RADIO TEST REPORT
FCC Part 90& RSS-119

Client Information:

Applicant:	Shenzhen Weiguo Times Technology Co.,Ltd
Applicant add.:	8th Floor,Block C, Wanguo City Pingi Avenue Nanwan Street, Longgang District Shenzhen 518000 China
Manufacturer:	Shenzhen Todakj Co., Ltd.
Manufacturer add.:	No. 40 Huan Dong Road, Tie Gang Industrial District, Baoan, Shenzhen, China

Product Information:

Product Name:	Wireless Intercom System
Model No./ HVIN:	S600
Brand Name:	WULOO
FCC ID:	2AZ6O-S600
IC:	27400-S600

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan,
Guangdong, China

Tel.: +86-769-8202 0499 Fax.: +86-769-8202 0495

Date of Receipt:	April 24, 2022	Date of Test:	April 24, 2022~May 18, 2022
Date of Issue:	May 19, 2022	Test Result:	Pass

This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Reviewed by: Simba Huang Simba Huang **Approved by:** Seal.chen

Table of Contents Page

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 90 :2017: PRIVATE LAND MOBILE RADIO SERVICES.

ANSI C63.26:2015: American National Standard of procedures for compliance testing of transmitters used in licensed radio services.

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

RSS-119 Issue 12: — Land Mobile and Fixed Equipment Operating in the Frequency Range 27.41-960 MHz

RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus

2 SUMMARY

2.1 PRODUCT DESCRIPTION

Name of EUT:	Wireless Intercom System
Model Number:	S600
Power supply:	DC 5V 1000mA
Adapter information:	Model: JHD-AP006U-050100BB-2 Output: DC 5V 1000mA
Hardware version:	V1.0
Software version:	V1.0
Frequency Range:	From 420.25 to 438.80MHz
Modilation Type:	GMSK
Channel No.	20
Rated Output Power:	1 Watts(30dBm)
Antenna Type:	External antenna
Antenna Gain:	2dBi
Sample ID:	AIT22042404

2.2 DESCRIPTION OF TEST MODES AND TEST FREQUENCY

The EUT has been tested under typical operating condition. As, test modes selected as below by the technical parameters of the EUT:

Operation Mode No.	Channel Separation	Condition
	12.5KHz	TX
1	☒	☒

Operation Frequency list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	420.2500	11	429.8000
02	421.0000	12	430.5000
03	422.0000	13	431.5000
04	423.2500	14	432.2500
05	424.0000	15	433.2500
06	424.8000	16	434.2500
07	425.8000	17	435.8000
08	427.0000	18	436.8000
09	428.0000	19	437.8000
10	429.0000	20	438.8000

Test Frequency list:

Modulation Type	Test Channel	Test Frequency (MHz)
GMSK	Ch01	420.250
	Ch10	429.000
	Ch20	438.800

2.3 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended to comply with FCC Part 90 Rules and RSS-119.

2.4 MODIFICATIONS

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 TEST FACILITY

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

CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited 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) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited 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.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

3.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %.

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	0.009MHz-30MHz	3.10dB	(1)
Radiated Emission	30MHz-1GHz	3.75dB	(1)
Radiated Emission	1GHz-18GHz	3.88dB	(1)
Radiated Emission	18GHz-40GHz	3.88dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	1.20dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

3.3 SUMMARY OF MEASUREMENT RESULTS

Description of Test Item	Standard clause	Verdict
Maximum Transmitter Power	FCC Part 90.205	PASS
Modulation Characteristic	FCC Part 90.207	N/A[note1]
Occupied Bandwidth	FCC Part 90.209	PASS
Emission Mask	FCC Part 90.210	PASS
Frequency Stability	FCC Part 90.213	PASS
Transmitter Frequency Behavior	FCC Part 90.214	PASS
Transmitter Radiated Spurious Emssion	FCC Part 90.210	PASS
Spurious Emssion On Antenna Port	FCC Part 90.210	PASS

Remark:

1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report

3.4 EQUIPMENTS USED DURING THE TEST

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2021.08.30	2022.08.29
2	EMI Measuring Receiver	R&S	ESR	101660	2021.08.30	2022.08.29
3	Low Noise Pre Amplifier	HP	HP8447E	1937A01855	2021.08.30	2022.08.29
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2021.08.30	2022.08.29
5	Passive Loop	ETS	6512	00165355	2020.09.05	2022.09.04
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.29	2024.08.28
7	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.29	2024.08.28
8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367d	2020.11.24	2023.11.23
9	EMI Test Receiver	R&S	ESCI	100124	2021.08.30	2022.08.29
10	LISN	Kyoritsu	KNW-242	8-837-4	2021.08.30	2022.08.29
11	LISN	R&S	ESH3-Z2	0357.8810.54101161-S2	2021.08.30	2022.08.29
12	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2021.08.30	2022.08.29
13	RF Automatic Test system	MW	MW100-RFCB	21033016	2021.08.30	2022.08.29
14	Signal Generator	Agilent	N5182A	MY501430009	2021.08.30	2022.08.29
15	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2021.08.30	2022.08.29
16	RF Automatic Test system	MW	MW100-RFCB	21033016	2021.08.30	2022.08.29

17	Signal Analyzer	Agilent	N9020A	9011796	2021.08.30	2022.08.29
18	Digital Phosphor Oscilloscope	Tektronix	TDS3012	B021220	2021.08.30	2022.08.29
19	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
20	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A
21	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A
22	RF Software	MW	MTS 8310	2.0.0.0	N/A	N/A
23	temporary antenna connector(Note)	NTS	R001	N/A	N/A	N/A

4 TEST CONDITIONS AND RESULTS

4.1 MAXIMUM TRANSMITTER POWER

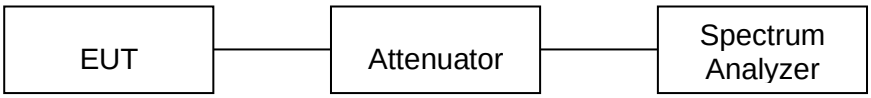
TEST APPLICABLE

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

TEST PROCEDURE

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels.
The EUT connect to the Spectrum Analyzer through 20 dB attenuator.

