

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

	OF
FCC Applicant:	Universal Electronics Inc.
	201 East Sandpointe Ave 7th Floor Santa Ana CA 92707
	USA
IC Applicant:	Universal Electronics Inc.
	201 East Sandpointe Ave 7th Floor Santa Ana CA 92707 USA
Product Name:	RF Remote Controller
Flouuct Name.	
Brand Name:	Duravit
Model No.:	Sensowash
Model Difference:	N/A
Report Number:	T190429W02-RP
FCC ID:	MG3-512003
IC:	2575A-512003
FCC Rule Part:	§15.247, Cat: DTS
IC Rule Part:	RSS-247 issue 2 Feb 2017
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Tested By:

Approved By:

Henry Chiang / Engineer

Kevin Tsai / Deputy Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190429W02-RP	Rev.00	Initial creation of docu- ment	All	Jun. 19, 2019	Elle Chang

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Table of Contents

1	GENERAL INFORMATION	4
2	SYSTEM TEST CONFIGURATION	6
3	SUMMARY OF TEST RESULTS	9
4	DESCRIPTION OF TEST MODES	. 10
5	MEASUREMENT UNCERTAINTY	. 12
6	CONDUCTED EMISSION TEST	. 13
7	PEAK OUTPUT POWER MEASUREMENT	. 15
8	6dB & 99% BANDWIDTH MEASUREMENT	. 18
9	CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT	. 21
10	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT	. 26
11	POWER SPECTRAL DENSITY	. 43
12	ANTENNA REQUIREMENT	. 46

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GENERAL INFORMATION 1

1.1 Product Description

Product Name:	RF Remote Controller
Brand Name:	Duravit
Model No.:	Sensowash
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	3V (2 coin cells CR2032 in parallel)

Radio Technology:	Bluetooth Low Energy
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	6.34 dBm
Frequency Range:	2402 – 2480MHz
Antenna Designation:	PCB antenna, Gain: 3.47dBi

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Report No.: T190429W02-RP Page 5 of 46



1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas. Guidance v05r02 RSS-Gen. issue 5 Apr. 2018 RSS-247 issue 2 Feb. 2017 ANSI C63.10:2013 Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1109) FCC Designation number: TW1309 Canada Registration number: 2324G

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 a table which is 0.8 m above ground plane. 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 50uH/50 ohm 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 **Conducted Test (RF)**

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 **Radiated Emissions**

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. 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.

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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.

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2.5 Configuration of Tested System Fig. 2-1 Conducted (Antenna Port) Emission Configuration

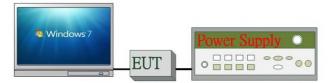


Fig 2-2 Radiated Emission

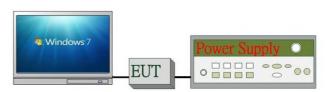


Table 2-1 Equipment Used in Tested System

ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Ca- ble	Power Cord
1	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	L420	LR-6MEX0	Shielded	Un-Shielded
3.	DC Power Supply	Lenovo	T440P	PC-089AH5	Shielded	Unshielded

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SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	N/A
§15.247(b) (3)	RSS-247 §5.4(4)	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.1 (1) RSS-Gen §6.7	6dB & 99% Emission Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5 RSS-Gen §8.10	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10 RSS-Gen §6.13	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 §6.8	Antenna Requirement	Compliant

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

40 channels are provided for Bluetooth LE

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	15	2430 MHz	29	2458 MHz
2	2404 MHz	16	2432 MHz	30	2460 MHz
3	2406 MHz	17	2434 MHz	31	2462 MHz
4	2408 MHz	18	2436 MHz	32	2464 MHz
5	2410 MHz	19	2438 MHz	33	2466 MHz
6	2412 MHz	20	2440 MHz	34	2468 MHz
7	2414 MHz	21	2442 MHz	35	2470 MHz
8	2416MHz	22	2444 MHz	36	2472 MHz
9	2418 MHz	23	2446 MHz	37	2474 MHz
10	2420 MHz	24	2448 MHz	38	2476 MHz
11	2422 MHz	25	2450 MHz	39	2478 MHz
12	2424 MHz	26	2452 MHz	40	2480 MHz
13	2426 MHz	27	2454 MHz		
14	2428 MHz	28	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:

MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)	
	RADIATED EMISSION TEST (BELOW 1 GHz)				
Bluetooth LE	2402 to 2480	2442	GFSK	1	
	RADIATED EMISSION TEST (ABOVE 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2442, 2480	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 FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	1

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MEASUREMENT UNCERTAINTY 5

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
Peak Output Power	+/- 1.92 dB
6dB Bandwidth	+/- 61.248 Hz
100 kHz Bandwidth of Frequency Band Edges	+/- 1.92 dB
Peak Power Density	+/- 1.996 dB
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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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		nits (uV)
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 the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used:

N/A

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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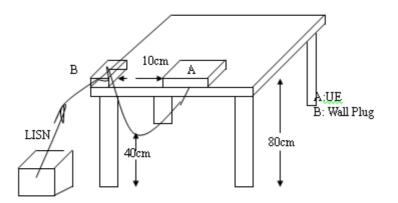
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6.4 Test SET-UP (Block Diagram of Configuration)



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:

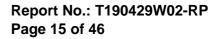
N/A; Powered from AAA battery.

