

# FCC PART 15.231

## TEST REPORT

For

### **IDT Technology Limited.**

Block C, 9/F, Kaiser Estate, Phase 1, 41 Man Yue Street, Hunghom, Kowloon, HongKong

**FCC ID: NMTRTHN129-01**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 5 Channel Remote RCC-Thermo Sensor
<b>Test Engineer:</b> Allen Qiao	<i>Allen Qiao</i>
<b>Report Number:</b> RDG140812004-00	
<b>Report Date:</b> 2014-09-10	
<b>Reviewed By:</b> Jerry Zhang EMC Manager	<i>Jerry Zhang</i>
<b>Test Laboratory:</b> Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

**TABLE OF CONTENTS**

**GENERAL INFORMATION.....3**

    PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....3

    OBJECTIVE .....3

    RELATED SUBMITTAL(S)/GRANT(S).....3

    TEST METHODOLOGY .....3

    TEST FACILITY .....3

**SYSTEM TEST CONFIGURATION .....4**

    JUSTIFICATION .....4

    EQUIPMENT MODIFICATIONS .....4

    BLOCK DIAGRAM OF TEST SETUP .....4

**SUMMARY OF TEST RESULTS .....5**

**FCC §15.203 - ANTENNA REQUIREMENT.....6**

    APPLICABLE STANDARD .....6

**FCC §15.205, §15.209, §15.231 (E) - RADIATED EMISSIONS .....7**

    APPLICABLE STANDARD .....7

    MEASUREMENT UNCERTAINTY .....7

    EUT SETUP .....7

    EMI TEST RECEIVER SETUP.....8

    TEST EQUIPMENT LIST AND DETAILS.....8

    TEST PROCEDURE .....9

    APPLICABLE STANDARD .....9

    CORRECTED AMPLITUDE & MARGIN CALCULATION .....9

    TEST RESULTS SUMMARY .....10

    TEST DATA .....10

**FCC §15.231(C) – 20 DB BANDWIDTH TESTING .....14**

    REQUIREMENT .....14

    TEST EQUIPMENT LIST AND DETAILS.....14

    TEST PROCEDURE .....14

    TEST DATA .....14

**FCC §15.231(E) - DEACTIVATION TESTING .....16**

    APPLICABLE STANDARD .....16

    TEST EQUIPMENT LIST AND DETAILS.....16

    TEST DATA .....16

**DECLARATION LETTER .....19**

## GENERAL INFORMATION

---

### Product Description for Equipment under Test (EUT)

The *IDT Technology Limited.*'s product, model number: *RTHN129 (FCC ID: NMTRTHN129-01)* (the "EUT") in this report is a *5 Channel Remote RCC-Thermo Sensor*, which was measured approximately: 5.0 cm (L) x 1.95 cm (W) x 12.5 cm (H), rated with input voltage: DC 3.0 V from 2 × AAA Alkaline battery.

*Note: The series product, model RTHN129 and THN129 are electrically identical, the difference between them is just the remote RCC circuit, we selected RTHN129 for fully testing, the details was explained in the attached declaration letter.*

*All measurement and test data in this report was gathered from production sample serial number: 140812004 (Assigned by BACL, Dongguan). The EUT was received on 2014-08-13.*

### Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4-2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

### Related Submittal(s)/Grant(s)

No related submittal(s).

