

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION

Product : NeX Guard
Trade mark : Integrated
Model/Type reference : NeX Guard 1-M, NeX Guard 2-M, NeX Guard 3-M
Serial Number : N/A
FCC ID : RHRX-M
Ratings : AC 120V/60Hz
Report Number : EESZE12110004
Date : Dec. 19, 2012
Regulations : See below

Standards	Results
<input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.225:2011	PASS

Prepared for
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5/F, Torch Building, Torch Hi-tech Industrial Development Zone,
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(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: Integrated Security Technology (Zhongshan) Co., Ltd
5/F, Torch Building, Torch Hi-tech Industrial Development Zone,
ZhongShan, Guangdong, China

Manufacturer: Integrated Security Technology (Zhongshan) Co., Ltd
5/F, Torch Building, Torch Hi-tech Industrial Development Zone,
ZhongShan, Guangdong, China

Product: NeX Guard

Trade mark: Integrated

Model/Type reference: NeX Guard 1-M, NeX Guard 2-M, NeX Guard 3-M

FCC ID: RHRX-M

Sample Received Date: Dec. 12, 2012

Report Number: EESZE12110004

Date of Test: Dec. 12, 2012 to Dec. 19, 2012

The above equipment was tested by Centre Testing International for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart C and the measurement procedure according to ANSI C63.4:2003.

2. TEST SUMMARY

The complete list of measurements is given below:

No.	Test Item	Rule	Result
1	AC Conducted Emissions	Part 15.207	PASS
2	Transmitter Fundamental Field Strength	Part 15.225(a)(b)(c)(d)	PASS
3	Transmitter Radiated Spurious Emissions	Part 15.209(a), 15.225(d)	PASS
4	Transmitter Band Edge Radiated Emissions	Part 15.209(a), 15.225(c)(d)	PASS
5	Transmitter 20 dB Bandwidth	Part 2.1049	PASS
6	Transmitter Frequency Stability (Temperature & Voltage Variation)	Part 15.225(e)	PASS
7	Antenna Requirements *	Part 15.203	PASS

*: According to Section 15.203, 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 EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement items	Uncertainty
Radiated Emissions / Out of Band Emission	4.5 dB
AC Voltage	$\pm 0.06\%$
Temperature	$\pm 1\%$

4. PRODUCT INFORMATION

Items	Description
Rating	AC 120V/60Hz input, DC 12V output
Product type	Intentional Transmitter
Modulation	ASK
Operated Frequency	13.56MHz

There are three models, NeX Guard 1-M, NeX Guard 2-M and NeX Guard 3-M. All the models are same product, and NeX Guard 2-M and NeX Guard 3-M just delete some functions. The test model is NeX Guard 1-M.

5. SYSTEM TEST CONFIGURATION

For emission testing, the equipment under test (Product) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. It was powered by AC 120V/60Hz. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 200Hz from 9kHz to 150kHz, 9kHz from 150kHz to 30MHz and 100kHz or greater for frequencies between 30MHz to 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (Product) was configured for testing in a typical fashion (as the customers would normally use it). The Product was placed on a turn table, and the Antenna of Product was fully extended, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was wired to transmit continuously.

6. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model Number	Serial Number	Due Date
Receiver	R&S	ESCI	100009	07/19/2013
LISN	R&S	ENV216	100098	07/19/2013
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/09/2013
Receiver	R&S	ESCI	100435	07/19/2013
Spectrum Analyzer	Agilent	E4440A	MY46185649	03/07/2013
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	401	07/06/2013
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Loop Antenna	ETS-LINDGERN	6502	71730	07/06/2013
Temperature & Humidity Chamber	ESPEC	EL-04KA	N/A	01/19/2013

7. SUPPORT EQUIPMENT LIST

No special auxiliary equipment used.