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7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

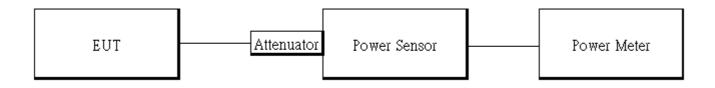
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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 TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.						
Power Meter	Anritsu	ML2496A	1326001	08/03/2018	08/02/2019						
Power Sensor	Anritsu	MA2411B	1315048	08/03/2018	08/02/2019						
Power Sensor	Anritsu	MA2411B	1315049	08/03/2018	08/02/2019						
DC Power Supply	Agilent	E3640A	MY53130054	09/03/2018	09/02/2019						

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 & ANSI C63.10..
- 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.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Duty Factor:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
BLE	100.00	0.00	0.00	0.01
Keysight Spectrum Analyzer - Swept SA	GHz PNO: Fast IFGein:Low #Atten: 30 dB	Avg Type: Voltage	4:29 PM May 03, 2019 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency Auto Tune
Ref Offset 1 dB 10 dB/div Ref 20.00 dBm		ΔMk	r1105.0 µs 7.08 dB	
10.0 1 0.00 1 -10.0				Center Freq 2.442000000 GHz
-20.0				Start Freq 2.442000000 GHz
-50.0				Stop Freq 2.442000000 GHz
Center 2.442000000 GHz Res BW 8 MHz	#VBW 8.0 MHz	Sweep 5.000	Span 0 Hz ms (1001 pts)	CF Step 8.000000 MHz <u>Auto</u> Man
	105.0 µs 7.08 dBm		E	Freq Offset 0 Hz
7 8 9 10				Scale Type
11 MSG	III	STATUS	•	

Duty Cycle Factor:10*log(1/(99.9999/100))=0

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7.5 **Measurement Result:**

BLE mode:

СН	Frequency (MHz)	Peak Power Output (dBm)	Required Limit
Low	2402	6.34	1 Watt = 30 dBm
Mid	2442	6.23	1 Watt = 30 dBm
High	2480	6.12	1 Watt = 30 dBm
BLE mo	de:		
СН	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	6.28	1 Watt = 30 dBm
Mid	2442	6.17	1 Watt = 30 dBm
High	2480	6.05	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss as 1 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

СН	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	I	Limit	:
Low	2402	6.28	3.47	9.75	4W=	36	dBm
Mid	2442	6.17	3.47	9.64	4W=	36	dBm
High	2480	6.05	3.47	9.52	4W=	36	dBm

* Note: EIRP = Average Power + Gain

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8 6DB & 99% BANDWIDTH MEASUREMENT

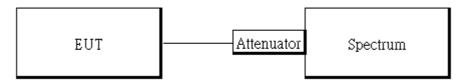
8.1 Standard Applicable

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	MY53400256	11/21/2018	11/20/2019						
DC Power Supply	Agilent	E3640A	MY53130054	09/03/2018	09/02/2019						
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020						

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 & ANSI C63.10.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. For 6dB Bandwidth:

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. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW=3*RBW, Span = 2MHz, Detector=Sample, Sweep=auto.

- 7. Turn on the 99% bandwidth function, max reading.
- 8. 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	1.032	> 0.5	PASS		
	1.002	2 0.0		2402	1.4107
2442	1.038	> 0.5	PASS	2442	1.4076
2400	1.05	. 0 F			
2480	1.05	> 0.5	PASS	2480	1.4039

Note: Refer to next page for plots.

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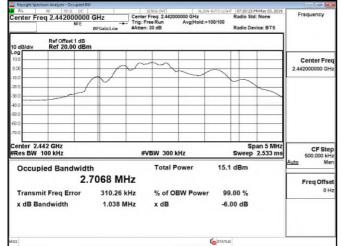
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6dB Band Width Test Data CH-Low

Center Fre	re 30 g DC eq 2.402000000 NFE		SENSE:DVT Center Freq: 2,4020 Trig: Free Run #Atten: 30 dB		Radio S	a PMMay (01, 2019) td: None levice: BTS	Frequency
0 dB/div	Ref Offset 1 dB Ref 20.00 dBm						
.00 10.0 10.0 20.0 30.0			~~~	~			Center Fre 2.402000000 GH
40 0 50 0 70 0							
Res BW			#VBW 300	kHz	Swee	ipan 5 MHz 5 2.533 ms	CF Ste 500.000 kH
Occupi	ied Bandwidti 2.1	220 MH	Total I	Power	15.2 dBm		Auto Ma
	it Freq Error ndwidth	316.00 kH 1.032 MH		BW Power	99.00 % -6.00 dB		OH
-					STATIS		

6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High

	trum Analyzer - Occupied BV	1			
Center Fre	eq 2.480000000 NFE	Trig	sense:m/i Aug er Freq: 2,480000000 GHz Free Run Avg/Hold: / en: 30 dB	Radio Std: None Radio Device: BT	Frequency
15 dB/div	Ref Offset 1 dB Ref 20.00 dBn	1			
-10.0					Center Free 2,48000000 GHz
40.0					
100					_
-115					
Res BW			#VBW 300 kHz	Span 5 M Sweep 2.533	ms 500.000 kH
Occup	ied Bandwidt 2.	^h 7339 MHz	Total Power	15.1 dBm	Auto Man Freg Offset
	iit Freq Error Indwidth	317.95 kHz 1.050 MHz	% of OBW Power x dB	-6.00 dB	OH
53				Costatus	

