FCC TEST REPORT

Report No:STS1807222W01

Issued for

Tersus GNSS Inc.

Rm 210, Building A, No. 666 Zhangheng Road,Zhangjiang Hi-tech Park,Pudong,Shanghai, P.R.C

Product Name:	David 2W Radio
Brand Name:	N/A
Model Name:	RS460
Series Model:	N/A
FCC ID:	2AMDJ-RS460
Test Standard:	FCC Part 90 Rules

Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
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TEST RESULT CERTIFICATION

Applicant's name	Tersus GNSS Inc.
Address	Rm 210, Building A, No. 666 Zhangheng Road,Zhangjiang Hi-tech Park,Pudong,Shanghai, P.R.C
Manufacture's Name	Tersus GNSS Inc.
Address	Rm 210, Building A, No. 666 Zhangheng Road,Zhangjiang Hi-tech Park,Pudong,Shanghai, P.R.C

Product description

Product Name	David 2W Radio
Brand Name	N/A
Model Name	RS460
Series Model	N/A
Test Standards	FCC Part 90 Rules
Test procedure	C63.26-2015

This device described above has been tested by STS, 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.

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Date of Test	
Date of performance of tests	25 July 2018 ~28 Sept. 2018
Date of Issue	28 Sept. 2018
Test Result	Pass

Testing Engineer : Chris chen

(Chris chen)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Vita Li

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	28 Sept. 2018	STS1807222W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission			
Standard	Item	Result	Remarks
FCC Part 90.205	Maximum Transmitter Power	PASS	
FCC Part 90.209	Occupied Bandwidth	PASS	
FCC Part 90.210	Emission Mask	PASS	
FCC Part 90.221	Adjacent channel power	PASS	
FCC Part 90.210	Transmitter Radiated Spurious Emssion	PASS	
FCC Part 90.210	Spurious Emssion on Antenna Port	PASS	
FCC Part 90.213	Frequency Stability Test	PASS	
FCC Part 90.210	Transmitter Frequency Behavior	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen STS Test Services Co., Ltd.
Add.: 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China.
CNAS Registration No.: L7649; FCC Registration No.: 625569
IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

1.2 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 %。

No.	Item	Uncertainty
1	RF power,conducted	±0.70dB
2	Spurious emissions,conducted	±1.19dB
3	Spurious emissions,radiated((>1G)	±2.83dB
4	Spurious emissions,radiated(<1G)	±3.01dB
5	Temperature	±0.5°C
6	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	David 2W Radio
Brand Name:	N/A
Model Name:	RS460
Series Model:	N/A
Model Difference description:	N/A
Operation Frequency Range	Frequency Range: 457MHz ~ 467MHz
Maximum Transmitter Power:	33.403dBm
Channel Separation:	25.0KHz
Modulation type:	GMSK
Emission Designator:	9K34G1D
Power Rating:	Input: DC 5-12V(Normal: DC 8V)
Temperature Range:	-30℃-60℃
Test frequency list:	See Note 5
Software version number:	V1.0
Hardware version number:	V1.0

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Note: The product has the same digital working characters when operating in both two digitized voice/data mode. So only one set of test results for digital modulation modes are provided in this test report.
3. Please refer to Appendix B for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.
4. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	RS460	TNC Antenna	N/A	3	Antenna

The EUT antenna is External Antenna. No antenna other than that furnished by the responsible party shall be used with the device.

5. Test frequency list

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	457	2	457.025	3	457.05	4	457.075
--	--	--	--	--	--	--	--
201	462	202	462.025	203	462.05	204	462.075
--	--	--	--	--	--	--	--
398	466.925	399	466.95	400	466.975	401	467

Channel Separation	Test Channel	Test Frequency (MHz)
25kHz	CH1	457
	CH201	462
	CH401	467

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test,please see the above listed frequency for testing.

2.2 EUT OPERATION MODE

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements..

2.3 DESCRIPTION OF TEST MODES

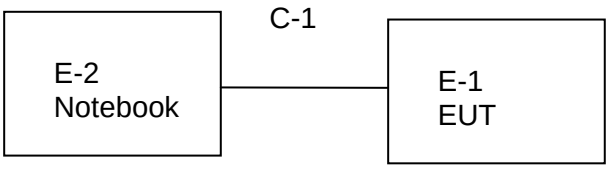
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Final Test Mode	Power level	Channel Separation	Frenquency
Model 1	High rated power	25kHz	457
			462
			467
Model 2	Low rated power		457
			462
			467

Model 1:
The equipment is set with GMSK modulation and 25.0KHz bandwidth at High rated power for transmitter,powered by DC 8V.

Model 2:
The equipment is set with GMSK modulation and 25.0KHz bandwidth at Low rated power for transmitter,powered by DC 8V.
.
Note:
(1) Due to the different configuration and test, in this list only some worse mode. The worst test data of the worse modeis reported by this report.