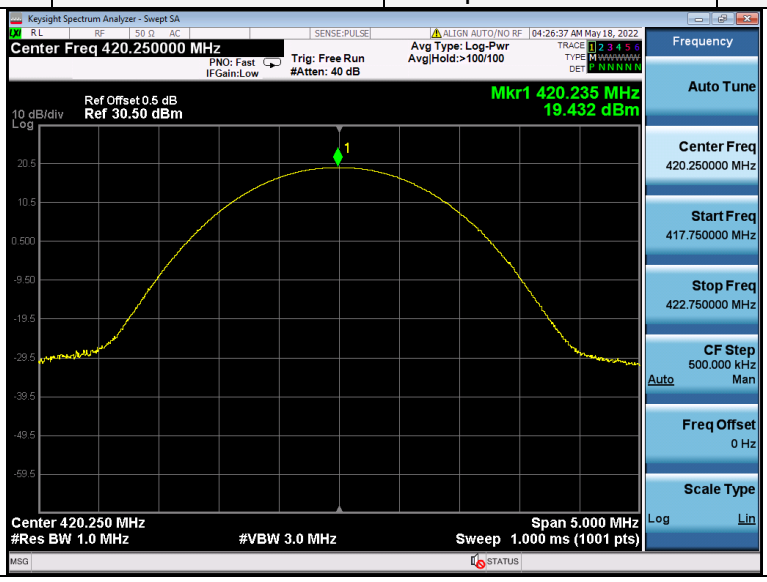
TEST CONFIGURATION



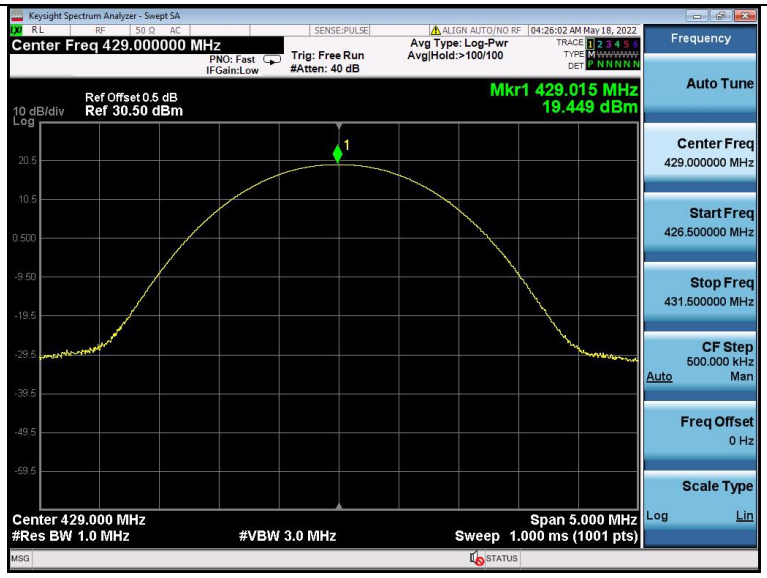
TEST RESULTS

Modulation Type	Test Channel	Test Frequency (MHz)	Test Results (dBm)
GMSK	Ch01	420.250	19.432
	Ch10	429.000	19.449
	Ch20	438.800	19.438

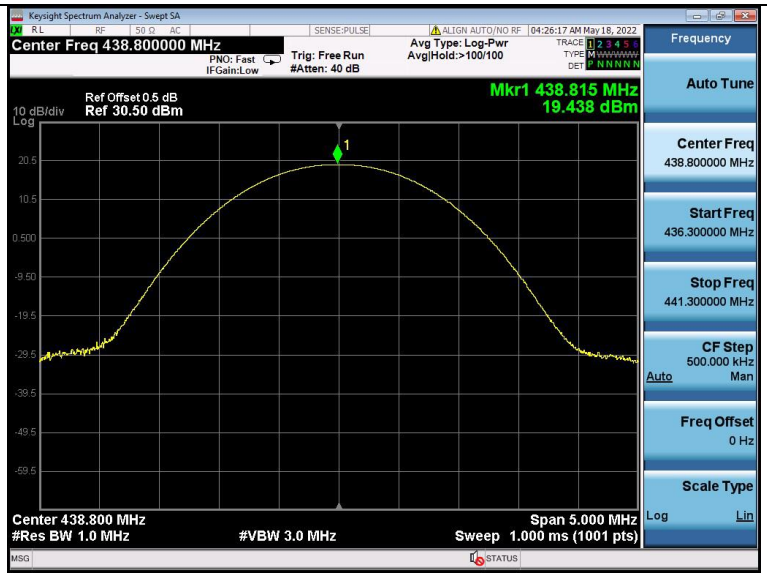
Modulation Type:	GMSK	Operation Mode:	TX



Ch1


Keysight Spectrum Analyzer - Swept SA
Center Freq 429.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
04:26:02 AM May 18, 2022
Ref Offset 0.5 dB
10 dB/div
Ref 30.50 dBm
Mkr1 429.015 MHz
19.449 dBm
Center 429.000 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 5.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
429.000000 MHz
Start Freq
426.500000 MHz
Stop Freq
431.500000 MHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

Ch10


Keysight Spectrum Analyzer - Swept SA
Center Freq 438.800000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
04:26:17 AM May 18, 2022
Ref Offset 0.5 dB
10 dB/div
Ref 30.50 dBm
Mkr1 438.815 MHz
19.438 dBm
Center 438.800 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 5.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
438.800000 MHz
Start Freq
436.300000 MHz
Stop Freq
441.300000 MHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

Ch20

4.2 OCCUPIED BANDWIDTH AND EMISSION MASK TEST

TEST APPLICABLE

(a). Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyzer via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyzer.

(b). Emission Mask B: For transmitters that are equipped with an audio low-pass filter pursuant to §90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

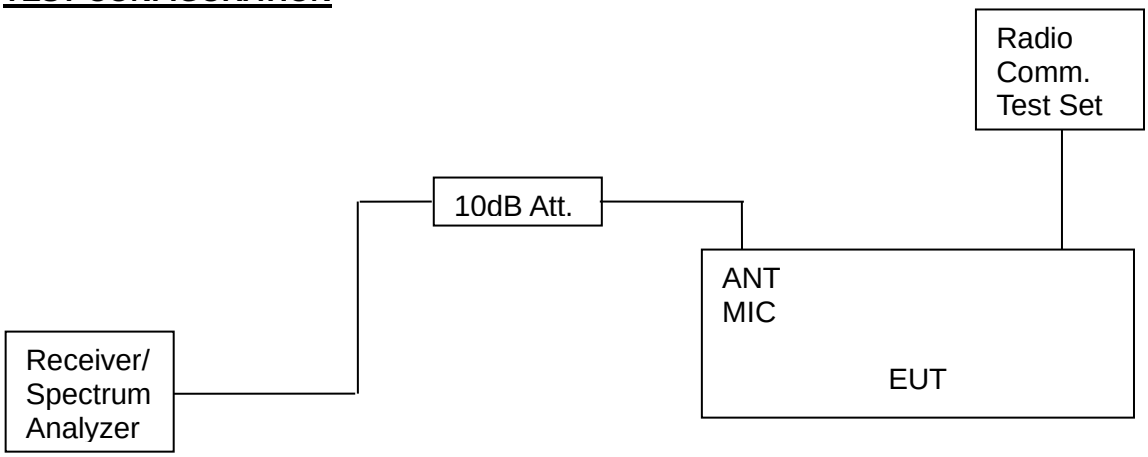
(c). Emission Mask D, 12.5 kHz channel bandwidth equipment: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd -2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

TEST CONFIGURATION



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.