99% Band Width Test Data CH-Low

Frequency	1: None vice: BTS			itse:n/T req: 2,40200 e Run 0 dB		GHz #FGain:Low	2000000 NFE		anter Fi
							ffset 1 dB 20,00 dBm		dB/div
Center Fre 2,402000000 GH			~		ww	w	-	-	
		~				~	1		
									10
CF Ste 200.000 kł	an 2 MHz 15.13 ms			5W 62 kH	#\			402 GHz 20 kHz	
<u>Auto</u> Ma		3.4 dBm	wer	Total P	H7	1 107 M	andwidth 1	pied Ba	Occu
Freq Offs 0 H		99.00 %	V Power	% of OE		54.609		nit Freq	Transr
		-6.00 dB		x dB	kHz	268.6	th	andwid	x dB B

99% Band Width Test Data CH-Mid

100		Run	Trig: Fri	-+	NFE		ter Fre
							B/div
	~~		~~~	~~~~			
 m					- mark	\checkmark	
							Ŷ
	z	BW 62 kH	#V	_			ter 2,44 s BW 2
13.2 dBm	ower	Total P	Hz	76 M		ed Ban	ccupi
99.00 %	W Power	% of Of	kHz	19.040	rror	t Freq E	ransmi
-6.00 dB		x dB	kHz	302.8		ndwidth	dB Bar
vice: BTS	Radio Device: BTS Span 2 MHz Sweep 15.13 ms 13.2 dBm 99.00 %	Avg Hold>100/100 Radio Device: BTS Avg Hold >100/100 Radio Device: BTS Span 2 MHz Span 2 MHz Sweep 15.13 ms ower 13.2 dBm SW Power 99.00 %	Avg Hold>100100 Radio Device: BT5 Radio Device: BT5 Radio Device: BT5 Span 2 MHz BW 62 kHz Sweep 15.13 ms Total Power 13.2 dBm % of OBW Power 99.00 %	Trig: Fire Run Avg/Hold:>100/100 #Atten: 30 dB Radio Device: BT5 #Atten: 30 dB Radio Device: BT5 #Atten: 30 dB Span 2 MHz #VBW 62 kHz Sweep 15.13 ms Total Power 13.2 dBm Hz % of OBW Power 99.00 %	Faint-Live Trig: Free Run Faint-Live Trig: Free Run Braint-Live Autors and the second seco	NEE Trig: Free Run #Atten: 30 dB Avg(Hold>100/100 et 1 dB 00 dBm	ME Trig: Free Run #Artgin: Low Arg/Hold:>100/100 Ref Offset 1 dB Ref 20.00 dBm Radio Device: BTS Ref Offset 1 dB Ref 20.00 dBm Image: Comparison of the second secon

99% Band Width Test Data CH-High

Center Freq	2.48000000 NFE	Trig:	er Freg: 2.48000000 GHz	Radio Std: None 0/100 Radio Device: BTS	Frequency
10 dB/div	Ref Offset 1 dB Ref 20.00 dB	m			
10.0 0.00			Among		Center Free 2,48000000 GH
20.0		~		and	-
40.0					
68.0					
Center 2.48 C #Res BW 20			FVBW 62 kHz	Span 2 M Sweep 15.13	ms 200.000 kH
Occupied	Bandwid	th 4039 MHz	Total Power	13.4 dBm	Auto Ma
Transmit I x dB Band		14.901 kHz 267.9 kHz	% of OBW Power x dB	99.00 % -6.00 dB	OH

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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

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.

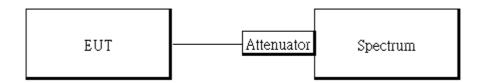
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Conducted Emission Test Site							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.		
Spectrum Analyzer	Agilent	N9010A	MY53400256	_	11/20/2019		
DC Power Supply	Agilent	E3640A	MY53130054	09/03/2018	09/02/2019		
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020		

9.2 Measurement Equipment Used:

9.3 Test SET-UP:



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9.4 Measurement Procedure

Reference Level of Emission 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 & ANSI C63.10.
- 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.
- 9. 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 & ANSI C63.10.
- 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. 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.
- 8. 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 & ANSI C63.10.
- 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	6.67	-13.33
2442	6.60	-13.40
2480	6.64	-13.36

Reference Level of Limit

NOTE: cable loss as 1dB that offsets in the spectrum NOTE: Refer to next page for plots.