8. AC CONDUCTED EMISSIONS

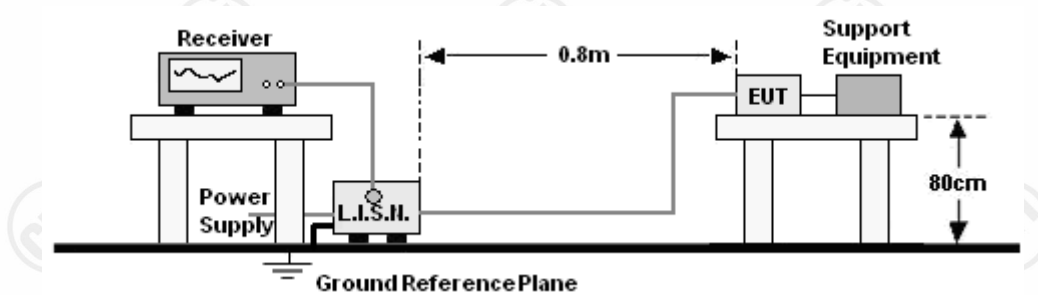
8.1 LIMITS

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

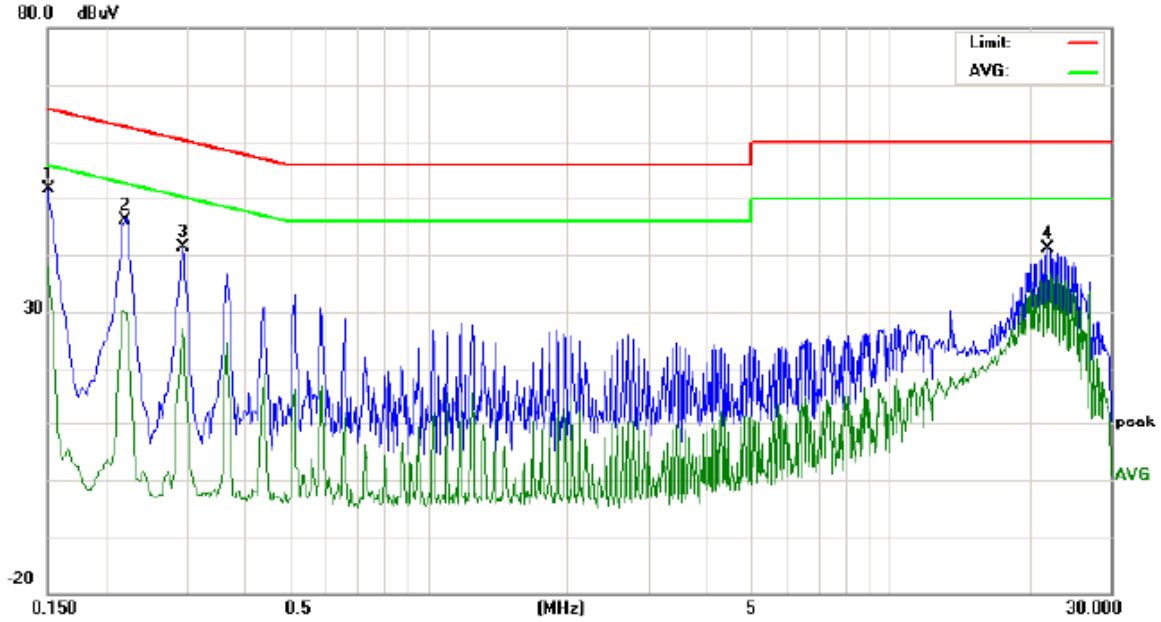
8.2 BLOCK DIAGRAM OF TEST SETUP



8.3 TEST PROCEDURE

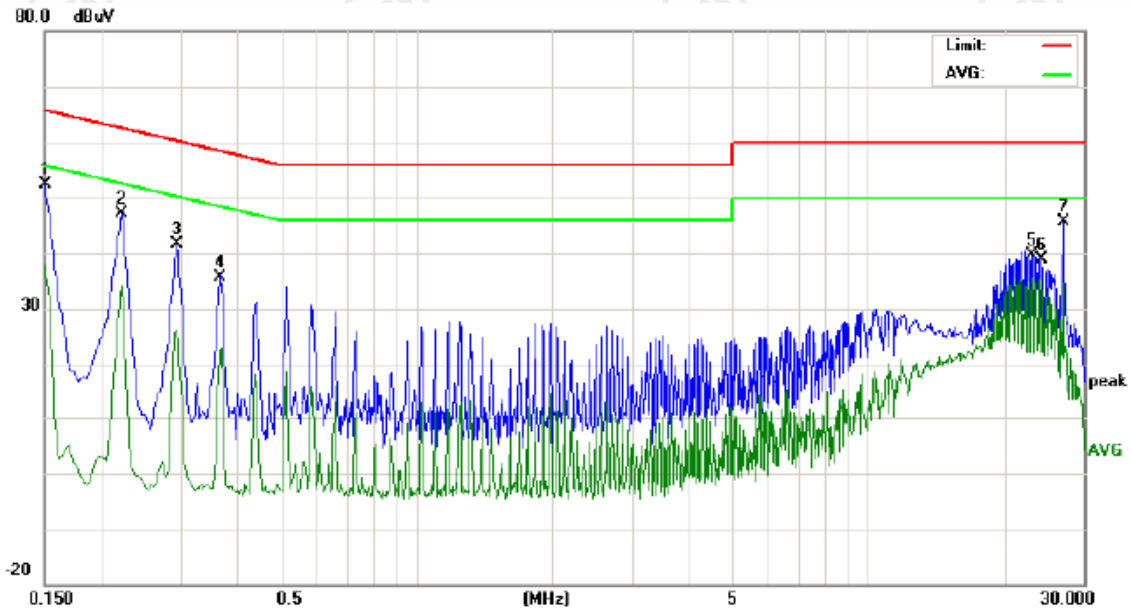
- a. The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

8.4 TEST RESULT



Site site #1 Phase: **L1** Temperature: 23
 Limit: FCC CE Power: AC 120V/60Hz Humidity: 56 %
 EUT: NeX Guard
 M/N: NeX Guard 1-M
 Mode: TX
 Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1500	41.61	36.23	28.04	9.90	51.51	46.13	37.94	65.99	55.99	-19.86	-18.05	P	
2	0.2180	35.37	29.60	20.14	9.90	45.27	39.50	30.04	62.89	52.89	-23.39	-22.85	P	
3	0.2940	31.47	28.12	17.22	9.90	41.37	38.02	27.12	60.41	50.41	-22.39	-23.29	P	
4	21.9180	30.39	28.20	25.84	10.72	41.11	38.92	36.56	60.00	50.00	-21.08	-13.44	P	



Site site #1 Phase: **N** Temperature: 23
 Limit: FCC CE Power: AC 120V/60Hz Humidity: 56 %
 EUT: NeX Guard
 M/N: NeX Guard 1-M
 Mode: TX
 Note:

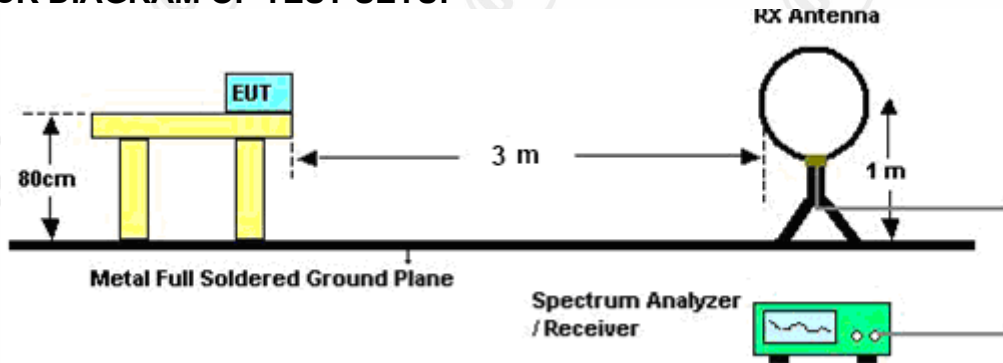
No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1500	42.39	35.20	28.02	9.90	52.29	45.10	37.92	65.99	55.99	-20.89	-18.07	P	
2	0.2220	37.11	30.25	24.32	9.90	47.01	40.15	34.22	62.74	52.74	-22.59	-18.52	P	
3	0.2940	31.81	25.20	16.24	9.90	41.71	35.10	26.14	60.41	50.41	-25.31	-24.27	P	
4	0.3700	24.31	20.12	13.05	9.90	34.21	30.02	22.95	58.50	48.50	-28.48	-25.55	P	
5	23.0580	28.85	22.01	25.01	10.73	39.58	32.74	35.74	60.00	50.00	-27.26	-14.26	P	
6	24.1820	28.14	21.02	24.41	10.74	38.88	31.76	35.15	60.00	50.00	-28.24	-14.85	P	
7	27.1260	34.79	29.30	23.88	10.77	45.56	40.07	34.65	60.00	50.00	-19.93	-15.35	P	

9. TRANSMITTER FUNDAMENTAL FIELD STRENGTH

9.1 LIMITS

The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters

9.2 BLOCK DIAGRAM OF TEST SETUP



9.3 TEST PROCEDURE

- The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the Product and rotated about its vertical axis for maximum response at each azimuth about the Product. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the Product.
- For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