2 The EUT was modulated by 2.5 KHz Sine wave audio signal; the level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing).

3 Set EUT as normal operation.

4 Set SPA Center Frequency = fundamental frequency, RBW=300Hz, VBW= 3 KHz, span =50 KHz.

5 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

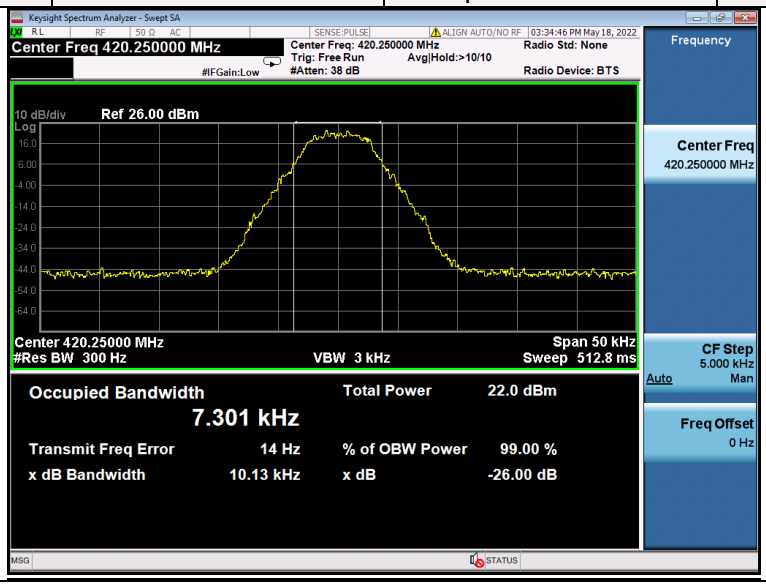
6 Set SPA Center Frequency=fundamental frequency, set =300Hz, VBW=1 KHz, span=50 KHz for 12.5 channel spacing.

TEST RESULTS

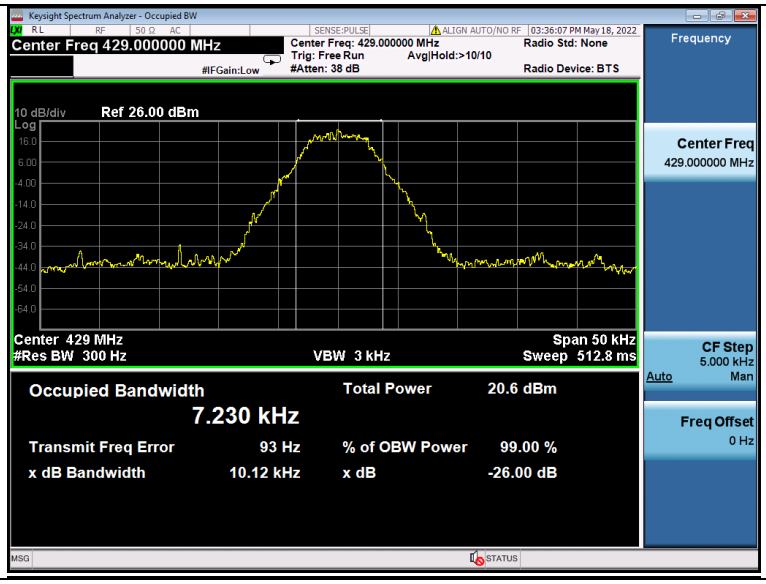
Occupied Bandwidth

Modulation Type	Frequency (MHz)	99% OBW (kHz)	26dB bandwidth (kHz)	Limit (KHz)	Test result
GMSK	420.250	7.301	10.13	11.25	Pass
	429.000	7.230	10.12		Pass
	438.800	7.317	10.20		Pass

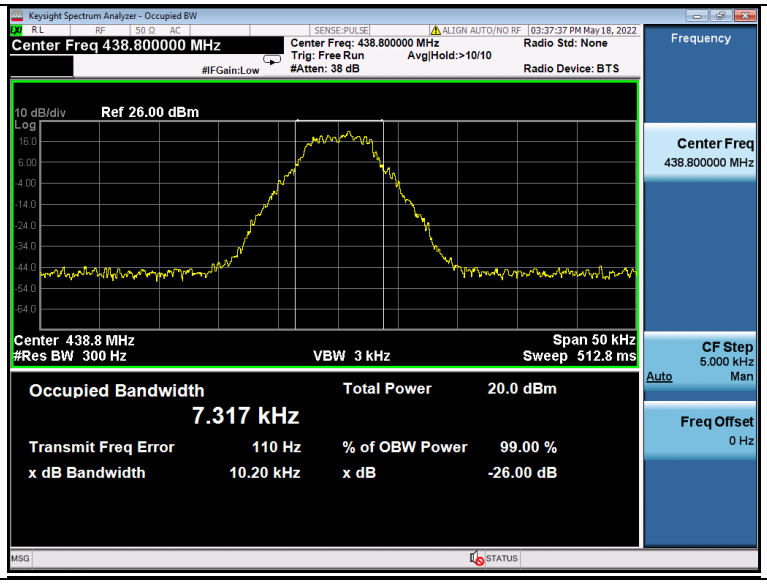
Modulation Type:	GMSK	Operation Mode:	TX



Ch01



Ch10


Keysight Spectrum Analyzer - Occupied BW
Center Freq 438.800000 MHz
Center Freq: 438.800000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 38 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
03:37:37 PM May 18, 2022
Frequency
10 dB/div
Log
Ref 26.00 dBm
16.0
6.00
-4.00
-14.0
-24.0
-34.0
-44.0
-54.0
-64.0
Center 438.8 MHz
#Res BW 300 Hz
VBW 3 kHz
Span 50 kHz
Sweep 512.8 ms
Occupied Bandwidth
7.317 kHz
Total Power 20.0 dBm
Transmit Freq Error 110 Hz
% of OBW Power 99.00 %
x dB Bandwidth 10.20 kHz
x dB -26.00 dB
Center Freq
438.800000 MHz
CF Step
5.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

