

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

Applicant:	<i>OF</i> Qbic technology Co., Ltd 26F12, No.99, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22175, Taiwan (R.O.C.)
Product Name:	BOX PC
Brand Name:	Qbic
Model No.:	BXP-321, BXP-320
Model Difference:	Different Component (W / WO HDMI IN)
Report Number:	T190327W09-RP3
FCC ID:	2AF82-BXP320
FCC Rule Part:	§15.247, Cat: DTS
Issue Date:	May 21, 2019
Date of Test:	Mar. 25, 2019 ~ May 15, 2019
Date of EUT Received:	Mar. 25, 2019
Issued by:	Compliance Certification Services Inc.Wugu Lab. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Tai- wan. (R.O.C.) service@ccsrf.com

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Henry Chiai

Tested By:

Henry Chiang / Engineer

Approved By:

Kevin Tsai / Deputy Manager



Testing Laboratory 1309

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190327W09-RP3	Rev.00	Initial creation of docu- ment	All	May 21, 2019	Violetta Tang

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GENERAL INFORMATION 1

Product Description 1.1

Product Name:	BOX PC		
Brand Name:	Qbic		
Model No.:	BXP-321, BXP-320		
Model Difference:	Different Component (W / WO HDMI IN)		
Hardware Version:	N/A		
Software Version:	N/A		
	12V from AC/DC Adapter		
Power Supply:	Adapter:1. Model No.: ADS-40RJ-12 12036E, Supplier: SHENZHEN HONOR ELECTRONIC CO., LTD.Adapter:2. Model No.: ADP-40BW A LPS, Supplier: DELTA ELECTRONICS, INC.		

Radio Technology:	Bluetooth LE single mode
Frequency Range:	2402 – 2480MHz
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	6.18dBm
Antenna Designation:	Dipole Antenna, Gain: 1.79dBi

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1.2 **Test Methodology of Applied Standards**

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 15.247 Meas. Guidance v05r02 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 1309) FCC Designation number: TW1309

1.4 **Special Accessories**

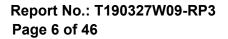
There are no special accessories used while test was conducted.

Equipment Modifications 1.5

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.

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**

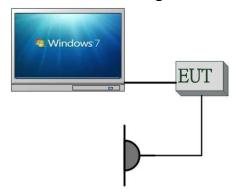


Fig 2-2 Radiated Emission

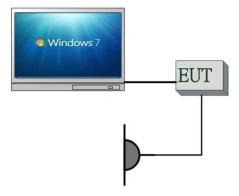
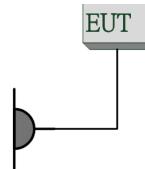


Fig 2-3 Conduction (AC Power Line) **Radiated Emission**



ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	T420	S0012407	Shielded	Unshielded

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SUMMARY OF TEST RESULTS 3

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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DESCRIPTION OF TEST MODES 4

Operated in 2400 ~ 2483.5MHz Band 4.1

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.
- 3. Investigation has been done on all the possible configurations for searching the worst case.

AC POWER LINE CONDUCTED EMISSION TEST:

Test Condition	AC Power line conducted emission for line and neutral
Worst Case	Operation in normal mode

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. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.
- 3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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

6.2 Measurement Equipment Used:

Conducted Emission Test Site									
EQUIPMENT	MFR	SERIAL	LAST	CAL DUE.					
TYPE		NUMBER	NUMBER	CAL.					
CABLE	EMCI	CFD300-NL	CERF	06/29/2018	06/28/2019				
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019				
LISN	SCHWARZBECK	NSLK 8127	8127-541	01/31/2019	01/30/2020				
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020				
Software		EZ-EMC(C	CCS-3A1-CE)					

6.3 **EUT Setup:**

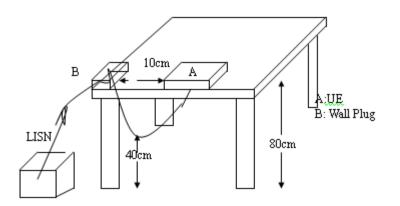
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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Test SET-UP (Block Diagram of Configuration) 6.4



