TEST REPORT

FCC ID: 2AAS5-FG2800

For

Farsun Photoelectric Science Technologies co., LTD

Wireless Barcode Scanner

Model No.	:	FG2800
Trade Name	:	华尚光电
Prepared for	:	Farsun Photoelectric Science Technologies co., LTD
Address	:	No.6 Henghui Road, Sanzao Zhuhai, Guangdong China
Prepared by	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road, Bao'an, Shenzhen, China
Report No.	:	T1860532 01
Date of Receipt	:	April 11, 2016
Date of Test	:	April 11-29, 2016
Date of Report	:	April 29, 2016
Version Number	:	REV0

Contents

DECLARATION

Applicant	:	Farsun Photoelectric Science Technologies co., LTD
Manufacturer	:	Farsun Photoelectric Science Technologies co., LTD
Product	:	Wireless Barcode Scanner
(A) Model No.	:	FG2800
(B) Trade Name	:	华尚光电
(C) Power supply	:	DC 3.7V From Battery, DC 5V From Base for charge

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231: 2015,
ANSI C63.4:2014

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Reak Yang Test Engineer	Reak Yang ……
Approved by (name + signature)…....:	Simple Guan Project Manager	……
Date of issue…… ……..:		May 03, 2016

1. General Information

1.1. Description of Device (EUT)

EUT	:	Wireless Barcode Scanner
Model No.	:	FG2800
DIFF.	:	N/A
Trade mark	:	华尚光电
Power supply	:	DC 3.7V From Battery, DC 5V From Base for charge
Operation frequency	:	433.1-434.51MHz
Channel	:	48
Channel Spacing	:	30KHz
Modulation	:	GFSK
Antenna Type	:	Internal antenna, max gain 2.5dBi.
Applicant	:	Farsun Photoelectric Science Technologies co., LTD
Address	:	No.6 Henghui Road, Sanzao Zhuhai, Guangdong China
Manufacturer		Farsun Photoelectric Science Technologies co., LTD
Address		No.6 Henghui Road, Sanzao Zhuhai, Guangdong China

1.2. Accessories of device (EUT)

Accessories	:	Adapter
Model	:	AC/DC ADAPTER
Input	:	110-240AC, 50/60Hz
Output	:	DC 5V/1000mA
Accessories2	:	SCANNER BASE
Model	:	FS-WX2800

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road, Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Summary of test result

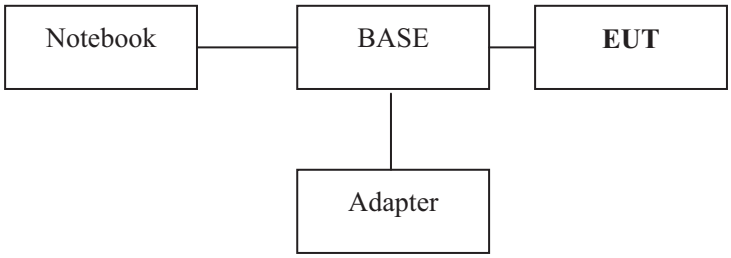
Description of Test Item	Standard	Results
Spurious Emission	Section 15.231&15.209	PASS
Conduction Emission	Section 15.207	PASS
Occupied bandwidth	Section 15.231	PASS
Transmission time	Section 15.231	PASS
Band Edge	Section 15.231	N/A
Antenna Requirement	Section 15.203	PASS
Duty cycle	Section 15.231&15.35	PASS
Note ： Test according to ANSI C63.4-2014 and ANSI C63.10-2013		

2.2. Assistant equipment used for test

Description1	:	Notebook
Manufacturer	:	ACER
Model No.	:	ZQR
Remark: FCC DOC approved		
Description2	:	Scanner Base
Manufacturer	:	FARSUN
Model No.	:	FS-WX2800
Remark: FCC VOC approved		

2.3. Block Diagram

1. For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was set into test mode before test. New battery is used during all test



2.4. Test mode

EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information				
Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
GFSK	CH1	433.10	…	…
	CH2	433.13	CH46	434.45
	CH3	433.16	CH47	434.48
	…	…	CH48	434.51
	CH23	433.76		
	CH24	433.79		
	CH25	433.82		

2.5. Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.71dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90 dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.26 dB	Polarize: H
	4.28 dB	Polarize: V
Uncertainty for conducted RF Power	0.16dB	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal. Due to	Cal Interval
3m Semi-Anechoic	CHENYU	N/A	N/A	2018.01.18	2Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2017.01.16	1Year
Receiver	R&S	ESPI	101873	2017.01.16	1Year
Receiver	R&S	ESCI	101165	2017.01.16	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	VULB9168-438	2018.01.18	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.20	2Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.01.16	1 Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2017.01.16	1 Year
Cable	Resenberger	N/A	No.1	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.2	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.3	2017.01.16	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2017.01.18	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2017.01.18	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2016.11.16	1 Year
vector Signal Generator	Agilent	E4438C	US44271917	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	2016.11.16	1 Year
Signal Analyzer	Agilent	N9020A	MY48030494	2016.11.16	1 Year