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

---

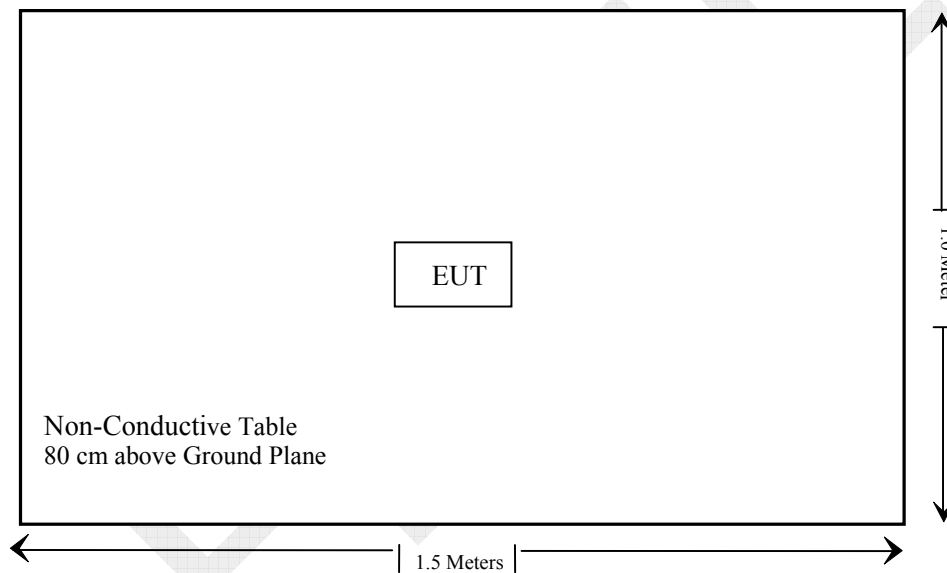
### Justification

The system was configured in testing mode which was provided by manufacturer.

### Equipment Modifications

No modifications were made to the unit tested.

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Not applicable*
§15.205, §15.209, §15.231 (e)	Radiated Emissions	Compliance
§15.231 (c)	20dB Bandwidth Testing	Compliance
§15.231 (e)	Deactivation Testing	Compliance

Not applicable\*: The EUT is battery operated equipment.

---

## **FCC §15.203 - ANTENNA REQUIREMENT**

---

### **Applicable Standard**

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.

**Result:** Compliant.

The EUT has one integral antenna arrangement, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

FLANN

**FCC §15.205, §15.209, §15.231 (e) - RADIATED EMISSIONS**

**Applicable Standard**

FCC §15.205, §15.209, §15.231 (e)

**Measurement Uncertainty**

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If  $U_{lab}$  is less than or equal to  $U_{cispr}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If  $U_{lab}$  is greater than  $U_{cispr}$  of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

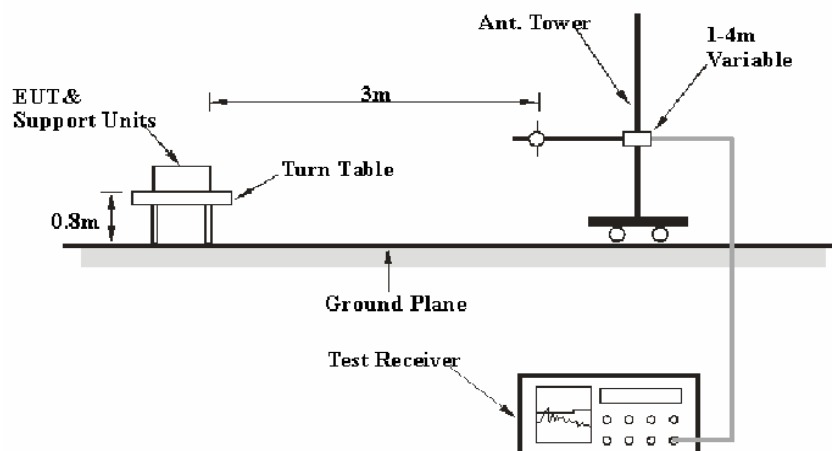
- 30M~200MHz: 5.0 dB
- 200M~1GHz: 6.2 dB
- 1G~6GHz: 4.45 dB
- 6G~18GHz: 5.23 dB

