

TEST REPORT

Application No.: SHEM2102001582CR
FCC ID: VPYCMABZ
IC: 772C-CMABZ
Applicant: Murata Manufacturing Co., Ltd.
Address of Applicant: 10-1, Higashikotari 1-chome, Nagaokakyo-shi Kyoto 617-8555 Japan
Manufacturer: Murata Manufacturing Co., Ltd.
Address of Manufacturer: 10-1, Higashikotari 1-chome, Nagaokakyo-shi Kyoto 617-8555 Japan
Factory: Shenzhen Murata Technology Co., Ltd.
Address of Factory: 15 Cuijing Road, Shenzhen Grand Industrial Zone, PingShan New District, Shenzhen, Guangdong, China

Equipment Under Test (EUT):

EUT Name: LoRa module
Model No.: CMWX1ZZABZ
Trade Mark: Murata
Standard(s) : 47 CFR Part 15, Subpart C 15.247
 RSS-247 Issue 2, February 2017
 RSS-Gen Issue 5 Amendment 2 (February 2021)

Date of Receipt: 2021-02-26
Date of Test: 2021-08-07 to 2021-08-11
Date of Issue: 2021-08-12

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

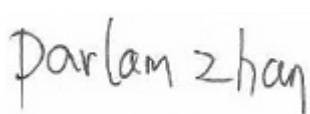
Parlam Zhan
Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record			
Version	Description	Date	Remark
00	Original	2021-08-12	/

Authorized for issue by:			
			
		<hr/> Bill Wu / Project Engineer	
			
		<hr/> Parlam Zhan / Reviewer	



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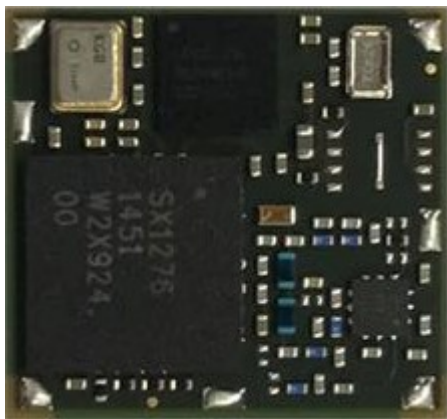
2 Test Summary

Radio Spectrum Matter Part				
Item	FCC Requirement	IC Requirement	Method	Result
Conducted Average Output Power	47 CFR Part 15, Subpart C 15.247(b)(3)	RSS-247 Clause 5.4(d)	ANSI C63.10 (2013) Section 11.9.2	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10.5	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4,6.5,6.6	Pass

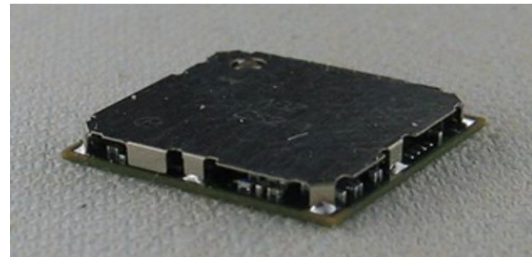
Remark: This C2PC has three major changes:

1. File a 32.768KHz crystal (Y1) substitution EPSON X1A000061001800 to the original model TXC 9H03200028.
2. File a 32MHz TCXO (Y2) substitution KDS 7EE03200A05 to the original model EPSON TG-5035CG-09N.
3. Adjust the component placement slightly to adopt a full-wrap metal shielding case.

<Origin>



Top view without shielding



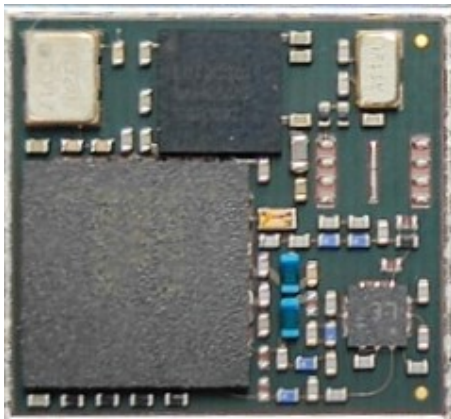
None full-wrap shielding



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<After Change>



Top view without shielding



Full-wrap shielding

- File an additional antenna (P/N: TE-LTFR-225, vendor: WINIZEN, peak gain: 2dBi).

Original:

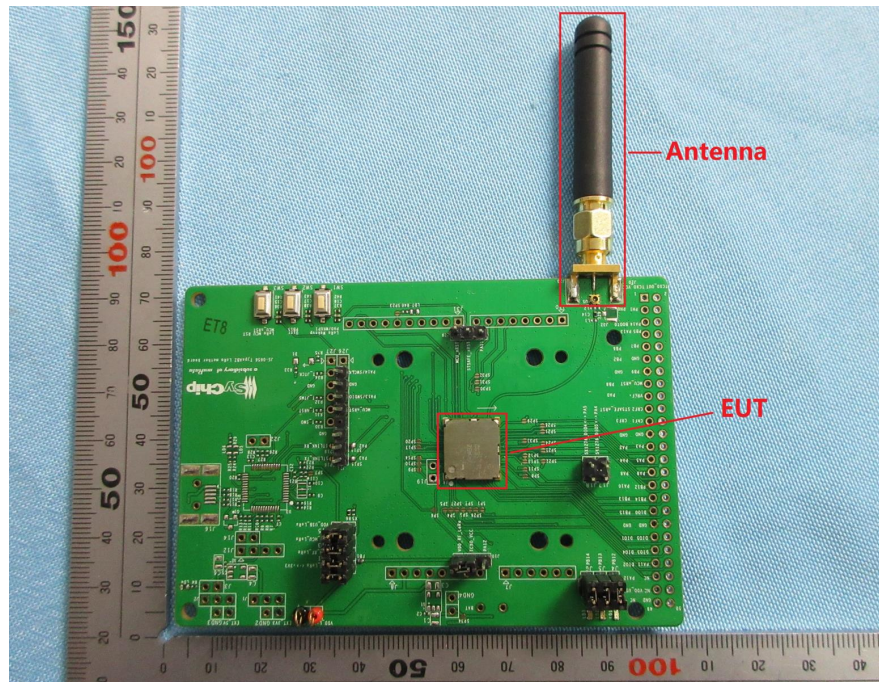
antenna gain

1.04dBi

Antenna type

Monopole Antenna

Antenna photo



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New:

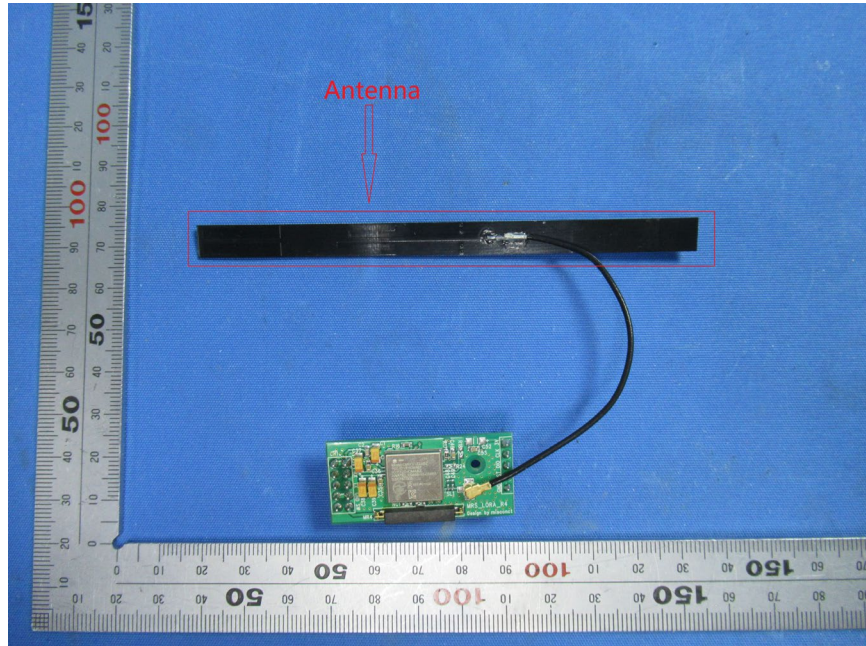
antenna gain

2dBi

Antenna type

PIFA Antenna

Antenna photo



So we just fully retest Output Power and RSE for this product, other test data reference to original module report SHEM160900621801.



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.3V
Test voltage:	DC 3.3V
Operation Frequency:	125kHz Channel: 902.3-914.9MHz
	500kHz Channel: 903-914.2MHz
Modulation Technique:	LoRa
	125kHz Channel: 7-10
Spread Factor (SF):	500kHz Channel: 7-12
	125kHz Channel: 64 channels
Number of Channel:	500kHz Channel: 8 channels
	125kHz Channel: 200KHz
Channel Space:	500kHz Channel: 1.6MHz
	Antenna Type:
Antenna Gain:	2 dBi (Provided by manufacturer)

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X 100e	/
DC Power Supply	GW	GPS-1850D	/
Serial port adapter plate	/	EVK for TypeABZ module	/

4.3 Power level setting using in test:

	125kHz Channel				500kHz Channel			
	Channel	Frequency	SF	Power setting	Channel	Frequency	SF	Power setting
lowest channel	CH01	902.3MHz	10	20	CH65	903MHz	12	20
Middle channel	CH32	908.5MHz	10	20	CH68	907.8MHz	12	20
Highest channel	CH64	914.9MHz	10	20	CH72	914.2MHz	12	20

Remark: Preliminary tests were performed in all tests in different data rate and antenna configurations at lowest channel, the data rates of worse case as above were chosen for final test.