3. Radiation Emission

3.1. Radiation Emission Limits(15.209&231e)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

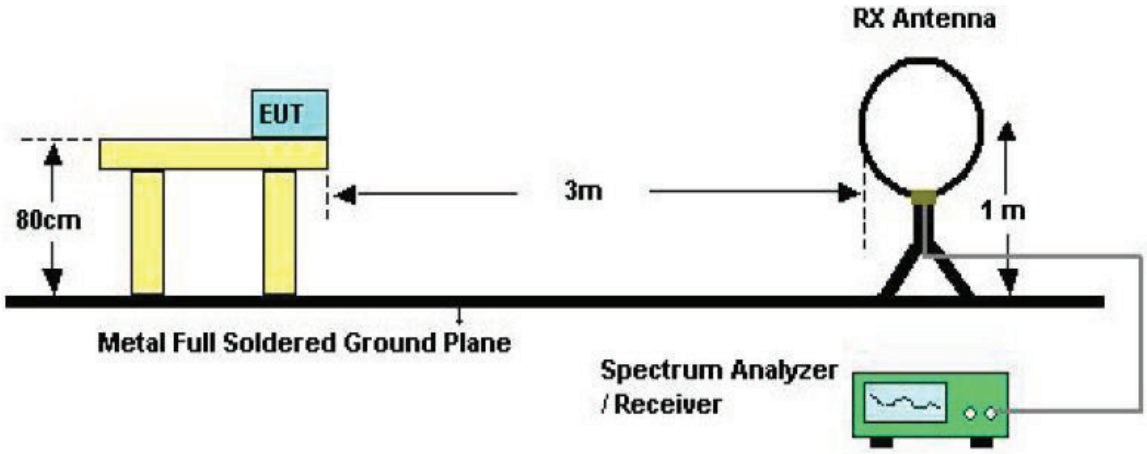
NOTE:

a) The tighter limit applies at the band edges.

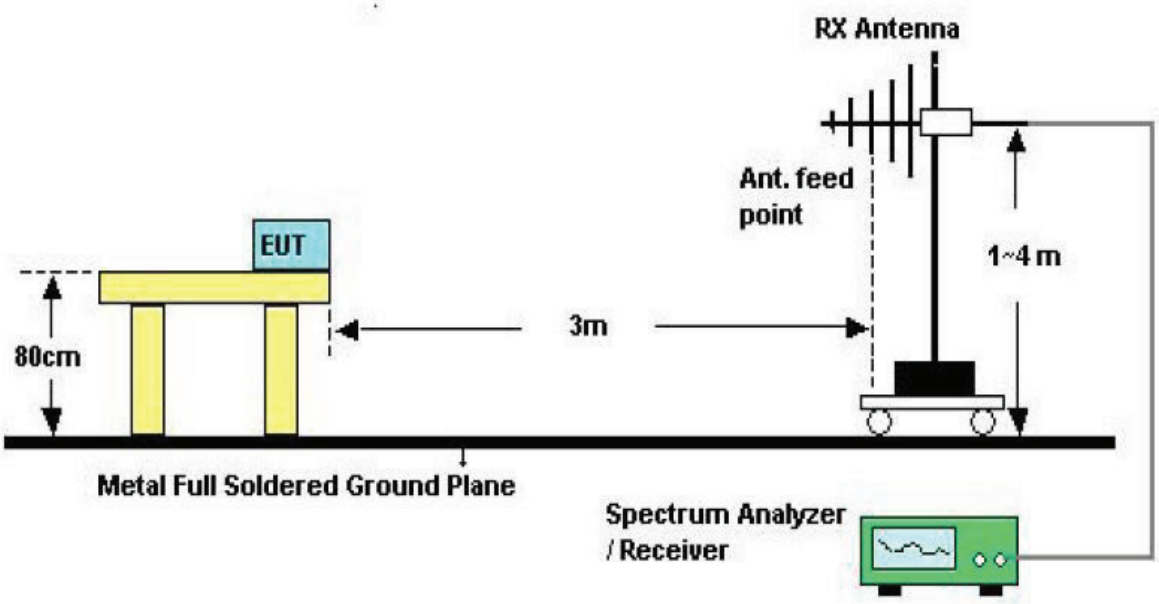
b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

3.2. Test Setup

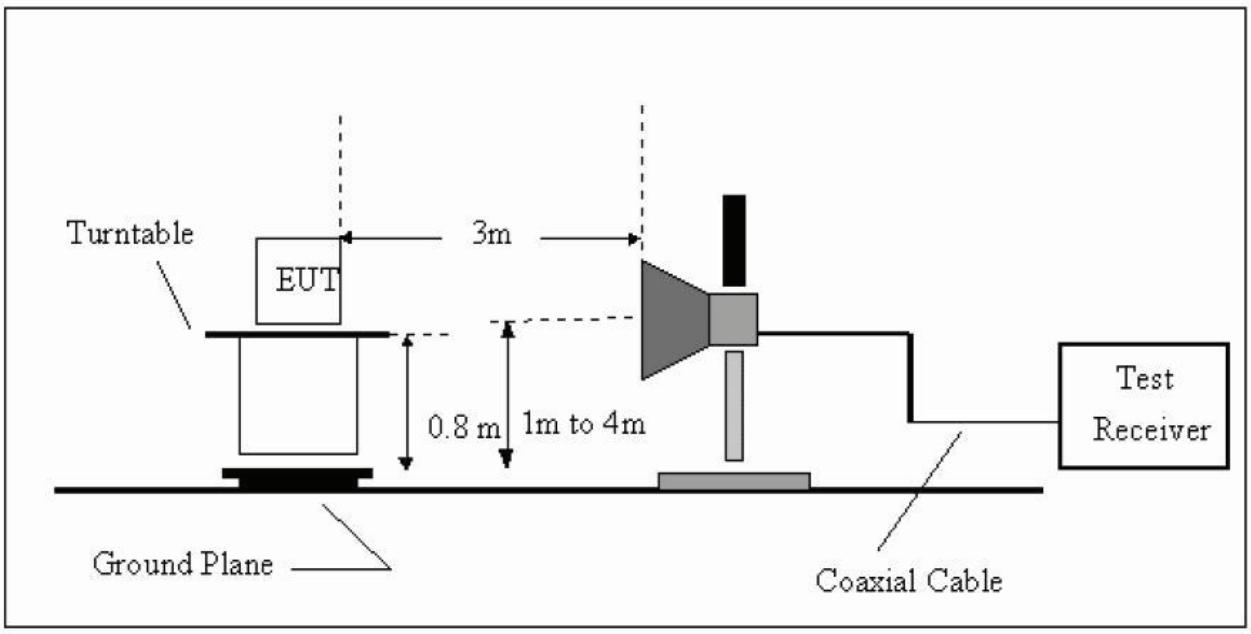
See the next page.



