Shenzhen Huatongwei International Inspection Co., Ltd.
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TEST REPORT

Report No. ..... :	**CHTEW19070106**
Project No. ..... :	**SHT1906058201EW**
FCC ID .....:	**2AOSL-M236**
Applicant's name .....:	**Bonso Technology (Shenzhen) Co., Ltd**
Address .....:	10/F,FuYong Property Comprehensive Building,Baoan District ShenZhen City,Guangdong,China
Manufacturer.....:	Bonso Advanced Technology (XinXing) Co., Ltd
Address.....:	Xincheng High-Tech Industrial Estate,Xinxing,Yunfu City,Guangdong,China
Test item description .....:	**Remote-control Barking Arrester For Dog Training**
Trade Mark.....:	MODUS
Model/Type reference .....:	M-236T
Listed Model(s).....:	-
Standard.....:	**FCC CFR Title 47 Part 2** **FCC CFR Title 47 Part 95C**
Date of receipt of test sample……...:	Jun.28, 2019
Date of testing……..……:	Jun.28, 2019- Jul.19, 2019
Date of issue……...:	Jul.22, 2019
Result ..... ……...:	**PASS**

Report verification :

Compiled by (position+printed name+signature) . :	File administrators Fanghui Zhu	Fanghui Zhu
Supervised by (position+printed name+signature) . :	Project Engineer Tom Ouyang	Tom ouyang
Approved by (position+printed name+signature) . :	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name.....:	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address .....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Contents

1 TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:
FCC Rules Part 2: Frequency allocations and radio treaty matters; General rules and regulations
FCC Rules Part 95C: Radio Control Radio Service
ANSI C63.4-2014: 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

1.2. Report revised information

Revised No.	Date of issued	Description
N/A	2019-07-22	Original

2 TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Carrier Output Power(ERP)	Part 95.767 Part 2.1046(a)	Pass	Pan Xie
99% Occupied Bandwidth	Part 95.773 Part 2.1049	Pass	Pan Xie
Emission Mask	Part 95.779(a)(1)(2)(3) Part 2.1049	Pass	Pan Xie
Frequency Stability V.S. Temperature	Part 95.765 Part 2.1055	Pass	Pan Xie
Frequency Stability V.S. Voltage	Part 95.765 Part 2.1055	Pass	Pan Xie
Transmit Radiated Spurious Emission	Part 95.779(a)(3) Part 2.1053	Pass	Pan Xie

3 SUMMARY

3.1 Client Information

Applicant:	Bonso Technology (Shenzhen) Co., Ltd
Address:	10/F,FuYong Property Comprehensive Building,Baoan District ShenZhen City,Guangdong,China
Manufacturer:	Bonso Advanced Technology (XinXing) Co., Ltd
Address:	Xincheng High-Tech Industrial Estate,Xinxing,Yunfu City,Guangdong,China

3.2 Product Description

Name of EUT:	Remote-control Barking Arrester For Dog Training
Trade mark:	MODUS
Model/Type reference:	M-236T
Listed model(s):	-
Power supply:	DC3.70V
Hardware version:	R0D1
Software version:	D1
RF Specification	
Support Frequency Range:	27.145MHz
Rated Output Power:	0.13W(21dBm)
Modulation Type:	FM
Antenna Type:	Integral
Antenna Gain:	1.0dBi

3.3 Test frequency list

According to ANSI C63.26 section 5.1.2.1:
Measurements of transmitters shall be performed and, if required, reported for each frequency band in which the EUT can be operated with the device transmitting at the number of frequencies in each band specified in Table 2.

Frequency range over which EUT operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

Frequency Bands (MHz)	Test Channel	Test Frequency (MHz)
26-28	CH_M	27.145

3.4 Operation mode

Test mode	Transmitting	Receiving	FRS
TX	■		
RX		■	

Note: ■ is operation mode.

3.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

●		Length (m) :	/
		Shield :	/
		Detachable :	/
○		Manufacturer :	/
		Model No. :	/

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 762235.

IC-Registration No.: 5377A

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3 Environmental conditions

Atmospheric Contions	
Temperature:	21℃ to 25℃
Relative Humidity:	20 % to 75 %.
Atmospheric Pressure:	860 mbar to 1060 mbar
Norminal Test Voltage:	V_N = DC 3.70V
Extrem Test Voltage @115%V_N:	V_H = DC 4.26V
Extrem Test Voltage @85%V_N:	V_L = DC 3.15V

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability & Occupied Bandwidth	15Hz for <1GHz 70Hz for >1GHz	(1)
Conducted Output Power	0.51dB	(1)
ERP / EIRP / RSE	2.66dB for <1GHz 3.44dB for >1GHz	(1)
Conducted Emission 9KHz-30MHz	3.02dB	(1)
Radiated Emission 30~1000MHz	4.90dB	(1)
Radiated Emission 1~18GHz	4.96dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.5 Equipments Used during the Test

● Conducted Emission						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26
●	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26
●	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26
●	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
○	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27
○	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27
○	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27
○	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26
○	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26
○	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26

