



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15.247

TEST REPORT

For

Unication Co Ltd

5F, No. 6, Wu-Kung 5 Rd., Hsinchuang City, Taipei, Taiwan

FCC ID: LEA-LEGENDII

Report Type: Original Report	Product Name: Alpha Pager
Report Number: RTW180716001-00B	
Report Date: 2018-09-10	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Alpha Pager
EUT Model:		Alpha Legend II
Multiple Model:		Alpha Legend EAS II
Rated Input Voltage:		Base: 5V DC for USB port Pager: 1.2V DC from Battery or 5V DC
Adapter Information	Model:	GME10C-050200Fux
	Input:	100~240V AC 50~60Hz 0.28A
	Output:	5V DC 2A
External Dimension:		Pager: 86mm(L)*57.5mm(W)*28mm(H) Base: 110mm(L)*110mm(W)*70mm(H)
Serial Number:		180716001
EUT Received Date:		2018.07.23

Note: The series product, models Alpha Legend II, Alpha Legend EAS II are electrically identical. The difference between them please refer to the declaration letter for details. For marketing purpose, we selected Alpha Legend II for fully test.

Objective

This report is prepared on behalf of *Unication Co Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Rules Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209, 15.247 rules.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and KDB 558074 D01 DTS Meas Guidance v04.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode, which was provided by manufacturer. For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	...	...
...	...	...	...
...	...	...	...
..	...	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

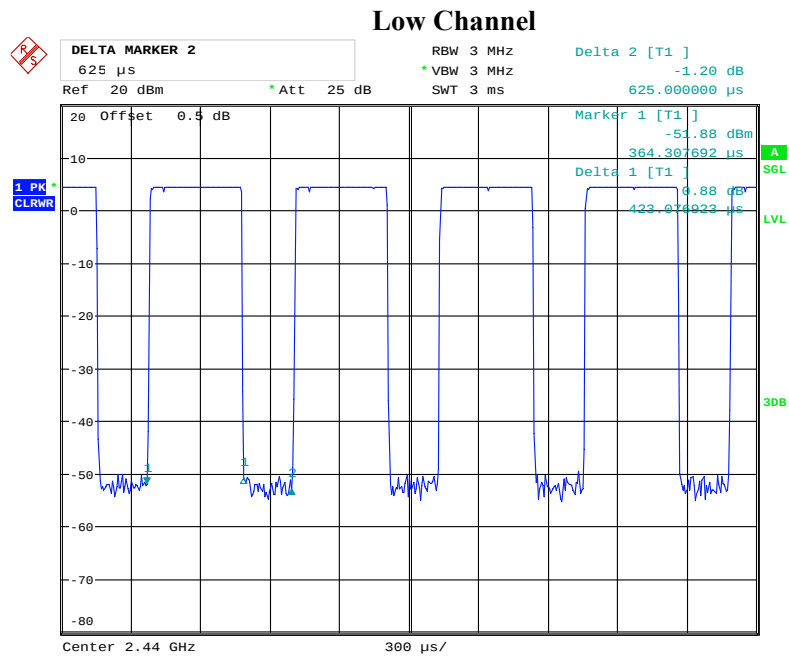
EUT Exercise Software

Software and version uEnergy Tools 2.3.0

Mode	Channel	Frequency (MHz)	Data rate (Mbps)	Power level
BLE	Low	2402	1	6
	Middle	2440	1	6
	High	2480	1	6

The duty cycle as below:

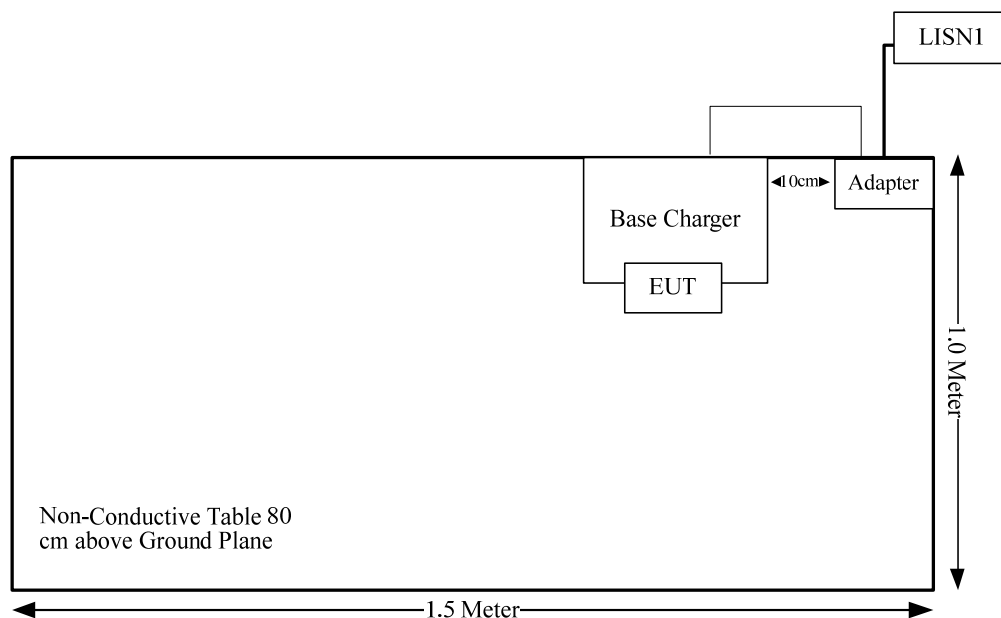
T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
0.423	0.625	67.68



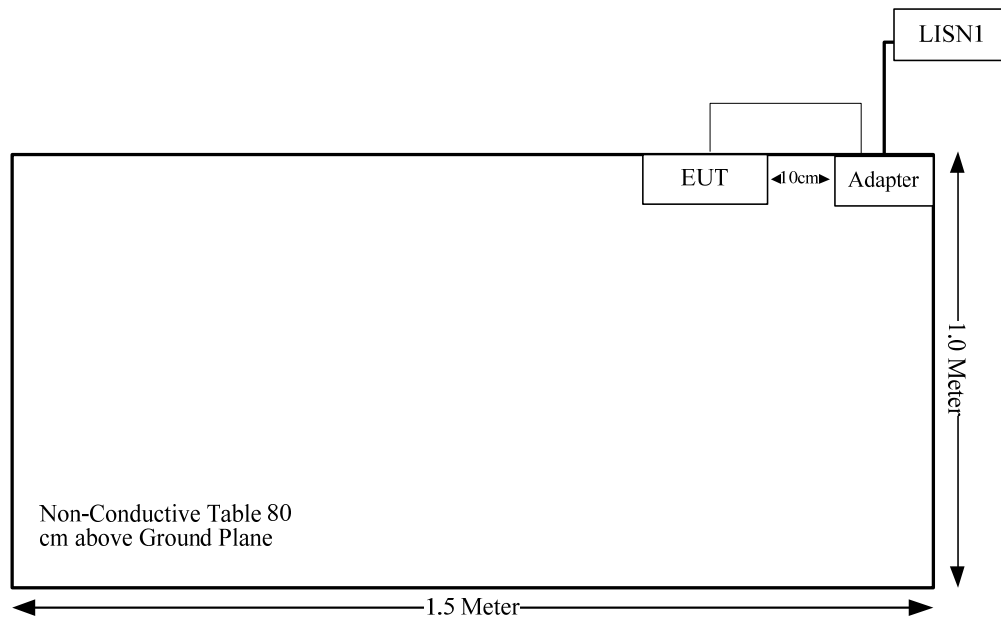
Date: 7.AUG.2018 20:38:34

Block Diagram of Test Setup

TM1:



TM2:

**Support Cable List and Details**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	no	no	1.0	Adapter	Base Charger/EUT

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2019-02-28
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2018-06-16	2019-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2018-06-16	2019-06-16
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247(i) & §1.1310 & §2.1093	RF exposure - SAR evaluation	Compliance
FCC §15.203	Antenna requirement	Compliance
FCC §15.207(a)	AC line conducted emissions	Compliance
FCC §15.205, §15.209, §15.247(d)	Spurious emissions	Compliance
FCC §15.247(a)(2)	6 dB emission bandwidth	Compliance
FCC §15.247(b)(3)	Maximum conducted output power	Compliance
FCC §15.247(d)	100 kHz Bandwidth of frequency band edge	Compliance
FCC §15.247(e)	Power spectral density	Compliance

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria: $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x]$ W/kg, for test separation distances ≤ 50 mm; where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

Measurement Result

The max conducted power including tune-up tolerance is 5.0 dBm (3.16 mW).