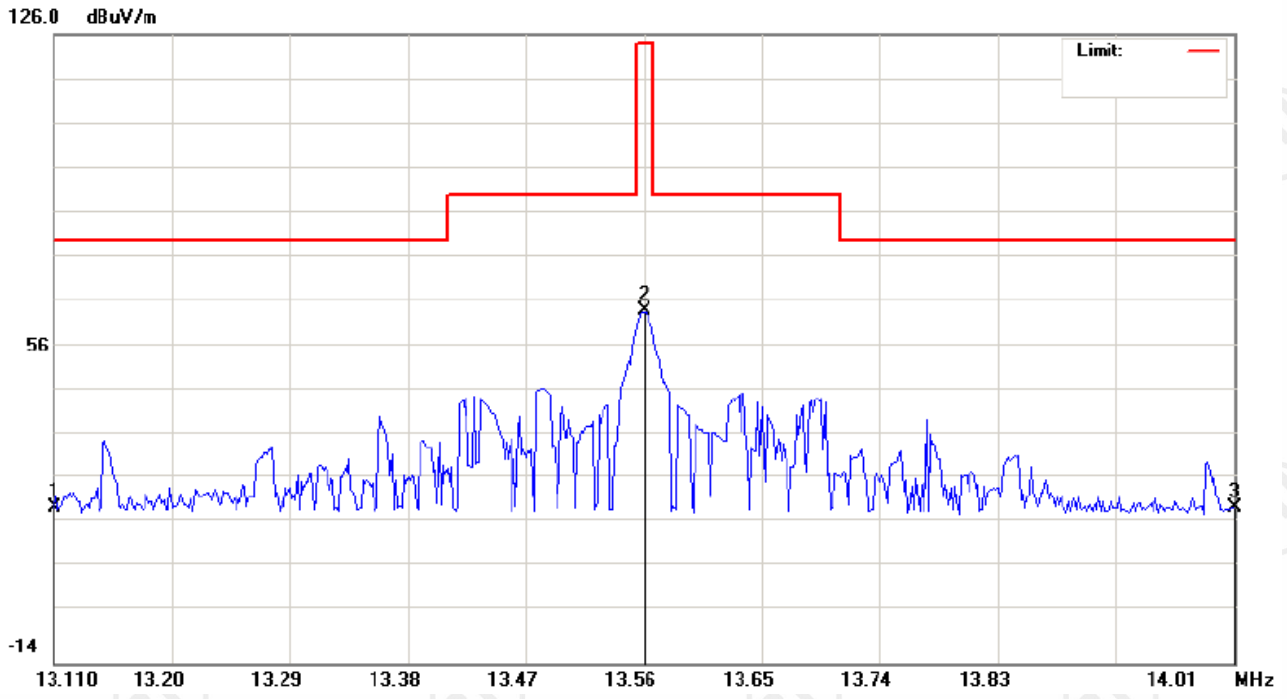
9.4 TEST RESULT

The worst data are below:

Frequency (MHz)	Antenna Polarity	PK Level (dB μ V/m)	QP Level (dB μ V/m)	Test limit_QP (dB μ V/m)	Test distance (m)	Result
13.56	90° to EUT	66.20	64.40	124	3	Pass

- Measurements were performed at 3 metres and results extrapolated to 30 metres.
- The limit is specified at a test distance of 30 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.

The worst test Graph is below:



10. TRANSMITTER RADIATED SPURIOUS EMISSIONS

10.1 LIMITS

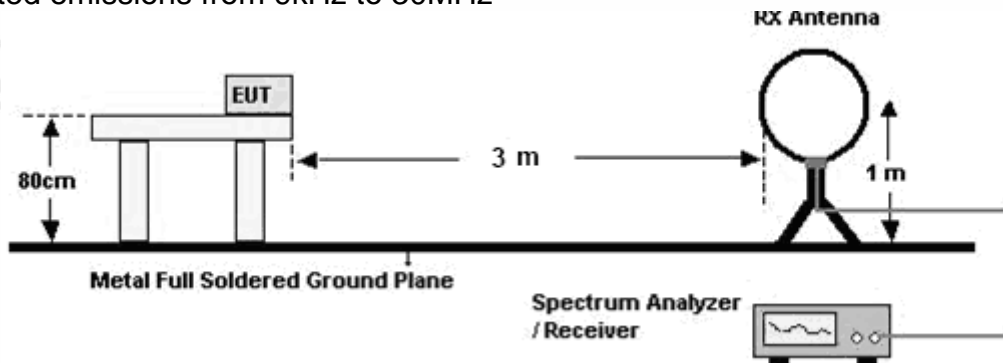
The field strength of any emissions, which appear outside of operating frequency band specified in 15.225, shall not exceed the general radiated emission limits as below.

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Distance (m)
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

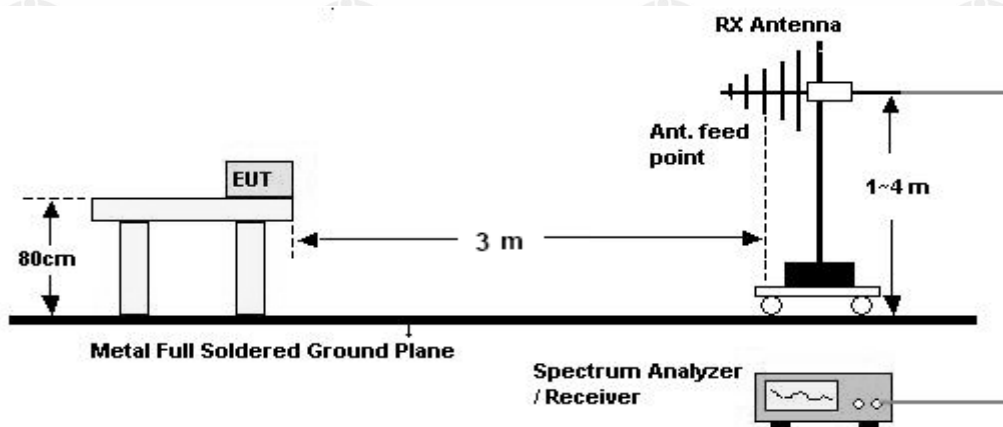
Note: the tighter limit applies at the band edges.

10.2 BLOCK DIAGRAM OF TEST SETUP

For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



10.3 TEST PROCEDURE

A. Above 30MHz

- a. The Product was placed on the top of a turntable 0.8 meters above the ground in the chamber, 3 meters away from the antenna, which was mounted on the top of a variable-height antenna tower. The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- b. For each suspected emission, the Product was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

B. Below 30MHz

- a. The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the Product and rotated about its vertical axis for maximum response at each azimuth about the Product. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the Product.
- b. For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

10.4 TEST RESULT

The worst test data are below:

Below 30MHz:

Frequency (MHZ)	Polarization (H/V)	Emission_PK (dB μ V/m) @3M	Emission_QP (dB μ V/m) @3M	Limit_QP (dB μ V/m) @3M	Results (P/F)
0.15	H	53.76	50.23	104	Pass
13.56*	H	66.20	64.40	124	Pass

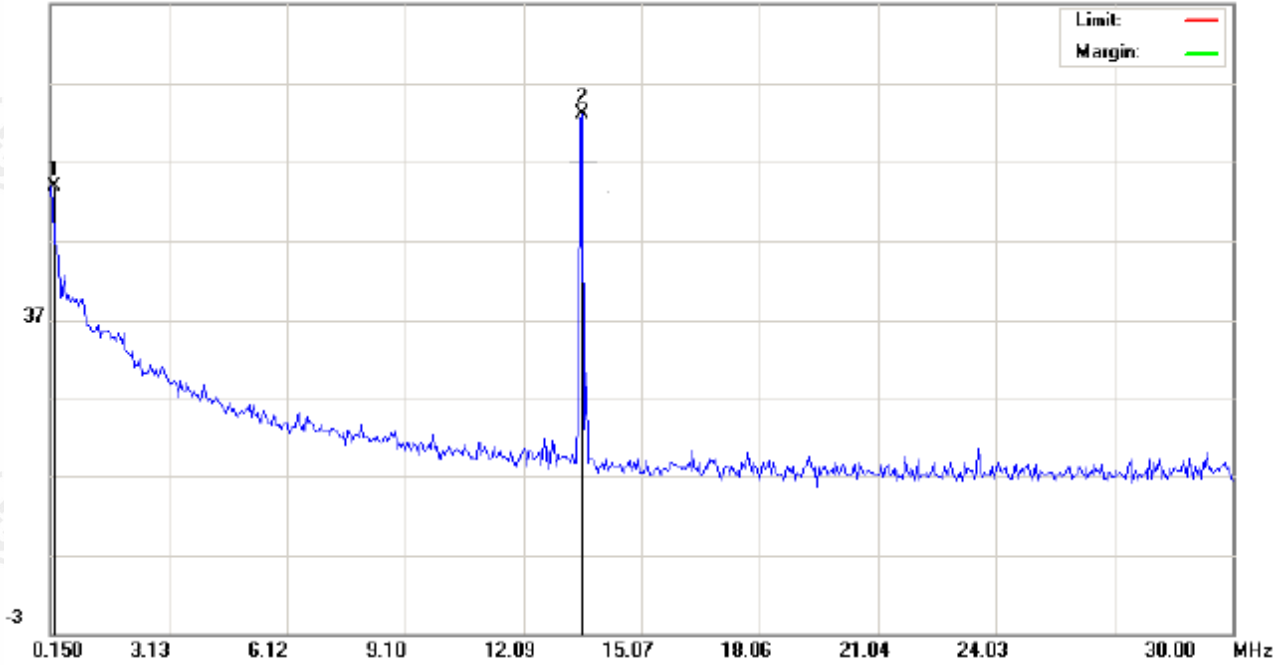
0.15	V	52.12	49.36	104	Pass
13.56*	V	61.23	60.01	124	Pass

