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## TEST REPORT

Report No. .....: CHTEW20060002

Report Verification:

Project No...... SHT2005026001EW

FCC ID.....: BBOSC100

Applicant's name.....: COBRA ELECTRONICS CORPORATION

Manufacturer...... COBRA ELECTRONICS CORPORATION

Test item description .....: Cobra SC 100

Trade Mark ...... Cobra

Listed Model(s) ..... -

Model/Type reference....:

Standard ......: FCC CFR Title 47 Part 15 Subpart C Section 15.247

SC100

Date of receipt of test sample........... May 19, 2020

Date of testing...... May 19, 2020- May 29, 2020

Date of issue...... Jun.01, 2020

Result...... PASS

(Position+Printed name+Signature):

Compiled by

( Position+Printed name+Signature): File administrator Echo Wei

Approved by

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(Position+Printed name+Signature): RF Manager Hans Hu

Testing Laboratory Name .....: Shenzhen Huatongwei International Inspection Co., Ltd.

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The test report merely correspond to the test sample.

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## 1. TEST STANDARDS AND REPORT VERSION

#### 1.1. Test Standards

The tests were performed according to following standards:

- FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
- ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices
- KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

## 1.2. Report version

Revision No. Date of issue		Description		
N/A 2020-06-01		Original		

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## 2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	
5.1	Antenna Requirement	15.203/15.247(c)	PASS	
5.2	AC Conducted Emission	15.207	PASS	
5.3	Peak Output Power	15.247(b)(3)	PASS	
5.4	Power Spectral Density	15.247(e)	PASS	
5.5	6dB Bandwidth	15.247(a)(2)	PASS	
5.6	99% Occupied Bandwidth	-	PASS <sup>*1</sup>	
5.7	Duty cycle	-	PASS*1	
5.8	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS	
5.9	Radiated Band Edge Emission	15.205/15.209	PASS	
5.10	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS	

#### Note:

<sup>-</sup> The measurement uncertainty is not included in the test result.

 <sup>\*1:</sup> No requirement on standard, only report these test data.

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## 3. **SUMMARY**

### 3.1. Client Information

Applicant:	COBRA ELECTRONICS CORPORATION		
Address:	6500 WEST CORTLAND STREET, CHICAGO, IL 60707 USA		
Manufacturer:	COBRA ELECTRONICS CORPORATION		
Address:	6500 WEST CORTLAND STREET, CHICAGO, IL 60707 USA		

## 3.2. Product Description

Name of EUT:	Cobra SC 100
Trade Mark:	Cobra
Model No.:	SC100
Listed Model(s):	-
Power supply:	DC 5V
Hardware version:	90100D1590001
Software version:	COBRA SC-100 V1.06

## 3.3. Radio Specification Description

Bluetooth version:	V4.2
Support function*2:	BLE
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	FPC
Antenna gain:	2.85dBi

Note:

<sup>\*2:</sup> only show the RF function associated with this report.

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## 3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.			
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Gongming, Shenzhen, China	,		
	Туре	Accreditation Number		
	CNAS	L1225		
Qualifications	A2LA	3902.01		
	FCC	762235		
	Canada	5377A		

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## 4. TEST CONFIGURATION

### 4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Channel	Frequency (MHz)
00	2402
01	2404
i i	÷
19	2440
i	:
38	2478
39	2480

#### 4.2. Test mode

For RF test items

The engineering test program was provided and enabled to make EUT continuous transmit.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

### 4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whetl	Whether support unit is used?							
✓	✓ No							
Item	m Equipement Trade Name Model No. FCC ID Power cord							
1	1							
2								

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## 4.4. Testing environmental condition

Туре	Requirement	Actual	
Temperature:	15~35°C	25°C	
Relative Humidity:	25~75%	50%	
Air Pressure:	860~1060mbar	1000mbar	

## 4.5. Measurement uncertainty

Test Item	Measurement Uncertainty		
AC Conducted Emission (150kHz~30MHz)	3.02 dB		
Radiated Emission (30MHz~1000MHz	4.90 dB		
Radiated Emissions (1GHz~25GHz)	4.96 dB		
Peak Output Power	0.51 dB		
Power Spectral Density	0.51 dB		
Conducted Spurious Emission	0.51 dB		
6dB Bandwidth	70 Hz		

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

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## 4.6. Equipment Used during the Test

•	Conducted Emission						
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
•	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
•	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
•	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
•	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	EF-NM- BNCM-2M	2019/10/23	2020/10/22
•	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

•	Radiated emiss	sion-6th test site					
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
•	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
•	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
•	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	538	2018/04/04	2021/04/03
•	Pre-Amplifer	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
•	RF Connection Cable	HUBER+SUHNER	HTWE0062- 01	N/A	N/A	2019/08/21	2020/08/20
•	RF Connection Cable	HUBER+SUHNER	HTWE0062- 02	SUCOFLEX 104	501184/4	2020/05/27	2021/05/26
•	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

