FCC Test Report

Product Name	Wireless Remote Control
Model No.	ICB
FCC ID.	X96ICB

Applicant	COMEUP INDUSTRIES INC.
Address	No.139, Jieyukeng Rd., Ruifang Dist., New Taipei City 22453, Taiwan

Date of Receipt	Jun. 07, 2018
Issued Date	Aug. 03, 2018
Report No.	1860074R-RFUSP02V00-A
Report Version	V1.0

Testing Laboratory
3023

Test Report

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Address	No.139, Jieyukeng Rd., Ruifang Dist., New Taipei City 22453, Taiwan
Manufacturer	COMEUP INDUSTRIES INC.
Model No.	ICB
FCC ID.	X96ICB
EUT Rated Voltage	DC 8-24V
EUT Test Voltage	DC 12V
Trade Name	COMEUP
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By : Jinn Chen

(Senior Adm. Specialist / Jinn Chen)

Tested By : Nova chu

(Engineer / Nova Chu)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Remote Control
Trade Name	COMEUP
Model No.	ICB
FCC ID.	X96ICB
Frequency Range	2402 – 2480MHz
Channel Number	79CH
Type of Modulation	GFSK
Antenna Type	Print on PCB
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	COMEUP	N/A	Print on PCB	0dBi for 2.4 GHz

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 2:	2402 MHz	Channel 23:	2423 MHz	Channel 44:	2444 MHz	Channel 65:	2465 MHz
Channel 3:	2403 MHz	Channel 24:	2424 MHz	Channel 45:	2445 MHz	Channel 66:	2466 MHz
Channel 4:	2404 MHz	Channel 25:	2425 MHz	Channel 46:	2446 MHz	Channel 67:	2467 MHz
Channel 5:	2405 MHz	Channel 26:	2426 MHz	Channel 47:	2447 MHz	Channel 68:	2468 MHz
Channel 6:	2406 MHz	Channel 27:	2427 MHz	Channel 48:	2448 MHz	Channel 69:	2469 MHz
Channel 7:	2407 MHz	Channel 28:	2428 MHz	Channel 49:	2449 MHz	Channel 70:	2470 MHz
Channel 8:	2408 MHz	Channel 29:	2429 MHz	Channel 50:	2450 MHz	Channel 71:	2471 MHz
Channel 9:	2409 MHz	Channel 30:	2430 MHz	Channel 51:	2451 MHz	Channel 72:	2472 MHz
Channel 10:	2410 MHz	Channel 31:	2431 MHz	Channel 52:	2452 MHz	Channel 73:	2473 MHz
Channel 11:	2411 MHz	Channel 32:	2432 MHz	Channel 53:	2453 MHz	Channel 74:	2474 MHz
Channel 12:	2412 MHz	Channel 33:	2433 MHz	Channel 54:	2454 MHz	Channel 75:	2475 MHz
Channel 13:	2413 MHz	Channel 34:	2434 MHz	Channel 55:	2455 MHz	Channel 76:	2476 MHz
Channel 14:	2414 MHz	Channel 35:	2435 MHz	Channel 56:	2456 MHz	Channel 77:	2477 MHz
Channel 15:	2415 MHz	Channel 36:	2436 MHz	Channel 57:	2457 MHz	Channel 78:	2478 MHz
Channel 16:	2416 MHz	Channel 37:	2437 MHz	Channel 58:	2458 MHz	Channel 79:	2479 MHz
Channel 17:	2417 MHz	Channel 38:	2438 MHz	Channel 59:	2459 MHz	Channel 80:	2480 MHz
Channel 18:	2418 MHz	Channel 39:	2439 MHz	Channel 60:	2460 MHz		
Channel 19:	2419 MHz	Channel 40:	2440 MHz	Channel 61:	2461 MHz		
Channel 20:	2420 MHz	Channel 41:	2441 MHz	Channel 62:	2462 MHz		
Channel 21:	2421 MHz	Channel 42:	2442 MHz	Channel 63:	2463 MHz		
Channel 22:	2422 MHz	Channel 43:	2443 MHz	Channel 64:	2464 MHz		

Note:

1. The EUT is a Wireless Remote Control with built-in 2.4G transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of 2.4G transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit

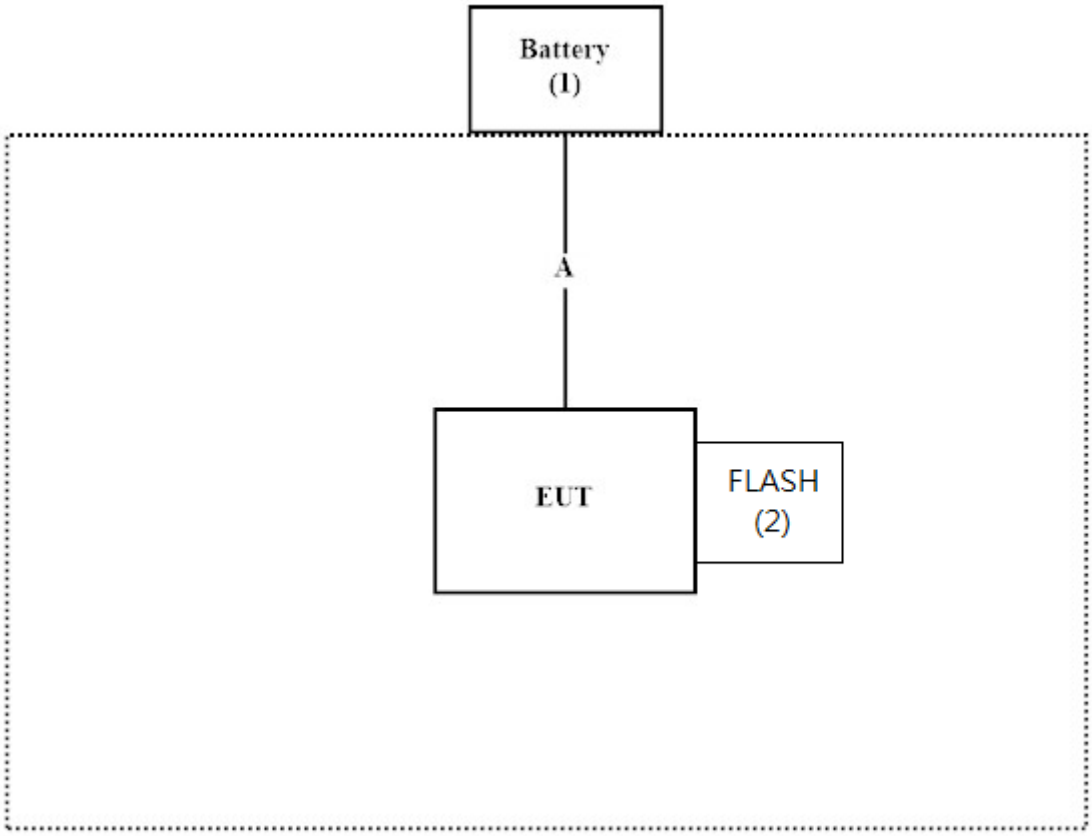
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Battery	YUASA	55B24L-CMF II	N/A	N/A
2	FLASH	Kingston	DT100G3/8GB	N/A	N/A

Signal Cable Type		Signal cable Description
A	Power Cable	Non-shielded, 1.0m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4.

(2) Press the button.

(3) Start transmits continually.

(4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW0023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2018.02.08	2019.02.07
X	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
X	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2018.05.24	2019.05.23

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2018.01.23	2019.01.22
X	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531025	2017.12.11	2018.12.10
	Bluetooth Tester	R&S	CBT	101238	2018.01.18	2019.01.17

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

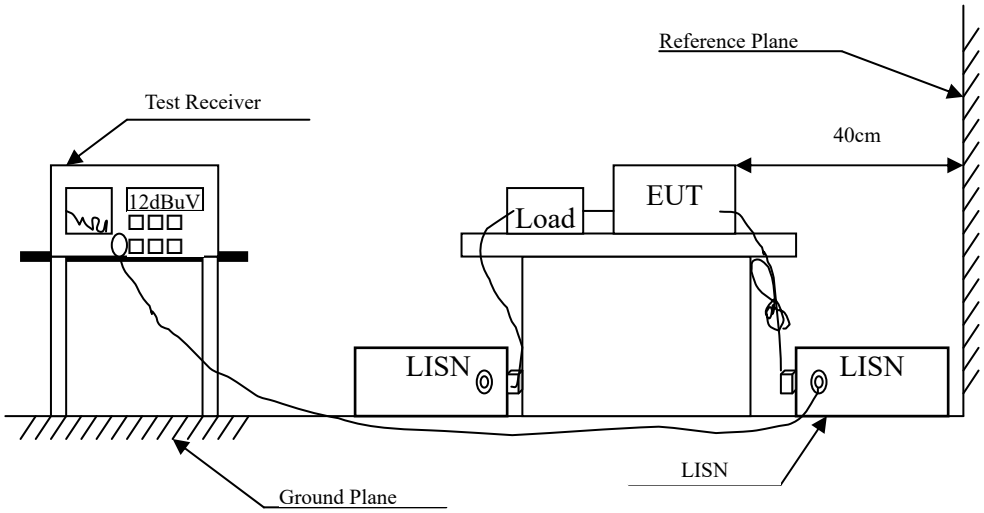
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2018.04.02	2019.04.01
X	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
X	Horn Antenna	Com-Power	AH-840	101087	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC001330	980316	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2018.05.16	2019.05.15
X	Filter	MICRO TRONICS	BRM50702	G251	2017.08.30	2018.08.29
	Filter	MICRO TRONICS	BRM50716	G188	2017.08.30	2018.08.29
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2018.05.25	2019.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2018.05.16	2019.05.15

