TEST REPORT

Application No.:	GZCR2110021316AT
Applicant:	NormaTec Industries LP
Address of Applicant:	480 Pleasant St. Ste A200 Watertown, Massachusetts 02472, United States
Manufacturer:	NormaTec Industries LP
Address of Manufacturer:	480 Pleasant St. Ste A200 Watertown, Massachusetts 02472, United States
Factory:	Ryder Electronics (Xinfeng) Ltd.
Address of Factory:	East Shuidong Avenue, Industrial Park, Xinfeng Town, Ganzhou City, Jiangxi Province, P.R. China 341600
Equipment Under Test (EUT):	
EUT Name:	Normatec Go
Model No.:	ALJ7
Trade Mark:	Hyperice
Standard(s) :	47 CFR Part 15, Subpart C 15.231
Date of Receipt:	2021-10-15
Date of Test:	2021-10-16 to 2021-10-29
Date of Issue:	2021-11-03
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2021-11-03*		*Original*

Authorized for issue by				
		Curry Wu/Project Engineer		
		Ricky Liu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Dwell Time (15.231(a))		ANSI C63.10 (2013) Section 7.5	47 CFR Part 15, Subpart C 15.231(a)	Pass
Field Strength of the Fundamental Signal (15.231(b))		ANSI C63.10 (2013) Section 6.5	Field Strength of the Fundamental Signal (15.231(b))	Pass
Radiated Emissions (below 1GHz)		ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass
Radiated Emissions (above 1GHz)		ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

Remark: The product comes with different Air compressor, Solenoid Valves and batteries, all the Configurations have been pre-tested, and only record the worst case in the report, here are the different configurations:

Component	Manufacturer	Type	Specification
Internal battery (Hixon J962)	Hixon (Shenzhen) Technology Limited	J962	3.6V, 2550mAh
Internal battery (D610-1-D1-1S1P)	Greenway Technology Co., Ltd	D610-1-D1-1S1P	3.65V, 2600mAh
Solenoid Valve	Shenzhen Deyuxin Technology Co., Ltd	DQF3-6A-9	DC3.3V
	DongGuan jingbofang Electronics Co., Ltd.	JQF1320-3.3A	DC3.3V
Air compressor	Shenzhen Deyuxin Technology Co., Ltd	DQB100-F	DC3.3V Flow rate: ≥1.7L/min, Pressure: ≤85KPA
	DongGuan jingbofang Electronics Co., Ltd.	JQB130-3.3B	DC3.3V Flow rate: ≥1.5L/min, Pressure: >400mmHg

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Switching Mode Power Supply Model: GPE013A-050200-Z Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5V, 2.0A, 10.0W Max
Test Voltage:	AC 120V, 60Hz or AC 240V, 50Hz Note: Both nominal AC 120V, 60Hz and AC 240 V, 50Hz are required for testing in accordance with FCC KDB174176, this report only shows the results of the worst test result(AC 120V, 60Hz);
Cable(s):	Type C cable:146cm unshielded
Operation Frequency:	433.92MHz
Modulation Type:	FSK
Number of channels:	1
Antenna Gain:	3dBi
Antenna type:	Helical Antenna

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
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The EUT has been tested as an independent unit.			

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	±3%
Dwell Time (15.231(a))	±3%
Field Strength of the Fundamental Signal (15.231(b))	±5.06dB(30MHz-1GHz; 3m)
Radiated Emissions (below 1GHz)	±5.06dB(30MHz-1GHz; 3m) ±4.46dB(30MHz-1GHz; 10m)
Radiated Emissions (above 1GHz)	±5.08 dB(1GHz-6 GHz); ±5.14 dB(above 6GHz)

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
MI CABLE	SGS-EMC	0.8M	EMC2136	2020-11-01	2021-11-02
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Dwell Time (15.231(a))					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
Test Receiver(9kHz-3GHz)	Rohde & Schwarz	ESCI	EMC0056	2021-01-03	2022-01-02
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
MI CABLE	SGS-EMC	0.8M	EMC2136	2020-11-01	2021-11-02
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Field Strength of the Fundamental Signal (15.231(b))					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
Chamber cable	HangTianXing	N/A	EMC0542	2021-06-28	2024-06-27
Trilog Broadband Antenna (25MHz-1GHz)- Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-01-08	2022-01-07
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Emissions Below 1GHz					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
Chamber cable	HangTianXing	N/A	EMC0542	2021-06-28	2024-06-27
Trilog Broadband Antenna (25MHz-1GHz)- Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-01-08	2022-01-07
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Emissions (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 3 dBi.

Antenna location: Refer to internal photo.

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)

Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

7.1.1 E.U.T. Operation

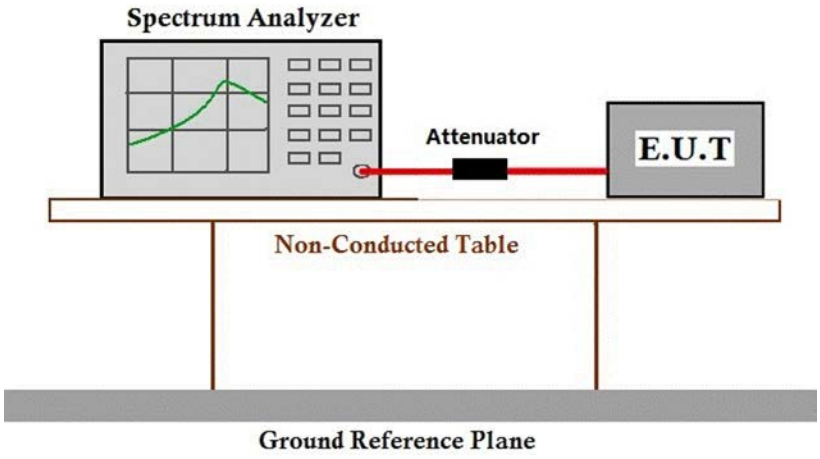
Operating Environment:

Temperature: 23.8 °C Humidity: 56.5 % RH Atmospheric Pressure: 1015 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	08	Tx mode_Keep the EUT in continuously transmitting mode with modulation.
Final test	09	Charge + Tx mode_Keep the EUT in charging and continuously transmitting mode with modulation.