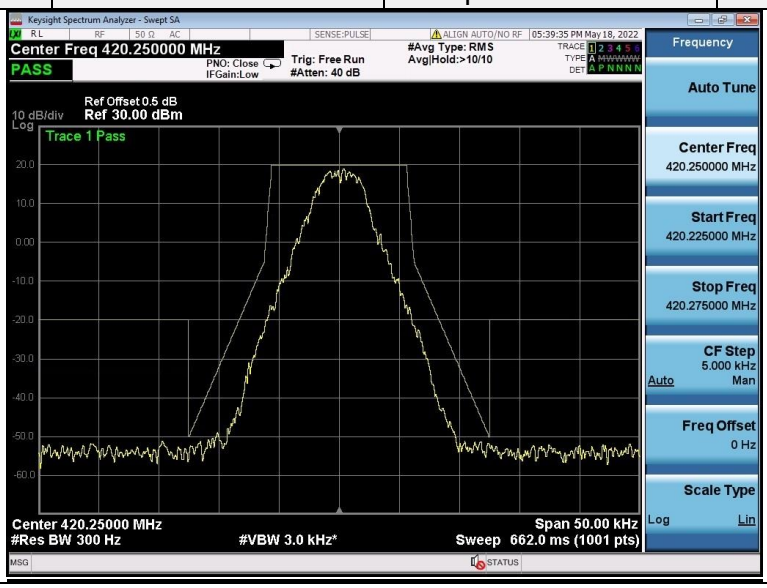
Ch20

20

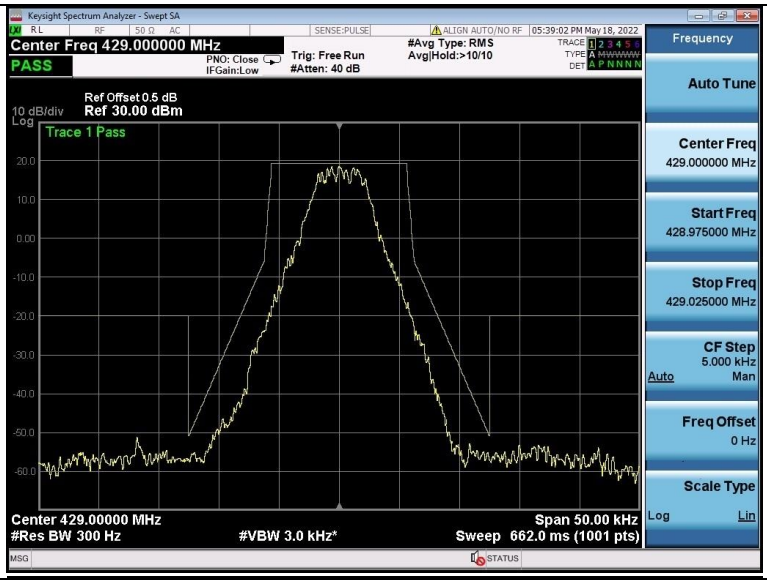
Emission Mask

Modulation Type	Test Channel	Frequency (MHz)	Applicable Mask	RBW (Hz)
GMSK	Ch01	420.250	D	300
	Ch10	429.000	D	300
	Ch20	438.800	D	300

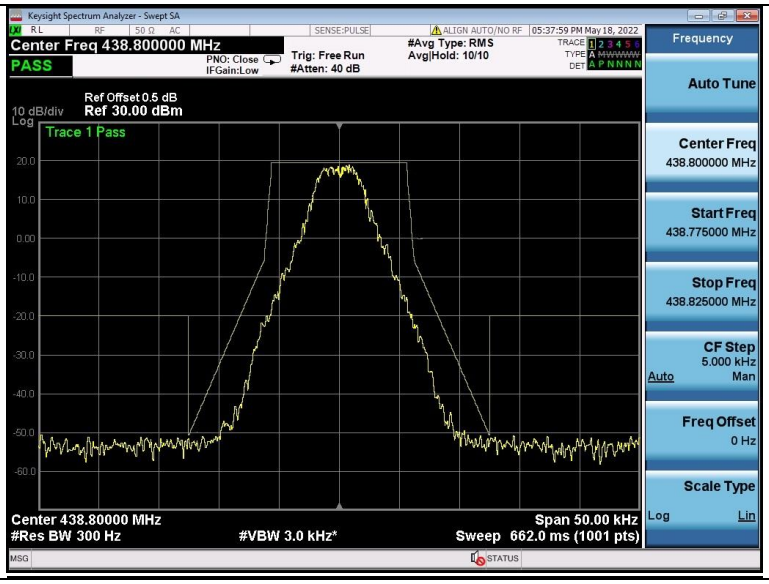
Modulation Type:	GMSK	Operation Mode:	TX



Ch1



Ch10


Keysight Spectrum Analyzer - Swept SA
Center Freq 438.800000 MHz
PASS
PNO: Close
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 10/10
05:37:59 PM May 18, 2022
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Log
Trace 1 Pass
Center 438.80000 MHz
#Res BW 300 Hz
#VBW 3.0 kHz*
Span 50.00 kHz
Sweep 662.0 ms (1001 pts)
Frequency
Auto Tune
Center Freq
438.800000 MHz
Start Freq
438.775000 MHz
Stop Freq
438.825000 MHz
CF Step
5.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

Ch20

4.3 TRANSMITTER RADIATED SPURIOUS EMISSIONS

TEST APPLICABLE

According to the ANSI C63.26 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

1 On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB

2 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB

3 On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) fo of more than 12.5 KHz: At least 50+10 log (P) dB or 70 dB, which ever is lesser attenuation.

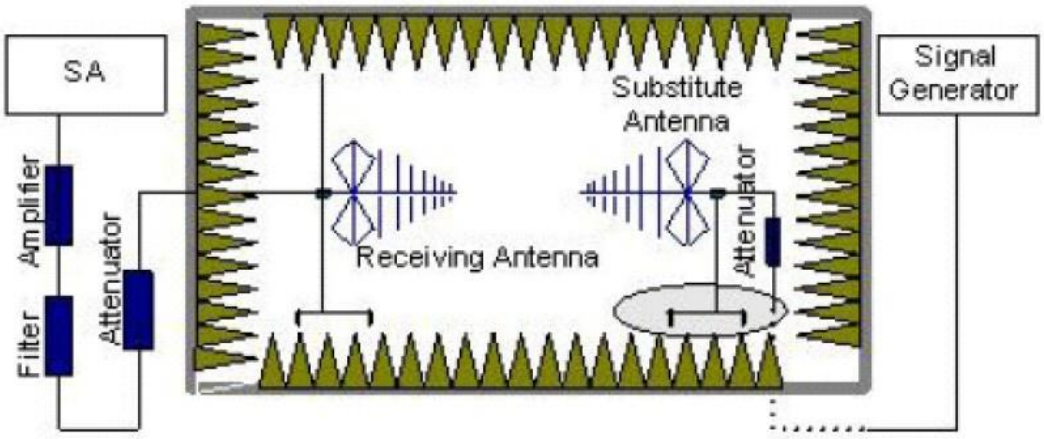
For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

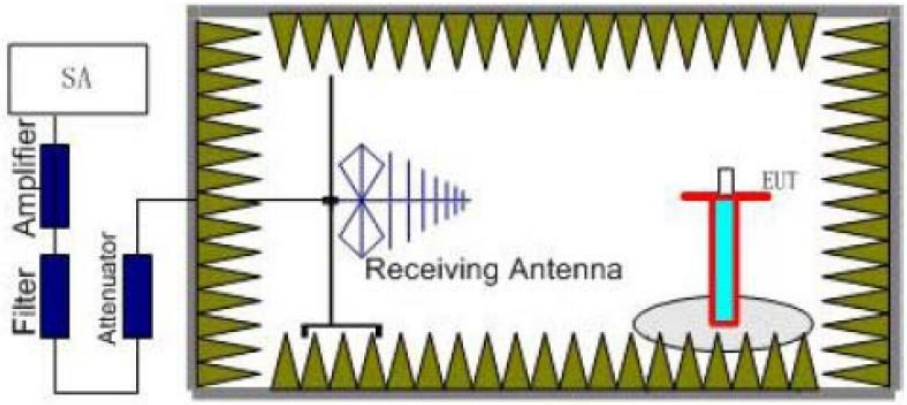
1 On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.

