Hong Kong

FCC – Test report

Report Number	:	60/760.10.122.01	Date of Issue:	05 July 2010
Model	:	THGN132ES, THN132ES		
Product Type	:	3 Channel Remote Sensor with Solar Panel		
Applicant	:	IDT Technology Limited		
Address	:	Block C, 9/F, Kaiser Estate, Phase 1, 41 Man Yue Street, Hunghom, Kowloon, Hong Kong		
Production Facility	:	IDT Technology Limited		
Address	:	Block C, 9/F, Kaiser Estate, Phase 1, 41 Man Yue Street, Hunghom, Kowloon, Hong Kong		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	32		

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TÜV SÜD Hong Kong Ltd. reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Hong Kong Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Hong Kong Ltd. issued reports.

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2 Details about the Test Laboratory

Details about the Test Laboratory

Company name: TÜV SÜD HONG KONG LTD.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin
HK.

Telephone: 852 2776 1323
Fax: 852 2776 1372

Company name: Neutron Engineering Inc.
3,Jinshagang 1st Road,
ShiXia, Dalang Town,
DongGuan, China

FCC Registered Test Site Number 319330

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	3 Channel Remote Sensor with Solar Panel
Model no.:	THGN132ES, THN132ES
Serial number:	NIL
Options and accessories:	NIL
Rated Voltage:	1.5 VDC
Rated Current:	NIL
Rated Power:	NIL
Frequency:	NIL
Description of the EUT:	Operate by battery only (1 x 1.5VDC AAA size battery)
Operated Frequency:	433.92MHz

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4 Summary of Test Standards and Results

Emission Tests						
Test Condition	Test Requirement	Test Method	Pages	Test Result		
				Pass	Fail	N/A
Radiated Emission (Fundamental & Spurious Emission)	FCC Part 15 Section 15.231 & 15.209	ANSI C63.4:2003	7-24	☒	☐	☐
Conducted Emission on AC 150kHz to 30MHz	FCC Part 15 Section 15.207	ANSI C63.4:2003	NIL	☐	☐	☒

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5 General Remarks

Remarks
Client informs that the 3 Channel Remote Sensor with Solar Panel, THN132ES has the same technical construction including circuit, PCB layout, components and component layout, all electrical construction and basic mechanical construction, with 3 Channel Remote Sensor with Solar Panel, THGN132ES. The difference lies in the sensor, model THN132ES without the Hygro function.
EMC tests were performed on model THGN132ES.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	01 June 2010
Testing Start Date:	01 June 2010
Testing End Date:	22 June 2010

- TÜV SÜD HONG KONG LTD. -

Reviewed by:

Edmond FUNG
EMC Test Engineer

Prepared by:

Cheng Kin Yeung
EMC Test Engineer

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6 Emission Test Results

6.1 Radiated Emission Test (Fundamental)

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.231

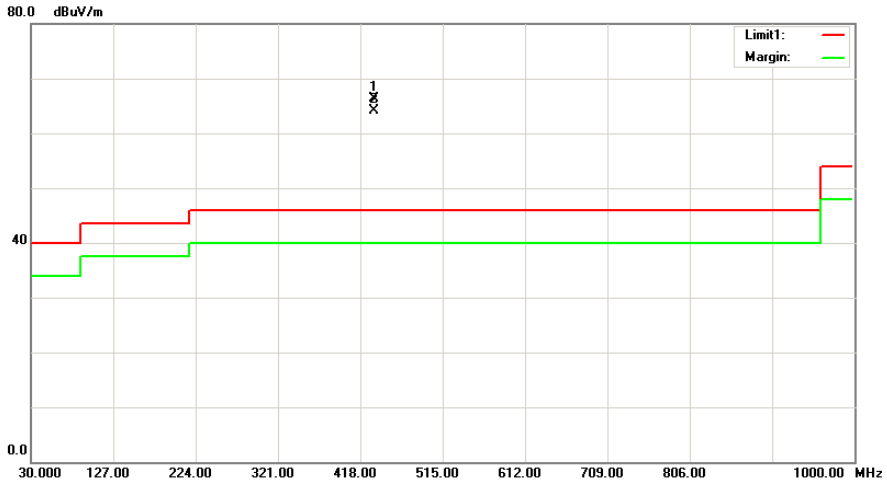
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Horizontal

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq.	Ant.Pol.	Reading	Ant./CF	Average	Act.		Limit	
		Peak		factor	Peak	AV	Peak	AV
(MHz)	H/V	(dBuV/m)	CF(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)
433.93	**H**	**78.38**	**12.08**	**7.17**	**66.30**	**59.13**	**92.87**	**72.87**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz , Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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Radiated Emission Test (Fundamental)

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.231

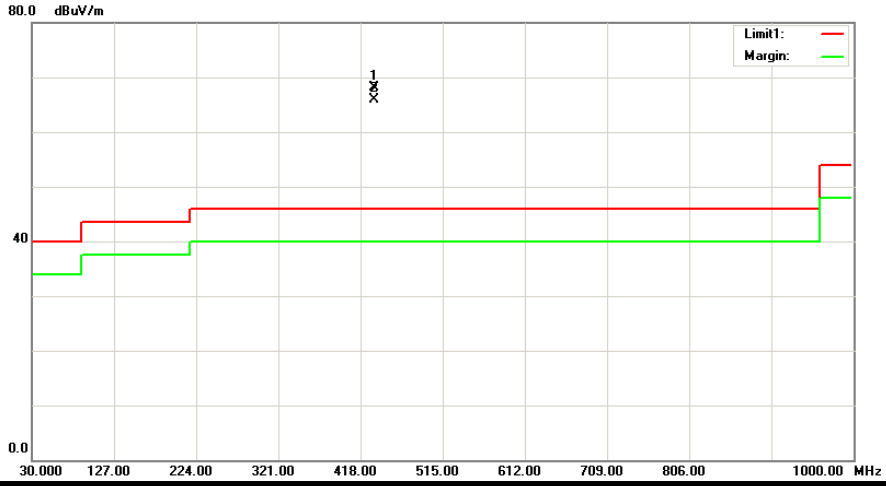
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Vertical

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq.	Ant.Pol.	Reading	Ant./CF	Average	Act.		Limit	
		Peak		factor	Peak	AV	Peak	AV
(MHz)	H/V	(dBuV/m)	CF(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)
433.93	**V**	**80.26**	**12.08**	**7.17**	**68.18**	**61.01**	**92.87**	**72.87**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz , Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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Radiated Emission Test 9kHz - 26500MHz

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.209

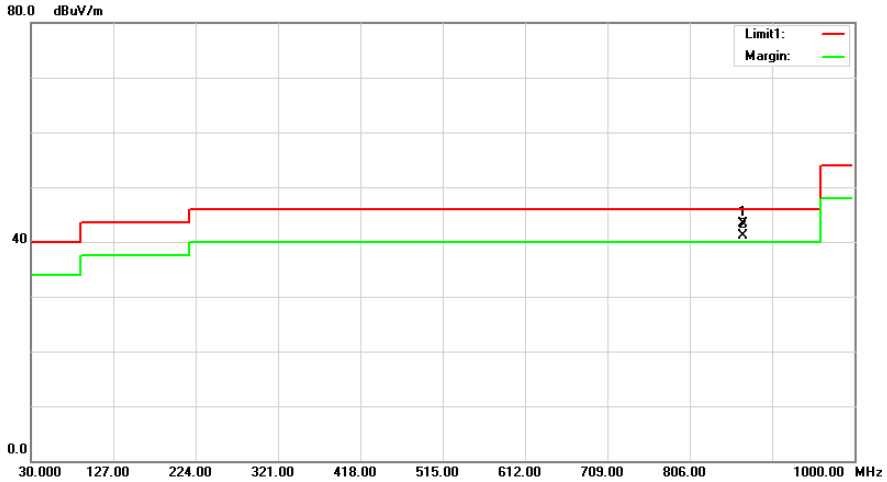
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Horizontal

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq. (MHz)	Ant.Pol. H/V	Reading Peak (dBuV/m)	Ant./CF CF(dB)	Act. Peak (dBuV/m)	Limit Peak (dBuV/m)	Note
867.87	**H**	**46.50**	**3.25**	**43.25**	**52.87**	**X/F**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz, Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
If the peak scan value lower limit more than 20dB, then this signal data does not show in graph

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Radiated Emission Test 9kHz - 26500MHz