$[(\text{max. power of channel, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 $= 3.16/5 \cdot (\sqrt{2.480}) = 1.0 < 3.0$

So the SAR test is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Information and Connector Construction

The EUT has one integrated antenna arrangement for, and the antenna gain is -2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

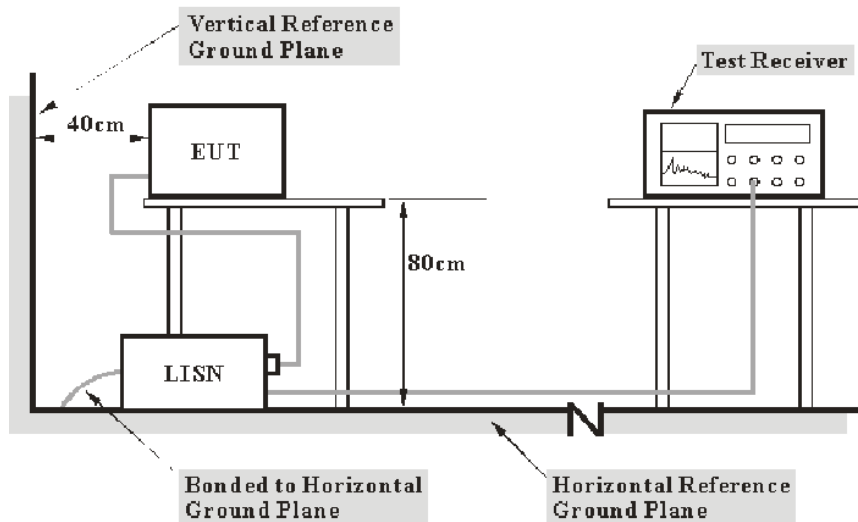
Result: Compliance.

FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main lisn with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

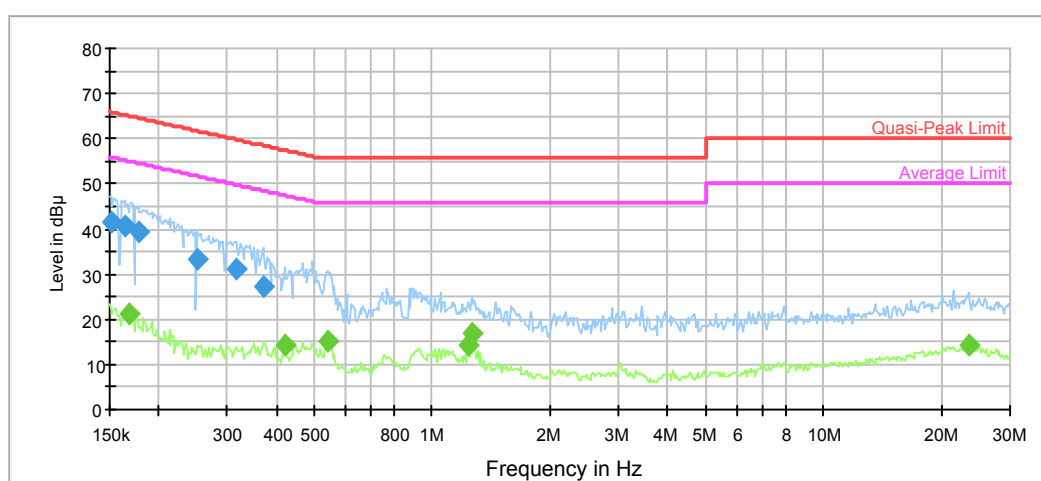
Test Data**Environmental Conditions**

Temperature:	27.5°C
Relative Humidity:	58%
ATM Pressure:	100.3kPa

The testing was performed by Andy Huang on 2018-08-07.

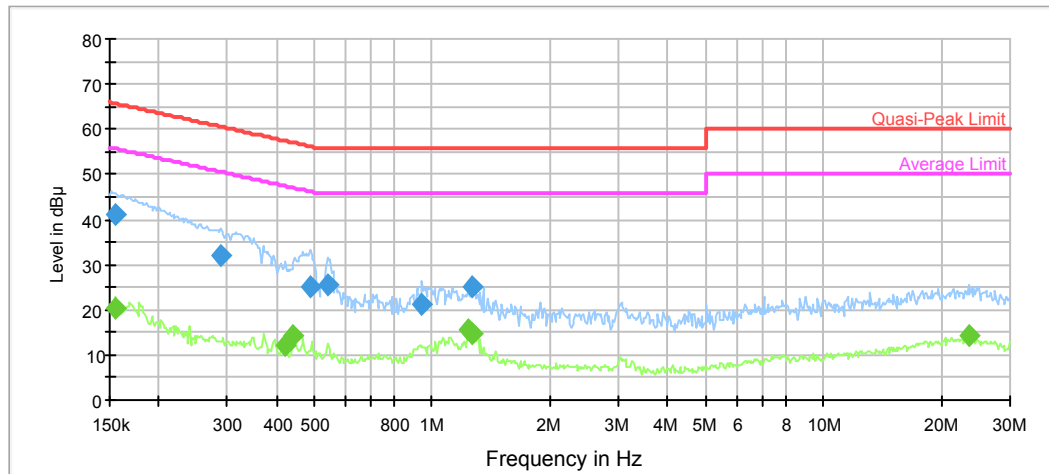
TM1: Charging & transmitting

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.151200	41.4	9.000	L1	11.2	24.5	65.9	Compliance
0.163741	40.4	9.000	L1	11.0	24.9	65.3	Compliance
0.177322	39.3	9.000	L1	10.8	25.3	64.6	Compliance
0.251783	33.3	9.000	L1	10.3	28.4	61.7	Compliance
0.317235	31.1	9.000	L1	10.1	28.7	59.8	Compliance
0.369089	27.4	9.000	L1	10.0	31.1	58.5	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.169044	21.2	9.000	L1	10.9	33.8	55.0	Compliance
0.419276	14.3	9.000	L1	10.0	33.2	47.5	Compliance
0.541050	14.9	9.000	L1	9.9	31.1	46.0	Compliance
1.239175	14.2	9.000	L1	9.8	31.8	46.0	Compliance
1.259081	16.9	9.000	L1	9.8	29.1	46.0	Compliance
23.446008	14.2	9.000	L1	10.1	35.8	50.0	Compliance