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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 10 ⁻⁸
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

4.6 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 8617A

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2020-12-20	2021-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2020-08-13	2021-08-12
Signal Generator	R&S	SMR20	SHEM006-1	2020-08-13	2021-08-12
Signal Generator	Agilent	N5182A	SHEM182-1	2020-08-13	2021-08-12
Communication Tester	R&S	CMW270	SHEM183-1	2020-08-13	2021-08-12
Switcher	Tonscend	JS0806	SHEM184-1	2020-08-13	2021-08-12
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2020-08-13	2021-08-12
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2018-09-25	2021-09-24
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2020-12-20	2021-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2020-12-20	2021-12-19
Conducted test Cable	/	RF01-RF04	/	2020-12-20	2021-12-19
Test software	Tonscend	JS Tonscend BT/WIFI System	Version: 2.6	/	/
RF Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2020-12-20	2021-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2020-12-20	2021-12-19
Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2020-12-20	2021-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2019-10-14	2021-10-13
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2020-04-30	2022-04-29
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2018-10-24	2021-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2019-10-14	2021-10-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2018-10-31	2021-10-30
Pre-amplifier (9KHz-2GHz)	CLAVIO	BDLNA-0001	SHEM164-1	2020-08-13	2021-08-12
Pre-amplifier (1-18GHz)	CLAVIO	BDLNA-0118	SHEM050-2	2020-08-13	2021-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2020-12-20	2021-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2020-08-13	2021-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
RE test Cable	/	RE01, RE02, RE06	/	2020-12-20	2021-12-19
Test software	ESE	E3	Version: 6.111221a	/	/



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6 Radio Spectrum Matter Test Results

6.1 Conducted Average Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

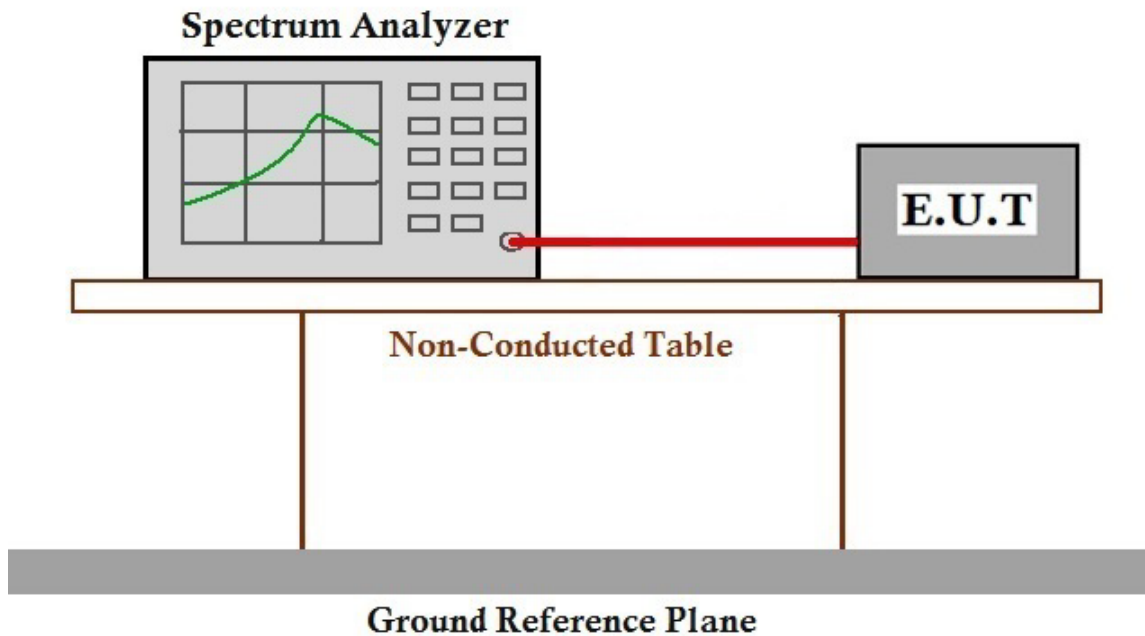
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1001 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation

6.1.2 Test Setup Diagram



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6.1.3 Measurement Procedure and Data

Test mode	Test Channel (MHz)	Reading Power (dBm)	Output Power (dBm)	Limit (dBm)	Result
125kHz Channel	902.3	18.01	18.61	30	Pass
	908.5	18.21	18.71		Pass
	914.9	18.15	18.65		Pass
500kHz Channel	903	17.48	17.98		Pass
	907.8	17.38	17.88		Pass
	914.2	17.44	17.94		Pass

Remark: 1) Output Avg Power = Reading Avg Power + Cable loss

2) Cable loss=0.5dB

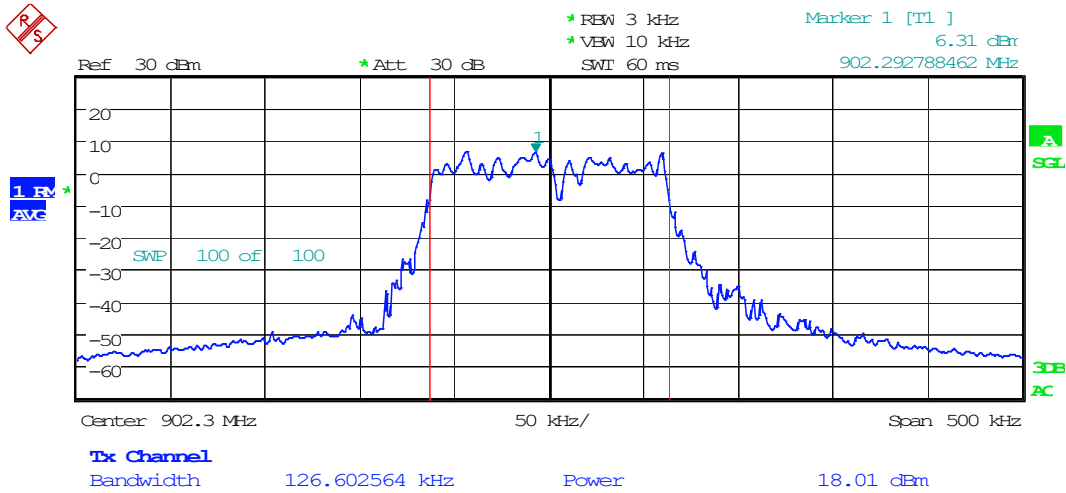


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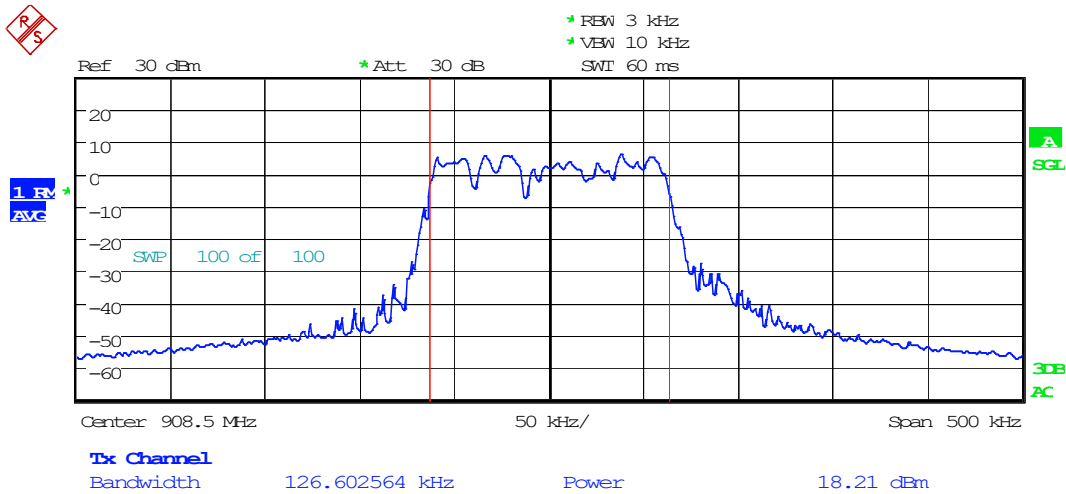
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Test plot as follows:

