TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 15.231

TEST REPORT

For

IDT Technology Limited

9/F, Kaiser Estate, 41 Man Yue Street, Hung Hom, Kowloon, Hong Kong

FCC ID: NMTTHGR221-01

Report Type:	**Product Type:**
Original Report	Wireless Temperature and Humidity Sensor with Display

Report Number:	RXM181011052-00
Report Date:	2018-11-09
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Wireless Temperature and Humidity Sensor with Display
EUT Model:	THGR221
FCC ID:	NMTTHGR221-01
Rated Input Voltage:	DC3V from battery
External Dimension:	95mm(L)*60mm(W)*27mm(H)
Serial Number:	181011052
EUT Received Date:	2018.10.12

Objective

This report is prepared on behalf of ***IDT Technology Limited*** in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules

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

Related Submittal(s)/Grant(s)

No related submittal(s)

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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 Industry Area, Tangxia, Dongguan, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Justification

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

The device operation frequency is 433.92 MHz, switch can change channel 1,2,3 for difference transmission sequence, all of the channels were test for transmission sequence in the report, and channel 1 was test for other items.

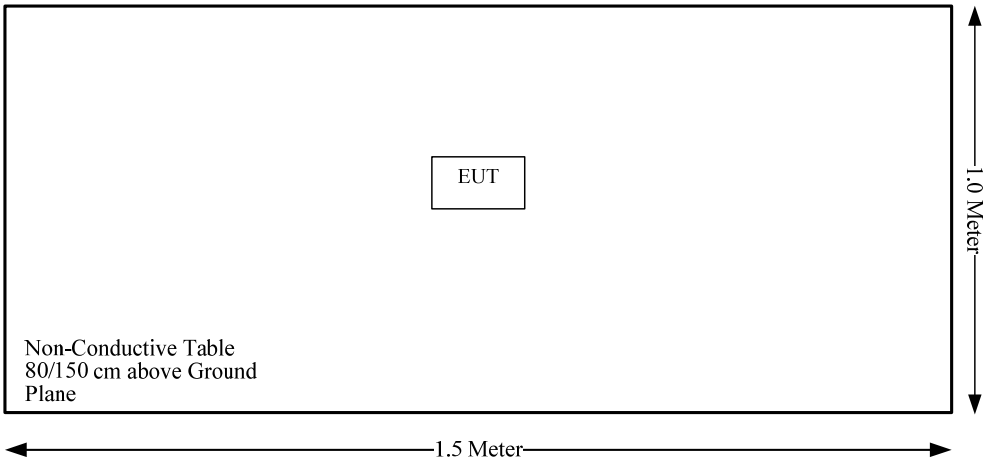
Equipment Modifications

No modifications were made to the unit tested.

EUT Exercise Software

No software was used in test.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§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	Compliance
§15.231 (e)	Transmission Time	Compliance

Not Applicable: the device was powered by battery.

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 1 internal antenna, which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

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

Applicable Standard

FCC §15.205, §15.209, §15.231 (e)

(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

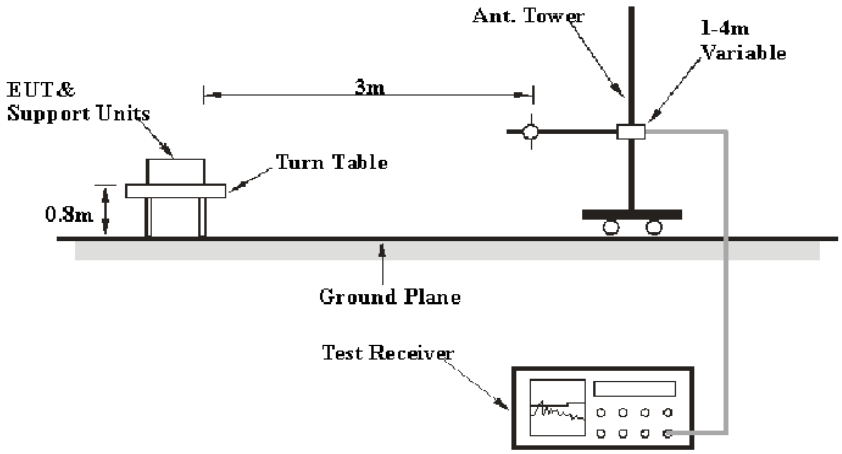
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

[1]Linear interpolations.