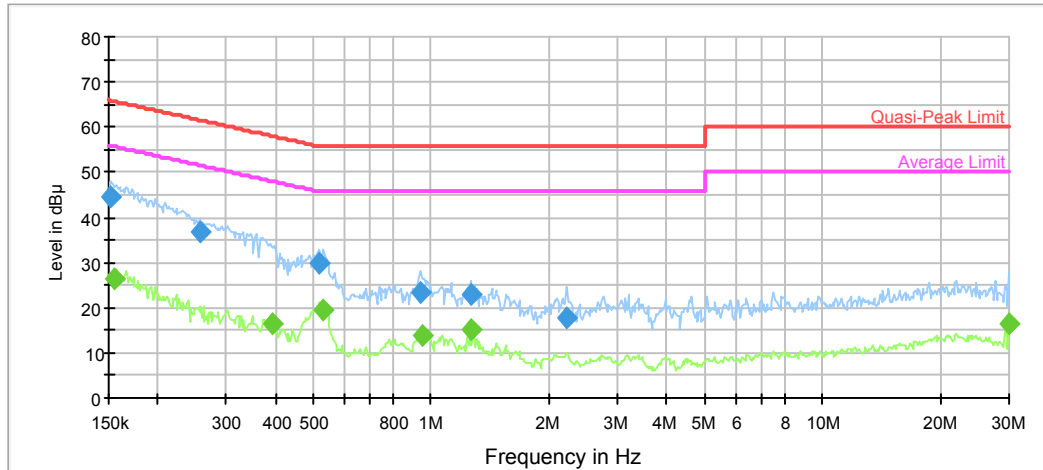
AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154858	41.0	9.000	N	11.1	24.7	65.7	Compliance
0.288307	32.2	9.000	N	10.2	28.4	60.6	Compliance
0.487810	25.2	9.000	N	9.9	31.0	56.2	Compliance
0.541050	25.4	9.000	N	9.9	30.6	56.0	Compliance
0.945093	21.0	9.000	N	9.8	35.0	56.0	Compliance
1.259081	24.9	9.000	N	9.8	31.1	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154858	20.5	9.000	N	11.1	35.2	55.7	Compliance
0.422630	12.0	9.000	N	9.9	35.4	47.4	Compliance
0.443327	14.4	9.000	N	9.9	32.6	47.0	Compliance
1.239175	15.7	9.000	N	9.8	30.3	46.0	Compliance
1.259081	14.6	9.000	N	9.8	31.4	46.0	Compliance
23.446008	14.1	9.000	N	10.1	35.9	50.0	Compliance

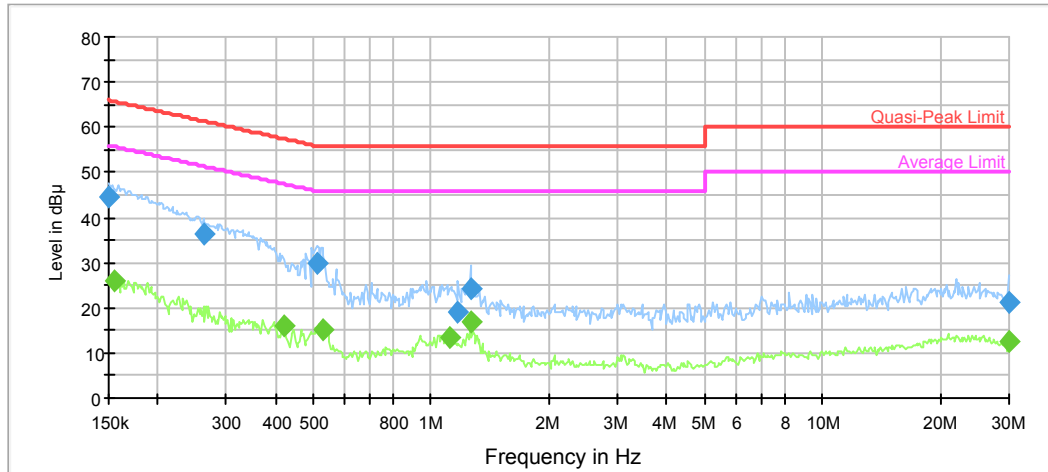
TM2: Charging & transmitting

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.151200	44.4	9.000	L1	11.2	21.5	65.9	Compliance
0.255827	36.6	9.000	L1	10.3	25.0	61.6	Compliance
0.519918	29.7	9.000	L1	9.9	26.3	56.0	Compliance
0.945093	23.5	9.000	L1	9.8	32.5	56.0	Compliance
1.259081	23.1	9.000	L1	9.8	32.9	56.0	Compliance
2.216927	17.6	9.000	L1	9.7	38.4	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154858	26.2	9.000	L1	11.1	29.5	55.7	Compliance
0.393383	16.3	9.000	L1	10.0	31.7	48.0	Compliance
0.532496	19.5	9.000	L1	9.9	26.5	46.0	Compliance
0.952654	14.0	9.000	L1	9.8	32.0	46.0	Compliance
1.259081	15.2	9.000	L1	9.8	30.8	46.0	Compliance
30.000000	16.3	9.000	L1	10.2	33.7	50.0	Compliance

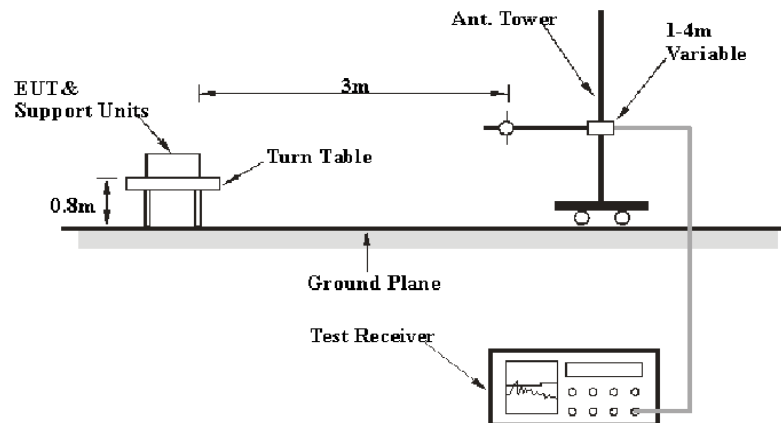
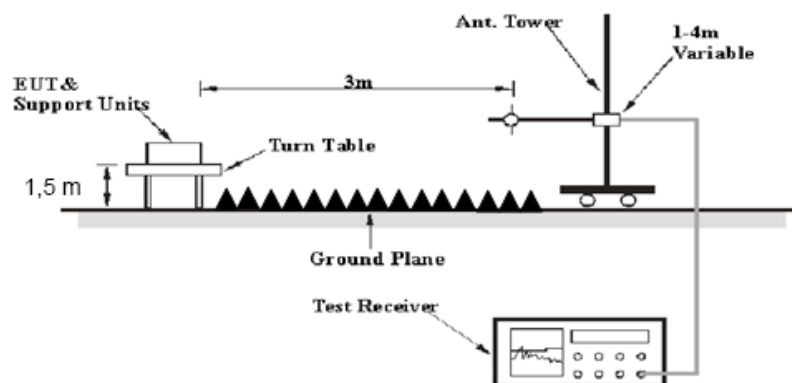
AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	44.4	9.000	N	11.2	21.6	66.0	Compliance
0.262017	36.5	9.000	N	10.3	24.9	61.4	Compliance
0.511698	29.9	9.000	N	9.9	26.1	56.0	Compliance
1.171949	19.1	9.000	N	9.8	36.9	56.0	Compliance
1.259081	24.0	9.000	N	9.8	32.0	56.0	Compliance
30.000000	21.3	9.000	N	10.2	38.7	60.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.156097	26.1	9.000	N	11.1	29.6	55.7	Compliance
0.419276	16.0	9.000	N	10.0	31.5	47.5	Compliance
0.528270	15.2	9.000	N	9.9	30.8	46.0	Compliance
1.117238	13.5	9.000	N	9.8	32.5	46.0	Compliance
1.259081	16.7	9.000	N	9.8	29.3	46.0	Compliance
30.000000	12.6	120.000	N	10.2	37.4	50.0	Compliance

FCC §15.209, §15.205, §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205

EUT Setup**Below 1GHz:****Above 1GHz:**

The radiated emission tests were performed in the 3 meters chamber test site for the range 30MHz to 1GHz and the 3 meters chamber B test site for above 1GHz, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