Note:

1. The emissions below 150kHz are not reported for they are much lower than the limits.
2. *: Operated frequency
3. Measurements were performed at 3 metres and results extrapolated to 30 metres and 300 metres.
4. The limit is specified at a test distance of 30 metres and 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.

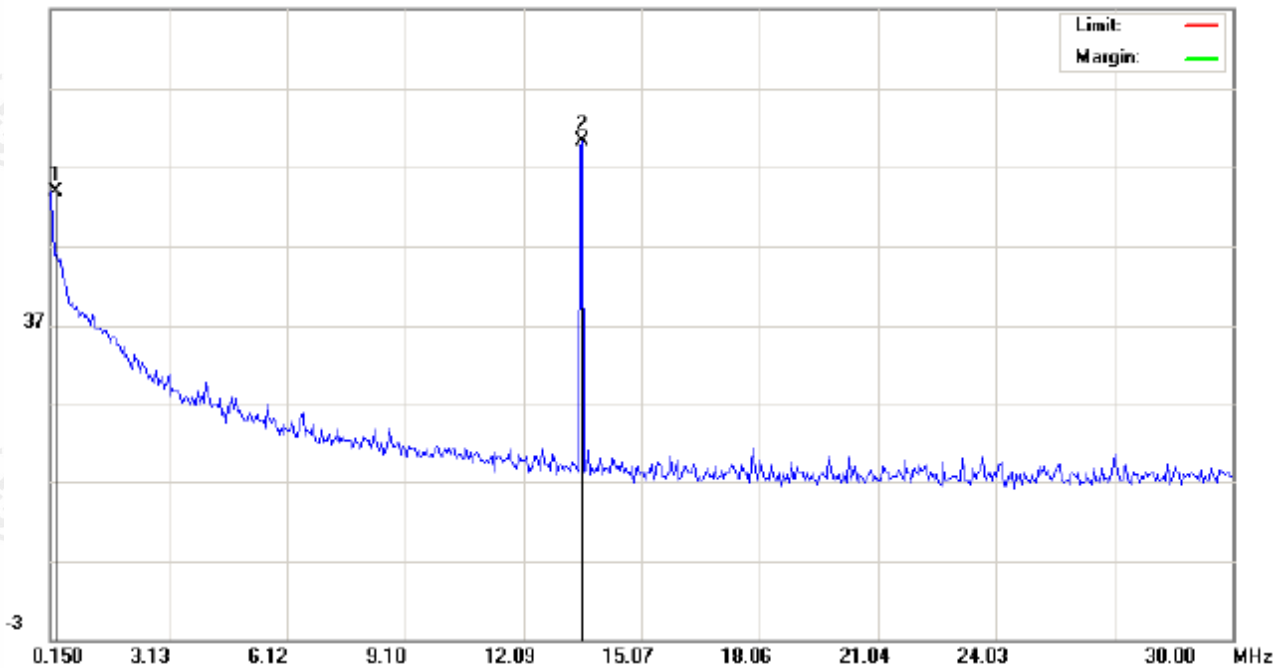
H:

76.9 dBuV/m



V:

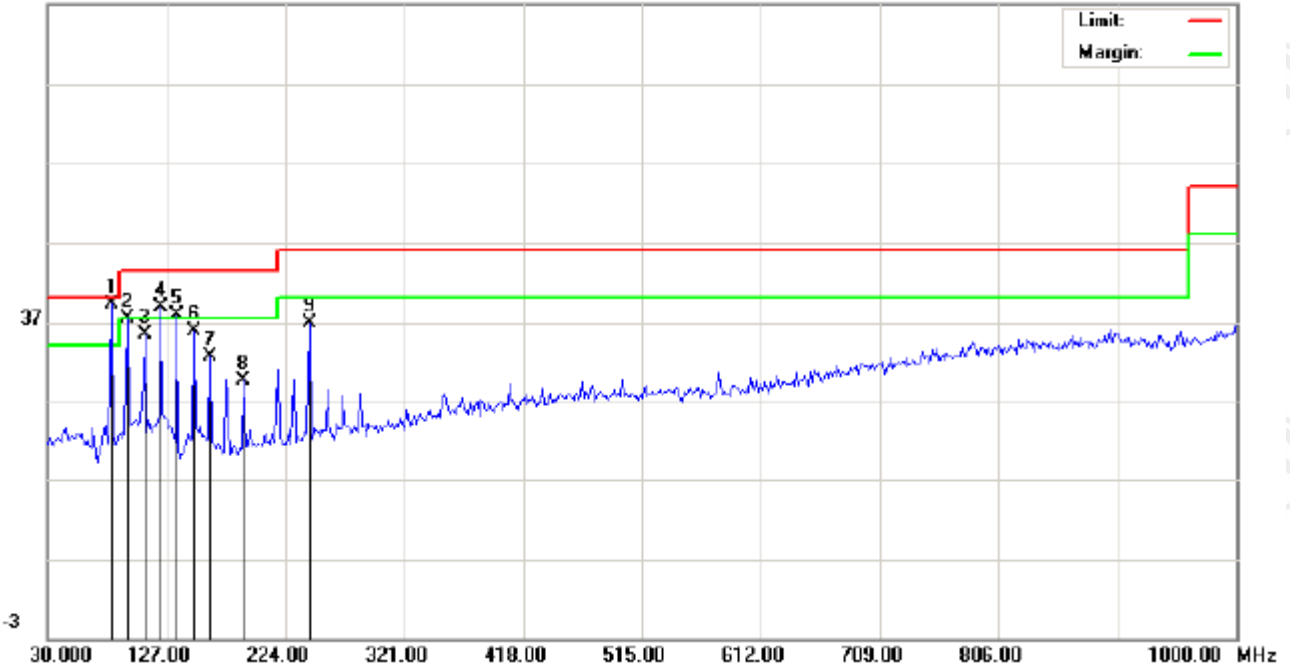
76.9 dBuV/m



Above 30MHz:

H:

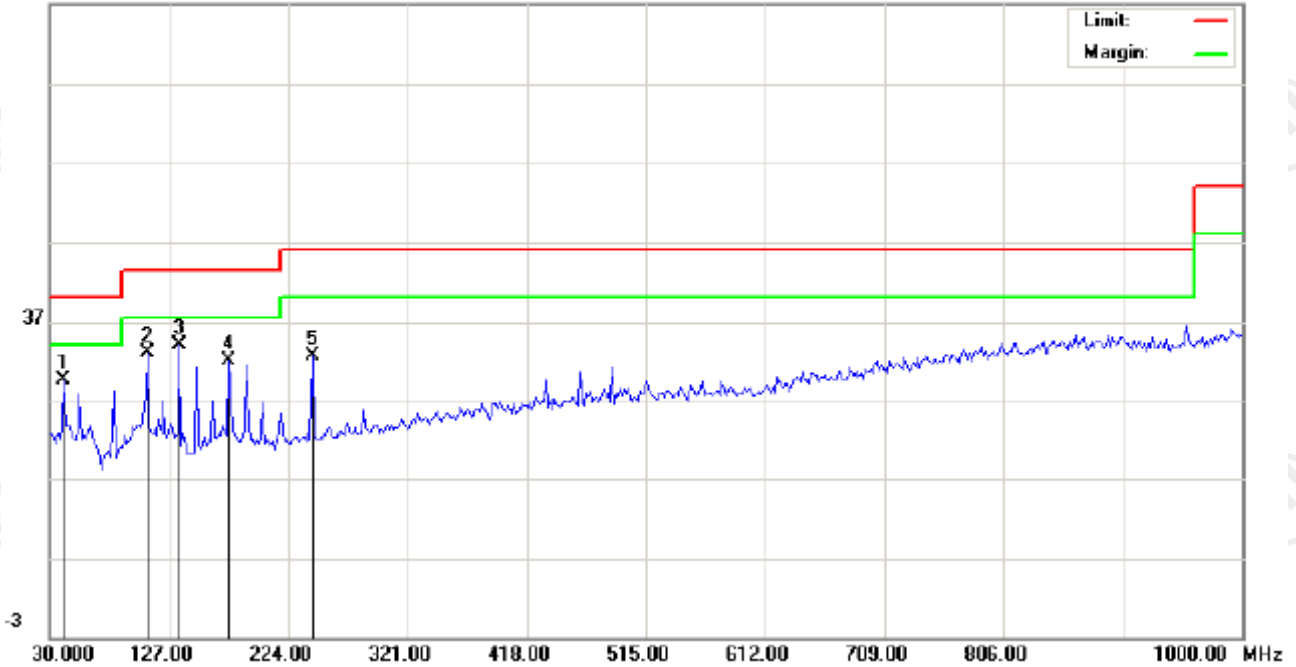
76.9 dBuV/m



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	81.7333	27.94	26.29		11.35	39.29	37.64	40.00		-2.36			P	
2	94.6667	22.46			15.02	37.48		43.50		-6.02			P	
3	109.2167	20.26			15.05	35.31		43.50		-8.19			P	
4	122.1500	25.12			13.76	38.88		43.50		-4.62			P	
5	135.0833	25.33			12.48	37.81		43.50		-5.69			P	
6	149.6331	24.72			11.04	35.76		43.50		-7.74			P	
7	162.5665	20.99			11.64	32.63		43.50		-10.87			P	
8	190.0500	16.66			13.04	29.70		43.50		-13.80			P	
9	243.4000	22.07			14.70	36.77		46.00		-9.23			P	

V:

76.9 dBuV/m



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	41.3167	14.57			15.03	29.60			40.00			-10.40		P
2	109.2167	17.93			15.05	32.98			43.50			-10.52		P
3	135.0833	21.50			12.48	33.98			43.50			-9.52		P
4	175.5000	19.75			12.30	32.05			43.50			-11.45		P
5	243.4000	17.99			14.70	32.69			46.00			-13.31		P

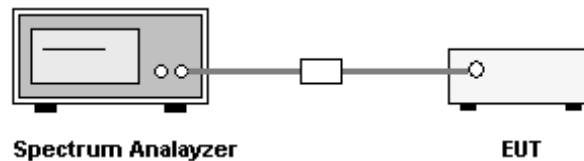
11 TRANSMITTER BAND EDGE RADIATED EMISSIONS

11.1 LIMITS

Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

11.2 BLOCK DIAGRAM OF TEST SETUP



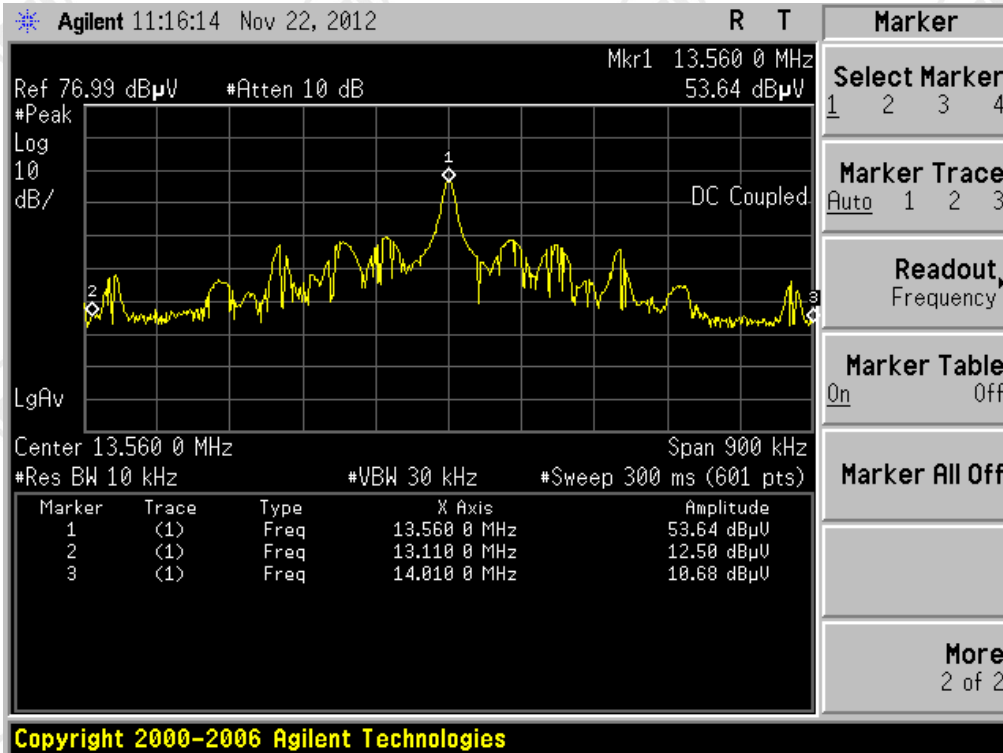
11.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine band-edge compliance as required.

11.4 TEST RESULT

Channel Frequency (MHz)	Fundamental Emission (dB μ V/m)	Delta (dB)	Final Emission (dB μ V/m)	Limit_QP @ 3m	Result
	PK		PK		
13.56	66.20	---	---	---	---
13.11	---	41.14	25.06	80.5	Pass
14.01	---	42.96	23.24	80.5	Pass

1. Measurements were performed at 3 metres and results extrapolated to 30 metres.
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.