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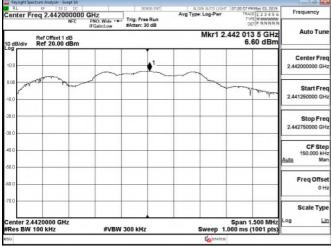
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Reference Level of Emission Limit (CH-Low)

Keysight Spectrum Analyzer - Swept				
RL RF 302 Center Freq 2.402000	E DND: Wide the Trig: Free Run	Avg Type: Log-Pwr	07:05:18 PMNay 03, 2019 TRACE 1 2 3 4 5 6 TVPE N WWWWW	Frequency
	IFGain1.ow #Atten: 30 dB		DET P NNNN N	Auto Tun
Ref Offset 1 dB 0 dB/div Ref 20.00 dB		Mkr1 2.4	02 010 5 GHz 6.67 dBm	Auto Tun
10.0	11			Center Fre 2,402000000 GH
100				
18.0				Start Fre 2.401250000 GH
-20.0				Stop Fre
30.0				2,402700000 00
48.0				CF Ste 150,000 ki Auto Ma
60.0				
0.03			-	Freq Offs 0 H
70.0				Scale Typ
Center 2.4020000 GHz			Span 1.500 MHz	Log L
Res BW 100 kHz	#VBW 300 kHz	Sweep 1.0	00 ms (1001 pts)	

Reference Level of Emission Limit (CH-Mid)



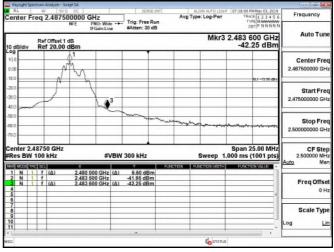
Reference Level of Emission Limit (CH-High)

Keysight Spectr	RF 30 S DC		SENSEINT	A TEN AUTO LIGHT	07:13:09 PMINay 03, 2019	
Center Fre	q 2.48000000	PNO: Wide =1	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	THACE 1 2 3 4 5 6 TYPE MMMMMM DET P NNNNN	Frequency
	Ref Offset 1 dB Ref 20.00 dBm	IFGain:Low	#Atten: 30 dB	Mkr1 2.4	80 012 0 GHz 6.64 dBm	Auto Tune
10.0		(Center Fre 2,48000000 GH
10.00						Start Fre 2.479250000 GH
30.0						Stop Fre 2.480750000 GH
						CF Ste 150.000 kF Auto Ma
80						Freq Offs 0 H
70.0	00000 GHz				Span 1.500 MHz	Scale Typ
Res BW 10		#VB	N 300 kHz	Sweep 1.0	00 ms (1001 pts)	
195				STATUS		

Band Edges Test Data CH-Low

	thim Analyzes - Si					
enter Fre		00000 GHz	Trig: Free Run	Avg Type: Log-Pwr	THACE 1 2 3 4 5 6 TVFE N	Frequency
	Ref Offset 1	IFGaintow	#Atten: 30 dB	M	Kr3 2.390 0 GHz	Auto Tun
0 dB/div	Ref 20.00				-52.88 dBm	
10.0					Q1	Center Fre
00.0						2,360000000 GH
00					2	Start Fre
10	_				3	2,31000000 GH
0.0 0.0	Account	and the second state of th	Am			Stop Fre 2.41000000 G8
	6000 GHz 100 kHz	#VBW	300 kHz	Sweep 1	Span 100.0 MHz .000 ms (1001 pts)	CF Ste 10.000000 M
OR MODE THE		x		UNCTION FUNCTION WIDTH	FUNCTION WALVE	Auto Mi
1 N 1 2 N 1 3 N 1 4 5	f (Δ) f (Δ)	2.402 0 GHz (Δ) 2.395 9 GHz 2.390 0 GHz (Δ)	6.69 dBm -33.30 dBm -52.88 dBm			Freq Offs
6 7 8						Scale Typ
9						Log L
				de state		

Band Edges Test Data CH-High



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Conducted Spurious Emission Measurement Result

Keydight Spectnam Analyzer - Swept		SENSE INT	L a trib a	ma una milana	:04 PMMay 01, 2019	- ii -
Center Freq 13.01500	E PNO: Fast		Avg Type: Lo		TRACE 1 2 3 4 5 6 TVFE M WWWWW DET P NNNN	Frequency
Ref Offset 1 dB		EADEN: 30 GB			803 3 GHz 47.81 dBm	Auto Tun
10 dB/div Ref 20.00 dB	-m	1	1		1.01 0.011	
10.0						Center Fre
-10.0					D.1-1553 abr	13,015000000 GH
-30.0						Start Fre 30.000000 Mil-
-400	A3	under the second second second				Stop Fre
Center 13.02 GHz #Res BW 100 kHz	#VBV	V 300 kHz		p 86,00 m	n 25.97 GHz s (30001 pts)	26.00000000 GF CF Ste 2.597000000 GF
-710 Center 13.02 GHz #Res BW 100 kHz 1 N 1 f (Δ) 2 N 1 f 3 N 1 f (Δ)	#VBV 2.4019 GHz [Δ] 4.804 0 GHz 7.205 0 GHz [Δ] 4.803 3 GHz	6.52 dBm -48.90 dBm	Swee	p 86,00 m	an 25.97 GHz s (30001 pts) Wetton Wate	26.00000000 GH CF Ste 2.59700000 GH
TOD Center 13.02 GHz #Res BW 100 kHz 100 kHz 100 L1202 bits for the fill 1 1 1 f 3 N 1 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f 0 1 f	2,401 9 GHz (Δ) 4,804 0 GHz 7,206 0 GHz (Δ)	6.52 dBm -43.90 dBm -58.50 dBm		p 86,00 m	s (30001 pts)	26,00000000 GF CF Ste 2,597000000 GF Auto Ma
-70 0 Center 13.02 GHz #Res BW 100 kHz Utilitizet File 1. N 1 f (Δ) 2. N 1 f 3. N 1 f 5 6	2,401 9 GHz (Δ) 4,804 0 GHz 7,206 0 GHz (Δ)	6.52 dBm -43.90 dBm -58.50 dBm		p 86,00 m	s (30001 pts)	26.00000000 GH 2.59700000 GH <u>Auto</u> Freq Offs 0 H