Table 1 – Values of  $U_{cispr}$

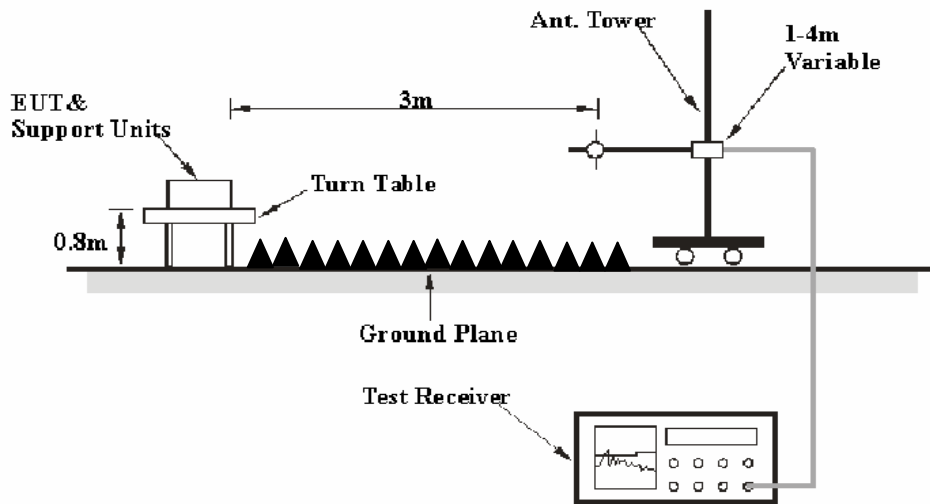
Measurement	$U_{cispr}$
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

**EUT Setup**

**Below 1 GHz:**



**Above 1 GHz:**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

**EMI Test Receiver Setup**

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	100 kHz	PK
1 GHz – 5 GHz	1 MHz	3 MHz	/	PK

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).



**Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

According to §15.231, Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector

**Applicable Standard**

According to §15.231 (e), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500 *	50 to 150 *
174-260	1,500	150
260-470	1,500 to 5,000*	150 to 500*
Above 470	5,000	500

\*Linear interpolations.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

**Corrected Amplitude & Margin Calculation**

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

**Test Results Summary**

According to the data in the following table, the EUT complied with the CFR47 §15.205, §15.209, §15.231 (e), with the worst margin reading of:

**4.08 dB at 867.84 MHz in the Vertical polarization**

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25.9 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	100.3 kPa

The testing was performed by Allen Qiao on 2014-09-03.

Test mode: Transmitting

**Field Strength (Peak)**

Frequency (MHz)	Receiver Reading (dBµV)	Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	15.231(e)	
		Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Operating Frequency:433.92 MHz								
433.92	73.44	H	16.85	2.49	21.85	70.93	92.87	21.94
433.92	76.35	V	16.85	2.49	21.85	73.84	92.87	19.03
867.84	44.94	H	22.50	3.59	22.23	48.80	72.87	24.06
867.84	50.12	V	22.50	3.59	22.23	53.98	72.87	18.88
1301.76	32.03	H	25.30	2.55	27.26	32.63	74.00	41.37
1301.76	36.14	V	25.30	2.55	27.26	36.74	74.00	37.26
1735.68	37.41	H	27.06	3.31	27.44	40.34	72.87	32.53
1735.68	41.51	V	27.06	3.31	27.44	44.44	72.87	28.43
2169.60	30.3	H	29.75	3.46	27.76	35.75	72.87	37.12
2169.60	34.46	V	29.75	3.46	27.76	39.91	72.87	32.96
2603.52	27.63	H	31.46	3.95	27.67	35.37	72.87	37.50
2603.52	29.16	V	31.46	3.95	27.67	36.90	72.87	35.97
3037.44	25.63	H	30.96	6.49	27.46	35.63	72.87	37.24
3037.44	28.72	V	30.96	6.49	27.46	38.72	72.87	34.15

Field Strength (Average)