● Radiated Emission-6th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
●	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
●	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● Radiated emission-7th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
●	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/26	2020/04/25
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	Test Software	Audix	E3	N/A	N/A	N/A

●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

●	RF Conducted Method					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28
○	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28
○	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A

●	Auxiliary Equipment					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Climate chamber	ESPEC	GPL-2	N/A	2018/11/08	2019/11/07
●	DC Power Supply	Gwinstek	SPS-2415	GER835793	2018/10/28	2019/10/27

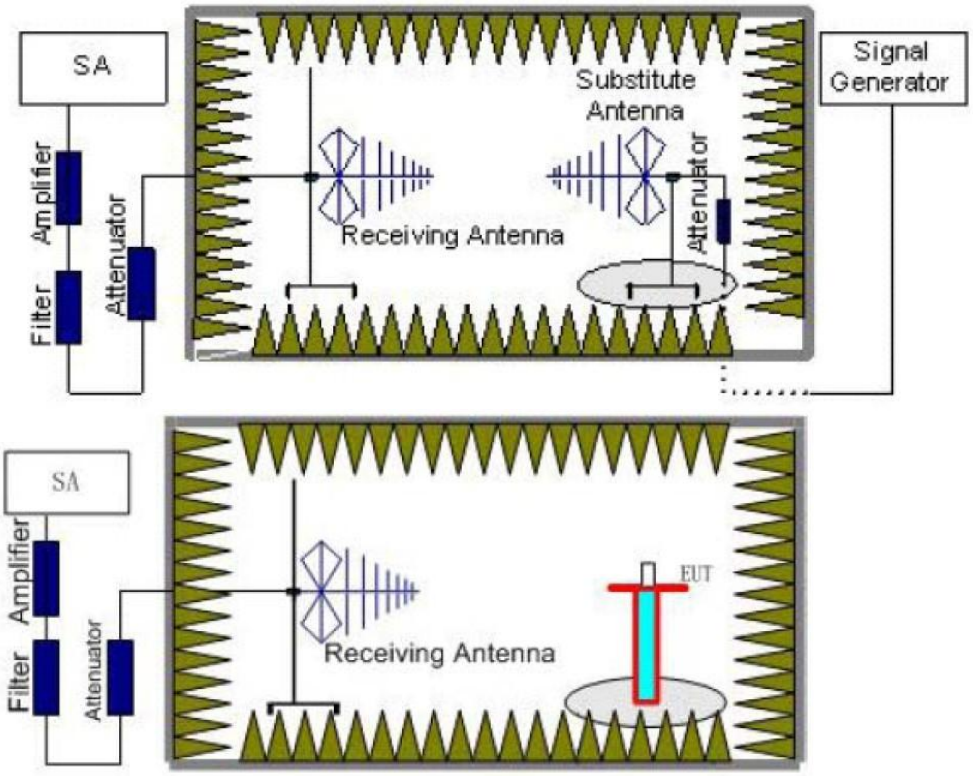
5 TEST CONDITIONS AND RESULTS

5.1 Effective Radiated Power(ERP)

LIMIT

FCC Part FCC Part 95.767, FCC Part 2.1046
26-28 MHz frequency band. For an RCRS transmitter operating on 27.255 MHz, the mean transmitter output power must not exceed 25 Watts. For an RCRS transmitter operating on 26.995, 27.045, 27.095, 27.145, or 27.195 MHz, the mean transmitter output power must not exceed 4 Watts.

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1. 0 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=100kHz,VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl - Ga
   We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl - Ga
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