Note:
1. Loop Antenna is calibrated every two year, the other equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

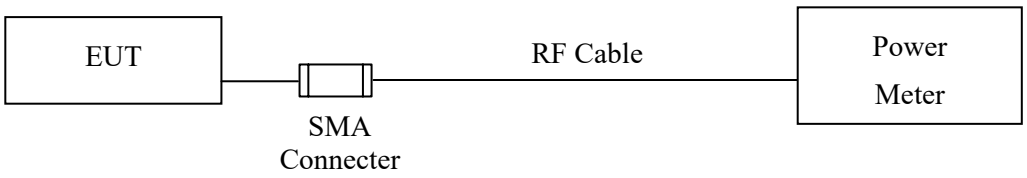
±2.35dB

2.5. Test Result of Conducted Emission

Owing to the EUT use Vehicular battery supply voltage ,this test item is not performed

3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

±0.86 dB

3.5. Test Result of Peak Power Output

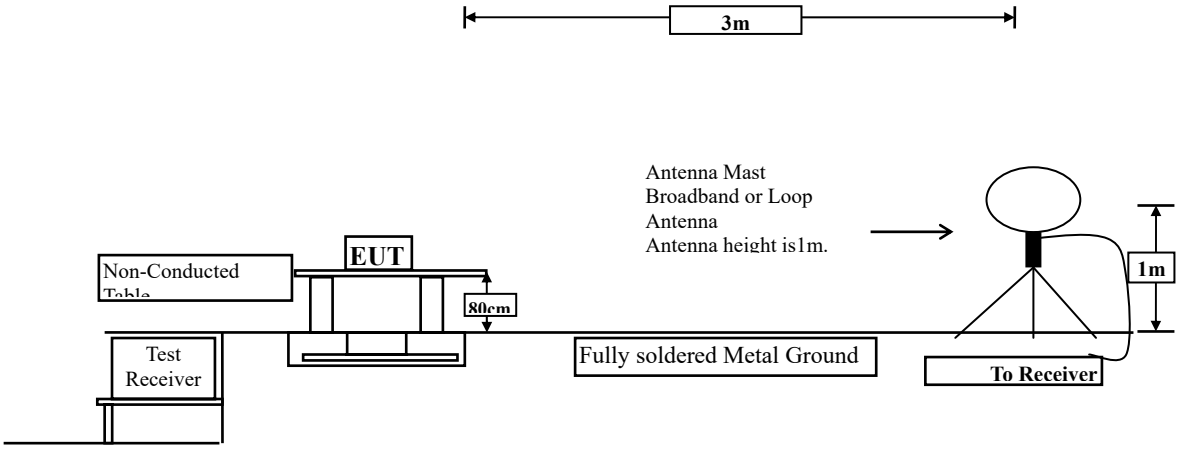
Product : Wireless Remote Control
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit
Test Date : 2018/07/24

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	0.86	1 Watt= 30 dBm	Pass
Channel 19	2441.00	1.20	1 Watt= 30 dBm	Pass
Channel 39	2480.00	0.90	1 Watt= 30 dBm	Pass

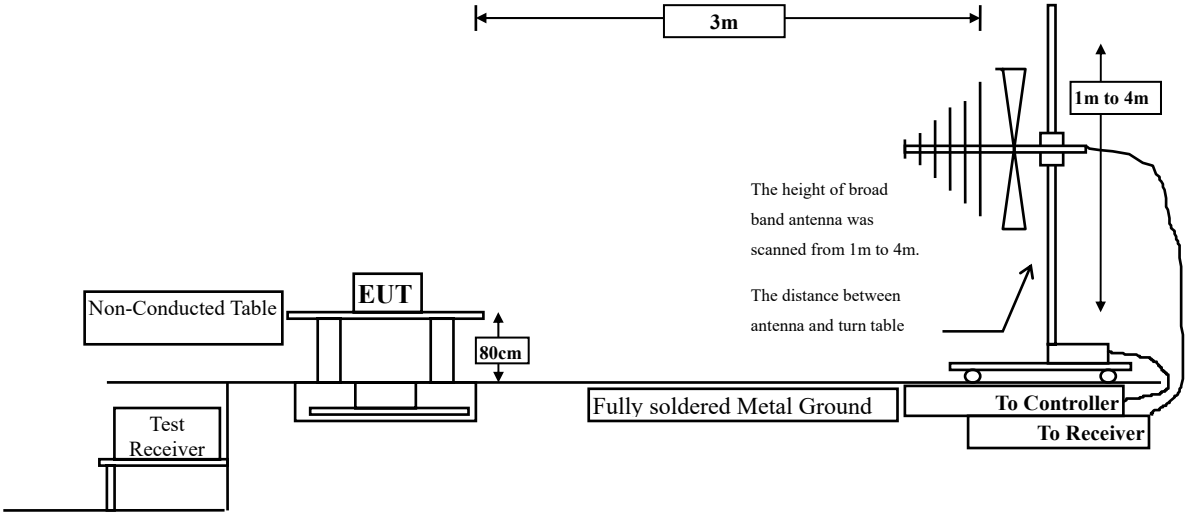
4. Radiated Emission

4.1. Test Setup

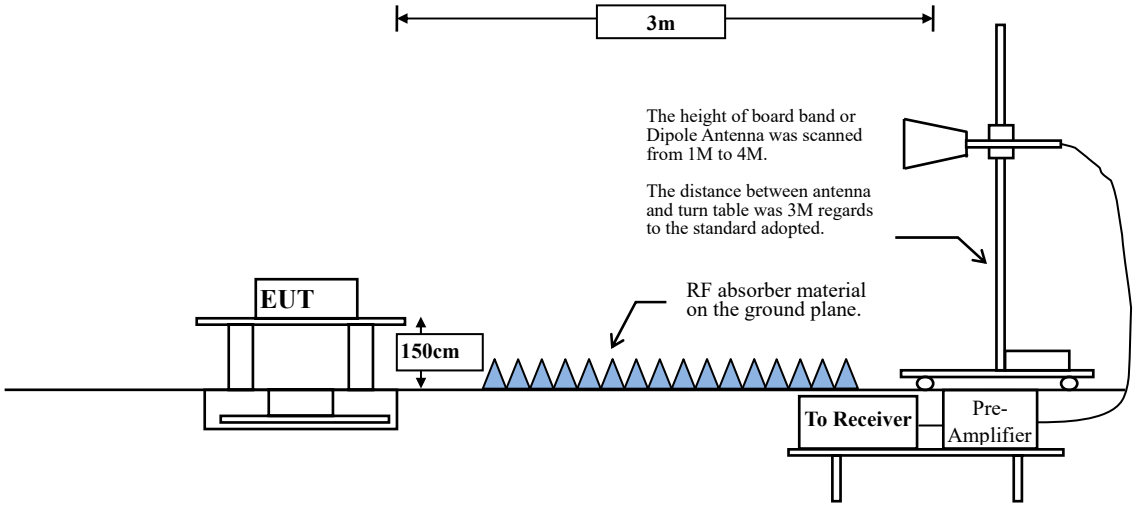
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
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

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	2.62	0.3200	3125	5K

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz：±3.83dB；18-40GHz: ±3.98dB

4.5. Test Result of Radiated Emission

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit(2402MHz)
Test Date : 2018/07/17

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	-2.417	56.000	53.583	-20.417	74.000
7206.000	0.757	50.190	50.947	-23.053	74.000
9608.000	3.284	43.390	46.675	-27.325	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4804.000	-2.417	50.530	48.113	-25.887	74.000
7206.000	0.757	48.130	48.887	-25.113	74.000
9608.000	3.284	43.490	46.775	-27.225	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit (2441MHz)
Test Date : 2018/07/17

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4882.000	-2.249	47.340	45.091	-28.909	74.000
7323.000	0.789	49.470	50.259	-23.741	74.000
9764.000	3.777	44.250	48.027	-25.973	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4882.000	-2.249	49.330	47.081	-26.919	74.000
7323.000	0.789	51.150	51.939	-22.061	74.000
9764.000	3.777	44.530	48.307	-25.693	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit (2480MHz)
Test Date : 2018/07/17