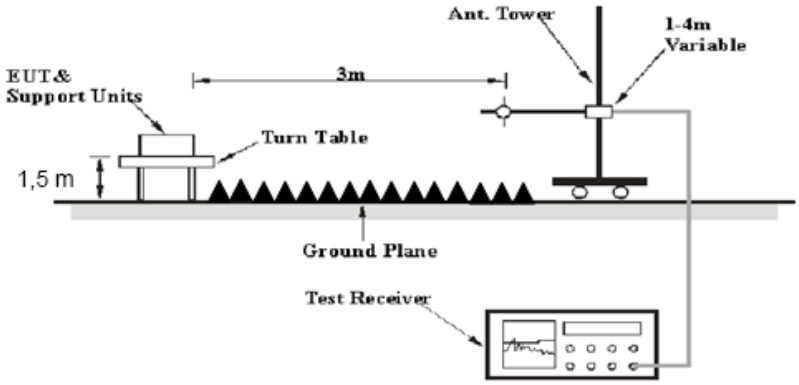
In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of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

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 C63.10-2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

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	Measurement
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	2017-12-11	2018-12-11
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05

*** 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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – 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).

Test Data

Environmental Conditions

Temperature:	25.8~26.3 °C
Relative Humidity:	37~40 %
ATM Pressure:	100.6 kPa

The testing was performed by Sunny Cen ,Tyler Pan on 2018-10-15.

Test mode: Transmitting

Field Strength (Peak)

Frequency	Receiver	Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	15.231 (e)	
(MHz)	Reading (dBμV)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)
Operating Frequency: 433.92 MHz								
433.92	73.84	H	16.48	2.65	26.54	66.43	92.87	26.44
433.92	80.23	V	16.48	2.65	26.54	72.82	92.87	20.05
30	26.43	H	21.40	0.54	26.32	22.05	72.87	50.82
145.43	36.06	H	12.43	1.44	25.85	24.08	72.87	48.79
361.74	33.69	H	14.63	2.40	25.85	24.87	72.87	48.00
867.84	35.22	H	21.76	4.09	26.68	34.39	72.87	38.48
879.72	48.13	H	21.99	3.99	26.65	47.46	72.87	25.41
973.81*	22.2	H	23.00	4.73	26.62	23.31	54.00	30.69
34.85	32.4	V	17.75	0.60	26.31	24.44	72.87	48.43
145.43	37.43	V	12.43	1.44	25.85	25.45	72.87	47.42
361.74	34.93	V	14.63	2.40	25.85	26.11	72.87	46.76
867.84	38.23	V	21.76	4.09	26.68	37.40	72.87	35.47
879.72	48.05	V	21.99	3.99	26.65	47.38	72.87	25.49
973.81*	19.3	V	23.00	4.73	26.62	20.41	54.00	33.59
1301.76	49.74	H	24.53	1.57	35.95	39.89	74.00	34.11
1301.76	57.63	V	24.53	1.57	35.95	47.78	74.00	26.22
1735.68	51.09	H	26.19	1.65	36.06	42.87	74.00	31.13
1735.68	51.56	V	26.19	1.65	36.06	43.34	74.00	30.66
2169.60	49.82	H	27.64	1.74	36.18	43.02	74.00	30.98
2169.60	51.15	V	27.64	1.74	36.18	44.35	74.00	29.65
3037.44	48.72	H	30.19	2.18	37.04	44.05	74.00	29.95
3037.44	50.00	V	30.19	2.18	37.04	45.33	74.00	28.67
3471.36	50.62	H	31.23	2.39	36.94	47.30	74.00	26.70
3471.36	50.47	V	31.23	2.39	36.94	47.15	74.00	26.85
3905.28	50.47	H	32.19	2.58	36.94	48.30	74.00	25.70
3905.28	54.33	V	32.19	2.58	36.94	52.16	74.00	21.84