6.5 Measurement Procedure:

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

6.6 **Measurement Result:**

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

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0.	Fre-		Average		Qua-	Average	Qua-	Average			Re-
0.	Fre-	siPeak	Average	rection	Qua- siPeak	Average	Qua- siPeak	Average	siPeak	age	Re-
0.	Fre- quency	siPeak reading	Average reading	rection factor	Qua- siPeak result	Average result	Qua- siPeak limit	Average limit	siPeak margin	age margin	Re-
0. ⁻ No.	Fre- quency (MHz) 0.1700	siPeak reading (dBuV) 40.40	Average reading (dBuV) 30.49	rection factor (dB) 0.16	Qua- siPeak result (dBuV) 40.56	Average result (dBuV) 30.65	Qua- siPeak limit (dBuV) 64.96	Average limit (dBuV) 54.96	siPeak margin (dB) -24.40	age margin (dB) -24.31	Re- mark
0. ¹ No.	Fre- quency (MHz) 0.1700 0.1940	siPeak reading (dBuV) 40.40 36.66	Average reading (dBuV) 30.49 29.31	rection factor (dB) 0.16 0.15	Qua- siPeak result (dBuV) 40.56 36.81	Average result (dBuV) 30.65 29.46	Qua- siPeak limit (dBuV) 64.96 63.86	Average limit (dBuV) 54.96 53.86	siPeak margin (dB) -24.40 -27.05	age margin (dB) -24.31 -24.40	Re- mark Pass Pass
0. No. 1* 2 3	Fre- quency (MHz) 0.1700 0.1940 0.2180	siPeak reading (dBuV) 40.40 36.66 34.11	Average reading (dBuV) 30.49 29.31 27.21	rection factor (dB) 0.16 0.15 0.15	Qua- siPeak result (dBuV) 40.56 36.81 34.26	Average result (dBuV) 30.65 29.46 27.36	Qua- siPeak limit (dBuV) 64.96 63.86 62.89	Average limit (dBuV) 54.96 53.86 52.89	siPeak margin (dB) -24.40 -27.05 -28.63	age margin (dB) -24.31 -24.40 -25.53	Re- mark Pass Pass Pass
0. No. 1* 2 3 4	Fre- quency (MHz) 0.1700 0.1940 0.2180 0.9620	siPeak reading (dBuV) 40.40 36.66 34.11 26.13	Average reading (dBuV) 30.49 29.31 27.21 20.42	rection factor (dB) 0.16 0.15 0.15 0.18	Qua- siPeak result (dBuV) 40.56 36.81 34.26 26.31	Average result (dBuV) 30.65 29.46 27.36 20.60	Qua- siPeak limit (dBuV) 64.96 63.86 62.89 56.00	Average limit (dBuV) 54.96 53.86 52.89 46.00	siPeak margin (dB) -24.40 -27.05 -28.63 -29.69	age margin (dB) -24.31 -24.40 -25.53 -25.40	Re- mark Pass Pass Pass Pass
0. No. 1* 2 3	Fre- quency (MHz) 0.1700 0.1940 0.2180	siPeak reading (dBuV) 40.40 36.66 34.11	Average reading (dBuV) 30.49 29.31 27.21	rection factor (dB) 0.16 0.15 0.15	Qua- siPeak result (dBuV) 40.56 36.81 34.26	Average result (dBuV) 30.65 29.46 27.36	Qua- siPeak limit (dBuV) 64.96 63.86 62.89	Average limit (dBuV) 54.96 53.86 52.89	siPeak margin (dB) -24.40 -27.05 -28.63	age margin (dB) -24.31 -24.40 -25.53	Re- mark Pass Pass Pass

AC POWER LINE CONDUCTED EMISSION TEST DATA

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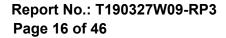
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.ine: Test V	iption: oltage:	N Temp.(°C)/Hum.(%):						2019/5/15 25.8(℃)/60% Henry			
80.0	dBu¥										
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0.1		siPeak		rection	(M Qua- siPeak	IHz)	Qua- siPeak		siPeak	Aver- age	
0.1	Fre-		Average		(M Qua-	IHz) Average	Qua-	Average		Aver-	Re-
0.1	Fre- quency	siPeak reading	Average reading	rection factor	Qua- siPeak result	fHz) Average result	Qua- siPeak limit	Average limit	siPeak margin	Aver- age margin	Re-
0.1 No.	Fre- quency (MHz)	siPeak reading (dBuV)	Average reading (dBuV)	rection factor (dB)	(M Qua- siPeak result (dBuV)	(Hz) Average result (dBuV)	Qua- siPeak limit (dBuV)	Average limit (dBuV)	siPeak margin (dB)	Aver- age margin (dB)	Re- mark
0.1 No.	Fre- quency (MHz) 0.1700	siPeak reading (dBuV) 37.76	Average reading (dBuV) 28.42	rection factor (dB) 0.10	(M Qua- siPeak result (dBuV) 37.86	Hrz) Average result (dBuV) 28.52	Qua- siPeak limit (dBuV) 64.96	Average limit (dBuV) 54.96	siPeak margin (dB) -27.10	Aver- age margin (dB) -26.44	Re- mark Pass
0.1 No. <u>1*</u> 2	Fre- quency (MHz) 0.1700 0.1780	siPeak reading (dBuV) 37.76 34.06	Average reading (dBuV) 28.42 27.84	rection factor (dB) 0.10 0.10	(M Qua- siPeak result (dBuV) 37.86 34.16	Hz) Average result (dBuV) 28.52 27.94	Qua- siPeak limit (dBuV) 64.96 64.57	Average limit (dBuV) 54.96 54.58	siPeak margin (dB) -27.10 -30.41	Aver- age margin (dB) -26.44 -26.64	Re- mark Pass Pass
0.1 No.	Fre- quency (MHz) 0.1700 0.1780 0.1940	siPeak reading (dBuV) 37.76 34.06 34.20	Average reading (dBuV) 28.42 27.84 26.58	rection factor (dB) 0.10 0.10 0.10	(N Qua- siPeak result (dBuV) 37.86 34.16 34.30	Hz) Average result (dBuV) 28.52 27.94 26.68	Qua- siPeak limit (dBuV) 64.96 64.57 63.86	Average limit (dBuV) 54.96 54.58 53.86	siPeak margin (dB) -27.10 -30.41 -29.56	Aver- age margin (dB) -26.44 -26.64 -27.18	Re- mark Pass Pass Pass

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2019/5/15

Date:



Operation

Description:

80.0 dBuV								Henry		
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-20 0.150		0.5		() ()	AHz)					30.000
0.150	Qua-	0.5 Average	Cor-	(M Qua-	Hz) Average	Qua-	5 Average	Qua-	Aver-	30.000 Re-
	Qua- siPeak		Cor- rection					Qua- siPeak	Aver- age	Re-
0.150		Average		Qua-	Average	Qua-	Average			Re-
0.150	siPeak	Average	rection	Qua- siPeak	Average	Qua- siPeak	Average	siPeak	age	Re-
0.150 No. Fre- quency (MHz)	siPeak reading	Average reading	rection factor	Qua- siPeak result	Average result	Qua- siPeak limit	Average limit	siPeak margin	age margin	30.000 Re- mark
0.150 No. Fre- quency (MHz) 1* 0.1500	siPeak reading (dBuV)	Average reading (dBuV)	rection factor (dB)	Qua- siPeak result (dBuV)	Average result (dBuV)	Qua- siPeak limit (dBuV)	Average limit (dBuV)	siPeak margin (dB)	age margin (dB)	Re- mark
0.150 No. Fre- quency (MHz) 1* 0.1500	siPeak reading (dBuV) 42.75	Average reading (dBuV) 26.03	rection factor (dB) 0.16	Qua- siPeak result (dBuV) 42.91	Average result (dBuV) 26.19	Qua- siPeak limit (dBuV) 65.99	Average limit (dBuV) 56.00	siPeak margin (dB) -23.08	age margin (dB) -29.81	Re- mark
0.150 No. Fre- quency (MHz) 1* 0.1500 2 0.1620	siPeak reading (dBuV) 42.75 39.25	Average reading (dBuV) 26.03 26.82	rection factor (dB) 0.16 0.16	Qua- siPeak result (dBuV) 42.91 39.41	Average result (dBuV) 26.19 26.98	Qua- siPeak limit (dBuV) 65.99 65.36	Average limit (dBuV) 56.00 55.36	siPeak margin (dB) -23.08 -25.95	age margin (dB) -29.81 -28.38	Re- mark Pass Pass
0.150 No. Fre- quency (MHz) 1* 0.1500 2 0.1620 3 0.1780	siPeak reading (dBuV) 42.75 39.25 37.91	Average reading (dBuV) 26.03 26.82 27.88	rection factor (dB) 0.16 0.16 0.15	Qua- siPeak result (dBuV) 42.91 39.41 38.06	Average result (dBuV) 26.19 26.98 28.03	Qua- siPeak limit (dBuV) 65.99 65.36 64.57	Average limit (dBuV) 56.00 55.36 54.58	siPeak margin (dB) -23.08 -25.95 -26.51	age margin (dB) -29.81 -28.38 -26.55	Re- mark Pass Pass Pass

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Report No.: T190327W09-RP3 Page 17 of 46



_ine: Fest V	ption: Operation Date: N Temp.(℃)/Hum.(%): Ditage: AC 120V/60Hz Test By:						2019/5/15 25.8(℃)/60% Henry				
80.0) dBu¥									Limit1:	
30		willing	hyphymetry	*	HANN MAY WAY MARK	1000 Martin Martin	5 X	(hulli Mutariylou p)	Maria yet Maria	6 ×	
-20 0.	150		0.5		()	(Hz)		5			30.000
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0.	Fre- quency		Average		Qua-	Average	Qua-	Average			Re-
0.	Fre-	siPeak reading	Average reading	rection factor	Qua- siPeak result	Average result	Qua- siPeak limit	Average limit	siPeak margin	age margin	Re-
0. ⁻	Fre- quency (MHz)	siPeak reading (dBuV)	Average reading (dBuV)	rection factor (dB)	Qua- siPeak result (dBuV)	Average result (dBuV)	Qua- siPeak limit (dBuV)	Average limit (dBuV)	siPeak margin (dB)	age margin (dB)	Re- mark
0. No.	Fre- quency (MHz) 0.1620	siPeak reading (dBuV) 39.34	Average reading (dBuV) 27.20	rection factor (dB) 0.10	Qua- siPeak result (dBuV) 39.44	Average result (dBuV) 27.30	Qua- siPeak limit (dBuV) 65.36	Average limit (dBuV) 55.36	siPeak margin (dB) -25.92	age margin (dB) -28.06	Re- mark Pass
0. No.	Fre- quency (MHz) 0.1620 0.1700	siPeak reading (dBuV) 39.34 39.10	Average reading (dBuV) 27.20 28.26	rection factor (dB) 0.10 0.10	Qua- siPeak result (dBuV) 39.44 39.20	Average result (dBuV) 27.30 28.36	Qua- siPeak limit (dBuV) 65.36 64.96	Average limit (dBuV) 55.36 54.96	siPeak margin (dB) -25.92 -25.76	age margin (dB) -28.06 -26.60	Re- mark Pass Pass
0. No. 1 2* 3	Fre- quency (MHz) 0.1620 0.1700 0.1860	siPeak reading (dBuV) 39.34 39.10 34.97	Average reading (dBuV) 27.20 28.26 21.84	rection factor (dB) 0.10 0.10 0.10	Qua- siPeak result (dBuV) 39.44 39.20 35.07	Average result (dBuV) 27.30 28.36 21.94	Qua- siPeak limit (dBuV) 65.36 64.96 64.21	Average limit (dBuV) 55.36 54.96 54.21	siPeak margin (dB) -25.92 -25.76 -29.14	age margin (dB) -28.06 -26.60 -32.27	Re- mark Pass Pass Pass

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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.