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	-2.358	50.770	48.412	-25.588	74.000
7440.000	0.870	49.000	49.870	-24.130	74.000
9920.000	4.100	44.170	48.270	-25.730	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4960.000	-2.358	49.120	46.762	-27.238	74.000
7440.000	0.870	46.800	47.670	-26.330	74.000
9920.000	4.100	43.070	47.170	-26.830	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Wireless Remote Control
Test Item : General Radiated Emission
Test Mode : Mode 1: Transmit (2402MHz)
Test Date : 2018/07/03

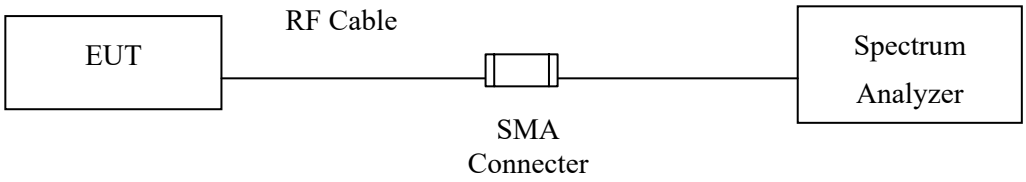
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
60.000	-14.958	54.600	39.642	-0.358	40.000
120.000	-14.779	58.000	43.221	-0.279	43.500
356.890	-14.345	36.267	21.922	-24.078	46.000
503.360	-14.149	31.385	17.236	-28.764	46.000
670.200	-13.955	31.234	17.279	-28.721	46.000
955.380	-13.669	30.975	17.306	-28.694	46.000
Vertical					
76.560	-14.903	54.656	39.753	-0.247	40.000
110.000	-14.810	58.100	43.290	-0.210	43.500
356.890	-14.345	36.267	21.922	-24.078	46.000
504.330	-14.148	31.536	17.388	-28.612	46.000
683.780	-13.939	31.183	17.244	-28.756	46.000
888.450	-13.731	31.259	17.528	-28.472	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product : Wireless Remote Control
Test Item : RF Antenna Conducted Test
Test Mode : Mode 1: Transmit
Test Date : 2018/07/25

Figure Channel 00:

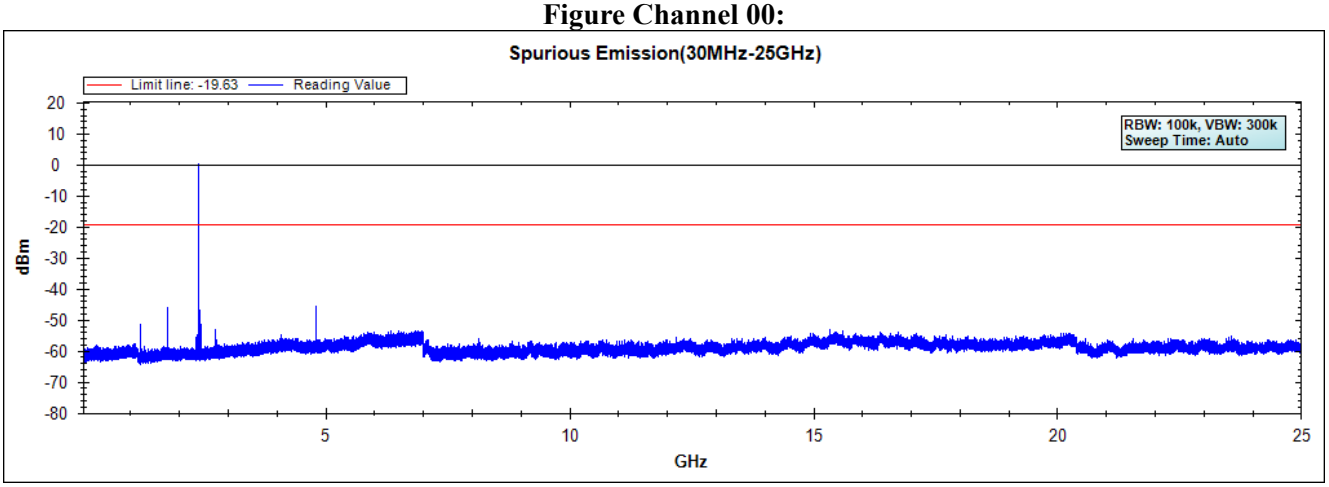


Figure Channel 19:

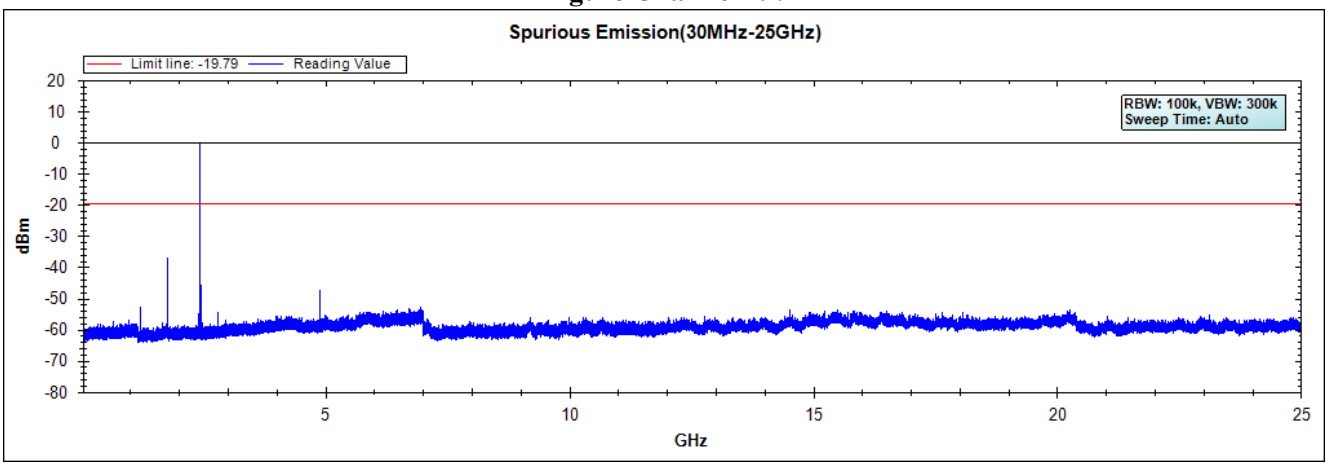
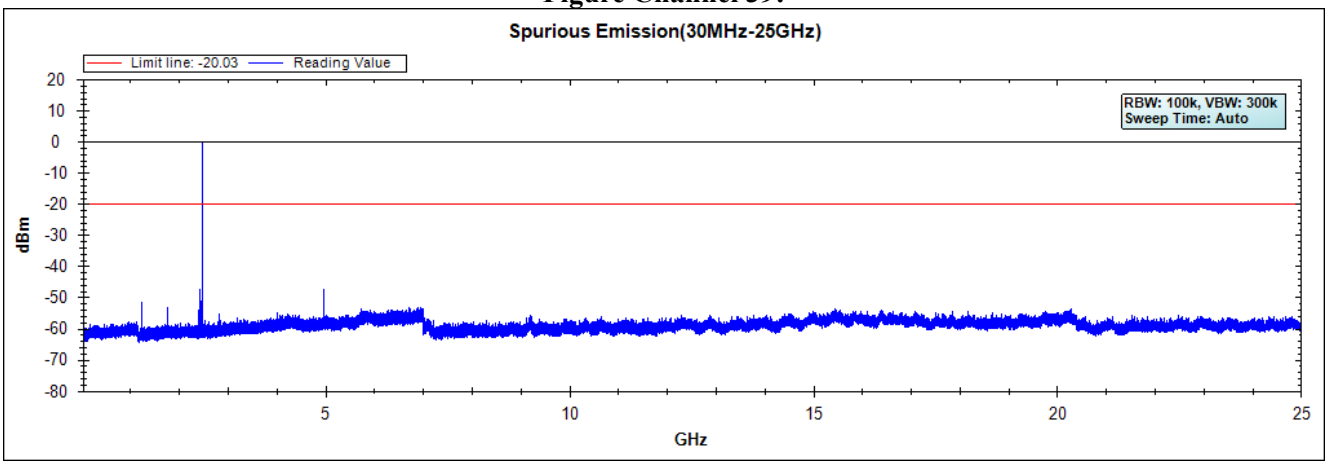


Figure Channel 39:

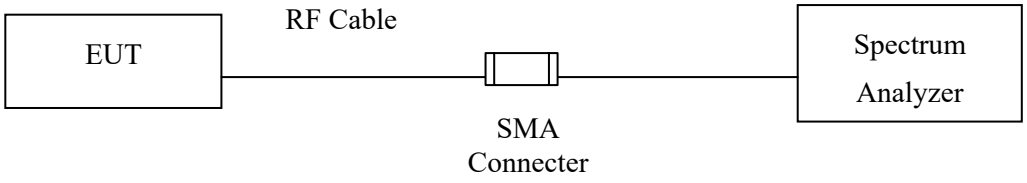


Note: The above test pattern is synthesized by multiple of the frequency range.

