

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: | E2/2018/40033 |
| 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 |
|---------------|----------|---------------------------------|------------------|--------------|---------------|
| E2/2018/40033 | Rev.00 | Initial creation of document | All | May 18, 2018 | Violetta Tang |



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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 | | | |
| Davies Curstin | 12V from | AC/DC Adapter | | |
| Power Supply: | Adapter: | Model No.: FSP050-AHCN3, Supplier: FSP | | |

Bluetooth Low Energy:

| Bluetooth Version: | Bluetooth V4.2 Dual Mode |
|----------------------|-------------------------------------|
| Channel number: | 40 channels |
| Modulation type: | GFSK |
| Transmit Power: | 9.72dBm |
| Frequency Range: | 2.402GHz – 2.480GHz |
| Antenna Designation: | PIFA Antenna, Antenna Gain: 1.58dBi |

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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

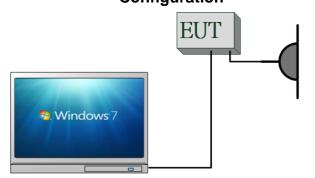


Fig 2-2 AC power line Configuration

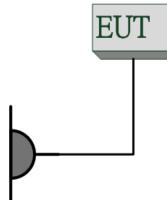


Table 2-1 Equipment Used in Tested System

| 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 |

DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

40 channels are provided for Bluetooth LE

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

| | RADIATED EMISSION TEST (BELOW 1 GHz) | | | | |
|--------------|--------------------------------------|-------------------|-----------------|---------------------|--|
| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | |
| Bluetooth LE | 0 to 39 | 0,20,39 | GFSK | 1 | |
| | RADI | ATED EMISSIO | N TEST (ABOVE 1 | GHz) | |
| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | |
| Bluetooth LE | 0 to 39 | 0,20,39 | GFSK | 1 | |

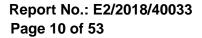
Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE 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 | DATA RATE (Mbps) |
| Bluetooth LE | 0 to 39 | 0,20,39 | GFSK | 1 |

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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 : Vertical) | 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 | _ | | SERIAL NUMBER | | | | | | | |
| 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. | | | | | |

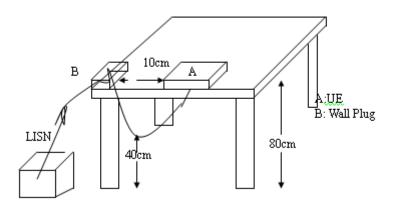
6.3 EUT Setup:

- 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

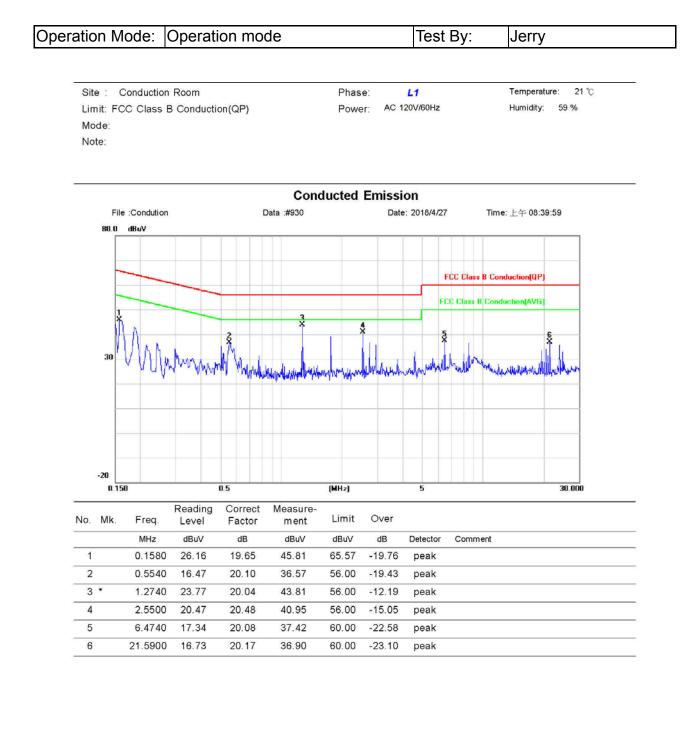
6.6 Measurement Result:

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

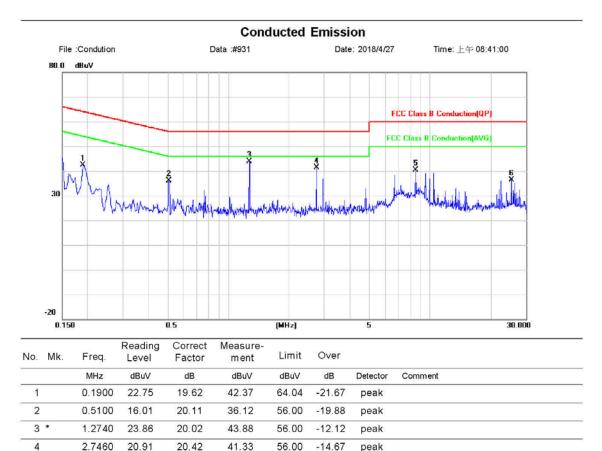
-19.61

-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.

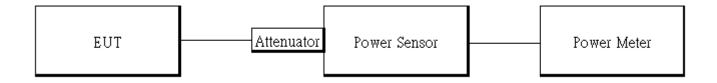
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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 | EQUIPMENT MFR | | QUIPMENT MFR MODEL SE | | 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.

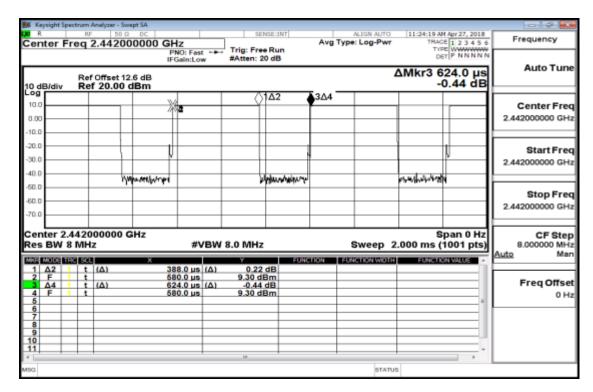
Power Meter:

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

- 4. 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) |
|-----|----------------|---------------------|--------------|-------------------------|
| BLE | 0.62 | 22.05 | 2.57 | 3.00 |



Duty Cycle Factor:10*log(1/(0.6231/100))=22.05

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7.5 Measurement Result:

BLE mode:

| СН | Frequency (MHz) | Peak Power Output (dBm) | Required Limit | | | | | | |
|--------|--------------------|--|-----------------|--|--|--|--|--|--|
| 0 | 2402 | 9.33 | 1 Watt = 30 dBm | | | | | | |
| 20 | 2442 | 9.72 | 1 Watt = 30 dBm | | | | | | |
| 39 | 2480 | 9.42 | 1 Watt = 30 dBm | | | | | | |
| BLE mo | BLE mode: | | | | | | | | |
| СН | Frequency (MHz) | Max. Avg. Output include tune up tolerance Power (dBm) | Required Limit | | | | | | |
| 0 | 2402 | 9.16 | 1 Watt = 30 dBm | | | | | | |
| 20 | 2442 | 9.48 | 1 Watt = 30 dBm | | | | | | |
| 39 | 2480 | 9.22 | 1 Watt = 30 dBm | | | | | | |