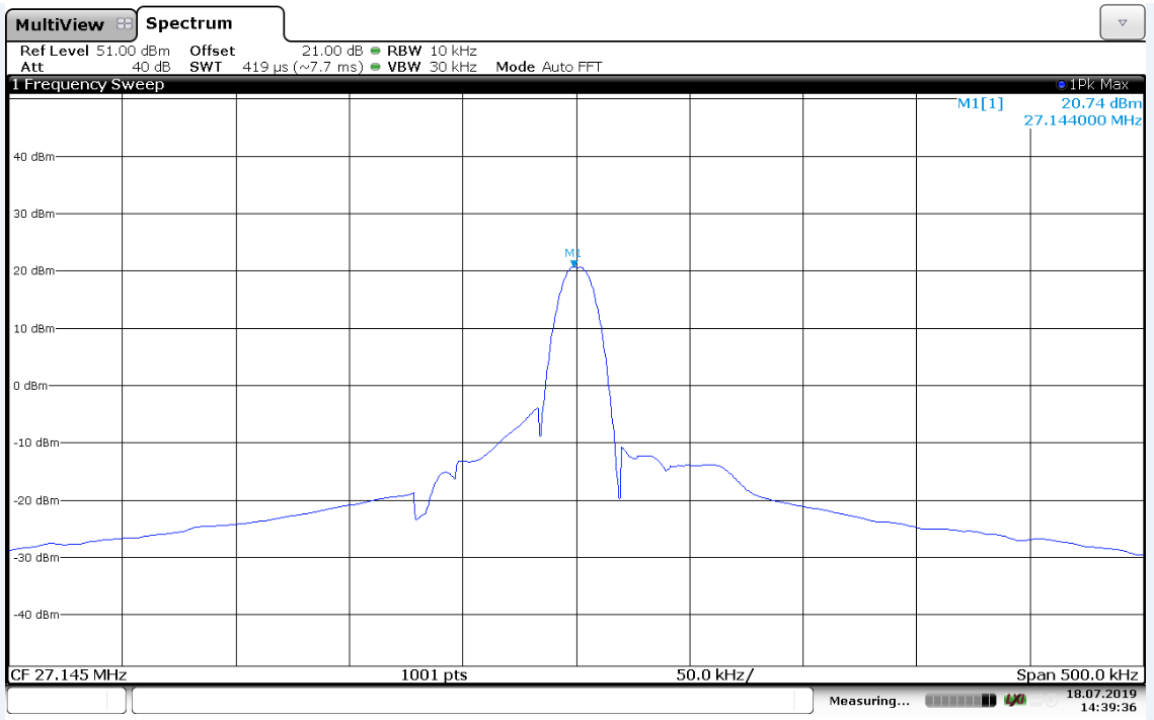
☒ **Passed** ☐ **Not Applicable**

ERP:

Mode	Frequency(MHz)	Antenna Pol.	ERP	Limit (dBm)	Result
TX-RCRS	27.145	V	20.55	<36.00	Pass
		H	19.58		

Conducted output power:

Mode	Frequency(MHz)	Power outpower(dBm)	Limit (dBm)	Result
TX-RCRS	27.145	20.74	<36.00	Pass



5.2 99% Occupied Bandwidth

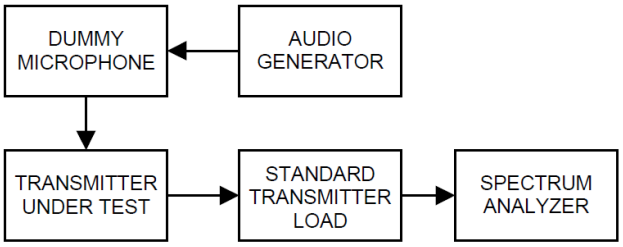
LIMIT

FCC Part 95.773, FCC Part 2.1049

Each RCRS transmitter type must be designed such that the occupied bandwidth does not exceed 8 kHz for any emission type.

TEST CONFIGURATION

Test setup for Analog:



TEST PROCEDURE

(1) Connect the equipment as illustrated

(2) Spectrum set as follow:

Centre frequency = the nominal EUT channel center frequency,

The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient)

RBW = 1% to 5% of the anticipated OBW, VBW ≥ 3 × RBW, Sweep = auto,

Detector function = peak, Trace = max hold

(3) Set 99% Occupied Bandwidth

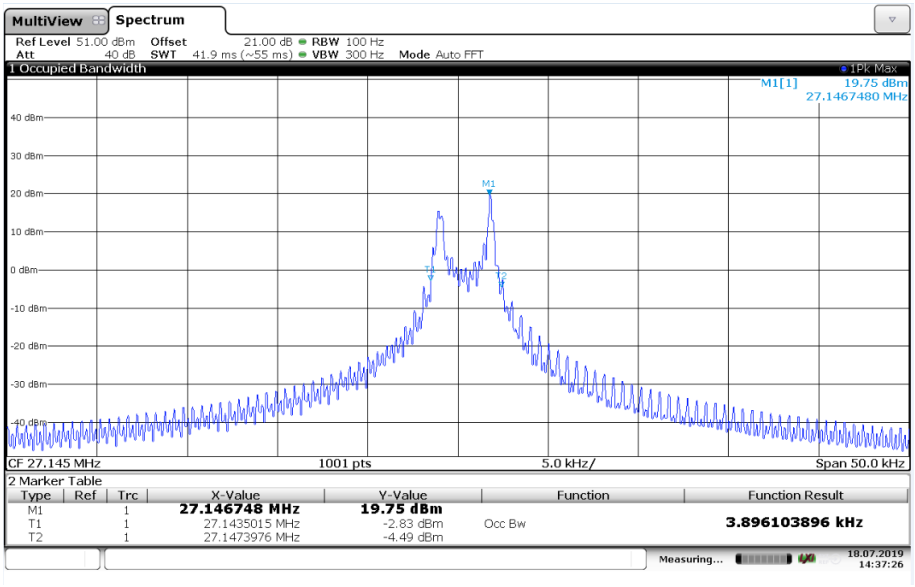
(4) Measure and record the results in the test report.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Mode	Frequency(MHz)	99% Bandwidth(MHz)	Limit (kHz)	Result
TX-RCRS	27.145		<8.00	Pass

5.3 Emission Mask

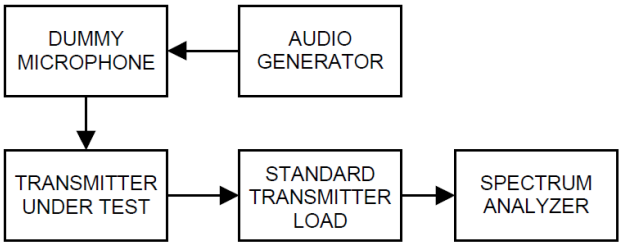
LIMIT

FCC Part 95.779(a)(1)(2)(3),FCC Part 2.1049

(a) 26-28 MHz frequency band. For an RCRS transmitter operating in the 26-28 MHz frequency band, the power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:
(1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency;
(2) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency;
(3) 43 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 20 kHz.