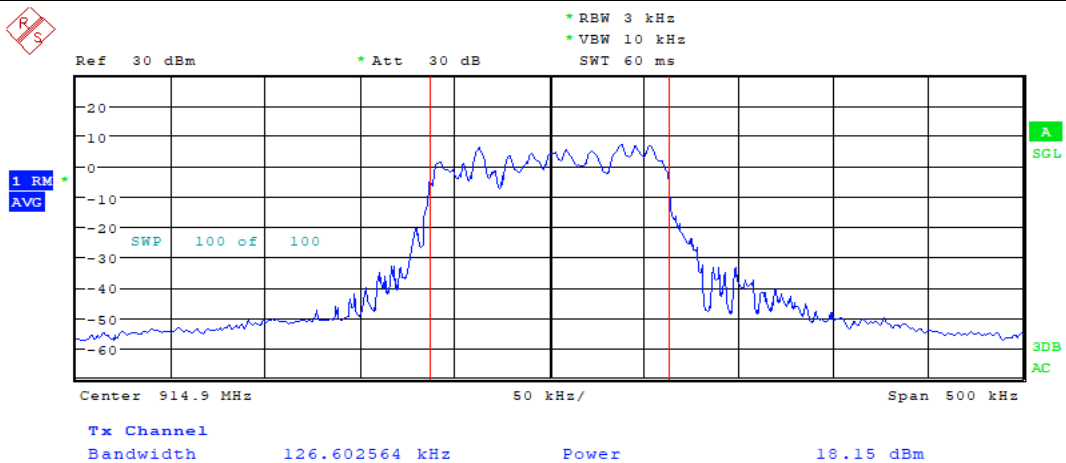
125kHz Channel	Test Channel: 902.3MHz
----------------	------------------------



125kHz Channel	Test Channel: 908.5MHz
----------------	------------------------

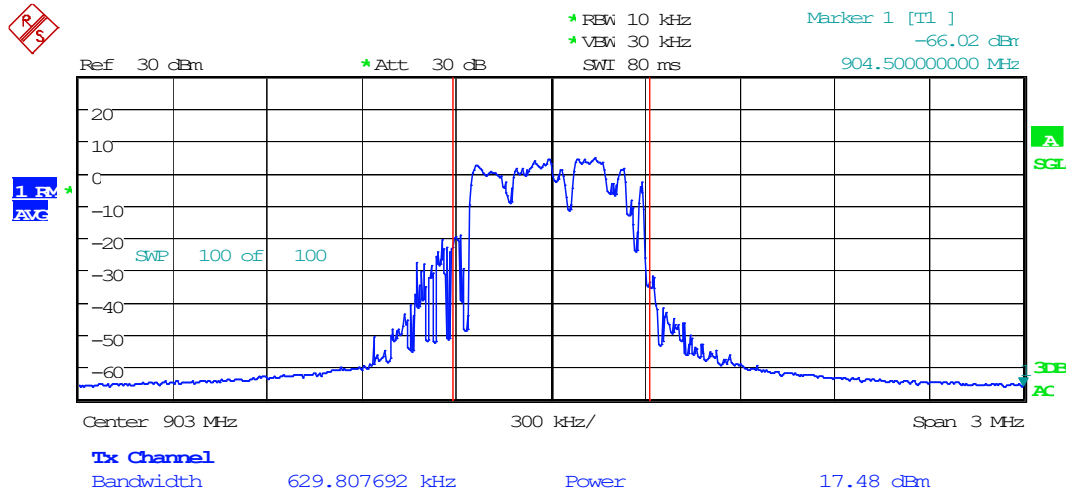


125kHz Channel	Test Channel: 914.9MHz
----------------	------------------------

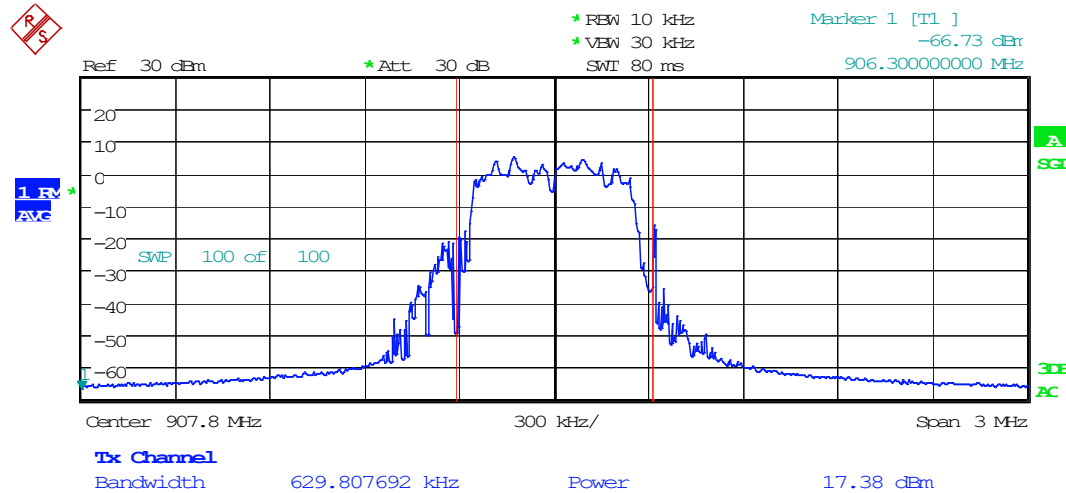


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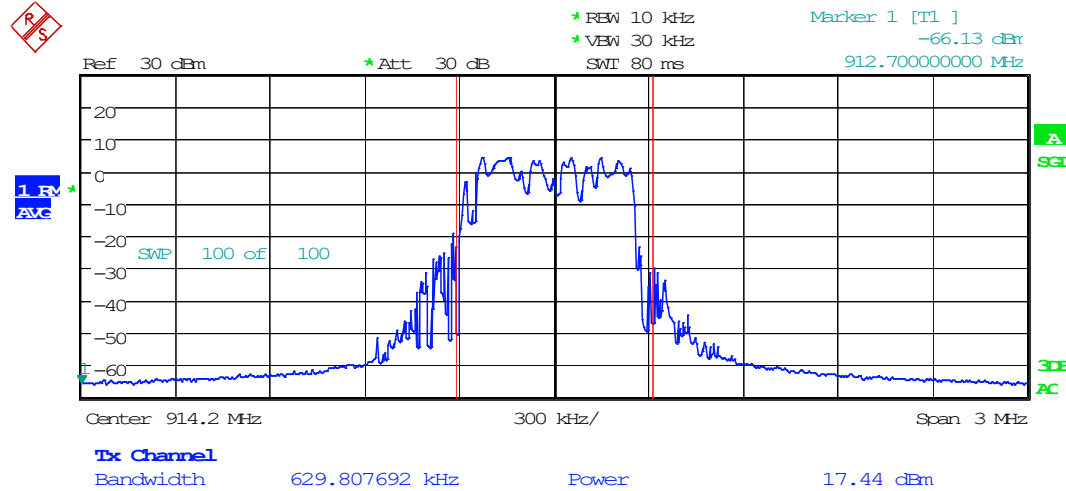
500kHz Channel Test Channel: 903MHz



500kHz Channel Test Channel: 907.8MHz



500kHz Channel Test Channel: 914.2MHz



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6.2 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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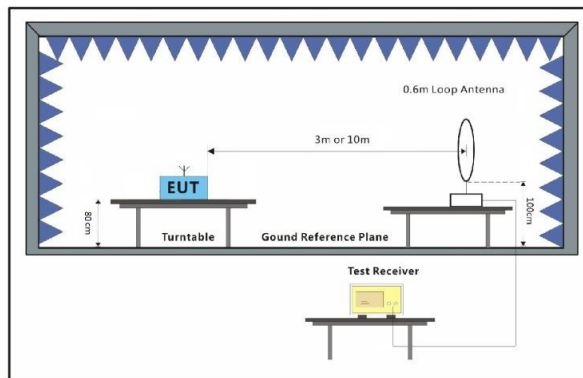
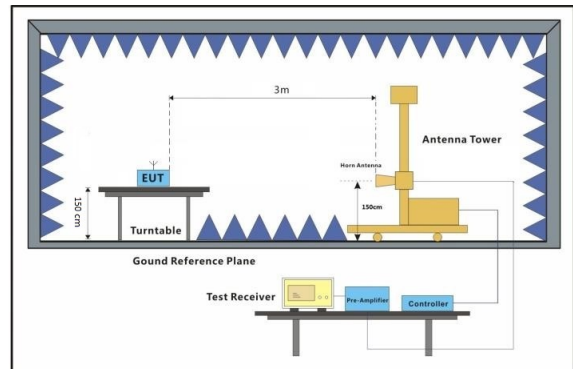
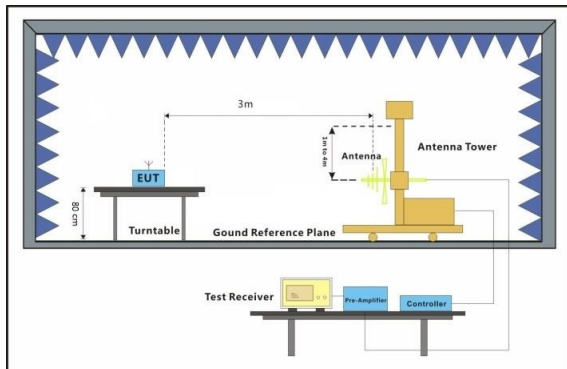
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1001 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation

6.2.2 Test Setup Diagram



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6.2.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