*Note: Measured by power meter, cable loss as 12.6 dB that offsets on the power meter in Peak *Note: Measured by power meter, as cable loss+ Duty cycle factor that offsets on the power meter *Note: Max. Output include tune up tolerance Power is average power

EIRP

| СН | Frequency (MHz) | Max. Avg. Output include tune up tolerance Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit |
|----|--------------------|--|--------------------------|---------------|------------|
| 0 | 2402 | 9.16 | 1.58 | 10.74 | 4W= 36 dBm |
| 20 | 2442 | 9.48 | 1.58 | 11.06 | 4W= 36 dBm |
| 39 | 2480 | 9.22 | 1.58 | 10.80 | 4W= 36 dBm |

* Note: EIRP = Average Power + Gain

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6DB & 99% BANDWIDTH MEASUREMENT 8

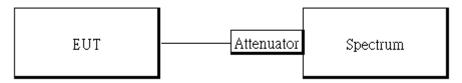
8.1 Standard Applicable

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:

BLE mode

| Frequency | 6dB BW | BW | Result | BLE mode | | | |
|-----------|-----------|-------|--------|-----------------|--------------------|--|--|
| (MHz) | (MHz) | (MHz) | Result | Frequency (MHz) | 99%Bandwidth (MHz) | | |
| 2402 | 0.724 | > 0.5 | PASS | | | | |
| 2102 | 0.721 | . 0.0 | 17,000 | 2402 | 1.0522 | | |
| 2442 | 0.72 | > 0.5 | PASS | 0.1.10 | 1.0504 | | |
| | - | | | 2442 | 1.0521 | | |
| 2480 | 0.718 | > 0.5 | PASS | 2480 | 1.0528 | | |

Note: Refer to next page for plots.

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6dB Band Width Test Data CH-Low

| R | um Analyzer - Occupied BW IU 50 Ω DC q 2.402000000 | | Center Fr Trig: Free | | | 60/50 | Radio Std | | Frequency |
|----------------------------------|--|-------------------------|-------------------------|-----------------|----|--------|-----------------|---------------------|--------------------------------|
| 10 dB/div | Ref Offset 12.6 dB | | #Atten: 2 | 0 dB | | | Radio Dev | ice: BTS | |
| 10.0 0.00 10.0 20.0 | | | ~ | \sim | | | | | Center Freq 2.402000000 GHz |
| 40.0 50.0 60.0 | ~~~~~ | | | | | | | vivenay | |
| 70.0 Center 2.40 #Res BW 1 | | | #VE | 300 kHz | | | | an 5 MHz ep 1 ms | CF Step 500.000 kHz |
| Occupi | ed Bandwidt 1. | ^ь 0801 МН | Ηz | Total Pow | er | 16.0 |) dBm | | Auto Mar |
| Transmi x dB Bai | it Freq Error ndwidth | -13.623 k 723.5 k | | OBW Pow x dB | er | | 0.00 % 00 dB | | 0 Hz |
| 93 | | | | | | STATUS | 5 | | |

6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High

| Keysight Spectrum Analyzer - Occupied | Dial. | | | | # * |
|---------------------------------------|---------------|-------------------------------|------------|--------------------------|-------------------------|
| R IU ¹ 50 Ω DC | | SENSE:INT | ALIGN AUTO | 11:28:02 AM Apr 27, 2018 | |
| enter Freq 2.4800000 | 0 GHz Cer | nter Freq: 2.480000000 GHz | R | adio Std: None | Frequency |
| | taken Tri | g:FreeRun Avg Ho ten:20 dB | ld: 50/50 | adio Device: BTS | |
| | #FGain:Low #M | ten: 20 ab | ĸ | adio Device: B13 | |
| Ref Offset 12.6 | dB | | | I | |
| 0 dB/div Ref 20.00 dE | 3m | | | | |
| .og | | | | | Center Free |
| 0.00 | | | | | |
| | | | | | 2.48000000 GHz |
| 10.0 | | | | | |
| 20.0 | | | | | |
| 30.0 | | | | | |
| 40.0 | / | | | | |
| N N | | | | man and the second | |
| - martine and a second | | | | and the second | |
| 60.0 | | | | | |
| 70.0 | | | | | |
| Center 2.48 GHz | | | | Span 5 MHz | |
| Res BW 100 kHz | | #VBW 300 kHz | | Sweep 1 ms | CF Step |
| ites bit foo kinz | | #TEN SOO KIL | | oncep 1113 | 500.000 kHz Auto Mar |
| Occupied Bandwid | ith | Total Power | 15.8 d | Bm | Auto Mar |
| | .0819 MHz | | | | |
| 1 | | | | | Freq Offset |
| Transmit Freq Error | -6.735 kHz | OBW Power | 99.0 | 0 % | 0 H2 |
| x dB Bandwidth | 718.3 kHz | x dB | -6.00 | dB | |
| X ub bandwiddi | / 10.3 KHZ | X UB | -0.00 | uв | |
| | | | | | |
| | | | | | |
| | | | | | |
| 90 | | | STATUS | | |
| | | | | | |

99% Band Width Test Data CH-Low

| R Center Fre | eq 2.402000000 GHz Center Freq: 2.402000000 GHz Radio Trig: Free Run Avg Hold: 50/50 | | | Radio Std | 1:20:29 AM Apr 27, 2018 Idio Std: None Frequencies BTS | | | |
|-----------------------|---|----------------------------|--------------|---|---|---------------|----------------------|------------------------------|
| 10 dB/div | Ref Offset 12.6 c Ref 20.00 dB | 1B | Atten: 20 dB | | | Radio Dev | ICE: BTS | |
| 10.0 0.00 | | | ~~~~ | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~~ | | | Center Fre 2.402000000 GH |
| 20.0 20.0 | | | | | - ~ | h | ~~~ | |
| 0.0 | | | | | | | | |
| enter 2.4 Res BW 3 | | | #VBW 62 k | Hz | | | an 2 MHz p 4.8 ms | CF Ste 200.000 ki |
| Occup | ied Bandwid | th .0522 MHz | Total I | Power | 15.5 | dBm | | Auto Ma |
| | it Freq Error Indwidth | -11.137 kHz 595.7 kHz | | Power | | 00 % 00 dB | | 01 |
| 20 | | | | | STATUS | | | |

99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High

| R | trum Analyzer - Occupied BW 10 50 Ω DC eq 2.4800000000 | | SENSE:INT | ALIGN AUTO | 11:33:36 AM | Apr 27, 2018 None | Frequency |
|---------------------|--|------------|--|------------|-------------|----------------------|------------------------------|
| | 2.100000000 | Trig: | FreeRun Avg Holo n: 20 dB | d: 50/50 | Radio Devi | ce: BTS | |
| 0 dB/div | Ref Offset 12.6 dB Ref 20.00 dBm | | | | | | |
| .og 10.0 1.00 | | | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | | | Center Fre 2.480000000 GF |
| 20.0 | | | | \sim | | | |
| 0.0 | | | | | J_ | $\sim \sim \sim$ | |
| 0.0 | | | | | | | |
| 30.0 70.0 | | | | | | | |
| enter 2.4 Res BW | | | VBW 62 kHz | | | an 2 MHz 5 4.8 ms | CF Ste 200.000 ki |
| Occup | ied Bandwidth | ı | Total Power | 15.4 | dBm | | <u>Auto</u> Ma |
| | 1.0 | 0528 MHz | | | | | Freq Offs |
| | nit Freq Error | -3.864 kHz | OBW Power | 99 | .00 % | | 01 |
| x dB Ba | andwidth | 594.9 kHz | x dB | -6. | 00 dB | | |
| | | | | | | | |
| a | | | | STATUS | | | |

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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

As per KDB 558074 D01 11.1 a)

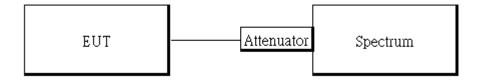
If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 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) |
|--------------------|---------------------------|---|
| 2402 | 8.66 | -11.34 |
| 2480 | 8.51 | -11.49 |

Reference Level of Limit

NOTE: cable loss as 12.6dB that offsets in the spectrum NOTE: Refer to next page for plots.