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.209

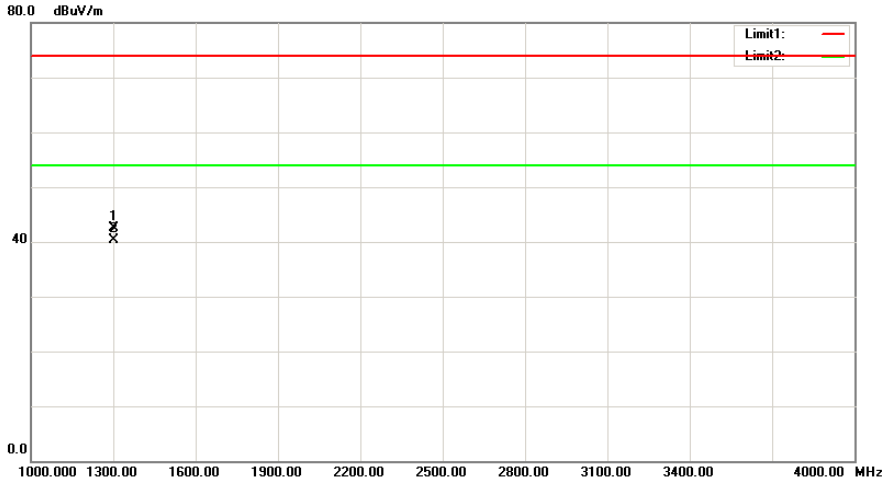
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Horizontal

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq. (MHz)	Ant.Pol. H/V	Reading Peak (dBuV)	Ant./CF CF(dB)	Act. Peak (dBuV)	Limit Peak (dBuV)	Note
1302.59	**H**	**50.68**	**8.09**	**42.59**	**54.00**	**X/F**
1736.51	**H**	**36.42**	**3.86**	**32.56**	**52.87**	**X/F**
2170.43	**H**	**34.75**	**1.15**	**33.60**	**52.87**	**X/F**
2604.35	**H**	**36.69**	**1.29**	**35.40**	**52.87**	**X/F**
3038.27	**H**	**34.73**	**-0.27**	**35.00**	**52.87**	**X/F**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz , Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
If the peak scan value lower limit more than 20dB, then this signal data does not show in graph

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Radiated Emission Test 9kHz - 26500MHz

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.209

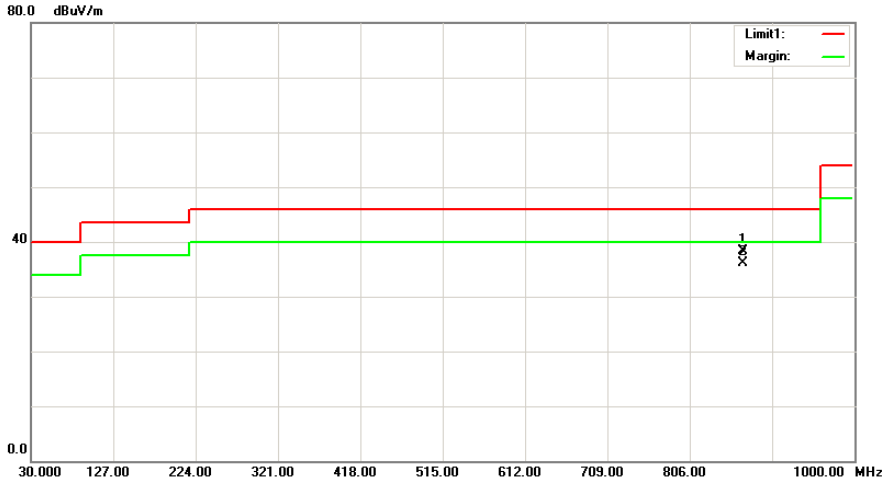
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Vertical

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq. (MHz)	Ant.Pol. H/V	Reading Peak (dBuV)	Ant./CF CF(dB)	Act. Peak (dBuV/m)	Limit Peak (dBuV/m)	Note
867.87	**V**	**41.47**	**3.25**	**38.22**	**52.87**	**X/F**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz , Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
If the peak scan value lower limit more than 20dB, then this signal data does not show in graph

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Radiated Emission Test 9kHz - 26500MHz

Date of test : 26 June 2010

Test requirement : FCC Part 15 Section 15.209

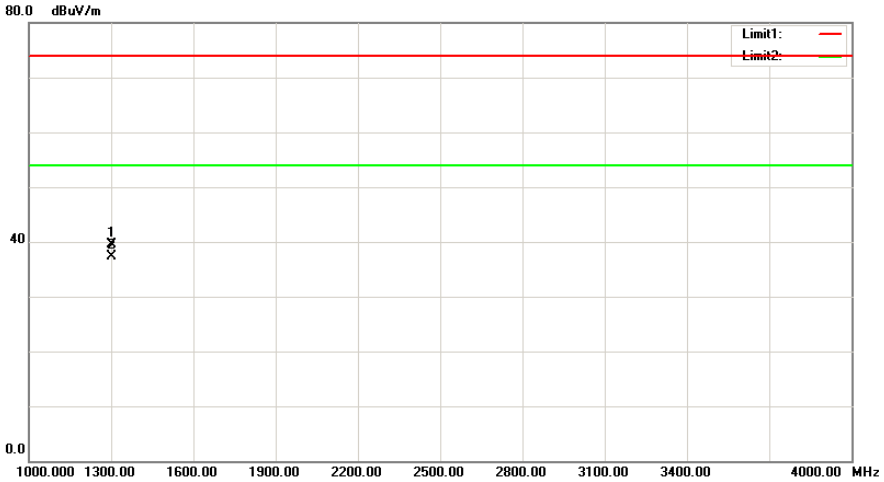
Test method : ANSI C63.4:2003

Operating mode : On mode

Antenna polarity : Vertical

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Freq. (MHz)	Ant.Pol. H/V	Reading Peak (dBuV)	Ant./CF CF(dB)	Act. Peak (dBuV)	Limit Peak (dBuV)	Note
1302.59	**V**	**47.55**	**8.09**	**39.46**	**54.00**	**X/F**
1736.51	**V**	**36.42**	**3.86**	**32.56**	**52.87**	**X/F**
2170.43	**V**	**33.65**	**1.15**	**32.50**	**52.87**	**X/F**
2604.35	**V**	**35.88**	**1.29**	**34.59**	**52.87**	**X/F**
3038.27	**V**	**33.29**	**-0.27**	**33.56**	**52.87**	**X/F**

Remark: The EUT was placed on the top of the turntable in test site area.
The resolution bandwidth setting on the test receiver was 120 KHz , Detector function peak (30 MHz～1000MHz).
The resolution bandwidth setting on the test receiver was 1MHz, Detector function peak (1 GHz～5GHz).
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.
If the peak scan value lower limit more than 20dB, then this signal data does not show in graph.

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Test Equipment List

Radiated Emission Test

Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
Double-Ridged Guide Antenna	ETS	3115	75789	May.12.2011
Spectrum Analyzer	R&S	FSP-40	100129	Sep. 10, 2010
Test Receiver	R&S	ESCI	100895	May.26.2011
Pre-Amplifier	EMC	EMC-330	980001	Jun. 02, 2011
Microflex Cable	AISI	S104-SMAP-1	10m	Aug. 23, 2010
Microflex Cable	N/A	N/A	1m	May. 19, 2011
Amplifier	HP	8447D	2944A09673	May.26.2011
Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 19, 2011
Amplifier	Agilent	8449B	3008A02274	May.26.2011
Test Cable	HUBER+SUHNER	SUCOFLEX_8m	313794/4	Apr.12.2011
Microflex Cable	N/A	N/A	3m	Aug. 23, 2010
Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
Antenna	Schwarbeck	VULB9160	9160-3232	Jul.01.2010
Test Cable	HUBER+SUHNER	CB03 High Fre	N/A	May.03.2011
Controller	CT	SC100	N/A	N/A
Test Cable	N/A	C-01_CB03	N/A	Jul.06.2010
Spectrum	Agilent	E4408B	US39240143	Nov.16.2010

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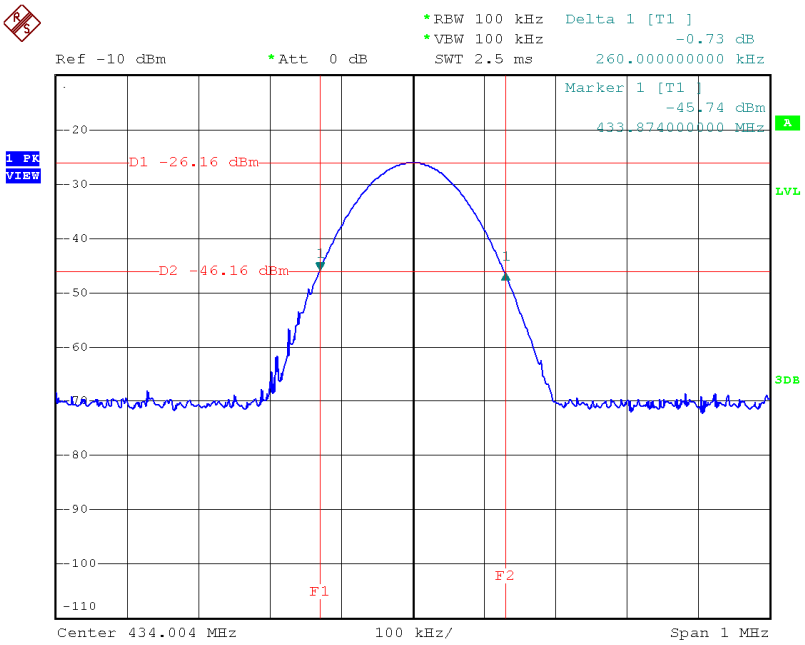
6.2 20dB Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed



Date: 30.JUN.2010 20:21:34

Remark: Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW Sweep = auto
Detector function = peak
Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section.