2 On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.

3 On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10Log (P) dB.

TEST CONFIGURATION





TEST PROCEDURE

1. EUT was placed on a 1.50 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 1.50 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=1MHz,VBW=3MHz for above 1GHz and RBW=100KHz,VBW=300KHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (P_r).
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 (P_{Mea}) 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 (P_r). The power of signal source (P_{Mea}) 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 (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} - G_a

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)=P_{Mea}- P_{cl} - G_a

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.

Limit

FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 11 (12.5 kHz bandwidth only): On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:
Low: 50 + 10 log (Pwatts) = 50 + 10 log (28.12) =64.49 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (29.85) =64.75 dB
Note: In general, the worse case attenuation requirement shown above was applied.
Calculation: Limit (dBm) =EL-50-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 43.98 dBm.
Limit (dBm) =43.98-50-10log10 (29.85) = -20 dBm

TEST RESULTS

Note: 1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5 GHz.
3. *** means that the emission level is too low to be measured or at least 20 dB down than the limit.

Test Frequency (MHz)	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Distance (m)	G_a Antenna Gain (dBd/dBi)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Pol.
420.250	840.50	-35.80	0.87	3.00	6.42	-30.25	-20.00	10.25	V
	1260.75	-34.58	1.02	3.00	10.24	-25.36	-20.00	5.36	V
	1681.00	-49.59	1.10	3.00	11.25	-39.44	-20.00	19.44	V
	--	--	--	--	--	--	--	--	--
	840.50	-37.20	0.87	3.00	6.42	-31.65	-20.00	11.65	H
	1260.75	-35.55	1.02	3.00	10.24	-26.33	-20.00	6.33	H
	1681.00	-51.01	1.10	3.00	11.25	-40.86	-20.00	20.86	H
	--	--	--	--	--	--	--	--	--
429.000	858.00	-36.80	0.92	3.00	6.47	-31.25	-20.00	11.25	V
	1287.00	-35.70	1.06	3.00	10.41	-26.35	-20.00	6.35	V
	1716.00	-48.70	1.12	3.00	11.38	-38.44	-20.00	18.44	V
	--	--	--	--	--	--	--	--	--
	858.00	-37.93	0.92	3.00	6.47	-32.38	-20.00	12.38	H
	1287.00	-37.23	1.06	3.00	10.41	-27.88	-20.00	7.88	H
	1716.00	-49.83	1.12	3.00	11.38	-39.57	-20.00	19.57	H
	--	--	--	--	--	--	--	--	--
438.800	877.60	-38.85	0.95	3.00	6.55	-33.25	-20.00	13.25	V
	1316.40	-37.47	1.10	3.00	10.89	-27.68	-20.00	7.68	V
	1755.20	-51.37	1.21	3.00	11.73	-40.85	-20.00	20.85	V
	--	--	--	--	--	--	--	--	--
	877.60	-39.92	0.95	3.00	6.55	-34.32	-20.00	14.32	H
	1316.40	-38.64	1.10	3.00	10.89	-28.85	-20.00	8.85	H
	1755.20	-52.50	1.21	3.00	11.73	-41.98	-20.00	21.98	H
	--	--	--	--	--	--	--	--	--

Remark:

1. *$EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$*
2. *-- Means other points for values lower than limits and not recorded.*
3. *Margin = Limit – EIRP*

4.4 SPURIOUS EMISSIONS ON ANTENNA PORT

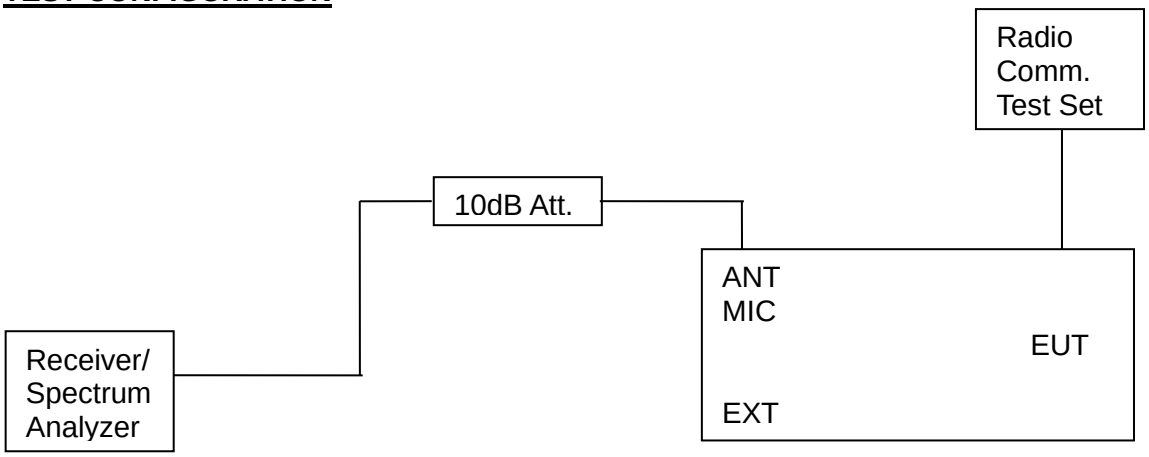
TEST APPLICABLE

The same as Section 4.3

TEST PROCEDURE

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.
The audio input was set to 0 to get the unmodulated carrier, the resulting picture is print out for each channel separation.