Frequency (MHz)	Peak Measurement @ 3m (dBµV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Average Amp. (dBµV/m)	15.231(e)	
					Limit (dBµV/m)	Margin (dB)
Operating Frequency:433.92 MHz						
433.92	70.93	H	-5.20	65.73	72.87	7.14
433.92	73.84	V	-5.20	68.64	72.87	4.23*
867.84	48.80	H	-5.20	43.61	52.87	9.26
867.84	53.98	V	-5.20	48.79	52.87	4.08*
1301.76	32.63	H	-5.20	27.43	54.00	26.57
1301.76	36.74	V	-5.20	31.54	54.00	22.46
1735.68	40.34	H	-5.20	35.14	52.87	17.73
1735.68	44.44	V	-5.20	39.24	52.87	13.63
2169.6	35.75	H	-5.20	30.56	52.87	22.31
2169.6	39.91	V	-5.20	34.72	52.87	18.15
2603.52	35.37	H	-5.20	30.17	52.87	22.69
2603.52	36.90	V	-5.20	31.70	52.87	21.16
3037.44	35.63	H	-5.20	30.43	52.87	22.44
3037.44	38.72	V	-5.20	33.52	52.87	19.35

\*Within measurement uncertainty!

Note:

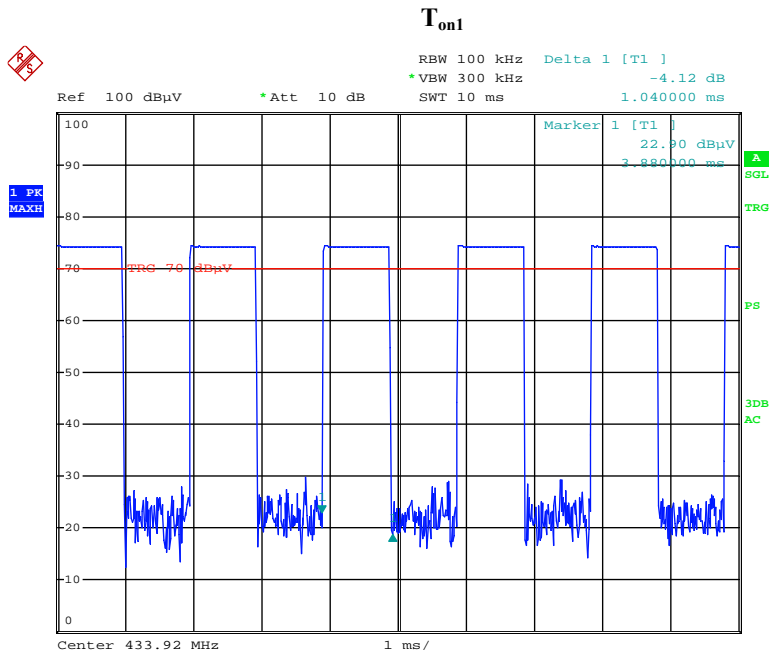
Calculate Average value based on duty cycle correction factor:

$$\begin{aligned}
 \text{Duty cycle} &= T_{ON}/100\text{ms} = (T_{ON1} N_1 + T_{ON2} N_2)/100 \\
 &= (1.04\text{ms} * 43 + 0.54\text{ms} * 19)/100 \\
 &= (44.72\text{ms} + 10.26\text{ms})/100 \\
 &= 54.98\%
 \end{aligned}$$