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.



Power Spectral Density for Bandedge Limit (CH-Low)



Power Spectral Density for Bandedge Limit (CH-High)

| 🗱 Keysight Spectrum Analyzer - Swept SA | | | |
|---|--|---|---|
| Center Freq 2.480000000 | GHz SENSE: INT | ALIGN AUTO 11:28:13 AM Apr Avg Type: Log-Pwr TRACE 1 | 23456 Frequency |
| Ref Offset 12.6 dB 10 dB/div Ref 20.00 dBm | PNO: Wide Trig: Free Run IFGein:Low #Atten: 20 dB | Mkr1 2.479 989 5 | GHz Auto Tune dBm |
| 10.0 | | | Center Freq 2.480000000 GHz |
| -10.0 | | | Start Freq 2.479250000 GHz |
| -20.0 | | | Stop Freq 2.480750000 GHz |
| -40.0 | | | CF Step 150.000 kHz <u>Auto</u> Man |
| -60.0 | | | Freq Offset 0 Hz |
| -70.0 Start 2.4792500 GHz #Res BW 100 kHz | #VBW 300 kHz | Stop 2.480750 Sweep 1.000 ms (100 | |
| MSG | | STATUS | |

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Band Edges Test Data CH-Low

| Keysight Spectrum Analyzer - Swept SA | | | |
|---|--------------------------------------|--------------------------------|--|
| Center Freq 2.360000000 GHz | | | Apr 27, 2018 1 2 3 4 5 6 MWWWWWW |
| PNO: Fast IFGain:Lov Ref Offset 12.6 dB 10 dB/div Ref 20.00 dBm | | Mkr3 2.390 | PNNNN |
| 10.0 0.00 -10.0 | | | 01 Center Freq 2.360000000 GHz |
| -20.0 | | | Start Freq 2.31000000 GHz |
| -50.0 | | 3 | Stop Freq 2.41000000 GHz |
| Start 2.31000 GHz #Res BW 100 kHz #V | BW 300 kHz | Stop 2.41 Sweep 9.600 ms (1 | 001 pts) 10.000000 MHz |
| 1 N 1 f 2.4022GHz 2 N 1 f 2.3999GHz 3 N 1 f 2.3990GHz 4 5 5 6 6 7 7 7 8 9 10 11 | 8.72 dBm -62.96 dBm -68.07 dBm | | Freq Offset 0 Hz |
| MSG | | STATUS | |

Band Edges Test Data CH-High

| 🇱 Keysight Sp | ectrum Analyzer - Sw | | | | | | | | | |
|---------------------------------------|----------------------------|----------------------------------|------------------------|--|--------|--------|---------------------------|------------|----------------------------------|-------------------------------------|
| Center F | req 2.48750 | 00000 GH | | | SE:INT | Avg Ty | ALIGN AUTO pe: Log-Pwr | TRA | M Apr 27, 2018 CE 1 2 3 4 5 6 | Frequency |
| 10 dB/div | Ref Offset 12 Ref 20.00 | 1F0 | NO: Fast G Gain:Low | Trig: Free #Atten: 20 | | | Mkr3 | 2.483 6 | 00 GHz 20 dBm | Auto Tune |
| 10.0 0.00 -10.0 | | 1 | | | | | | | -11.49 dBm | Center Freq 2.487500000 GHz |
| -20.0 -30.0 -40.0 | | L. | | | | | | | | Start Freq 2.475000000 GHz |
| -50.0 -60.0 -70.0 | - | | ***** | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | | | - | | Stop Freq 2.50000000 GHz |
| Start 2.47 #Res BW | 100 kHz | × | #VBI | W 300 kHz | | | Sweep 2 | 2.400 ms (| 0000 GHz 1001 pts) | CF Step 2.500000 MHz Auto Man |
| 1 N 2 N 3 N 4 5 6 7 | 1 1 1 1 | 2,479,75 2,483,50 2,483,60 | 0 GHz | 8.60 dB -56.00 dB -56.20 dB | m m | | | | | Freq Offset 0 Hz |
| 8 9 10 11 4 MBG | | | | 19 | | | STATU | 5 | | |

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

| 😹 Keysight Sp | ectrum Analyzer - Sv | | | | | |
|-----------------------------------|-----------------------------------|-------------|-------------------|--|--|---------------------------------------|
| Center F | req 1.5150 | | SENSE:INT | Aug Type: Log-Pwr | 11:20:00 AM Apr 27, 2018 TRACE 1 2 3 4 5 6 TVPE M 00000000 | Frequency |
| 10 dB/div | Ref Offset 1: Ref 20.00 | | | М | kr1 2.403 0 GHz 8.63 dBm | Auto Tune |
| 10.0 0.00 -10.0 | | | | | -11.37 dila | Center Freq 1.515000000 GHz |
| -20.0 -30.0 -40.0 | | | | | | Start Freq 30.000000 MHz |
| -50.0 -60.0 | a and a state of the state of the | | مىرىم مىلىم مىرىم | and the second s | and hitse and a second | Stop Freq 3.00000000 GHz |
| Start 30 #Res BW | 100 kHz | #V | BW 300 kHz | Sweep 2 | Stop 3.000 GHz 283.9 ms (1001 pts) | CF Step 297.000000 MHz Auto Man |
| 1 N 2 3 4 5 6 7 | 1 f | 2,403 0 GHz | 8.63 dBm | | | Freq Offset 0 Hz |
| 8 9 10 11 * | | | 10 | STATU | s | |

CH-Low 3GHz – 26.5GHz

| | ectrum Analyzer - Sv | | | | | | | | | | | | | |
|-----------------------------------|--------------------------------------|-------------------------|------------------|-------------|--|---------|-----------|--|-------------------------------------|--|--|--|--|--|
| Center F | req 14.750 | 000000 GHz PN0: Fest | | Run | | Log-Pwr | TRAC | E 1 2 3 4 5 6 | Frequency | | | | | |
| 10 dB/div | Ref Offset 12.6 dB Mkr1 25.959 5 GHz | | | | | | | | | | | | | |
| 10.0 0.00 | Rei 20.00 | | | | | | | -11.37 dDn | Center Free 14.750000000 GH: | | | | | |
| -20.0 -30.0 -40.0 | | | | | | | | 1 | Start Free 3.000000000 GH | | | | | |
| -50.0 -60.0 | | | and and a second | 14.5 Marine | anderstand and a second se | | | an a | Stop Free 26.50000000 GH | | | | | |
| Start 3.00 #Res BW | 100 kHz | #V | /BW 300 kHz | 51 M/C | TON LOD | Sweep | 2.246 s (| 6.50 GHz 1001 pts) | CF Step 2.35000000 GH Auto Ma | | | | | |
| 1 N 2 3 4 5 6 7 | | 25,959 5 GHz | -48.67 dB | | | | | | Freq Offse 0 H | | | | | |
| 8 9 10 11 * | | | 17 | | | STATUS | | | | | | | | |