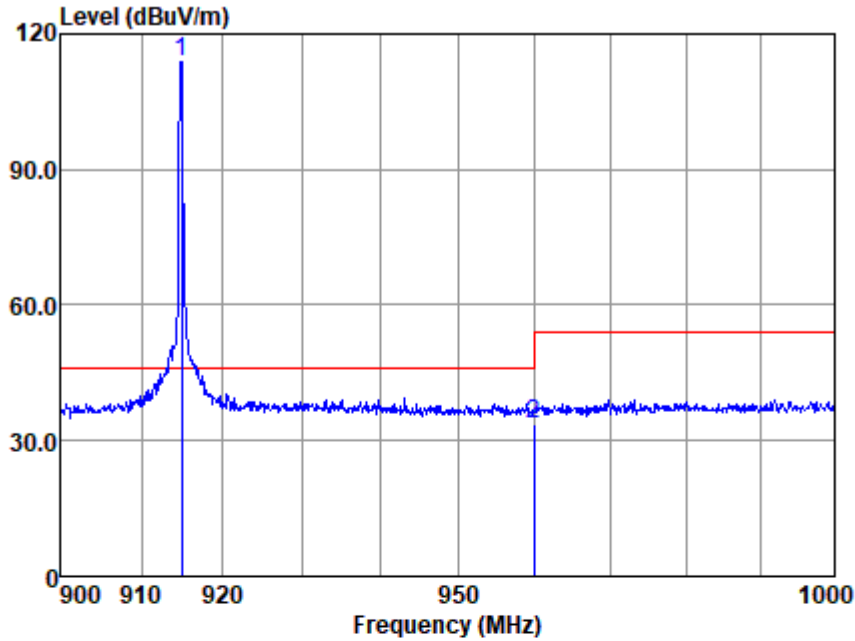


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Test Mode: 125kHz Channel
Horizontal

Test Channel: 914.9MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :125k

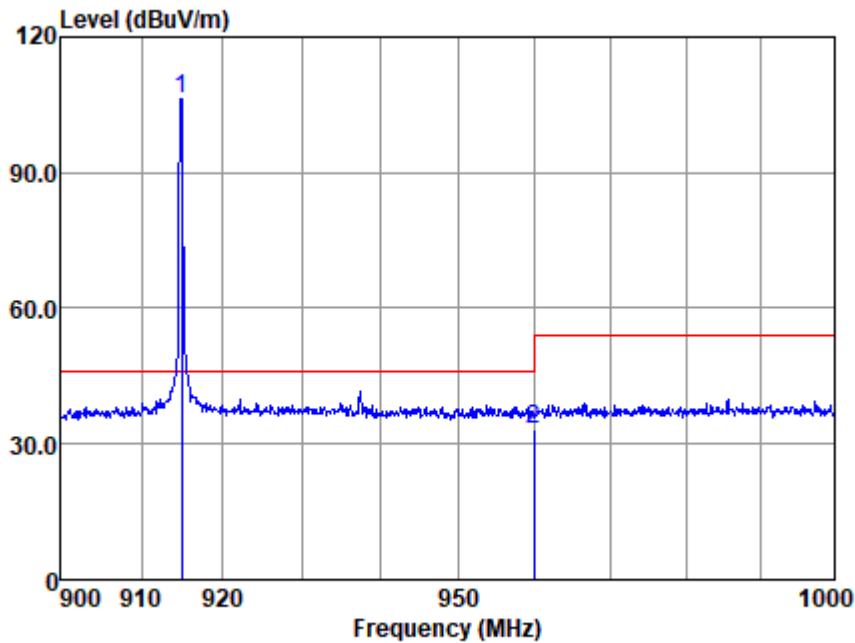
	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	914.915	117.10	23.60	4.85	31.87	113.68	46.00	67.68	Peak
2	960.000	37.26	24.00	4.96	32.74	33.48	46.00	-12.52	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :125k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	914.915	109.89	23.60	4.85	31.87	106.47	46.00	60.47	Peak
2	960.000	36.91	24.00	4.96	32.74	33.13	46.00	-12.87	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

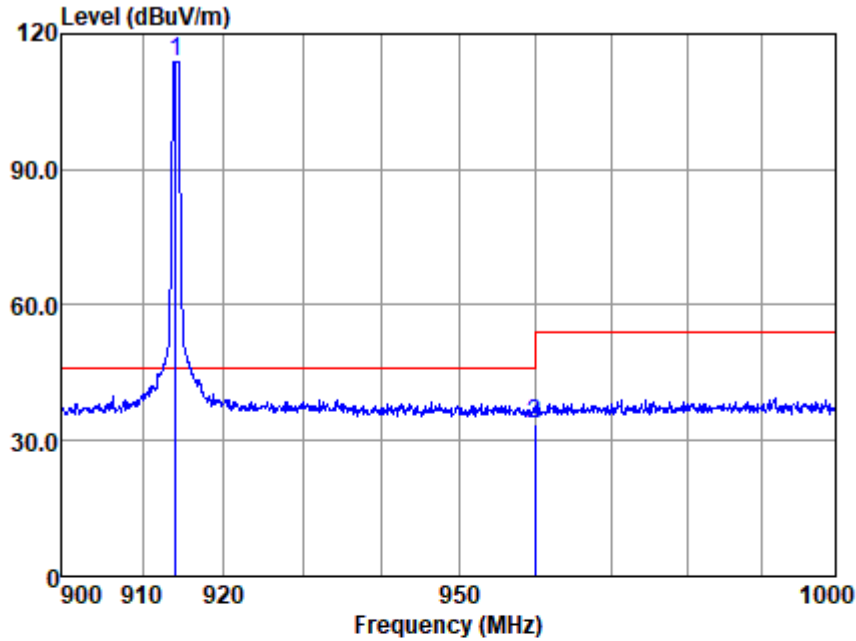


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Test Mode: 500kHz Channel
Horizontal

Test Channel: 914.2MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :500k

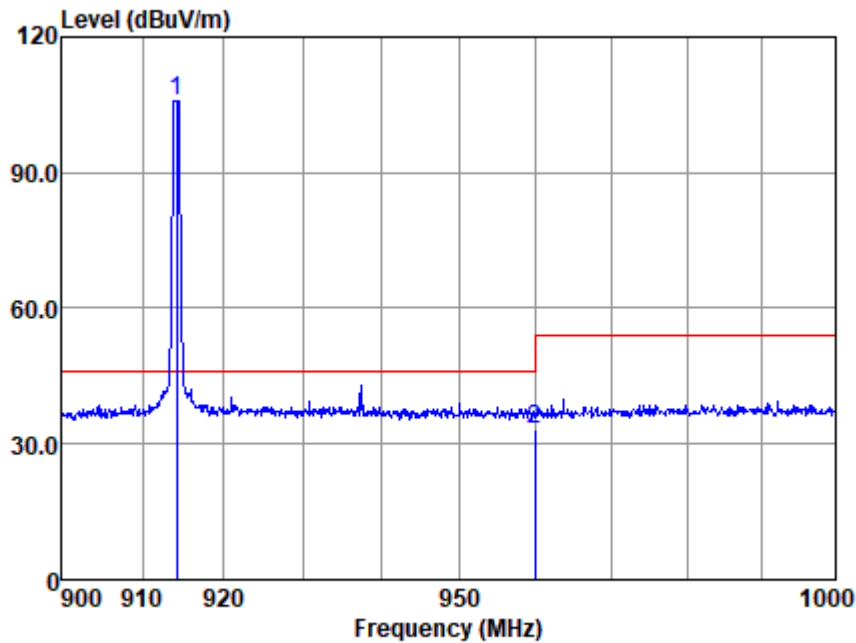
	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	914.048	117.24	23.56	4.85	31.87	113.78	46.00	67.78	Peak
2	960.000	37.26	24.00	4.96	32.74	33.48	46.00	-12.52	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :500k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	914.240	109.36	23.56	4.85	31.87	105.90	46.00	59.90 Peak
2	960.000	36.81	24.00	4.96	32.74	33.03	46.00	-12.97 QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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6.3 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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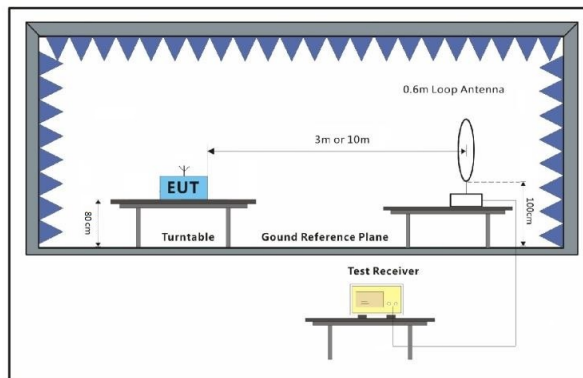
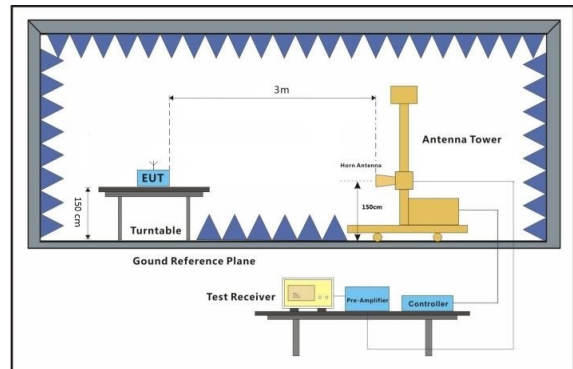
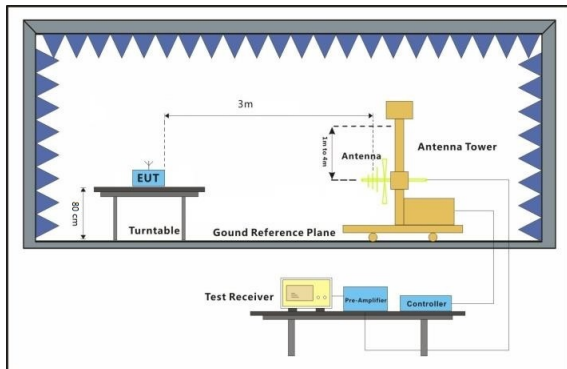
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1001 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation