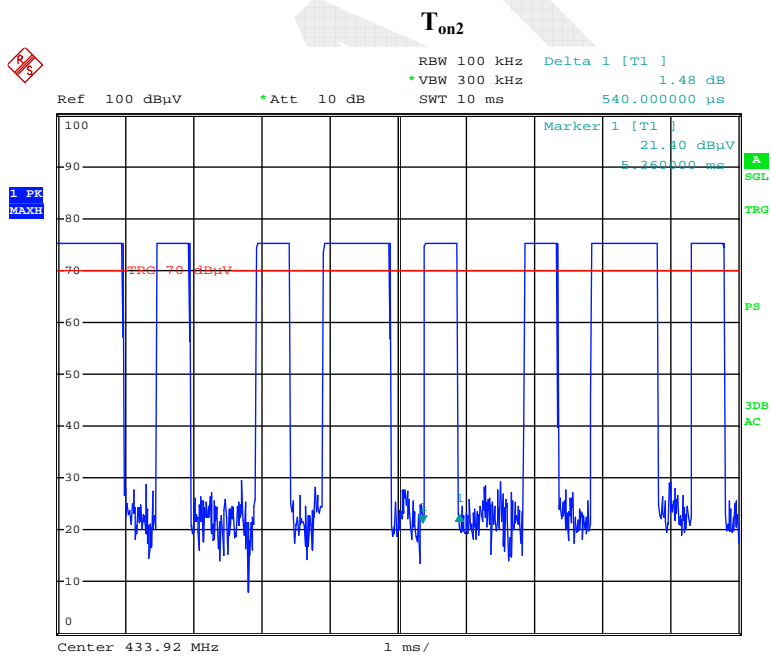
$$\text{Duty cycle correction factor} = 20 * \log(\text{duty cycle}) = 20 * \log(54.98\%) = -5.20\text{dB}$$

Average= Peak+ Duty cycle correction factor

Please refer to following plot.

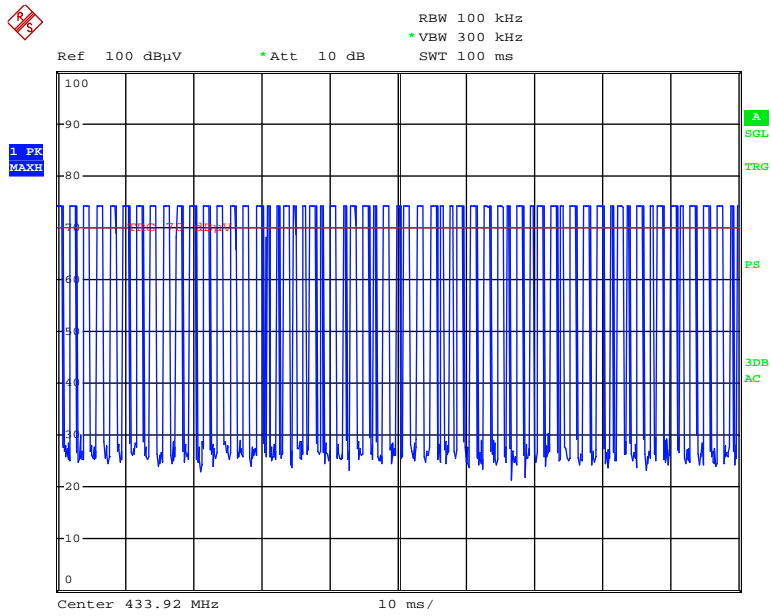


Date: 3.SEP.2014 10:42:27



Date: 3.SEP.2014 10:45:21

### T<sub>p</sub> (100ms)



Date: 3.SEP.2014 10:40:10

## FCC §15.231(c) – 20 dB BANDWIDTH TESTING

### Requirement

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	28.0 °C
<b>Relative Humidity:</b>	58 %
<b>ATM Pressure:</b>	100.3 kPa

The testing was performed by Allen Qiao on 2014-09-03.