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CH-Mid 30MHz – 3GHz

| 🗱 Keysight Sp | ectrum Analyzer - Swept ! | | | | | - S × |
|---|---------------------------|--------------------------------|----------------------|--|--|--------------------------------|
| Center F | req 1.515000 | 000 GHz | SENSE:INT | ALIGN AUTO Avg Type: Log-Pwr | 11:27:05 AM Apr 27, 2018 TRACE 1 2 3 4 5 6 TVPE M WWWWWW | Frequency |
| 10 dB/div | Ref Offset 12.6 | PN0: Fast G IFGain:Low | #Atten: 20 dB | Mk | r1 2.441 6 GHz 8.90 dBm | Auto Tune |
| 10.0 0.00 | | | | | -11.10 dBm | Center Freq 1.515000000 GHz |
| -20.0 -30.0 -40.0 | | | | | | Start Freq 30.000000 MHz |
| -50.0 -60.0 | | مريد ويسترك وما مع المريد والم | naparita a la subera | and an | Jaseph Maranapa | Stop Freq 3.000000000 GHz |
| Start 30 # #Res BW | 100 kHz | #VB\ | V 300 kHz | Sweep 2 | Stop 3.000 GHz 83.9 ms (1001 pts) | |
| 1 N 2 3 4 5 6 7 8 9 10 | | 2.441 6 GHz | 8.90 dBm | | | Freq Offset 0 Hz |
| 8 9 10 11 * | | | 19 | STATU | | |

CH-Mid 3GHz – 26.5GHz

| 🎒 Key | ysight Sp | | | | | | | | | | | | | | | | | | - ÷ - |
|-------------------------|---------------|---------|---------|---------|---|-------|------|--------------------|--|-------|-------|-------------|-------|-----|--------------------|-------------|---|-----|---------------------------------------|
| Cen | iter F | | ۳ 14 | .750 | | | Gŀ | łz | | Triat | SENSE | | Avg | | Log-Pwr | TR | AM Apr 27, 2 ACE 1 2 3 4 YPE MWWW | 5 6 | Frequency |
| | B/div | | | fset 1 | | | IFGa | 0: Fast ain:Lov | w and the second s | #Atte | | | | | Mkr | 1 26.12 | DET P N N N | Hz | Auto Tune |
| 10.0 0.00 -10.0 | | | | | | | | | | | | | | | | | -11.10 | dDn | Center Freq 14.750000000 GHz |
| -20.0 -30.0 -40.0 | | | | | | | + | | | | | | | | | | | 4 | Start Freq 3.000000000 GHz |
| -50.0 -60.0 -70.0 | | يوسو يې | ~ | a de la | - | منهم | | 697-646 | ***** | | | der metalen | | ~~~ | herre weglen giber | and so were | | - | Stop Freq 26.50000000 GHz |
| #Re | t 3.0 s BW | 100 |) kł | łz | | | | #\ | /BW | 300 k | Hz | | | | | 2.246 s | · · | ts) | CF Step 2.35000000 GHz Auto Man |
| | N | | | | | 26.12 | 24 0 | GHz | | -47.7 | 7 dBn | | CTION | | IN TON WENTH | FUNC | TON VALUE | | Freq Offset 0 Hz |
| MSG | | | | | | | | | | | | | | | STATU | 5 | | | |

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CH-High 30MHz – 3GHz

| 🎫 Keysight Sp | ectrum Analyzer - Swept S | | | | | |
|-----------------------------------|--|-------------|---------------------------------|---|---|--------------------------------|
| Center F | Freq 1.5150000 | | SENSE:INT | ALIGN AUTO Avg Type: Log-Pwr | 11:33:09 AM Apr 27, 2018 TRACE 1 2 3 4 5 6 | Frequency |
| 10 dB/div | Ref Offset 12.6 d Ref 20.00 dBr | PN0: Fast G | Trig: Free Run #Atten: 20 dB | Mk | r1 2.480 3 GHz 8.47 dBm | Auto Tune |
| 10.0 0.00 -10.0 | | | | | ↓1 -11 51.090 | Center Freq 1.515000000 GHz |
| -20.0 -30.0 -40.0 | | | | | | Start Freq 30.000000 MHz |
| -50.0 -60.0 -70.0 | and the second | | | en and a state of the state of | همهد مومودورا واردا دور | Stop Freq 3.00000000 GHz |
| Start 30 I #Res BW | 100 kHz | #VBW | / 300 kHz | Sweep 2 | Stop 3.000 GHz 83.9 ms (1001 pts) | |
| 1 N 2 3 4 5 6 7 | | 2.480 3 GHz | 8.47 dBm | | | Freq Offset 0 Hz |
| 8 9 10 11 4 MSG | | | | STATUS | | |

CH- High 3GHz – 26.5GHz

| 🎒 Keysigl | ht Spect | rum A | nalyzer - Swe | pt SA | | | | | | | | | | | |
|-----------------------------------|----------|----------|-----------------------|----------------|----------------------|--------|--------------|------|-------------------------|------|-----|-----------|-------------------------|--|---------------------------------------|
| Cente | r Fre | ات q1 | 4.7500 | 00000 0 | GHz | | rig: Free | Rue | | Avg | | LIGN AUTO | TRA | M Apr 27, 2018 CE 1 2 3 4 5 6 PE M WWWWW | <u> </u> |
| 10 dB/d | | | Offset 12. 20.00 d | 6 dB | NO: Fast Gain:Lov | | Atten: 2 | | | | | Mkr | ⁰ 1 26.05 | 3 5 GHz 52 dBm | Auto Tuno |
| 10.0 0.00 | | | | | | | | | | | | | | -11.53.099 | Center Freq 14.75000000 GHz |
| -20.0 -30.0 -40.0 | | + | | | | | | | | | | | | 4 | Start Freq 3.00000000 GHz |
| -50.0 -60.0 | سمام | ~ | يو د الدي فيومي | end the second | | - | يەسىرىم 1 | •••• | روبر مر ^{مع} ر | | ~~ | | ann an Alenna | | Stop Freq 26.50000000 GHz |
| Start 3 #Res E | BW 1 | 00 | | × | #V | 'BW 30 | 00 kHz | | FUNK | TION | FUN | Sweep | 2.246 s | 26.50 GHz (1001 pts) | CF Step 2.35000000 GHz Auto Man |
| 1 N 2 3 4 5 6 7 | | 1 | | 26.053 | 5 GHz | | 47.52 dE | 3m | | | | | | _ | Freq Offset 0 Hz |
| 8 9 10 11 < | | | | | | | 19 | | | | | STATU | 5 | | |