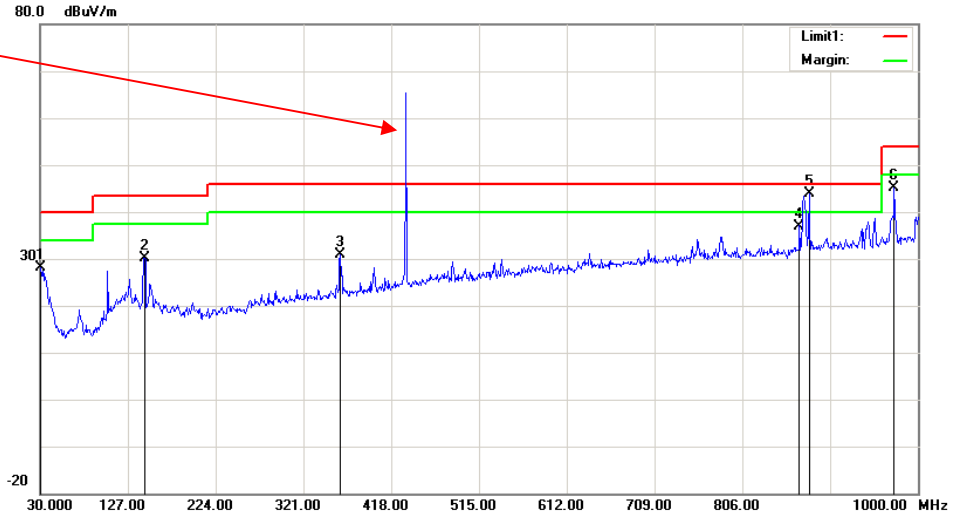
Note:

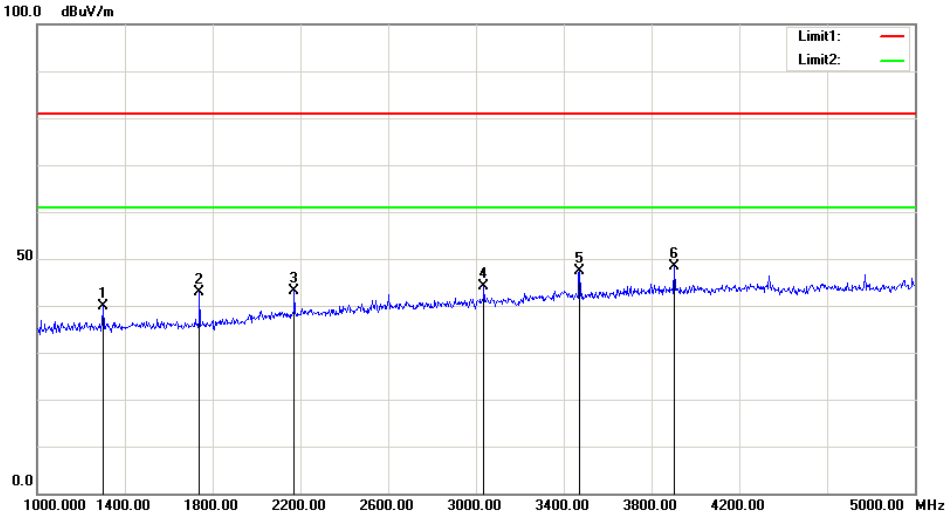
According to C63.10-2013, clause 6.6.4.3, where limits are specified by regulations for both average and peak detection, if the maximized peak measured value complies with the average limit(20dBc below the Peak limit), then it is unnecessary to perform an average measurement.

*: QP measurement was applicable for this frequency in the restricted band. if the maximized peak measured value complies with the QP limit, then it is unnecessary to perform an QP measurement.