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.3. Test Procedure

a) The measureing distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground,The table was rotated 360 degrees to determine the position of the highest radiation
b) The Test antenna shall vary between 1m and 4m,Both Horizontal and Vertical antenna are set ot make measurement.
c) The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significent Peaks are then marked. and then Qusia Peak Detector mode remeasured
d) If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
e) For the actual test configuration, please see the test setup photo.

3.4. Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHz~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

3.5. Test Condition

Continual Transmitting in maximum power(The new battery be used during Test)

3.6. Test Result

We have scanned the 10th harmonic from 9KHz to the EUT.
Detailed information please see the following page.

From 9KHz to 30MHz: 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.

Notes: 1 --Means other frequency and mode comply with standard requirements and at least have 20dB margin.
Correct Factor=Cable Loss+Antenna Factor-Amplifier Gain
Measurement Result=Reading + Correct Factor
Margin=Measurement Result-Limit
2 –Spectrum setting:
a. Peak setting 30MHz-1GHz, RBW=100KHz, VBW=300KHz.
3- PK measure result values is less than the AVG limit values, so AV measure result values test not applicable.

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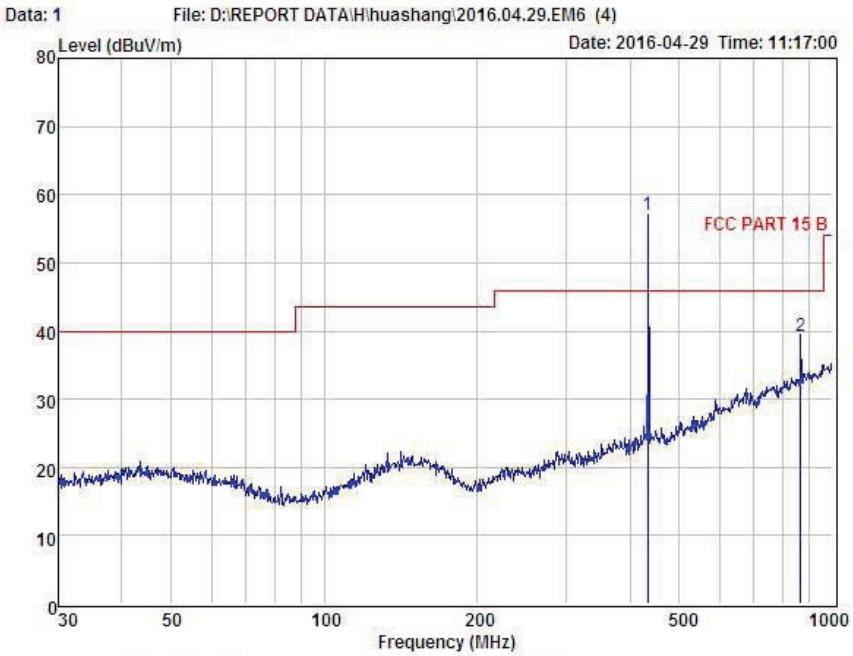

Condition : FCC PART 15 B 3m POL: HORIZONTAL
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	433.10	67.92	15.68	27.22	0.67	56.95	72.84		Peak
2	866.20	41.58	21.21	24.87	1.42	39.34	46.00	-6.66	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

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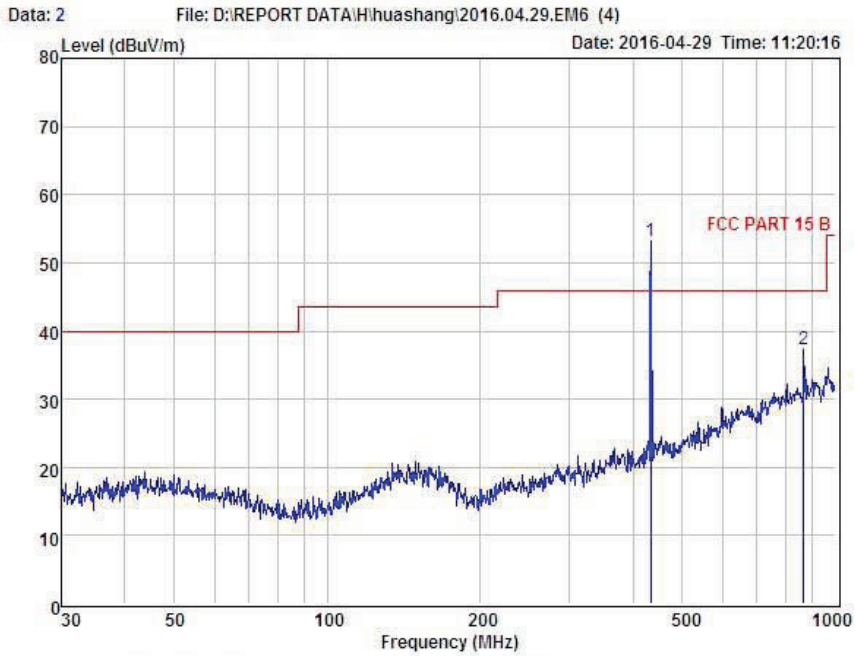

Condition : FCC PART 15 B 3m POL: VERTICAL
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	433.10	64.15	15.58	27.22	0.67	53.18	72.84		Peak
2	866.20	39.52	21.21	24.87	1.42	37.28	46.00	-8.72	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

