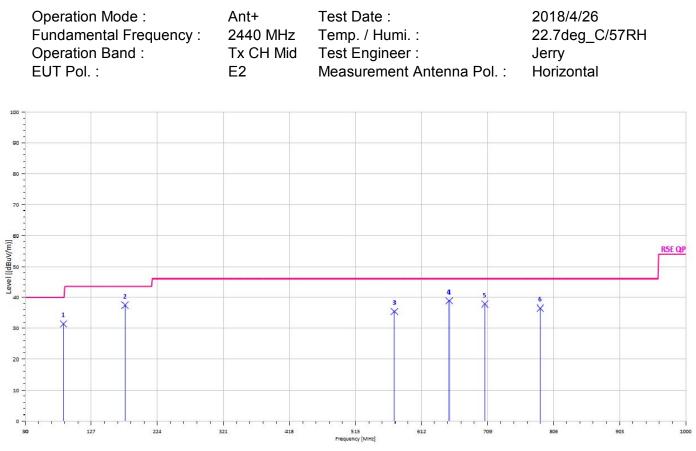
	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	87.23	S	Peak	54.28	-22.32	31.96	40	-8.04
	176.47	S	Peak	54.71	-17.48	37.23	43.5	-6.27
4	572.23	S	Peak	44.92	-9.47	35.45	46	-10.55
(	652.74	S	Peak	47.72	-7.95	39.77	46	-6.23
	786.60	S	Peak	43.25	-6.79	36.46	46	-9.54
9	929.19	S	Peak	39.03	-4.74	34.29	46	-11.71





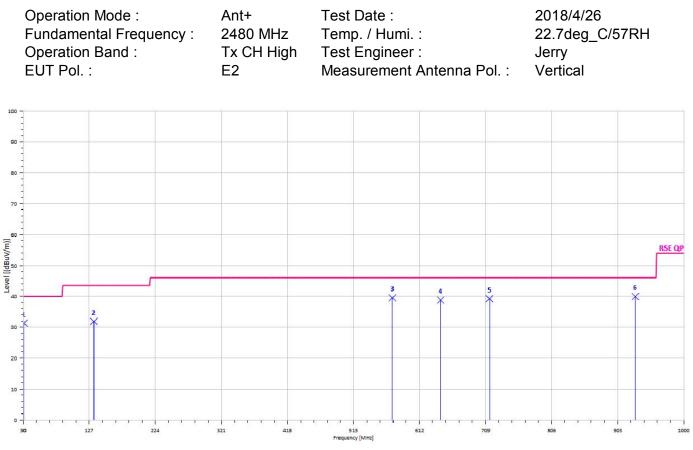
I	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4	42.61	S	Peak	48.08	-17.18	30.90	40	-9.10
8	36.26	S	Peak	54.32	-22.16	32.16	40	-7.84
4	20.91	S	Peak	43.86	-12.09	31.77	46	-14.23
5	72.23	S	Peak	48.23	-9.47	38.76	46	-7.24
7	14.82	S	Peak	46.54	-7.42	39.11	46	-6.89
9	29.19	S	Peak	44.54	-4.74	39.80	46	-6.20





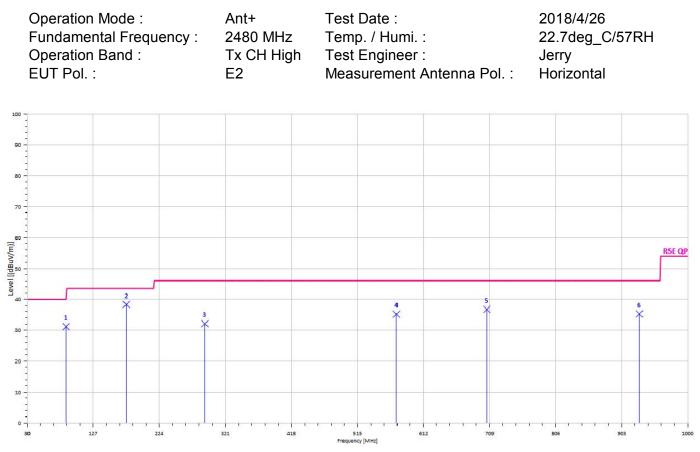
	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	86.26	S	Peak	53.59	-22.16	31.44	40	-8.56
	176.47	S	Peak	54.94	-17.48	37.46	43.5	-6.04
	572.23	S	Peak	44.89	-9.47	35.42	46	-10.58
	652.74	S	Peak	46.82	-7.95	38.87	46	-7.13
	705.12	S	Peak	45.20	-7.37	37.83	46	-8.17
	786.60	S	Peak	43.28	-6.79	36.48	46	-9.52