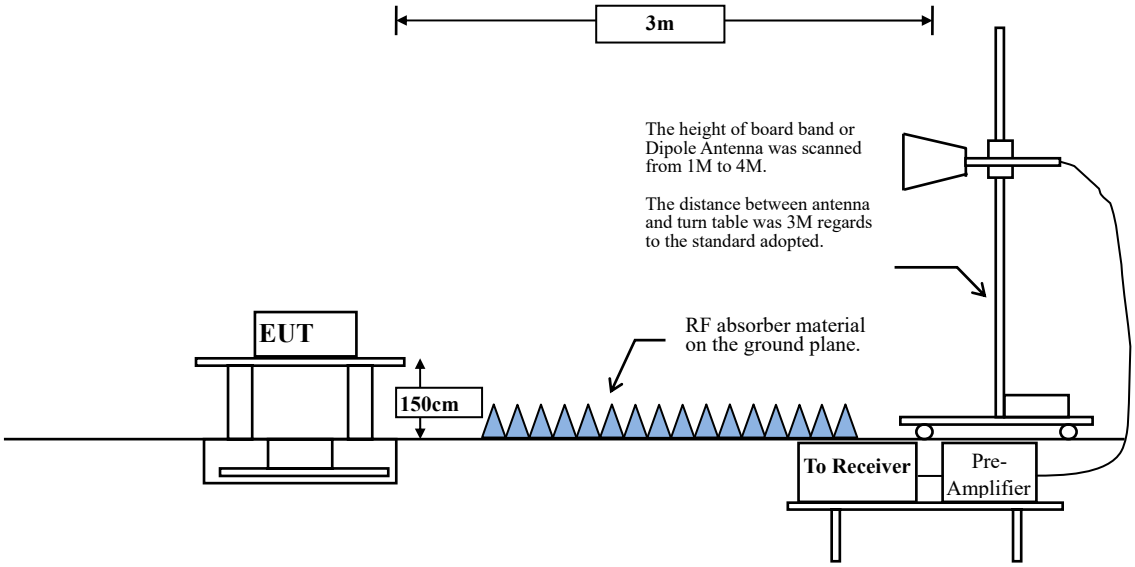
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	2.62	0.3200	3125	5K

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

Conducted: ±1.23dB

Radiated:

Horizontal polarization：1-18GHz: ±3.77dB

Vertical polarization：1-18GHz : ±3.83dB

6.5. Test Result of Band Edge

Product : Wireless Remote Control
Test Item : Band Edge
Test Mode : Mode 1: Transmit
Test Date : 2018/07/17

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
00 (Peak)	2390.000	12.186	37.371	49.557	74.00	54.00	Pass
00 (Peak)	2402.174	12.246	70.642	82.888	--	--	--
00 (Average)	2390.000	12.186	17.787	29.973	74.00	54.00	Pass
00 (Average)	2402.029	12.246	70.622	82.867	--	--	--

Figure Channel 00: Horizontal (Peak)

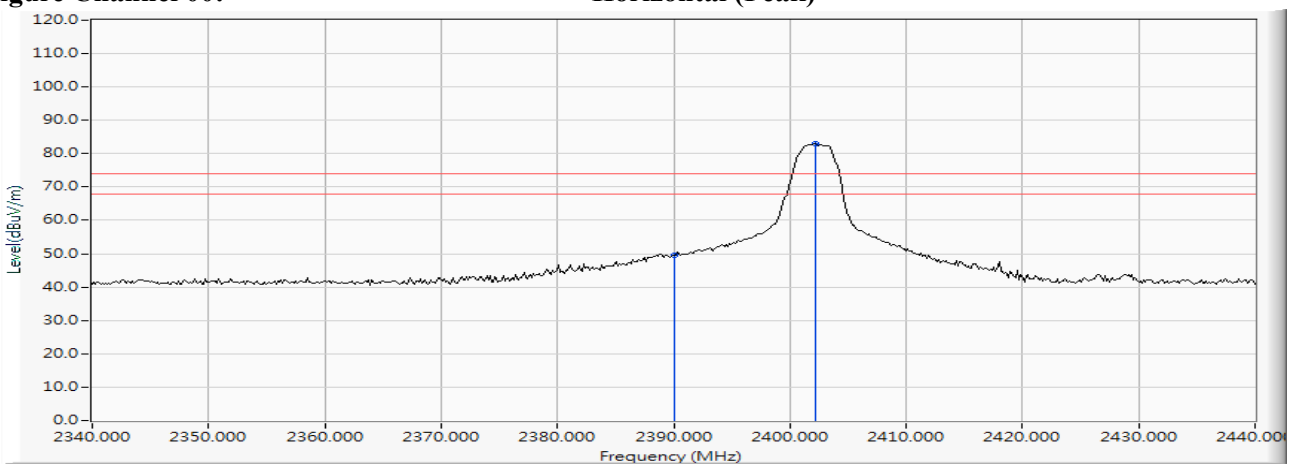
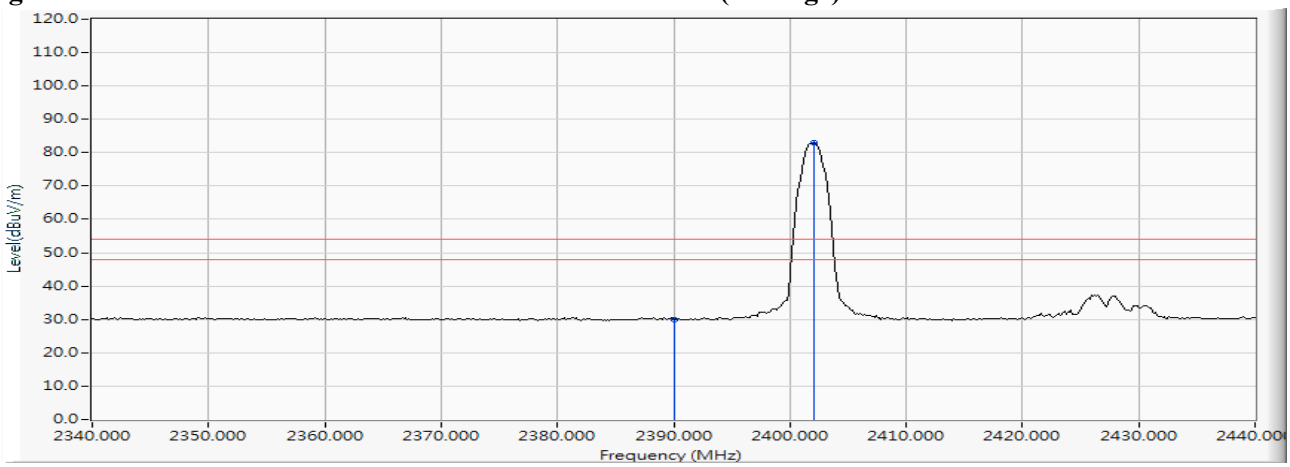


Figure Channel 00: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Remote Control
Test Item : Band Edge
Test Mode : Mode 1: Transmit
Test Date : 2018/07/17

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
00 (Peak)	2390.000	12.186	42.241	54.427	74.00	54.00	Pass
00 (Peak)	2402.174	12.246	76.750	88.996	--	--	--
00 (Average)	2390.000	12.186	17.815	30.001	74.00	54.00	Pass
00 (Average)	2402.029	12.246	76.578	88.823	--	--	--

Figure Channel 00: Vertical (Peak)