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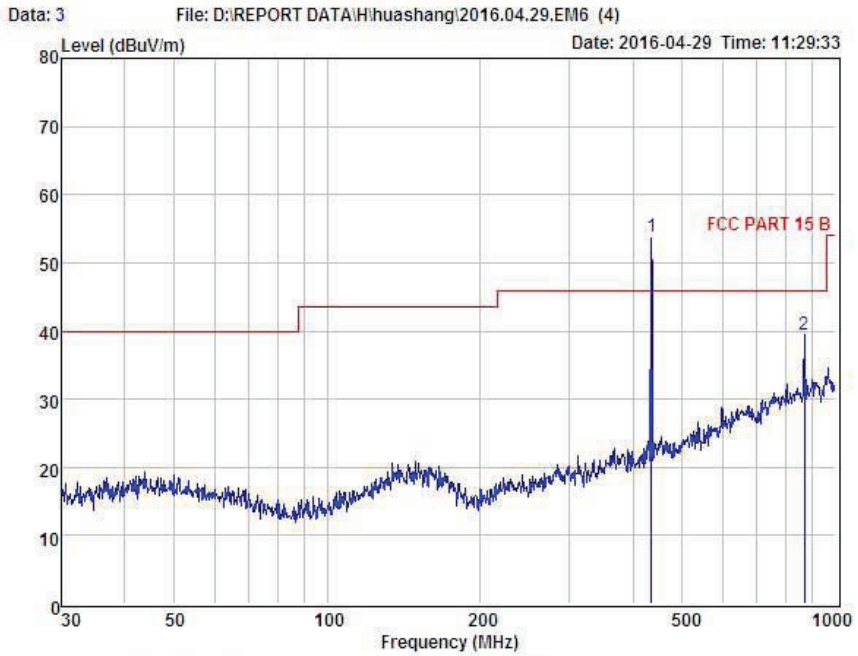

Condition : FCC PART 15 B 3m POL: VERTICAL
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	434.51	64.81	15.58	27.22	0.59	53.76	72.89		Peak
2	869.02	41.59	21.26	24.89	1.49	39.45	46.00	-6.55	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

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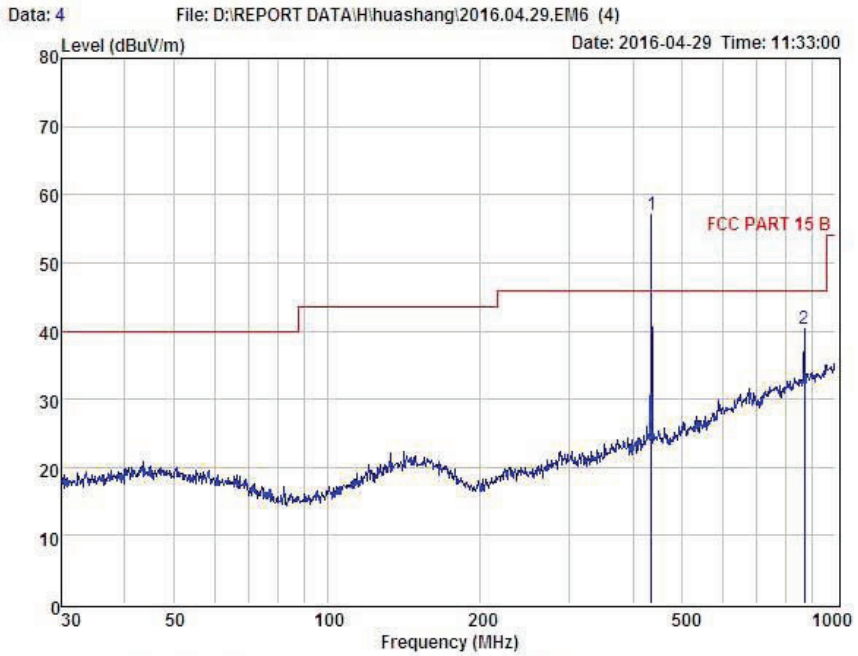


Condition : FCC PART 15 B 3m POL: HORIZONTAL
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :
Temp : 24.2℃
Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	434.51	68.00	15.58	27.22	0.59	56.95	72.89		Peak
2	869.02	42.48	21.26	24.89	1.49	40.34	46.00	-5.66	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Note: This report only list the worst data below 1GHz.

Radiated Emissions Result of Inside band above 1GHz

EUT	Wireless Barcode Scanner	**Model Name**	FG2800
Temperature	25°C	**Relative Humidity**	56%
Pressure	960hPa	**Test voltage**	DC 3.7V From Battery
Test Mode	TX CH1 CH48	**Test by**	Reak

Above 1GHz

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
1299.3	V	53.07	---	-10.83	42.23	74.00	-31.77	Peak
1303.53	V	52.74	---	-10.83	41.91	74.00	-32.09	Peak
1299.3	H	51.42	---	-10.83	40.58	74.00	-33.42	Peak
1303.53	H	51.05	---	-10.83	40.22	74.00	-33.78	Peak