•	Radiated emis	sion-7th test site					
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
•	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
•	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
•	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	25841	2018/10/11	2021/10/10
•	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/10
•	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
•	Broadband Pre- amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2020/05/23	2021/05/22
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2020/05/10	2021/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2020/05/10	2021/05/09
•	Test Software	Audix	N/A	E3	N/A	N/A	N/A

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•	RF Conducted Method										
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)					
•	Signal and spectrum Analyzer	R&S	FSV40	100048	2019/10/26	2020/10/25					
•	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25					
•	Power Meter	Anritsu	ML249A	N/A	2019/10/26	2020/10/25					
0	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25					

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### 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna Requirement

#### Requirement

#### FCC CFR Title 47 Part 15 Subpart C Section 15.203:

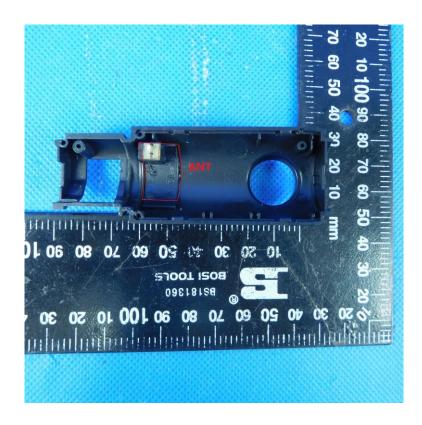
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responseble party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

#### **TEST RESULT**

The antenna type is a FPC antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



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#### 5.2. AC Conducted Emission

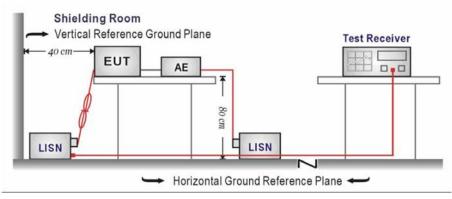
#### **LIMIT**

#### FCC CFR Title 47 Part 15 Subpart C Section 15.207

Fraguency ronge (MHz)	Limit (dBuV)				
Frequency range (MHz)	Quasi-peak	Average			
0.15-0.5	66 to 56*	56 to 46*			
0.5-5	56	46			
5-30	60	50			

<sup>\*</sup> Decreases with the logarithm of the frequency.

#### **TEST CONFIGURATION**



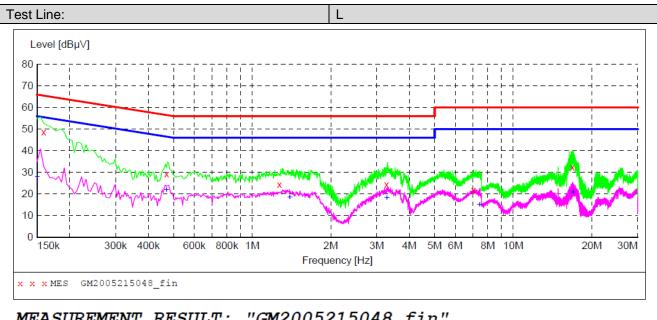
#### **TEST PROCEDURE**

- 1. The EUT was setup according to ANSI C63.10 requirements.
- The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

#### TEST MODE:

Please refer to the clause 4.2

#### **TEST RESULT**

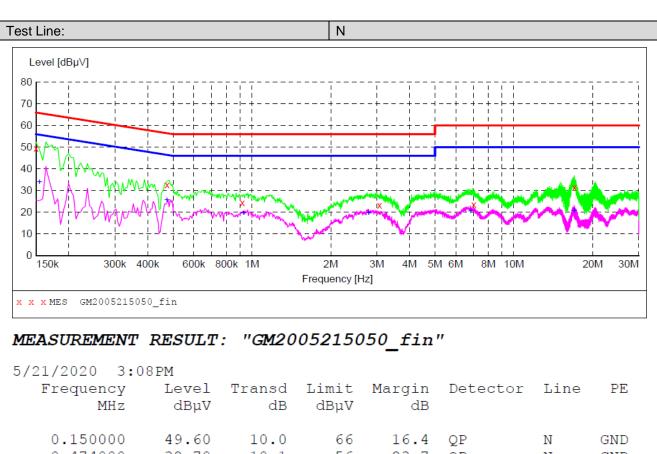


## MEASUREMENT RESULT: "GM2005215048\_fin"

5/21/2020	2:59	9 PM						
Freque	ncy MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159	000	48.70	10.0	66	16.8	QP	L1	GND
0.469	500	29.30	10.1	57	27.2	QP	L1	GND
1.270	500	24.40	10.1	56	31.6	QP	L1	GND
3.273	000	24.30	10.2	56	31.7	QP	L1	GND
7.044	000	21.80	10.3	60	38.2	QP	L1	GND
16.845	000	32.50	10.5	60	27.5	~	L1	GND