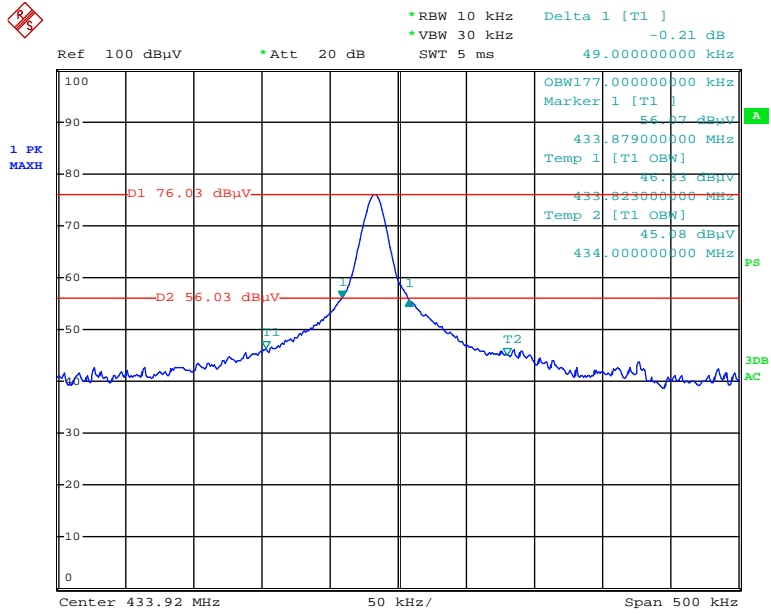
Test Mode: Transmitting

Please refer to following table and plot.

Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	49	1084.8	Pass

**Note:** Limit = 0.25% \* Center Frequency = 0.25% \* 433.92 MHz = 1084.8 kHz

### 20 dB Bandwidth



Date: 3.SEP.2014 07:50:58

## FCC §15.231(e) - DEACTIVATION TESTING

### Applicable Standard

Per 15.231(e), 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.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

Temperature:	29.8 °C
Relative Humidity:	65 %
ATM Pressure:	99.6 kPa

The testing was performed by Allen Qiao on 2014-09-03.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following plot.

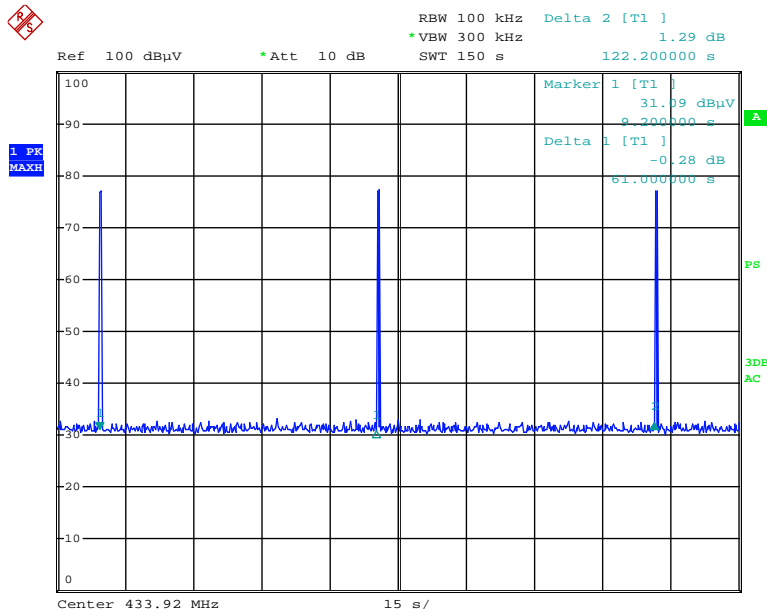
Transmission period (S)	Limit(S)	Result
0.348	<1.0	Pass

Period time (S)	Duration time (S)	Silent time (S)	Silent time Limit	Result
61	0.348	60.65	>10S and >30* Duration time	Pass