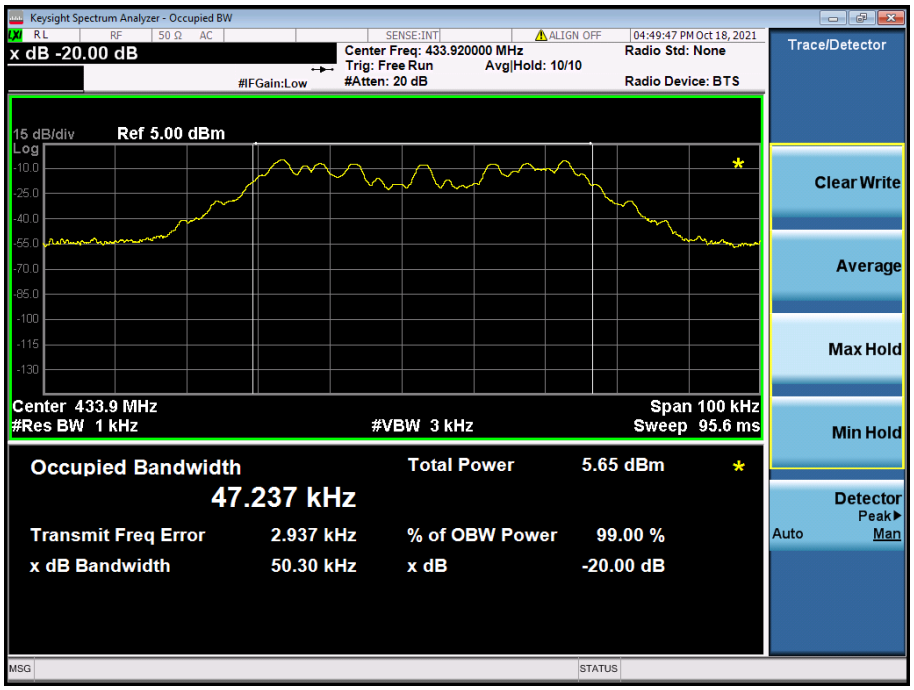
7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Test Channel	Bandwidth	Limit	Verdict
433.92MHz	50.30kHz	1.0848MHz	PASS

Note:Limit=433.92*0.25%=1.0848MHz



7.2 Dwell Time (15.231(a))

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)

Test Method: ANSI C63.10 (2013) Section 7.5

Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically actived transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

7.2.1 E.U.T. Operation

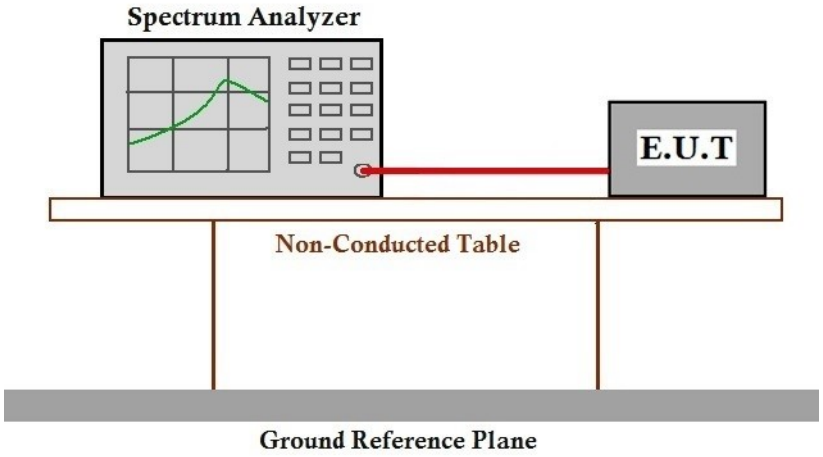
Operating Environment:

Temperature: 23.8 °C Humidity: 56.5 % RH Atmospheric Pressure: 1015 mbar

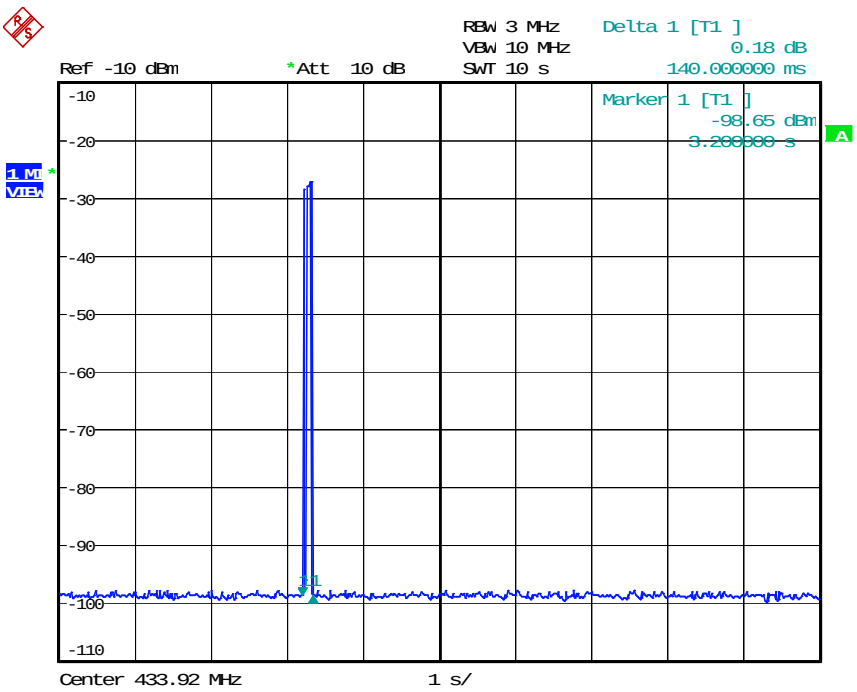
7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	08	Tx mode_Keep the EUT in continuously transmitting mode with modulation.
Final test	09	Charge + Tx mode_Keep the EUT in charging and continuously transmitting mode with modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data