30MHz-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

Environmental Conditions

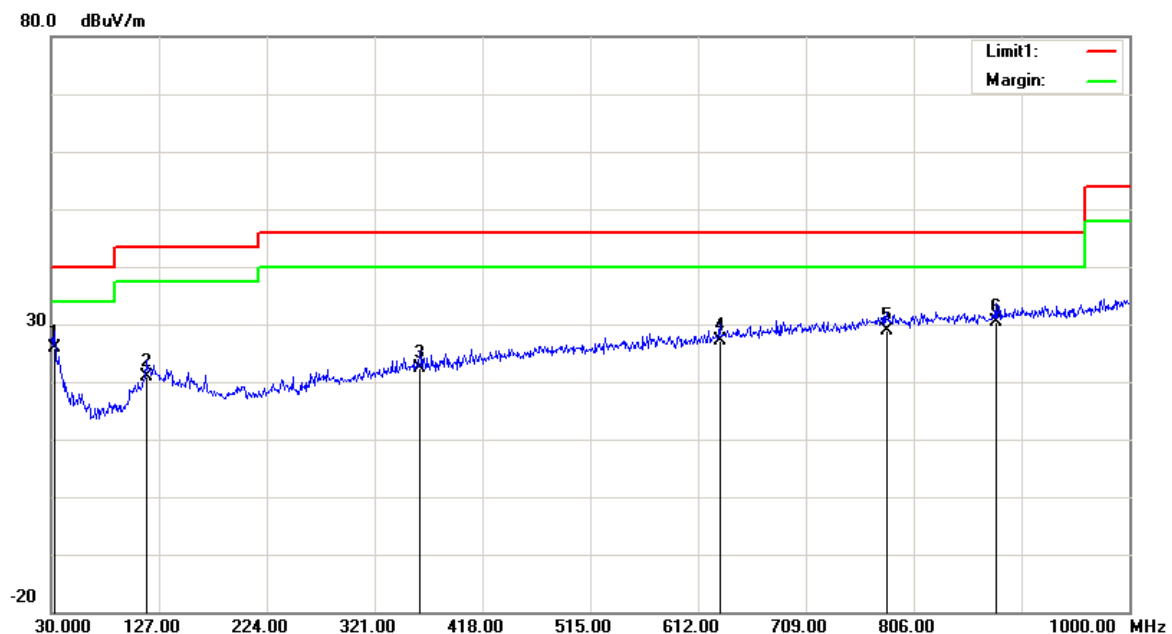
Temperature:	27.5°C
Relative Humidity:	58%
ATM Pressure:	100.3kPa

* The testing was performed by Andy Huang on 2018-08-07.

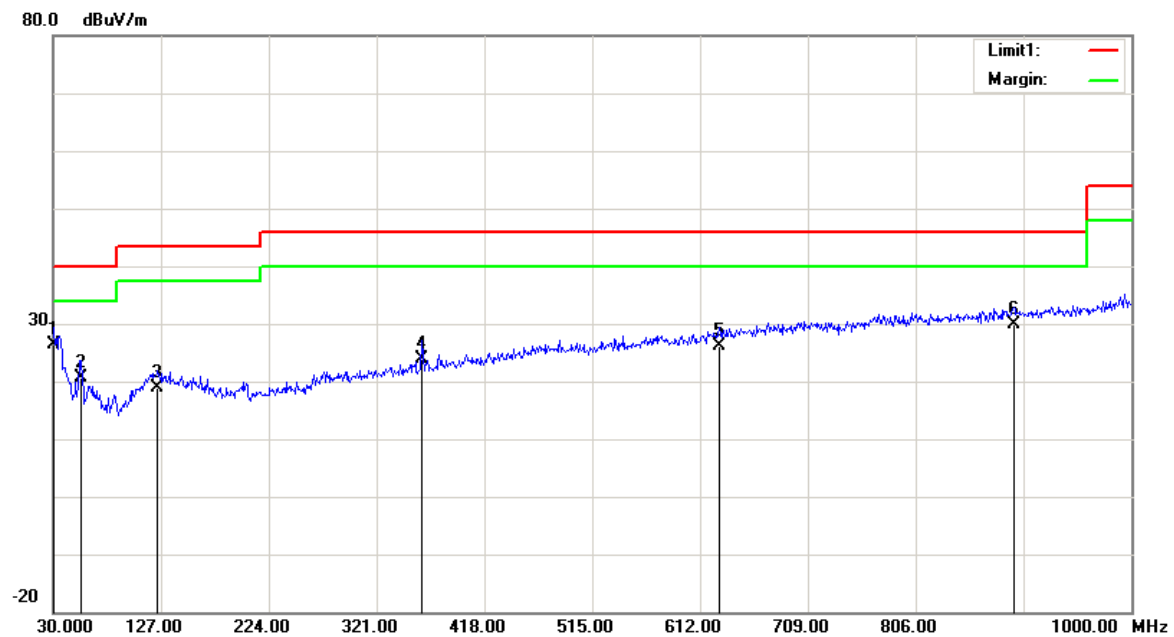
Test Mode: Transmitting

1) 30MHz-1GHz (BLE High channel Transmitting-Worst case):

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Remark	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.9100	26.45	QP	-0.65	25.80	40.00	14.20
115.3600	26.29	QP	-5.39	20.90	43.50	22.60
361.7400	25.10	QP	-2.80	22.30	46.00	23.70
631.4000	25.19	QP	2.01	27.20	46.00	18.80
781.7500	24.47	QP	4.53	29.00	46.00	17.00
879.7200	24.96	QP	5.54	30.50	46.00	15.50

Vertical:

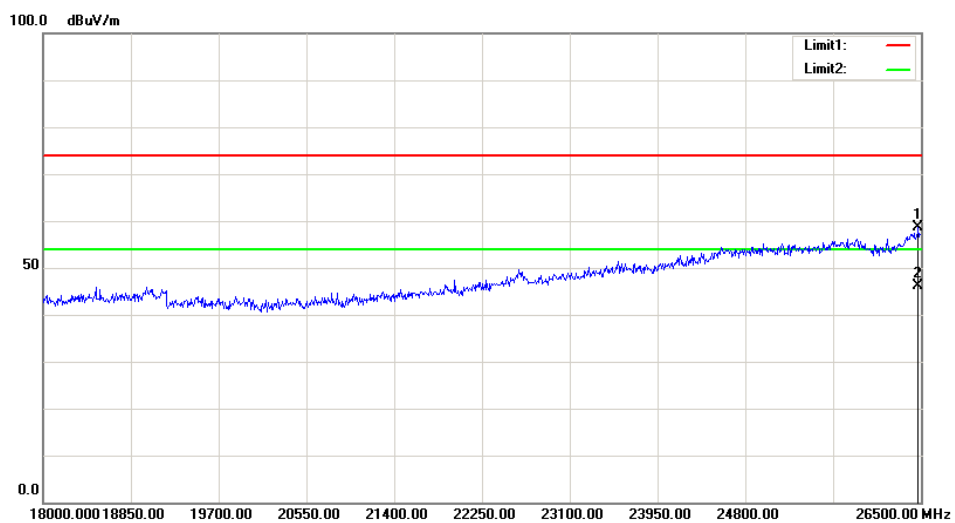
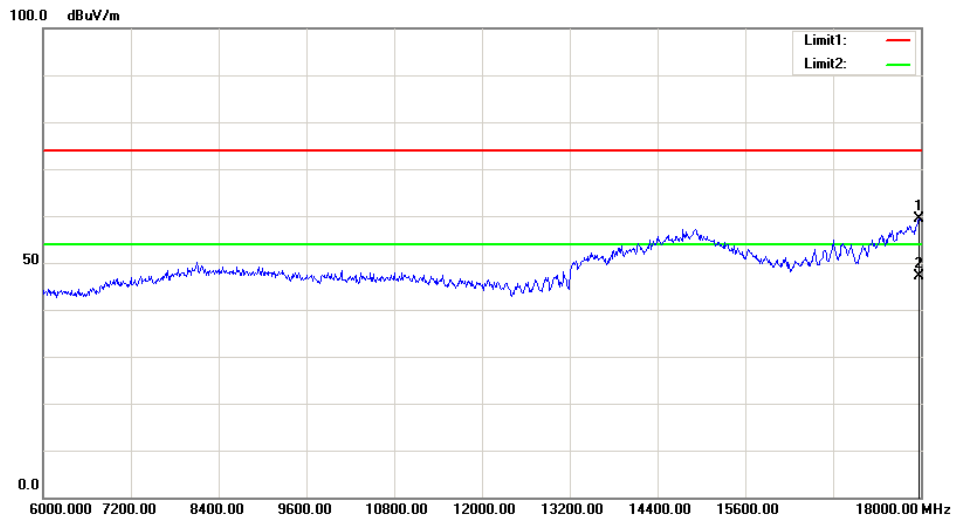
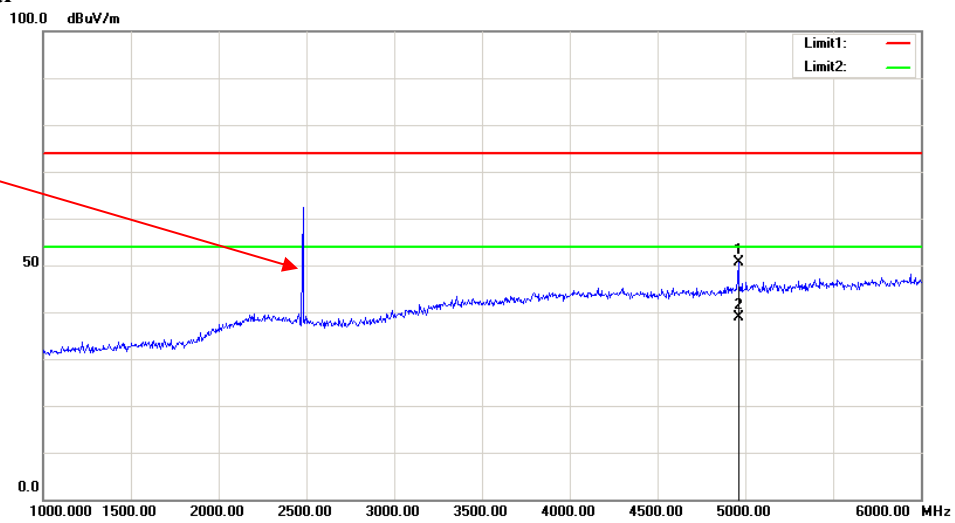
Frequency (MHz)	Receiver Reading (dBuV)	Remark	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	24.85	QP	1.55	26.40	40.00	13.60
55.2200	32.93	QP	-12.23	20.70	40.00	19.30
124.0900	23.55	QP	-4.75	18.80	43.50	24.70
361.7400	26.80	QP	-2.80	24.00	46.00	22.00
629.4600	24.30	QP	1.90	26.20	46.00	19.80
894.2700	23.86	QP	6.04	29.90	46.00	16.10