TEST CONFIGURATION



Limit

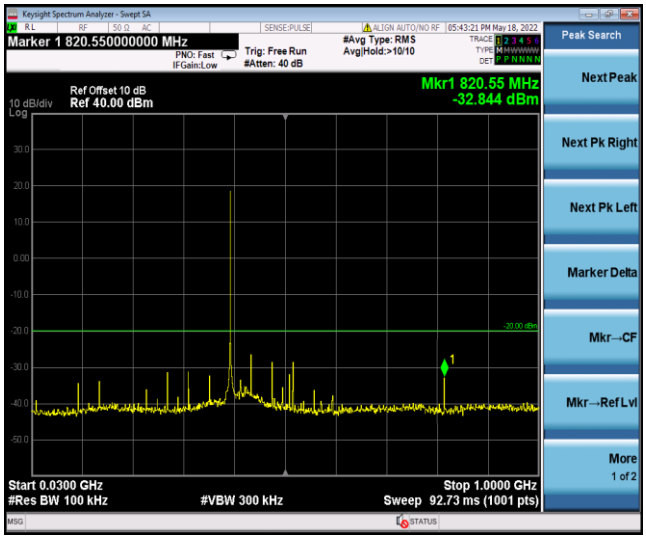
FCC Part 22.359, 74.462, 80.211 and 90.210 and RSS Gen, RSS 119 Issue 11 (12.5 kHz bandwidth only): On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:
Low: 50 + 10 log (Pwatts) = 50 + 10 log (28.12) =64.49 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (29.85) =64.75 dB
Note: In general, the worse case attenuation requirement shown above was applied.
Calculation: Limit (dBm) =EL-50-10log10 (TP)

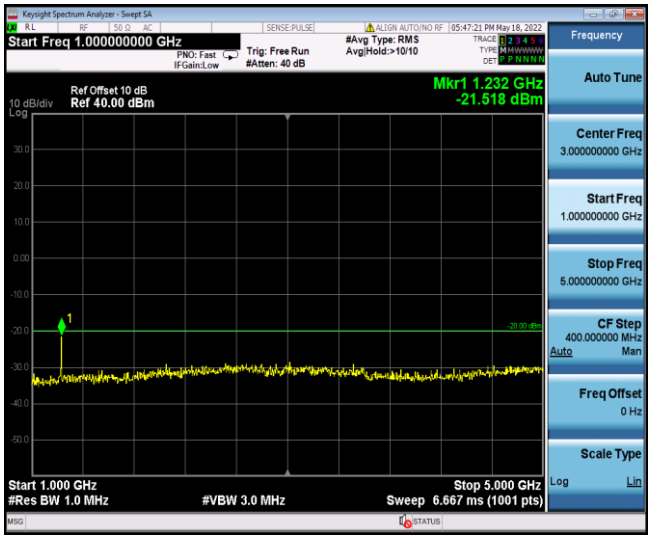
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 43.98 dBm.
Limit (dBm) =43.98-50-10log10 (29.85) = -20 dBm

Note: 1. In general, the worse case attenuation requirement shown above was applied.
2.The measurement frequency range from 30 MHz to 5GHz.

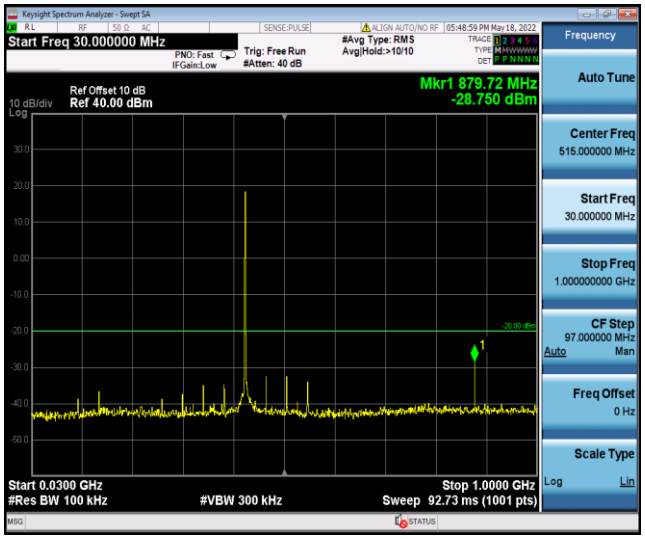
TEST RESULTS

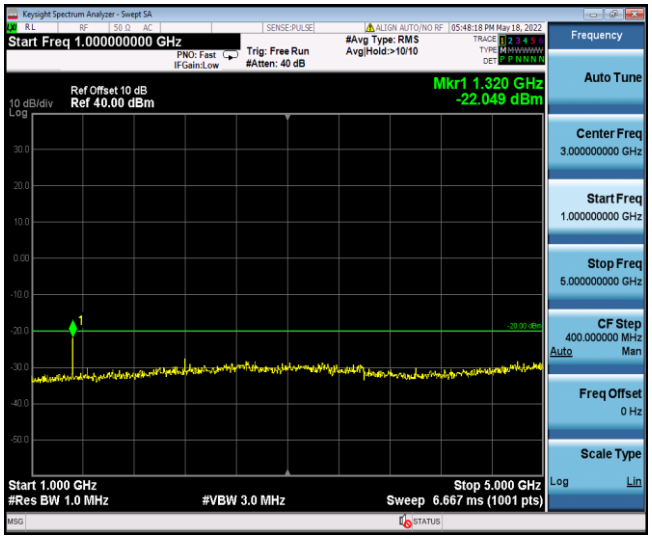
Modulation Type:	GMSK	Channel:	Ch01



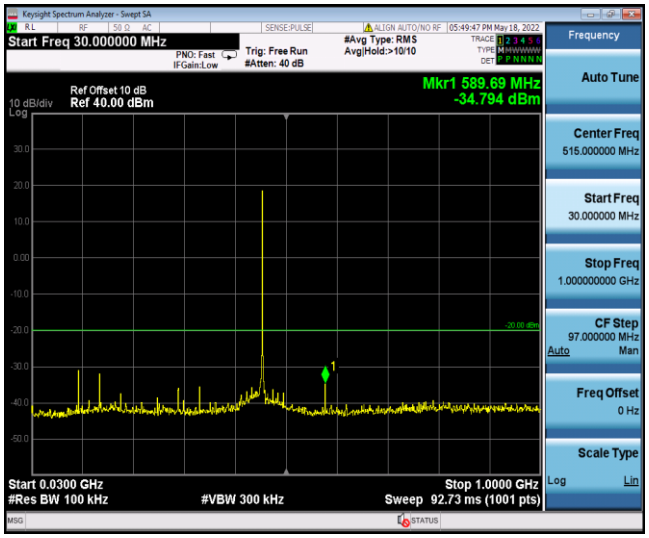
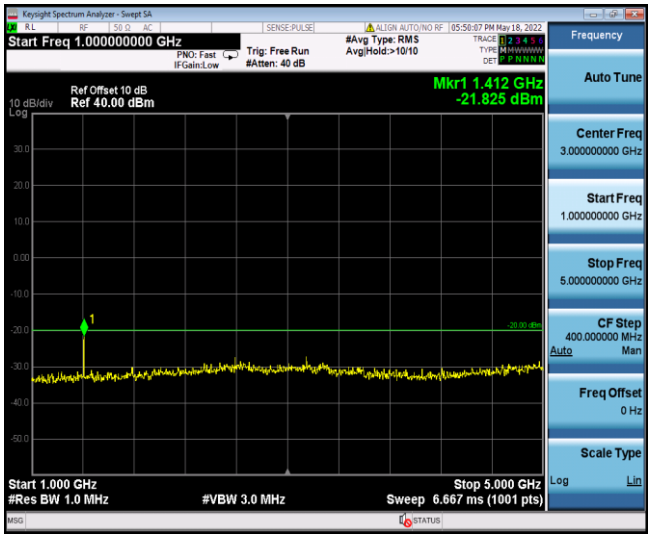