6.3.2 Test Setup Diagram



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 t(86-21) 61915666 f(86-21) 61915678 e sgs.china@sgs.com

6.3.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Pre-amplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown

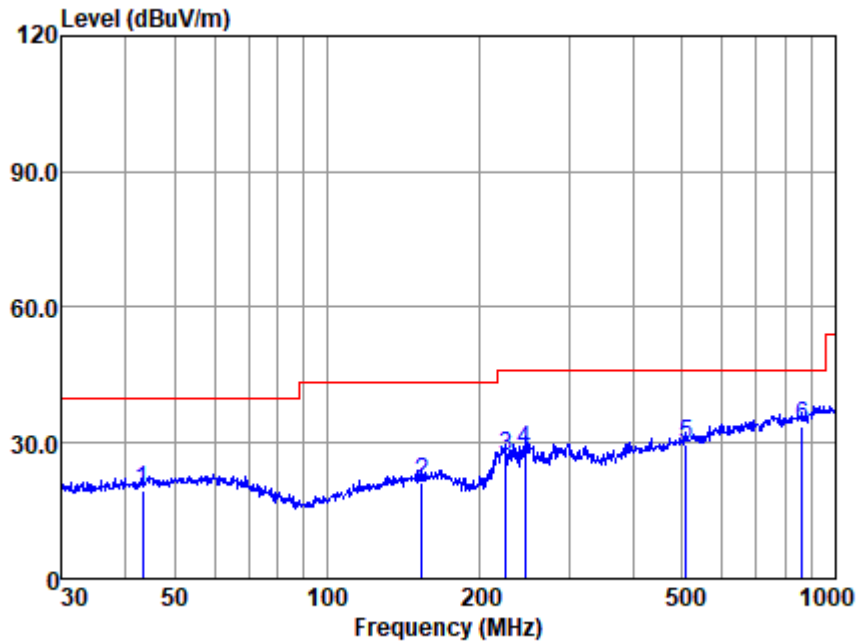


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Below 1GHz

Test Mode: 125kHz Channel
Horizontal

Test Channel: 902.3MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :125k

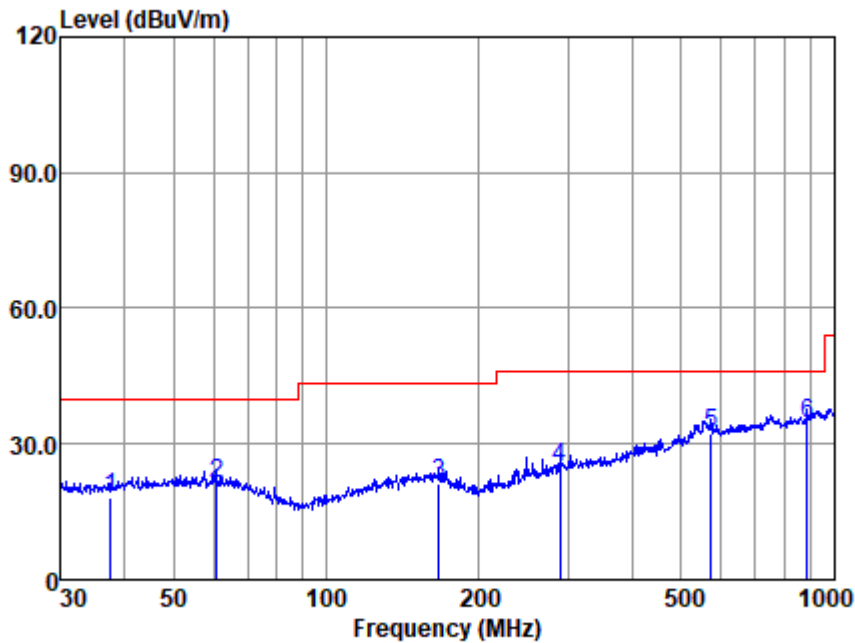
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	43.202	37.32	13.39	0.92	32.12	19.51	40.00	-20.49 QP
2	153.739	37.47	13.02	1.89	31.32	21.06	43.50	-22.44 QP
3	224.519	45.92	9.61	2.42	31.13	26.82	46.00	-19.18 QP
4	245.090	45.78	11.28	2.56	31.09	28.53	46.00	-17.47 QP
5	508.258	38.87	17.81	3.57	30.72	29.53	46.00	-16.47 QP
6	863.056	38.33	22.80	4.70	31.99	33.84	46.00	-12.16 QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :125k

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	37.680	36.58	12.84	0.85	31.93	18.34	40.00	-21.66	QP
2	60.704	38.93	13.00	1.13	31.60	21.46	40.00	-18.54	QP
3	166.651	37.82	12.93	1.96	31.27	21.44	43.50	-22.06	QP
4	289.002	40.46	13.04	2.78	31.30	24.98	46.00	-21.02	QP
5	572.614	40.16	18.90	3.81	30.60	32.27	46.00	-13.73	QP
6	884.503	39.82	23.15	4.73	33.01	34.69	46.00	-11.31	QP

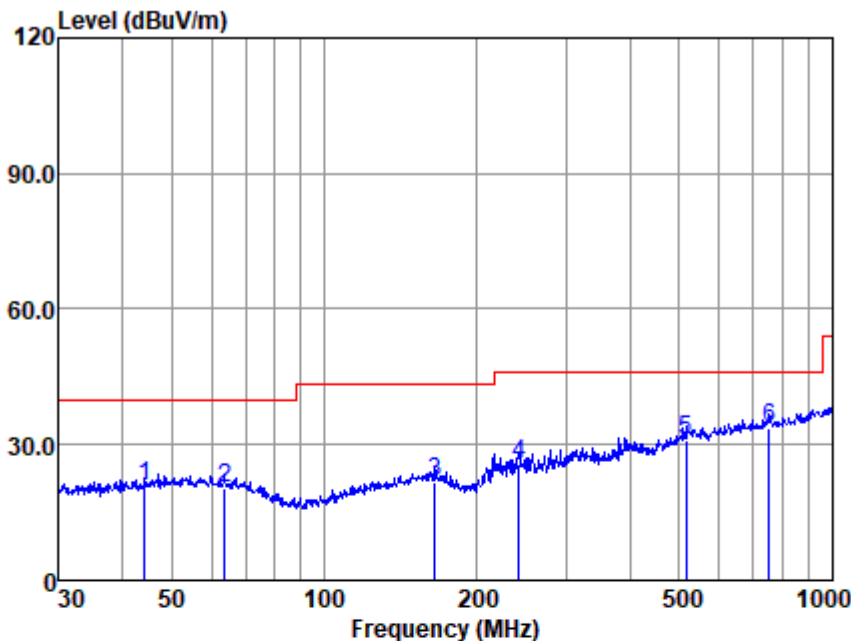
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test Mode: 500kHz Channel
Horizontal

Test Channel: 903MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :500k

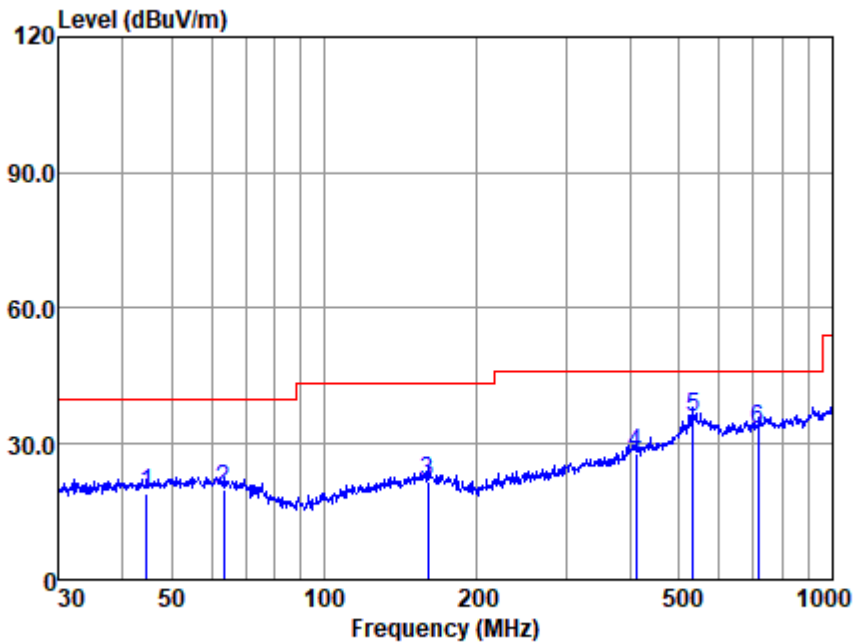
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	44.275	38.51	13.46	0.94	32.12	20.79	40.00	-19.21 QP
2	63.536	38.10	12.59	1.15	31.49	20.35	40.00	-19.65 QP
3	165.487	37.94	12.98	1.96	31.25	21.63	43.50	-21.87 QP
4	241.676	43.10	11.00	2.54	31.10	25.54	46.00	-20.46 QP
5	515.437	40.16	17.89	3.60	30.71	30.94	46.00	-15.06 QP
6	752.743	38.16	22.11	4.37	30.79	33.85	46.00	-12.15 QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :500k