## MEASUREMENT RESULT: "GM2005215048 fin2"

5/21/2020 2	2:59PM						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dBµV	dB	dΒμV	dB			
0.150000	27.80	10.0	56	28.2	AV	L1	GND
0.469500	21.90	10.1	47	24.6	AV	L1	GND
1.392000	18.30	10.1	46	27.7	AV	L1	GND
3.282000	18.20	10.2	46	27.8	AV	L1	GND
7.440000	15.00	10.3	50	35.0	AV	L1	GND
16.971000	20.60	10.5	50	29.4	AV	L1	GND



5/21/2020	3:08PM						
Frequenc	y Level	Transd	Limit	Margin	Detector	Line	PE
MH	Iz dBuV	dB	dBuV	dB			
	ιΣ αΣμν	Q.D	αΣμν	QD.			
0 15000	10 60	10.0		1.6.4	0.0		CILID
0.15000	00 49.60	10.0	66	16.4	QP	N	GND
0.47400	32.70	10.1	56	23.7	QP	N	GND
0.91950	24.40	10.1	56	31.6	QP	N	GND
3.07050	00 23.20	10.2	56	32.8	QP	N	GND
7.02150	23.60	10.3	60	36.4	QP	N	GND
17.02500	31.60	10.5	60	28.4	QP	N	GND

## MEASUREMENT RESULT: "GM2005215050 fin2"

5/21/2020	3:08PM						
Frequenc	y Level	Transd	Limit	Margin	Detector	Line	PE
MH	z dBµV	dB	dΒμV	dB			
0.15450	0 33.70	10.0	56	22.1	AV	N	GND
0.47400	0 25.50	10.1	46	20.9	AV	N	GND
0.92850	0 19.60	10.1	46	26.4	AV	N	GND
2.78700	0 19.50	10.2	46	26.5	AV	N	GND
6.84600	0 20.30	10.2	50	29.7	AV	N	GND
16.97100	0 20.80	10.5	50	29.2	AV	N	GND
10.57100	20.00	10.0	00	20.2	214		0110

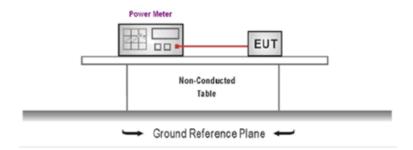
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### 5.3. Peak Output Power

#### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): 30dBm

#### **TEST CONFIGURATION**



### **TEST PROCEDURE**

- 1. The EUT was tested according to ANSI C63.10 and KDB 558074 D01 requirements.
- 2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
- 3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.
- 4. Record the measurement data.

#### **TEST MODE:**

Please refer to the clause 4.2

#### **TEST RESULT**

#### **TEST Data**

Please refer to appendix A on the appendix report

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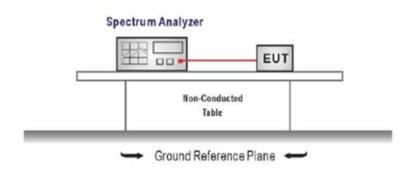
#### 5.4. Power Spectral Density

#### LIMIT

### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e):

For digitally modulated systems, 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.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. Connect the antenna port(s) to the spectrum analyzer input,
- Configure the spectrum analyzer as shown below:

Center frequency=DTS channel center frequency

Span =1.5 times the DTS bandwidth

RBW = 3 kHz ≤ RBW ≤ 100 kHz, VBW ≥ 3 × RBW

Sweep time = auto couple

Detector = peak

Trace mode = max hold

- 3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
- 4. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### **TEST MODE:**

Please refer to the clause 4.2

### **TEST RESULT**

□ Passed □ Not Applicable

#### **TEST Data**

Please refer to appendix B on the appendix report

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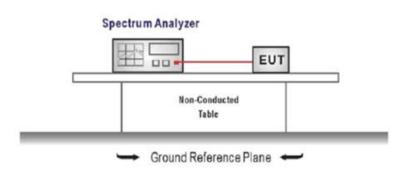
#### 5.5. 6dB bandwidth

#### LIMIT

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. Connect the antenna port(s) to the spectrum analyzer input.
- 2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency =DTS channel center frequency

Span=2 x DTS bandwidth

RBW = 100 kHz, VBW ≥ 3 × RBW

Sweep time= auto couple

Detector = Peak

Trace mode = max hold

- 3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
- 4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

#### **TEST MODE:**

Please refer to the clause 4.2

### **TEST RESULT**

#### **TEST Data**

Please refer to appendix C on the appendix report

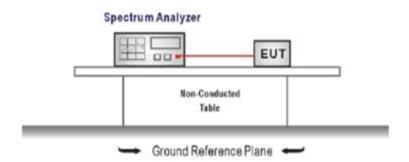
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### 5.6. 99% Occupied Bandwidth

#### **LIMIT**

N/A

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. Connect the antenna port(s) to the spectrum analyzer input.
- Configure the spectrum analyzer as shown below (enter all losses between the transmitter output andthe spectrum analyzer).