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Test Equipment List

20dB Bandwidth measurement

Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
Double-Ridged Guide Antenna	ETS	3115	75789	May.12.2011
Spectrum Analyzer	R&S	FSP-40	100129	Sep. 10, 2010
Test Receiver	R&S	ESCI	100895	May.26.2011
Pre-Amplifier	EMC	EMC-330	980001	Jun. 02, 2011
Microflex Cable	AISI	S104-SMAP-1	10m	Aug. 23, 2010
Microflex Cable	N/A	N/A	1m	May. 19, 2011
Amplifier	HP	8447D	2944A09673	May.26.2011
Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 19, 2011
Amplifier	Agilent	8449B	3008A02274	May.26.2011
Test Cable	HUBER+SUHNER	SUCOFLEX_8m	313794/4	Apr.12.2011
Microflex Cable	N/A	N/A	3m	Aug. 23, 2010
Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
Antenna	Schwarbeck	VULB9160	9160-3232	Jul.01.2010
Test Cable	HUBER+SUHNER	CB03 High Fre	N/A	May.03.2011
Controller	CT	SC100	N/A	N/A
Test Cable	N/A	C-01_CB03	N/A	Jul.06.2010
Spectrum	Agilent	E4408B	US39240143	Nov.16.2010

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6.3 Deactivation Time measurement

Date of test : 30 June 2010

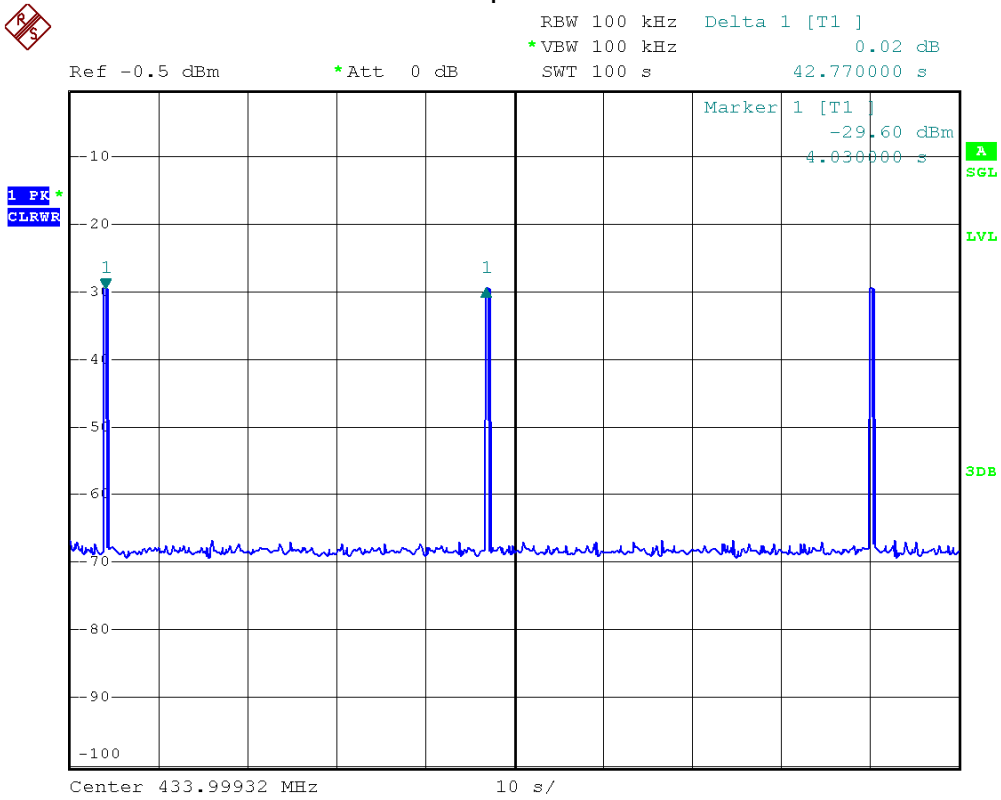
Test requirement : FCC Part 15 Section 15.231

Test method : ANSI C63.4:2003

Operating mode : On mode

Remarks : Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT automatically transmits signal after 42.77 seconds from the previous transmitted signal.

Limit: For periodic transmitter, according to FCC Part 15C § 15.231(e)

Item	Limit (second)
One transmission time	not greater than 1 second
Transmission period	at least 30 times the duration of the transmssion but in no case less than 10 second

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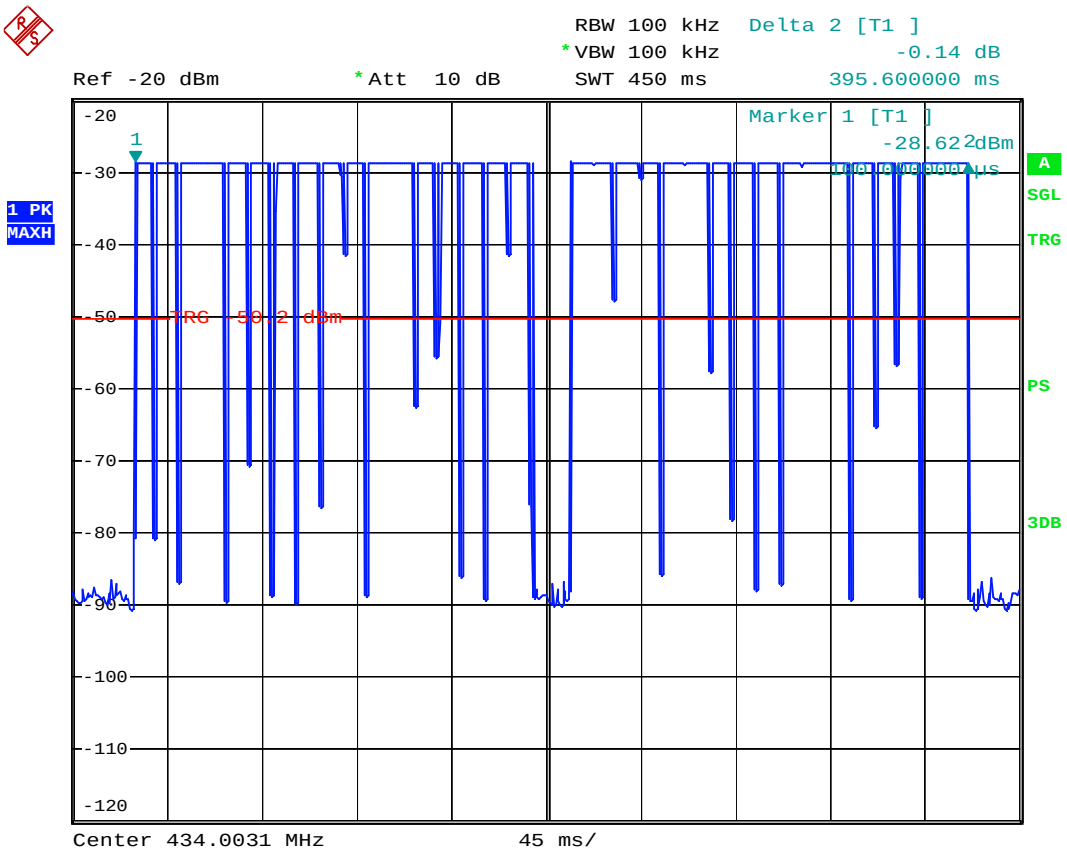
Deactivation Time measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT data packet has the period of 395.6ms

Limit: For periodic transmitter, according to FCC Part 15C § 15.231(e)

Item	Limit (second)
One transmission time	not greater than 1 second
Transmission period	at least 30 times the duration of the transmssion but in no case less than 10 second