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	44.587	36.91	13.47	0.94	32.11	19.21	40.00	-20.79	QP
2	63.313	37.49	12.62	1.15	31.49	19.77	40.00	-20.23	QP
3	159.784	37.89	13.20	1.92	31.22	21.79	43.50	-21.71	QP
4	411.824	39.59	15.88	3.16	30.64	27.99	46.00	-18.01	QP
5	531.964	45.05	18.09	3.66	30.76	36.04	46.00	-9.96	QP
6	716.682	39.29	21.25	4.28	31.80	33.02	46.00	-12.98	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



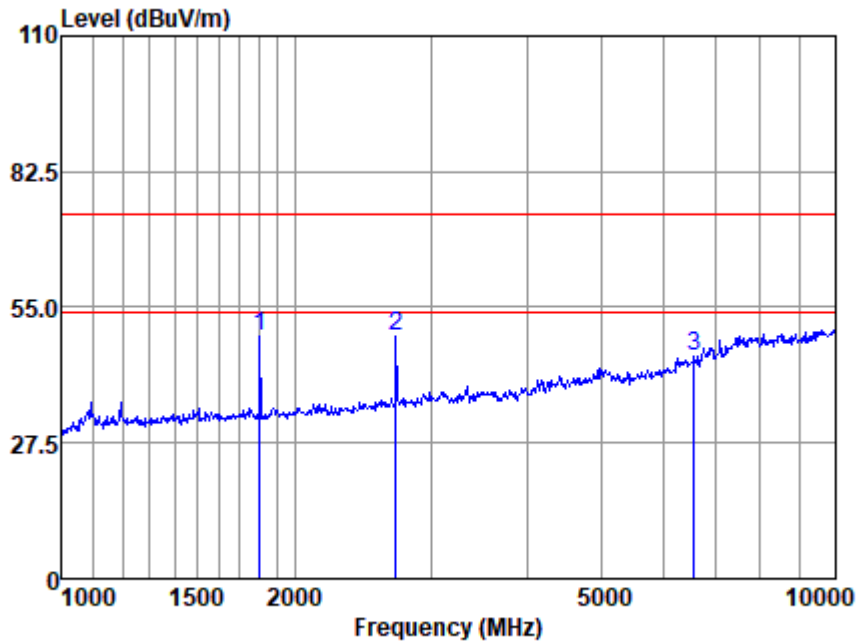
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Above 1GHz

Test mode: 125kHz Channel

Test Channel: 902.3MHz

Horizontal



Antenna Polarity :HORIZONTAL
 EUT/Project :1582CR
 Test mode :125k

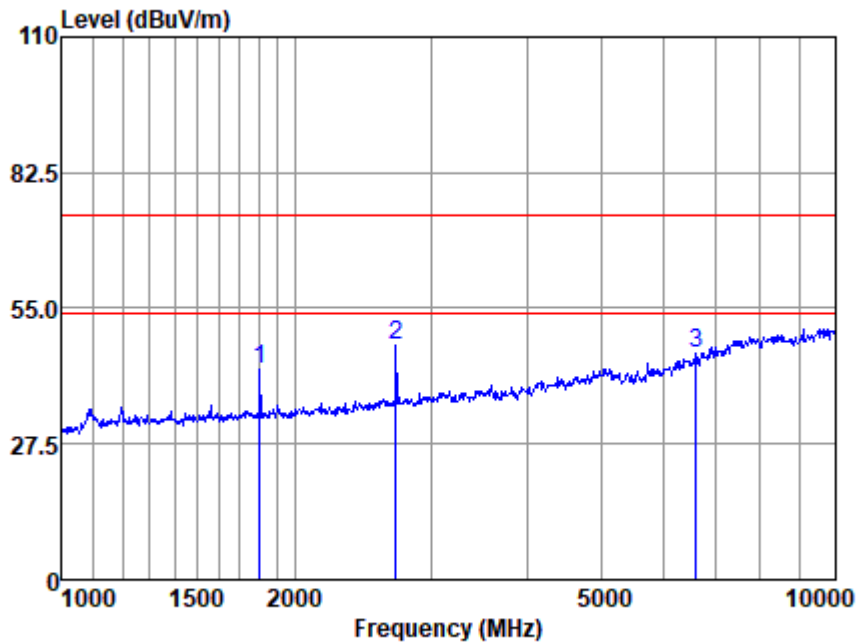
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1803.332	57.96	25.55	7.05	41.30	49.26	74.00	-24.74	Peak
2 2702.799	54.23	28.03	9.09	42.40	48.95	74.00	-25.05	Peak
3 6564.209	38.23	34.74	14.65	42.61	45.01	74.00	-28.99	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :125k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1803.332	51.50	25.55	7.05	41.30	42.80	74.00	-31.20	Peak
2 2702.799	52.93	28.03	9.09	42.40	47.65	74.00	-26.35	Peak
3 6621.375	38.87	34.89	14.77	42.62	45.91	74.00	-28.09	Peak

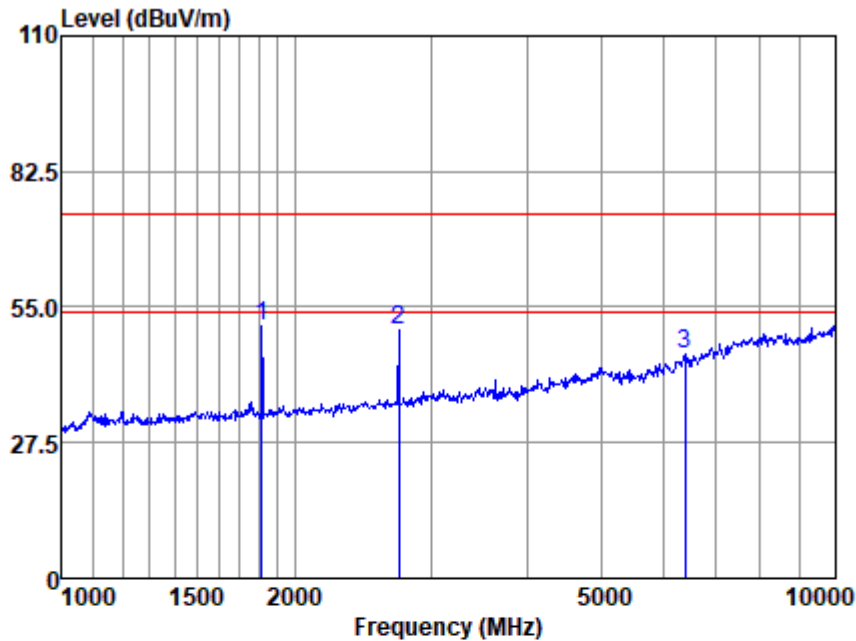
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test mode: 125kHz Channel
Horizontal

Test Channel: 908.5MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :125k

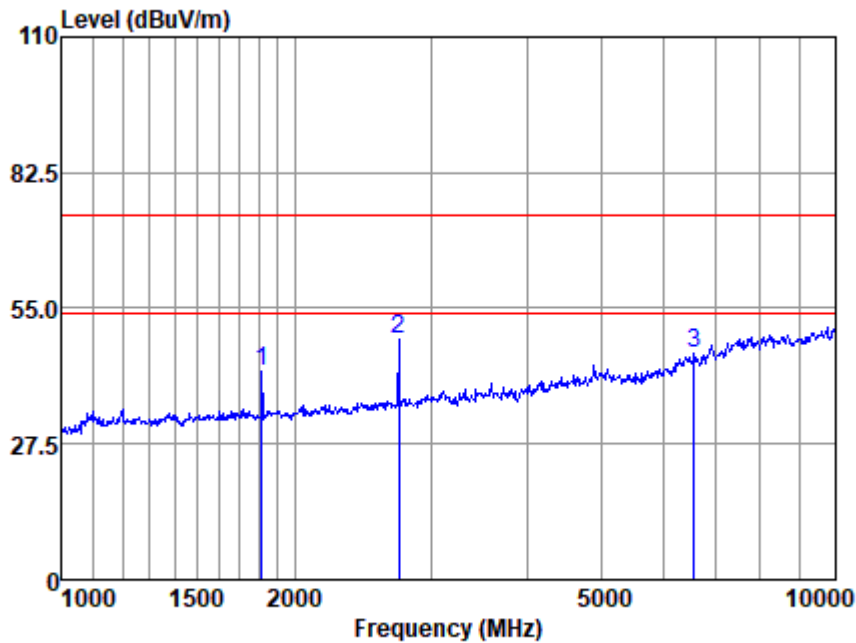
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1813.786	59.57	25.56	7.12	41.30	50.95	74.00	-23.05	Peak
2 2726.337	55.55	28.08	9.19	42.40	50.42	74.00	-23.58	Peak
3 6395.654	39.12	34.21	14.54	42.58	45.29	74.00	-28.71	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :125k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1813.786	50.85	25.56	7.12	41.30	42.23	74.00	-31.77	Peak
2	2726.337	53.81	28.08	9.19	42.40	48.68	74.00	-25.32	Peak
3	6583.209	38.80	34.79	14.77	42.62	45.74	74.00	-28.26	Peak