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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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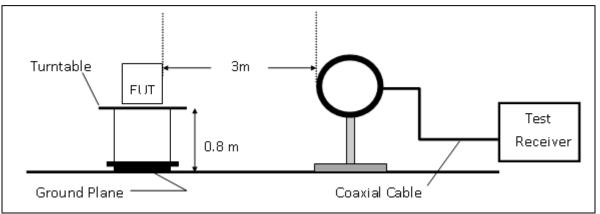
10.2 Measurement Equipment Used

| 966 Chamber | | | | | | | | | | |
|-------------------|----------------------|-----------------------|------------|------------|------------|--|--|--|--|--|
| EQUIPMENT | MFR | MODEL NUMBER | SERIAL | LAST | CAL DUE. | | | | | |
| ТҮРЕ | TYPE | | NUMBER | CAL. | | | | | | |
| Broadband Antenna | SCHWAZBECK | VULB 9168 | 9168-617 | 2017/10/27 | 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 | EMC Instru- ments | EMC12630SE | 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 | | | | | |

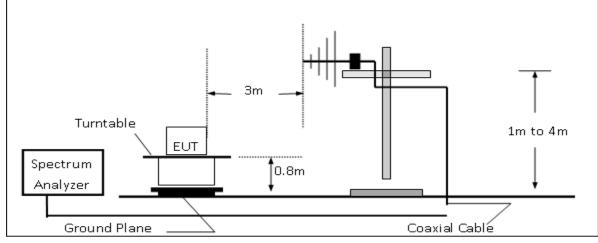


10.3 Test SET-UP

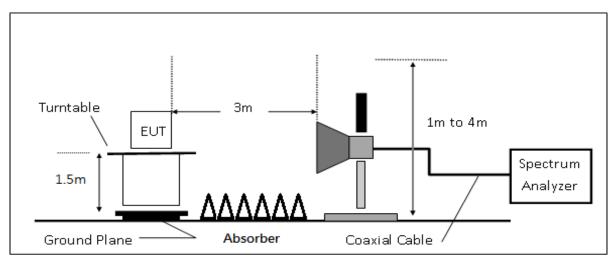
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 μ V/m) = SPA. Reading level(dB μ 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:

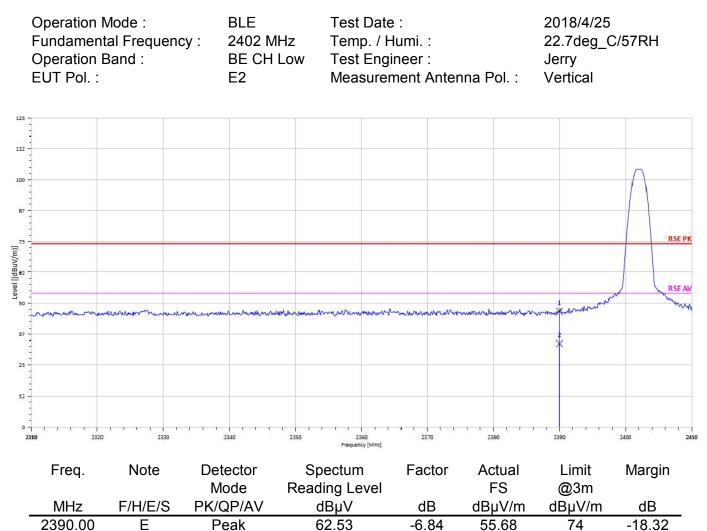
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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Radiated Band Edge Measurement Result (BLE mode)



48.51

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Average

Е

2390.00

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-6.84

41.67

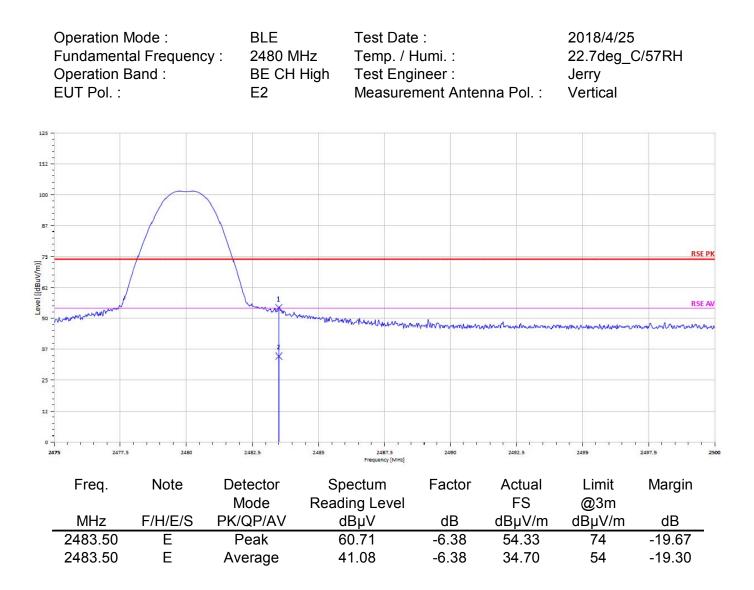
54

-12.33



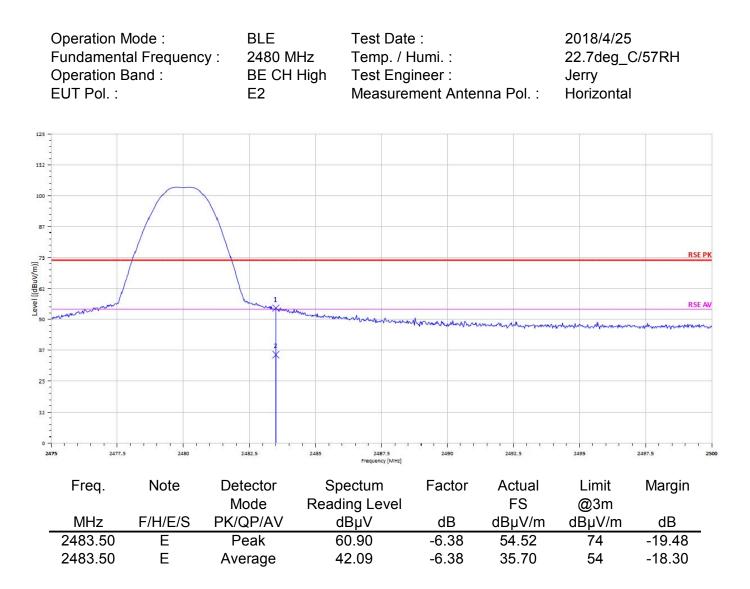
| | Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. : | | icy : | BLE 2402 MHz BE CH Low E2 | | Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : | | | | 2018/4/25 22.7deg_C/57RH Jerry Horizontal | | | | |
|-------------------------------|---|----------|--------|------------------------------------|---------------|---|---------|-------------------|--------------|--|-----------|---------|-----------|--------|
| 125 - - - 112 - | | | | | | | | | | | | | | |
| 100 - | | | | | | | | | | | | | \square | |
| 87 - | | | | | | | | | | | | | | |
| 75 [(ɯ/ʌŋ | | | | | | | | | | | | | | RSE PK |
| Level [(dBuV/m)] در ۲۰۰۰ ا | | | | | | | | | | | | | | RSE AV |
| 37 - | murtund | unnhound | hannen | million | urtersoniador | mum | whenthe | us kan med som an | monn | Munham | minten | www.ww | | |
| 25 - | | | | | | | | | | | * | | | |
| 12 - | | | | | | | | | | | | | | |
| 0 - 23 | 10 2320 | 2330 | | 40 | 2350 | 2360 Frequency | | 2370 | 25 | 50 | 2390 | <u></u> | 2400 | 2410 |
| | • | | | | ectum | | Factor | | Actual FS | | nit | Marg | jin | |
| | MHz | F/H/E/S | | Mode PK/QP/AV | | ing Lev IBµV | vei | dB | | -S JV/m | @3 dBµ | | dB | |
| - | 2390.00 | E | Pe | ak | 5 | 3.51 | | -6.84 | 46 | 6.67 | 74 | 4 | -27.3 | |
| | 2390.00 | E | Avei | rage | 4 | 40.38 -6.84 | | 33 | 8.53 | 54 | | -20.47 | | |