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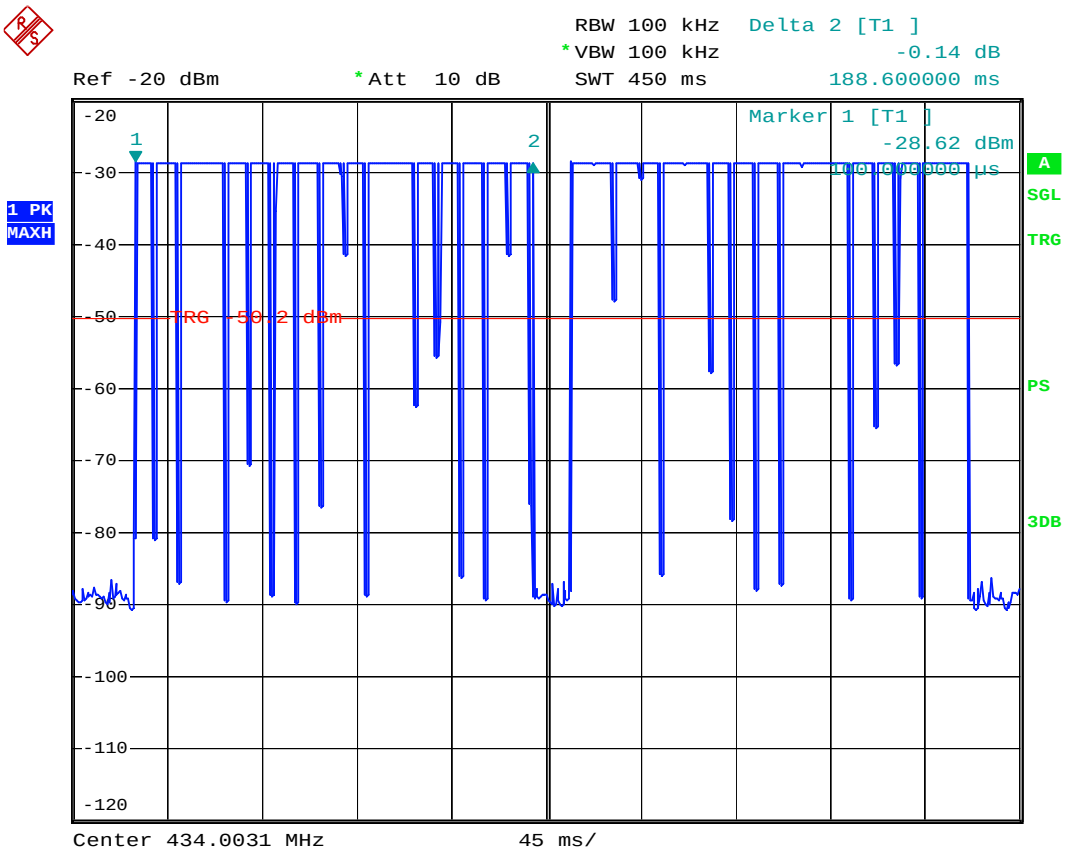
6.4 Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT data packet 1 has the period of 188.6ms

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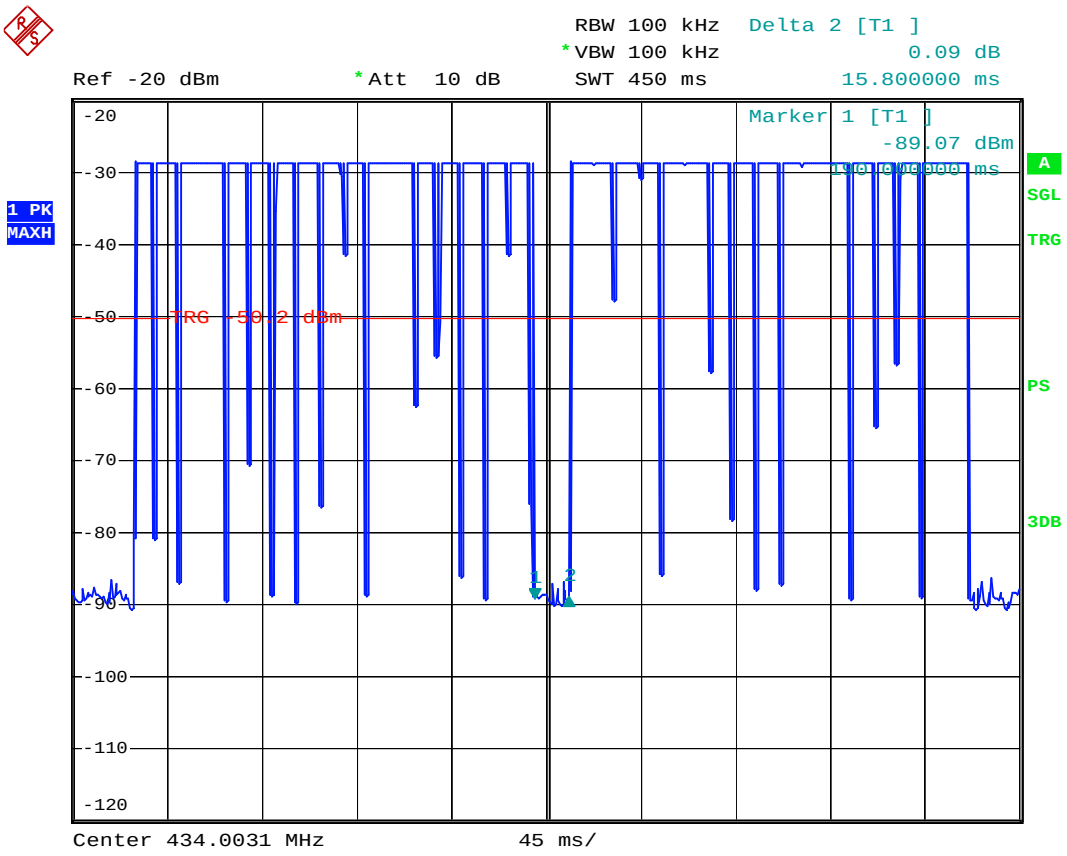
Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT data packet off has the period of 15.8ms

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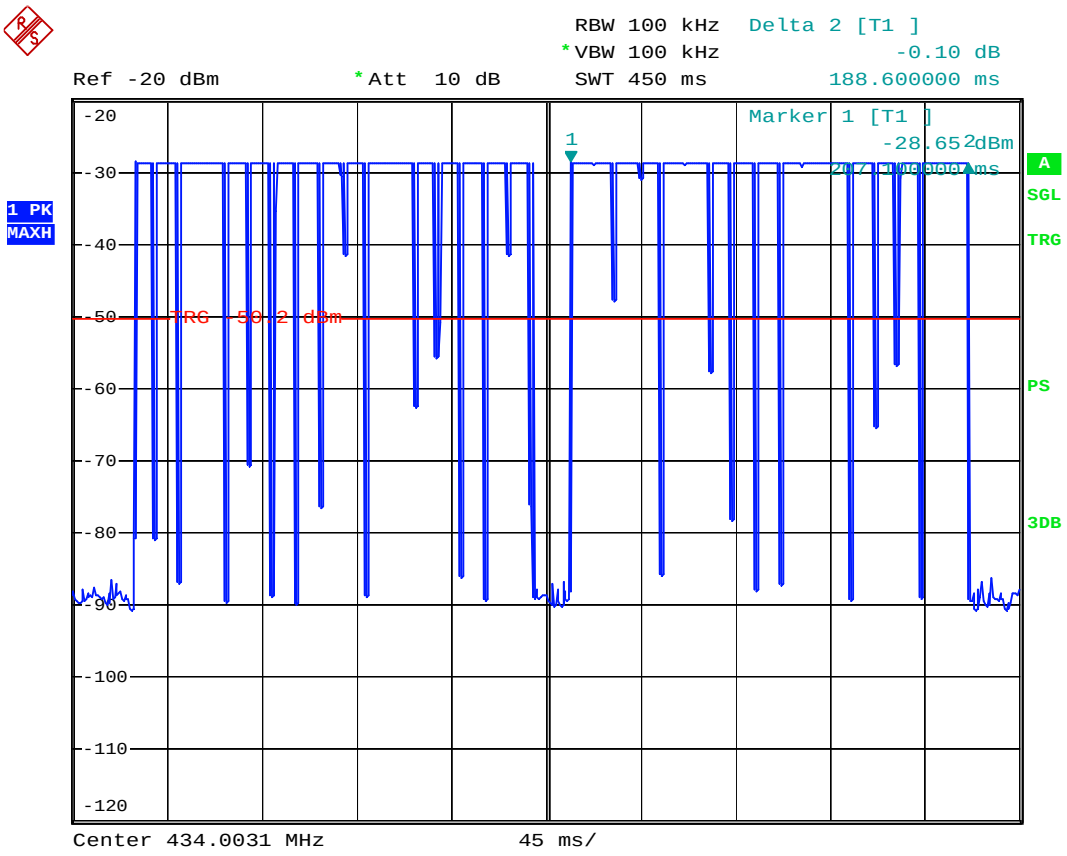
Tel: +852-2776 1323 Fax: +852-2776 1206

Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT data packet 2 has the period of 188.6ms