Horizontal:

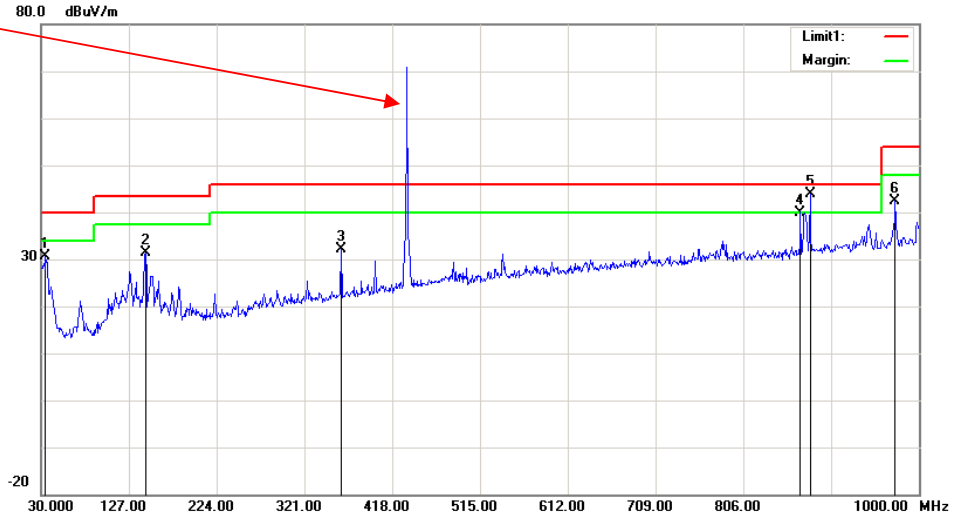
Fundamental

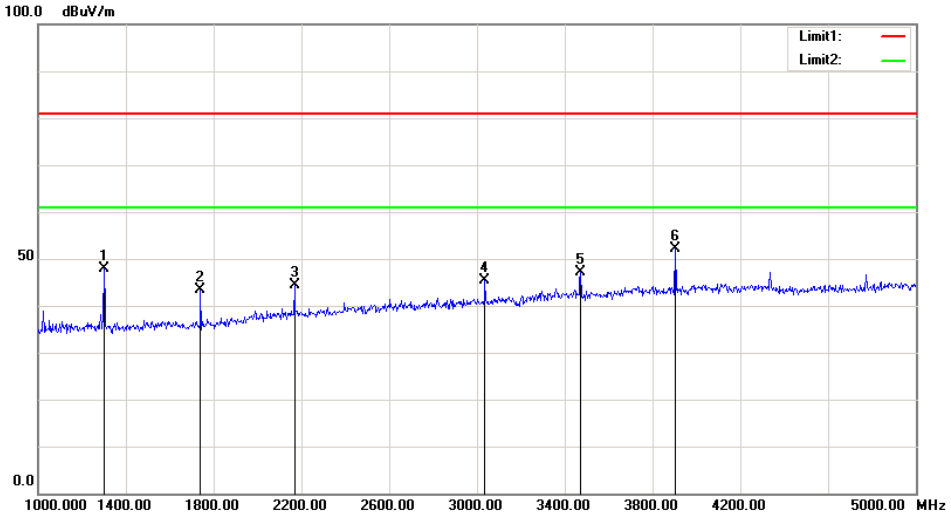




Vertical:

Fundamental





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	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05

*** 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

The waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Data

Environmental Conditions

Temperature:	28°C
Relative Humidity:	47 %
ATM Pressure:	101.2 kPa

The testing was performed by Sunny Cen on 2018-11-08.

