

FCC Radio Test Report

FCC ID: 2AG2ATON9668

Original Grant

Report No. : TB-FCC151315
Applicant : Shenzhen Fast Precision Technologies Co. Ltd.
Equipment Under Test (EUT)
EUT Name : BLE Anti-lost Card
Model No. : TON9668
Serial No. : Please see the page of 4
Brand Name : iQard
Receipt Date : 2017-01-10
Test Date : 2017-01-11 to 2017-02-09
Issue Date : 2017-02-10
Standards : FCC Part 15: 2015, Subpart C(15.247)
Test Method : ANSI C63.10: 2013
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above,

**Test/Witness
Engineer**

: *Ivan Su*

**Approved &
Authorized**

: *Long Lai*



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

1.1 Client Information

Applicant	:	Shenzhen Fast Precision Technologies Co. Ltd.
Address	:	4th Floor, Yangtian Building, Chuangye 2nd Road, Baoan 72 District, Shenzhen, China.
Manufacturer	:	Shenzhen Fast Precision Technologies Co. Ltd.
Address	:	4th Floor, Yangtian Building, Chuangye 2nd Road, Baoan 72 District, Shenzhen, China.

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	BLE Anti-lost Card	
Models No.	:	TON9668 TON9668* (* represents 2-digit characters, and each character can be anything ranging from 0 to 9, A to Z, symbols like "-" or "space" and different product models. And * is targeted at different sales territories, sales regions, sales methods, varied client groups, different market positioning and different product colors, and won't affect the product safety and electromagnetic compatibility)	
Model Difference	:	All these models are identical in the same PCB layout and electrical circuit, the only difference is model name for commercial.	
Product Description	:	Operation Frequency:	Bluetooth 4.0(BLE): 2402MHz~2480MHz
		Number of Channel:	Bluetooth 4.0(BLE): 40 channels see note(3)
		RF Output Power:	0.567 dBm Conducted Power
		Antenna Gain:	2 dBi FPC Antenna
		Modulation Type:	GFSK
		Bit Rate of Transmitter:	1Mbps(GFSK)
Power Source	:	DC Supply from the Host System. DC Supply by the Battery.	
Power Rating	:	DC 5.0 V from the Host System by the USB Cable. DC 3.7 V~120mAh by Li-Lion Battery.	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

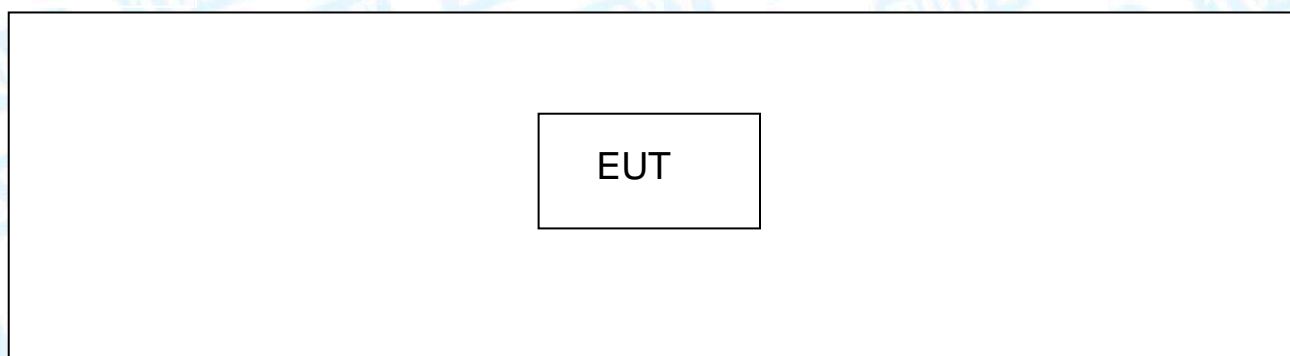
- (1) This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB 558074 D01 DTS Means Guidance v03r05.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Antenna information provided by the applicant.

(4) Channel List:

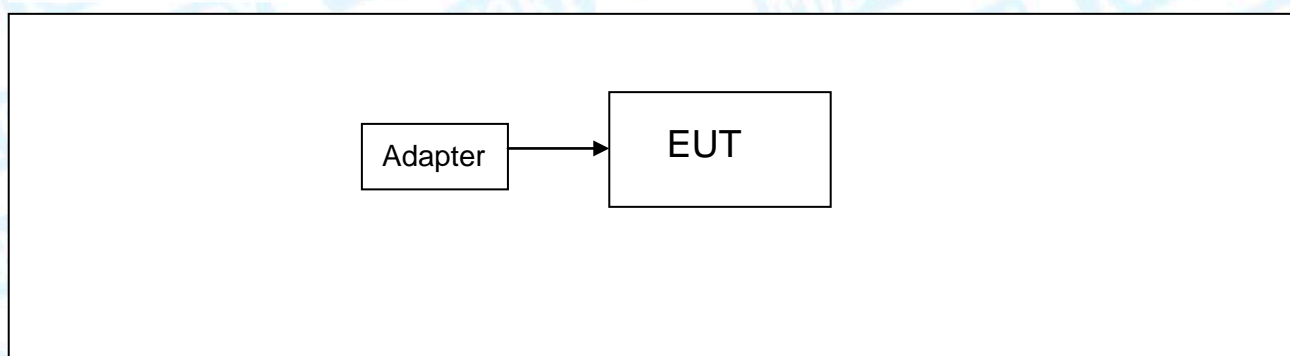
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



Charging Mode



1.4 Description of Support Units

Equipment Information				
Name	Model	S/N	Manufacturer	Used “√”
AC Adapter	TEKA012-0502000UK	----	N/A	√

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test	
Final Test Mode	Description
Mode 1	TX Mode
Mode2	Charging Mode

For Radiated Test	
Final Test Mode	Description
Mode 3	TX Mode
Mode 4	TX Mode (Channel 00/20/39)

Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.
According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:
BLE Mode: GFSK Modulation Transmitting mode.
- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	prodtest		
Frequency	2402 MHz	2442MHz	2480 MHz
BLE GFSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz	± 3.42 dB
	150kHz to 30MHz	± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.8 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

FCC Part 15 Subpart C(15.247)/RSS 247 Issue 1				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203		Antenna Requirement	PASS	N/A
15.207(a)	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A
15.205&15.247(d)	RSS-GEN 7.2.2	Band-Edge & Unwanted Emissions into Restricted Frequency	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)(3)	RSS 247 5.4 (4)	Conducted Max Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.205, 15.209&15.247(d)	RSS 247 5.5	Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	PASS	N/A
Note: N/A is an abbreviation for Not Applicable.				

3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 22, 2016	Jul. 21, 2017
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 22, 2016	Jul. 21, 2017
LISN	Rohde & Schwarz	ENV216	101131	Jul. 22, 2016	Jul. 21, 2017
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 20, 2016	Mar. 19, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 20, 2016	Mar. 19, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 19, 2016	Mar. 18, 2017
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 19, 2016	Mar. 18, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 20, 2016	Mar. 19, 2017
Pre-amplifier	HP	8449B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Power Meter	Anritsu	ML2495A	25406005	Jul. 22, 2016	Jul. 21, 2017
Power Sensor	Anritsu	ML2411B	25406005	Jul. 22, 2016	Jul. 21, 2017

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard
FCC Part 15.207

4.1.2 Test Limit

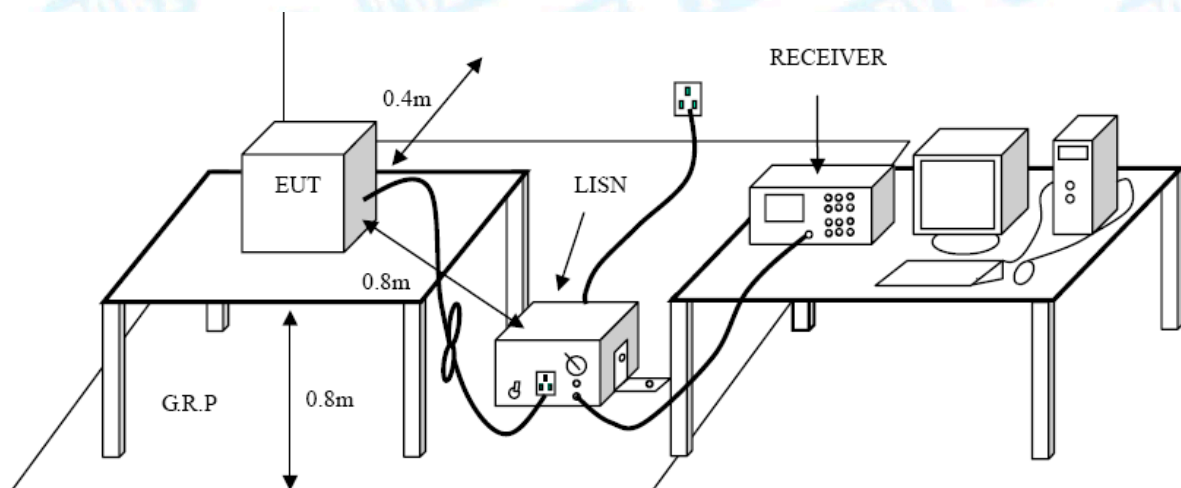
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

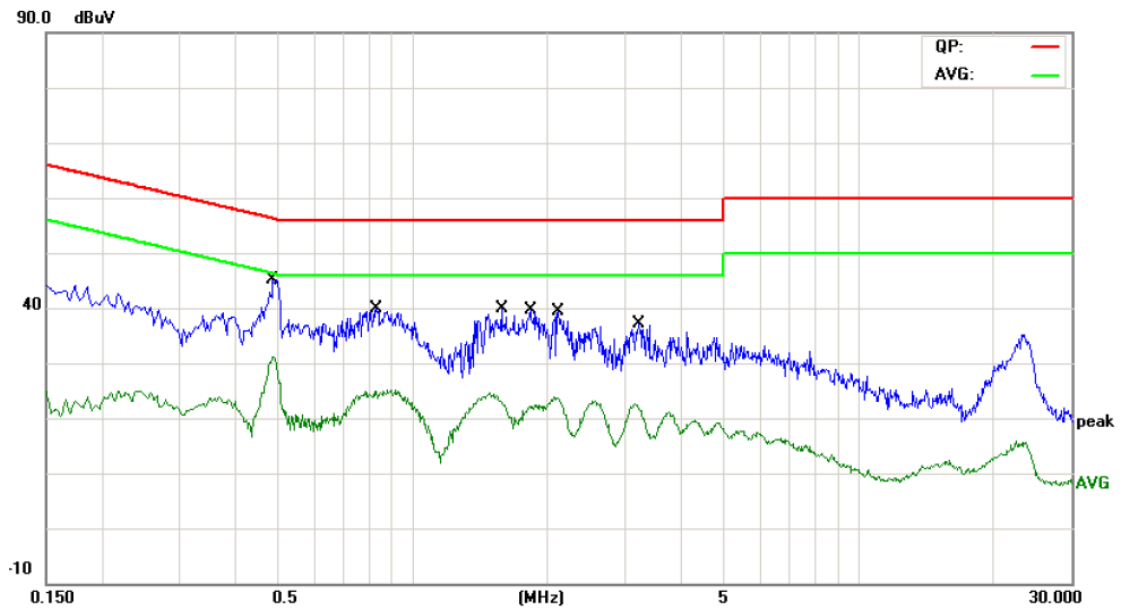
4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Test data please refer the following pages.