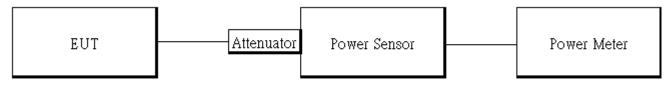
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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	EQUIPMENT MFR MODEL SERIAL								
TYPE		NUMBER	NUMBER	CAL.					
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				
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020				

7.3 Test Set-up:



7.4 Measurement Procedure:

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

Power Meter:

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

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

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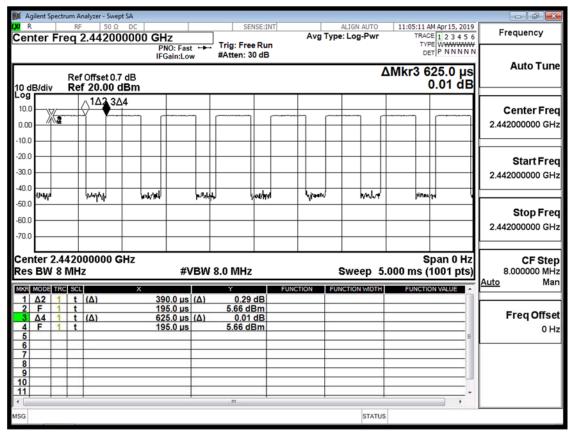


Formula:

Duty Cycle = Ton / (Ton+Toff)

Duty Factor:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
BLE	62.00	2.08	2.56	3.00



Duty Cycle Factor:10*log(1/(62/100))=2.08

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7.5 Measurement Result:

BLE mode:

СН	Frequency (MHz)	Peak Power Output (dBm)	Required Limit
Low	2402	6.03	1 Watt = 30 dBm
Mid	2442	5.90	1 Watt = 30 dBm
High	2480	6.18	1 Watt = 30 dBm
BLE mo	ode:		
СН	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	5.85	1 Watt = 30 dBm
Mid	2442	5.75	1 Watt = 30 dBm
High	2480	6.03	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss as 0.7 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

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6DB BANDWIDTH MEASUREMENT 8

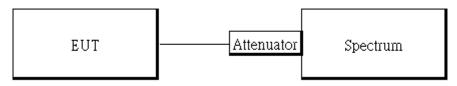
8.1 Standard Applicable

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

8.2 Measurement Equipment Used

	Conducted Emission Test Site								
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL								
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019				
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020				
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020				

Test Set-up: 8.3



8.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. 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. Repeat above procedures until all test default channel is completed.

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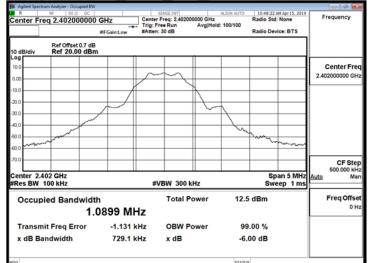
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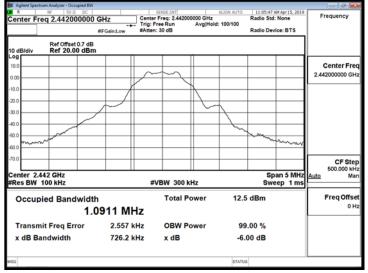
8.5 Measurement Result:

Frequency (MHz)	6dB BW (MHz)	BW (MHz)	Result
2402	0.729	> 0.5	PASS
2442	0.726	> 0.5	PASS
2480	0.726	> 0.5	PASS

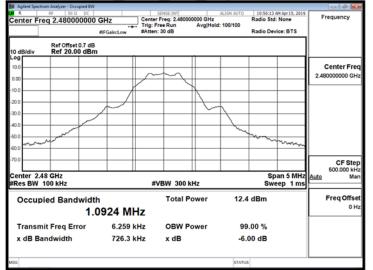
OBW 6dB BLE 1M LowCH00-2402



OBW 6dB BLE 1M MidCH20-2442



OBW 6dB BLE 1M HighCH39-2480



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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

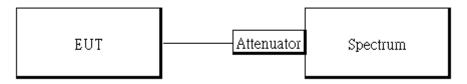
9.1 Standard Applicable

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), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Measurement Equipment Used:

Conducted Emission Test Site								
EQUIPMENT	IPMENT MFR MODEL SERIAL LAST							
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019			
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020			
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020			

9.3 Test SET-UP:



9.4 Measurement Procedure

9.4.1 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.
- 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.

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9.4.2 **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.
- 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 (2400~2483.5MHz) 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.

9.4.3 **Conducted Spurious Emission:**

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

9.5 Measurement Result

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
2402	5.20	-14.80
2442	5.21	-14.79
2480	5.05	-14.95

Reference Level of Limit

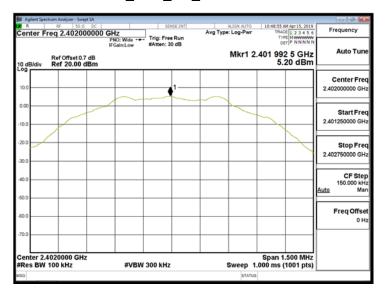
NOTE: cable loss as 0.7dB that offsets in the spectrum NOTE: Refer to next page for plots.