F	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
3	30.97	S	Peak	49.63	-18.30	31.33	40	-8.67
1	33.79	S	Peak	49.05	-17.17	31.88	43.5	-11.62
5	72.23	S	Peak	48.97	-9.47	39.50	46	-6.50
6	43.04	S	Peak	46.83	-8.07	38.75	46	-7.25
7	14.82	S	Peak	46.63	-7.42	39.21	46	-6.79
93	29.19	S	Peak	44.67	-4.74	39.94	46	-6.06



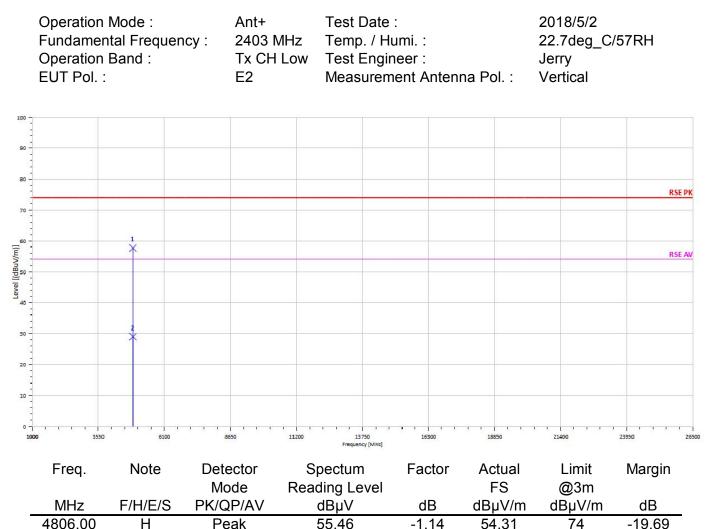


	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
_	87.23	S	Peak	53.48	-22.32	31.16	40	-8.84
	175.50	S	Peak	55.65	-17.32	38.33	43.5	-5.17
	290.93	S	Peak	47.56	-15.45	32.11	46	-13.89
	572.23	S	Peak	44.64	-9.47	35.17	46	-10.83
	705.12	S	Peak	44.12	-7.37	36.75	46	-9.25
	929.19	S	Peak	40.01	-4.74	35.27	46	-10.73

4806.00

Н

## Radiated Spurious Emission Measurement Result (ANT+ mode) For Frequency above 1GHz



28.60

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Average

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-1.14

27.46

54

-26.54



	Operation Fundamen Operation EUT Pol. :	tal Freque	ency: 2	Ant+ 2403 MHz Fx CH Lov E2	v Test E	Date : . / Humi. : Engineer : urement <i>F</i>		Pol. :	2018/5/2 22.7deg_0 Jerry Horizontal	C/57RH
100 -										
90 - - - 80 -										
70 -										RSE PK
60		×								
Level [(dBuV/m)]										RSE AV
Preve										
30 -		*								
20 -										
10 -										
0 - 10		6100	8650 B	11200	137 Frequenc		5300	18850	21400	23950 26500
	Freq.	Note	Detec Mod		Spectum ading Le		ctor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP		dBµV		IB c	iBµV/m	dBµV/m	dB
-	4806.00 4806.00	H H	Pea Avera		61.28 30.86		.14 .14	60.14 29.71	74 54	-13.86 -24.29