Center Frequency =channel center frequency

Span≥1.5 x OBW

. RBW = 1%~5%OBW

VBW ≥ 3 × RBW

Sweep time= auto couple

Detector = Peak

Trace mode = max hold

3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

### TEST MODE:

Please refer to the clause 4.2

#### **TEST RESULT**

#### **TEST Data**

Please refer to appendix D on the appendix report

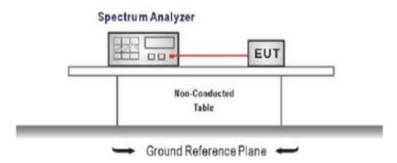
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### 5.7. Duty Cycle

#### **LIMIT**

N/A

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:
  - Span=zero span, Frequency=centered channel, RBW= 1 MHz, VBW  $\geq$  RBW
  - Sweep=as necessary to capture the entire dwell time,
  - Detector function = peak, Trigger mode
- 4. Measure and record the duty cycle data

#### **TEST MODE:**

Please refer to the clause 4.2

#### **TEST Data**

Please refer to appendix E on the appendix report

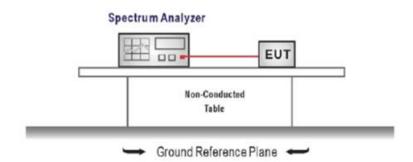
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## 5.8. Conducted Band edge and Spurious Emission

#### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. Connect the antenna port(s) to the spectrum analyzer input.
- 2. Establish a reference level by using the following procedure

Center frequency=DTS channel center frequency

The span = 1.5 times the DTS bandwidth.

RBW = 100 kHz, VBW  $\geq$  3 x RBW

Detector = peak, Sweep time = auto couple, Trace mode = max hold

Allow trace to fully stabilize

Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

3. Emission level measurement

Set the center frequency and span to encompass frequency range to be measured

RBW = 100 kHz, VBW  $\geq$  3 x RBW

Detector = peak, Sweep time = auto couple, Trace mode = max hold

Allow trace to fully stabilize

Use the peak marker function to determine the maximum amplitude level.

- 4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
- Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

#### **TEST MODE:**

Please refer to the clause 4.2

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### **TEST RESULT**

 $oxed{oxed}$  Passed  $oxed{oxed}$  Not Applicable

## TEST Data

Please refer to appendix F on the appendix report

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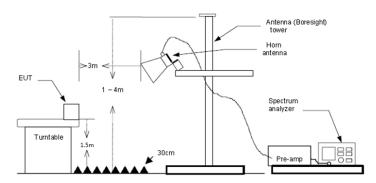
### 5.9. Radiated Band edge Emission

#### **LIMIT**

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. The EUT was setup and tested according to ANSI C63.10.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
- Use the following spectrum analyzer settings:
  - a) Span shall wide enough to fully capture the emission being measured
  - b) Set RBW=100kHz for <1GHz, VBW=3\*RBW, Sweep time=auto, Detector=peak, Trace=max hold
  - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

- VBW=10Hz, When duty cycle is no less than 98 percent
- VBW≥1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation, so refer to this clasue 5.6 duty cycle.

#### **TEST MODE:**

Please refer to the clause 4.2

#### **TEST RESULT**

#### Note:

- Level= Reading + Factor; Factor = Antenna Factor + Cable Loss- Preamp Factor
- 2) Over Limit = Level Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

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Test channe	əl				CH00						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value		
2310.00	34.45	27.96	7.73	38.17	31.97	74.00	-42.03	Vertical	Peak		
2390.03	44.29	27.72	7.84	37.97	41.88	74.00	-32.12	Vertical	Peak		
2310.00	33.47	27.96	7.73	38.17	30.99	74.00	-43.01	Horizontal	Peak		
2390.03	44.37	27.72	7.84	37.97	41.96	74.00	-32.04	Horizontal	Peak		
2310.00	27.56	27.96	7.73	38.17	25.08	54.00	-28.92	Vertical	Average		
2390.03	30.43	27.72	7.84	37.97	28.02	54.00	-25.98	Vertical	Average		
2310.00	25.99	27.96	7.73	38.17	23.51	54.00	-30.49	Horizontal	Average		
2390.03	30.74	27.72	7.84	37.97	28.33	54.00	-25.67	Horizontal	Average		

Test channe	əl				CH39					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	42.45	27.43	8.04	37.59	40.33	74.00	-33.67	Vertical	Peak	
2500.00	33.46	27.40	8.08	37.38	31.56	74.00	-42.44	Vertical	Peak	
2483.50	43.85	27.43	8.04	37.59	41.73	74.00	-32.27	Horizontal	Peak	
2500.00	33.53	27.40	8.08	37.38	31.63	74.00	-42.37	Horizontal	Peak	
2483.50	33.51	27.43	8.04	37.59	31.39	54.00	-22.61	Vertical	Average	
2500.00	25.82	27.40	8.08	37.38	23.92	54.00	-30.08	Vertical	Average	
2483.50	35.33	27.43	8.04	37.59	33.21	54.00	-20.79	Horizontal	Average	
2500.00	25.67	27.40	8.08	37.38	23.77	54.00	-30.23	Horizontal	Average	