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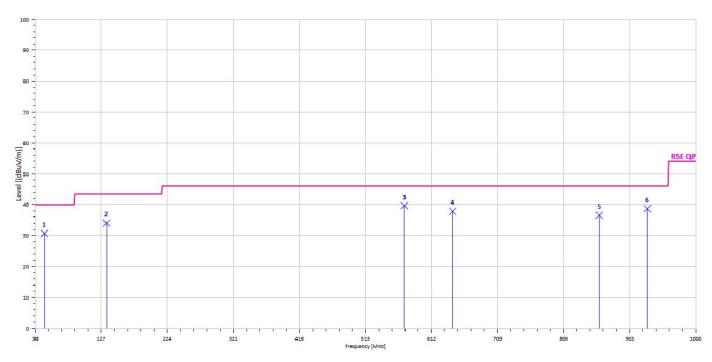






Radiated Spurious Emission Measurement Result (BLE mode) For Frequency form 30MHz to 1000MHz

| Operation Mode : | BLE | Test Date : | 2018/4/26 |
|-------------------------|-----------|----------------------------|----------------|
| Fundamental Frequency : | 2402 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 |
| 43.58 | S | Peak | 47.84 | -17.14 | 30.70 | 40 | -9.30 |
| 134.76 | S | Peak | 51.09 | -17.06 | 34.03 | 43.5 | -9.47 |
| 572.23 | S | Peak | 49.14 | -9.47 | 39.67 | 46 | -6.33 |
| 643.04 | S | Peak | 45.91 | -8.07 | 37.83 | 46 | -8.17 |
| 858.38 | S | Peak | 42.66 | -6.08 | 36.58 | 46 | -9.42 |
| 929.19 | S | Peak | 43.45 | -4.74 | 38.71 | 46 | -7.29 |

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| Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. : | BLE 2402 MHz Tx CH Low E2 | Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : | 2018/4/26 22.7deg_C/57RH Jerry Horizontal |
|---|------------------------------------|---|--|
| | | | |
| | | | 5 × 6 × |
| | 321 415 | 515 612 709 | 806 903 |

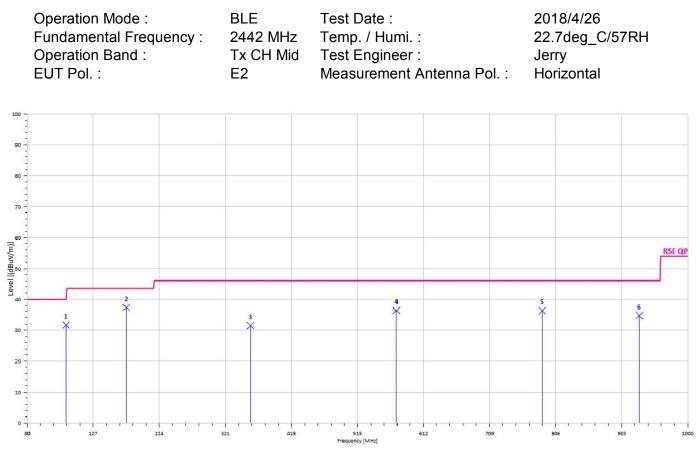
| Freq. | Note | Detector Mode | Spectum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|------------------|--------------------------|--------|--------------|--------------|--------|
| MHz | F/H/E/S | PK/QP/AV | dBµV | dB | dBµV/m | dBµV/m | dB |
| 85.29 | S | Peak | 53.06 | -21.99 | 31.07 | 40 | -8.93 |
| 171.62 | S | Peak | 53.45 | -16.71 | 36.74 | 43.5 | -6.76 |
| 226.91 | S | Peak | 52.30 | -18.01 | 34.29 | 46 | -11.71 |
| 572.23 | S | Peak | 45.37 | -9.47 | 35.90 | 46 | -10.10 |
| 786.60 | S | Peak | 45.15 | -6.79 | 38.36 | 46 | -7.64 |
| 929.19 | S | Peak | 37.77 | -4.74 | 33.04 | 46 | -12.96 |



| | Operation Mode : Fundamental Freq Operation Band : EUT Pol. : | uency : | BLE 2442 MHz Tx CH Mid E2 | Test Date : Temp. / Hum Test Enginee Measuremer | | Jerry | 26 _C/57RH |
|---|--|---------|------------------------------------|--|---|-------|---------------|
| - | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | R |
| | | | 3 | * | 5 | | 6 × |
| - | | | | | | | |
| | | | | | | | |

| | 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 |
| - | 43.58 | S | Peak | 48.10 | -17.14 | 30.96 | 40 | -9.04 |
| | 130.88 | S | Peak | 50.45 | -17.51 | 32.94 | 43.5 | -10.56 |
| | 420.91 | S | Peak | 44.30 | -12.09 | 32.21 | 46 | -13.79 |
| | 572.23 | S | Peak | 49.28 | -9.47 | 39.81 | 46 | -6.19 |
| | 714.82 | S | Peak | 47.27 | -7.42 | 39.85 | 46 | -6.15 |
| | 929.19 | S | Peak | 43.84 | -4.74 | 39.10 | 46 | -6.90 |

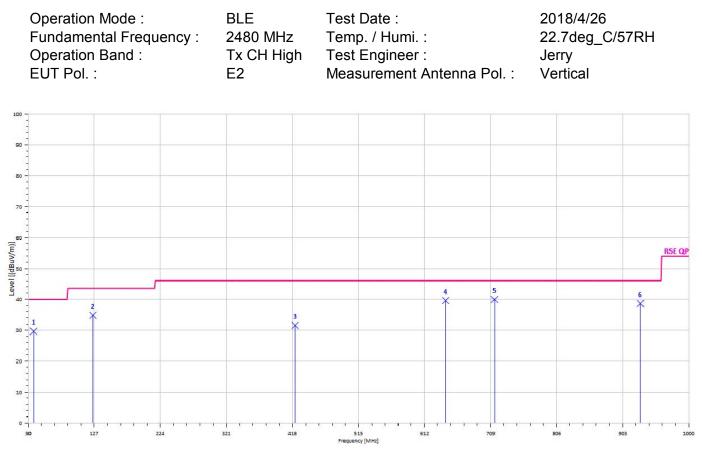




| Freq. | Note | Detector Mode | Spectum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|--------|---------|------------------|--------------------------|--------|--------------|--------------|--------|
| MHz | F/H/E/S | PK/QP/AV | dBµV | dB | dBµV/m | dBµV/m | dB |
| 87.23 | S | Peak | 54.02 | -22.32 | 31.70 | 40 | -8.30 |
| 175.50 |) S | Peak | 54.67 | -17.32 | 37.35 | 43.5 | -6.15 |
| 357.86 | S S | Peak | 45.60 | -14.07 | 31.53 | 46 | -14.47 |
| 572.23 | 3 S | Peak | 45.83 | -9.47 | 36.36 | 46 | -9.64 |
| 786.60 |) S | Peak | 43.12 | -6.79 | 36.33 | 46 | -9.67 |
| 929.19 |) S | Peak | 39.43 | -4.74 | 34.69 | 46 | -11.31 |