CH-Mid

									Bytes-Sam	nm A	t Spect		
Frequency	E123456	THAT	ELOG-PW		NSE:IN			0000 GHz		q 1	Fre		Cer
Auto Tur	4 7 GHz 98 dBm	r4 4.884	Mk		10 dB	#Atten: 3			offset 1 d 20,00 d			B/dh	
Center Fre 13,015000000 GH					-						_		10.0 0,00
Start Fre 30.000000 MH	0.1 -1540 dbr												-10.0 20.0 30.0 40.0
Stop Fre 26.00000000 GH	-	يو، دانچر مي		vin er	-	Maria di Ja		waa Alimaa			-	-	-511 D -610 O -711 O
CF Ste 2,597000000 GH Auto Ma	25.97 GHz 10001 pts)	.00 ms (3				300 kHz	VBW			00	13. W 1	s B	Re
Freq Offs	SN WALLIE +	FUNCTI	ACTION MIDTH!	UNCTION	Bm Bm	6.68 di -48.48 di -58.50 di -47.98 di	(Δ)	2,441 7 GHz 4,884 0 GHz 7,326 0 GHz 4,884 7 GHz	Δ) Δ)	1	1	NNNN	1 2 3 4 5 6
Scale Typ	_												7 8 9
			Gestatus.			π							8 9 10 11

CH-High

Center Free	13.015	000000 GHz NFE PNO: Feet IFGainston	Trig: Freel	Run	Type: Log-Pwr	THACE 1 2 3 4 5 6 THACE 1 2 3 4 5 6 TYPE MMMMMM DET P NNNNN	Frequency
10 dB/div	tef Offset 1 tef 20.00				Mk	r4 2.484 2 GHz -46.12 dBm	Auto Tun
10.0							Center Fre 13,015000000 GH
-10.0	4					0:1-1531 dBr	Start Fre 30.000000 Mit
410 4510 -60.0	-				ان دو ویا ^ر در نور و و و و و و و و و و و و و و و و و		Stop Fre 26.00000000 GH
Center 13.0 #Res BW 10	0 kHz	#\	/BW 300 kHz	P BICTORI	Sweep 86	Span 25.97 GHz .00 ms (30001 pts)	CF Ste 2.597000000 GH Auto Ma
1 N 1 2 N 1 3 N 1 4 N 1 5		2.479 8 GHz 4.960 0 GHz 7.440 0 GHz 2.484 2 GHz	(Δ) 6.67 dB -50.64 dB	n n		FOR TOWNED F	Freq Offse 0 H
6 7 8 9							Scale Typ
11			π.				

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10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

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 RSS-Gen §8.10 Table 7.

And according to 15.33(a)(1) & RSS-Gen §6.13(a) 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.

According to RSS-Gen §8.9 Table 5 & 6 Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission

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**

		966A Chamber			
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/26/2019	02/25/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M0200 3	08/20/2018	08/19/2019
Loop Antenna	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software		e3 V6.1	1-20180413		

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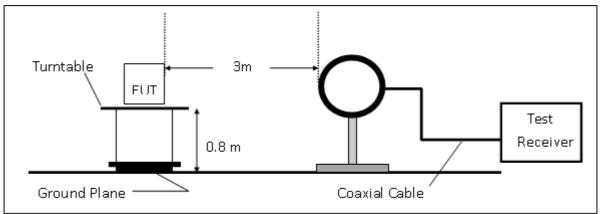
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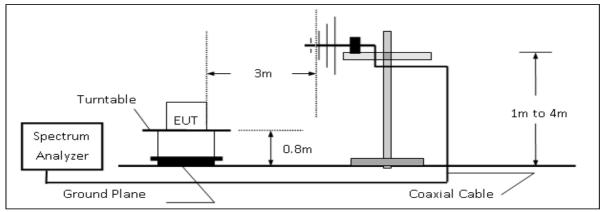
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10.3 Test SET-UP

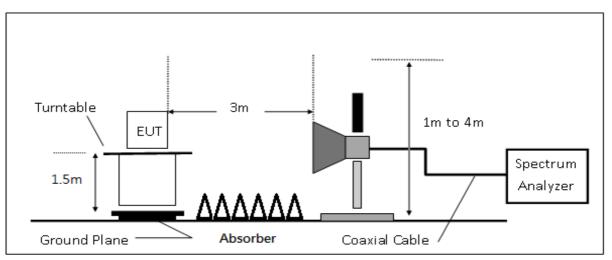
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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Bit PS data and the states and the states and the state states and the state states and the st invision issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



10.4 Measurement Procedure

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance & ANSI C63.10.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plan.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 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.
- 8. When 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.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna 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	FS = Field Strength	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)

 $Factor(dB) = Antenna Factor(dB\mu V/m) + Cable Loss(dB) - Pre_Amplifier Gain(dB)$

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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Report No.: T190429W02-RP Page 31 of 46

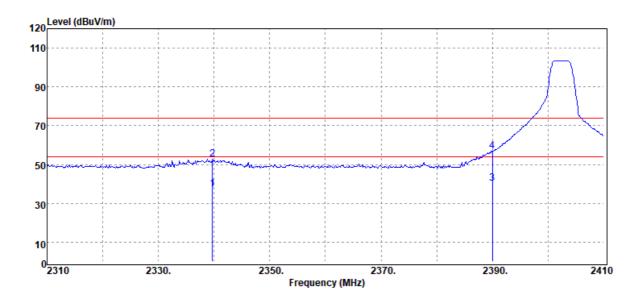


Radiated Band Edge Measurement Result

Project Number
Operation Band
Fundamental Frequency
Operation Mode
EUT Pol.