TEST CONFIGURATION

Test setup for Analog:



TEST PROCEDURE

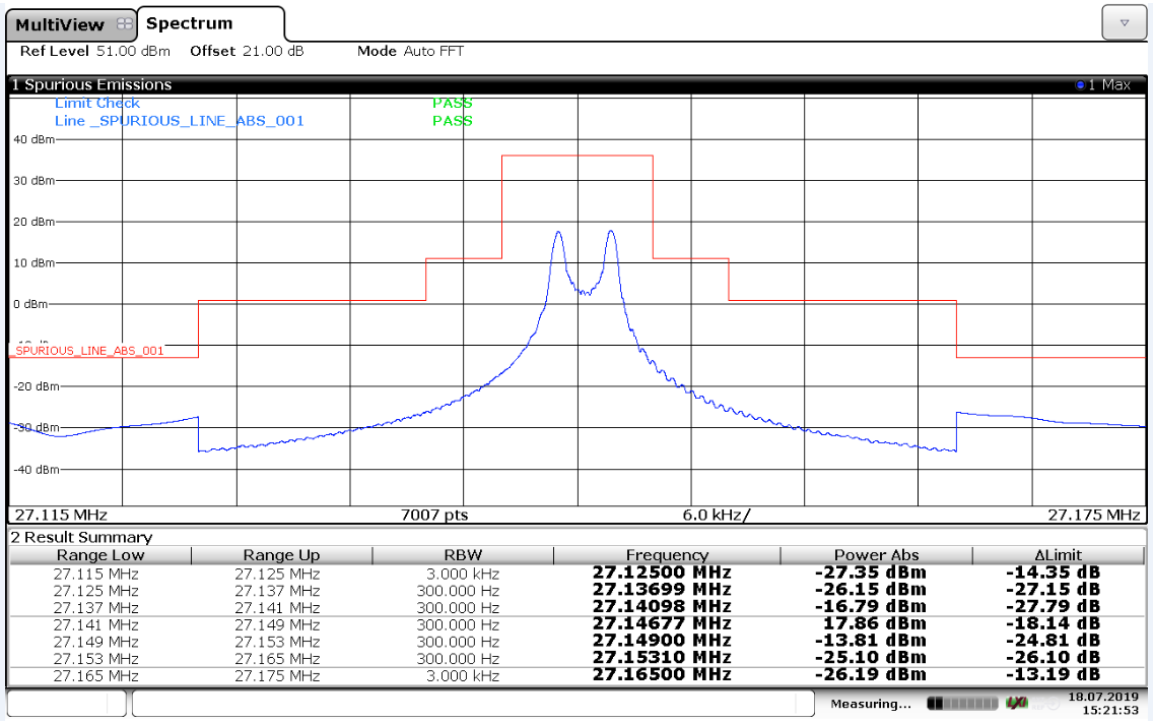
1) Connect the equipment as illustrated.
2) Spectrum set as follow:
   Centre frequency = fundamental frequency, span=120kHz for 12.5kHz channel spacing,
   RBW=100Hz, VBW=1000Hz, Sweep = auto,
   Detector function = peak, Trace = max hold
3) Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
4) Apply Input Modulation Signal to EUT according to Section 3.4
5) Measure and record the results in the test report.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**


MultiView
Spectrum
Ref Level 51.00 dBm Offset 21.00 dB Mode Auto FFT
1 Spurious Emissions
1 Max
Limit Check PASS
Line _SPURIOUS_LINE_ABS_001 PASS
40 dBm
30 dBm
20 dBm
10 dBm
0 dBm
SPURIOUS_LINE_ABS_001
-20 dBm
-30 dBm
-40 dBm
27.115 MHz
7007 pts
6.0 kHz/
27.175 MHz
2 Result Summary
Range Low | Range Up | RBW | Frequency | Power Abs | ΔLimit
27.115 MHz | 27.125 MHz | 3.000 kHz | 27.12500 MHz | -27.35 dBm | -14.35 dB
27.125 MHz | 27.137 MHz | 300.000 Hz | 27.13699 MHz | -26.15 dBm | -27.15 dB
27.137 MHz | 27.141 MHz | 300.000 Hz | 27.14098 MHz | -16.79 dBm | -27.79 dB
27.141 MHz | 27.149 MHz | 300.000 Hz | 27.14677 MHz | 17.86 dBm | -18.14 dB
27.149 MHz | 27.153 MHz | 300.000 Hz | 27.14900 MHz | -13.81 dBm | -24.81 dB
27.153 MHz | 27.165 MHz | 300.000 Hz | 27.15310 MHz | -25.10 dBm | -26.10 dB
27.165 MHz | 27.175 MHz | 3.000 kHz | 27.16500 MHz | -26.19 dBm | -13.19 dB
Measuring...
18.07.2019
15:21:53