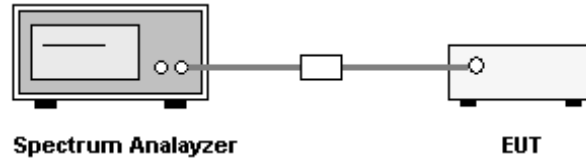


12. TRANSMITTER 20 DB BANDWIDTH

12.1 LIMITS

None

12.2 BLOCK DIAGRAM OF TEST SETUP

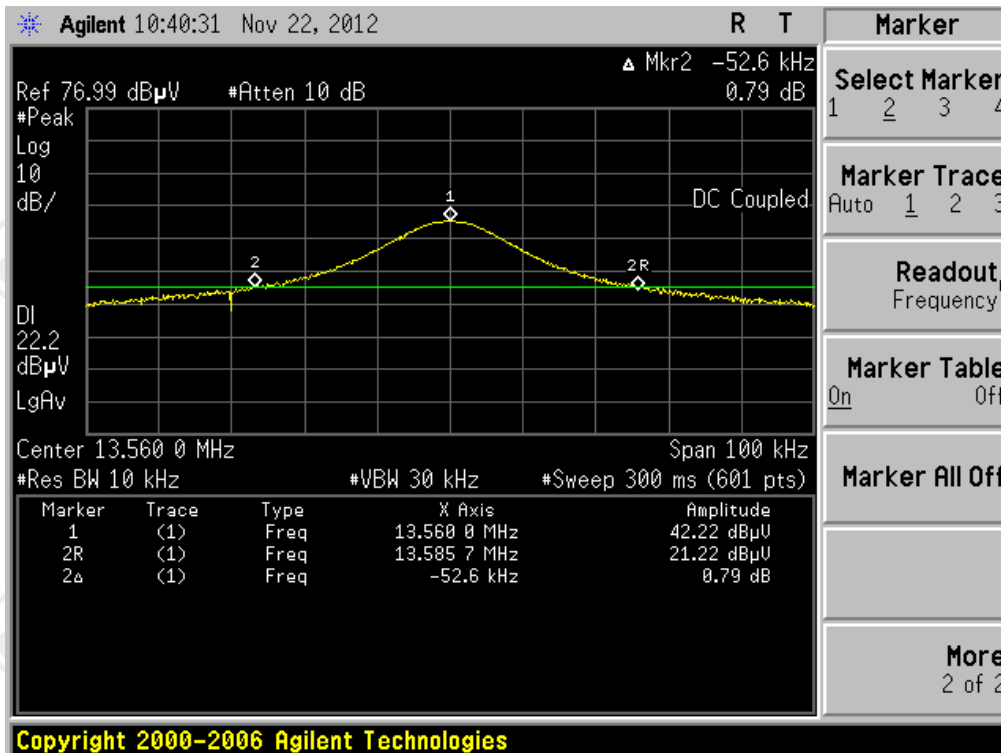


12.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

12.4 TEST RESULT

Frequency (MHz)	20 dB BW (kHz)
13.56	52.6

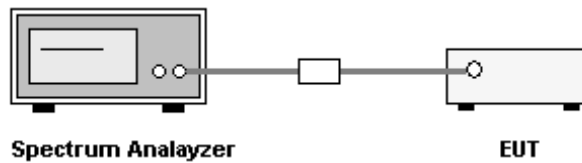


13. TRANSMITTER FREQUENCY STABILITY

13.1 LIMITS

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

13.2 BLOCK DIAGRAM OF TEST SETUP



13.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

13.4 TEST RESULT

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	57

Maximum frequency error of the EUT with variations in ambient temperature:

Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Result
-20	13.56	13.559978	-22	0.000162	0.01	Pass
20	13.56	13.560000	0	0	0.01	Pass
50	13.56	13.559927	-73	0.000538	0.01	Pass

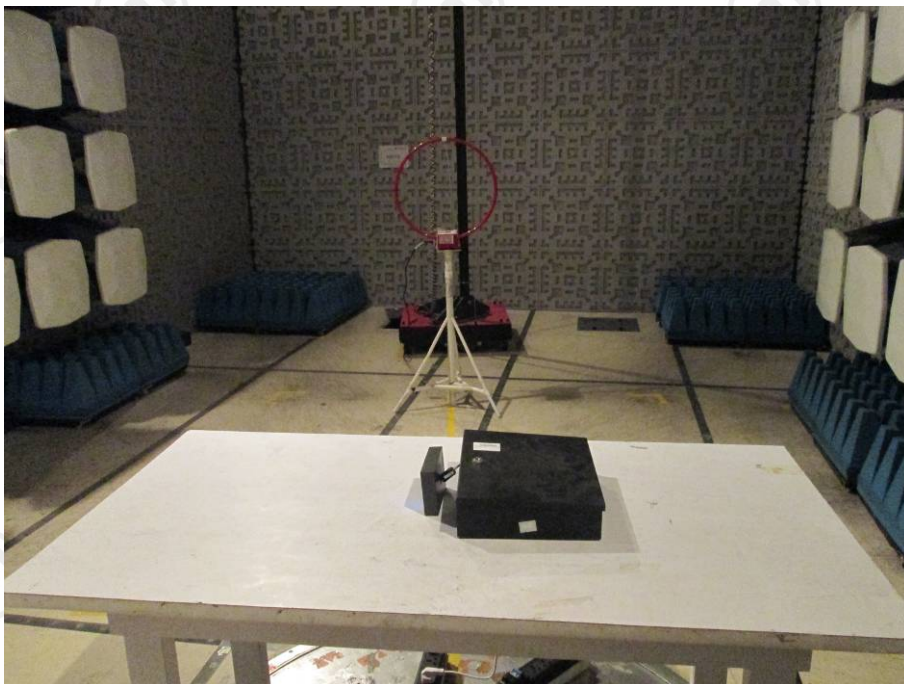
Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20 °C:

Supply Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Result
102	13.56	13.559979	-21	0.000155	0.01	Pass
120	13.56	13.560000	0	0	0.01	Pass
138	13.56	13.559980	-20	0.000147	0.01	Pass

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



TEST SETUP OF CONDUCTED EMISSION



TEST SETUP OF RADIATED EMISSION (Below 30MHz)



TEST SETUP OF RADIATED EMISSION (30MHz~1GHz)