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## 5.10. Radiated Spurious Emission

### **LIMIT**

### FCC CFR Title 47 Part 15 Subpart C Section 15.209

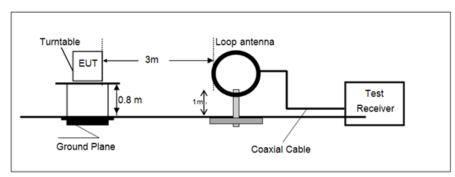
Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40\*log(300/3) = Limit dBuV/m @300m +80, Limit dBuV/m @3m = Limit dBuV/m @30m +40\*log(30/3) = Limit dBuV/m @30m + 40.

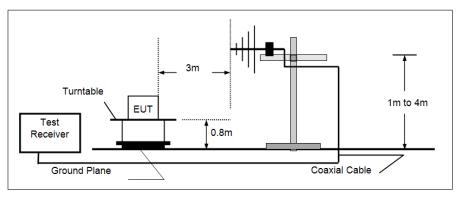
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
Above IGHZ	74.00	Peak

### **TEST CONFIGURATION**

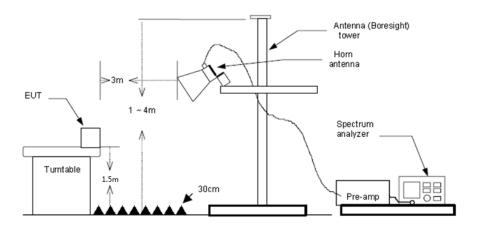
#### → 9 kHz ~ 30 MHz



#### > 30 MHz ~ 1 GHz



Above 1 GHz



#### **TEST PROCEDURE**

- 1. The EUT was setup and tested according to ANSI C63.10.
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings
  - a) Span shall wide enough to fully capture the emission being measured;
  - b) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated

using the quasi-peak detector and reported.
c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

- VBW=10Hz, When duty cycle is no less than 98 percent
- VBW≥1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation, so refer to this clasue 5.6 duty cycle.

#### **TEST MODE:**

Please refer to the clause 4.2

#### **TEST RESULT**

#### Note:

- 1) Above 1GHz Final Level = Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) Over Limit = Level Limit
- Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

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### TEST DATA FOR 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

#### TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH39 which it was worst case, so only show the worst case's data on this report.

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#### Polarization: Horizontal Level [dBµV/m] 50 40 30 20 10 0 30M 40M 50M 60M 70M 100M 200M 300M 400M 500M 600M 800M 1G Frequency [Hz] x x x MES GM2005226115\_red MEASUREMENT RESULT: "GM2005226115 red" 5/22/2020 11:29PM Frequency Level Transd Limit Margin Det. Height Azimuth Polarization MHz dBuV/m dB dBuV/m dB cm dea 142.520000 30.10 -13.9 43.5 13.4 QP 100.0 305.00 HORIZONTAL 167.740000 27.30 -12.6 43.5 16.2 QP 100.0 254.00 HORIZONTAL 43.5 187.140000 27.50 -10.8 16.0 QP 100.0 360.00 HORIZONTAL 46.0 46.0 29.50 -8.9 16.5 QP 345.00 HORIZONTAL 242.00 HORIZONTAL 231.760000 100.0 547.980000 27.70 -0.1 18.3 QP 100.0 955.380000 35.20 8.1 46.0 10.8 QP 100.0 7.00 HORIZONTAL Polarization: Vertical Level [dBµV/m] 70 60 50 40 30 20 10 0 30M40M 50M 60M 70M 100M 200M 300M 400M 500M 600M 800M Frequency [Hz] x x x MES GM2005226116\_red MEASUREMENT RESULT: "GM2005226116 red" 5/22/2020 11:31PM Frequency Level Transd Limit Margin Det. Height Azimuth Polarization dBµV/m dB dBµV/m MHz dB cm deg 38.00 VERTICAL 45.520000 25.20 -8.3 40.0 14.8 QP 100.0 55.220000 14.7 QP 25.30 -8.2 100.0 153.00 40.0 VERTICAL 15.9 QP 17.2 QP 142.520000 27.60 -13.943.5 100.0 320.00 VERTICAL 233.700000 28.80 -8.8 46.0 100.0 360.00 VERTICAL 100.0 356.00 VERTICAL 551.860000 27.70 0.1 46.0 18.3 QP

10.6 QP

100.0

35.40

7.7

46.0

935.980000

3.00 VERTICAL

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### TEST DATA FOR 1 GHz ~ 25 GHz