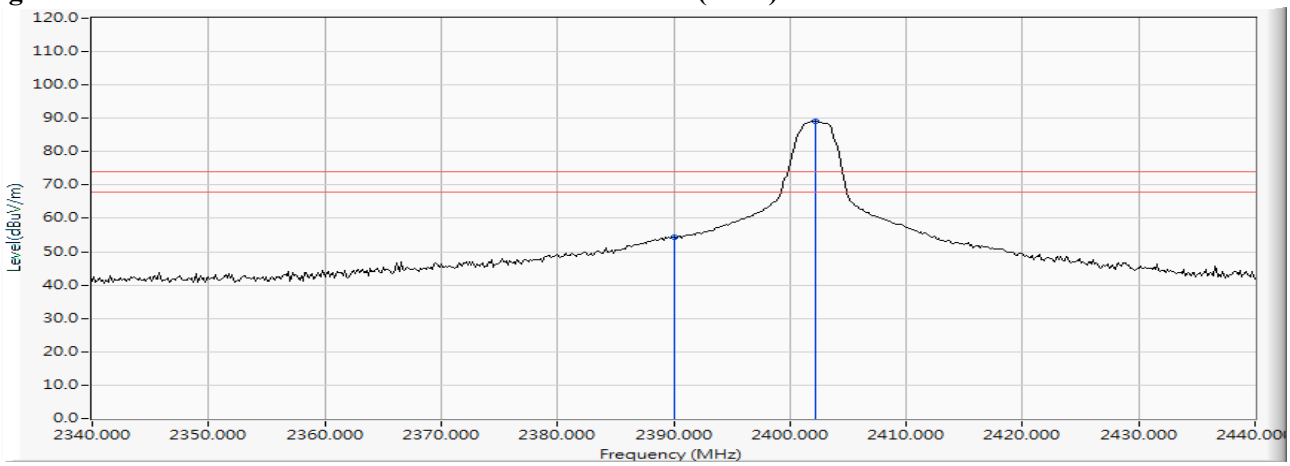
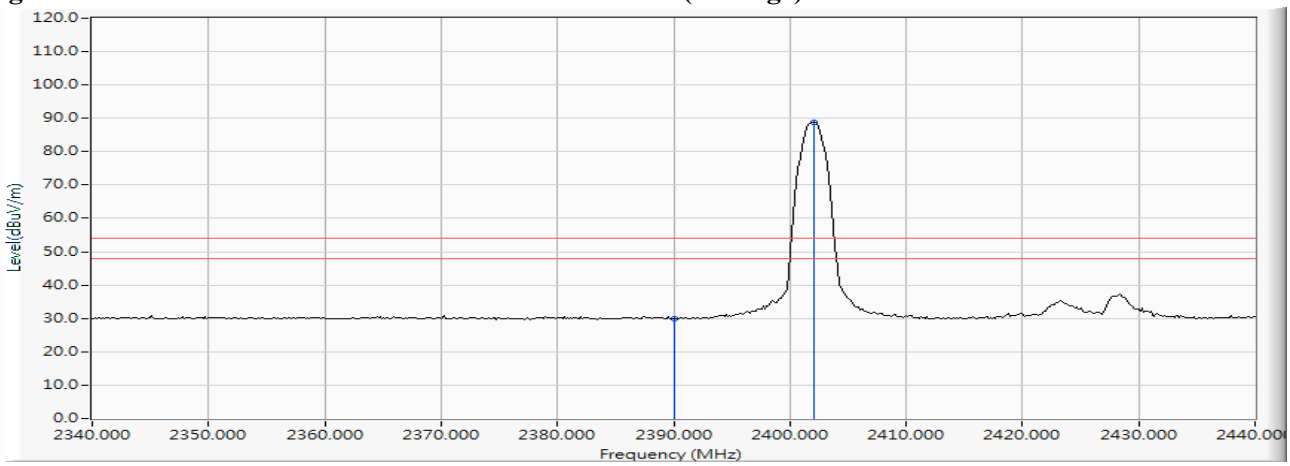


Figure Channel 00: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Remote Control
Test Item : Band Edge
Test Mode : Mode 1: Transmit
Test Date : 2018/07/17

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
39 (Peak)	2480.167	12.432	76.656	89.088	--	--	--
39 (Peak)	2483.500	12.433	53.093	65.526	74.00	54.00	Pass
39 (Average)	2480.022	12.431	76.333	88.765	--	--	--
39 (Average)	2483.500	12.433	19.656	32.089	74.00	54.00	Pass
39 (Average)	2487.848	12.435	21.766	34.202	74.00	54.00	Pass

Figure Channel 39: Horizontal (Peak)

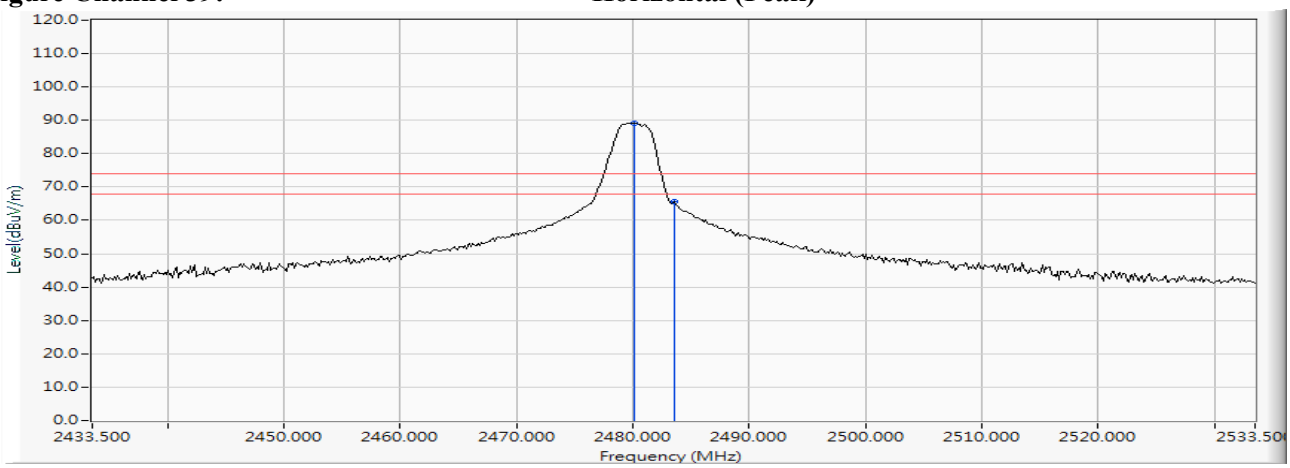
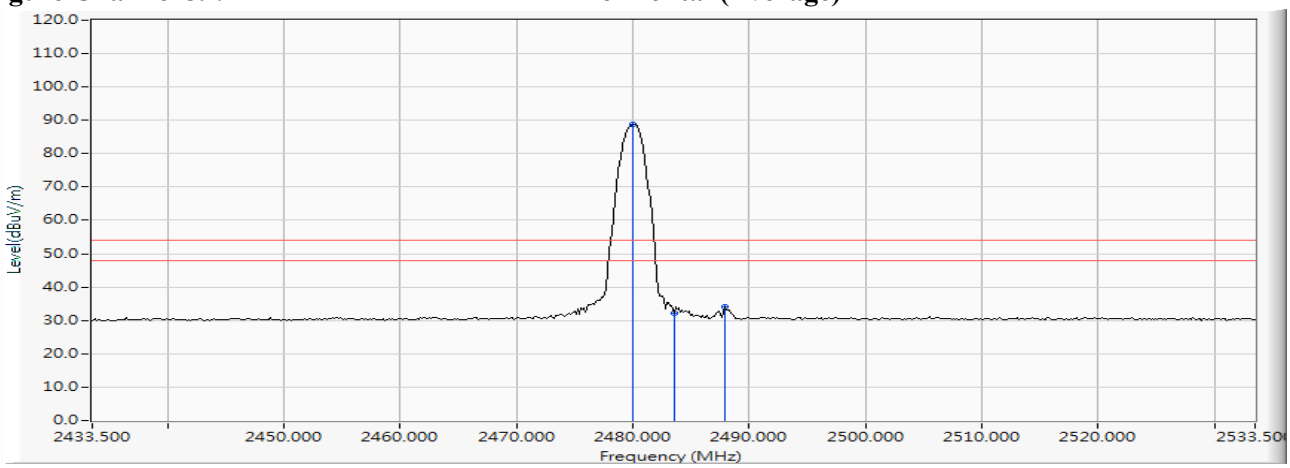


Figure Channel 39: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Remote Control
Test Item : Band Edge
Test Mode : Mode 1: Transmit
Test Date : 2018/07/17

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
39 (Peak)	2480.167	12.432	75.622	88.054	--	--	--
39 (Peak)	2483.500	12.433	52.074	64.507	74.00	54.00	Pass
39 (Average)	2480.022	12.431	75.401	87.833	--	--	--
39 (Average)	2483.500	12.433	21.195	33.628	74.00	54.00	Pass

Figure Channel 39: Vertical (Peak)