7.3 Field Strength of the Fundamental Signal (15.231(b))

Test Requirement Field Strength of the Fundamental Signal (15.231(b))

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

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250

** linear interpolations

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dBuv/m for the fundamental emission= 80.83 dBμV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission=60.83 dBuV/m. Spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, whichever limit permits a higher field strength.

7.3.1 E.U.T. Operation

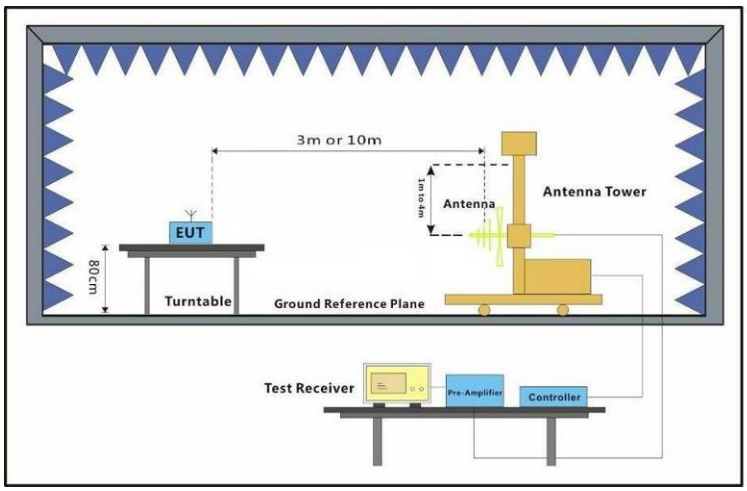
Operating Environment:

Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1015 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	08	Tx mode_Keep the EUT in continuously transmitting mode with modulation.
Final test	09	Charge + Tx mode_Keep the EUT in charging and continuously transmitting mode with modulation.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

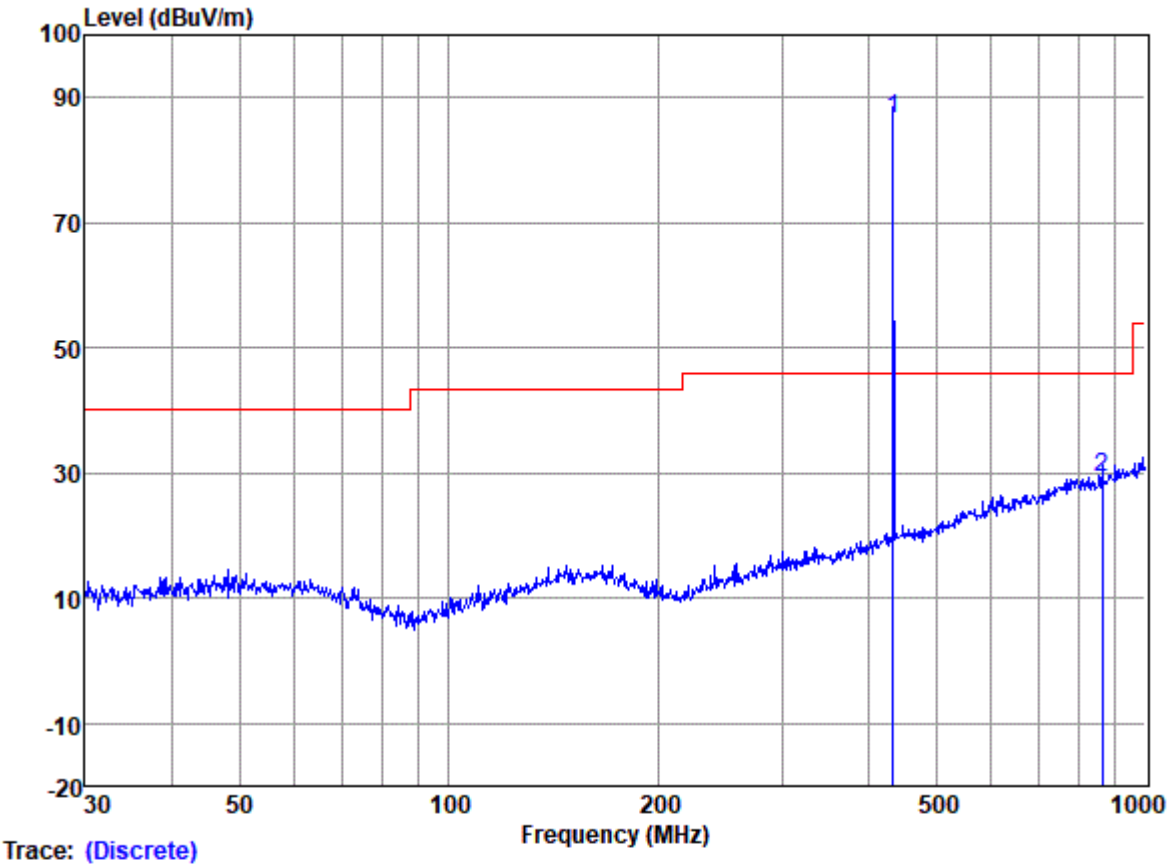
And according 15.35(a)