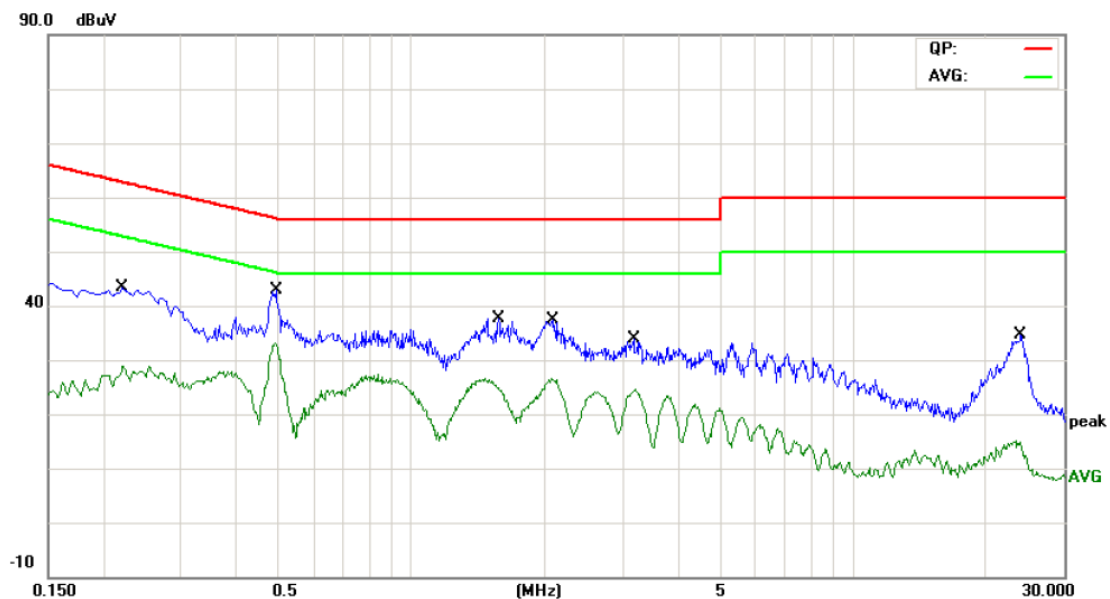
EUT:	BLE Anti-lost Card	Model Name :	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Line		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.4860	27.46	10.02	37.48	56.24	-18.76	QP
2	*	0.4860	20.95	10.02	30.97	46.24	-15.27	AVG
3		0.8300	23.32	10.09	33.41	56.00	-22.59	QP
4		0.8300	14.00	10.09	24.09	46.00	-21.91	AVG
5		1.5780	22.90	10.06	32.96	56.00	-23.04	QP
6		1.5780	13.27	10.06	23.33	46.00	-22.67	AVG
7		1.8340	22.69	10.06	32.75	56.00	-23.25	QP
8		1.8340	9.95	10.06	20.01	46.00	-25.99	AVG
9		2.1140	19.74	10.06	29.80	56.00	-26.20	QP
10		2.1140	14.01	10.06	24.07	46.00	-21.93	AVG
11		3.2180	17.31	10.02	27.33	56.00	-28.67	QP
12		3.2180	12.10	10.02	22.12	46.00	-23.88	AVG

Emission Level= Read Level+ Correct Factor

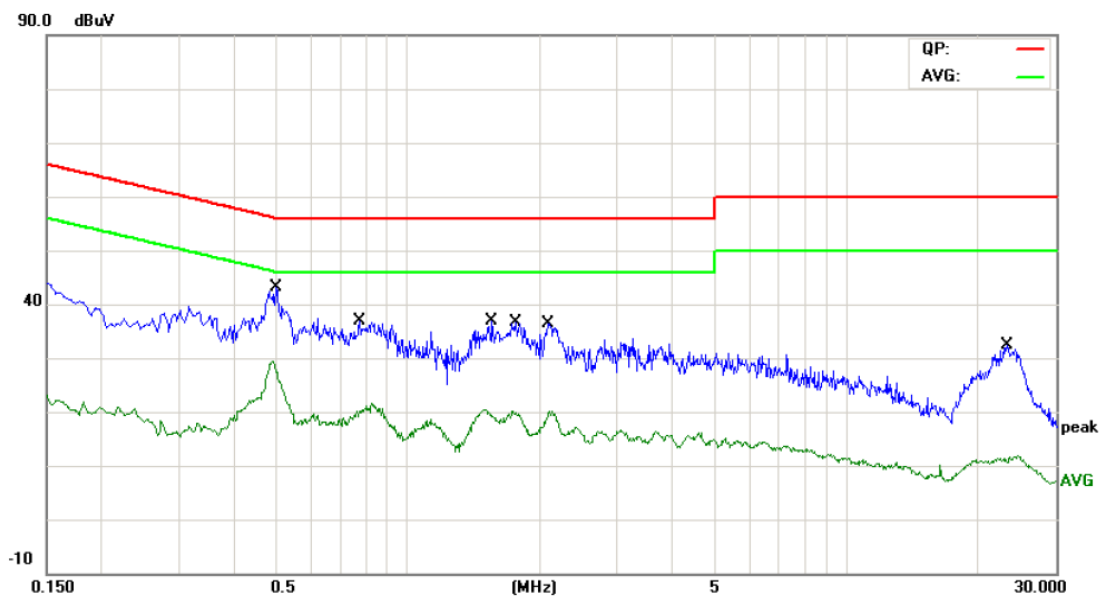
EUT:	BLE Anti-lost Card	Model Name :	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60 Hz		
Terminal:	Neutral		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2220	28.35	10.11	38.46	62.74	-24.28	QP
2		0.2220	16.28	10.11	26.39	52.74	-26.35	AVG
3		0.4940	26.63	10.02	36.65	56.10	-19.45	QP
4	*	0.4940	22.34	10.02	32.36	46.10	-13.74	AVG
5		1.5740	18.81	10.10	28.91	56.00	-27.09	QP
6		1.5740	14.40	10.10	24.50	46.00	-21.50	AVG
7		2.0860	21.64	10.06	31.70	56.00	-24.30	QP
8		2.0860	16.07	10.06	26.13	46.00	-19.87	AVG
9		3.1780	17.42	10.06	27.48	56.00	-28.52	QP
10		3.1780	13.24	10.06	23.30	46.00	-22.70	AVG
11		23.9060	17.78	10.06	27.84	60.00	-32.16	QP
12		23.9060	2.42	10.06	12.48	50.00	-37.52	AVG

Emission Level= Read Level+ Correct Factor

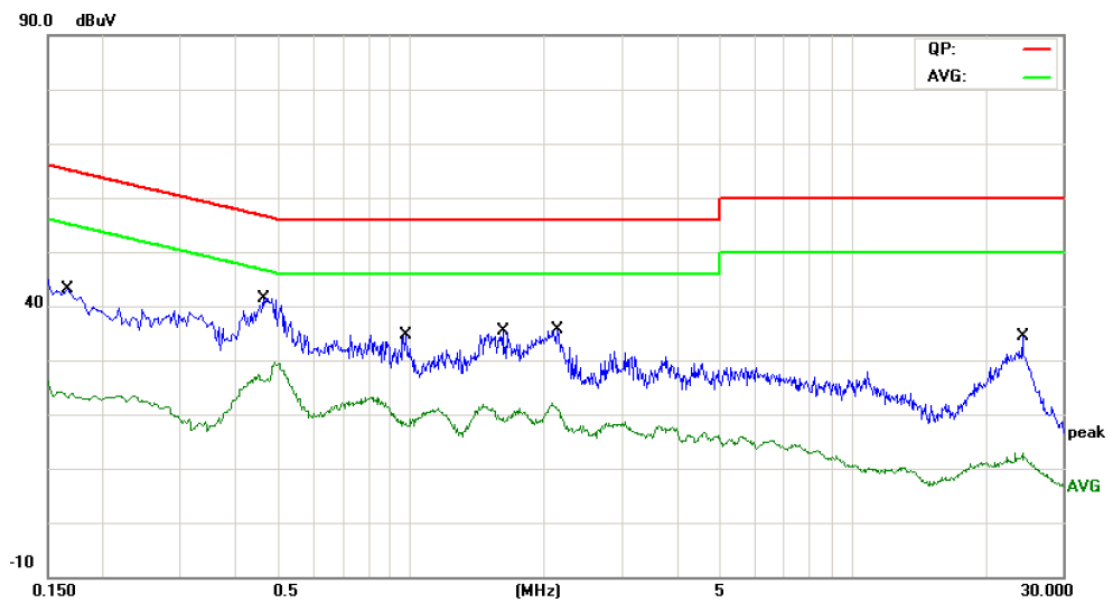
EUT:	BLE Anti-lost Card	Model Name :	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 240V/60 Hz		
Terminal:	Line		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.5020	24.74	10.02	34.76	56.00	-21.24	QP
2	*	0.5020	17.34	10.02	27.36	46.00	-18.64	AVG
3		0.7780	20.70	10.10	30.80	56.00	-25.20	QP
4		0.7780	9.05	10.10	19.15	46.00	-26.85	AVG
5		1.5540	20.05	10.06	30.11	56.00	-25.89	QP
6		1.5540	8.84	10.06	18.90	46.00	-27.10	AVG
7		1.7620	20.74	10.06	30.80	56.00	-25.20	QP
8		1.7620	8.67	10.06	18.73	46.00	-27.27	AVG
9		2.0860	17.86	10.06	27.92	56.00	-28.08	QP
10		2.0860	8.65	10.06	18.71	46.00	-27.29	AVG
11		23.2260	14.11	10.16	24.27	60.00	-35.73	QP
12		23.2260	-0.44	10.16	9.72	50.00	-40.28	AVG