Test channel				CH00					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1487.51	34.89	25.95	6.20	37.63	29.41	74.00	-44.59	Vertical	Peak
3216.84	34.20	28.83	9.48	37.38	35.13	74.00	-38.87	Vertical	Peak
5138.58	31.54	32.05	12.04	34.94	40.69	74.00	-33.31	Vertical	Peak
9228.06	30.78	38.91	15.94	35.95	49.68	74.00	-24.32	Vertical	Peak
1577.20	34.35	25.45	6.35	37.61	28.54	74.00	-45.46	Horizontal	Peak
3672.11	33.99	29.40	9.99	37.88	35.50	74.00	-38.50	Horizontal	Peak
5164.81	31.37	31.91	12.05	34.79	40.54	74.00	-33.46	Horizontal	Peak
8104.56	30.91	37.18	15.67	34.33	49.43	74.00	-24.57	Horizontal	Peak

Test channel				CH19					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1313.08	34.58	26.08	5.82	37.46	29.02	74.00	-44.98	Vertical	Peak
3454.49	33.88	28.92	9.77	37.88	34.69	74.00	-39.31	Vertical	Peak
5125.52	30.98	32.10	12.04	35.02	40.10	74.00	-33.90	Vertical	Peak
8042.90	30.79	37.19	15.67	34.37	49.28	74.00	-24.72	Vertical	Peak
1553.29	35.80	25.49	6.31	37.64	29.96	74.00	-44.04	Horizontal	Peak
3208.66	33.94	28.87	9.46	37.34	34.93	74.00	-39.07	Horizontal	Peak
5177.97	30.45	31.83	12.05	34.71	39.62	74.00	-34.38	Horizontal	Peak
8725.48	30.41	37.70	15.96	34.68	49.39	74.00	-24.61	Horizontal	Peak

Test channel				CH39					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1545.41	34.92	25.54	6.30	37.66	29.10	74.00	-44.90	Vertical	Peak
3607.26	33.60	29.40	10.00	37.86	35.14	74.00	-38.86	Vertical	Peak
5217.66	31.75	31.59	12.11	34.69	40.76	74.00	-33.24	Vertical	Peak
8002.06	30.96	37.10	15.52	34.42	49.16	74.00	-24.84	Vertical	Peak
1545.41	34.92	25.54	6.30	37.66	29.10	74.00	-44.90	Horizontal	Peak
3607.26	33.60	29.40	10.00	37.86	35.14	74.00	-38.86	Horizontal	Peak
5217.66	31.75	31.59	12.11	34.69	40.76	74.00	-33.24	Horizontal	Peak
9346.26	31.20	39.29	15.90	36.35	50.04	74.00	-23.96	Horizontal	Peak

#### Remark:

- 1. Final Level =Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2. The peak level is lower than average limit(54dBuV/m), this data is the too weak instrument of signal is unable to test.
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 6. APPENDIX REPORT

# **APPENDIX REPORT**

Project No.	SHT2005026001EW	Radio Specification	Bluetooth BLE
Test sample No.	YPHT20050260006	Model No.	SC100
Start test date	2020/5/27	Finish date	2020/5/27
Temperature	25°C	Humidity	50%
Test Engineer	Jinyue.Yan	Auditor	William . wang

Appendix clause	Test item	Result
А	Peak Output Power	PASS
В	Power Spectral Density	PASS
С	6 dB Bandwidth	PASS
D	99% Occupied Bandwidth	PASS
E	Duty cycle	PASS
F	Band edge and Spurious Emissions (conducted)	PASS

## Appendix A: Peak Output Power

Туре	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
	00	6.50	6.49		
BT-BLE	19	7.05	7.04	≤30.00	Pass
	39	6.60	6.58		

## Appendix B: Power Spectral Density

Туре	Channel	Power Spectral Density(dBm/3KHz)	Limit (dBm/3KHz)	Result
	00	-10.46		
BT-BLE	19	-9.96	≤8.00	Pass
	39	-10.39		