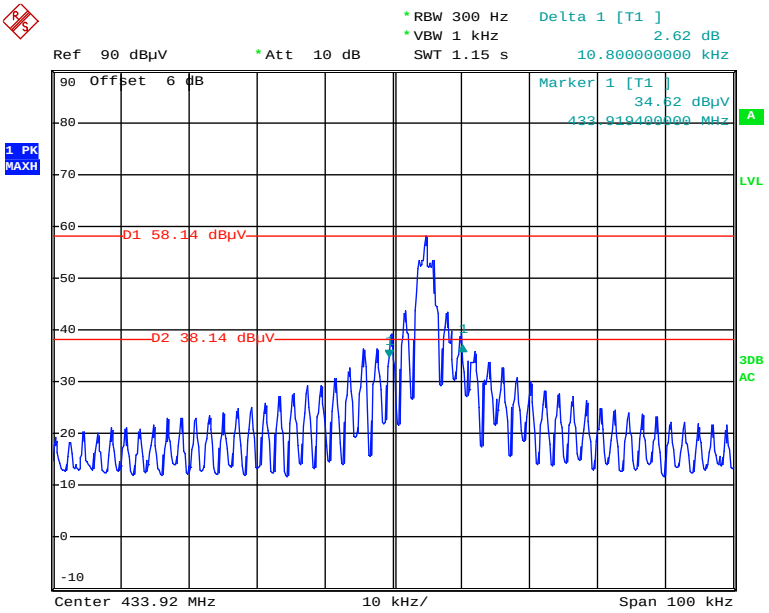
Test Mode: Transmitting

Please refer to following table and plot.

Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	10.8	1084.8	Pass

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

20 dB Bandwidth



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FCC §15.231(e) - DEACTIVATION TESTING

Applicable Standard

Per 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05

*** 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:	26.4 °C
Relative Humidity:	42 %
ATM Pressure:	100.8 kPa

The testing was performed by Sunny Cen on 2018-10-14.

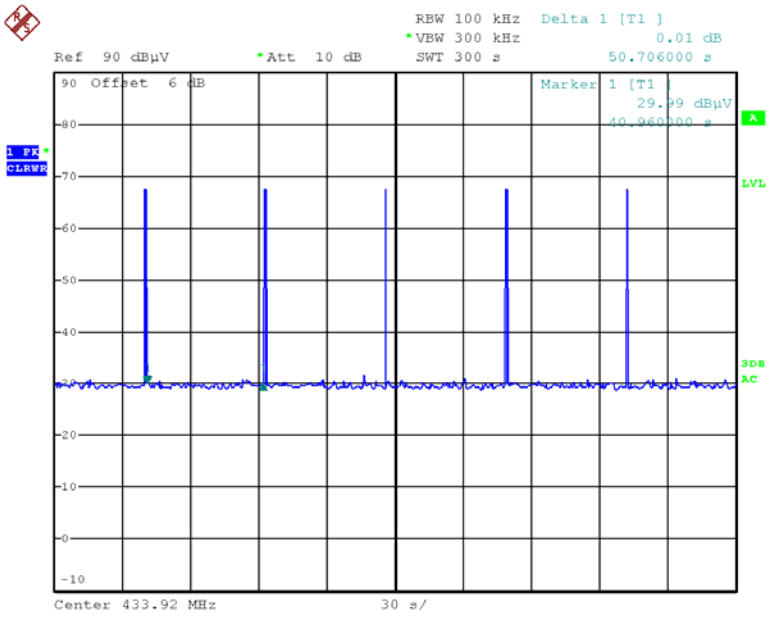
Test Mode: Transmitting

Test Result: Compliance. Please refer to following plot.

Channel	Deactivate Time (s)	Deactivate Time Limit (s)	Silent Time (s)	Silent Time Limit (s)	Result
1	0.306	<1	50.71	>10	Pass
2	0.308	<1	57.30	>10	Pass
3	0.310	<1	59.11	>10	Pass

Channel 1:

Silent period



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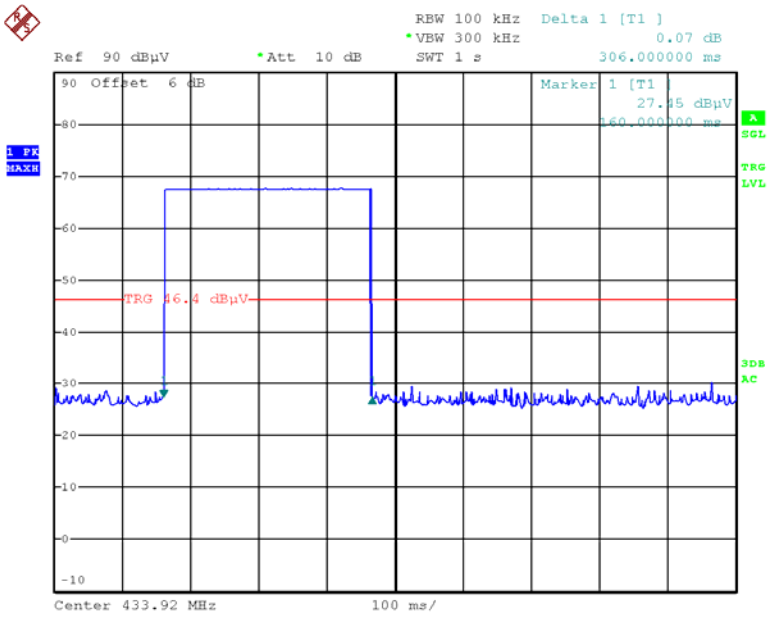
Transmission duration



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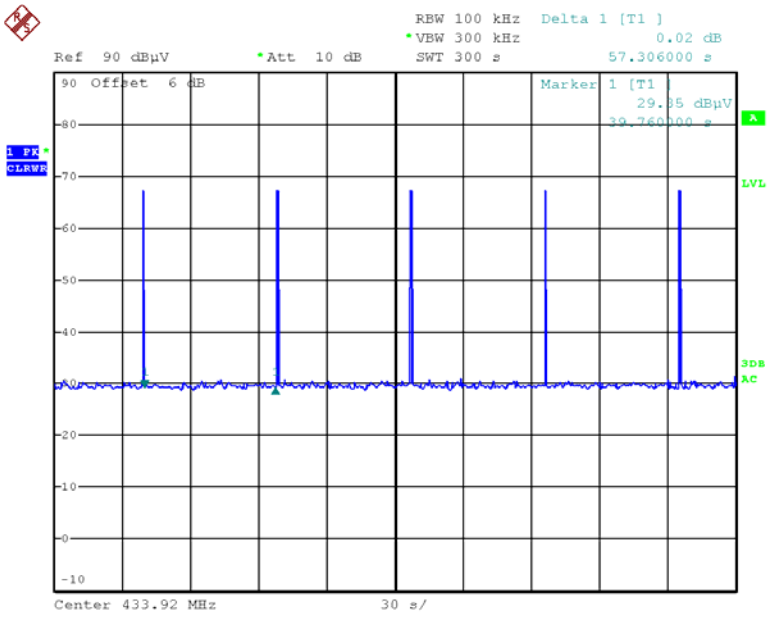
Channel 2:

Silent period



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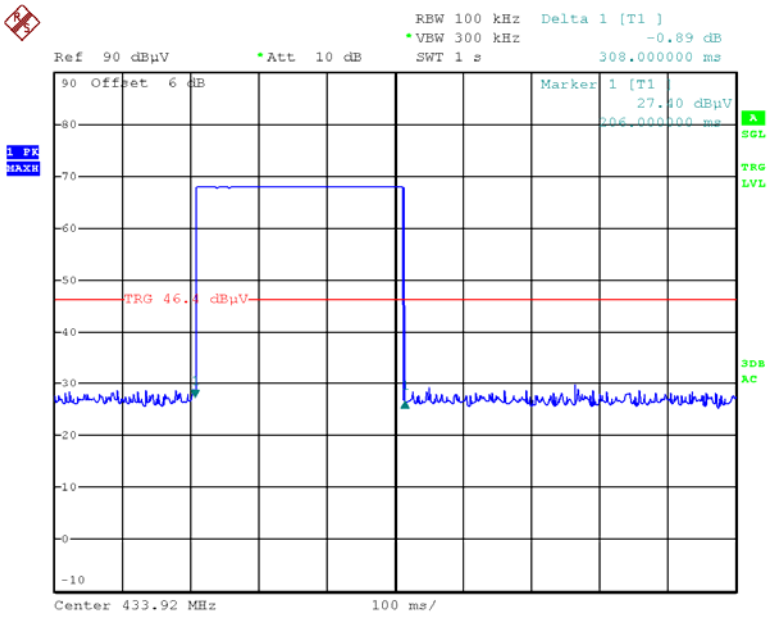