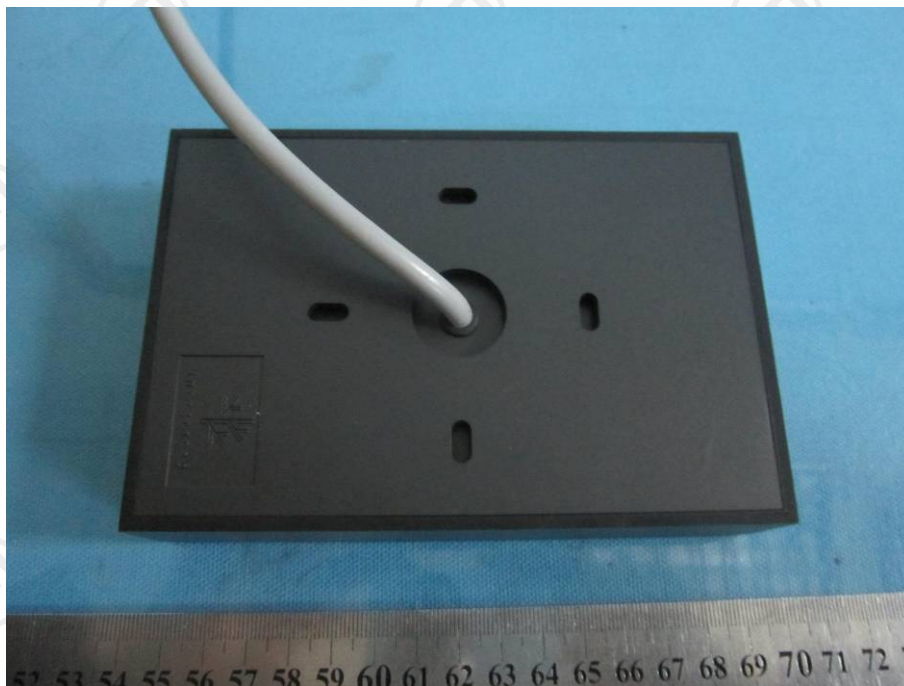


TEST SETUP OF TRANSMITTER FREQUENCY STABILITY

APPENDIX 2 PHOTOGRAPHS OF EUT



View of EUT-1(NeX Guard 1-M)



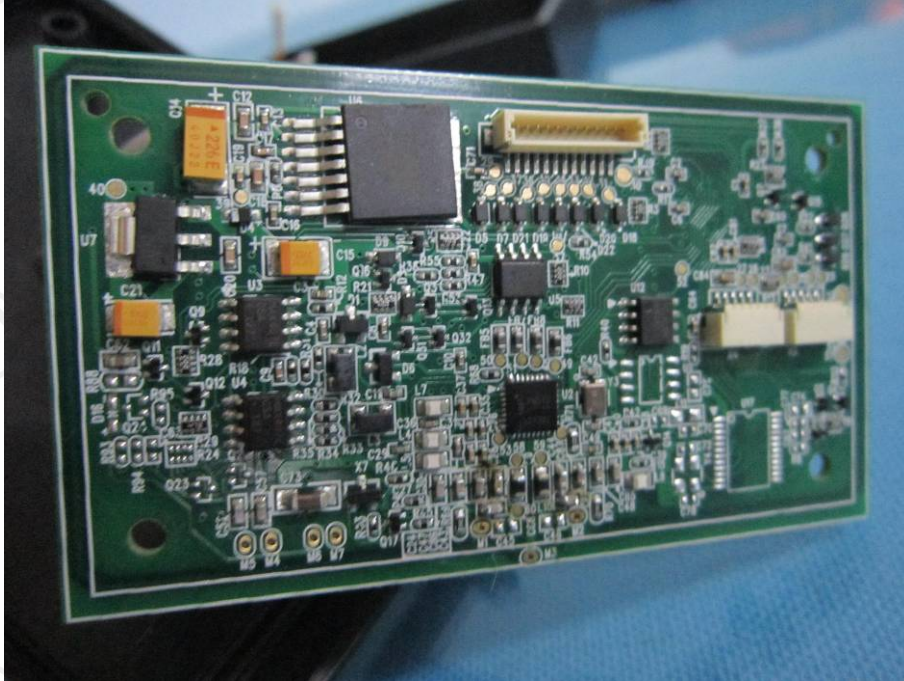
View of EUT-2(NeX Guard 1-M)



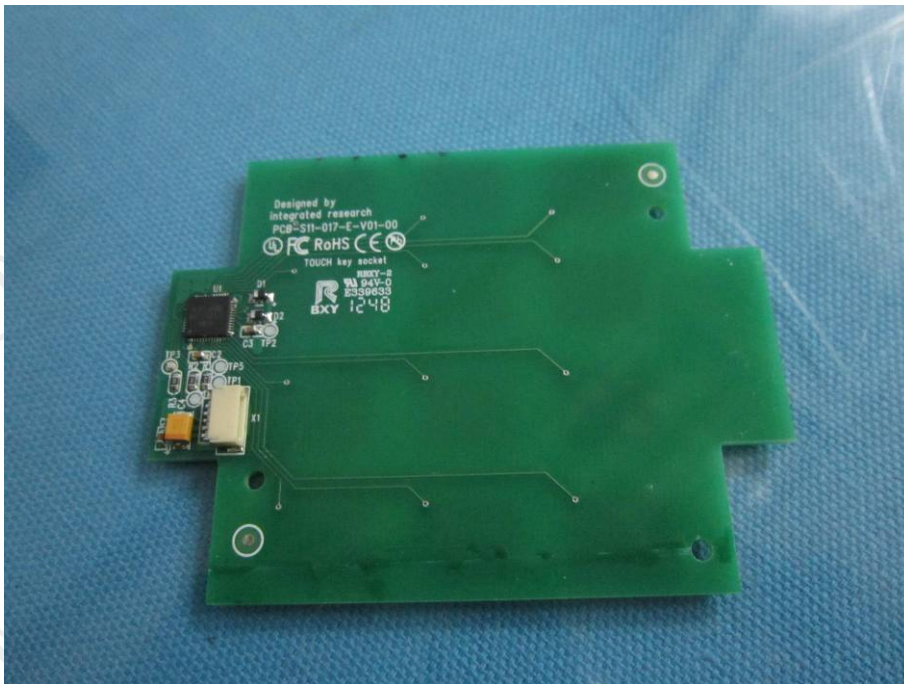
View of EUT-3(NeX Guard 1-M)



View of EUT-4(NeX Guard 1-M)



View of EUT-5(NeX Guard 1-M)



View of EUT-6(NeX Guard 1-M)



View of EUT-7(NeX Guard 1-M)



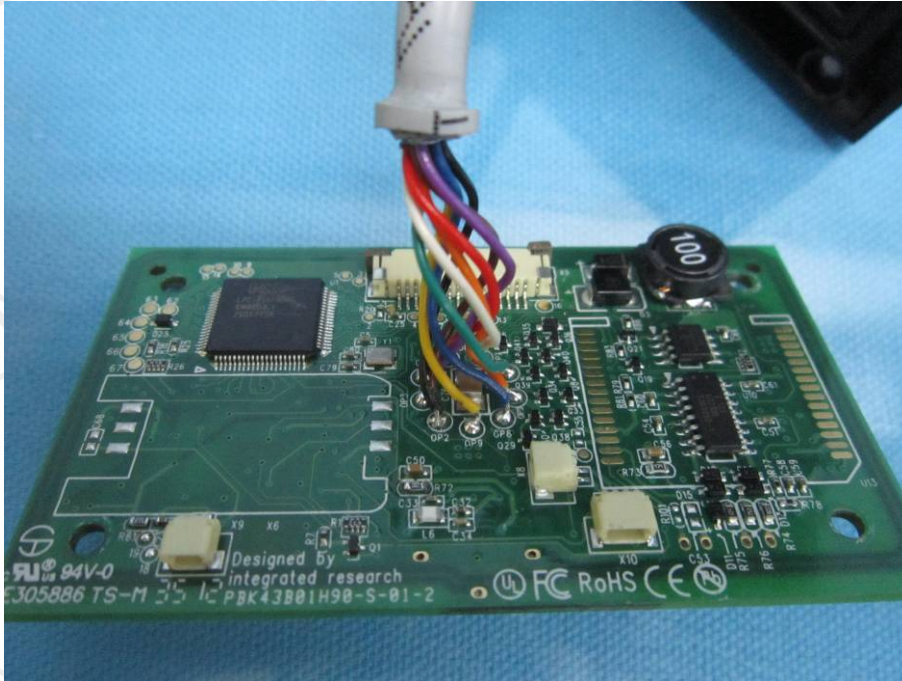
View of EUT-1(NeX Guard 2-M)