30MHz~1GHz		*1GHz-5GHz*	
Modulation Type:	GMSK	Channel:	Ch10





30MHz~1GHz		*1GHz-5GHz*	
Modulation Type:	GMSK	Channel:	Ch20

	
30MHz~1GHz	*1GHz-5GHz*

4.5 FREQUENCY STABILITY TEST

TEST APPLICABLE

1 According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +60℃ centigrade.

2 According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.

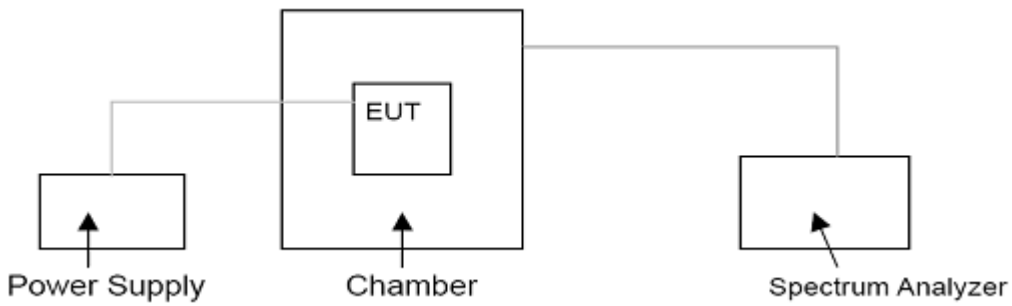
3 Vary primary supply voltage from 85 to 115 percent of the nominal value.

4 According to §90.213, the frequency stability limit is 1.5 ppm for 12.5KHz channel separation

TEST PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer ESI 26. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST CONFIGURATION



TEST LIMITS

According to 90.213, Transmitters used must have minimum frequency stability as specified in the following table.

Frequency Range (MHz)	Channel Bandwidth (KHz)	Frequency Tolerance (ppm)		
		Fixed and Base Stations	Mobile Stations	
			> 2 W	≤ 2 W
150-174 MHz	6.25 12.5 25	1.0 2.5 5.0	2.0 5.0 5.0	2.0 5.0 50.0*
421-512 MHz	6.25 12.5 25	0.5 1.5 2.5	1.0 2.5 5.0	1.0 2.5 5.0

- Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.
- Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

TEST RESULTS

Operation Mode	Channel Separation	Test conditions		Frequency error (ppm)		
		Voltage(V)	Temp(℃)	420.250	429.000	438.800
TX	12.5KHz	120	-30	1.01	1.03	1.01
			-20	0.84	0.82	0.83
			-10	0.79	0.78	0.77
			0	0.76	0.75	0.75
			10	0.80	0.79	0.79
			20	0.54	0.55	0.53
			30	0.87	0.83	0.82
			40	0.91	0.90	0.90
			50	1.00	1.01	1.01
		102(85% Rated)	20	0.94	0.94	0.94
		138(115% Rated)	20	0.79	0.78	0.78
Limit			**2.5 ppm**			
Test Results			**PASS**			

4.6 TRANSMITTER FREQUENCY BEHAVIOUR

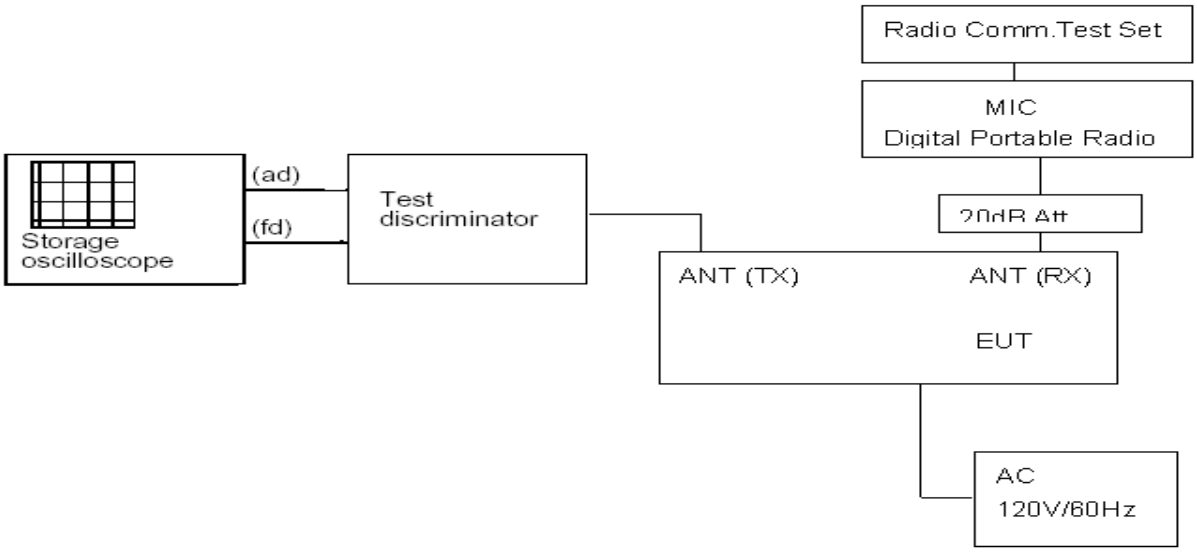
TEST APPLICABLE

Section 90.214
Transient frequencies must be within the maximum frequency difference limits during the time intervals indicated:

Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 MHz	421 to 512MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 KHz Channels			
t_1 [4]	± 25.0 KHz	5.0 ms	10.0 ms
t_2	± 12.5 KHz	20.0 ms	25.0 ms
t_3 [4]	± 25.0 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 KHz Channels			
t_1 [4]	± 12.5 KHz	5.0 ms	10.0 ms
t_2	± 6.25 KHz	20.0 ms	25.0 ms
t_3 [4]	± 12.5 KHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 KHz Channels			
t_1 [4]	±6.25 KHz	5.0 ms	10.0 ms
t_2	±3.125 KHz	20.0 ms	25.0 ms
t_3 [4]	±6.25 KHz	5.0 ms	10.0 ms

1. t_{on} is the instant when a 1 KHz test signal is completely suppressed, including any capture time due to phasing.
   t_1 is the time period immediately following t_{on}.
   t_2 is the time period immediately following t_1.
   t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
   t_{off} is the instant when the 1 KHz test signal starts to rise.
2. During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in § 90.213.
3. Difference between the actual transmitter frequency and the assigned transmitter frequency.
4. If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