5.4 Frequency stability VS Temperature

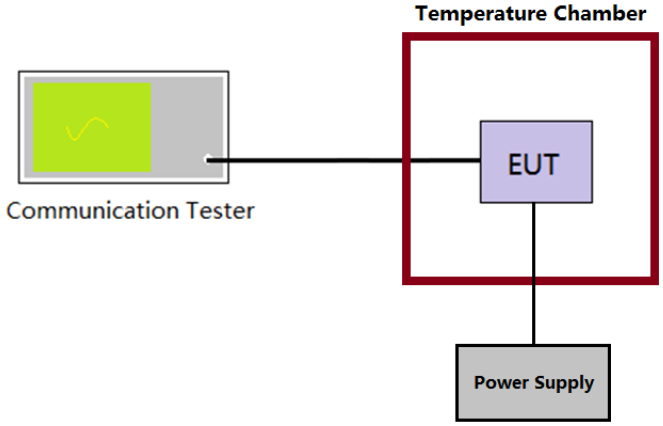
LIMIT

FCC Part 95.765, Part 2.1055:

(b) Except as allowed under paragraph (c) of this section, each RCRS transmitter type capable of transmitting in the 26-28 MHz frequency band must be designed such that the carrier frequencies remain within ±50 ppm of the channel center frequencies listed in §95.763(a) during normal operating conditions.

(c) Each RCRS transmitter type that transmits in the 26-28 MHz frequency band with a mean transmitter power of 2.5 W or less and is used solely by the operator to turn on and/or off a device at a remote location, other than a device used solely to attract attention, must be designed such that the carrier frequencies remain within ±100 ppm of the channel center frequencies listed in §95.763(a) during normal operating conditions.

TEST CONFIGURATION



TEST PROCEDURE

1) The EUT output port was connected to communication tester.

2) The EUT was placed inside the temperature chamber.

3) Turn EUT off and set the chamber temperature to –30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency as MCF_{MHz}.

4) Calculate the ppm frequency error by the following:
ppm error=$(MCF_{MHz}/ACF_{MHz}-1)*10^6$
where
MCF_{MHz} *is the Measured Carrier Frequency in MHz*
ACF_{MHz} *is the Assigned Carrier Frequency in MHz*

5) Repeat step 3 measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
27.145	3.70	25	1000	36	50	PASS
	3.15	-30	1100	40	50	PASS
	4.26	50	1200	44	50	PASS

5.5 Frequency stability VS Voltage

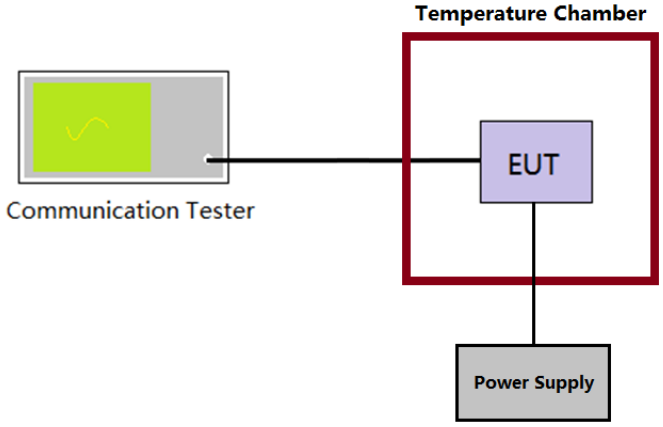
LIMIT

FCC Part 95.765, Part 2.1055:

(b) Except as allowed under paragraph (c) of this section, each RCRS transmitter type capable of transmitting in the 26-28 MHz frequency band must be designed such that the carrier frequencies remain within ±50 ppm of the channel center frequencies listed in §95.763(a) during normal operating conditions.

(c) Each RCRS transmitter type that transmits in the 26-28 MHz frequency band with a mean transmitter power of 2.5 W or less and is used solely by the operator to turn on and/or off a device at a remote location, other than a device used solely to attract attention, must be designed such that the carrier frequencies remain within ±100 ppm of the channel center frequencies listed in §95.763(a) during normal operating conditions.

TEST CONFIGURATION



TEST PROCEDURE

1) The EUT output port was connected to communication tester.

2) The EUT was placed inside the temperature chamber at 25°C

3) Record the carrier frequency of the transmitter as MCF_{MHZ}

4) Calculate the ppm frequency error by the following:
ppm error=$(MCF_{MHz}/ACF_{MHz}-1)*10^6$
where
MCF_{MHz} *is the Measured Carrier Frequency in MHz*
ACF_{MHz} *is the Assigned Carrier Frequency in MHz*

5) Repeat step 3 measure with varied ±15% of the nominal value measured at the input to the EUT

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
27.145	3.70	-30	1000	36	50	PASS
	3.70	-20	1000	36	50	PASS
	3.70	-10	1000	36	50	PASS
	3.70	0	1000	36	50	PASS
	3.70	10	1000	36	50	PASS
	3.70	20	1000	36	50	PASS
	3.70	30	1000	36	50	PASS
	3.70	40	1000	36	50	PASS
	3.70	50	1000	36	50	PASS

5.6 Transmitter Radiated Spurious Emission

LIMIT

FCC Part 95.779(a)(3):

43 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 20 kHz.