15.35(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

According to 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§ 15.250, 15.252, 15.255, and 15.509-15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

Test Mode: 09; Polarity: Horizontal

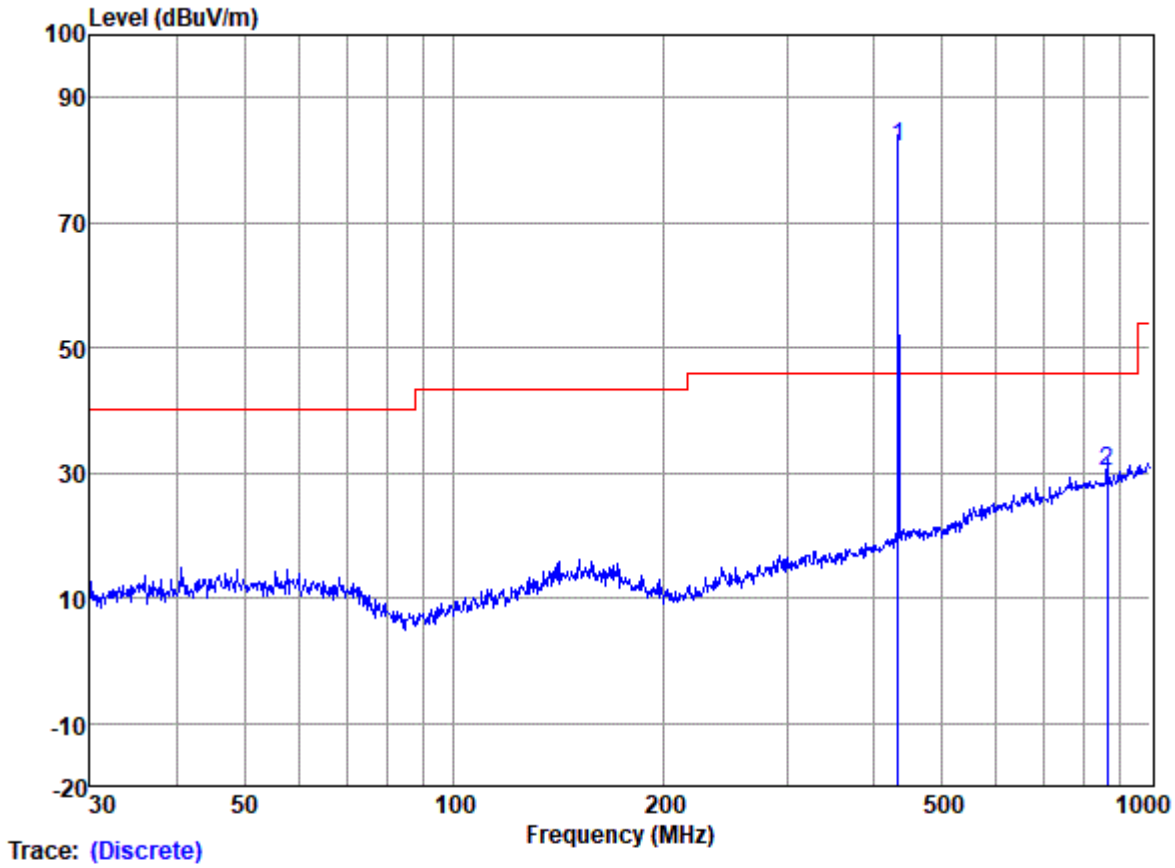


Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	433.92	93.21	16.85	4.09	27.53	86.62	46.00	40.62	HORIZONTAL	QP
2	867.84	27.48	22.93	6.71	27.90	29.22	46.00	-16.78	HORIZONTAL	QP

Test Mode: 09; Polarity: Vertical



Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	433.92	88.53	16.85	4.09	27.53	81.94	46.00	35.94	VERTICAL	QP
2	867.84	28.41	22.93	6.71	27.90	30.15	46.00	-15.85	VERTICAL	QP

Peak value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.92	4.09	16.85	27.53	93.21	86.62	100.83	-14.21	Horizontal
867.84	6.71	22.93	27.90	27.48	29.22	80.83	-51.61	Horizontal
433.92	4.09	16.85	27.53	88.53	81.94	100.83	-18.89	Vertical
867.84	6.71	22.93	27.90	28.41	30.15	80.83	-50.68	Vertical

Average value:						
Frequency (MHz)	Average correction factor	Peak Level (dBuV/m)	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	-23.10	86.62	63.52	80.83	-17.31	Horizontal
867.84	-23.10	29.22	6.12	60.83	-54.71	Horizontal
433.92	-23.10	81.94	58.84	80.83	-21.99	Vertical
867.84	-23.10	30.15	7.05	60.83	-53.78	Vertical

Note: The Average correction factor calculation please refer to Clause 7.4.4
Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

7.4 Radiated Emissions (below 1GHz)

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

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

Limit:

For Restricted bands

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.		

For Other bands

Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Hasrmonics and Spurious Emissions (dBµV/m @ 3 m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	**61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	**71.48 to 81.94	51.48 to 61.94
Above 470	81.94	61.94
Detector:	Peak for pre-scan	
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth Peak for Above 1 GHz: 1 MHz resolution bandwidth	

** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dBuv/m for the fundamental emission= 80.83 dBµV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission=60.83 dBuV/m. Spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, whichever limit permits a higher field strength.