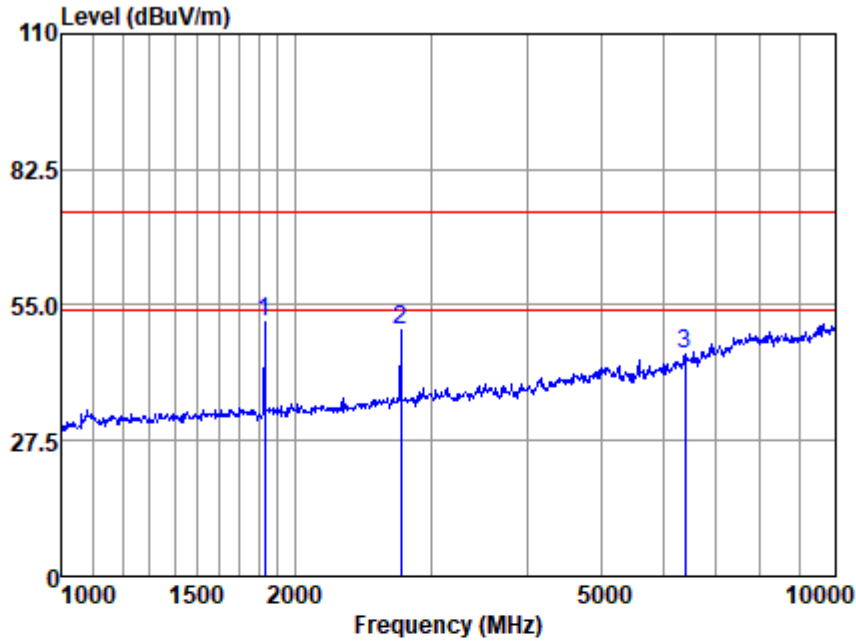
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test mode: 125kHz Channel
Horizontal

Test Channel: 914.9MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :125k

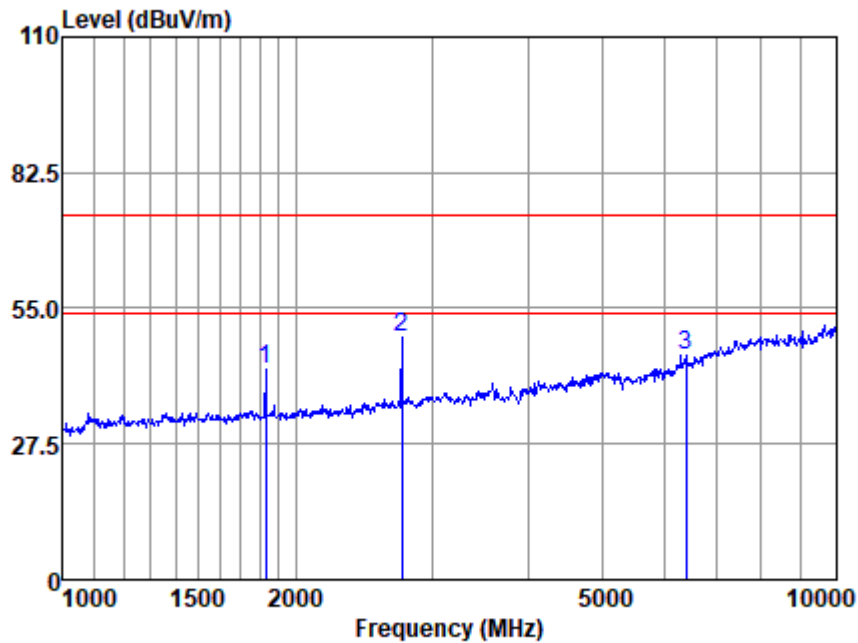
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1829.582	60.19	25.58	7.12	41.30	51.59	74.00	-22.41	Peak
2 2742.143	54.90	28.11	9.19	42.40	49.80	74.00	-24.20	Peak
3 6395.654	38.93	34.21	14.54	42.58	45.10	74.00	-28.90	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL
 EUT/Project :1582CR
 Test mode :125k

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1829.582	51.37	25.58	7.12	41.30	42.77	74.00	-31.23	Peak
2 2742.143	54.17	28.11	9.19	42.40	49.07	74.00	-24.93	Peak
3 6395.654	39.39	34.21	14.54	42.58	45.56	74.00	-28.44	Peak

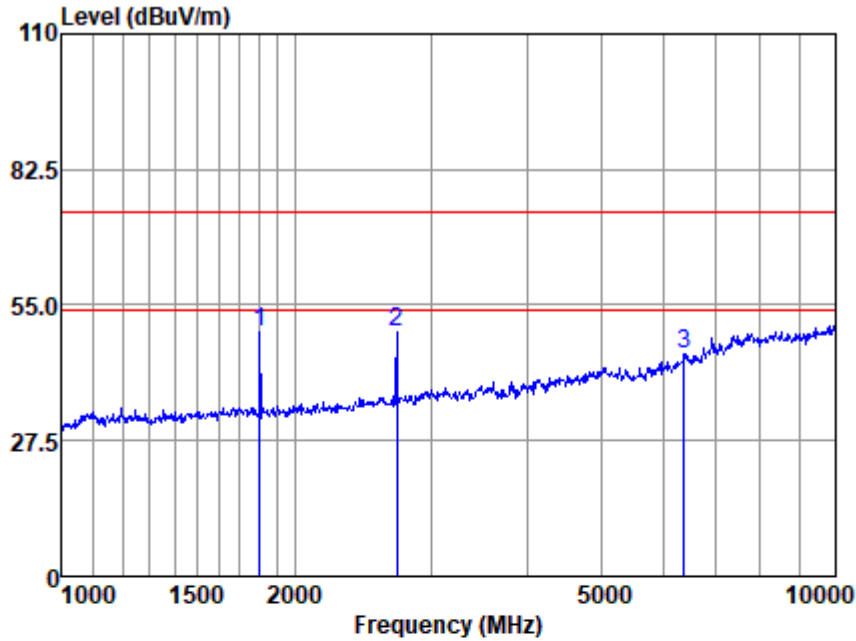
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test mode: 500kHz Channel
Horizontal

Test Channel: 903MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :500k

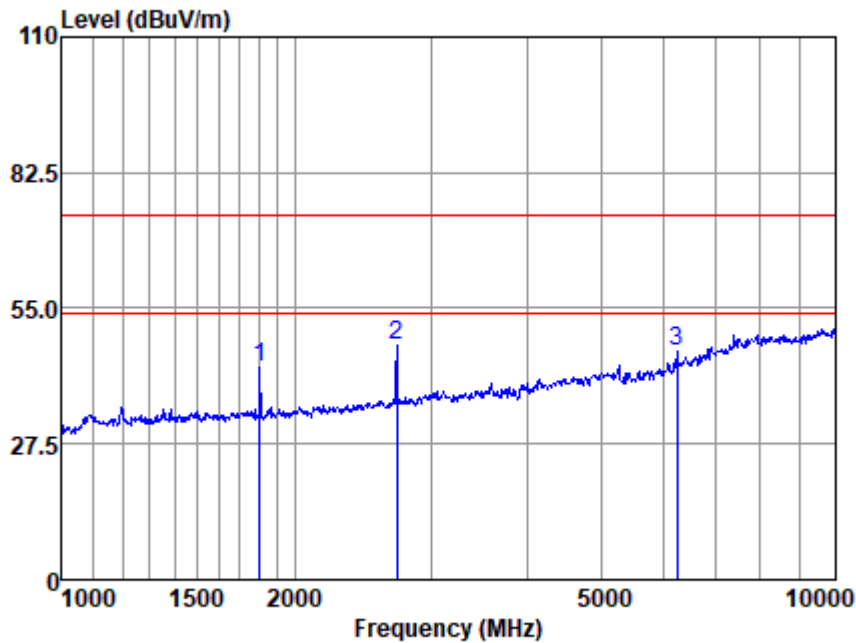
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1803.332	58.28	25.55	7.05	41.30	49.58	74.00	-24.42	Peak
2 2710.622	54.50	28.04	9.19	42.40	49.33	74.00	-24.67	Peak
3 6377.195	38.86	34.15	14.42	42.57	44.86	74.00	-29.14	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :500k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1803.332	51.66	25.55	7.05	41.30	42.96	74.00	-31.04	Peak
2 2710.622	52.73	28.04	9.19	42.40	47.56	74.00	-26.44	Peak
3 6249.464	40.95	33.70	14.30	42.55	46.40	74.00	-27.60	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