:T190429W02 :BLE 1M :2402 MHz :BE CH Low :E2 Plan

Test Date	:2019-05-03
Temp./Humi.	:20/51
Engineer	:Jerry
Measurement Antenna Pol.	:VERTICAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2339.70	Average	40.73	-3.29	37.44	54.00	-16.56
2339.70	Peak	56.01	-3.29	52.72	74.00	-21.28
2390.00	Average	43.74	-3.38	40.36	54.00	-13.64
2390.00	Peak	60.24	-3.38	56.86	74.00	-17.14

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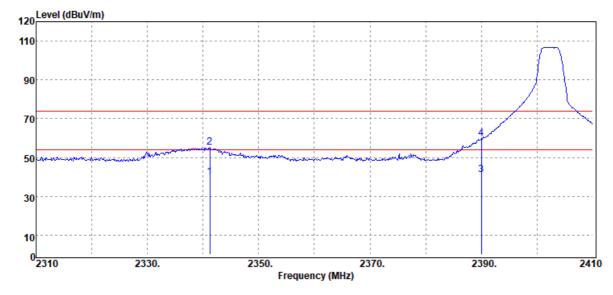
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Report No.: T190429W02-RP Page 32 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2402 MHz :BE CH Low :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-03 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2341.20	Average	43.31	-3.29	40.02	54.00	-13.98
2341.20	Peak	58.40	-3.29	55.11	74.00	-18.89
2390.00	Average	44.34	-3.38	40.96	54.00	-13.04
2390.00	Peak	63.01	-3.38	59.63	74.00	-14.37

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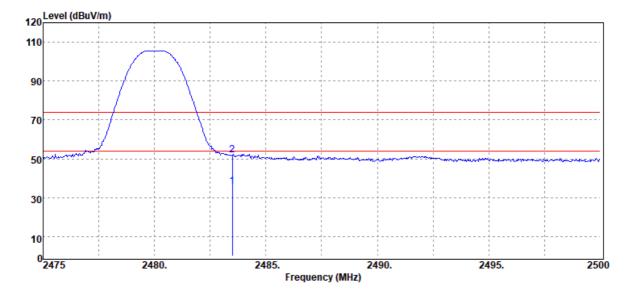
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Report No.: T190429W02-RP Page 33 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2480 MHz :BE CH High :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-09 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	38.53	-2.83	35.70	54.00	-18.30
2483.50	Peak	54.54	-2.83	51.71	74.00	-22.29

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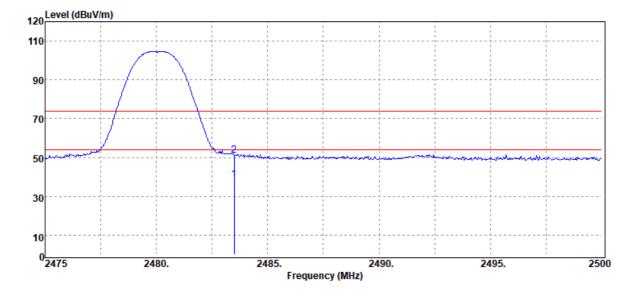
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Report No.: T190429W02-RP Page 34 of 46



Project Number	:T190429W02	Test Date	:2019-05-09
Operation Band	:BLE 1M	Temp./Humi.	:20/51
Fundamental Frequency	:2480 MHz	Engineer	:Jerry
Operation Mode EUT Pol.	:BE CH High :E2 Plan	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Average	41.46	-2.83	38.63	54.00	-15.37
2483.50	Peak	53.76	-2.83	50.93	74.00	-23.07

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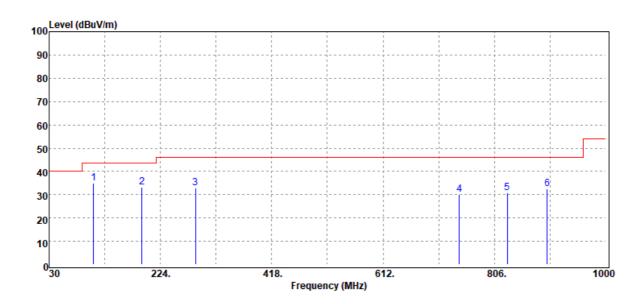
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Radiated Spurious Emission Measurement Result

For Frequency form 30MHz to 1000MHz

Project Number	:T190429W02	Test Date	:2019-05-03
Operation Band	:BLE 1M	Temp./Humi.	:20/51
Fundamental Frequency	:2442 MHz	Engineer	:Jerry
Operation Mode	:Tx CH Mid	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plan		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
107.60	Peak	45.60	-10.67	34.93	43.50	-8.57
191.99	Peak	43.92	-10.55	33.37	43.50	-10.13
285.11	Peak	41.48	-8.46	33.02	46.00	-12.98
744.89	Peak	28.05	1.93	29.98	46.00	-16.02
828.31	Peak	27.38	3.26	30.64	46.00	-15.36
898.15	Peak	28.50	4.15	32.65	46.00	-13.35