2) 1-26.5GHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Remark	Polar (H/V)	Factor (dB/m)					
Low Channel: 2402 MHz									
2402.00	61.15	PK	H	28.10	1.80	0.00	91.05	N/A	N/A
2402.00	56.23	AV	H	28.10	1.80	0.00	86.13	N/A	N/A
2402.00	58.82	PK	V	28.10	1.80	0.00	88.72	N/A	N/A
2402.00	53.95	AV	V	28.10	1.80	0.00	83.85	N/A	N/A
2390.00	25.36	PK	H	28.08	1.80	0.00	55.24	74.00	18.76
2390.00	13.38	AV	H	28.08	1.80	0.00	43.26	54.00	10.74
4804.00	50.71	PK	H	32.91	3.17	37.20	49.59	74.00	24.41
4804.00	38.22	AV	H	32.91	3.17	37.20	37.10	54.00	16.90
7206.00	45.31	PK	H	35.74	4.82	37.23	48.64	74.00	25.36
7206.00	32.87	AV	H	35.74	4.82	37.23	36.20	54.00	17.80
Middle Channel: 2440 MHz									
2440.00	62.03	PK	H	28.18	1.82	0.00	92.03	N/A	N/A
2440.00	56.89	AV	H	28.18	1.82	0.00	86.89	N/A	N/A
2440.00	59.26	PK	V	28.18	1.82	0.00	89.26	N/A	N/A
2440.00	54.13	AV	V	28.18	1.82	0.00	84.13	N/A	N/A
4880.00	51.26	PK	H	33.06	3.27	37.21	50.38	74.00	23.62
4880.00	39.08	AV	H	33.06	3.27	37.21	38.20	54.00	15.80
7320.00	45.44	PK	H	36.03	4.62	37.37	48.72	74.00	25.28
7320.00	33.06	AV	H	36.03	4.62	37.37	36.34	54.00	17.66
High Channel: 2480 MHz									
2480.00	59.60	PK	H	28.26	1.84	0.00	89.70	N/A	N/A
2480.00	54.53	AV	H	28.26	1.84	0.00	84.63	N/A	N/A
2480.00	61.91	PK	V	28.26	1.84	0.00	92.01	N/A	N/A
2480.00	56.87	AV	V	28.26	1.84	0.00	86.97	N/A	N/A
2483.50	26.03	PK	H	28.27	1.84	0.00	56.14	74.00	17.86
2483.50	14.03	AV	H	28.27	1.84	0.00	44.14	54.00	9.86
4960.00	51.37	PK	H	33.22	3.23	37.25	50.57	74.00	23.43
4960.00	39.10	AV	H	33.22	3.23	37.25	38.30	54.00	15.70
7440.00	45.44	PK	H	36.34	4.41	37.52	48.67	74.00	25.33
7440.00	33.12	AV	H	36.34	4.41	37.52	36.35	54.00	17.65