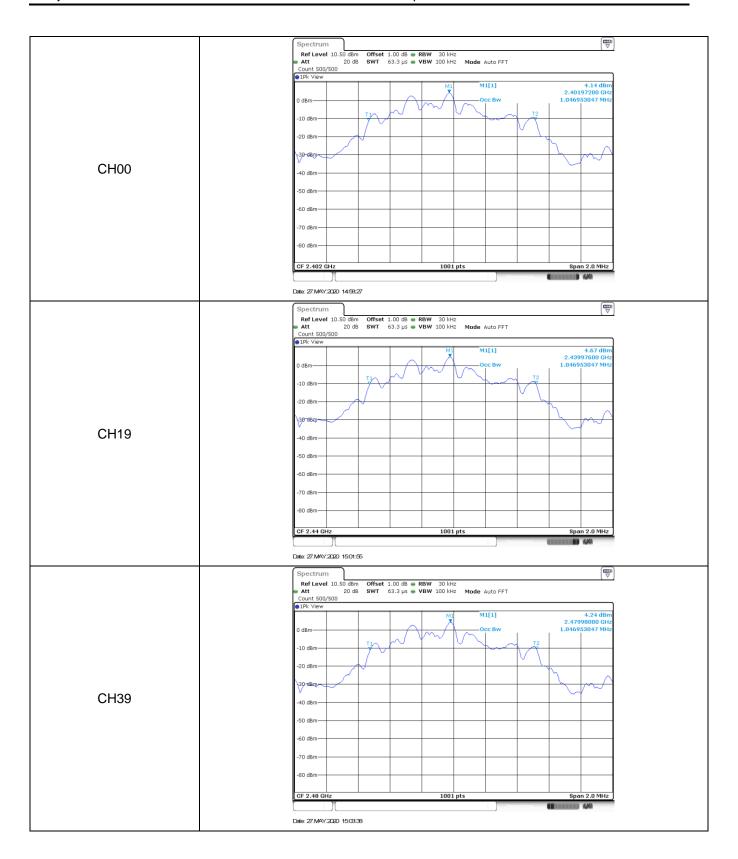
## Appendix C: 6dB bandwidth

Type	Channel	6dB Bandwidth(kHz)	Limit (kHz)	Result
	00	506.00		
BT-BLE	19	510.00	≥500	Pass
	39	508.00		



## Appendix D: 99% Occupied Bandwidth

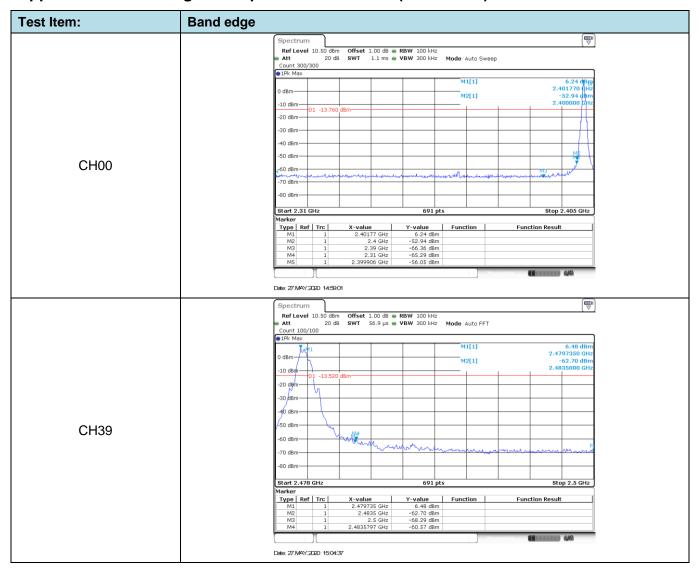
Туре	Channel	99% Occupied Bandwidth(MHz)	Limit (kHz)	Result
	00	1.05		
BT-BLE	19	1.05	-	Pass
	39	1.05		