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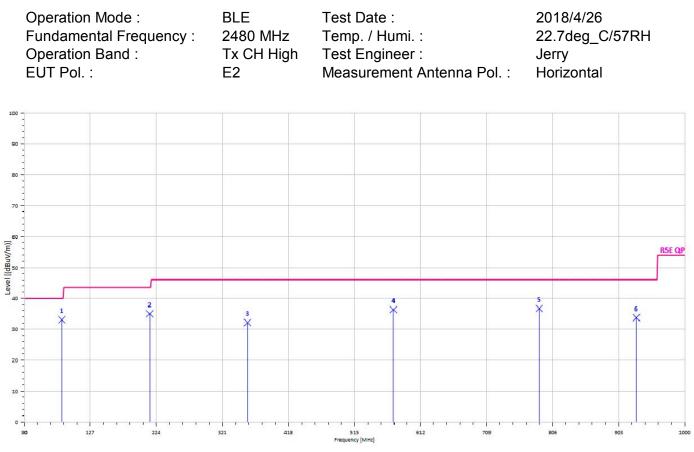




| Freq. | Note | Detector Mode | Spectum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|-----------|---------|------------------|--------------------------|--------|--------------|--------------|--------|
| MHz | F/H/E/S | PK/QP/AV | dBµV | dB | dBµV/m | dBµV/m | dB |
| 37.76 | S | Peak | 47.21 | -17.57 | 29.65 | 40 | -10.35 |
| 125.06 | S | Peak | 52.96 | -18.16 | 34.81 | 43.5 | -8.69 |
| 421.88 | S | Peak | 43.72 | -12.14 | 31.58 | 46 | -14.42 |
| 643.04 | S | Peak | 47.67 | -8.07 | 39.60 | 46 | -6.40 |
| 714.82 | S | Peak | 47.38 | -7.42 | 39.96 | 46 | -6.04 |
| 929.19 | S | Peak | 43.35 | -4.74 | 38.62 | 46 | -7.38 |

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| 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 |
| 85.29 | S | Peak | 55.05 | -21.99 | 33.06 | 40 | -6.94 |
| 214.30 | S | Peak | 53.57 | -18.59 | 34.98 | 43.5 | -8.52 |
| 357.86 | S | Peak | 46.21 | -14.07 | 32.14 | 46 | -13.86 |
| 572.23 | S | Peak | 45.79 | -9.47 | 36.32 | 46 | -9.68 |
| 786.60 | S | Peak | 43.49 | -6.79 | 36.69 | 46 | -9.31 |
| 929.19 | S | Peak | 38.47 | -4.74 | 33.74 | 46 | -12.26 |

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4804.00

4804.00

Н

Н

Radiated Spurious Emission Measurement Result (BLE mode) For Frequency above 1GHz

| | Operation Fundamer Operation EUT Pol. : | ntal Frequer Band : | BLE ncy : 2402 I Tx CH E2 | | Test Date Temp. / H Test Engi Measuren | umi. : | ina Pol. : | 2018/4/26 22.7deg_C Jerry Vertical | /57RH |
|-----------------------|--|------------------------|------------------------------------|-------|---|--------|------------|---|-------------|
| 100 - | | | | | | | | | |
| 90 - | - | | | | | | | | |
| | | | | | | | | | |
| 80 - | | | | | | | | | RSE PK |
| 70 - | | | | | | | | | |
| _60 - | | | | | | | | | |
| dBuV/m) | | | | | | | | | RSE AV |
| Level [(dBuV/m)] g | | 1 X | | | | | | | |
| 40 - | | | | | | | | | |
| 30 - | | × · | | | | | | | |
| 20 - | - | | | | | | | | |
| 10 - | | | | | | | | | |
| 1 | | | | | | | | | |
| 0 - 10 | 00 3550 | 6100 | | 11200 | 13750 Frequency [MHz] | 16300 | 18850 | 21400 | 23950 26500 |
| | Freq. | Note | Detector | Sp | pectum | Factor | Actual | Limit | Margin |
| | | | Mode | | ling Level | | FS | @3m | |
| | MHz | F/H/E/S | PK/QP/AV | (| dBµV | dB | dBµV/m | dBµV/m | dB |

43.28

30.50

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.

Peak

Average

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-1.16

-1.16

38.38

29.35

74

54

-35.62

-24.65



| | Operation Fundamen Operation EUT Pol. : | tal Freque | ncy: 2 | BLE 2402 MHz Fx CH Lov E2 | v Test E | Date : . / Humi. Engineer urement . | : | a Pol. : | 2018/4/26 22.7deg_C Jerry Horizontal | /57RH |
|-------------------------|--|------------|--------------|------------------------------------|-------------------|--|------------|----------------|---|------------------|
| 100 - - - 90 - | | | | | | | | | | |
| 90 - - - 80 - | | | | | | | | | | |
| 70 - | | | | | | | | | | RSE PK |
| (ju) (ju) | | | | | | | | | | RSE AV |
| Level [(dBuV/m)] | | 1 ※ | | | | | | | | |
| 40 - | | 2 | | | | | | | | |
| 30 - - - 20 - | | × | | | | | | | | |
| 10 - | | | | | | | | | | |
| 0 - 10 | | 6100 | 8650 | 1120 | | | 16300 | 18850 | 21400 | 23950 26500 |
| | Freq. | Note | Detec | | Spectum | n Fa | actor | Actual | Limit | Margin |
| | MHz | F/H/E/S | Mod PK/QP | | eading Le dBµV | | dB | FS dBµV/m | @3m dBµV/m | dB |
| - | 4804.00 4804.00 | H H | Pea Avera | | 42.38 29.35 | | .16 .16 | 41.22 28.20 | 74 54 | -32.78 -25.80 |



| | Operation Fundamen Operation EUT Pol. : | tal Freque Band : | ncy : | BLE 2442 N Tx CH E2 | | Test I Temp Test I Meas | . / Hu Engine | eer : | itenna | Pol. : | 22. Jer | 18/4/26 7deg_C ry rtical | :/57RH | |
|------------------------|--|----------------------|--------------|------------------------------|-------|----------------------------------|------------------|--------------|-------------|----------------|------------|-----------------------------------|------------------|--------|
| 100 - | | | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | | | |
| 80 - - - 70 - | | | | | | | | | | | | | | RSE PK |
| 60 - | | | | | | | | | | | | | | |
| Level [(dBuV/m)] | | | | | | | | | | | | | | RSE AV |
| B Level [(| | 1 | | | | | | | | | | | | |
| 30 - | | * | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 10 - | | | | | | | | | | | | | | |
| 0 100 | 00 3550 | 5100 | і і і і В | 550 | 11200 | 13 | | 16300 | | 18850 | | 400 | 23950 | 26500 |
| | Frog | Note | Dote | ector | c, | pectum | | Fact | or | Actual | | Limit | Margin | |
| | Freq. | nole | | de | | ding Le | | raci | 01 | FS | | @3m | Margir | I |
| _ | MHz F/H/E/S PK/0 | | | P/AV | | dBµV | | dB | | dBµV/m | | BµV/m | dB | |
| | 4884.00 4884.00 | H H | Pe Ave | ak rage | | 43.68 30.99 | | -0.6 -0.6 | | 42.99 30.30 | | 74 54 | -31.01 -23.70 | |