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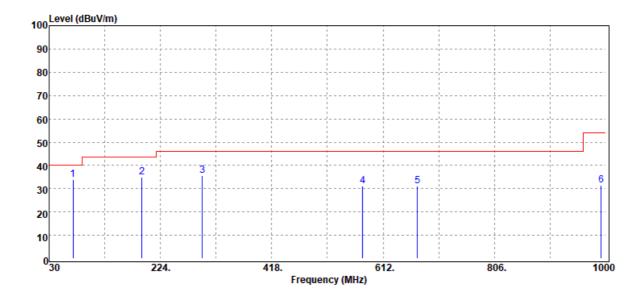
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Report No.: T190429W02-RP Page 36 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2442 MHz :Tx CH Mid :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-03 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
71.71	Peak	48.58	-14.74	33.84	40.00	-6.16
191.99	Peak	45.55	-10.55	35.00	43.50	-8.50
296.75	Peak	43.85	-8.29	35.56	46.00	-10.44
576.11	Peak	32.98	-1.82	31.16	46.00	-14.84
672.14	Peak	30.95	0.02	30.97	46.00	-15.03
992.24	Peak	26.43	5.17	31.60	54.00	-22.40

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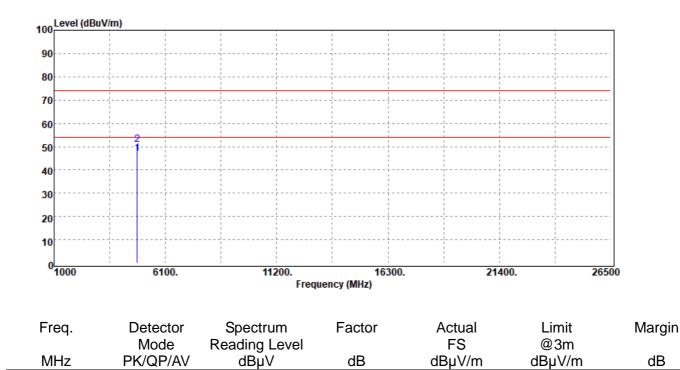
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Radiated Spurious Emission Measurement Result For Frequency above 1GHz

Project Number	:T190429W02	Test Date	:2019-05-21
Operation Band	:BLE 1M	Temp./Humi.	:20/51
Fundamental Frequency	:2402 MHz	Engineer	:Jerry
Operation Mode	:Tx CH Low	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plan		



3.05

3.05

47.02

50.94

54.00

74.00

-6.98

-23.06

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43.97

47.89

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4804.00

4804.00

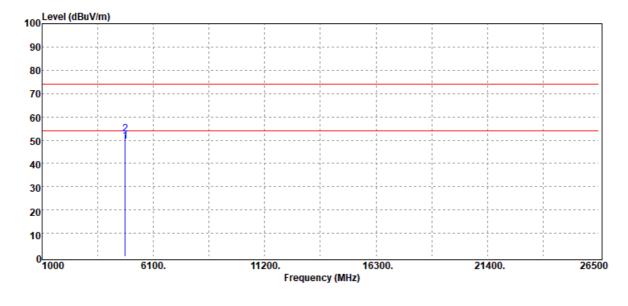
Average

Peak

Report No.: T190429W02-RP Page 38 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2402 MHz :Tx CH Low :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-21 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4804.00	Average	46.47	3.05	49.52	54.00	-4.48	
4804.00	Peak	49.60	3.05	52.65	74.00	-21.35	

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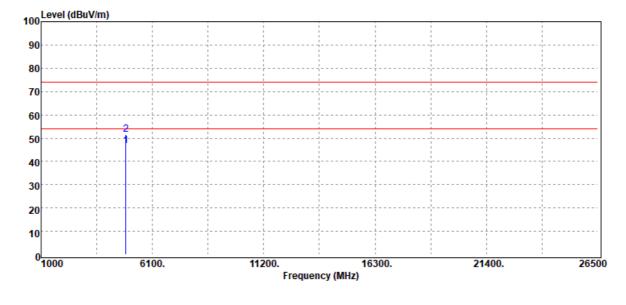
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Report No.: T190429W02-RP Page 39 of 46



Project Number	:T190429W02	Test Date	:2019-05-21
Operation Band	:BLE 1M	Temp./Humi.	:20/51
Fundamental Frequency	:2442 MHz	Engineer	:Jerry
Operation Mode	:Tx CH Mid	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plan		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4884.00	Average	43.24	3.41	46.65	54.00	-7.35
4884.00	Peak	48.19	3.41	51.60	74.00	-22.40

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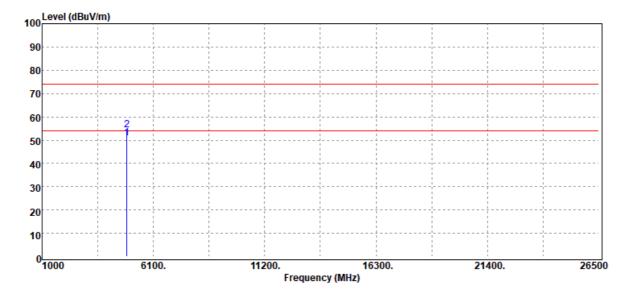
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Report No.: T190429W02-RP Page 40 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2442 MHz :Tx CH Mid :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-21 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4884.00	Average	47.51	3.41	50.92	54.00	-3.08
4884.00	Peak	51.05	3.41	54.46	74.00	-19.54