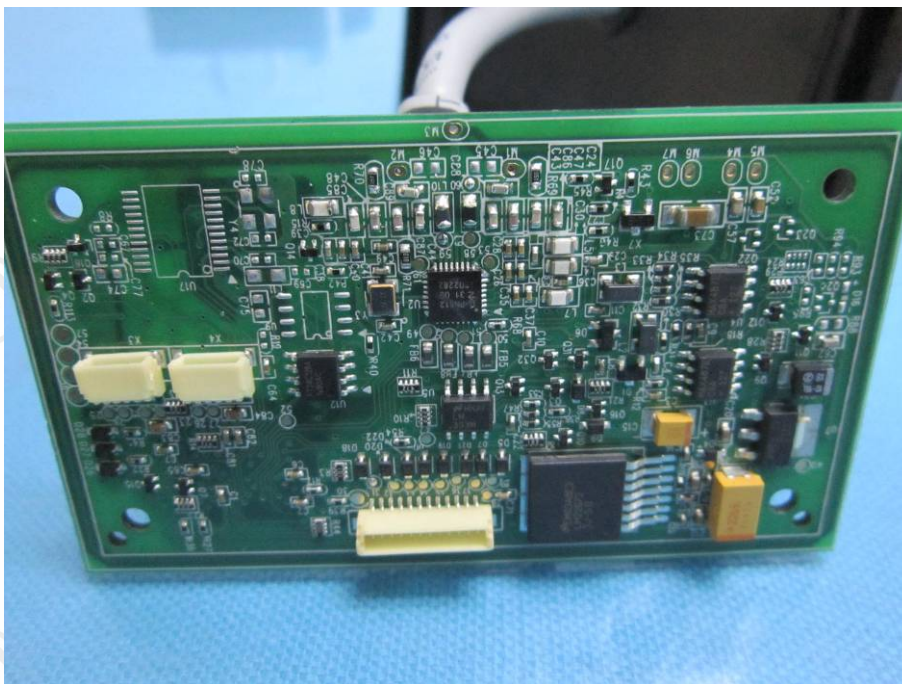
View of EUT-2(NeX Guard 2-M)



View of EUT-3(NeX Guard 2-M)



View of EUT-4(NeX Guard 2-M)



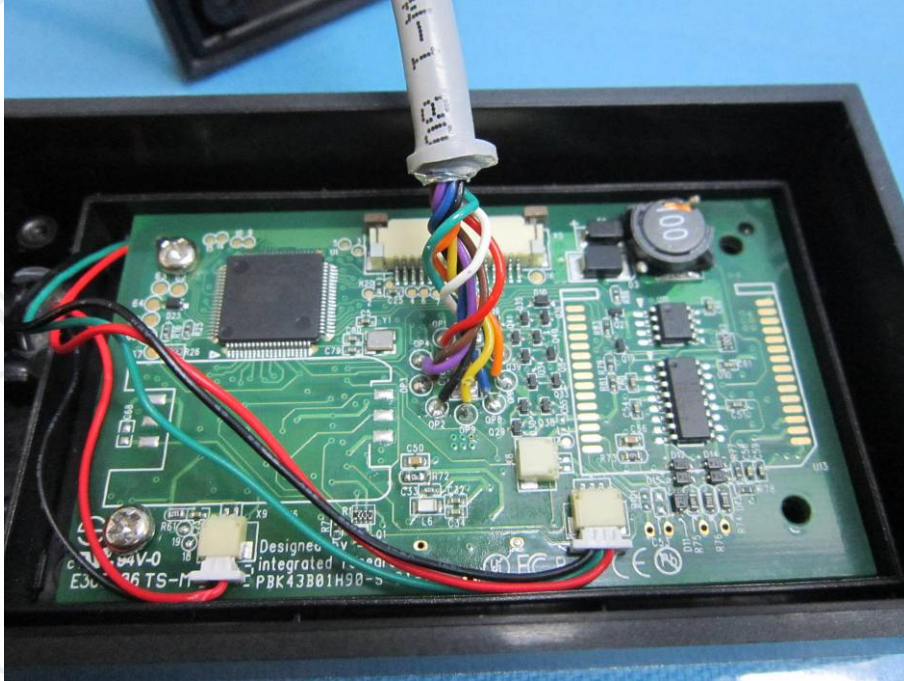
View of EUT-5(NeX Guard 2-M)



View of EUT-1(NeX Guard 3-M)



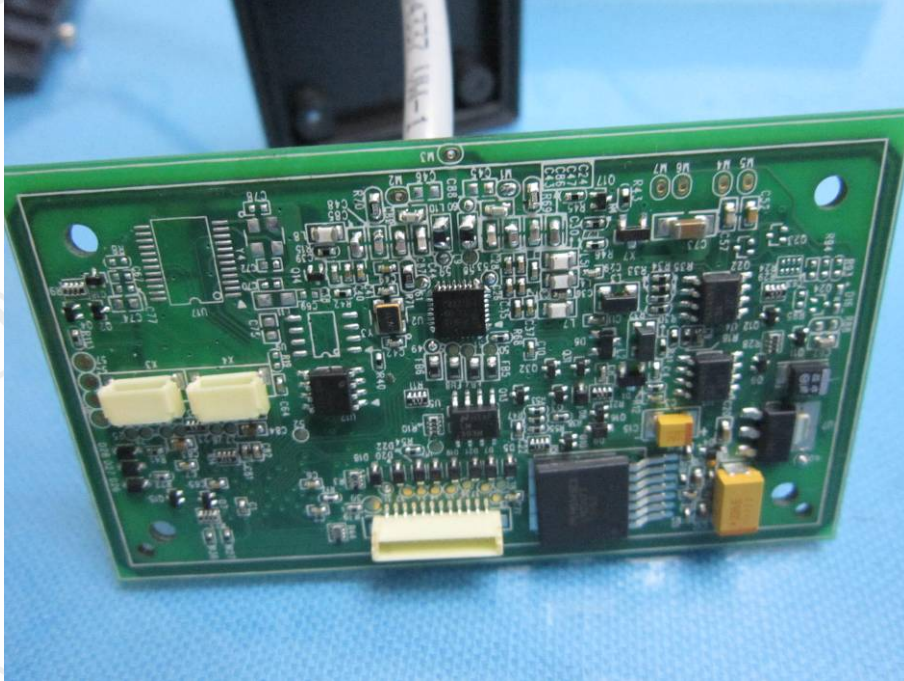
View of EUT-2(NeX Guard 3-M)



View of EUT-3(NeX Guard 3-M)



View of EUT-4(NeX Guard 3-M)



View of EUT-5(NeX Guard 3-M)

*** End of report ***

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