7.4.1 E.U.T. Operation

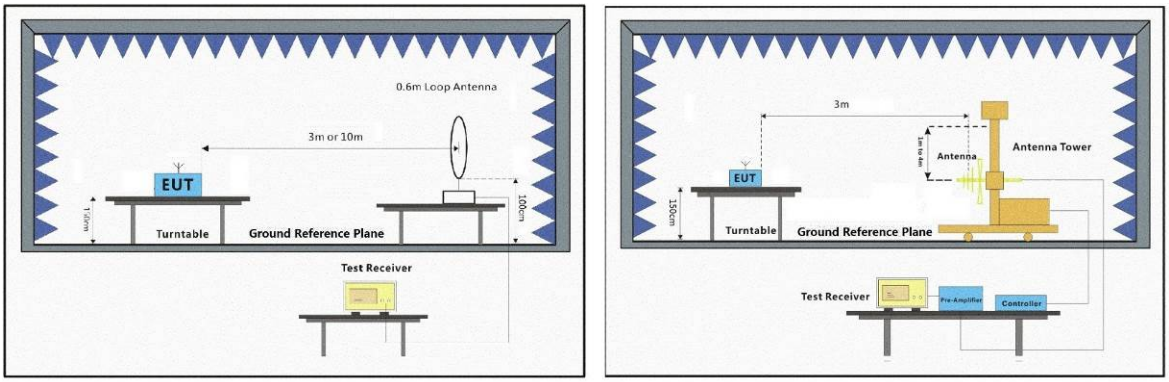
Operating Environment:

Temperature: 23.6 °C Humidity: 48.1 % RH Atmospheric Pressure: 1015 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	08	Tx mode_Keep the EUT in continuously transmitting mode with modulation.
Final test	09	Charge + Tx mode_Keep the EUT in charging and continuously transmitting mode with modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of Horizontal was shown in the report.

Measured Level l=Read Level + Antenna Factor + Cable Loss - Preamp Factor

The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

20log (Duty cycle) =20log(22.4%)= -23.10 dB

Here:

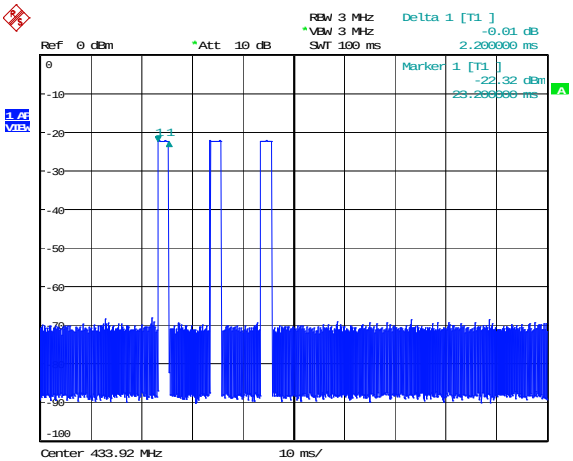
Duty cycle = Ton_cum / Ton+off

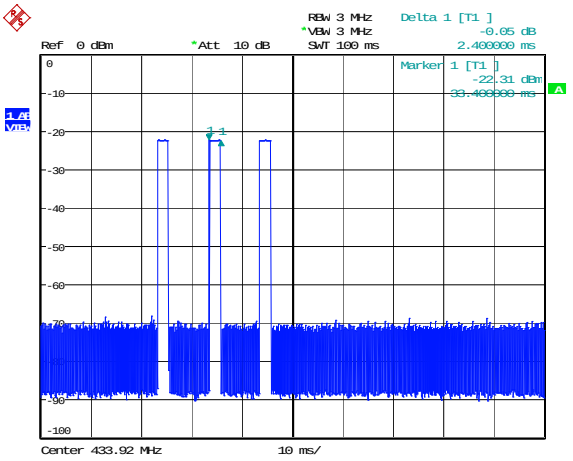
Ton_cum = 2.4ms+2.4ms+2.2ms =7.0ms

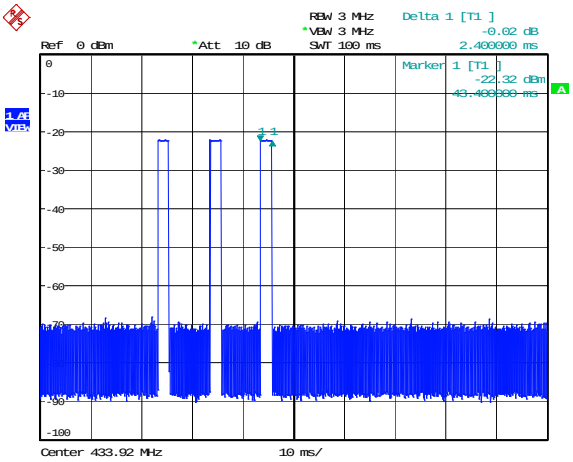
Ton+off = 100ms

Duty cycle = 7.0/ 100 = 7.0%

Please refer to below plot for more details.