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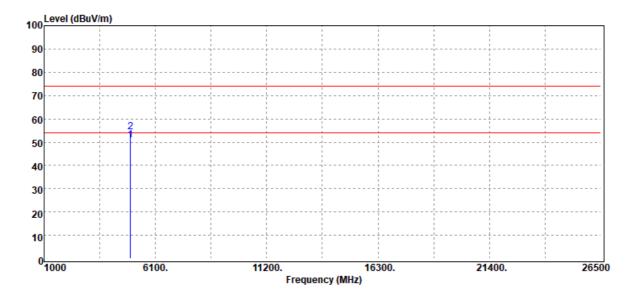
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Report No.: T190429W02-RP Page 41 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2480 MHz :Tx CH High :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-21 :20/51 :Jerry :VERTICAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Average	46.78	4.06	50.84	54.00	-3.16
4960.00	Peak	50.12	4.06	54.18	74.00	-19.82

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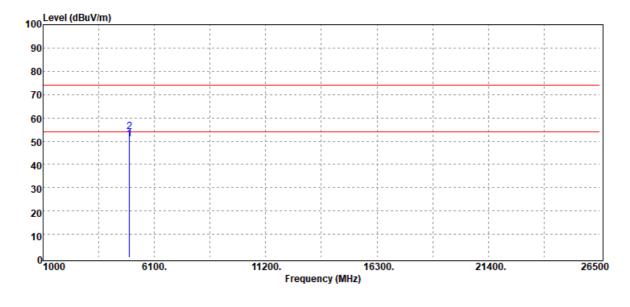
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Report No.: T190429W02-RP Page 42 of 46



Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	:T190429W02 :BLE 1M :2480 MHz :Tx CH High :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-05-21 :20/51 :Jerry :HORIZONTAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Average	46.81	4.06	50.87	54.00	-3.13
4960.00	Peak	49.95	4.06	54.01	74.00	-19.99

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11 POWER SPECTRAL DENSITY

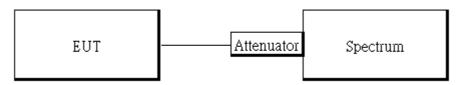
11.1 Standard Applicable:

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	EQUIPMENT MFR MODEL SERIAL LAST							
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019			
DC Power Supply	Agilent	E3640A	MY53130054	09/03/2018	09/02/2019			
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020			

11.3 Test Set-up:



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 & ANSI C63.10.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. For defining Restricted Band Edge Limit: Set the RBW = 100kHz & VBW = 300 kHz.
- 6. Detector = peak.
- 7. Sweep time = auto couple.
- 8. Trace mode = max hold.
- 9. Allow trace to fully stabilize.
- 10. Use the peak marker function to determine the maximum amplitude level.

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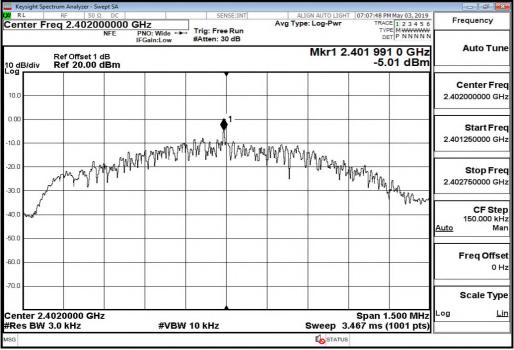
11.5 Measurement Result:

BLE mode

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result	
2402	-5.01	8	PASS	
2442	-5.70	8	PASS	
2480	-5.50	8	PASS	

NOTE: cable loss as 1dB that offsets in the spectrum

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



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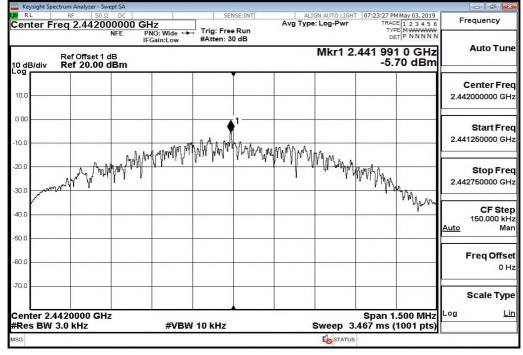
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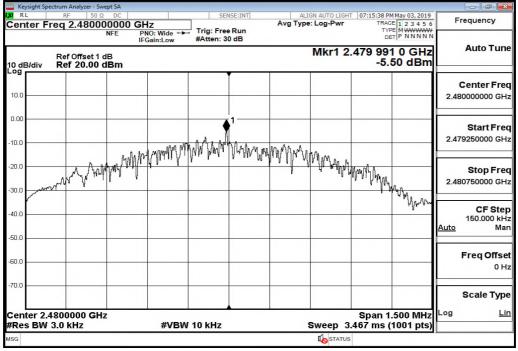
程智科技股份有限公司



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.

12.2 Antenna Connected Construction:

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

~ End of Report ~

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