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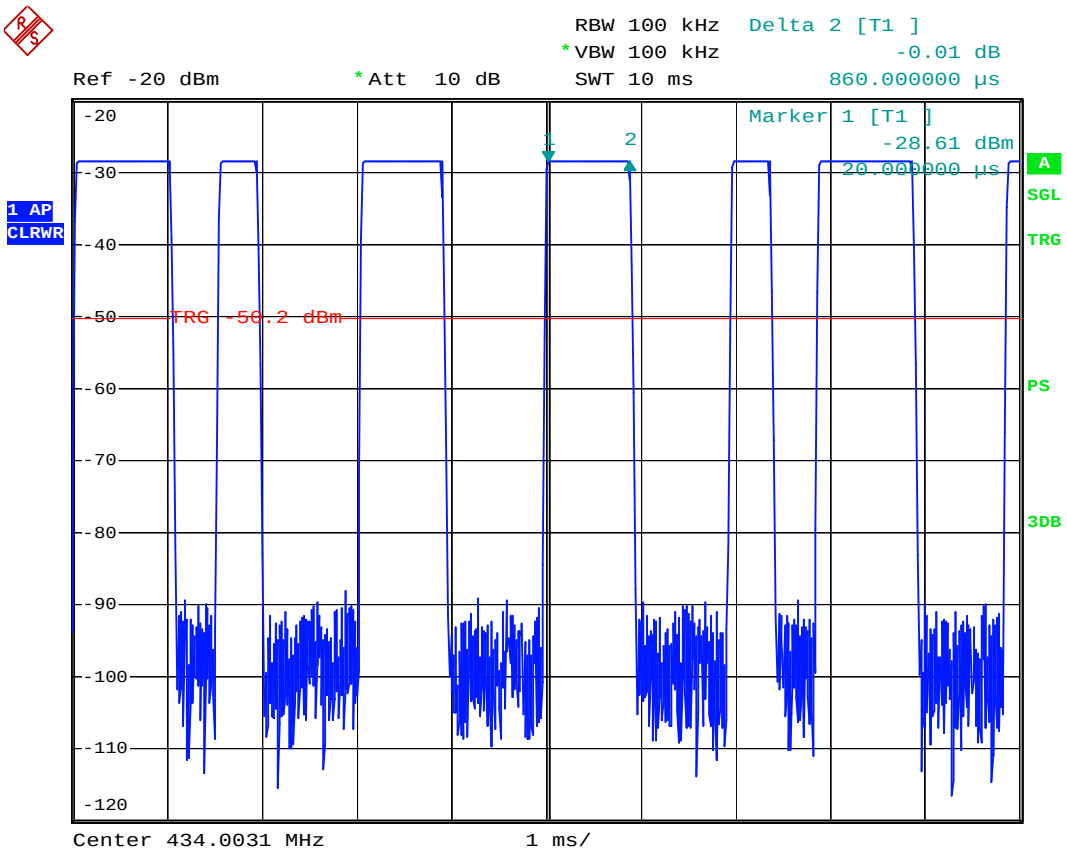
Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT “ON” data 1 has the period of 860µs

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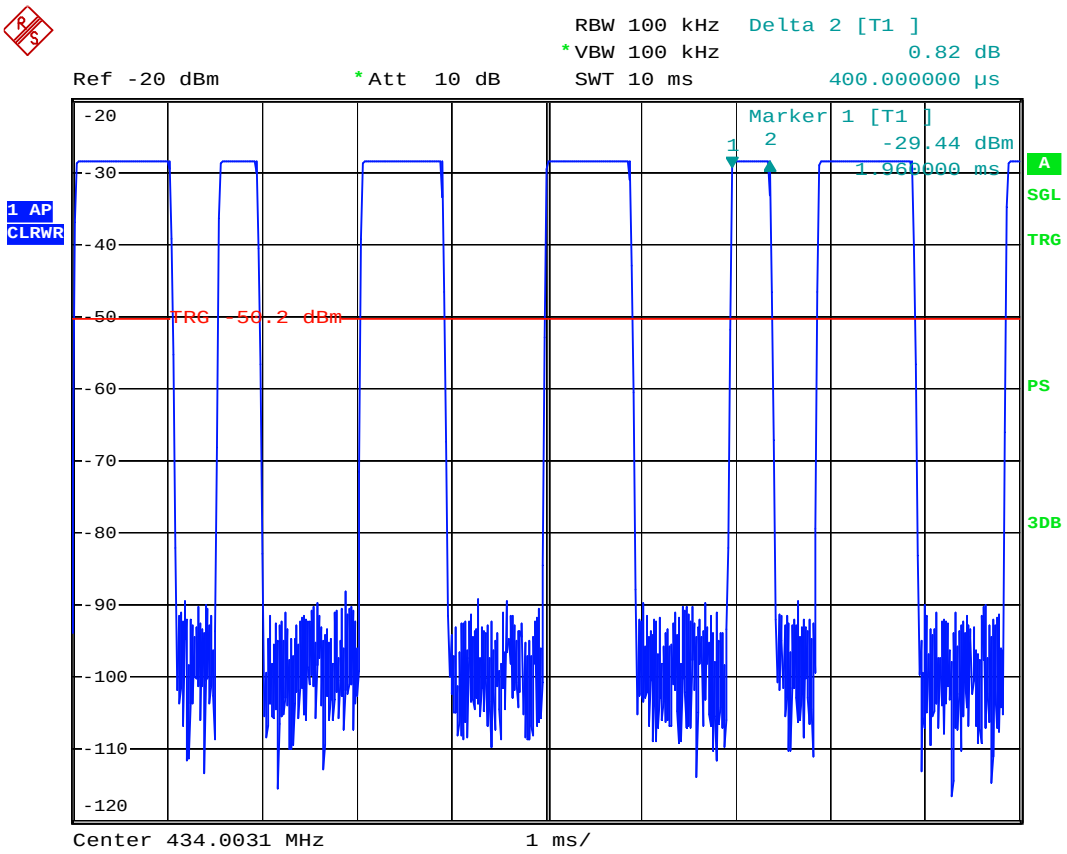
Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



EUT “ON” data 2 has the period of 400µs

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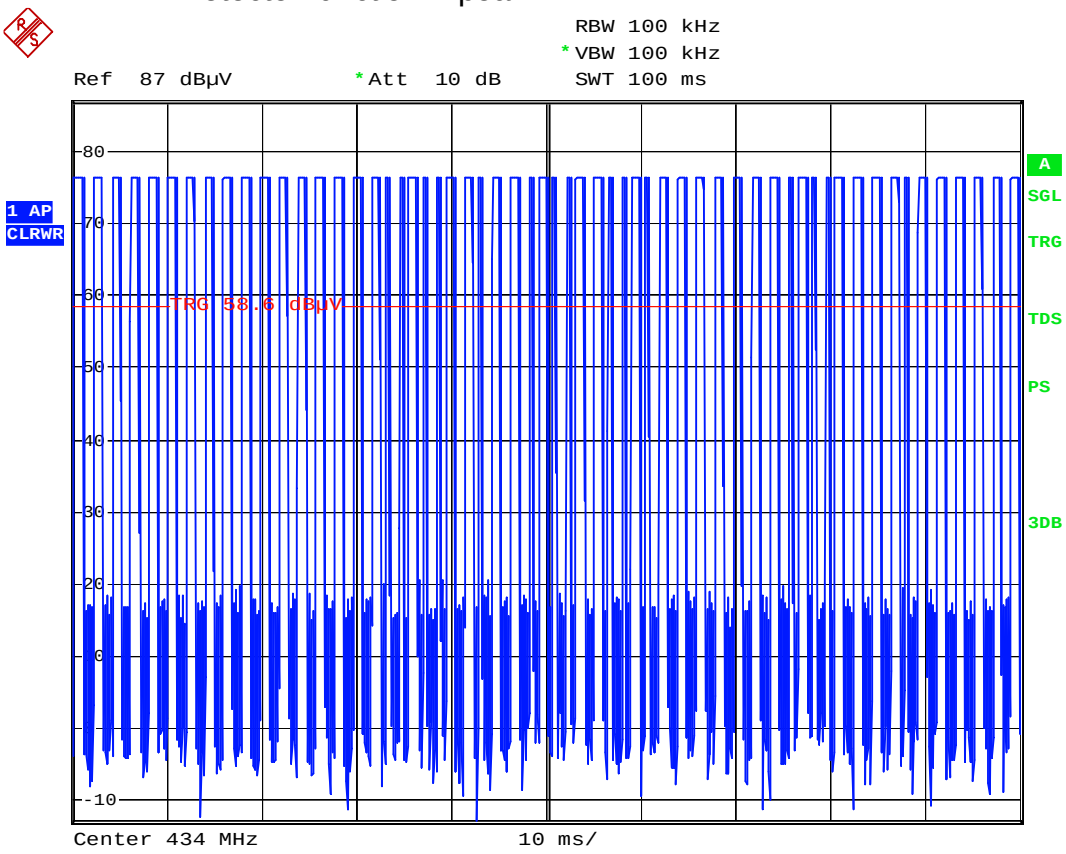
Tel: +852-2776 1323 Fax: +852-2776 1206

Bandwidth measurement

Date of test	:	30 June 2010
Test requirement	:	FCC Part 15 Section 15.231
Test method	:	ANSI C63.4:2003
Operating mode	:	On mode
Remarks	:	Detector function = peak

Test Result
☒ Passed
☐ Not Passed



Within 100ms, there are 44 long and 15 short ”On” signal.
Therefore, the total signal "on" time of on successful period is (860us x 44) + (400us x 15) = 43.80 ms.