| | Operation Fundamen Operation EUT Pol. : | tal Freque | ency : | BLE 2442 M Tx CH E2 | | Test D Temp. Test E Measu | . / Hun Engine | | enna f | Pol. : | 22. Jeri | 8/4/26 7deg_C ry izontal | :/57RH | |
|--|--|------------|-------------|------------------------------|-------|------------------------------------|-------------------|----------------|--------|----------------|-------------|-----------------------------------|----------------|--------|
| 100 - - - 90 - | | | | | | | | | | | | | | |
| 90 - - - 80 - | | | | | | | | | | | | | | |
| 70 - | | | | | | | | | | | | - | | RSE PK |
| (/m)] 8 | | | | | | | | | | | | | | RSE AV |
| Level [(dBuV/m)] | | 1 | | | | | | | | | | | | |
| 40 - - - - - - - - - - - | | 2 | | | | | | | | | | | | |
| 20 - | | | | | | | | | | | | | | |
| 10 - | | | | | | | | | | | | | | |
| 0 - 10 | | 6100 | - 1 - 1 - 1 | 650 | 11200 | 1375 Frequency | | 16300 | | 18850 | 214 | 1 1 1 | 23950 | 26500 |
| | Freq. | Note | | ector ode | - | ectum | | Factor | · / | Actual FS | | Limit @3m | Marg | jin |
| | MHz | F/H/E/S | | P/AV | | lBµV | | dB | d | . Ο ΒμV/m | | 3μV/m | dB | |
| - | 4884.00 4884.00 | H H | | eak rage | | 3.27 30.20 | | -0.69 -0.69 | | 42.58 29.51 | | 74 54 | -31.4 -24.4 | |



| | Operation N Fundament Operation E EUT Pol. : | al Frequen | BLE 2480 M Tx CH E2 | | Test Date Temp. / I Test Eng Measure | Humi. : jineer : | ntenna P | ol. : | 2018/4/2 22.7deg Jerry Vertical | 26 _C/57RH |
|--|---|------------|------------------------------|-------|---|---------------------|----------|--------------|--|------------------|
| 100 - - - 90 - | | | | | | | | | | |
| 80 - | | | | | | | | | | RSE PK |
| 70 - | | | | | | | | | | |
| BuV/m]] 8 | | | | | | | | | | RSE AV |
| Level [(dBuV/m)] ه ۱۰۰۰۰۱ | | × | | | | | | | | |
| - - - - - - - - - - - - | | | | | | | | | | |
| 20 - | | | | | | | | | | |
| 10 - 10 - | | | | | | | | | | |
| 0 - | | 6100 | 8650 | 11200 | 13750 Frequency [MHz] | 16300 | 1 1 1 1 | 50 | 21400 | 23950 26500 |
| | Freq. | Note | Detector Mode | - | ectum ng Level | Facto | | tual S | Limit @3m | Margin |
| _ | MHz | F/H/E/S | PK/QP/AV | d | ΒµV | dB | dBj | uV/m | dBµV/n | n dB |
| - | 4960.00 4960.00 | H H | Peak Average | | 3.90 1.50 | -0.66 -0.66 | | 3.24).84 | 74 54 | -30.76 -23.16 |



| | Operation N Fundament Operation E EUT Pol. : | al Frequer | BLE ncy : 2480 M Tx CH E2 | | Test Dat Temp. / Test Eng Measure | Humi. : gineer : | ntenna P | ol. : | 2018/4/26 22.7deg_ Jerry Horizonta | C/57RH |
|--|---|------------|------------------------------------|-------|--|---------------------|----------|--------------|---|------------------|
| 100 - - - 90 - | | | | | | | | | | |
| 80 - 80 - - - - - - - - - - - - - - - - - - - | | | | | | | | | | RSE PK |
| uv/m] 8 (m/vi | | | | | | | | 1 | | RSE AV |
| Level [(dBuV/m)] ه | | 1 × | | | | | | | | |
| 30 - - - 20 - | | * | | | | | | | | |
| 10 - | | | | | | | | | | |
| 0 - | 000 3550 | 6100 | 8650 | 11200 | 13750 Frequency [MHz] | 16300 | 188 | 850 | 21400 | 23950 26500 |
| | Freq. | Note | Detector Mode | Read | ectum ing Level | | F | tual ⁼S | Limit @3m | Margin |
| | MHz | F/H/E/S | PK/QP/AV | | BμV | dB | | uV/m | dBµV/m | dB |
| | 4960.00 4960.00 | H H | Peak Average | | 3.36 0.69 | -0.6 -0.6 | | 2.70).04 | 74 54 | -31.30 -23.97 |



11 PEAK POWER SPECTRAL DENSITY

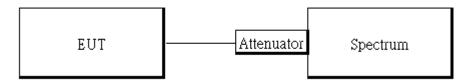
Standard Applicable: 11.1

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.

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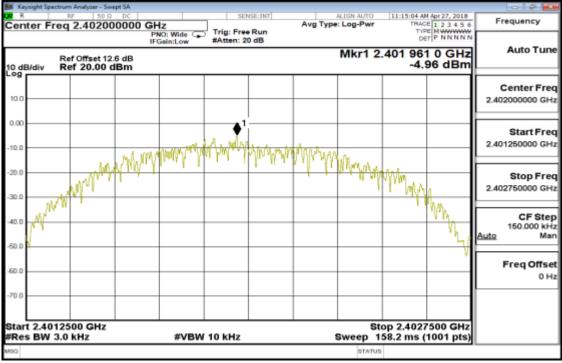
11.5 Measurement Result:

BLE mode

| Frequency (MHz) | RF Power Density (dBm) | Maximum Limit (dBm) | Result |
|--------------------|---------------------------|------------------------|--------|
| 2402 | -4.96 | 8 | PASS |
| 2442 | -4.75 | 8 | PASS |
| 2480 | -5.12 | 8 | PASS |

NOTE: cable loss as 12.6dB that offsets in the spectrum

BLE mode Power Spectral Density Test Plot (CH-Low)



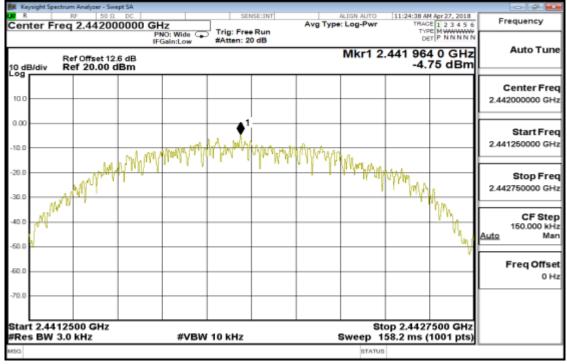
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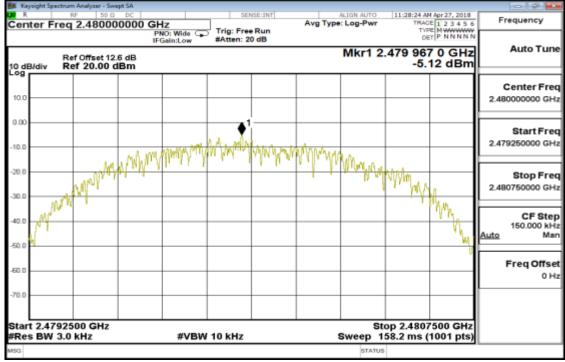
SGS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號



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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