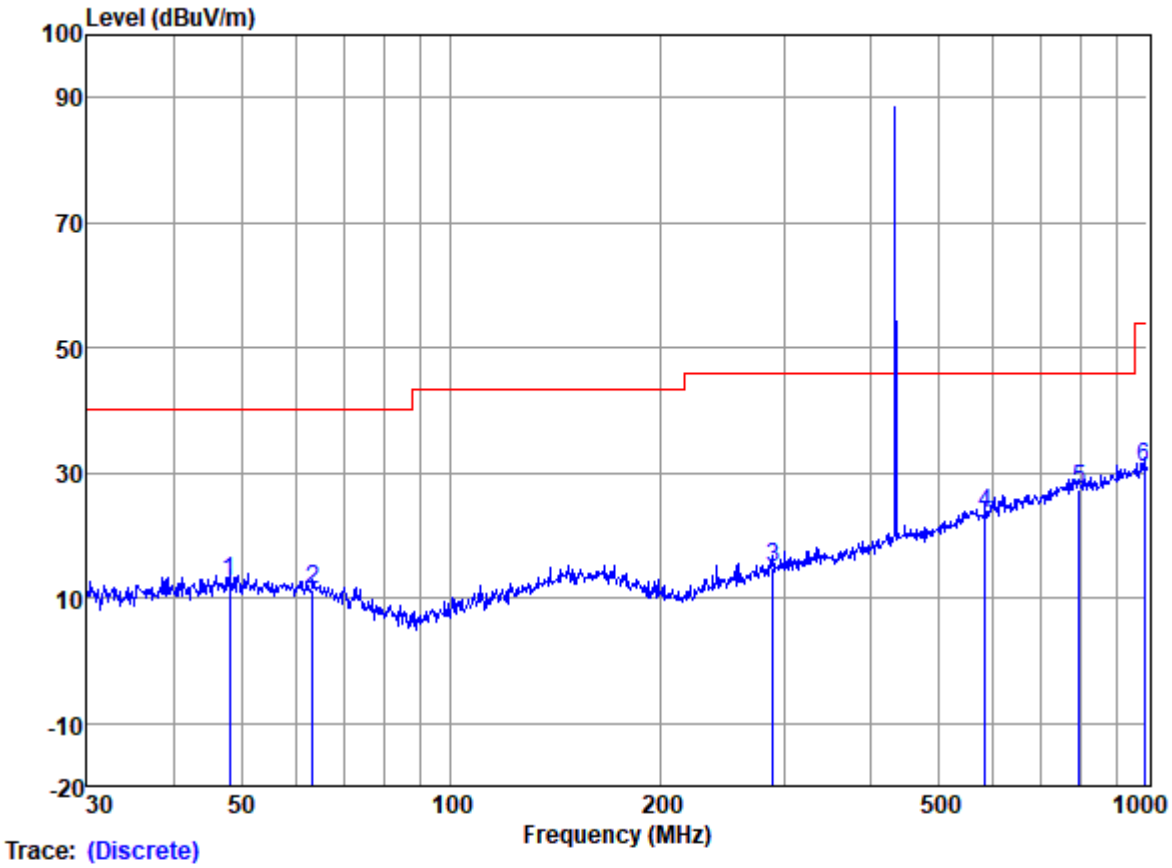




Radiated emission below 30MHz

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test Mode: 09; Polarity: Horizontal

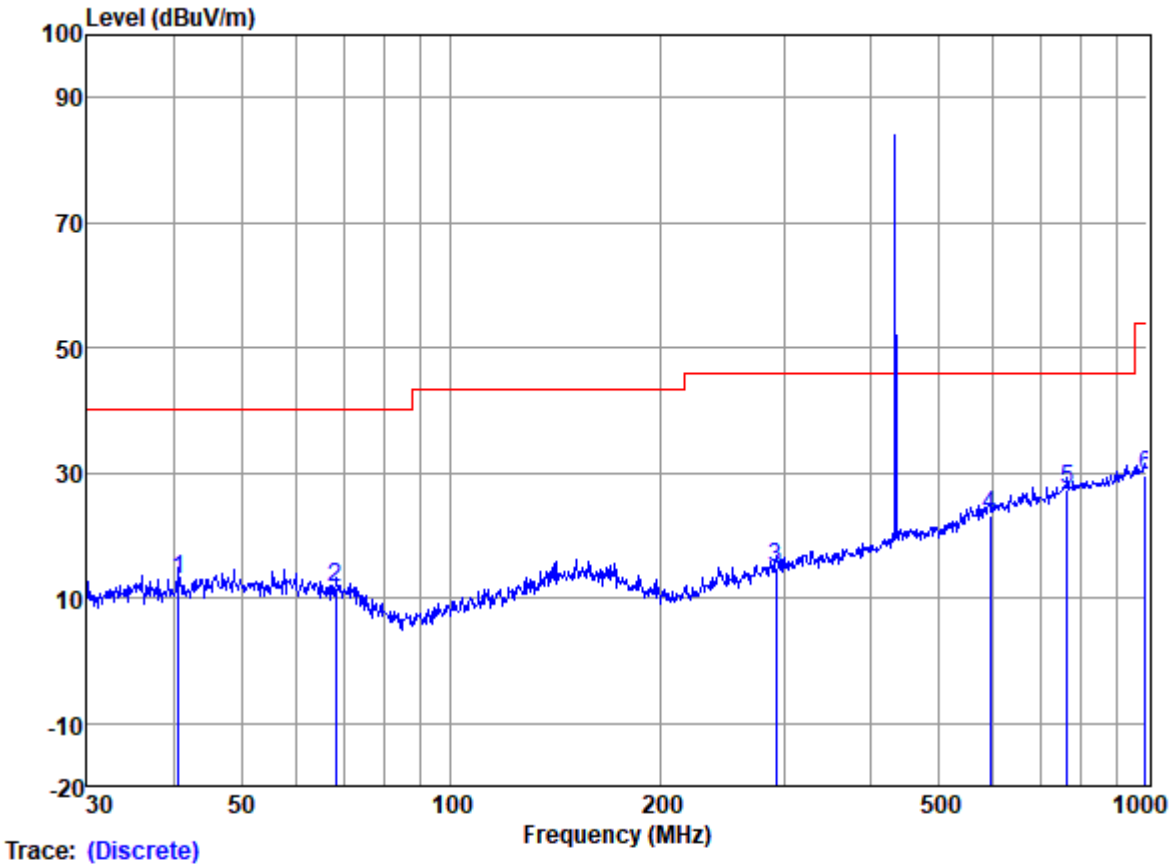


Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	47.99	24.74	14.00	1.13	27.17	12.70	40.00	-27.30	HORIZONTAL	QP
2	63.31	24.11	12.97	1.31	27.15	11.24	40.00	-28.76	HORIZONTAL	QP
3	290.02	24.87	13.40	3.12	26.56	14.83	46.00	-31.17	HORIZONTAL	QP
4	584.79	27.39	19.30	5.06	28.19	23.56	46.00	-22.44	HORIZONTAL	QP
5	796.18	26.59	22.57	6.14	28.03	27.27	46.00	-18.73	HORIZONTAL	QP
6	989.54	26.87	24.20	7.37	27.67	30.77	54.00	-23.23	HORIZONTAL	QP