Note: Silent time= Period time- Duration time

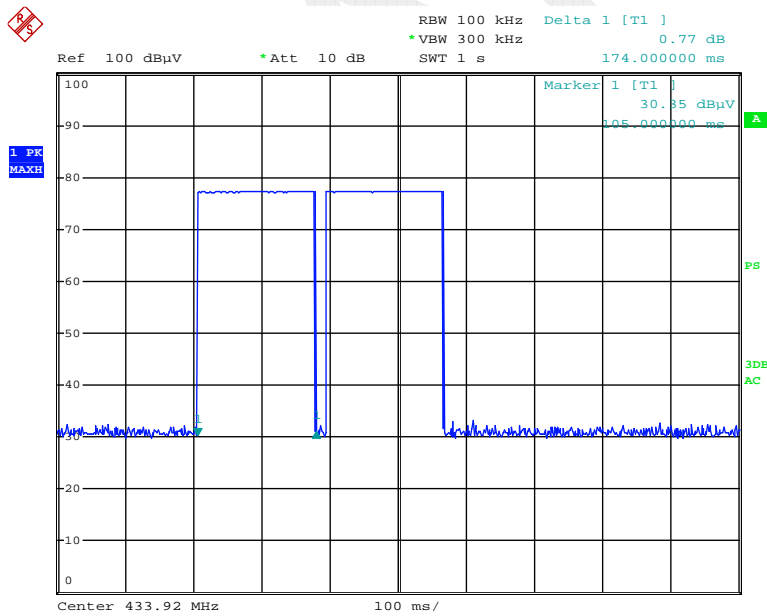


### Period time



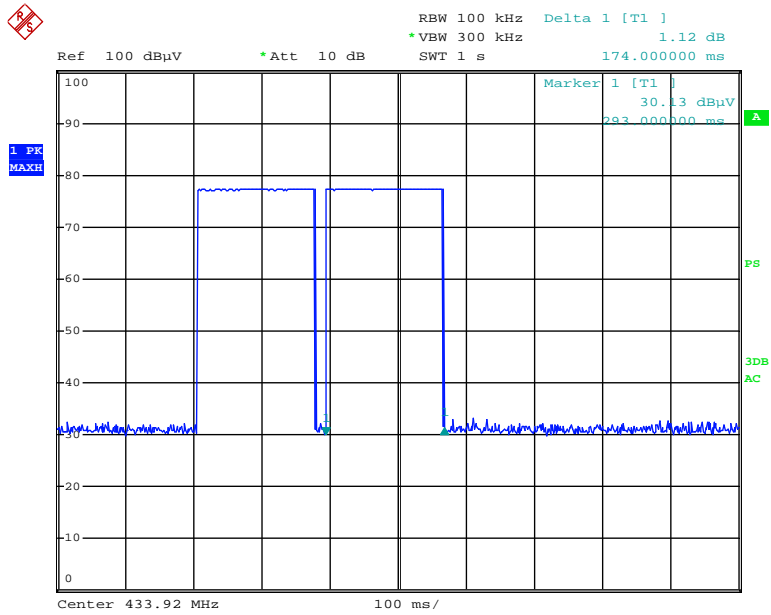
Date: 3.SEP.2014 10:27:25

### Duration Time-1



Date: 3.SEP.2014 10:33:21

### Duration Time-2



Date: 3.SEP.2014 10:33:42

FMA

**DECLARATION LETTER**



IDT Technology Limited

**Declaration of Alteration**

To Whom It May Concern,

We, IDT Technology Limited, hereby declare that there are some differences between our Multiple Models and testing products. Details as below:

(This is for your reference only.)

Products Description	Name	5 Channel Remote RCC-Thermo Sensor		
	Brand	Oregon scientific		
	Manufacturer	IDT Technology Limited		
	Project No.	RDG140812004, RDG140812005, RDG140812005-03		
Differences Description				
Testing Products	Multiple Models	Differences Items	Details	
RTHN129	THN129	Remote RCC Circuit	RTHN129 has this circuit, and THN129 hasn't.	

Notes: Testing products-the products tested by BACL

Multiple Model- have the same or similar appearance, structure, PCB, Material and function to the testing products, and only are different for little parameters.

Besides the differences in the table above, we declare the products are identical We guarantee all the information provided above is true, and notice that we'll bear all the consequences caused by any false information or concealing

Best Regards,

Signature:  
Print Name: Alex Chan  
Title: Project Manager

Client's Address: Block C, 9/F, Kaiser Estate, Phase 1, 41 Man Yue Street, Hung Hom, Kowloon, Hong Kong.  
Tel: (852)22653376 Fax: (852)23658936

QPDG004R32 Version1.0 (20140717)

\*\*\*\*\*END OF REPORT\*\*\*\*\*