Average factor: 20 log 1/(43.80/100) = 7.17 dB Average = Peak – Average Factor

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Test Equipment List

Bandwidth measurement

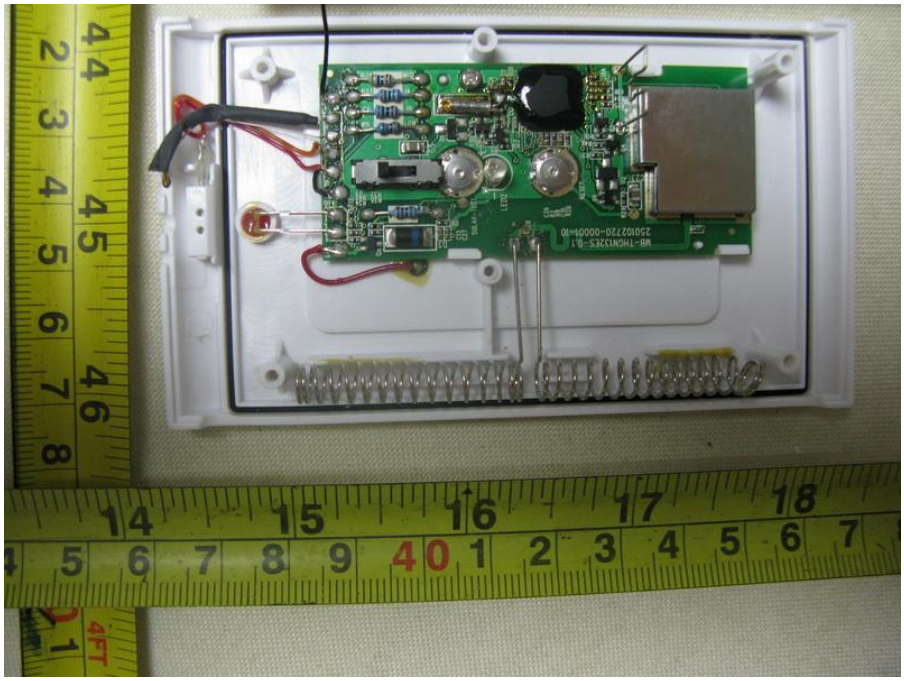
Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
Double-Ridged Guide Antenna	ETS	3115	75789	May.12.2011
Spectrum Analyzer	R&S	FSP-40	100129	Sep. 10, 2010
Test Receiver	R&S	ESCI	100895	May.26.2011
Pre-Amplifier	EMC	EMC-330	980001	Jun. 02, 2011
Microflex Cable	AISI	S104-SMAP-1	10m	Aug. 23, 2010
Microflex Cable	N/A	N/A	1m	May. 19, 2011
Amplifier	HP	8447D	2944A09673	May.26.2011
Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 19, 2011
Amplifier	Agilent	8449B	3008A02274	May.26.2011
Test Cable	HUBER+SUHNER	SUCOFLEX_8m	313794/4	Apr.12.2011
Microflex Cable	N/A	N/A	3m	Aug. 23, 2010
Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
Antenna	Schwarbeck	VULB9160	9160-3232	Jul.01.2010
Test Cable	HUBER+SUHNER	CB03 High Fre	N/A	May.03.2011
Controller	CT	SC100	N/A	N/A
Test Cable	N/A	C-01_CB03	N/A	Jul.06.2010
Spectrum	Agilent	E4408B	US39240143	Nov.16.2010

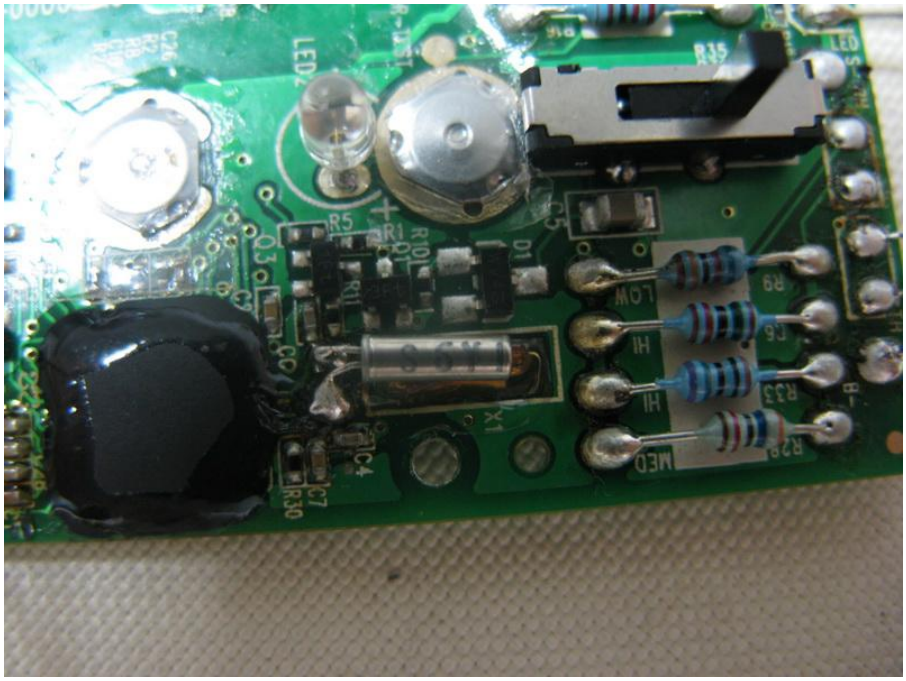
7 Appendix A


THERMO · HYGRO · SENSOR
SOLAR · POWER
Oregon
SCIENTIFIC


THGN132ES
MADE IN CHINA
Protected by U.S. Patents Nos. 5,978,738,
6,076,044 and/or 6,597,990

Appendix A





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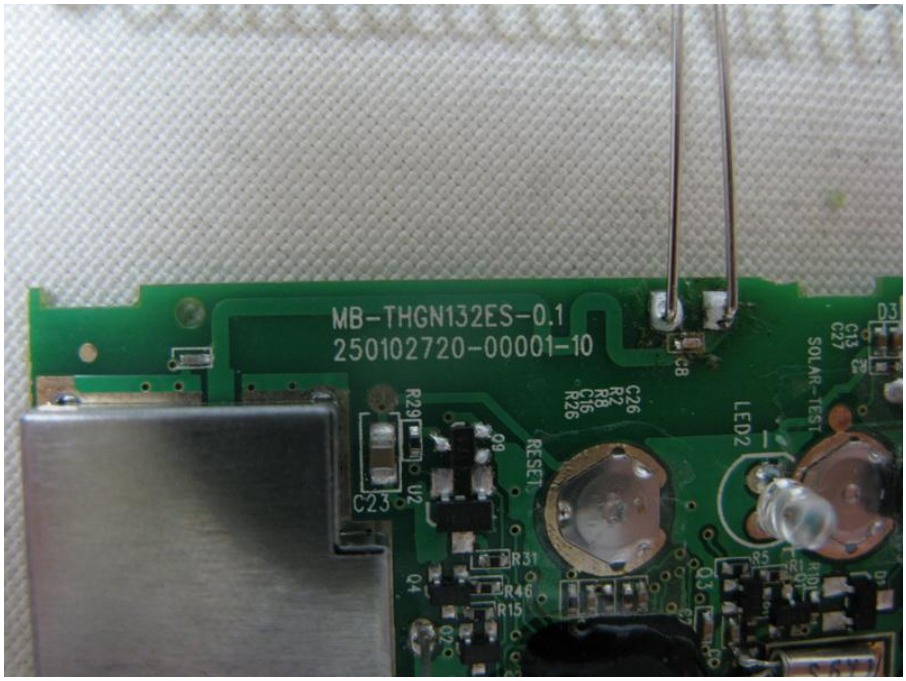
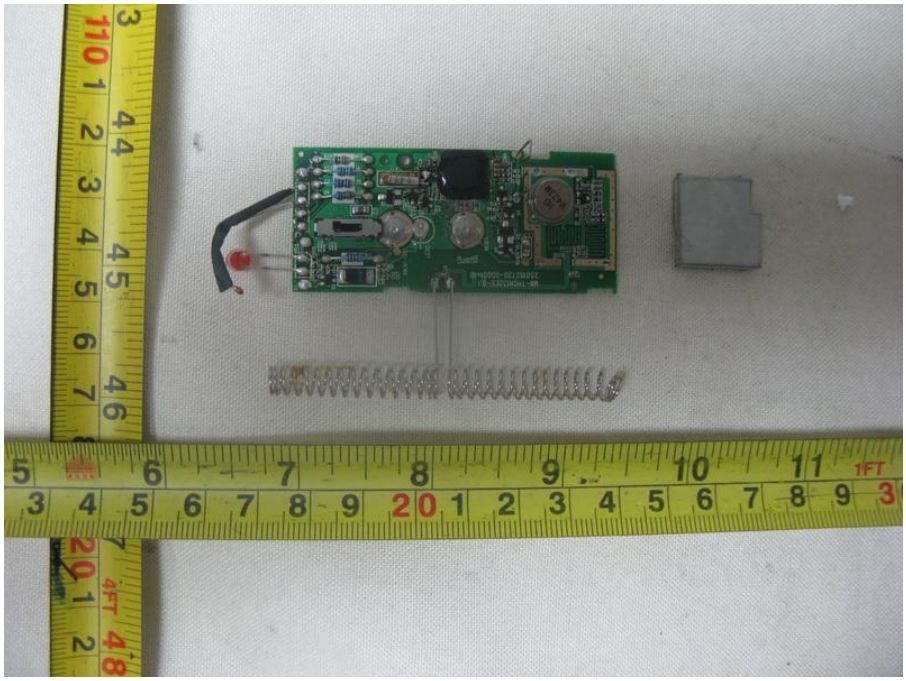
Appendix A