4. POWER LINE CONDUCTED EMISSION

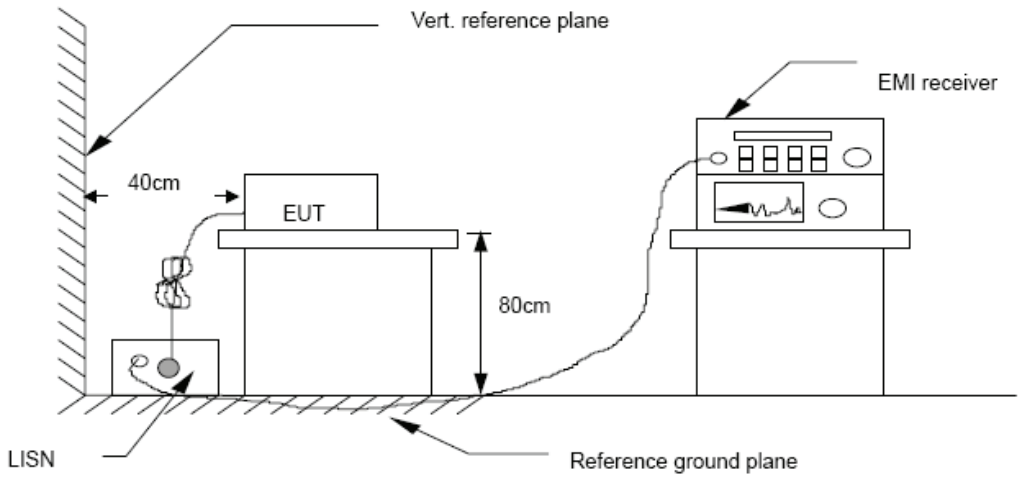
4.1. Conducted Emission Limits (15.209)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

4.2. Test Setup



4.3. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4-2014 on Conducted Emission Measurement.
The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

4.4. Test Results

Conclusion: **PASS**
Detailed information please see the following page.

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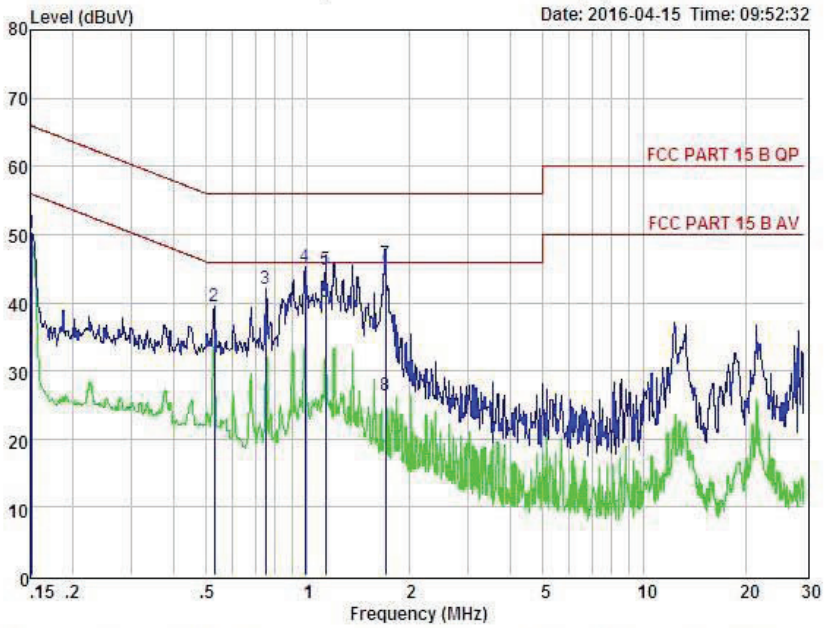
Data: 5 File: E:\TEST REPORT\p\Posmart\2016.04.15 CE.EM6 (20)



Condition : FCC PART 15 B QP POL: NEUTRAL Temp: 25℃ Hum: 51 %
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :

Item	Freq	Read Level	LISN Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	0.151	40.54	0.03	-9.49	0.10	50.16	65.96	-15.80	Peak
2	0.529	29.71	0.03	-9.58	0.10	39.42	56.00	-16.58	Peak
3	0.751	32.34	0.04	-9.59	0.10	42.07	56.00	-13.93	Peak
4	0.984	35.52	0.04	-9.63	0.10	45.29	56.00	-10.71	Peak
5	1.129	35.09	0.04	-9.64	0.10	44.87	56.00	-11.13	QP
6	1.129	30.30	0.04	-9.64	0.10	40.08	46.00	-5.92	Average
7	1.707	35.88	0.05	-9.70	0.10	45.73	56.00	-10.27	QP
8	1.707	16.55	0.05	-9.70	0.10	26.40	46.00	-19.60	Average

Remark: Level = Read Level + LISN Factor - Preamp Factor + Cable Loss

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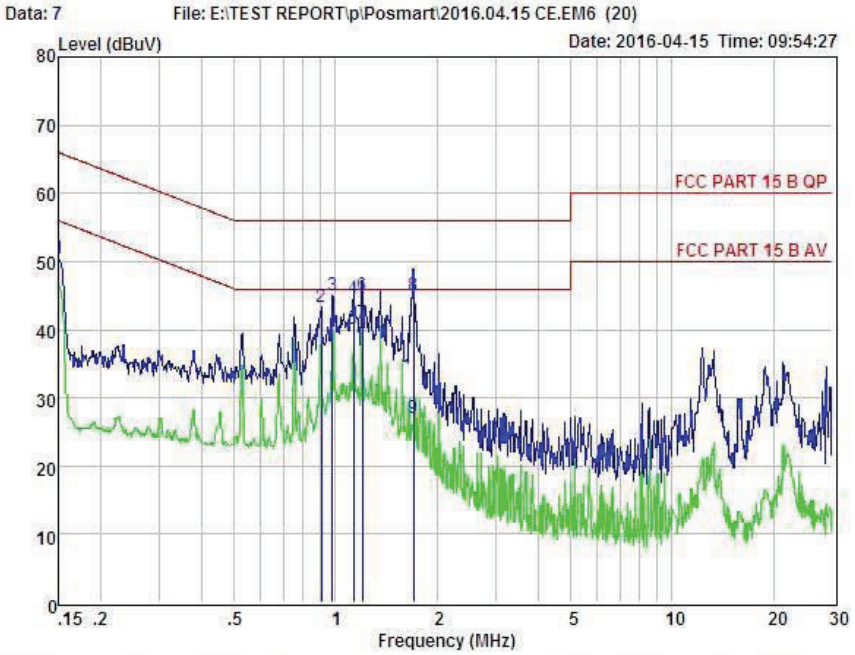