Emission Level= Read Level+ Correct Factor

EUT:	BLE Anti-lost Card	Model Name :	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 240V/60 Hz		
Terminal:	Neutral		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1660	28.80	10.12	38.92	65.15	-26.23	QP
2		0.1660	12.95	10.12	23.07	55.15	-32.08	AVG
3	*	0.4620	25.98	10.03	36.01	56.66	-20.65	QP
4		0.4620	15.96	10.03	25.99	46.66	-20.67	AVG
5		0.9740	15.82	10.15	25.97	56.00	-30.03	QP
6		0.9740	7.29	10.15	17.44	46.00	-28.56	AVG
7		1.6140	16.67	10.10	26.77	56.00	-29.23	QP
8		1.6140	8.26	10.10	18.36	46.00	-27.64	AVG
9		2.1500	17.31	10.06	27.37	56.00	-28.63	QP
10		2.1500	10.57	10.06	20.63	46.00	-25.37	AVG
11		24.2740	13.66	10.06	23.72	60.00	-36.28	QP
12		24.2740	0.75	10.06	10.81	50.00	-39.19	AVG

Emission Level= Read Level+ Correct Factor

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.247(d)

5.1.2 Test Limit

Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

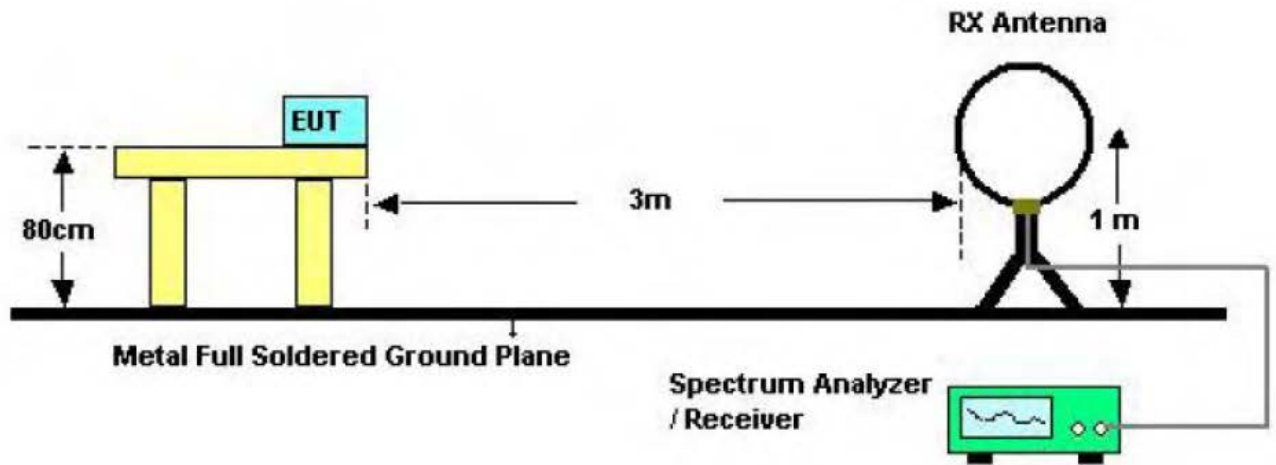
Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance Meters (at 3m)	
	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

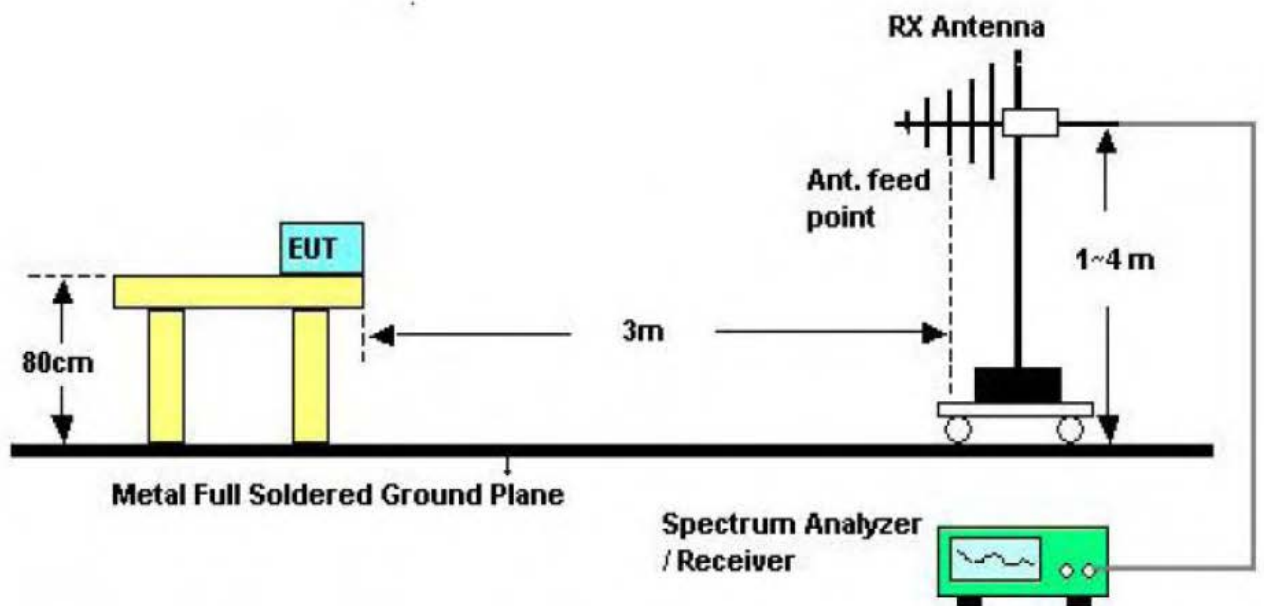
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

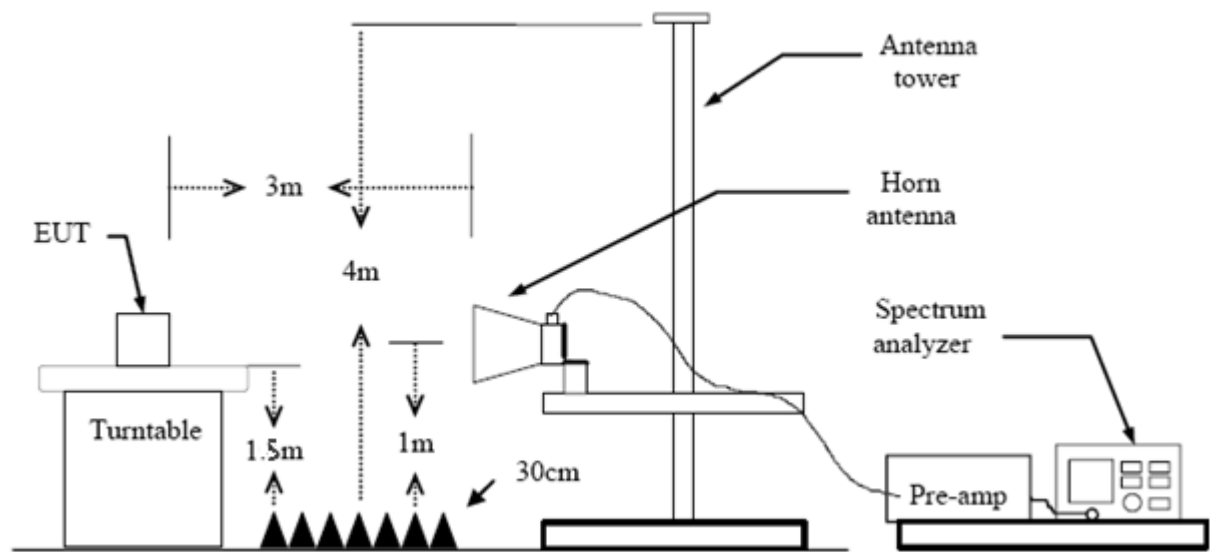
5.2 Test Setup



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.

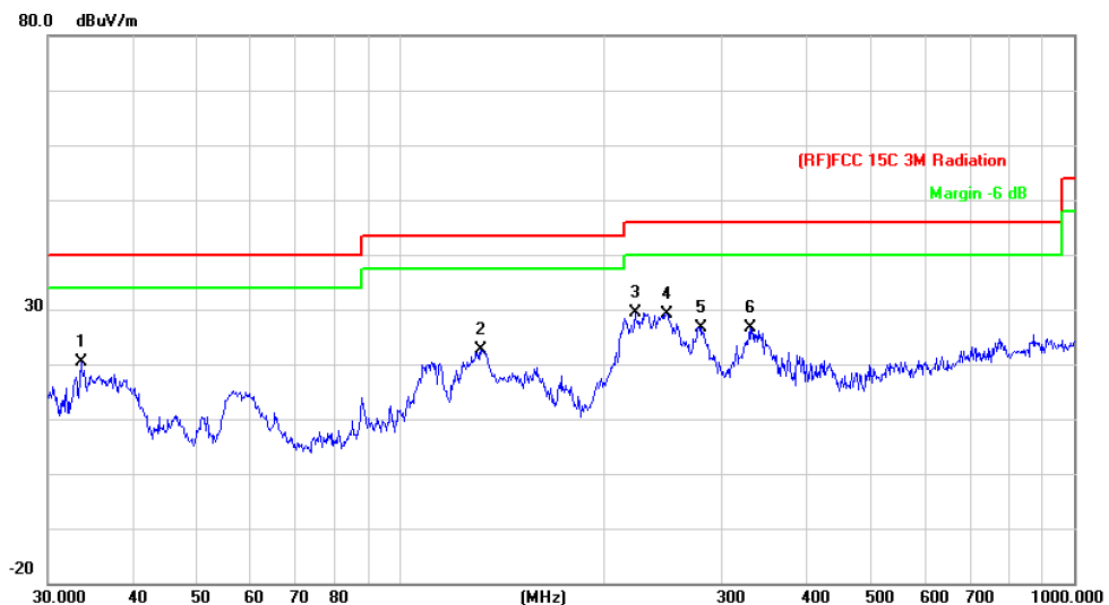
9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