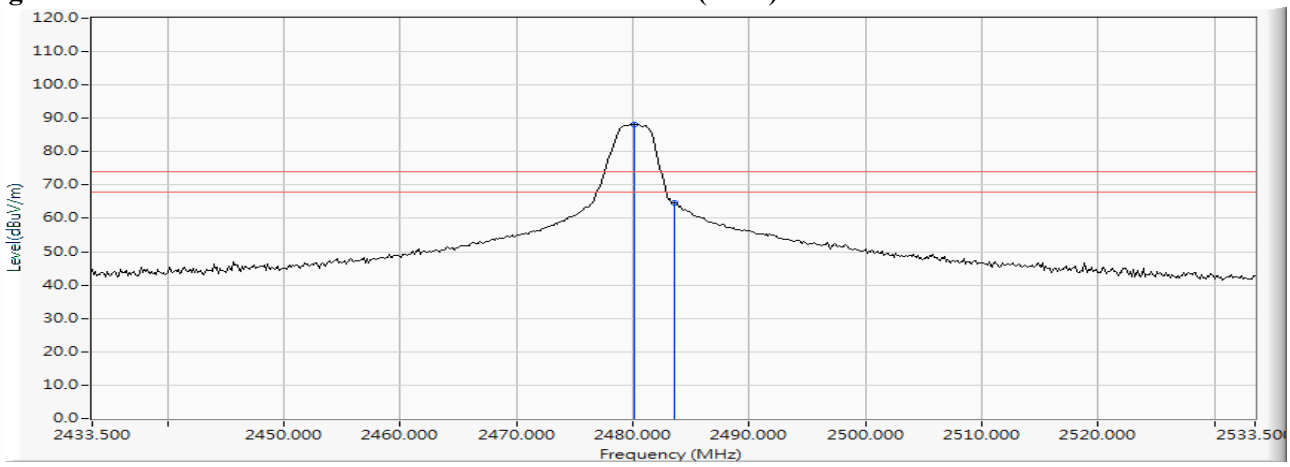
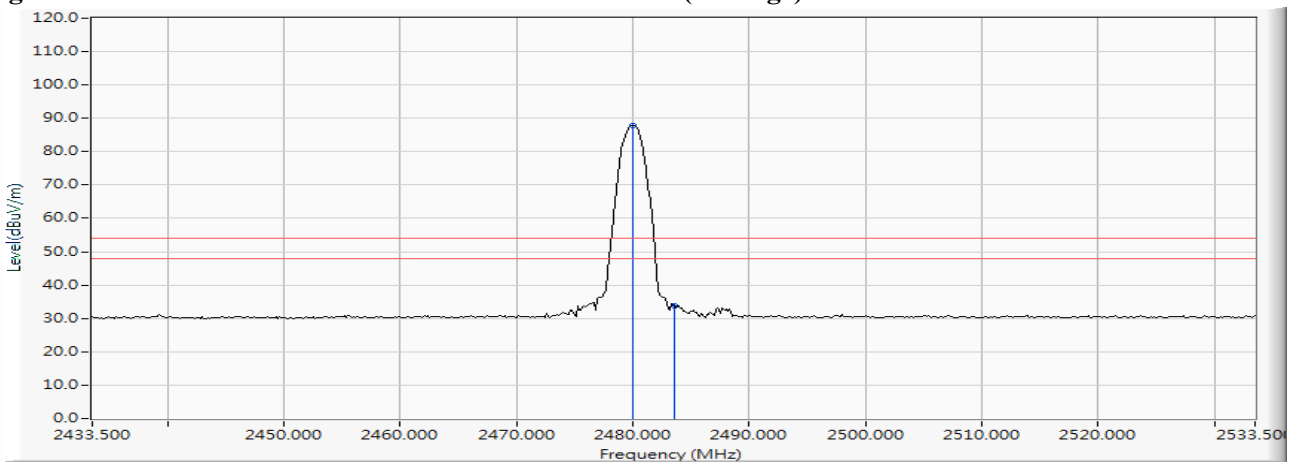


Figure Channel 39: Vertical (Average)

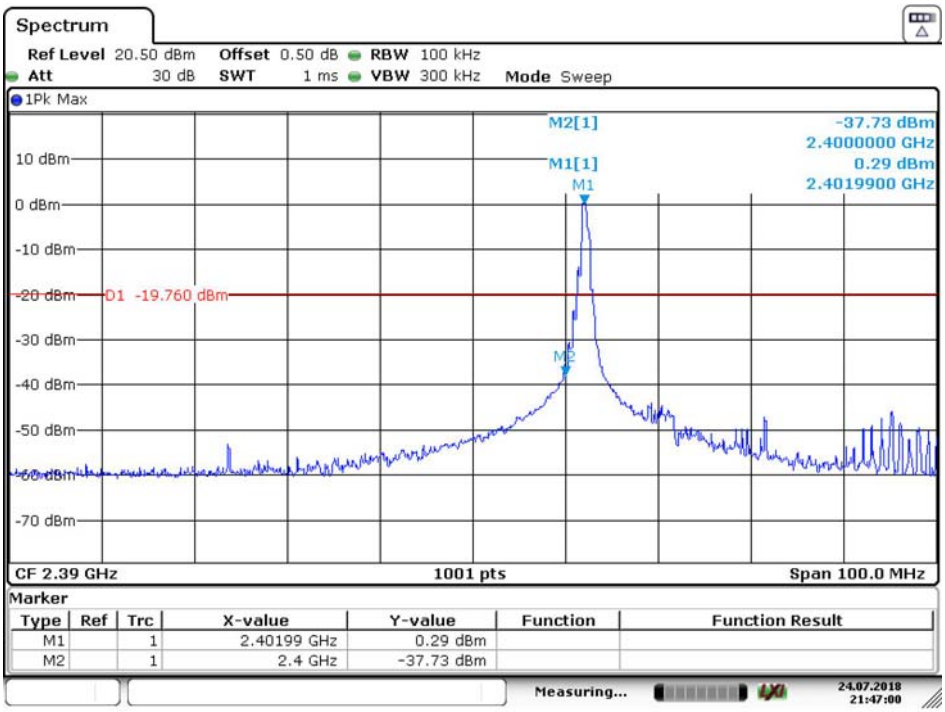


Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

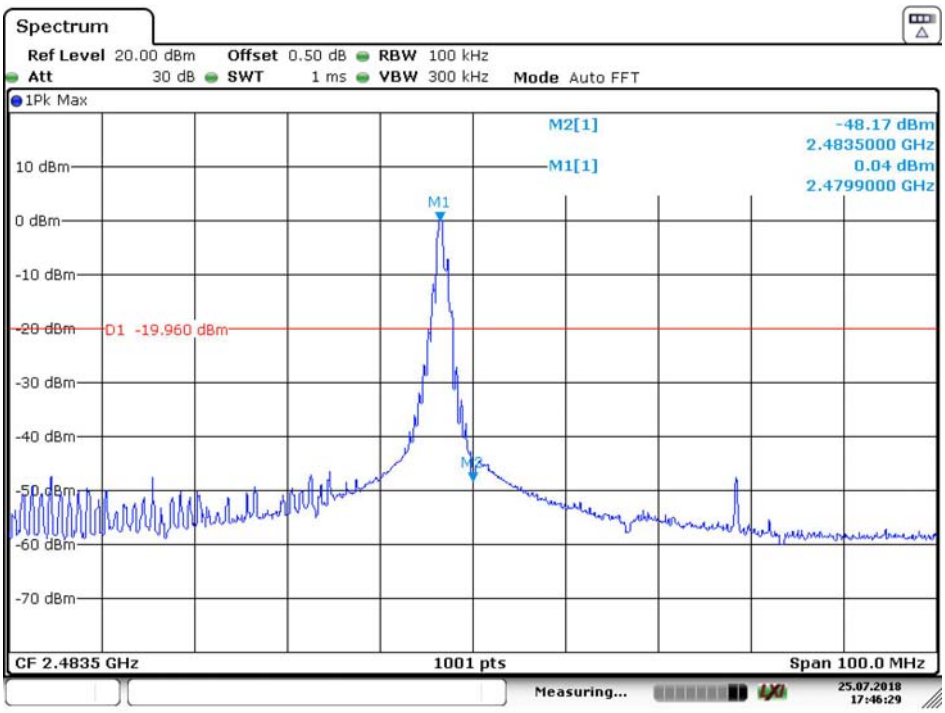
Product : Wireless Remote Control
Test Item : Band Edge
Test Mode : Mode 1: Transmit
Test Date : 2018/07/17

Figure Channel 00



Date: 24.JUL.2018 21:47:00

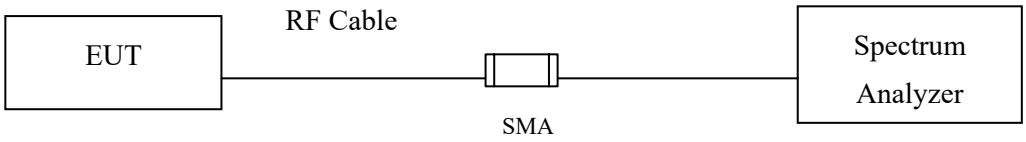
Figure Channel 039



Date: 25.JUL.2018 17:46:29

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 1-5% of the emission bandwidth, VBW≥3*RBW