Condition : FCC PART 15 B QP POL: LINE Temp: 25℃ Hum: 51 %
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :

Item	Freq	Read Level	LISN Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	0.150	40.70	0.03	-9.49	0.10	50.32	66.00	-15.68	Peak
2	0.909	33.64	0.04	-9.62	0.10	43.40	56.00	-12.60	Peak
3	0.979	35.33	0.04	-9.63	0.10	45.10	56.00	-10.90	Peak
4	1.129	34.94	0.04	-9.64	0.10	44.72	56.00	-11.28	QP
5	1.129	30.26	0.04	-9.64	0.10	40.04	46.00	-5.96	Average
6	1.203	35.33	0.04	-9.65	0.10	45.12	56.00	-10.88	QP
7	1.203	31.26	0.04	-9.65	0.10	41.05	46.00	-4.95	Average
8	1.707	35.14	0.05	-9.70	0.10	44.99	56.00	-11.01	QP
9	1.707	17.10	0.05	-9.70	0.10	26.95	46.00	-19.05	Average

Remark: Level = Read Level + LISN Factor - Preamp Factor + Cable Loss

5. Occupied bandwidth

5.1. Test limit

Please refer section15.231

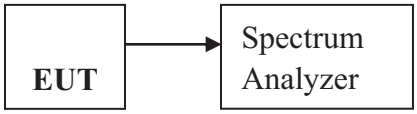
According to§15.231(C), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

5.2. Method of measurement

a)The bandwidth is measured at an amplitude level reduced 20dB 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.

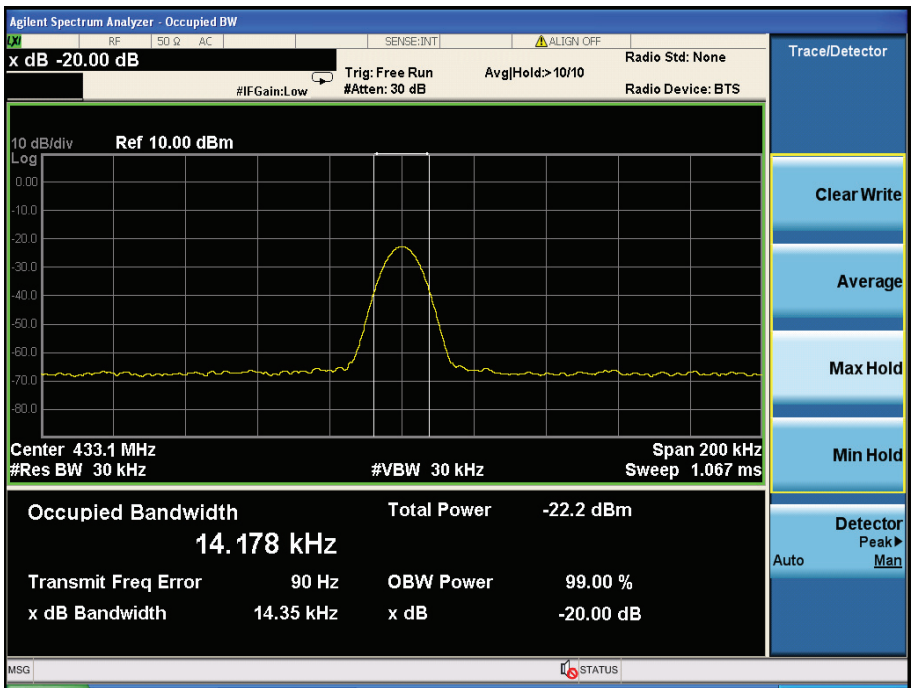
b)The test receiver RBW set 30KHz,VBW set 30KHz,Sweep time set auto.