30MHz~1GHz

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		

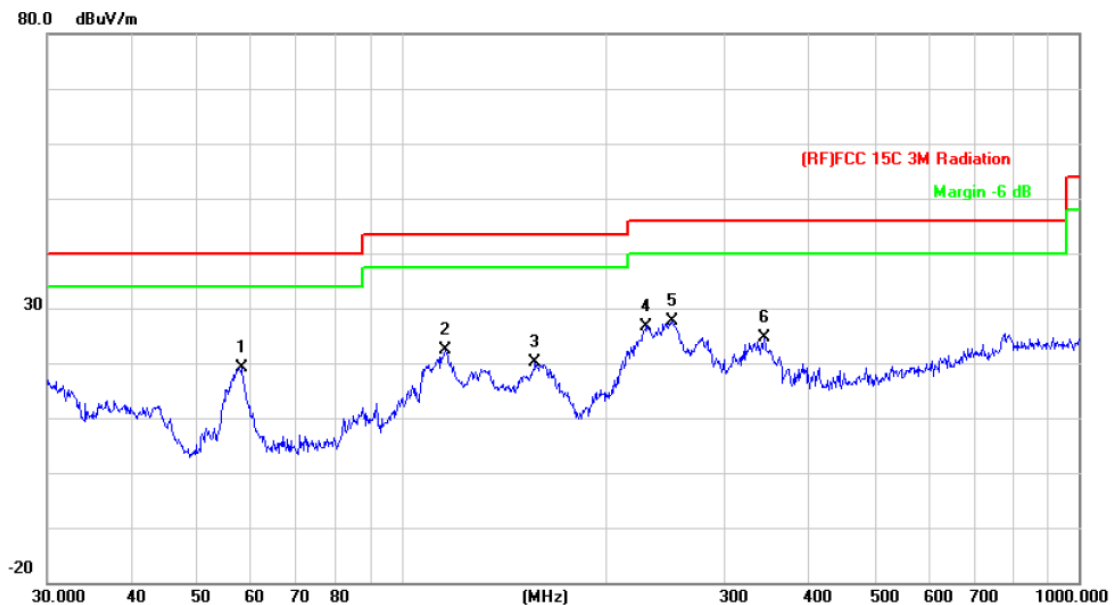


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		33.5624	36.79	-16.34	20.45	40.00	-19.55	peak
2		131.7577	44.70	-22.03	22.67	43.50	-20.83	peak
3	*	222.9502	48.48	-18.99	29.49	46.00	-16.51	peak
4		248.5519	46.84	-17.77	29.07	46.00	-16.93	peak
5		280.0237	43.78	-17.05	26.73	46.00	-19.27	peak
6		330.1949	42.01	-15.38	26.63	46.00	-19.37	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE TX 2402 Mode		
Remark:	Only worse case is reported		



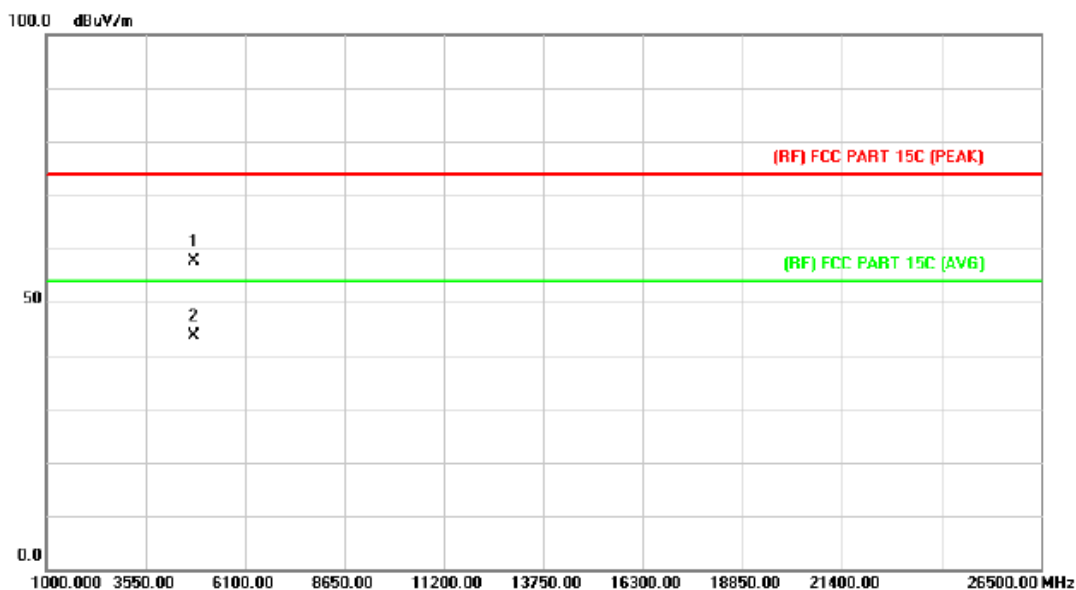
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		57.9993	43.66	-24.59	19.07	40.00	-20.93	peak
2		116.1321	44.64	-22.22	22.42	43.50	-21.08	peak
3		157.5588	40.46	-20.45	20.01	43.50	-23.49	peak
4		230.0985	45.40	-18.65	26.75	46.00	-19.25	peak
5	*	251.1804	45.24	-17.68	27.56	46.00	-18.44	peak
6		343.1800	39.18	-14.58	24.60	46.00	-21.40	peak

*:Maximum data x:Over limit !:over margin

Emission Level= Read Level+ Correct Factor

Above 1GHz

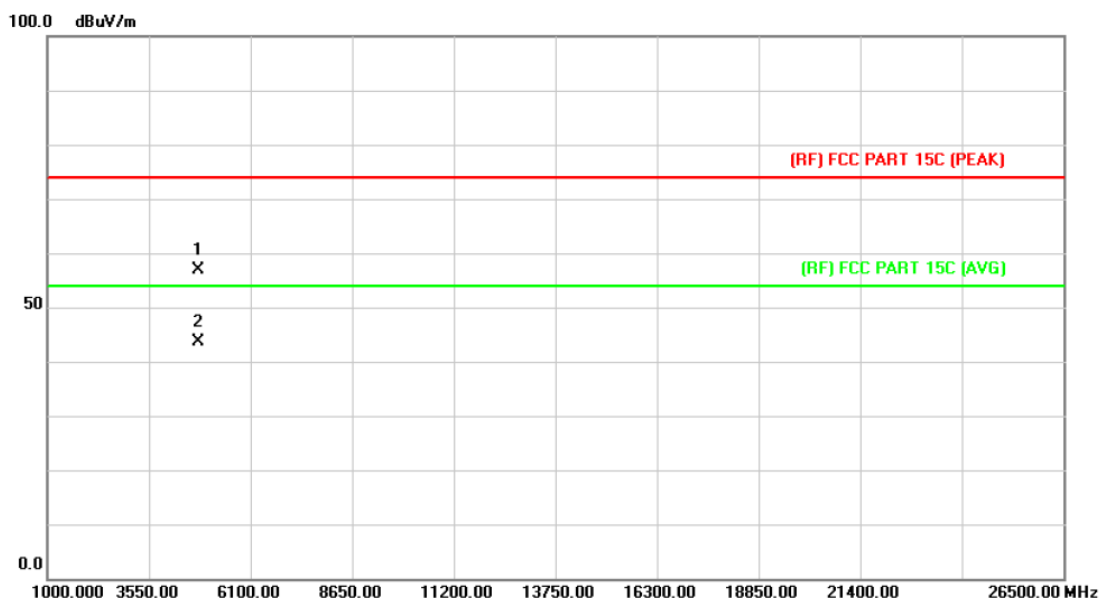
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2402 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.727	44.07	13.44	57.51	74.00	-16.49	peak
2	*	4805.455	30.25	13.45	43.70	54.00	-10.30	AVG

Emission Level= Read Level+ Correct Factor

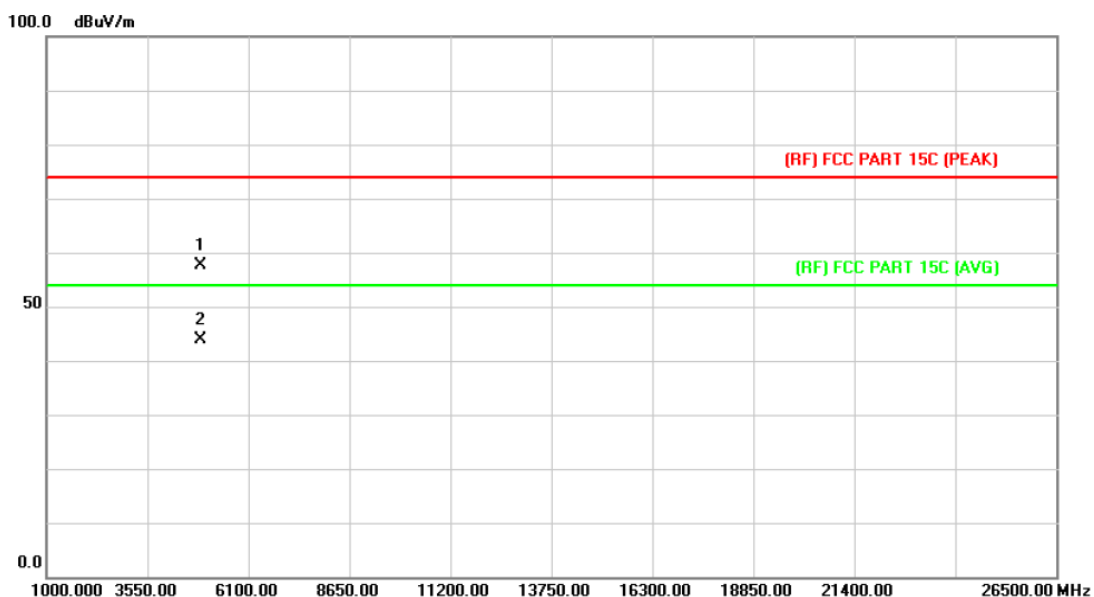
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2402 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.685	43.56	13.44	57.00	74.00	-17.00	peak
2	*	4804.882	30.18	13.44	43.62	54.00	-10.38	AVG