	Operation Fundamen Operation EUT Pol. :	tal Freque	Ant+ ncy : 2442 Tx Cl E2		Test Dat Temp. / I Test Eng Measure	Humi. : gineer :	ntenna P	ol. :	2018/5/2 22.7deg_ Jerry Vertical	<u>C</u> /57RH
100 - - - - 90 -										
- - 80 -										
70 -										RSE PK
60 (m//m		1								RSE AV
Level [(dBuV/m)] ه المراقع المراقع										
30		*								
20 -										
10 -										
100		6100	8650	11200	13750 Frequency [MHz			18850	21400	23950 26500
	Freq.	Note	Detector Mode		pectum ding Level	Fac		ctual FS	Limit @3m	Margin
-	MHz	F/H/E/S	PK/QP/AV		dBµV	dE		βµV/m	dBµV/m	
	4884.00 4884.00	H H	Peak Average		58.37 29.68	-0.6 -0.6		7.68 8.99	74 54	-16.32 -25.01



	Operation Fundamen Operation EUT Pol. :	tal Freque	Ant+ ncy : 2442 Tx CH E2		Test Da Temp. / Test En Measur	Humi. :	ntenna	Pol. :	2018 22.7c Jerry Horiz	deg_C	/57RH
100 - - - - 90 -											
80 -											
- 70 -											RSE PK
60 [(m/		*									RSE AV
Level [(dBuV/m)]											
40 -		2									
20 -											
- 											
- - - 10	00 3550	5100	1 1 1 1 1 1 1 1 8650	11200	13750 Frequency [M	163 Hz]	00	18850	21400		23950 26500
	Freq.	Note	Detector		pectum	Fac	tor	Actual		mit	Margin
	MHz	F/H/E/S	Mode PK/QP/AV		ding Leve dBµV	el dl	З (	FS dBµV/m	-	3m JV/m	dB
-	4884.00 4884.00	H H	Peak Average		62.39 32.59	-0. -0.		61.70 31.90	7	74 54	-12.30 -22.10



	Operation N Fundament Operation E EUT Pol. :	al Frequen	Ant+ cy : 2403 M Tx CH E2		Test Date Temp. / H Test Engi Measurer	łumi. :	ına Pol. :	2018/5/2 22.7deg_0 Jerry Vertical	C/57RH
100 - - - - - - - - -									
80 -									RSE PK
70 -									
Level [(dBuV/m)] 8 · · · · · · · · · · · ·		1 X							RSE AV
Prevel [(0									
30 - 		2							
20 -									
10 - - - - -		, , , , , , ,							
10		6100	Botactor	11200	13750 Frequency [MHz]	16300 Eastar	Actual	21400	23950 26500
	Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Readi	ectum ng Level BµV	Factor dB	FS dBµV/m	Limit @3m dBµV/m	Margin dB
-	4960.00 4960.00	H	Peak Average	5	6.39 8.79	-0.66 -0.66	55.73 28.13	74 54	-18.27 -25.87



	Operation N Fundament Operation E EUT Pol. :	al Frequen	Ant+ cy : 2403 M Tx CH E2		Test Date Temp. / H Test Eng Measure	łumi. : ineer :	enna Pol. :	2018/5/2 22.7deg_0 Jerry Horizontal	C/57RH
100 - 90 -									
80 -									RSE PK
70 - 60 - 60 - 60 - 60 - 60 - 60 - 60 -		1							RSE AV
Level [(dBuV/m)] ه									
30 -		2 *							
20 -									
0 - 10	<b>00</b> 3550	6100	8650	11200	13750 Frequency [MHz]	16300	18850	21400	23950 26500
	Freq.	Note	Detector Mode	Readi	ectum ng Level	Factor	FS	Limit @3m	Margin
•	MHz 4960.00	F/H/E/S H	PK/QP/AV Peak		ΒμV 2.39	dB -0.66	dBµV/m 61.73	dBµV/m 74	dB -12.27
	4960.00	Н	Average		1.28	-0.66	30.62	54	-23.38



# **11 PEAK POWER SPECTRAL DENSITY**

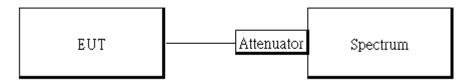
### Standard Applicable: 11.1

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.