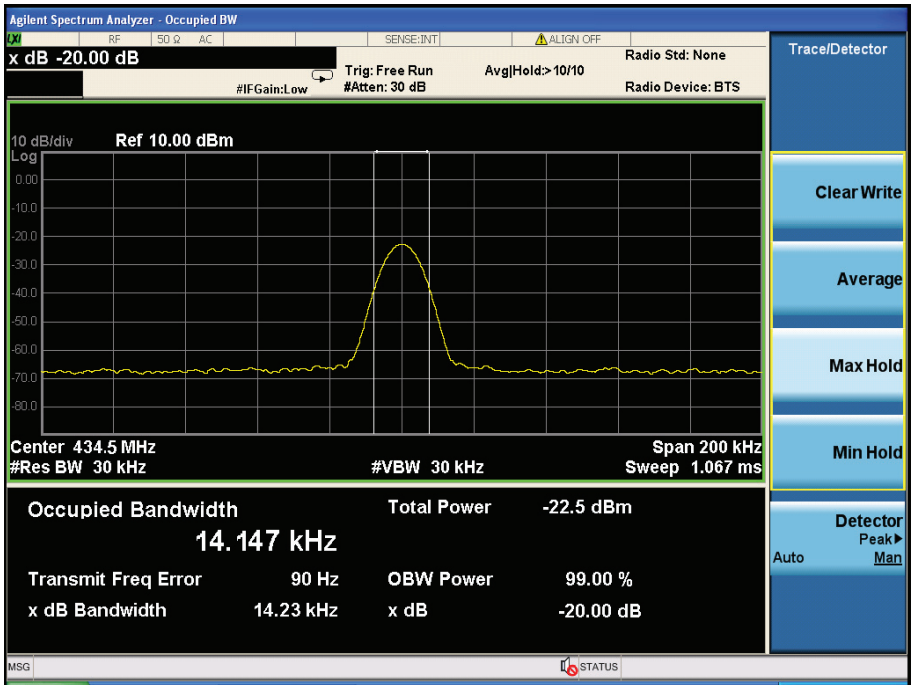
5.3. Test Setup



5.4. Test Results

EUT: Wireless Barcode Scanner				
M/N: FG2800				
Test Mode: Keeping TX mode				
Test date: 2016-04-22		Test site: RF site	Tested by: Reak	
Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
GFSK	433.10	14.35	1084.5	PASS
	434.51	14.23	1084.5	PASS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN OFF
x dB -20.00 dB
#IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg|Hold:>10/10
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 433.1 MHz
#Res BW 30 kHz
#VBW 30 kHz
Span 200 kHz
Sweep 1.067 ms
Occupied Bandwidth
14.178 kHz
Total Power -22.2 dBm
Transmit Freq Error 90 Hz
OBW Power 99.00 %
x dB Bandwidth 14.35 kHz
x dB -20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN OFF
x dB -20.00 dB
#IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg|Hold:>10/10
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 434.5 MHz
#Res BW 30 kHz
#VBW 30 kHz
Span 200 kHz
Sweep 1.067 ms
Occupied Bandwidth
14.147 kHz
Total Power -22.5 dBm
Transmit Freq Error 90 Hz
OBW Power 99.00 %
x dB Bandwidth 14.23 kHz
x dB -20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS

6. Transmission time

6.1. Test limit

Please refer section15.231(e)

According to §15.231(e), In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.2. Method of measurement

6.2.1. Place the EUT on the table and set it in transmitting mode.

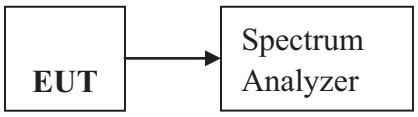
6.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3. Set spectrum analyzer Span = 0MHz, Sweep = 200ms.

6.2.4. Set the spectrum analyzer as RBW, VBW=1MHz,

6.2.5. Max hold, view and count how many channel in the band.

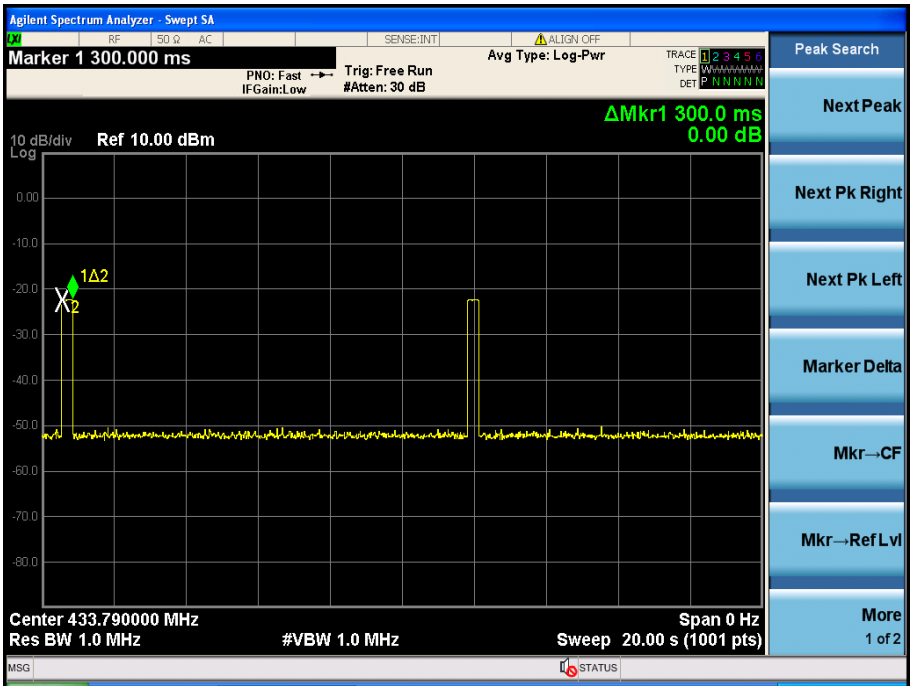
6.3. Test Setup

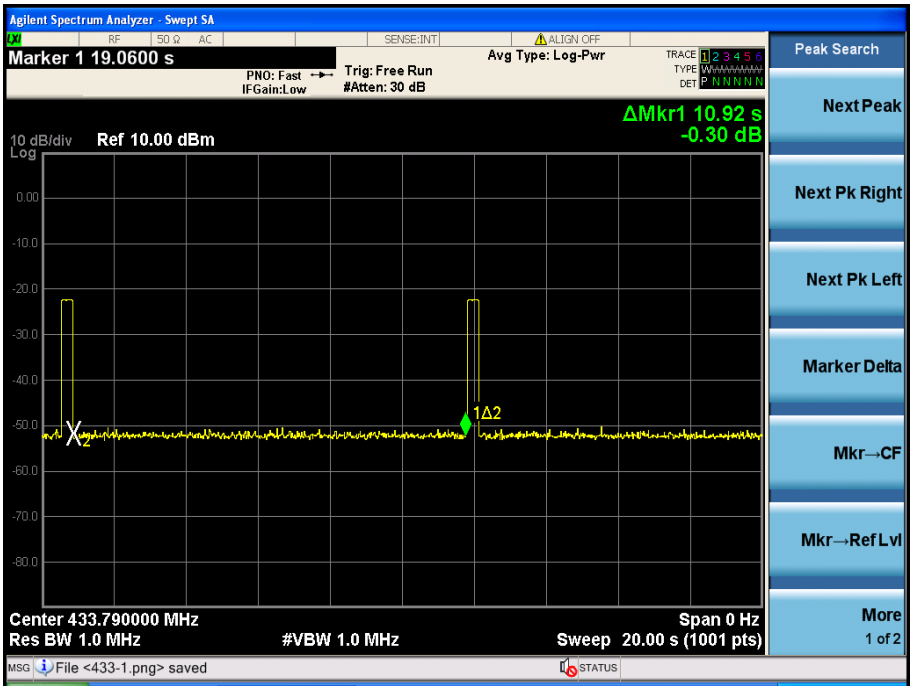


6.4. Test Results

EUT: Wireless Barcode Scanner				
M/N: FG2800				
Test Mode: Keeping TX mode				
Test date: 2016-04-22		Test site: RF site	Tested by: Reak	
Mode	Freq (MHz)	Test Result(S)	Limit (S)	Conclusion
GFSK	433.79	0.3	<1S	PASS