Emission Level= Read Level+ Correct Factor

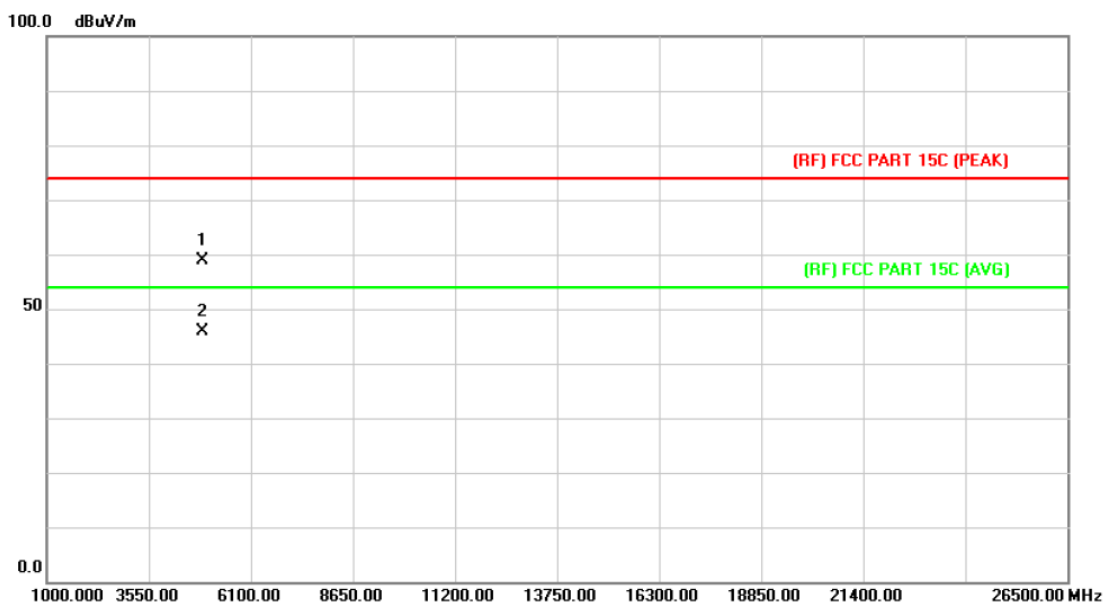
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2442 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4884.370	43.63	13.92	57.55	74.00	-16.45	peak
2	*	4884.990	29.87	13.92	43.79	54.00	-10.21	AVG

Emission Level= Read Level+ Correct Factor

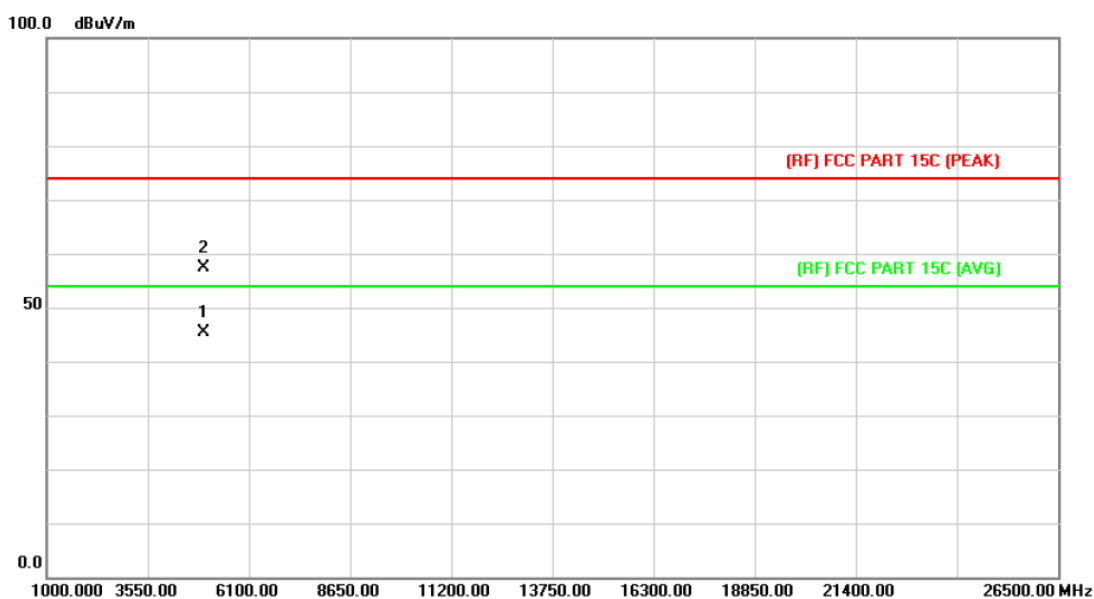
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2442 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4883.020	44.94	13.91	58.85	74.00	-15.15	peak
2	*	4883.070	32.04	13.91	45.95	54.00	-8.05	AVG

Emission Level= Read Level+ Correct Factor

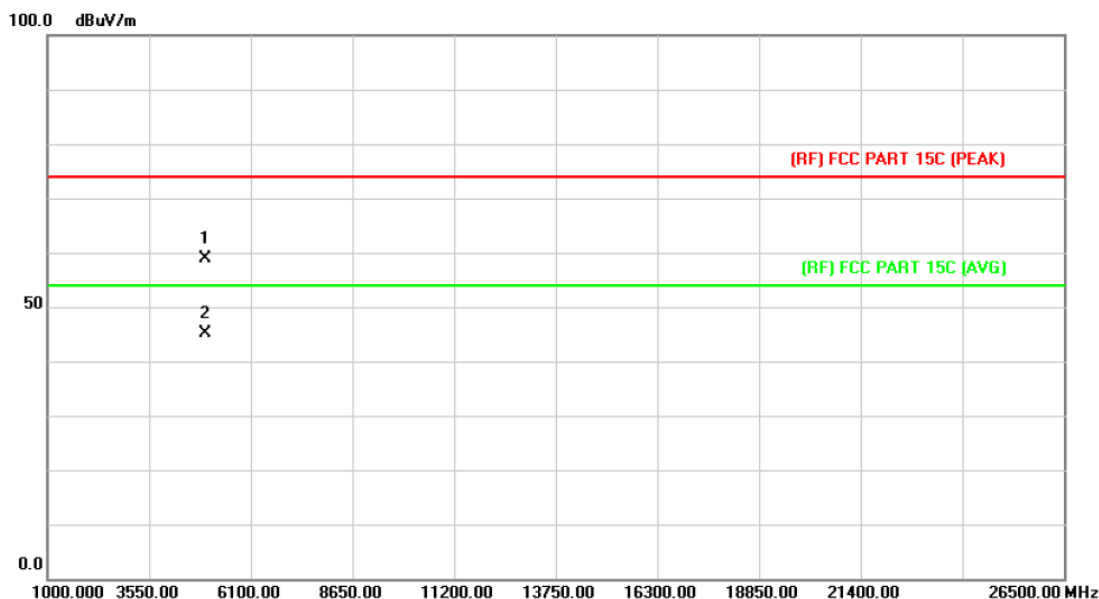
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2480 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.778	30.94	14.36	45.30	54.00	-8.70	AVG
2		4961.440	42.96	14.38	57.34	74.00	-16.66	peak

Emission Level= Read Level+ Correct Factor

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2480 MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4959.889	44.42	14.36	58.78	74.00	-15.22	peak
2	*	4960.201	30.88	14.36	45.24	54.00	-8.76	AVG

Emission Level= Read Level+ Correct Factor

6. Restricted Bands Requirement

6.1 Test Standard and Limit

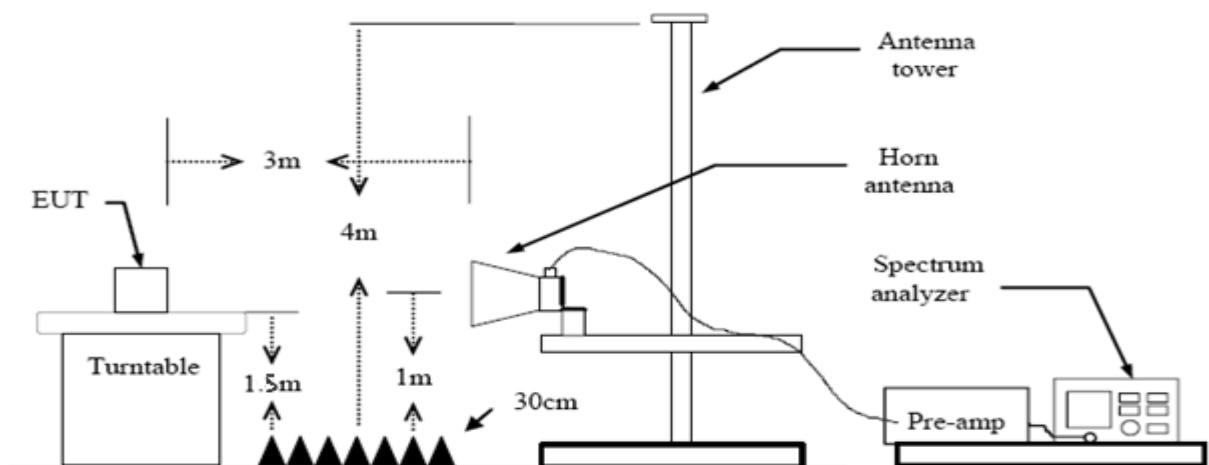
6.1.1 Test Standard

FCC Part 15.247(d) FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency Band (MHz)	Distance Meters (at 3m)	
	Peak (dBuV/m)	Peak (dBuV/m)
2310 ~2390	74	54
2483.5 ~2500	74	54

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector

mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

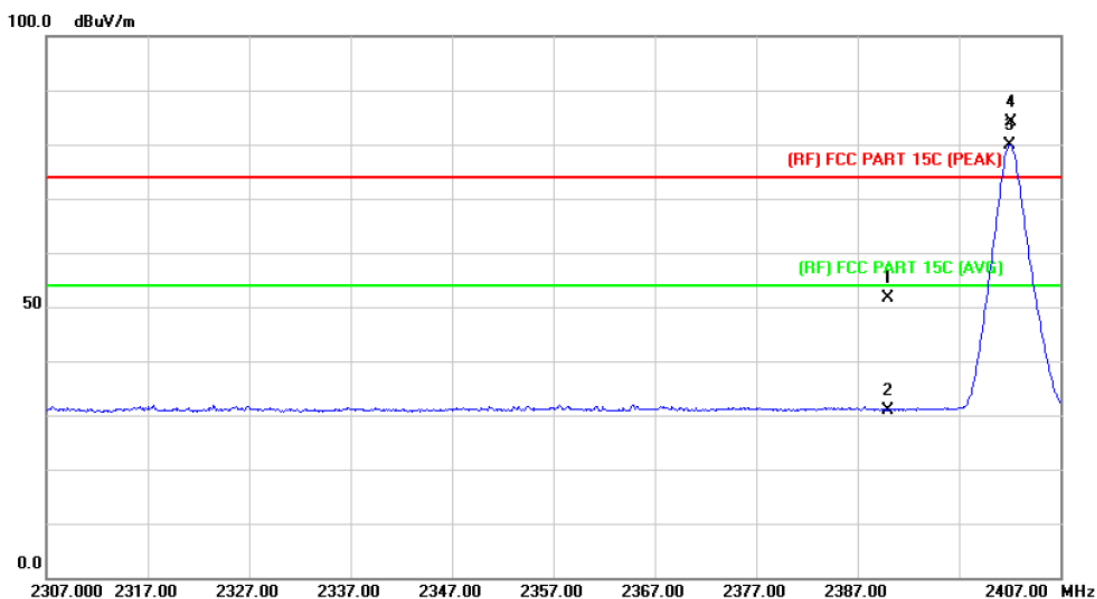
6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.