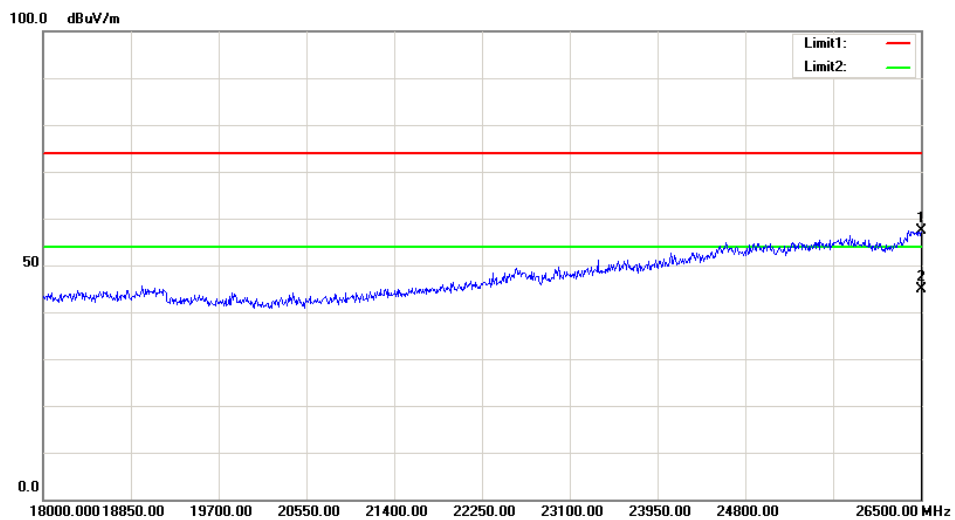
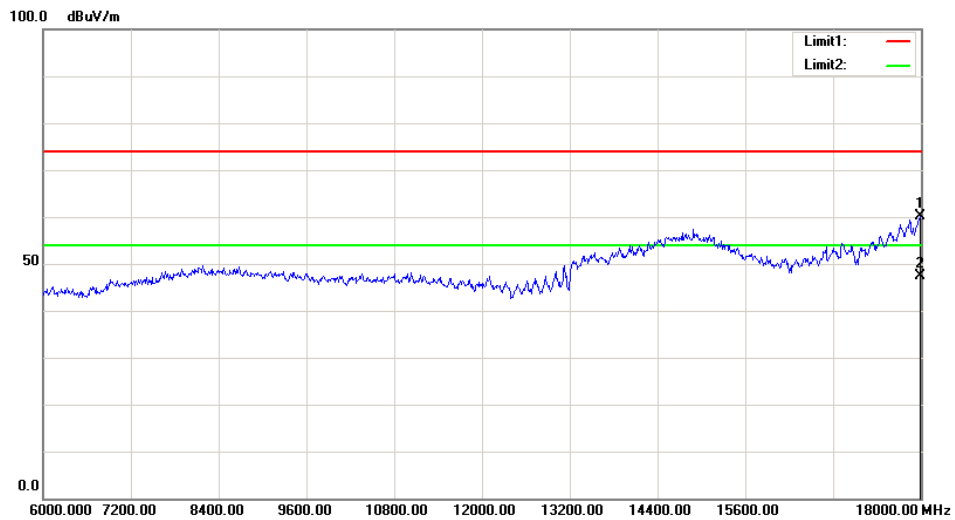
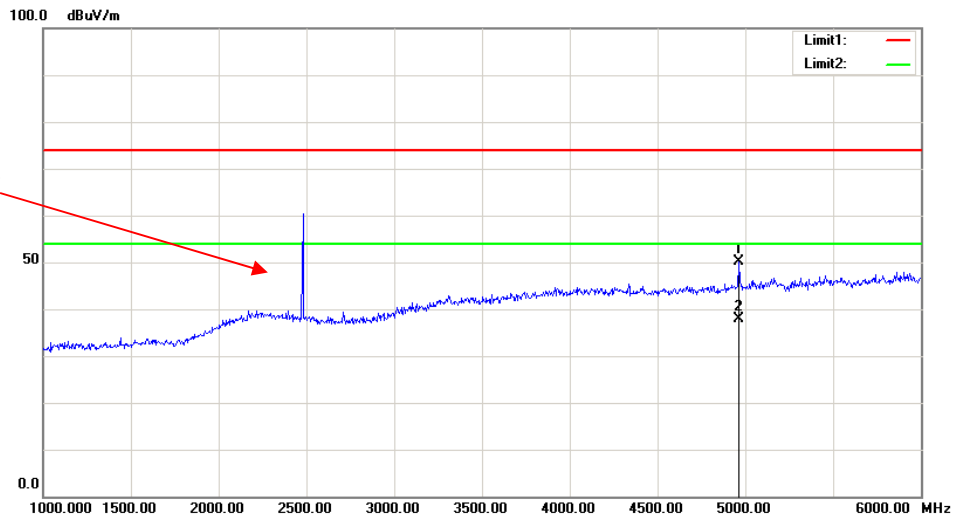
Worst plots (High Channel-worst case) **Horizontal**

Fundamental
Test with Band
Rejection Filter



Vertical

Fundamental
Test with Band
Rejection Filter



FCC §15.247(a) (2) –6 dB EMISSION BANDWIDTH

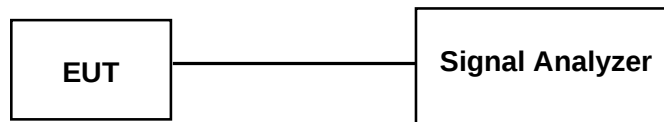
Applicable Standard

According to FCC §15.247(a) (2)

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	27.5°C
Relative Humidity:	58%
ATM Pressure:	100.3kPa

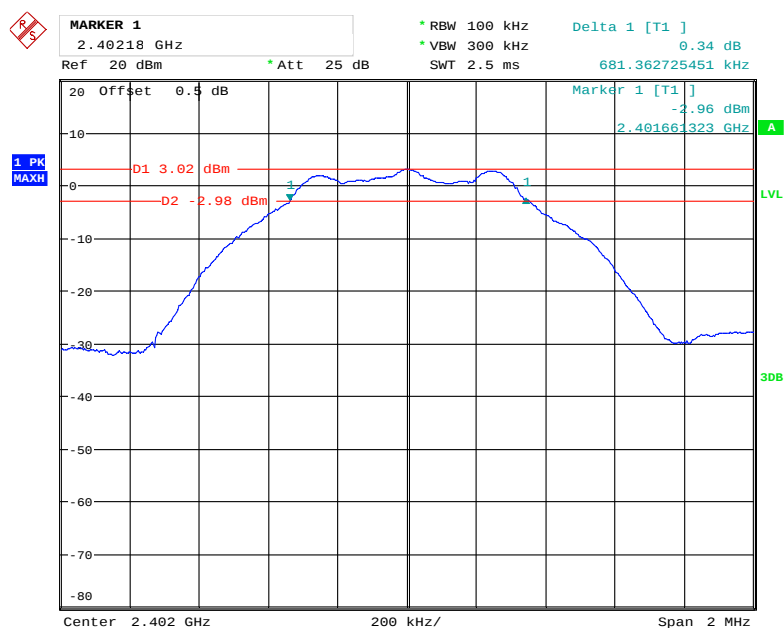
* The testing was performed by Andy Huang on 2018-08-07.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots.

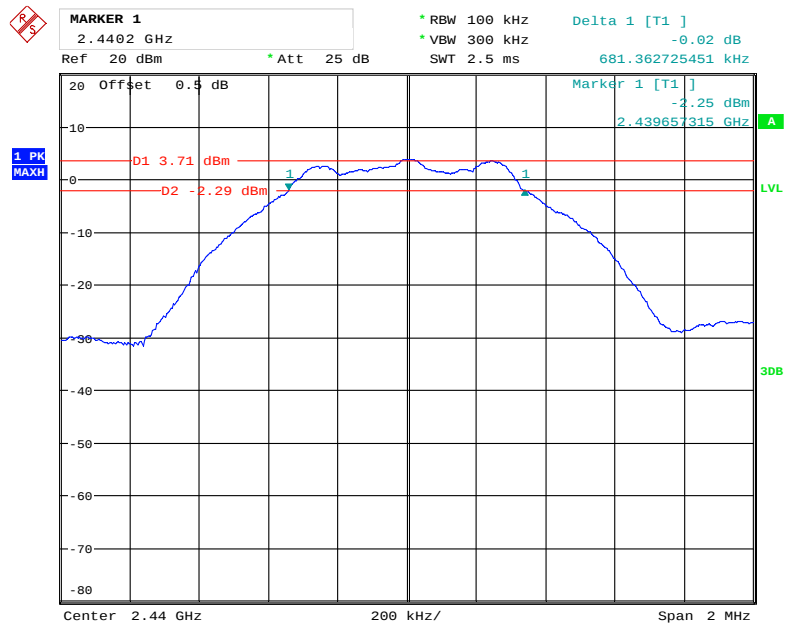
Mode	Channel	Frequency (MHz)	Result (MHz)	Limit (MHz)
BLE	Low	2402	0.68	0.5
	Middle	2440	0.68	
	High	2480	0.69	

Low Channel



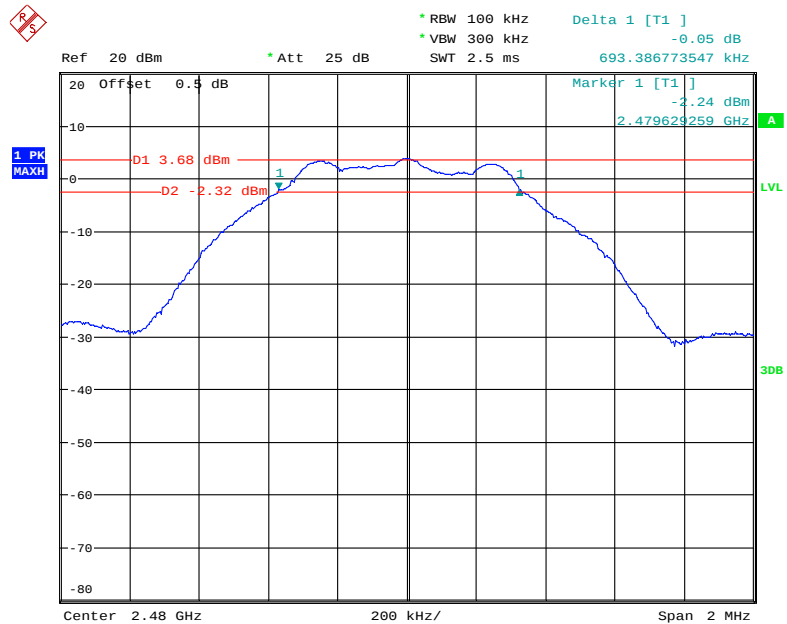
Date: 7.AUG.2018 20:31:52

Middle Channel



Date: 7.AUG.2018 20:34:12

High Channel



Date: 7.AUG.2018 20:24:44

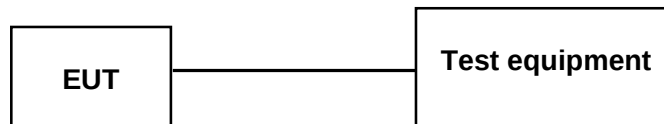
FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.
4. Set the test equipment to test Peak output power, record the result as peak power.
5. Set the test equipment to test average output power, record the result as average power.