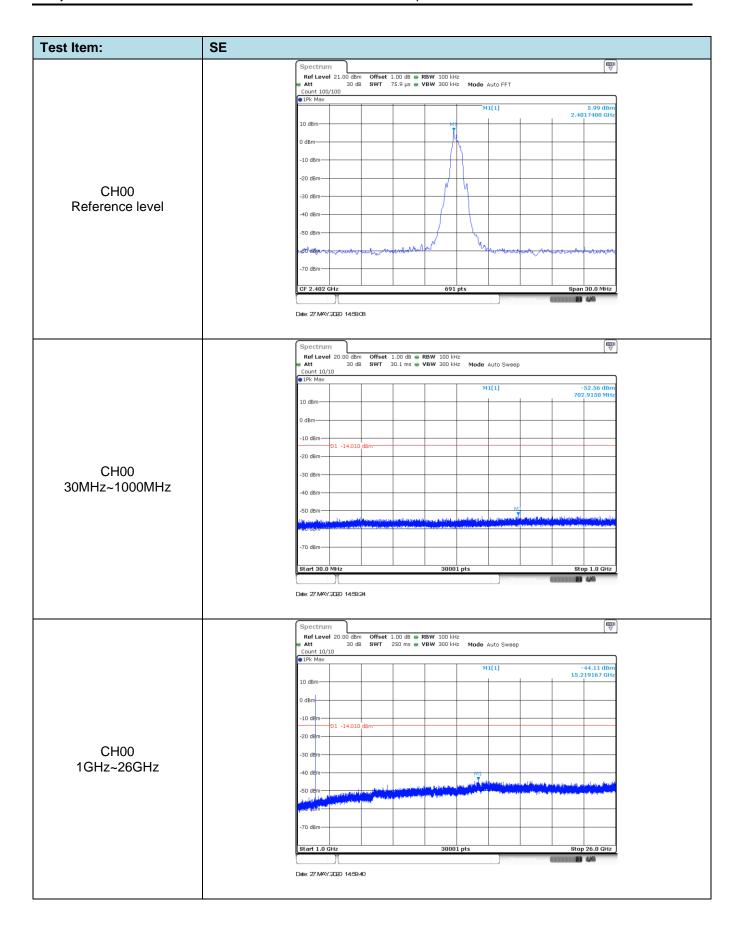


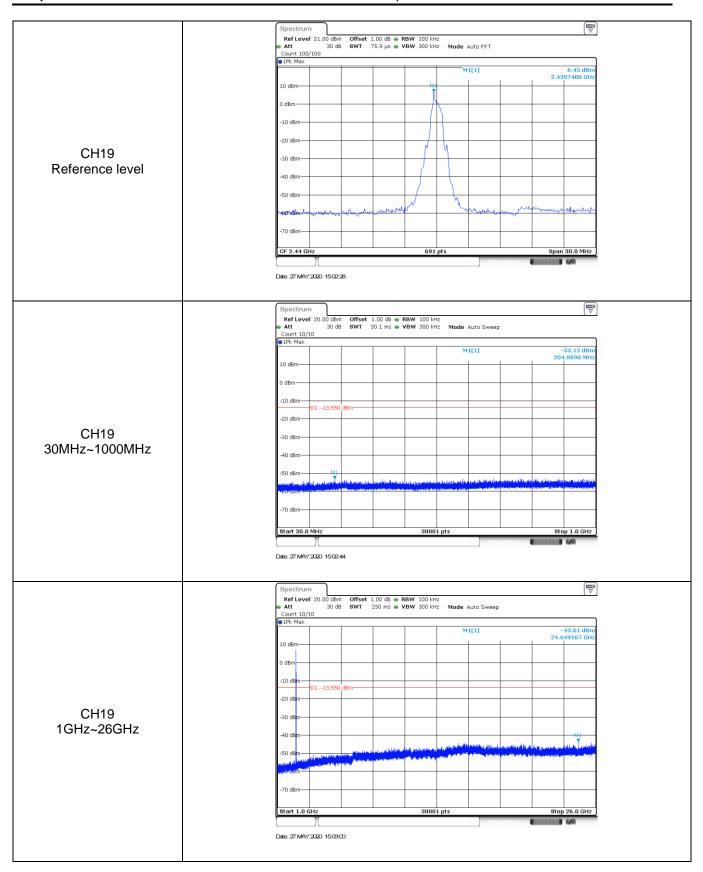
## Appendix E: Duty cycle

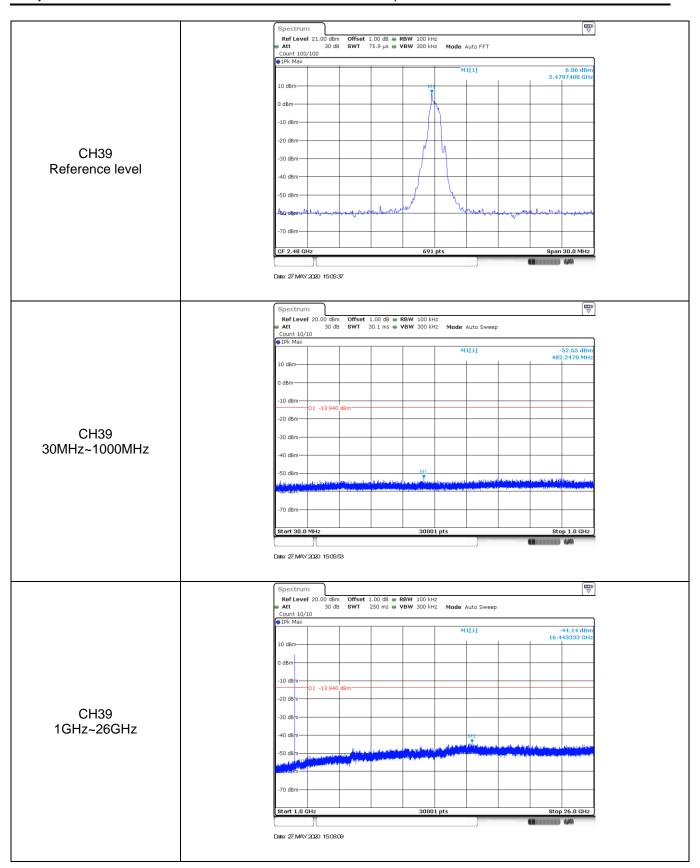
Test Frequency (MHz)	T <sub>on time</sub> for single burst (ms)	T <sub>period</sub> (ms)	Duty cycle	1/T <sub>on time</sub> (kHz)
2440	0.09	0.62	14.5%	11.1
	SGL TRG: VID  ● 1Pk Clrw  20 dBm  10 dBm  10 dBm  -10 dBm  -20 dBm  -30 dBm  -30 dBm  -60 dBm  -60 dBm  -60 dBm  -70 dB	8000 pts  X-value Y-value Ference 25.0 ns 0.86 dBm	D1[1] 4. 92.	idBm 25 ns 37 dB 51 μs  ms/
	Date: 27.MAY.2020 15:01:16	92.51 µs 4.37 dB 621.33 µs 1.70 dB	Ready (IIIIII) 49	

## Appendix F: Band edge and Spurious Emissions (conducted)









-----End of Report-----