7.4. Uncertainty

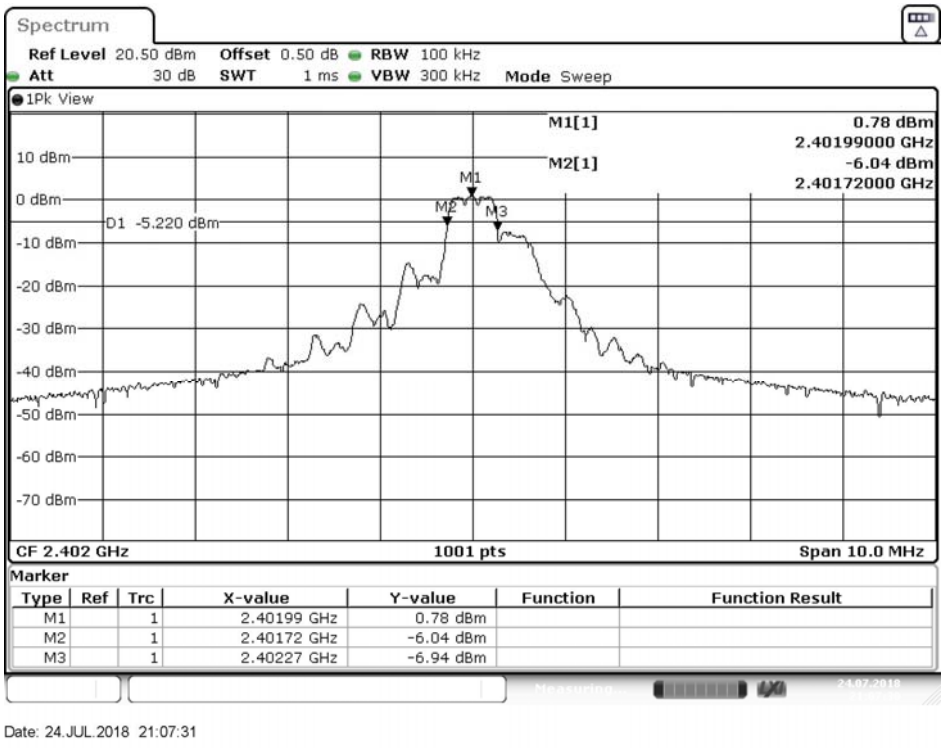
±279.2Hz

7.5. Test Result of 6dB Bandwidth

Product : Wireless Remote Control
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	550	>500	Pass

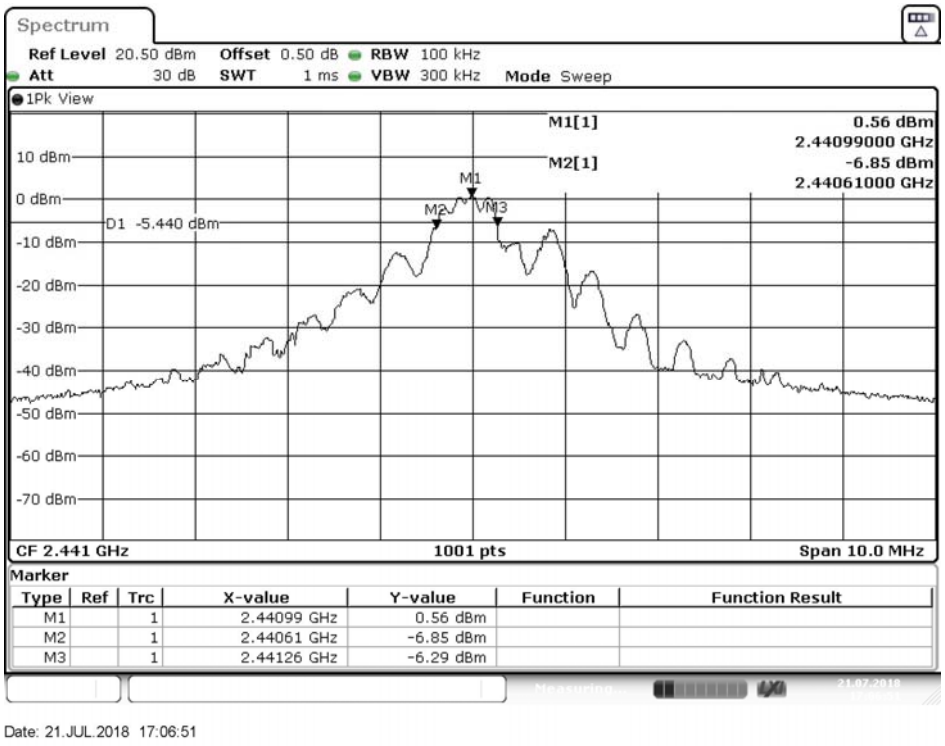
Figure Channel 00:



Product : Wireless Remote Control
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2441	650	>500	Pass

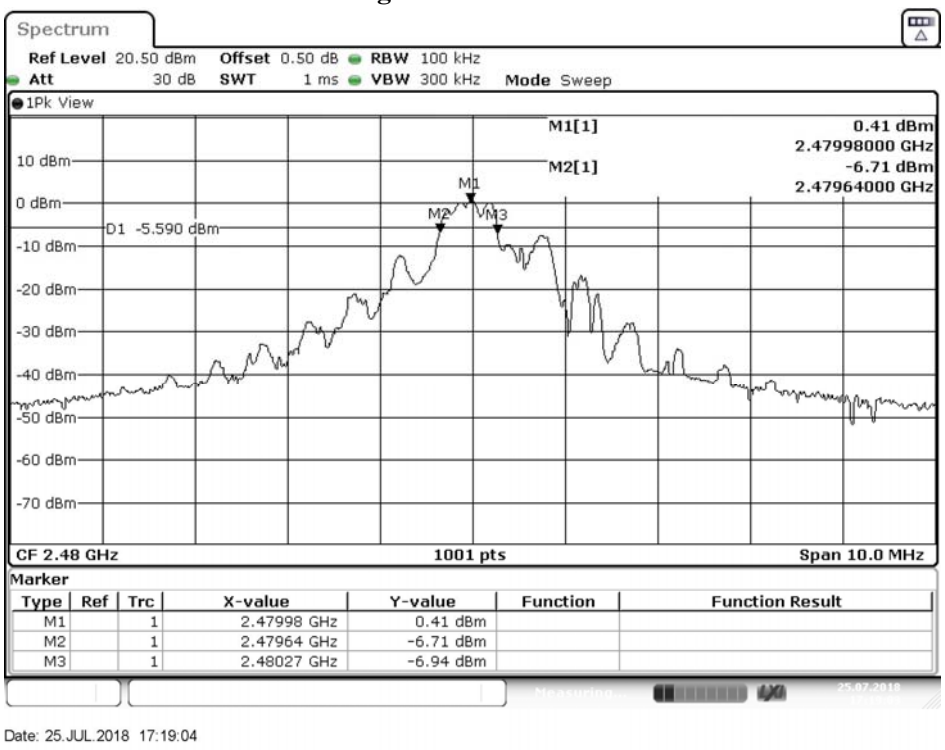
Figure Channel 19:



Product : Wireless Remote Control
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (2480MHz)

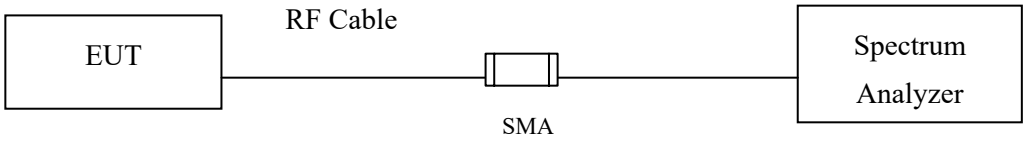
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	630	>500	Pass

Figure Channel 39:



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

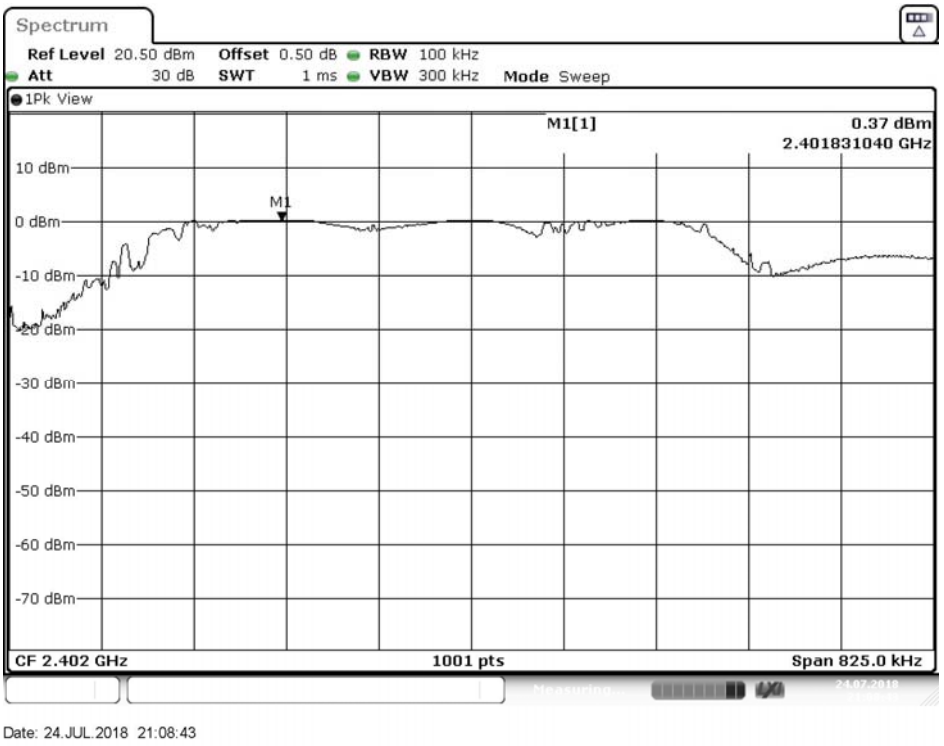
±1.23dB

8.5. Test Result of Power Density

Product : Wireless Remote Control
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	0.37	≦8dBm	Pass