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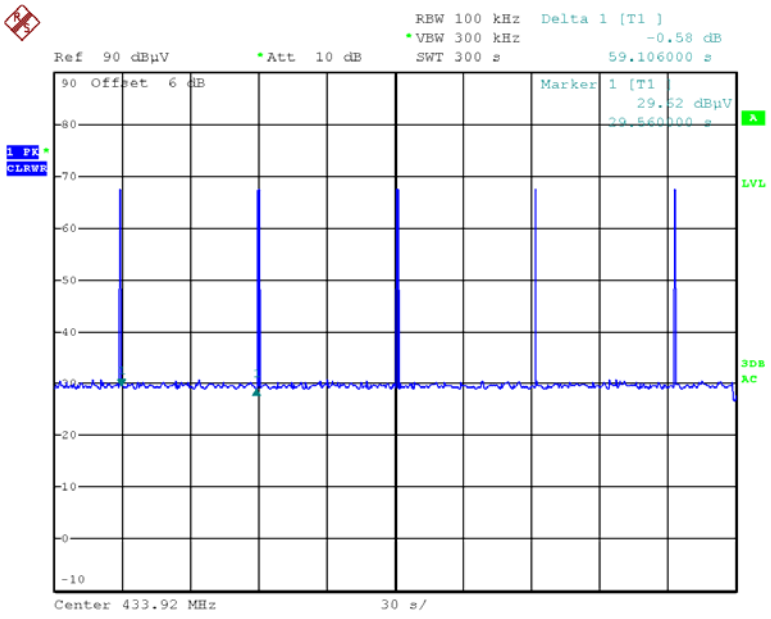
Channel 3:

Silent period



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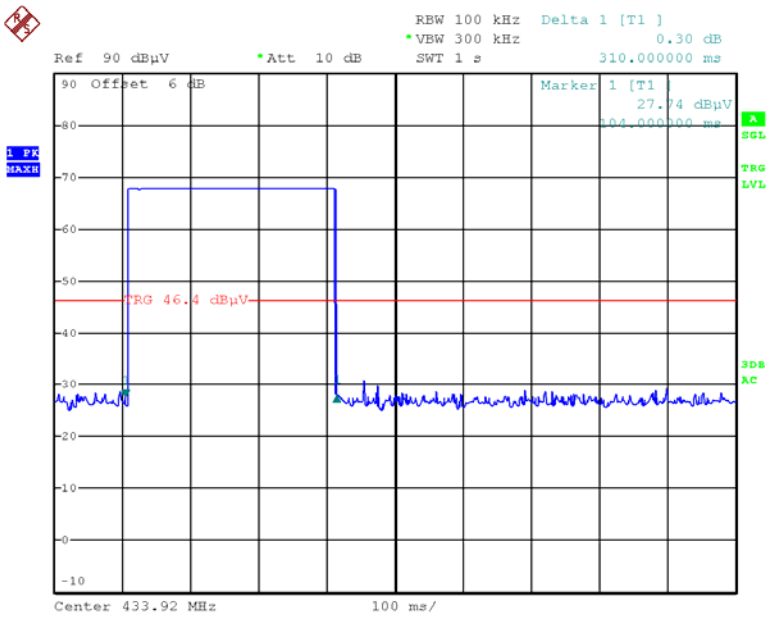

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*******END OF REPORT*******