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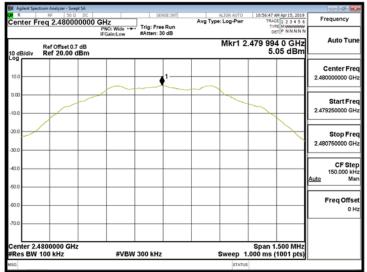
Reference Level_BLE_1M_LowCH00-2402



Reference Level_BLE_1M_MidCH20-2442

Agilent Spec	trum Analyzer - Swept SA					• • • • •
Center F	req 2.4420000	00 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	11:06:20 AM Apr 15, 2019 TRACE 1 2 3 4 5 6	Frequency
	Ref Offset 0.7 dE		HAtten: 30 dB	Mkr1 2	.441 985 0 GHz 5.21 dBm	Auto Tune
10 dB/div	Ref 20.00 dBr	n	1		5.21 UBII	Center Free 2.442000000 GH
0.00		\frown				Start Free 2.441250000 GH
-20.0						Stop Fre 2.442750000 GH
-40.0						CF Ster 150.000 kH Auto Ma
60.0						Freq Offse 0 H
Center 2.4	4420000 GHz	#\/P\	V 300 kHz	Swaan 1	Span 1.500 MHz .000 ms (1001 pts)	
#Res BW	100 KHZ	#VBI	N 300 KHZ	Sweep 1		

Reference Level_BLE_1M_HighCH39-2480



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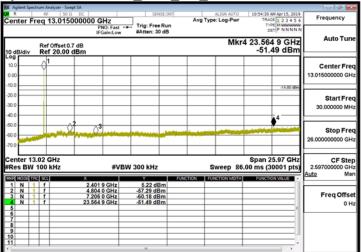
Band Edge BLE 1M LowCH00-2402

	pectrum Analyzer - Swept SA
GHz Aug Type: Log-Pwr TR402[12:3:4:5:6] Frequency	RF 50 Ω DC SENS Freq 2.36000000 GHz
PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB DET P NNN N	PNO: Fast Trig: Free F
Mkr3 2.390 0 GHz -60.56 dBm	Ref Offset 0.7 dB Ref 20.00 dBm
Center Fre	
2.36000000 GH	
Start Fre	
2.31000000 GH	
3 2	
Stop Fre 2,41000000 Gł	
Span 100.0 MHz CF Ste #VBW 300 kHz Sweep 1.000 ms (1001 pts) 10.00000 Mi	2.36000 GHz N 100 kHz #VBW 300 kHz
402 4 GHz 5.20 dBm	TRE SEL X Y 1 f 2.402 4 GHz 5.20 dBr
399 9 GHz -54.69 dBm Freq Offs	1 f 2.399 9 GHz -54.69 dBr
III STATUS	11
3LF 1M HighCH39-2480	

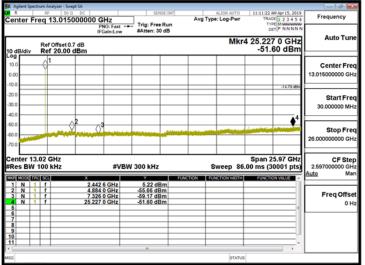
ำเพ_ฅเฐกษศงษ-2480 sana Eage_все

M Agilent Spectrum Analyzer - Swept SA			- 6 - 8
Center Freq 2.487500000	GHz SENSE:INT	Avg Type: Log-Pwr TRJ	AM Apr 15, 2019 Ct 1 2 3 4 5 6 Frequency
Ref Offset 0.7 dB	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Mkr3 2.483	600 GHz 82 dBm
			2.487500000 GH
-0.0			-14 95 dbm Start Free 2.475000000 GH
50.0	× ***		Stop Fre 2.500000000 GH
Center 2.48750 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 1.000 ms	25.00 MHz (1001 pts) Auto Ma
1 N 1 f 2.480 2 N 1 f 2.483	025 GHz 5.05 dBm 500 GHz -58.97 dBm 600 GHz -56.82 dBm		Freq Offse
7 8 8 9 10 11			
< MSG		STATUS	,

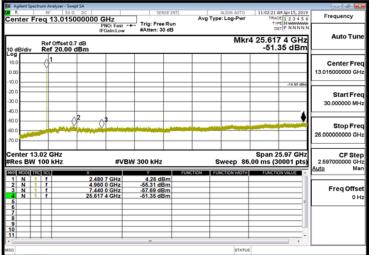
Spurious Emission BLE 1M LowCH00-2402



Spurious Emission_BLE_1M_MidCH20-2442



Spurious Emission_BLE_1M_HighCH39-2480



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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 §15.209 limit as below.

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

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

Note:

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

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Measurement Equipment Used 10.2

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	DRH13M02003	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		
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R		
Software		e3 V6.	11-20180413				

NOTE: N.C.R refers to Not Calibrated Required.

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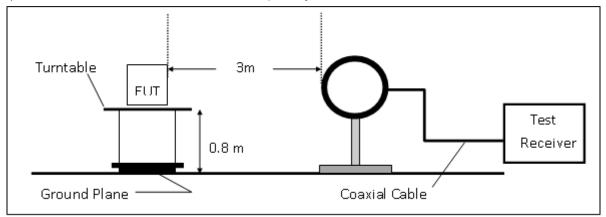
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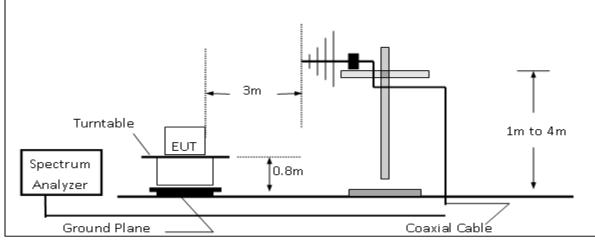


10.3 **Test SET-UP**

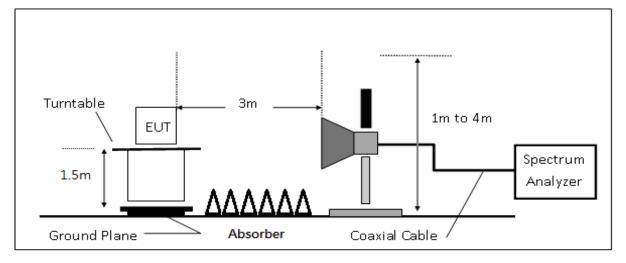
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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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10.4 Measurement Procedure

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 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.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 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.