(1) Radiation Test

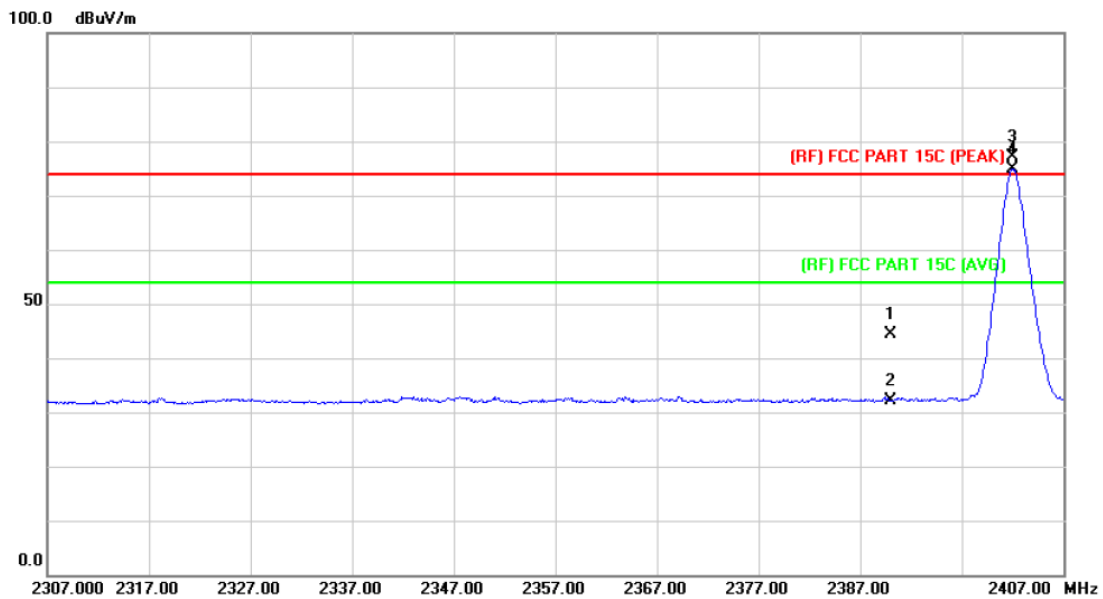
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2402 MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	50.75	0.77	51.52	74.00	-22.48	peak
2		2390.000	30.18	0.77	30.95	54.00	-23.05	AVG
3	*	2402.000	79.04	0.82	79.86	Fundamental Frequency		AVG
4	X	2402.100	83.34	0.82	84.16	Fundamental Frequency		peak

Emission Level= Read Level+ Correct Factor

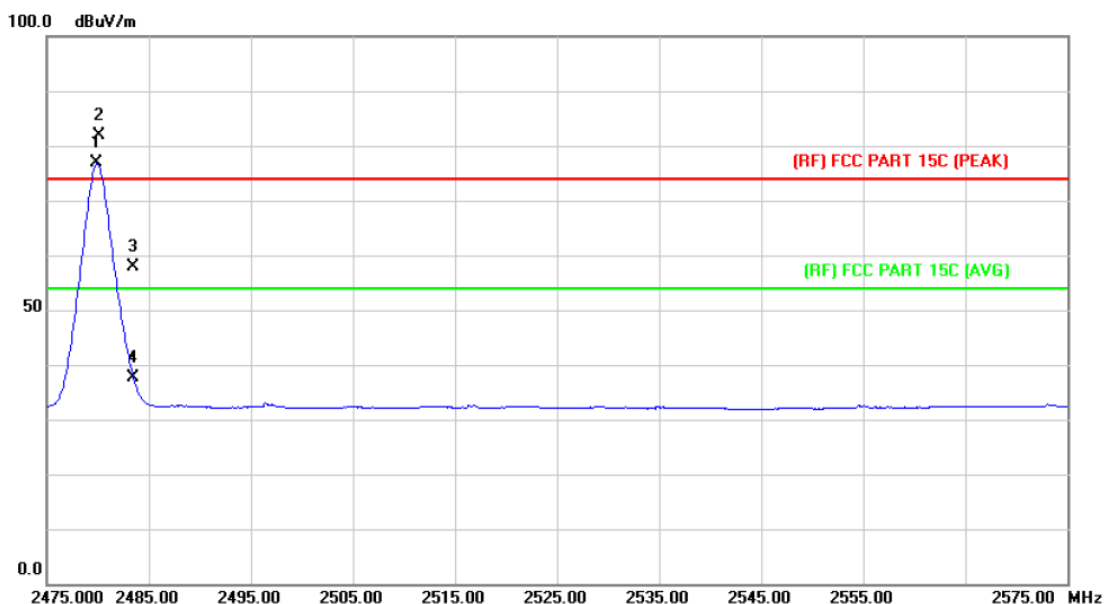
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2402 MHz		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	43.57	0.77	44.34	74.00	-29.66	peak
2		2390.000	31.41	0.77	32.18	54.00	-21.82	AVG
3	X	2402.000	76.20	0.82	77.02	Fundamental Frequency		peak
4	*	2402.000	74.10	0.82	74.92	Fundamental Frequency		AVG

Emission Level= Read Level+ Correct Factor

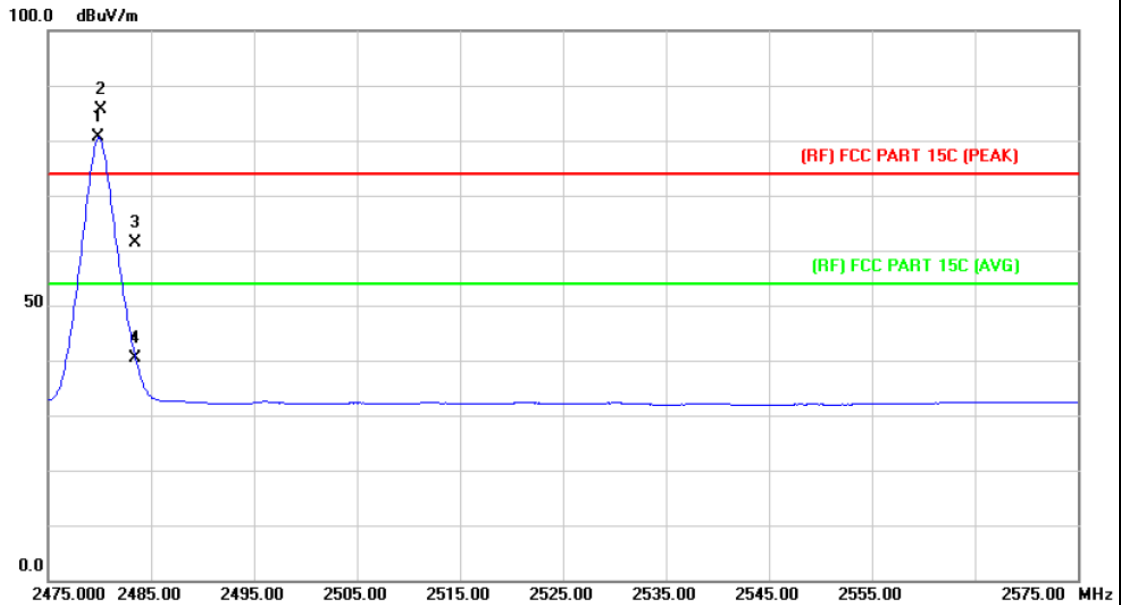
EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Horizontal		
Test Mode:	BLE Mode TX 2480 MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	75.65	1.15	76.80	Fundamental Frequency		AVG
2	X	2480.200	80.62	1.15	81.77	Fundamental Frequency		peak
3		2483.500	56.74	1.17	57.91	74.00	-16.09	peak
4		2483.500	36.40	1.17	37.57	54.00	-16.43	AVG

Emission Level= Read Level+ Correct Factor

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Ant. Pol.	Vertical		
Test Mode:	BLE Mode TX 2480 MHz		
Remark:	N/A		

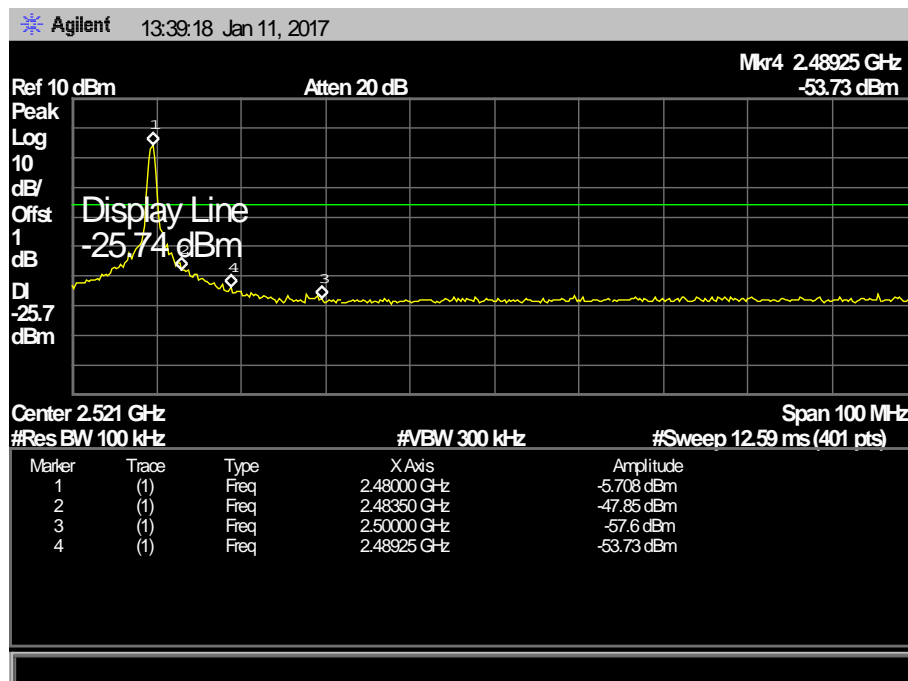
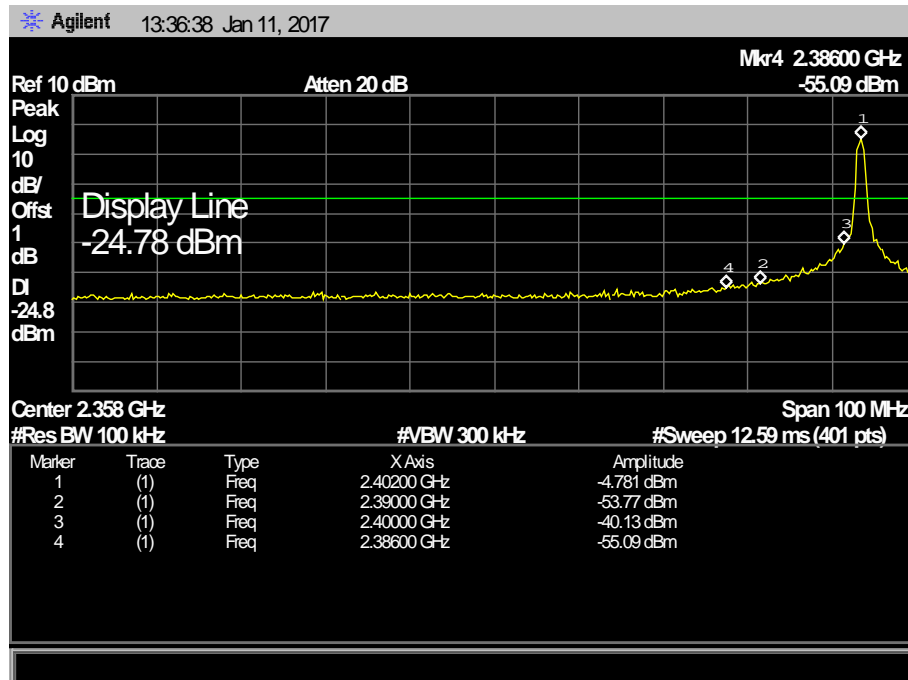