43 + 10 log (Pwatts)

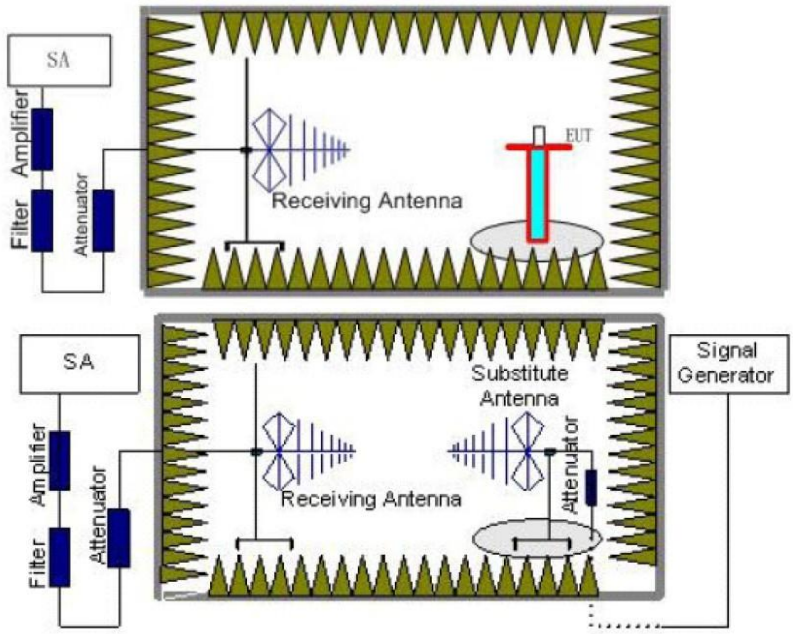
Calculation: Limit (dBm) =EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm).

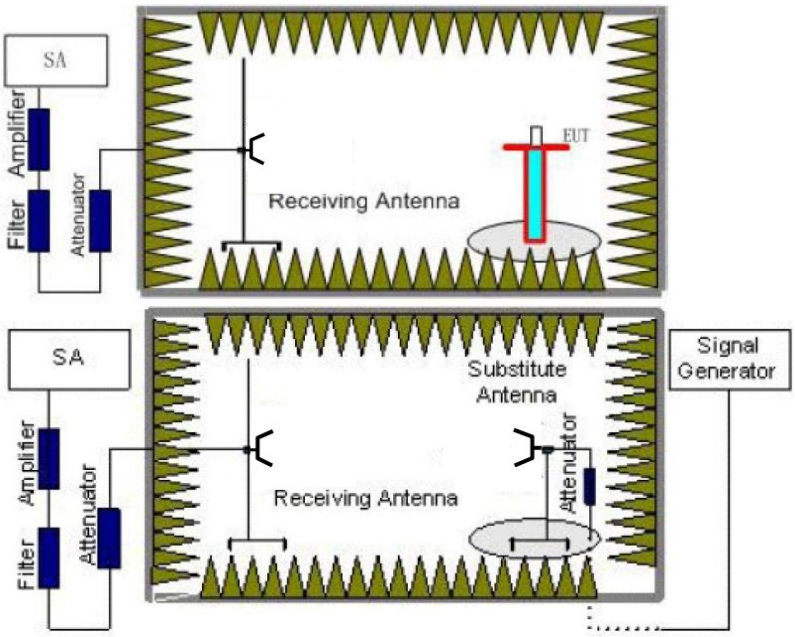
Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13 dBm

TEST CONFIGURATION

Below 1GHz:



Above 1GHz:



TEST PROCEDURE

1. Place the EUT in the center of the turntable.
   a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
   b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
   Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
   Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
   a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
   b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
   c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
   d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
   e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
    a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
    b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
    c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
    Pe = Ps(dBm) − cable loss (dB) + antenna gain (dBd)
    where
    Pe = equivalent emission power in dBm
    Ps = source (signal generator) power in dBm
    NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.
13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:
    gain (dBd) = gain (dBi) − 2.15 dB.
    If necessary, the antenna gain can be calculated from calibrated antenna factor information
14. Provide the complete measurement results as a part of the test report.