Test Mode: 09; Polarity: Vertical



Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	40.56	25.57	13.55	1.10	27.18	13.04	40.00	-26.96	VERTICAL	QP
2	68.15	25.19	12.17	1.39	27.14	11.61	40.00	-28.39	VERTICAL	QP
3	293.08	24.92	13.45	3.14	26.56	14.95	46.00	-31.05	VERTICAL	QP
4	593.05	26.65	19.60	5.10	28.20	23.15	46.00	-22.85	VERTICAL	QP
5	766.06	27.24	22.20	6.05	28.06	27.43	46.00	-18.57	VERTICAL	QP
6	993.01	25.66	24.23	7.37	27.67	29.59	54.00	-24.41	VERTICAL	QP

7.5 Radiated Emissions (above 1GHz)

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

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

Limit:

For Restricted bands

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.		

For Other bands

Fundamental Frequency MHz	Field Strength of Fundamental (dBµV/m @ 3 m)	Field Strength of Hasrmonics and Spurious Emissions (dBµV/m @ 3 m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	**61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	**71.48 to 81.94	51.48 to 61.94
Above 470	81.94	61.94
Detector:	Peak for pre-scan	
	QP for 30MHz to1000 MHz:120 kHz resolution bandwidth Peak for Above 1 GHz: 1 MHz resolution bandwidth	

** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 433.92 MHz

The limit for average or QP field strength dBuv/m for the fundamental emission= 80.83 dBµV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuv/m for the spurious emission=60.83 dBuV/m. Spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, whichever limit permits a higher field strength.

7.5.1 E.U.T. Operation

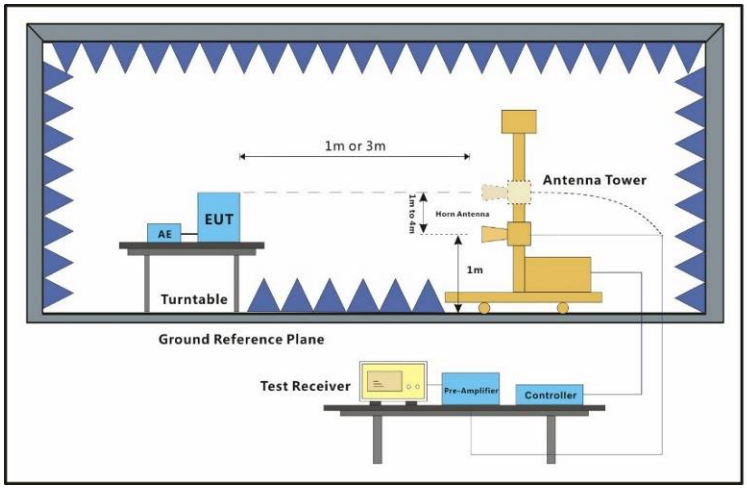
Operating Environment:

Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1015 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	08	Tx mode_Keep the EUT in continuously transmitting mode with modulation.
Final test	09	Charge + Tx mode_Keep the EUT in charging and continuously transmitting mode with modulation.