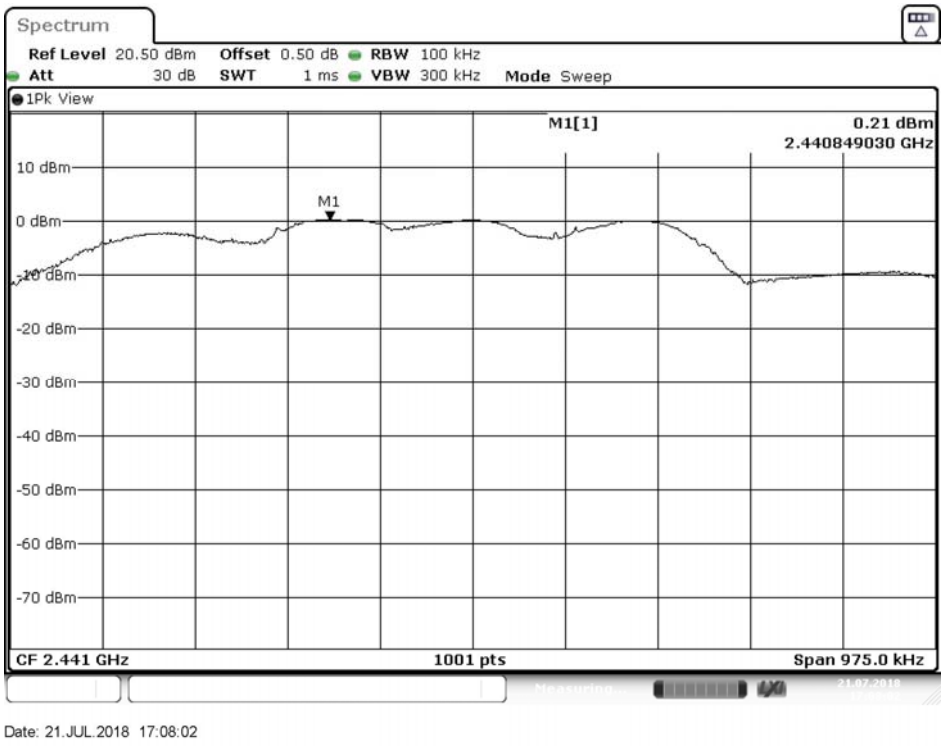
Figure Channel 00:



Product : Wireless Remote Control
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2441	0.21	≦8dBm	Pass

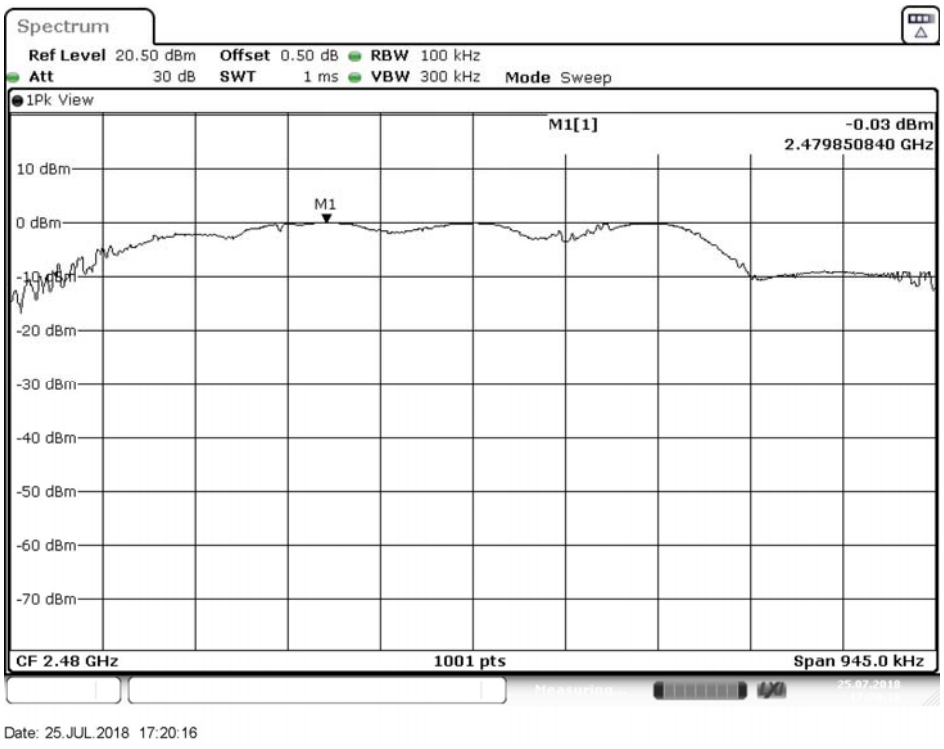
Figure Channel 19:



Product : Wireless Remote Control
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (2480MHz)

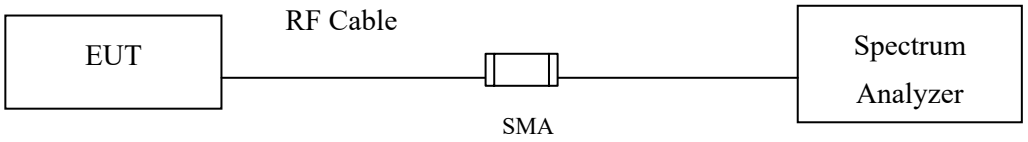
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	-0.03	≦8dBm	Pass

Figure Channel 39:



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

± 2.31msec

9.4. Test Result of Duty Cycle

Product : Wireless Remote Control
Test Item : Duty Cycle
Test Mode : Mode 1: Transmit

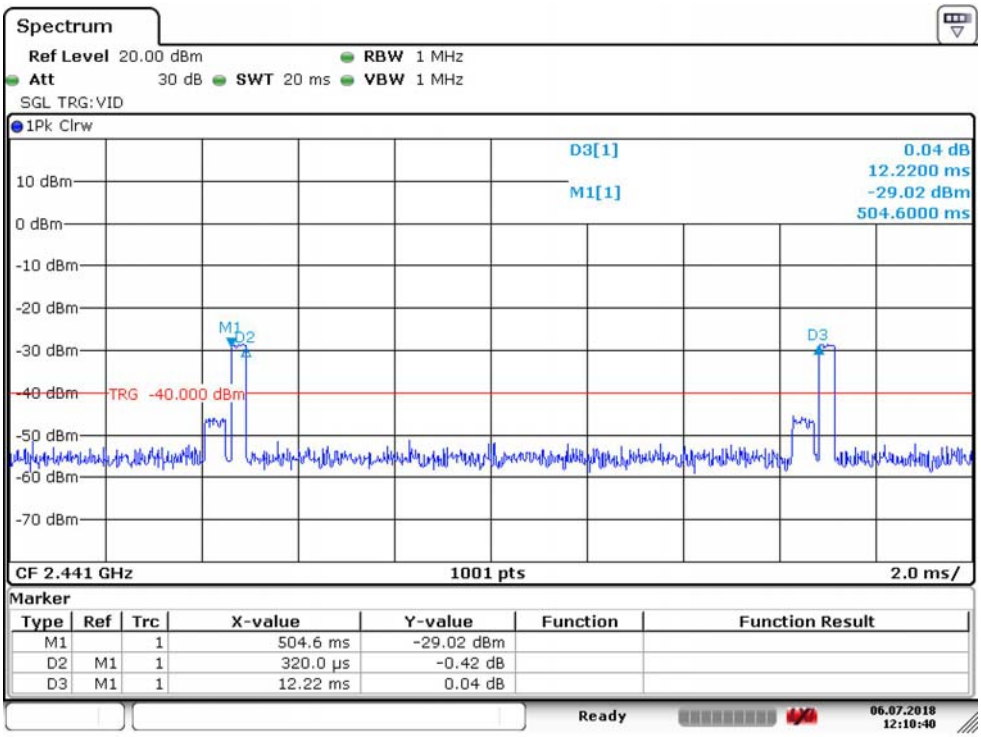
Duty Cycle Formula:

Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.32	12.22	2.62	15.82



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.