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	5	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 μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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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 for tabular data sheets.

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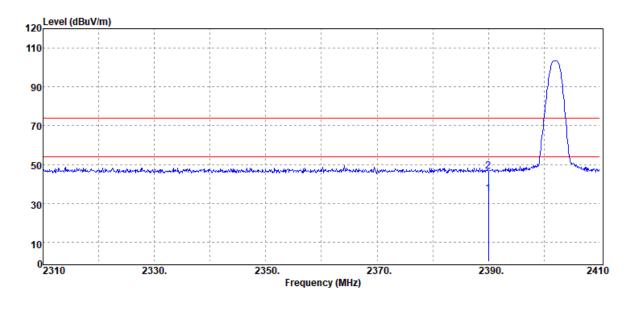


Radiated Band Edge Measurement Result

Project Number
Operation Band
Fundamental Frequency
Operation Mode
EUT Pol.

: T190327W09 :BLE 1M :2402 MHz :BE CH Low :E2 Plan

Test Date	:2019-04-25
Temp./Humi.	:20/55
Engineer	:Kane
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
2390.00	Average	38.36	-3.38	34.98	54.00	-19.02
2390.00	Peak	49.90	-3.38	46.52	74.00	-27.48

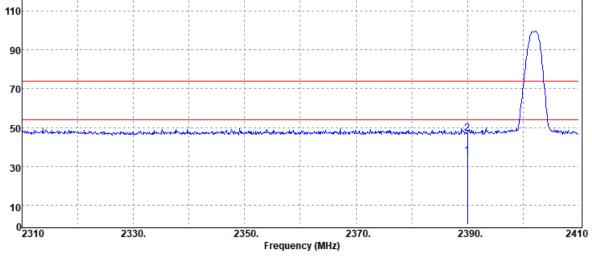
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Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	: T190327W09 :BLE 1M : 2402 MHz :BE CH Low :E2 Plan	9		Terr Eng	t Date np./Humi. ineer asuremer			:2019-04-25 :20/55 :Kane :HORIZONTAL
120								7
110						*		
		1	1	1	1	1	1	



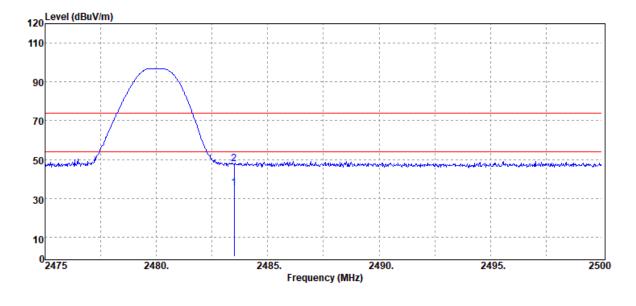
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Average	38.50	-3.38	35.12	54.00	-18.88
2390.00	Peak	50.27	-3.38	46.89	74.00	-27.11

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Operation Band :BI Fundamental Frequency :24 Operation Mode :BI	⁻ 190327W09 LE 1M 480 MHz E CH High 2 Plan	Temp./Humi. Engineer	:2019-04-25 :20/55 :Kane :VERTICAL
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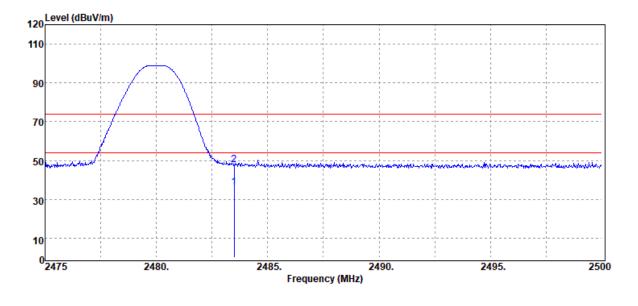


Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
2483.50	Average	38.33	-2.83	35.50	54.00	-18.50	
2483.50	Peak	50.66	-2.83	47.83	74.00	-26.17	

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Operation Band :BLE 7 Fundamental Frequency :2480	MHz Engine H High Measu	łumi. :20/55
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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	38.84	-2.83	36.01	54.00	-17.99
2483.50	Peak	50.42	-2.83	47.59	74.00	-26.41

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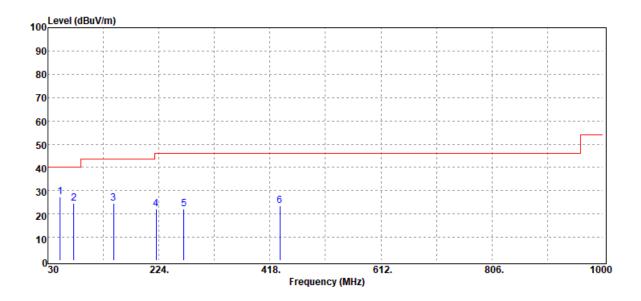


Radiated Spurious Emission Measurement Result For Frequency form 30MHz to 1000MHz

Project Number **Operation Band** Fundamental Frequency Operation Mode EUT Pol.