#### 11.2 **Measurement Equipment Used:**

Conducted Emission Test Site								
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
Spectrum Analyzer	Agilent	N9010A	MY51440113	2017/06/21	2018/06/20			
Attenuator	Marvelous	MVE2213-10	RF31	2017/12/26	2018/12/25			
DC Block	PASTER- NACK	PE8210	RF81	2017/12/26	2018/12/25			
Notebook	Lenovo	L430	P0000195	N/A	N/A			

### Test Set-up: 11.3



#### 11.4 **Measurement Procedure:**

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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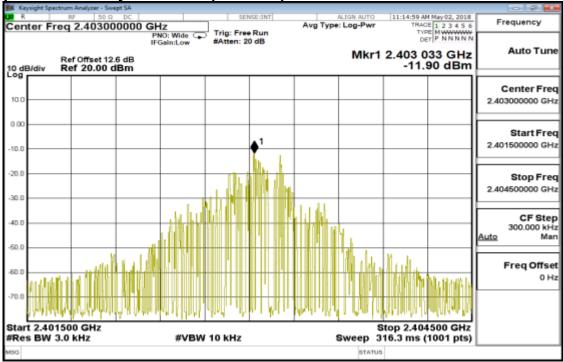
### 11.5 Measurement Result:

### Ant + mode

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result
2403	-11.90	8	PASS
2442	-11.26	8	PASS
2480	-10.99	8	PASS

NOTE: cable loss as 0.45dB that offsets in the spectrum

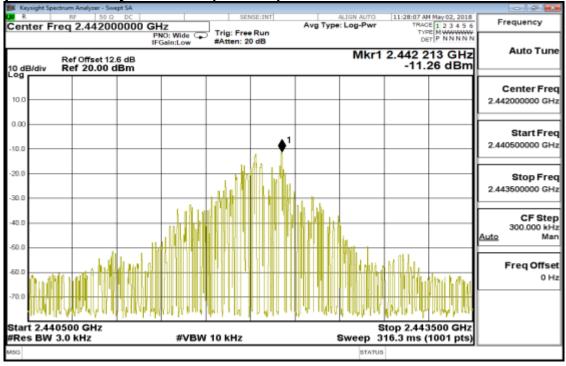
### ANT+ mode Power Spectral Density Test Plot (CH-Low)



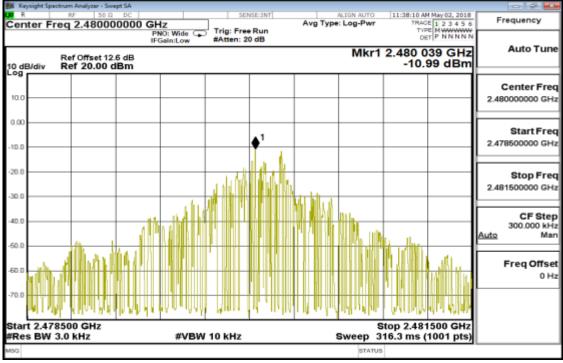
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## Power Spectral Density Test Plot (CH-Mid)



# Power Spectral Density Test Plot (CH-High)



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# **12 ANTENNA REQUIREMENT**

### 12.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

In case of point-to-point operation, the power shall be reduced by the one dB for every 3 dB that the directional gain of antenna exceeds 6dBi.

### **Antenna Connected Construction:** 12.2

An embedded-in antenna design is used.

The antenna is designed as permanently attached and has no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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