EUT: Wireless Barcode Scanner				
M/N: FG2800				
Test Mode: Keeping TX mode				
Test date: 2016-04-22		Test site: RF site	Tested by: Reak	
Mode	Freq (MHz)	Silent Period(S)	Limit (S)	Conclusion
GFSK	433.79	10.92	>10S	PASS




Agilent Spectrum Analyzer - Swept SA
Marker 1 19.0600 s
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
ΔMkr1 10.92 s
-0.30 dB
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
1Δ2
Center 433.790000 MHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 20.00 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
File <433-1.png> saved
STATUS

7. Antenna Requirement

7.1. Standard 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.

7.2. Antenna Connected Construction

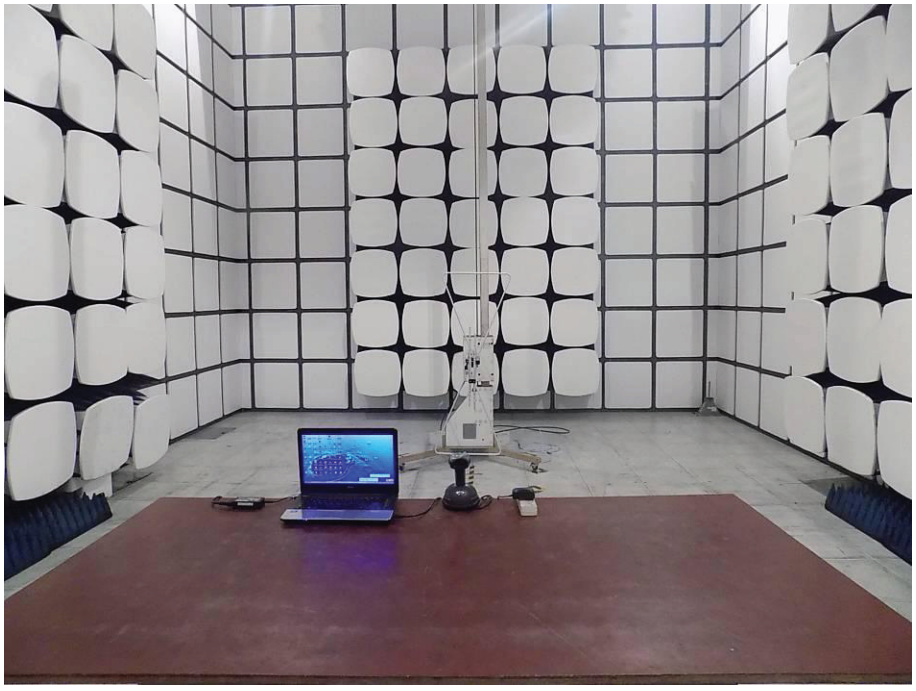
The directional gains of antenna used for transmitting is 2.5dBi, and the antenna connector is de- signed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

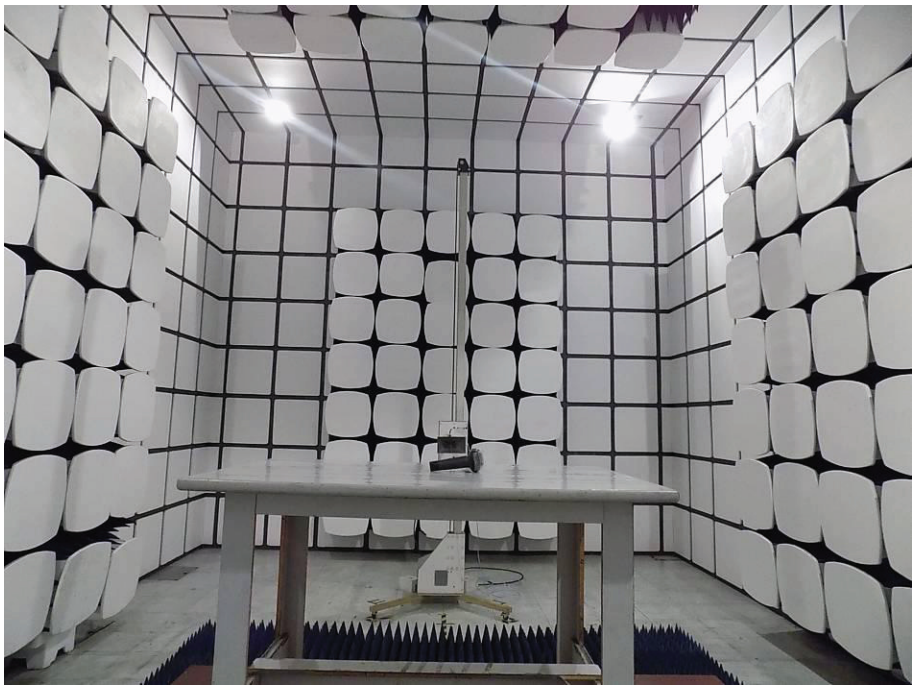
7.3. Result

The EUT antenna is Integrated antenna. It comply with the standard requirement.

8. Test setup photo

Photos of Radiated emission





Photos of Power Line Conducted Emission