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	*	2479.900	79.44	1.15	80.59	Fundamental Frequency		AVG
2	X	2480.100	84.39	1.15	85.54	Fundamental Frequency		peak
3		2483.500	60.18	1.17	61.35	74.00	-12.65	peak
4		2483.500	39.22	1.17	40.39	54.00	-13.61	AVG

Emission Level= Read Level+ Correct Factor

(2) Conducted Test

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Test Mode:	BLE Mode TX 2402MHz / BLE Mode TX 2480MHz		
Remark:	The EUT is programed in continuously transmitting mode		



7. Bandwidth Test

7.1 Test Standard and Limit

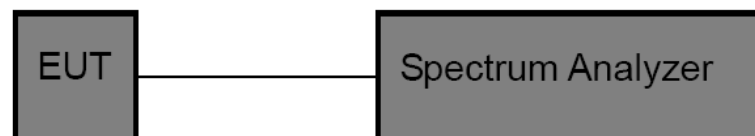
7.1.1 Test Standard

FCC Part 15.247 (a)(2)

7.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-247		
Test Item	Limit	Frequency Range(MHz)
Bandwidth	≥ 500 KHz (6dB bandwidth)	2400~2483.5

7.2 Test Setup



7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst -case (i.e the widest) bandwidth.
- (3) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

7.4 EUT Operating Condition

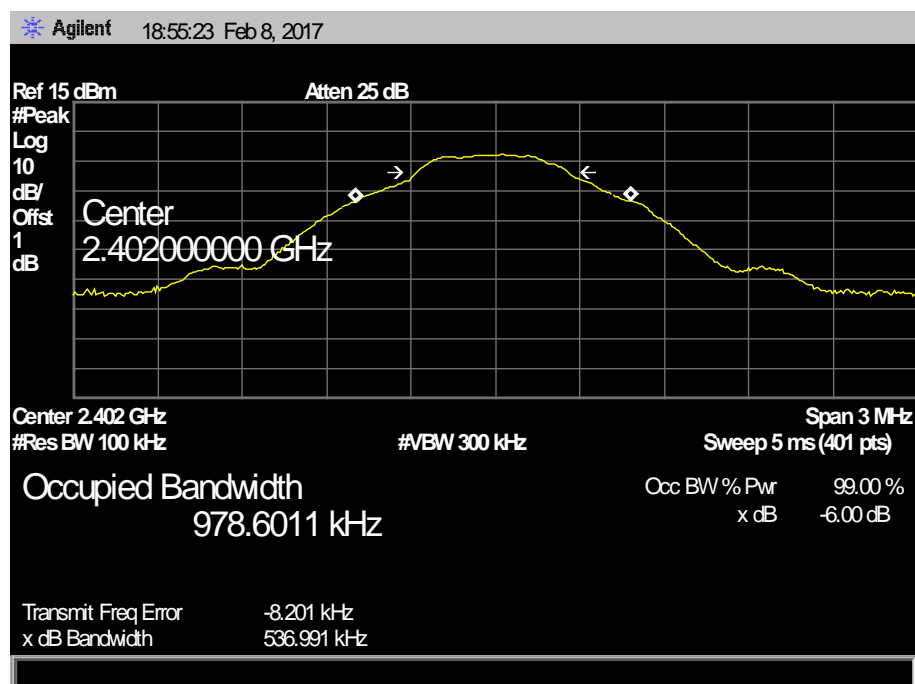
The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

7.5 Test Data

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Test Mode:	BLE TX Mode		
Channel frequency (MHz)	6dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
2402	536.991	978.6011	>=500
2442	535.865	971.2077	
2480	531.633	969.7459	

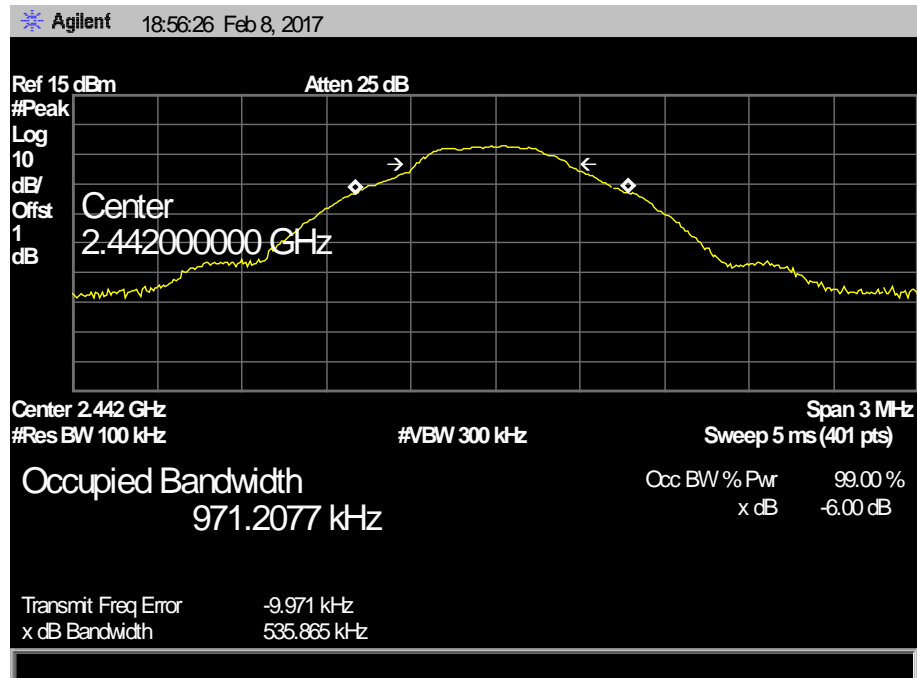
BLE Mode

2402 MHz



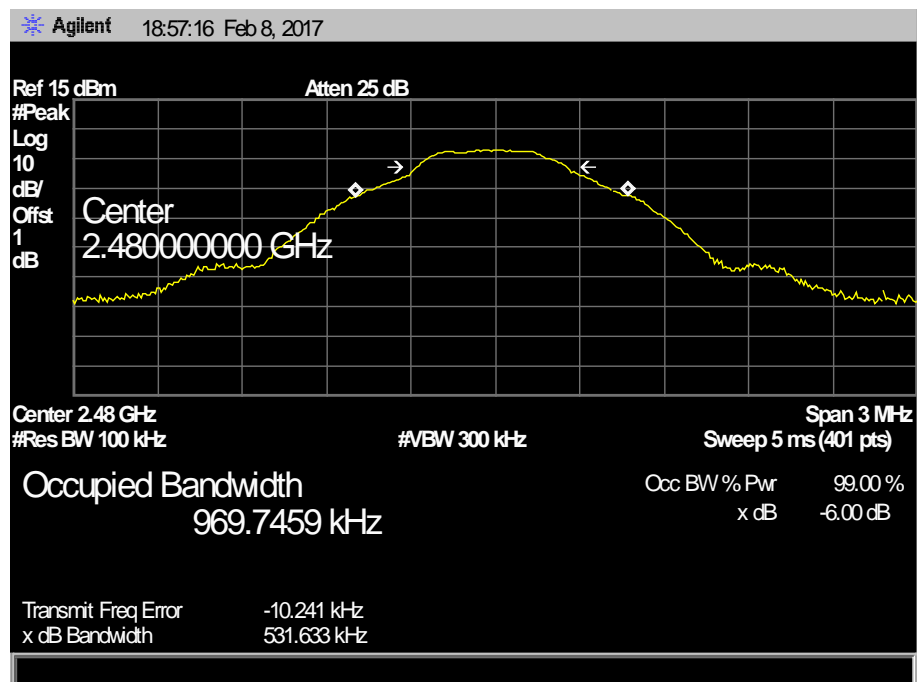
BLE Mode

2442 MHz



BLE Mode

2480 MHz



8. Peak Output Power Test

8.1 Test Standard and Limit

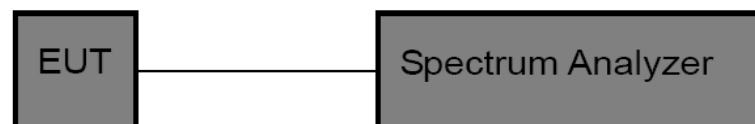
8.1.1 Test Standard

FCC Part 15.247 (b)(3)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)/RSS-247		
Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

8.2 Test Setup



8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v03r05.