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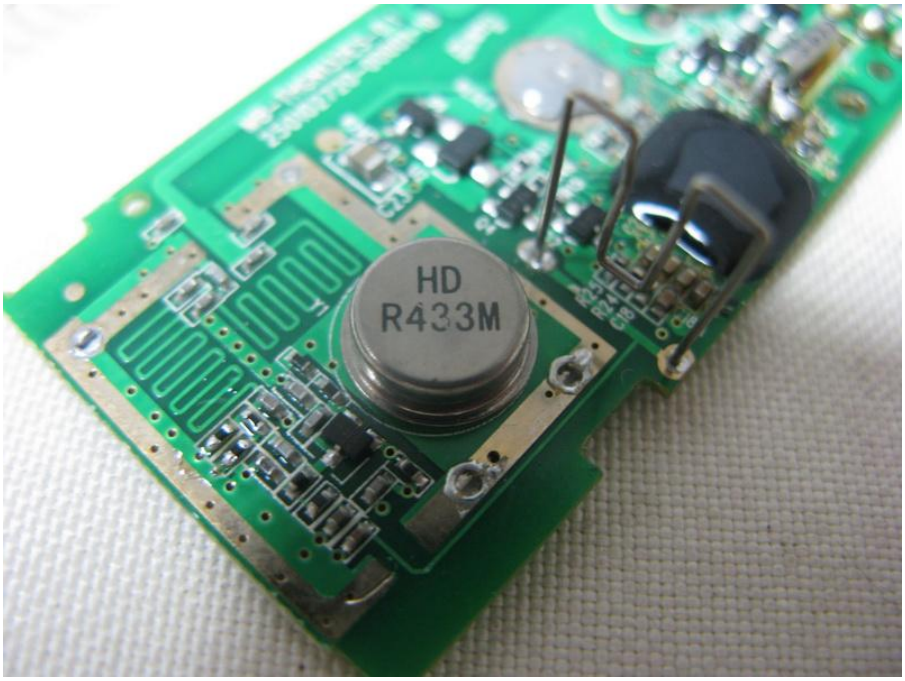
Appendix A



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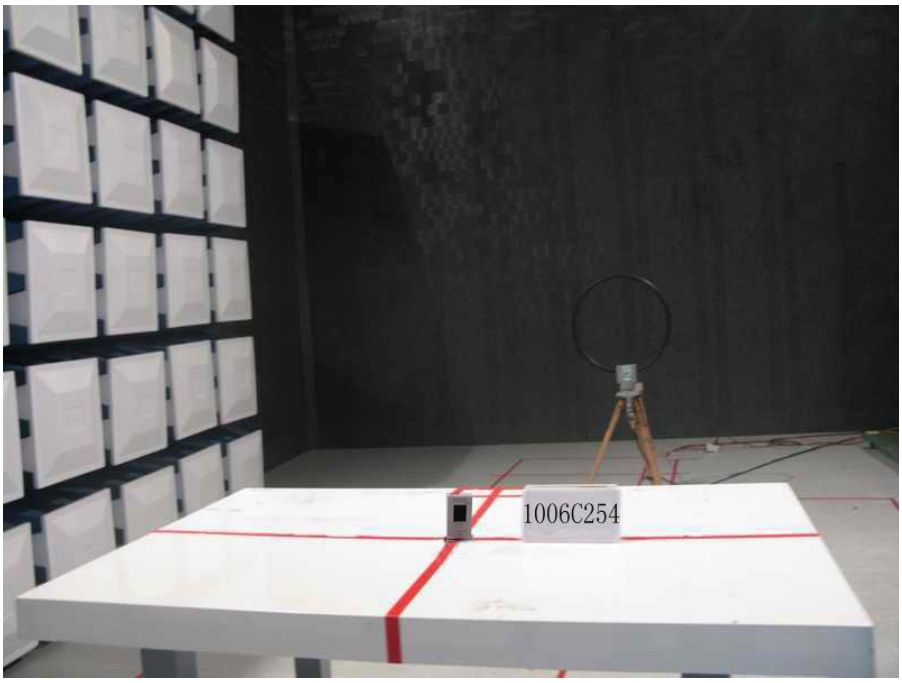
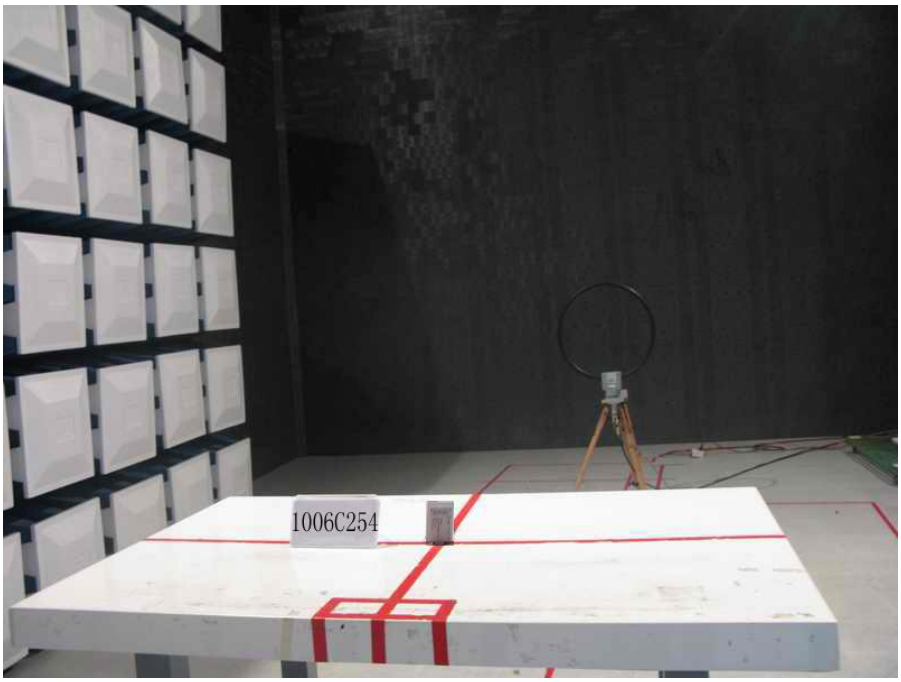
8 Appendix B