TEST CONFIGURATION



TEST PROCEDURE

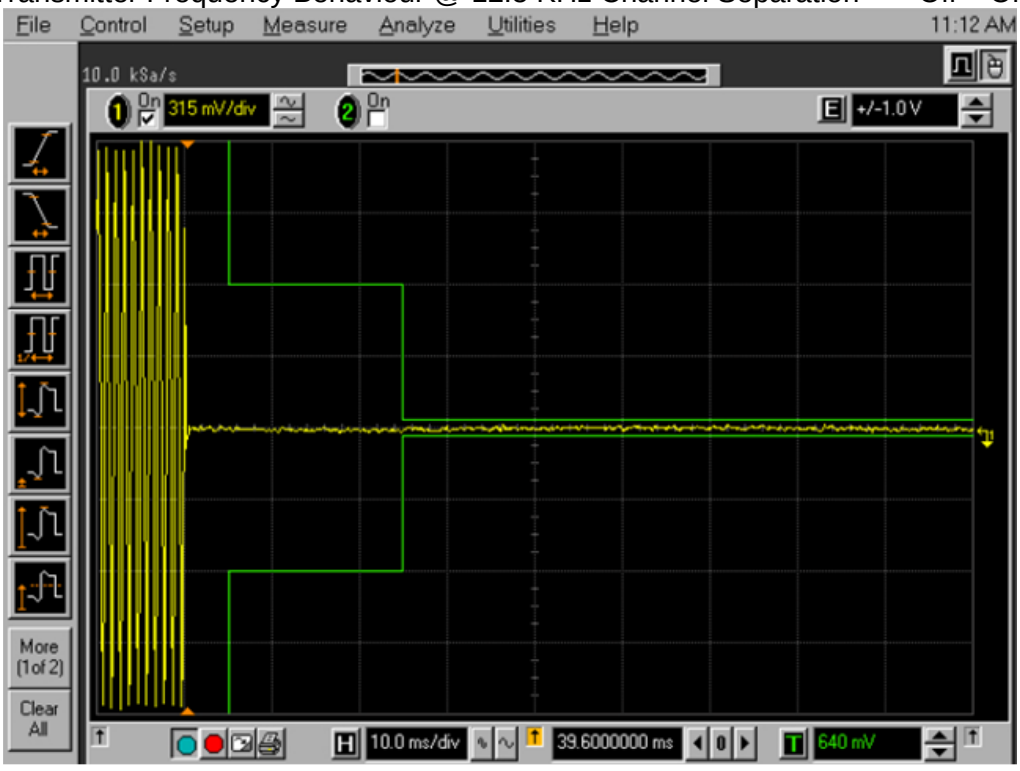
1. Connect the EUT and test equipment as shown in the test configuration.

2. Set Spectrum Analyzer to measure FM deviation, and tune the RF frequency to transmitter assigned frequency.
3. Set the signal generator to the assigned transmitter frequency and modulate it with a 1KHz tone at ±12.5Khz deviation and set its output level to -100dBm.
4. Turn on the transmitter.
5. Supply sufficient attenuation via RF attenuator to provide an input level to the Spectrum Analyzer that is 40dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on Spectrum Analyzer as $P_{0.}$
6. Turn off the transmitter.
7. Adjust the RF level of the signal generator to provide RF power equal to $P_{0.}$ This signal generator RF level shall be maintained throughout the rest of the measurement.
8. Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30dB when the transmitter is turned on.
9. Adjust the vertical amplitude control of the spectrum analyzer to display the 1000Hz at ±4 divisions vertically centered on display. Set trigger mode of the Spectrum Analyzer to “Video”, and tune the “trigger level” on suitable level. Then set the “trigger offset” to -10ms for turn on and -15ms for turn off.
10. Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 KHz test signal is completely suppressed is considered to be $t_{on.}$ The trace should be maintained within the allowed divisions during the period t_1 and $t_{2.}$
11. Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period $t_{3.}$

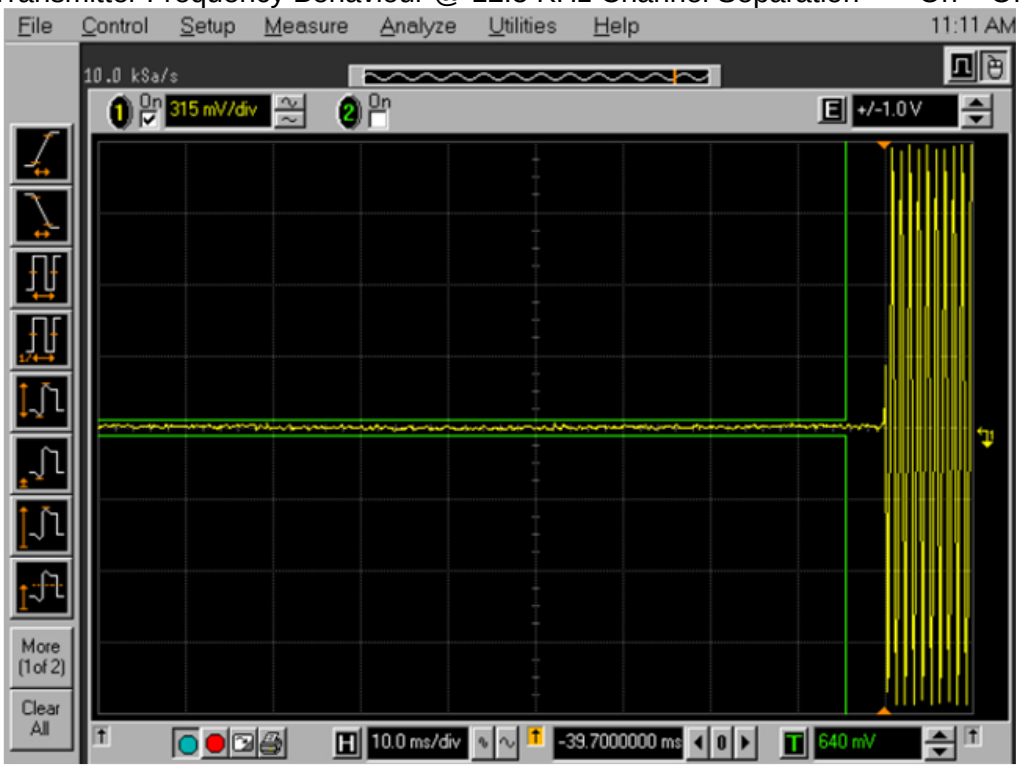
TEST RESULTS

Modulation Type: GMSK

Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------Off – On



Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation------On – Off



5 APPENDIX ——PHOTOS

TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

EXTERNAL PHOTOGRAPHS OF EUT

Please refer to separated files for External Photos of the EUT.

INTERNAL PHOTOGRAPHS OF EUT

Please refer to separated files for Internal Photos of the EUT.

End of report