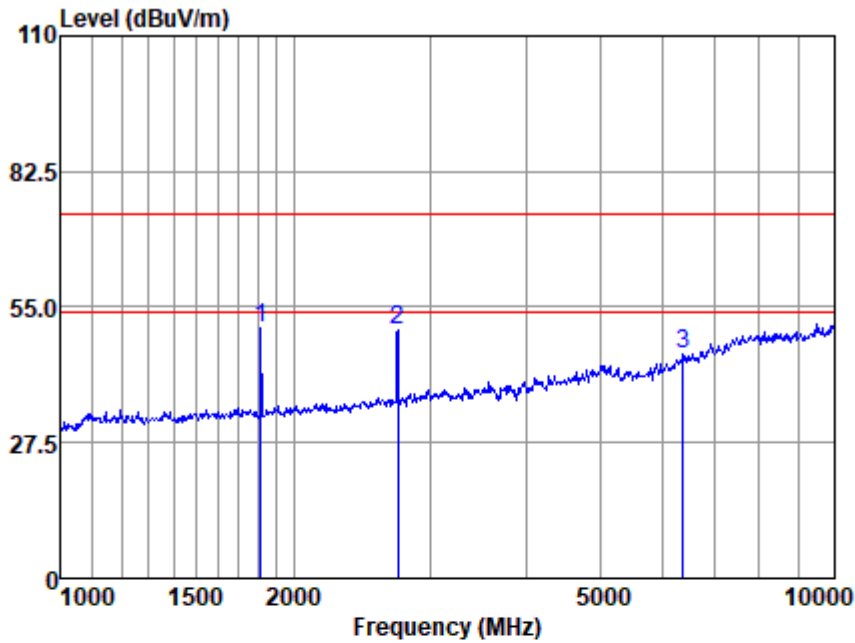


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Test mode: 500kHz Channel
Horizontal

Test Channel: 907.8MHz



Antenna Polarity : HORIZONTAL
EUT/Project : 1582CR
Test mode : 500k

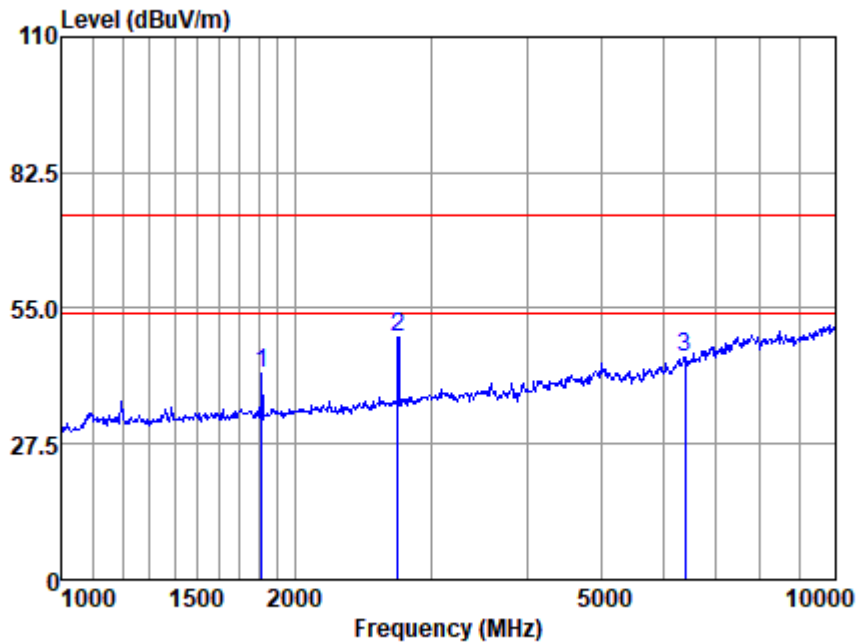
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1813.786	59.17	25.56	7.12	41.30	50.55	74.00	-23.45	Peak
2 2726.337	55.42	28.08	9.19	42.40	50.29	74.00	-23.71	Peak
3 6377.195	39.48	34.15	14.42	42.57	45.48	74.00	-28.52	Peak

Note: Emission Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



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Vertical



Antenna Polarity :VERTICAL

EUT/Project :1582CR

Test mode :500k

	Read	Antenna	Cable	Preamp	Emission	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1813.786	50.54	25.56	7.12	41.30	41.92	74.00	-32.08	Peak
2	2718.469	54.23	28.06	9.19	42.40	49.08	74.00	-24.92	Peak
3	6395.654	39.01	34.21	14.54	42.58	45.18	74.00	-28.82	Peak

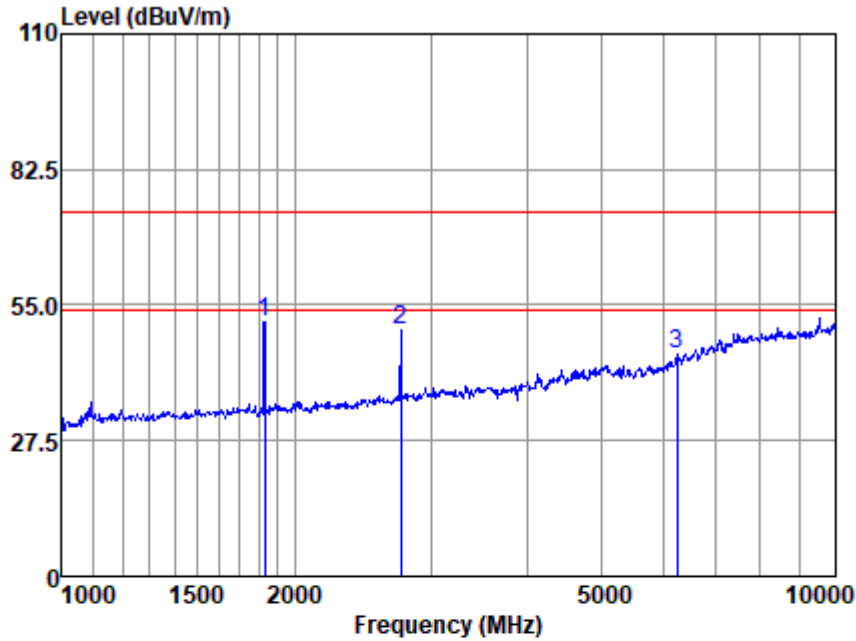
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Test mode: 500kHz Channel
Horizontal

Test Channel: 914.2MHz



Antenna Polarity :HORIZONTAL
EUT/Project :1582CR
Test mode :500k

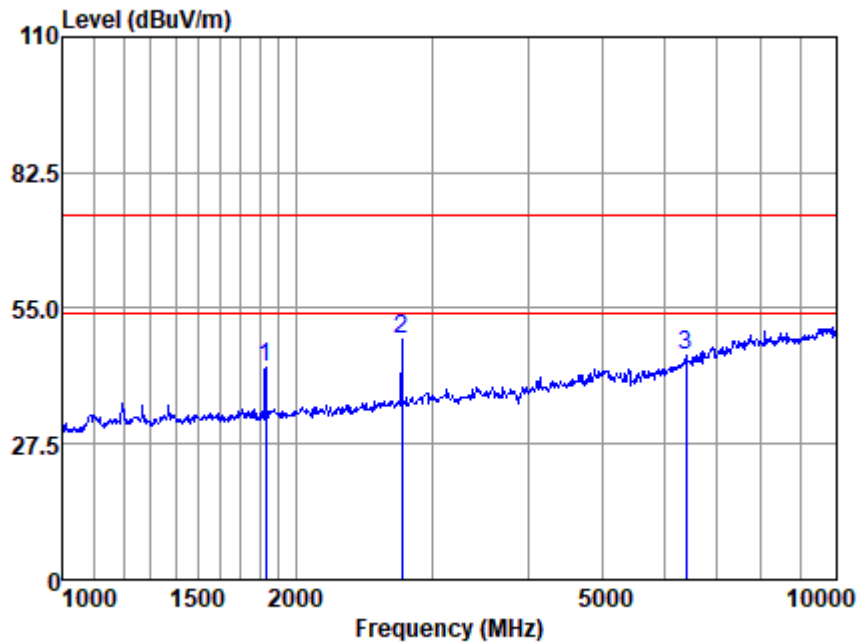
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 1829.582	60.25	25.58	7.12	41.30	51.65	74.00	-22.35	Peak
2 2742.143	55.22	28.11	9.19	42.40	50.12	74.00	-23.88	Peak
3 6249.464	39.76	33.70	14.30	42.55	45.21	74.00	-28.79	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Vertical



Antenna Polarity :VERTICAL
 EUT/Project :1582CR
 Test mode :500k

Read	Antenna	Cable	Preamp	Emission	Limit	Over	Remark
Level	Factor	Loss	Factor	Level	Line	Limit	
dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
51.81	25.58	7.12	41.30	43.21	74.00	-30.79	Peak
53.93	28.11	9.19	42.40	48.83	74.00	-25.17	Peak
39.39	34.21	14.54	42.58	45.56	74.00	-28.44	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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7 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

8 EUT Constructional Details

Refer to the < Photos >.

- End of the Report -



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