Test Data**Environmental Conditions**

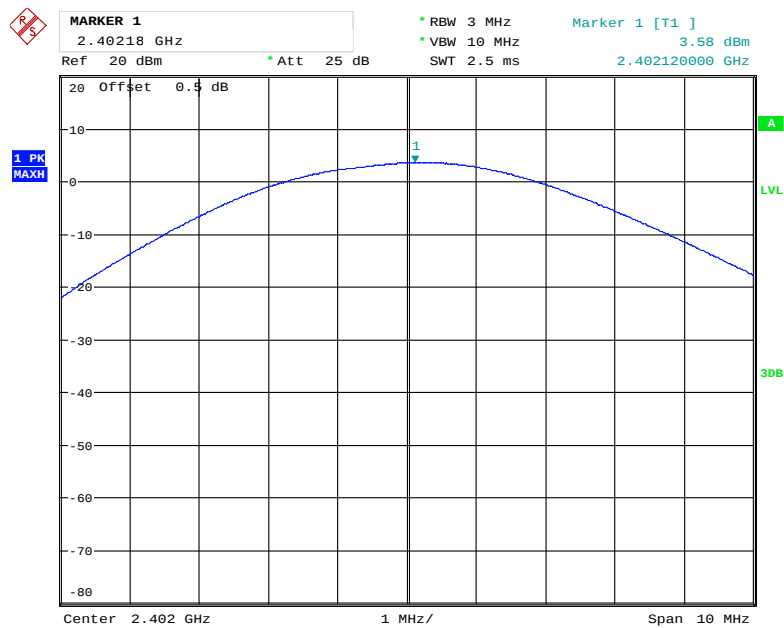
Temperature:	27.5°C
Relative Humidity:	58%
ATM Pressure:	100.3kPa

* The testing was performed by Andy Huang on 2018-08-07

Test Mode: Transmitting

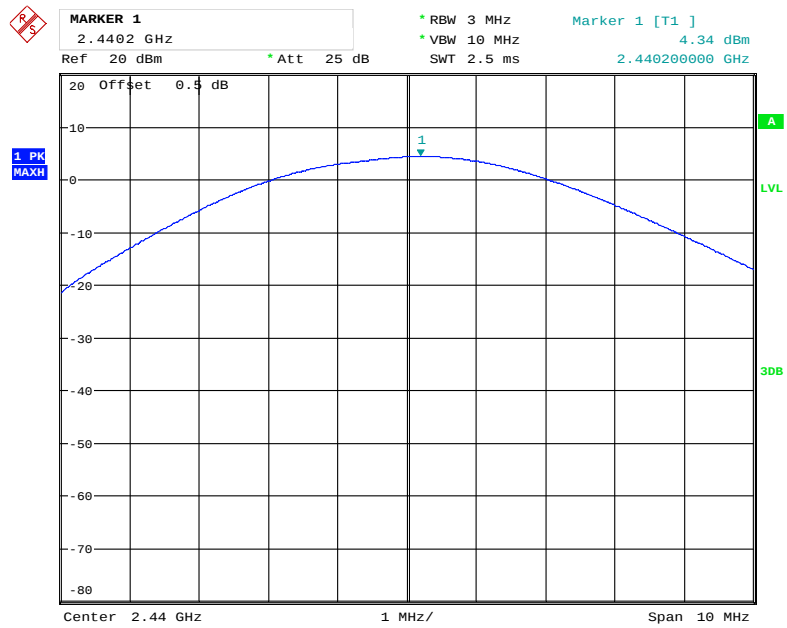
Test Result: Compliance. Please refer to the following table.

Mode	Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)
BLE	Low	2402	3.58	30
	Middle	2440	4.34	
	High	2480	4.33	

Peak Power, Low Channel

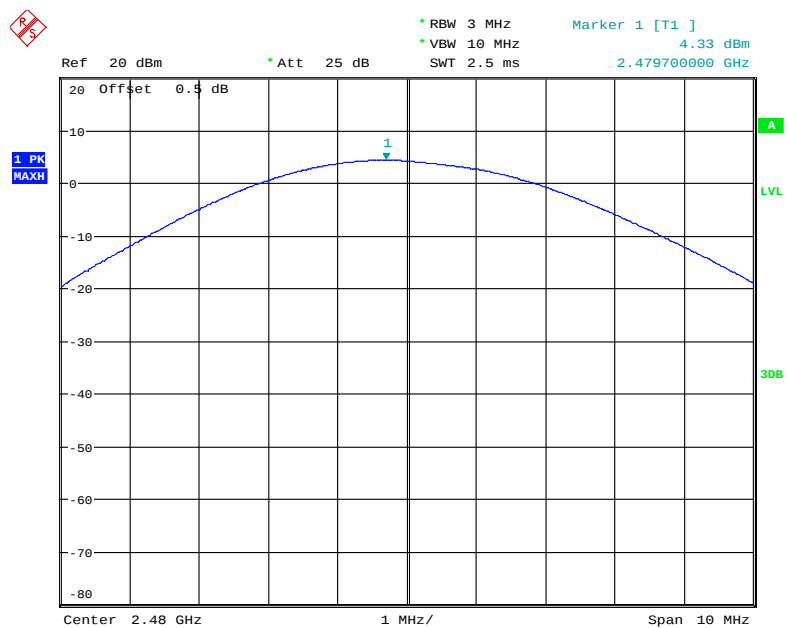
Date: 7.AUG.2018 20:32:20

Peak Power, Middle Channel



Date: 7.AUG.2018 20:34:39

Peak Power, High Channel



Date: 7.AUG.2018 20:25:26

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

According to FCC§15.247(d): 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