: T190327W09 :BLE 1M :2442 MHz :Tx CH Mid :E2 Plan

Test Date	:2019-04-25
Temp./Humi.	:20/55
Engineer	:Kane
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
51.34	Peak	42.93	-15.57	27.36	40.00	-12.64
75.59	Peak	39.40	-14.79	24.61	40.00	-15.39
144.46	Peak	34.39	-9.92	24.47	43.50	-19.03
219.15	Peak	33.35	-11.37	21.98	46.00	-24.02
267.65	Peak	30.77	-8.72	22.05	46.00	-23.95
435.46	Peak	27.68	-4.27	23.41	46.00	-22.59

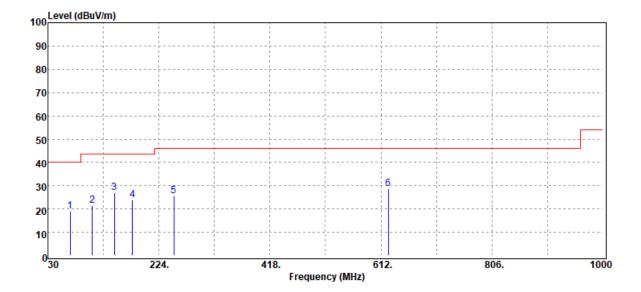
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Project Number: T190327WOperation Band:BLE 1MFundamental Frequency:2442 MHzOperation Mode:Tx CH MidEUT Pol.:E2 Plan	Temp./Humi. Engineer	:2019-04-25 :20/55 :Kane ol. :HORIZONTAL
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Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
68.80	Peak	33.98	-14.93	19.05	40.00	-20.95
107.60	Peak	32.29	-10.67	21.62	43.50	-21.88
146.40	Peak	36.98	-10.03	26.95	43.50	-16.55
177.44	Peak	35.00	-11.13	23.87	43.50	-19.63
250.19	Peak	35.95	-10.40	25.55	46.00	-20.45
624.61	Peak	29.34	-0.55	28.79	46.00	-17.21

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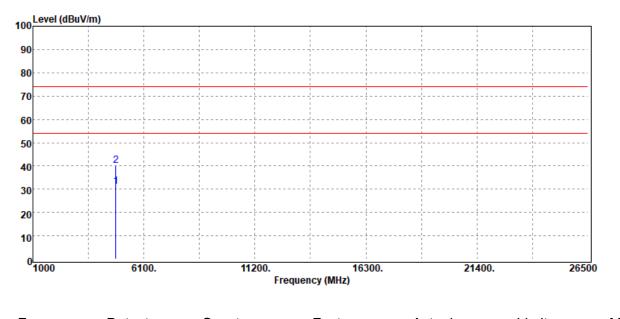
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Radiated Spurious Emission Measurement Result

For Frequency above 1GHz

: T190327W09	Test Date	:2019-04-25
:BLE 1M	Temp./Humi.	:20/55
:2402 MHz	Engineer	:Kane
:Tx CH Low	Measurement Antenna Pol.	:VERTICAL
:E2 Plan		
	: T190327W09 :BLE 1M :2402 MHz :Tx CH Low	: T190327W09Test Date:BLE 1MTemp./Humi.:2402 MHzEngineer:Tx CH LowMeasurement Antenna Pol.



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
 MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Average	28.16	3.05	31.21	54.00	-22.79
4804.00	Peak	37.24	3.05	40.29	74.00	-33.71

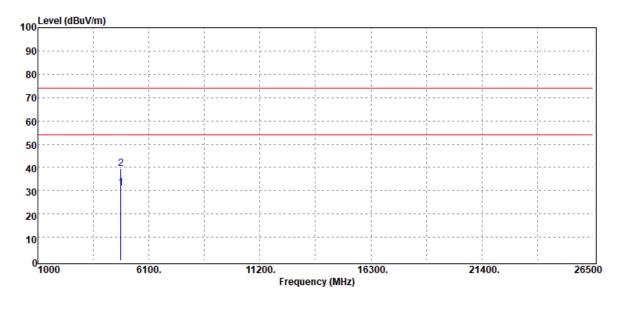
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Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	: T190327W09 :BLE 1M :2402 MHz :Tx CH Low :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-04-25 :20/55 :Kane :HORIZONTAL
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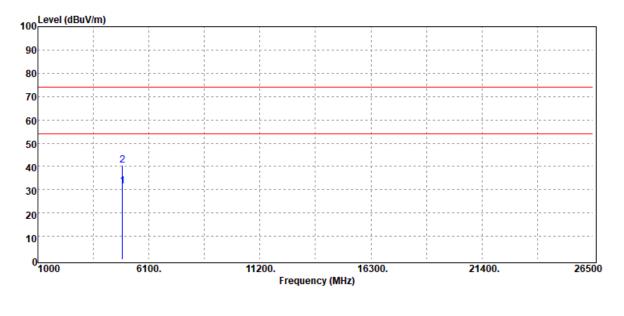
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin	
	Mode	Reading Level		FS	@3m		
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4804.00	Average	28.08	3.05	31.13	54.00	-22.87	
4804.00	Peak	36.43	3.05	39.48	74.00	-34.52	

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Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	: T190327W09 :BLE 1M :2442 MHz :Tx CH Mid :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-04-25 :20/55 :Kane :VERTICAL
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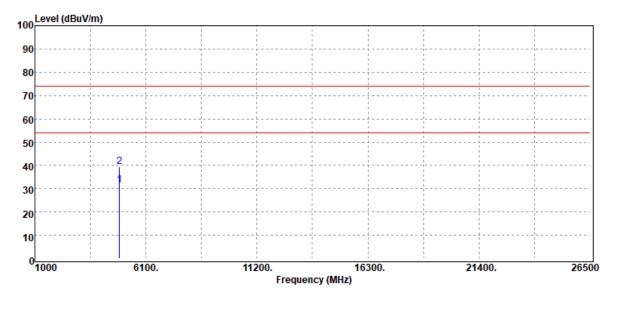
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4884.00	Average	28.25	3.41	31.66	54.00	-22.34
4884.00	Peak	37.20	3.41	40.61	74.00	-33.39