Radiated Emission Test Set Up



9kHz-30MHz



9kHz-30MHz

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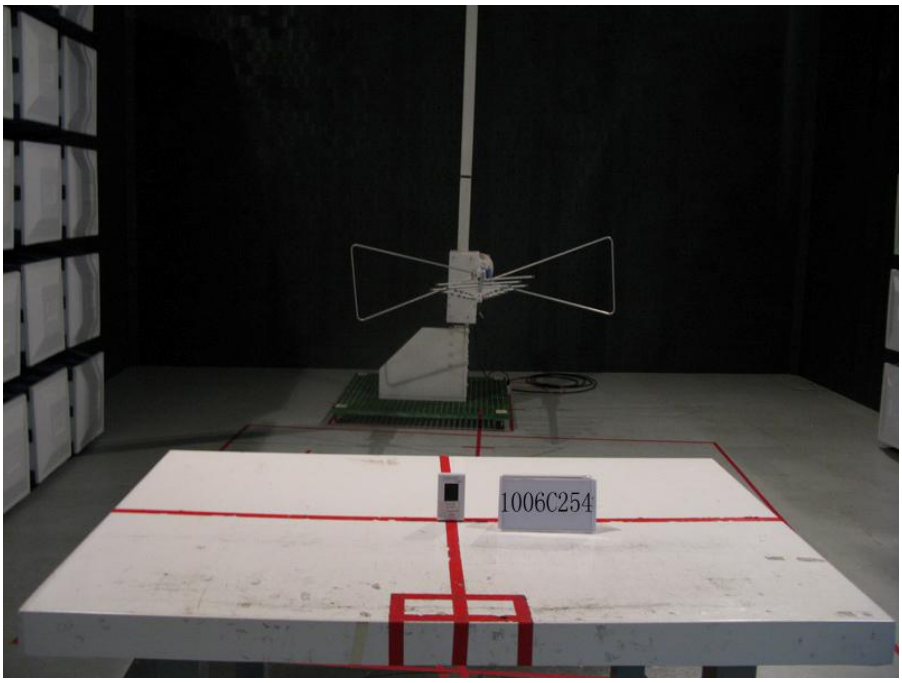
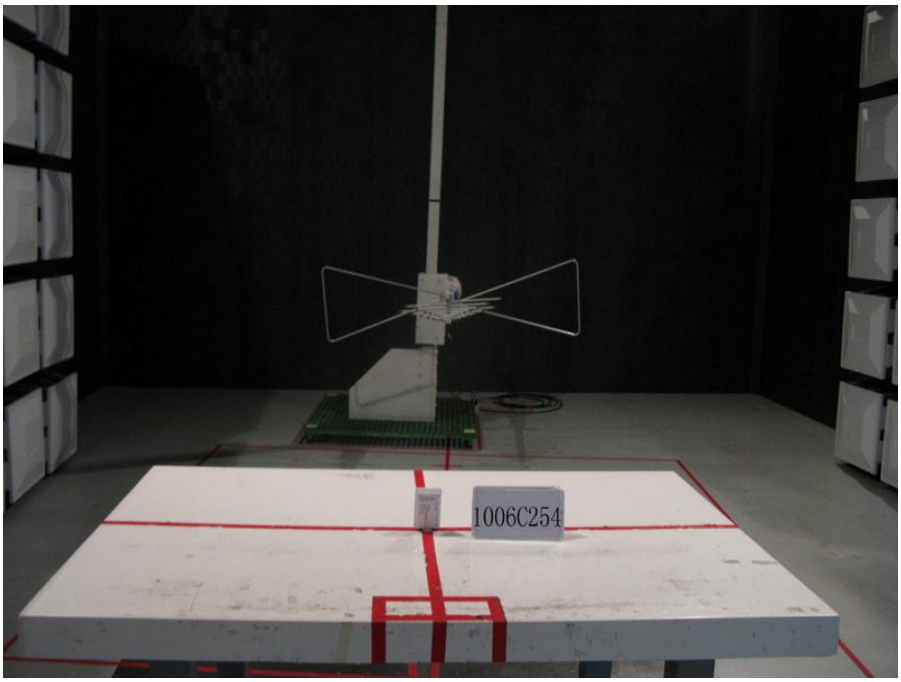
Appendix B

Radiated Emission Test Set Up



30MHz-1GHz



30MHz-1GHz

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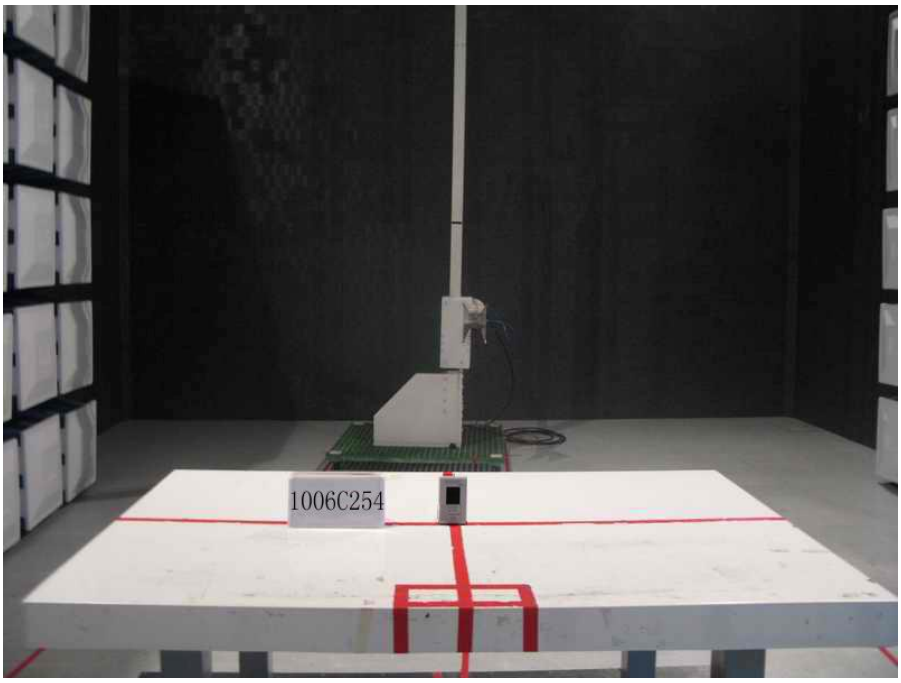
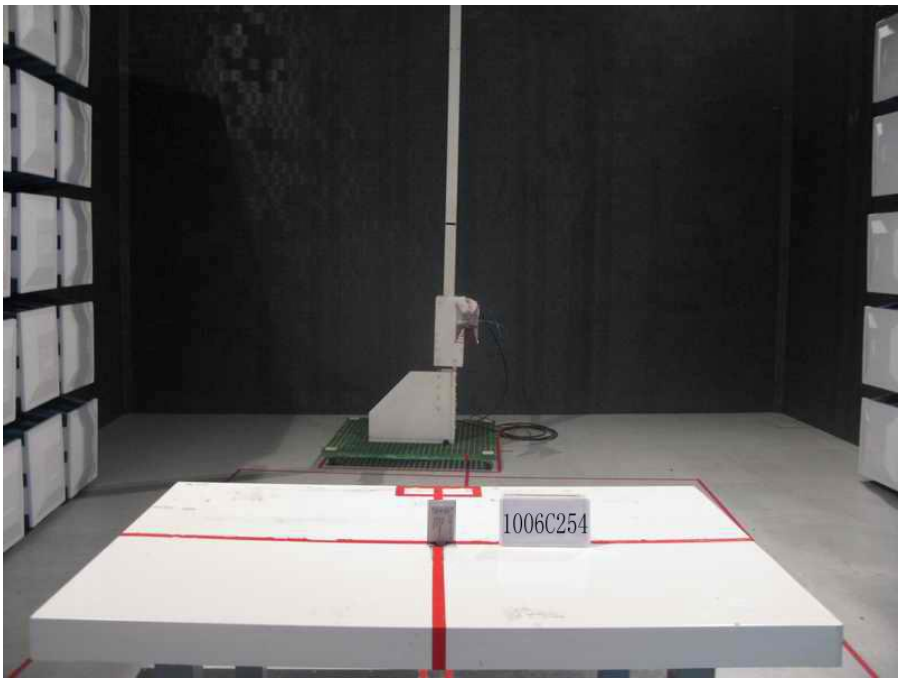
Appendix B

Radiated Emission Test Set Up



1GHz above



1GHz above

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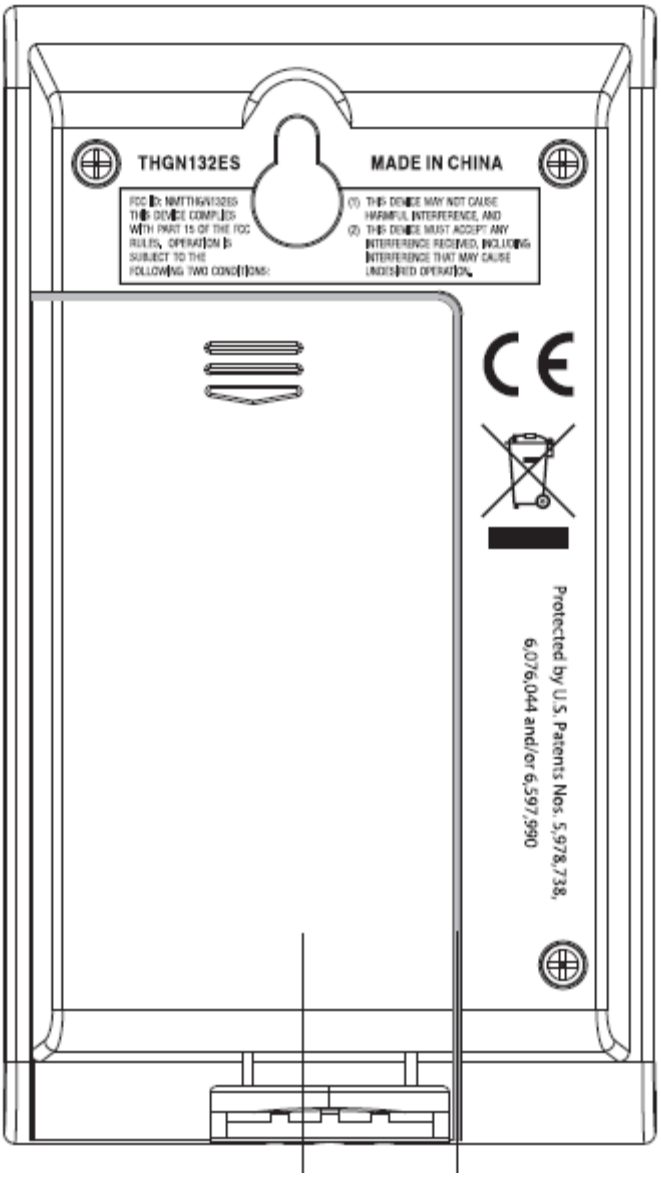
9 Appendix C



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