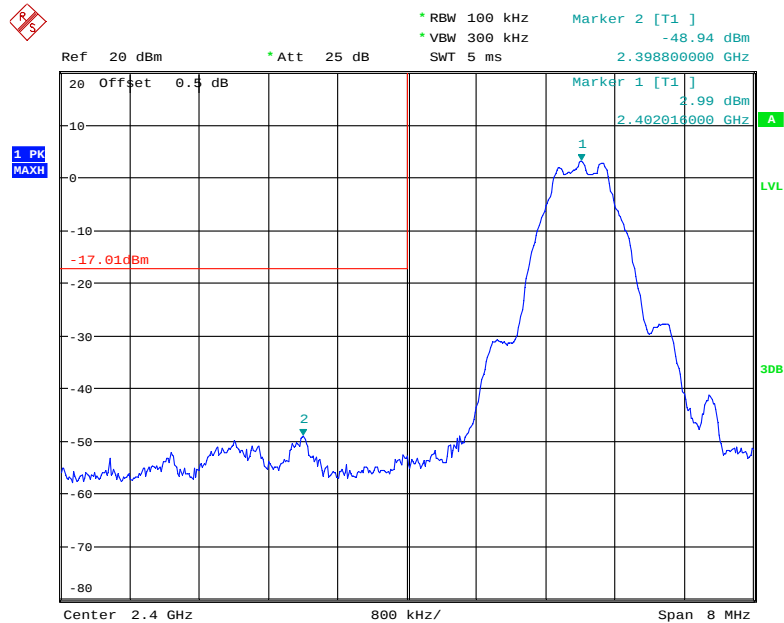
Test Data**Environmental Conditions**

Temperature:	27.5°C
Relative Humidity:	58%
ATM Pressure:	100.3kPa

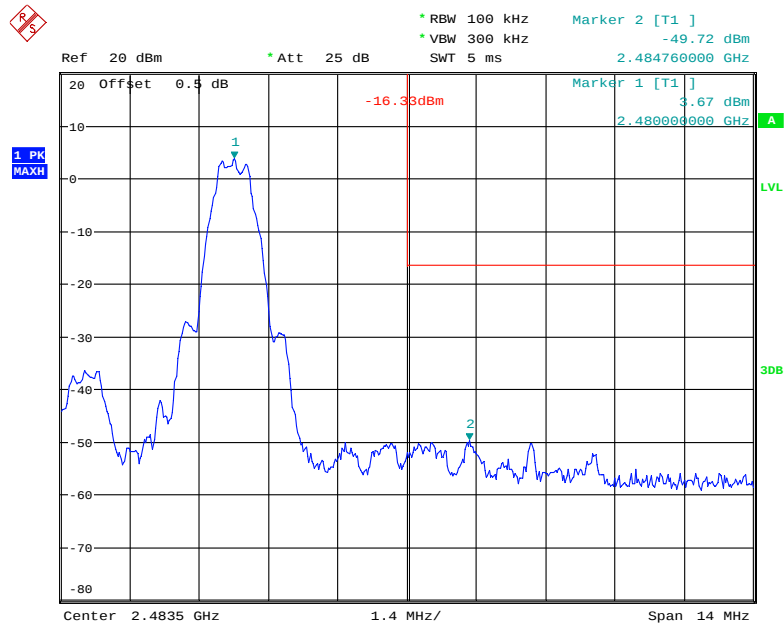
** The testing was performed by Andy Huang on 2018-08-07*

Test mode: Transmitting

Test Result: Compliance. Please refer to following plots.

Band Edge, Left Side

Date: 7.AUG.2018 20:32:59

Band Edge, Right Side

Date: 7.AUG.2018 20:25:58

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

According to FCC§15.247(e):For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

Test Data

Environmental Conditions

Temperature:	27.5℃
Relative Humidity:	58%
ATM Pressure:	100.3kPa

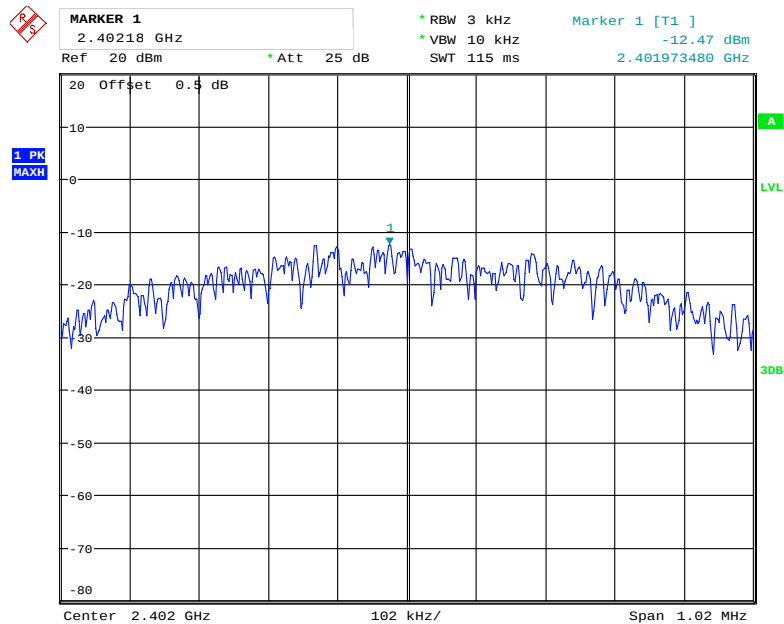
* The testing was performed by Andy Huang on 2018-08-07.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plots

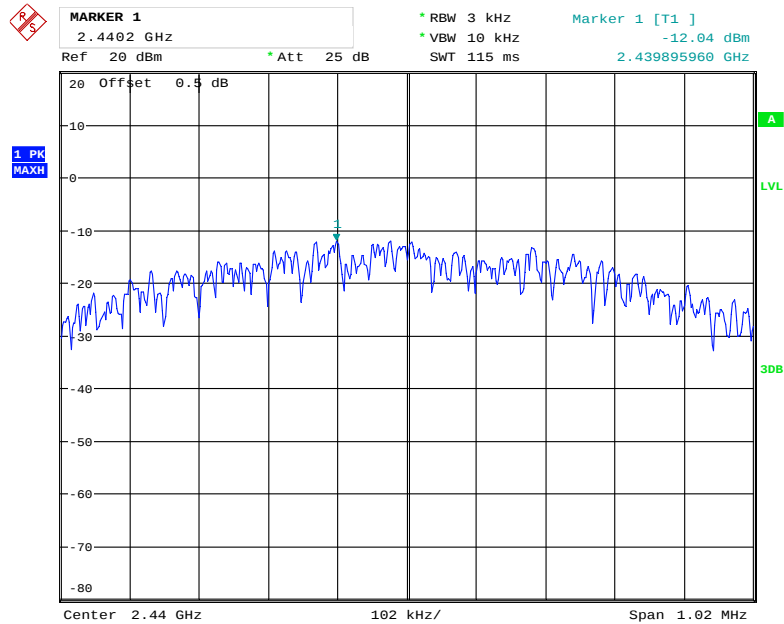
Mode	Channel	Frequency (MHz)	Result (dBm/3kHz)	Limit (dBm/3kHz)
BLE	Low	2402	-12.47	8
	Middle	2440	-12.04	
	High	2480	-11.49	

Power Spectral Density, Low Channel



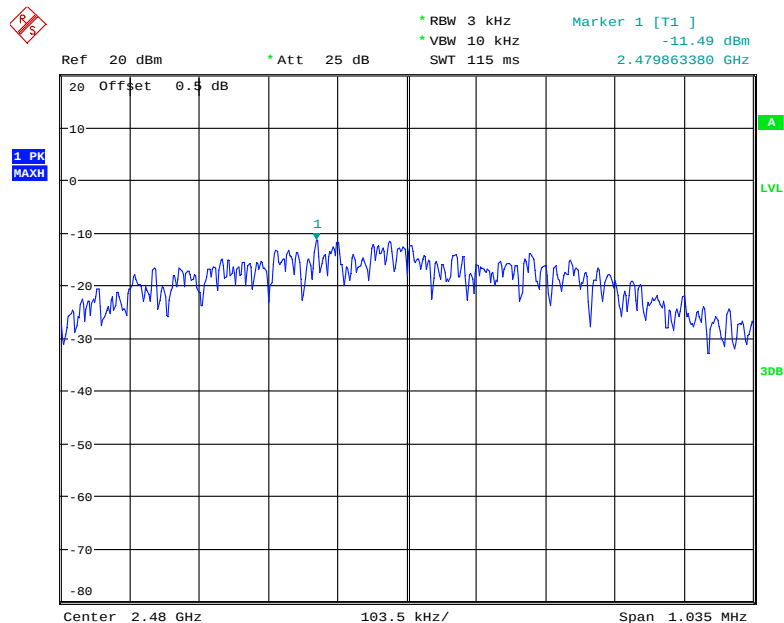
Date: 7.AUG.2018 20:32:33

Power Spectral Density, Middle Channel



Date: 7.AUG.2018 20:34:49

Power Spectral Density, High Channel



Date: 7.AUG.2018 20:25:38

***** END OF REPORT *****