- (1) Set the $RBW \geq DTS$ Bandwidth
- (2) Set $VBW \geq 3 * RBW$
- (3) Set $Span \geq 3 * RBW$
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

8.5 Test Data

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Test Mode:	BLE TX Mode		
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)	
2402	0.567	30	
2442	-0.239		
2480	0.261		
BLE Mode			
2402 MHz			

Agilent

16:45:44 Jan 8, 2017

Ref 15 dBm

Atten 25 dB

Mkr1 2.4020000 GHz
0.567 dBm

Peak

Log

10

dB/

Offst

1

dB

Marker

2.402000000 GHz

0.567 dBm

M1 S2

S3 FC

AA

Center 2.402 GHz

#Res BW 1 MHz

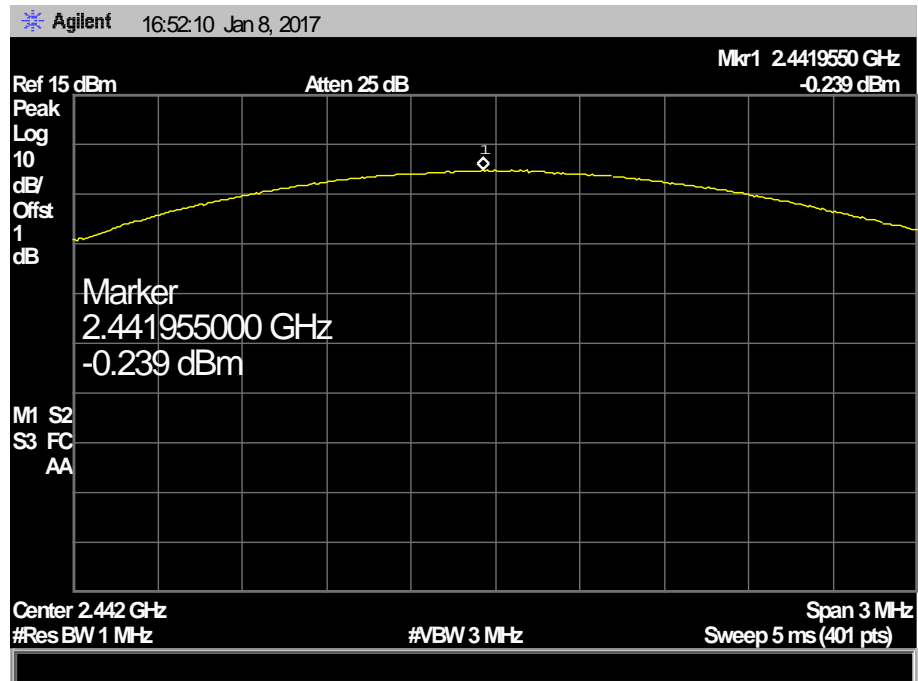
#VBW 3 MHz

Span 3 MHz

Sweep 5 ms (401 pts)

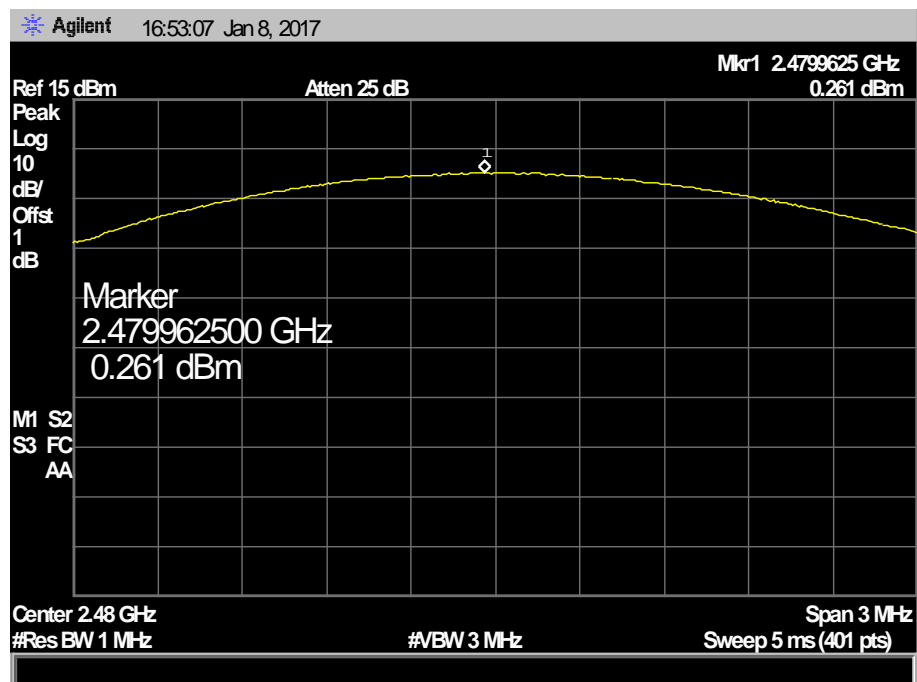
BLE Mode

2442 MHz



BLE Mode

2480 MHz



9. Power Spectral Density Test

9.1 Test Standard and Limit

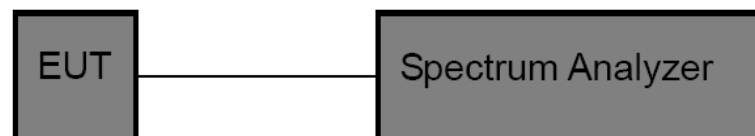
9.1.1 Test Standard

FCC Part 15.247 (e)

9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

9.2 Test Setup



9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v03r05.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequencyc.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Midle and high channel for the test.

9.5 Test Data

EUT:	BLE Anti-lost Card	Model:	TON9668
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7 V		
Test Mode:	BLE TX Mode		
Channel Frequency (MHz)	Power Density (dBm)	Limit (dBm)	Result
2402	-16.800	8	PASS
2442	-16.650		
2480	-17.600		

BLE Mode

2402 MHz

Agilent08:29:48 Feb 7, 2017

Ref 5 dBm

#Atten 25 dB

Mkr1 2.40190025 GHz
-16.8 dBm

Peak

Log

10

dB/

Offst

1

dB

Marker

2.401900250 GHz

-16.8 dBm

M1 S2

S3 FC

AA

Center 2.402 GHz

#Res BW 3 kHz

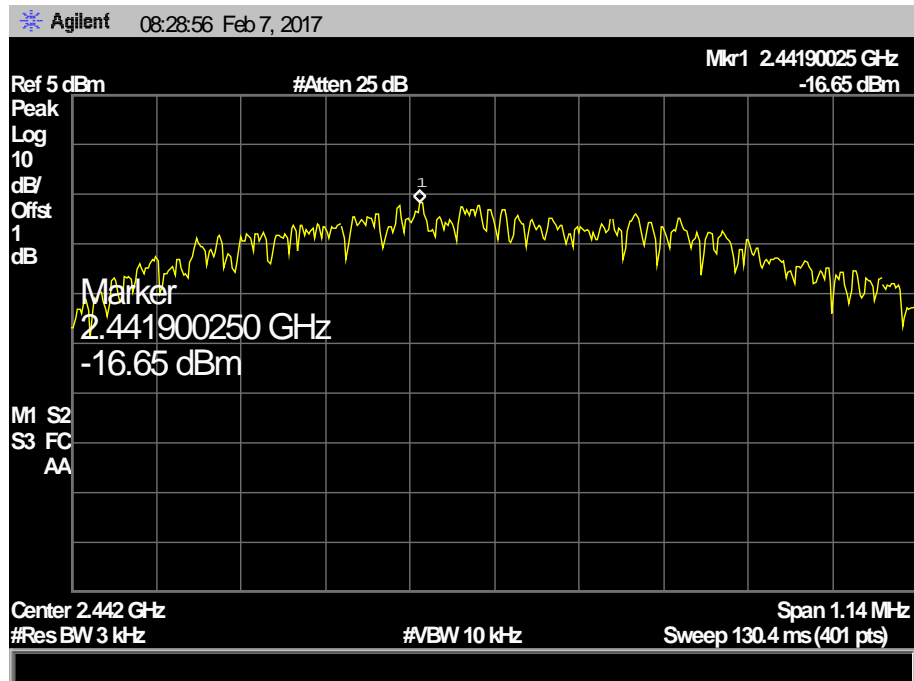
#BW 10 kHz

Sweep 130.4 ms (401 pts)

Span 1.14 MHz

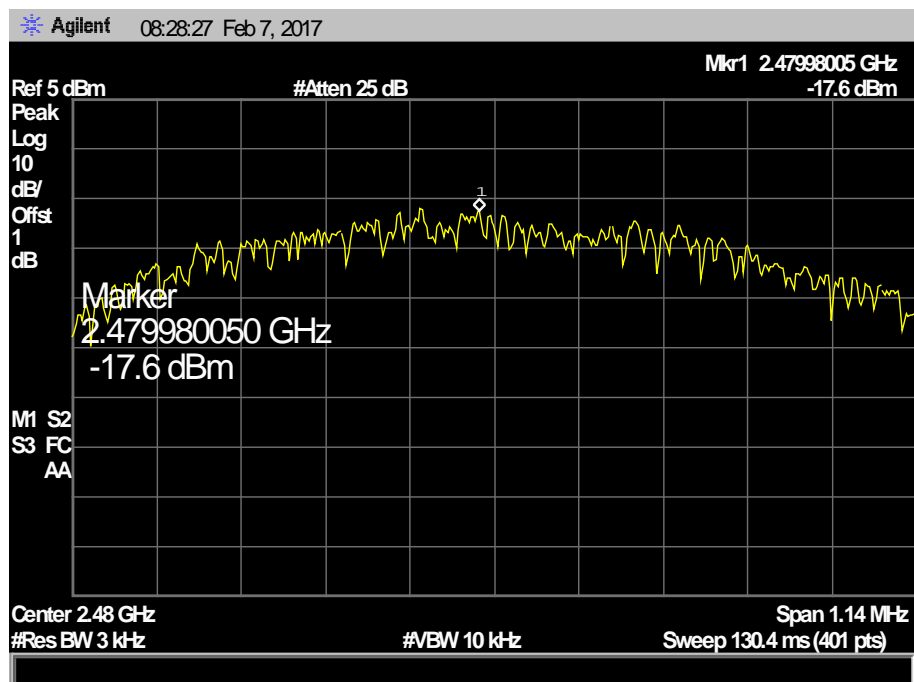
BLE Mode

2442 MHz



BLE Mode

2480 MHz



10. Antenna Requirement

10.1 Standard Requirement

10.1.1 Standard

FCC Part 15.203

10.1.2 Requirement

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

10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 2 dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

10.3 Result

The EUT antenna is a FPC Antenna. It complies with the standard requirement.

Antenna Type
<input checked="" type="checkbox"/> Permanent attached antenna
<input type="checkbox"/> Unique connector antenna
<input type="checkbox"/> Professional installation antenna

-----END OF REPORT-----