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Operation Band :B Fundamental Frequency :2 Operation Mode :T	BLE 1M 2442 MHz	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-04-25 :20/55 :Kane :HORIZONTAL
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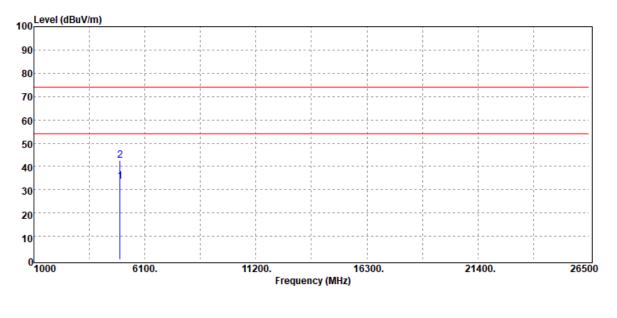
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4884.00	Average	27.91	3.41	31.32	54.00	-22.68
4884.00	Peak	36.13	3.41	39.54	74.00	-34.46

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Project Number Operation Band Fundamental Frequency	: T190327W09 :BLE 1M :2480 MHz :Tx CH High	Test Date Temp./Humi. Engineer	:2019-04-25 :20/55 :Kane
Operation Mode EUT Pol.	:Tx CH High :E2 Plan	Measurement Antenna Pol.	:VERTICAL



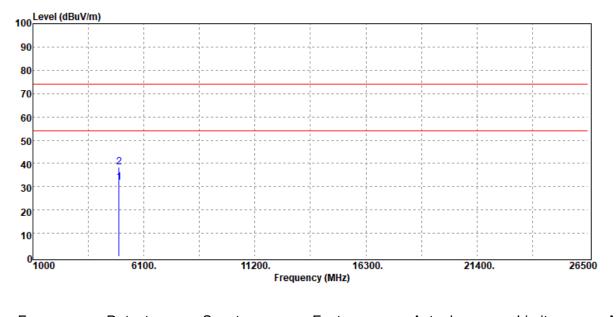
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Average	29.46	4.06	33.52	54.00	-20.48
4960.00	Peak	38.61	4.06	42.67	74.00	-31.33

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Project Number Operation Band Fundamental Frequency Operation Mode EUT Pol.	: T190327W09 :BLE 1M :2480 MHz :Tx CH High :E2 Plan	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2019-04-25 :20/55 :Kane :HORIZONTAL
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Detector	Spectrum	Factor	Actual	Limit	Margin	
Mode	Reading Level		FS	@3m		
PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
Average	27.86	4.06	31.92	54.00	-22.08	
Peak	34.48	4.06	38.54	74.00	-35.46	
	Mode PK/QP/AV Average	ModeReading LevelPK/QP/AVdBµVAverage27.86	ModeReading LevelPK/QP/AVdBµVdBAverage27.864.06	ModeReading LevelFSPK/QP/AVdBµVdBdBµV/mAverage27.864.0631.92	Mode Reading Level FS @3m PK/QP/AV dBµV dB dBµV/m dBµV/m Average 27.86 4.06 31.92 54.00	Mode Reading Level FS @3m PK/QP/AV dBµV dB dBµV/m dBµV/m dB Average 27.86 4.06 31.92 54.00 -22.08

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11 POWER SPECTRAL DENSITY

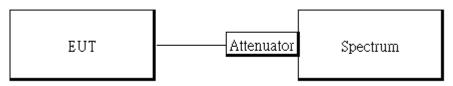
11.1 Standard Applicable:

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	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	Agilent	N9010A	MY53400256	11/21/2018	11/20/2019		
DC Block	PASTERNACK	PE8210	RF256	02/26/2019	02/25/2020		
Attenuator	Marvelous	MVE2213-10	RF80	02/26/2019	02/25/2020		

11.3 **Test Set-up:**



11.4 **Measurement Procedure:**

- Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. 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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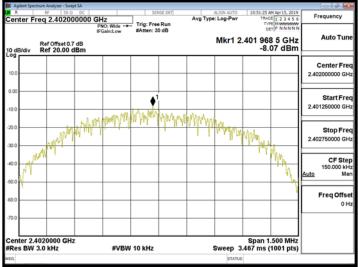
11.5 **Measurement Result:**

BLE mode

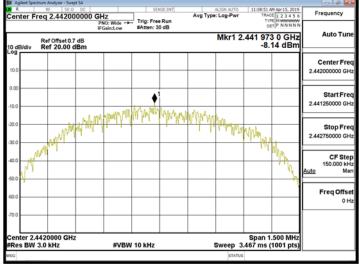
BEE mode						
Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result			
2402	-8.07	8	PASS			
2442	-8.14	8	PASS			
2480	-8.27	8	PASS			

NOTE: cable loss as 0.7dB that offsets in the spectrum

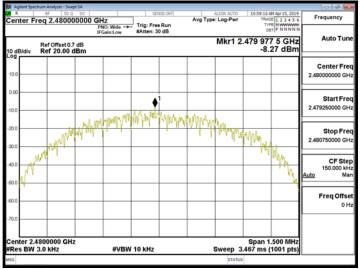
Power Density BLE 1M LowCH00-2402



Power Density BLE 1M MidCH20-2442



Power Density_BLE_1M_HighCH39-2480



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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 with unique RF connector and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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

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