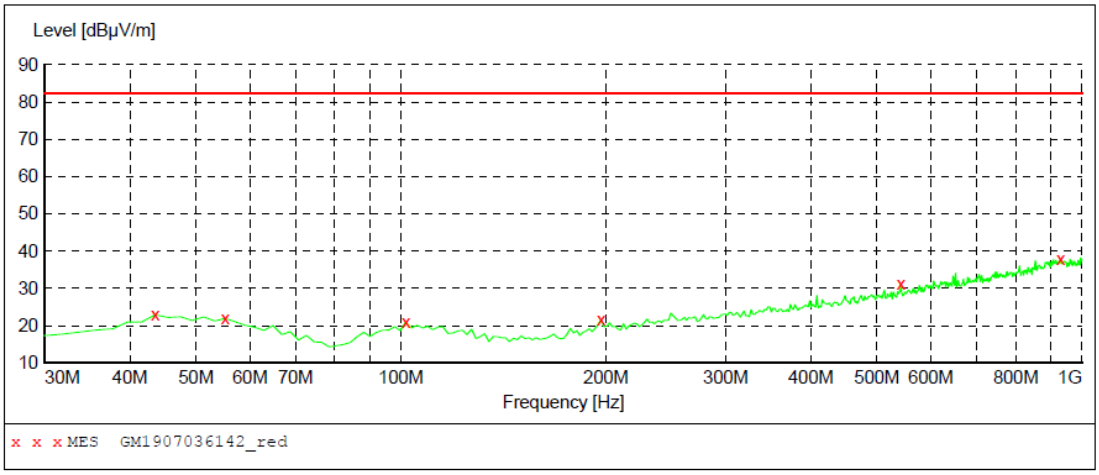
TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

TEST MODE	TX-RCRS	Test Channel:	CH_M	Polarity:	Horizontal

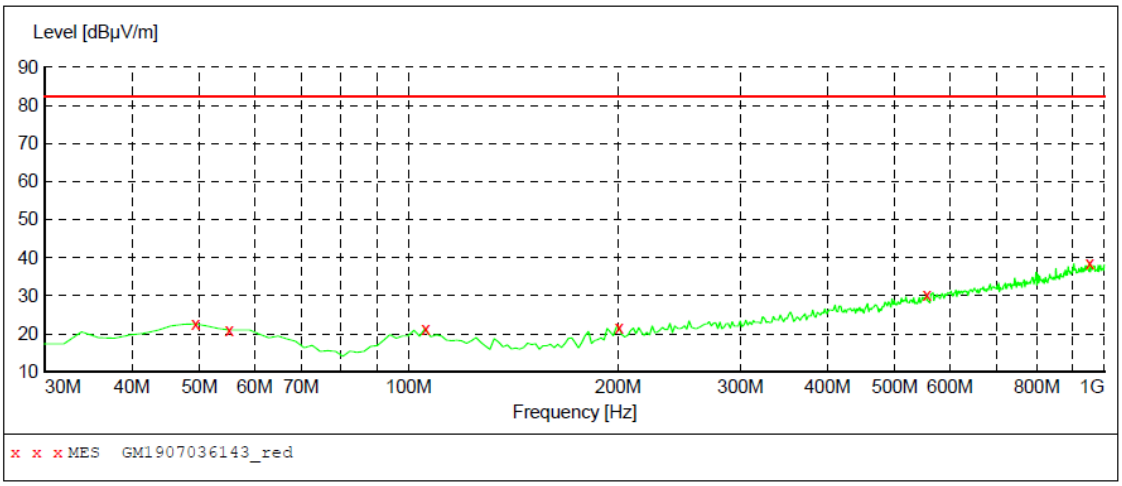


MEASUREMENT RESULT: "GM1907036142_red"

7/3/2019 11:03PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	22.90	-5.2	82.3	59.4	QP	100.0	63.00	HORIZONTAL
55.220000	21.90	-5.3	82.3	60.4	QP	100.0	360.00	HORIZONTAL
101.780000	20.90	-6.6	82.3	61.4	QP	100.0	0.00	HORIZONTAL
196.840000	21.50	-5.9	82.3	60.8	QP	100.0	305.00	HORIZONTAL
542.160000	31.10	2.8	82.3	51.2	QP	100.0	185.00	HORIZONTAL
930.160000	37.90	10.7	82.3	44.4	QP	100.0	345.00	HORIZONTAL

TEST MODE	TX-RCRS	Test Channel:	CH_M	Polarity:	Vertical



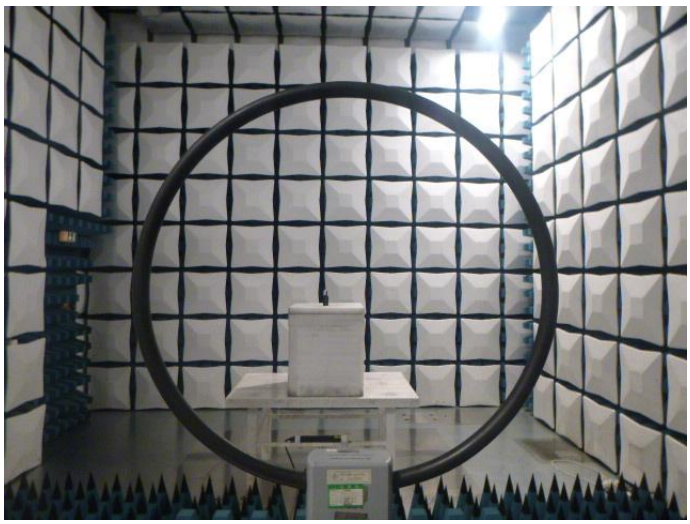
MEASUREMENT RESULT: "GM1907036143_red"