7.5.3 Test Setup Diagram

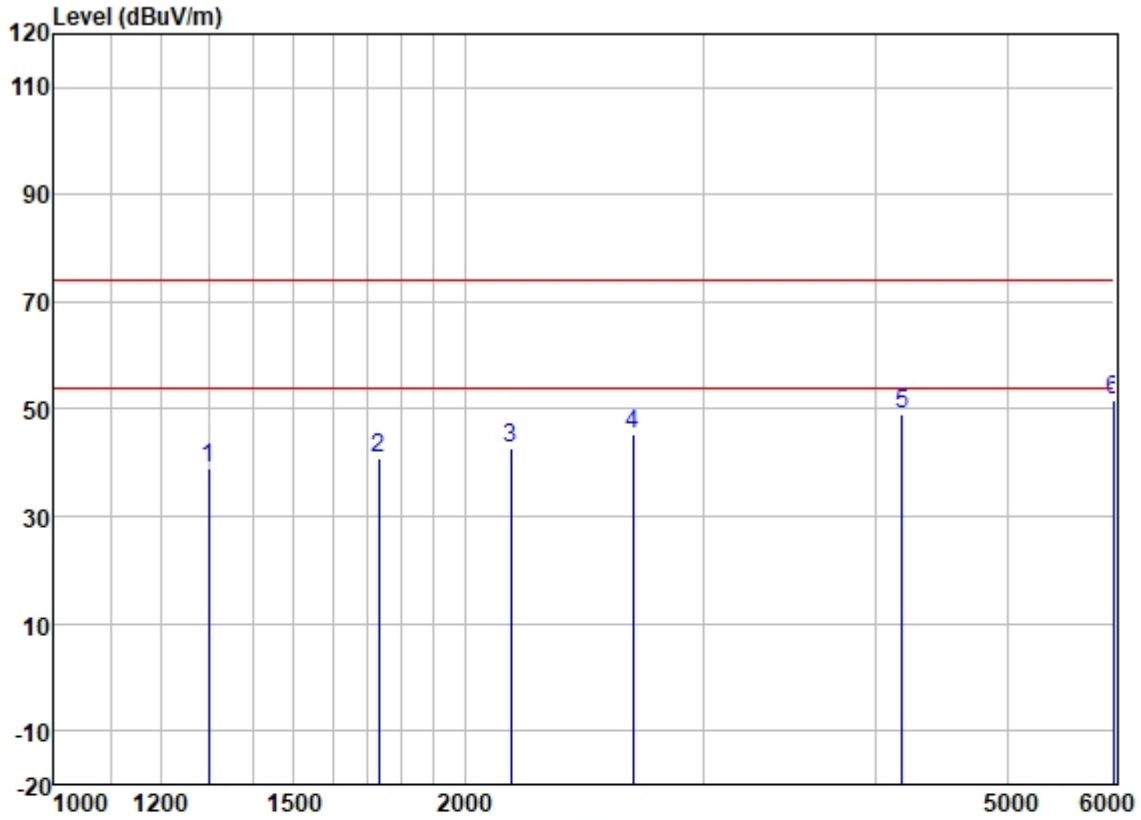


7.5.4 Measurement Procedure and Data

Measured Level l=Read Level + Antenna Factor + Cable Loss - Preamp Factor

The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is -23.10dB, please refer to Section 7.4.4 for more details.

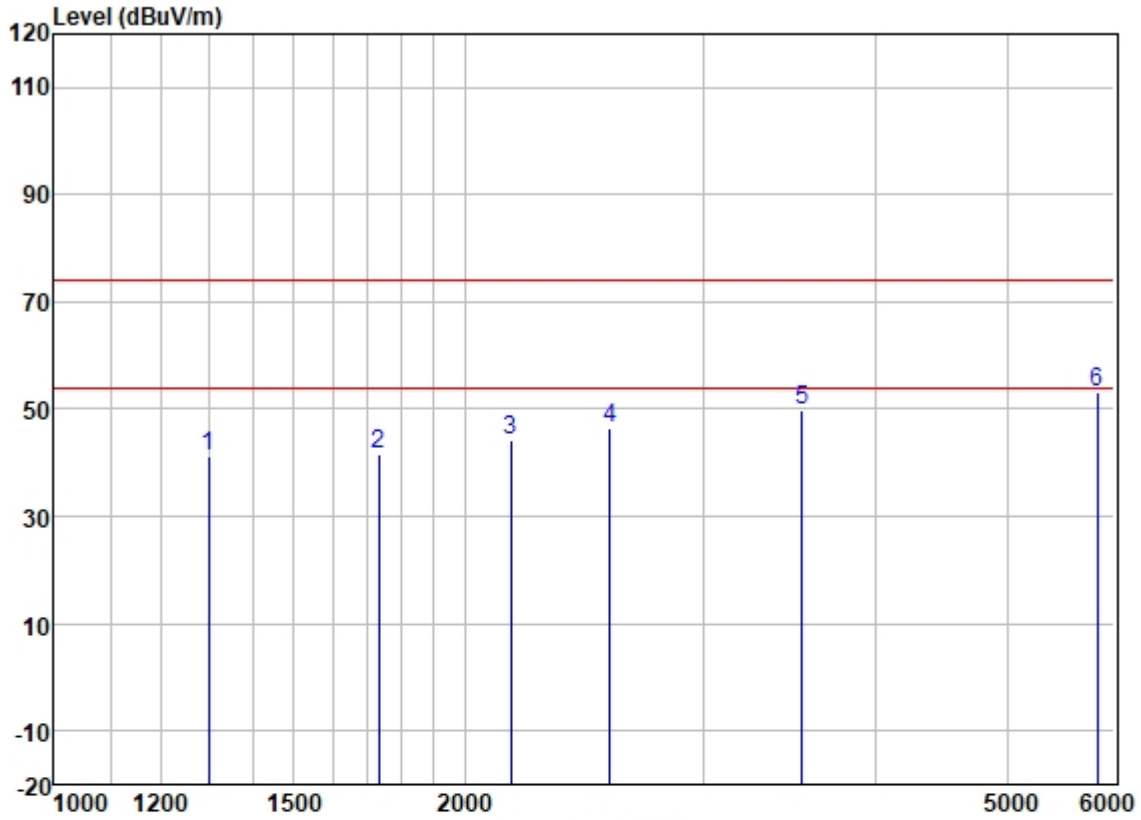
Test Mode: 09; Polarity: Horizontal



Trace: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1299.000	49.42	25.20	2.60	38.31	38.91	74.00	-35.09	HORIZONTAL	Peak
2	1732.000	50.05	25.80	2.85	37.87	40.83	74.00	-33.17	HORIZONTAL	Peak
3	2165.000	50.80	26.47	3.19	37.66	42.80	74.00	-31.20	HORIZONTAL	Peak
4	2659.932	51.39	27.73	3.55	37.49	45.18	74.00	-28.82	HORIZONTAL	Peak
5	4192.963	51.04	30.15	4.60	36.81	48.98	74.00	-25.02	HORIZONTAL	Peak
6	5989.259	50.10	32.39	6.15	36.90	51.74	74.00	-22.26	HORIZONTAL	Peak

Test Mode: 09; Polarity: Vertical



Trace: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1299.000	51.69	25.20	2.60	38.31	41.18	74.00	-32.82	VERTICAL	Peak
2	1732.000	50.86	25.80	2.85	37.87	41.64	74.00	-32.36	VERTICAL	Peak
3	2165.000	52.05	26.47	3.19	37.66	44.05	74.00	-29.95	VERTICAL	Peak
4	2557.121	52.87	27.57	3.46	37.54	46.36	74.00	-27.64	VERTICAL	Peak
5	3536.687	53.33	28.95	4.40	36.93	49.75	74.00	-24.25	VERTICAL	Peak
6	5830.433	51.67	32.23	6.04	36.90	53.04	74.00	-20.96	VERTICAL	Peak

8 Test Setup Photo

Refer to Appendix – Test Setup Photos for GZCR2110021316AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for GZCR2110021316AT

- End of the Report -

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