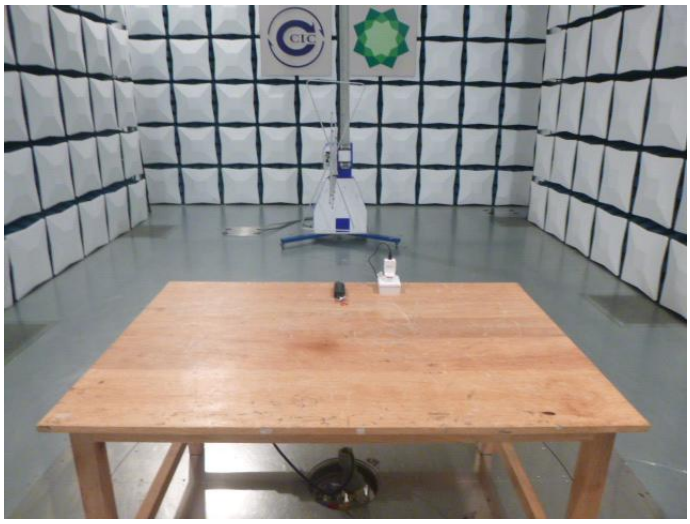
7/3/2019 11:05PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000	22.60	-4.8	82.3	59.7	QP	100.0	359.00	VERTICAL
55.220000	21.00	-5.3	82.3	61.3	QP	100.0	23.00	VERTICAL
105.660000	21.40	-6.7	82.3	60.9	QP	100.0	23.00	VERTICAL
200.720000	21.80	-6.0	82.3	60.5	QP	100.0	0.00	VERTICAL
555.740000	30.30	3.1	82.3	52.0	QP	100.0	353.00	VERTICAL
953.440000	38.70	10.9	82.3	43.6	QP	100.0	245.00	VERTICAL

6 TEST SETUP PHOTOS OF THE EUT

Radiated Emission:



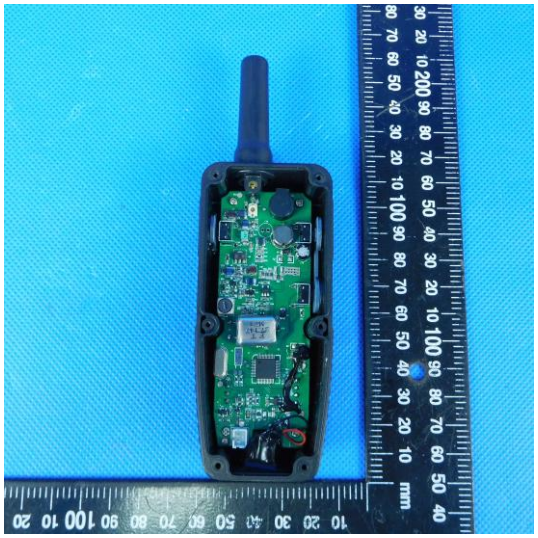


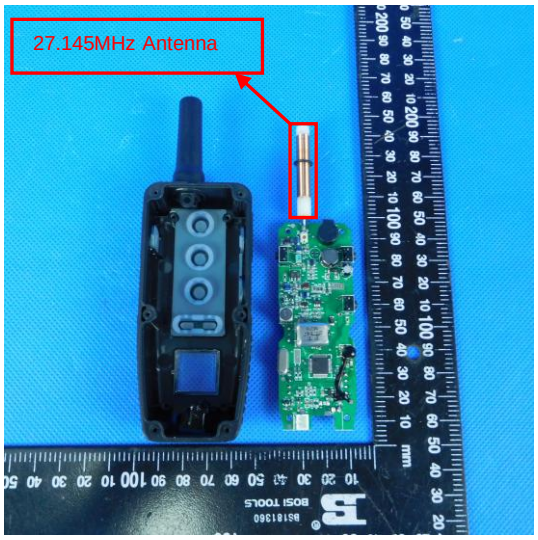
7 EXTERNAL AND INTERNAL PHOTOS OF THE EUT

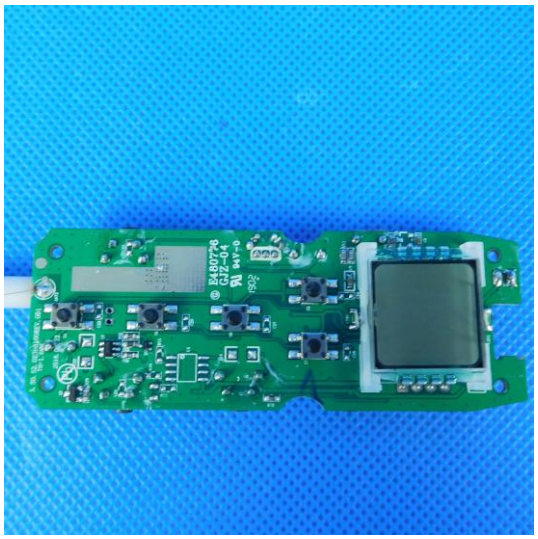
External Photos of the EUT


modus

Internal Photos of the EUT







.....End of Report.....