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-2	Notebook	DELL	VOSTRO.3800	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	Shieled line	N/A	110cm	N/A

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

2.7 TEST EQUIPMENT

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY49100060	2017.10.15	2018.10.14
Signal Generator	Agilent	N5182A	MY46240556	2017.10.15	2018.10.14
Audio Generator	TRONSON	TAG-101	20030212	2017.10.15	2018.10.14
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2018.11.01
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1343	2017.10.27	2018.10.26
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2017.10.15	2018.10.14
Pre-mplifier (0.1M-3GHz)	EM	EM330	60538	2018.03.11	2019.03.10
PreAmplifier (1G-26.5GHz)	Agilent	8449B	60538	2017.10.15	2018.10.14
Attenuator	HP	8494B	DC-18G	2017.10.15	2018.10.14
programmable power supply	Agilent	3642A	STS-S095	N.C.R	N.C.R
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Audio analyzer	R&S	UPL	100689	2018.03.08	2019.03.07
RF COMMUNICATION TEST SET	HP	N8920A	348A05658	2017.10.15	2018.10.14

3. MAXIMUM TRANSMITTER POWER

3.1 LIMITS

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

The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

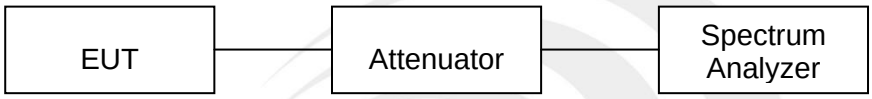
3.2 TEST PROCEDURE

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 30 dB attenuator.

3.3 DEVIATION FROM TEST STANDARD

No deviation

3.4 TEST SETUP BLOCK DIAGRAM



3.5 TEST RESULT

Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)	Test Results (W)
GMSK	25KHz	Mode 1	CH01	457.0000	33.363	2.17
			CH201	462.0000	33.403	2.19
			CH401	467.0000	33.214	2.10
		Mode 2	CH01	457.0040	29.568	0.91
			CH201	462.0000	29.648	0.92
			CH401	467.0000	29.600	0.91

Note: The high rated power is 2W, the power limits is 1.6W~2.4W.
The low rated power is 1W, the power limits is 0.8W~1.2W.

4. OCCUPIED BANDWIDTH

4.1 LIMIT

Occupied Bandwidth: The EUT was connected to 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. The maximum authorized bandwidth shall not be more than that normally authorized for digital data mode.

4.2 MEASUREMENT PROCEDURE

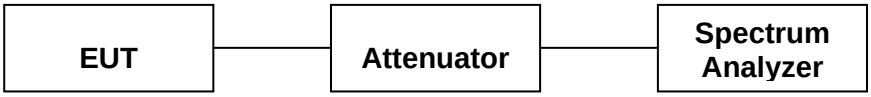
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Set EUT as digital data mode.

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

e Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth.

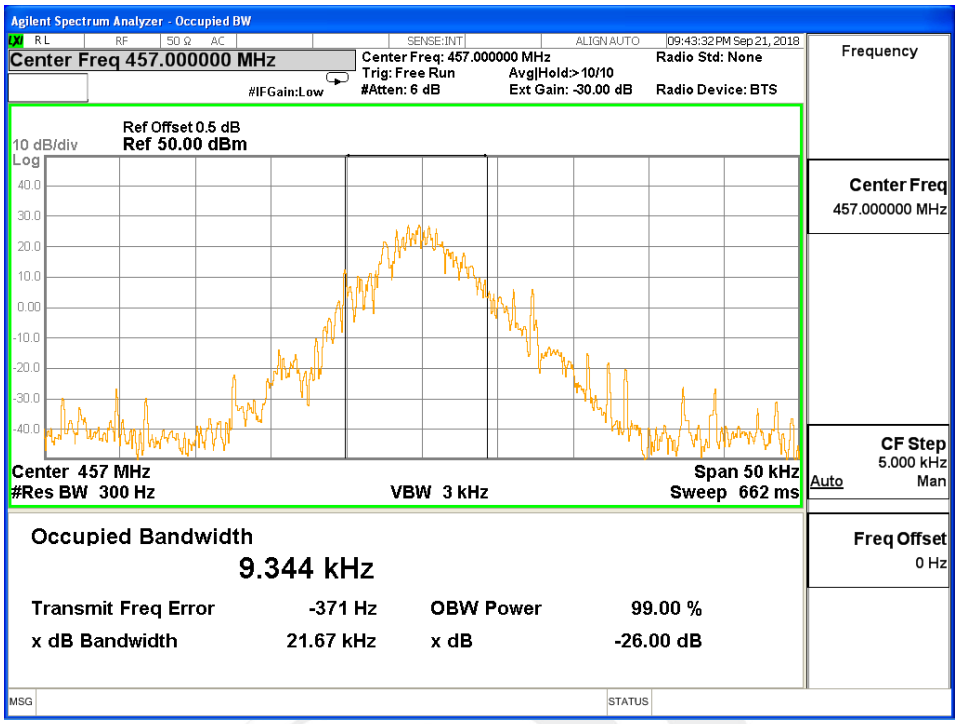
4.3 TEST SETUP BLOCK DIAGRAM



4.4 TEST RESULT

Modulation Type	Channel Sparation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)
					99%
GMSK	25KHz	Mode 1	CH01	457.0000	9.344
			CH201	462.0000	8.232
			CH401	467.0000	8.368
		Mode 2	CH01	457.0040	8.812
			CH201	462.0000	8.715
			CH401	467.0000	8.643

CH 01 Model 1



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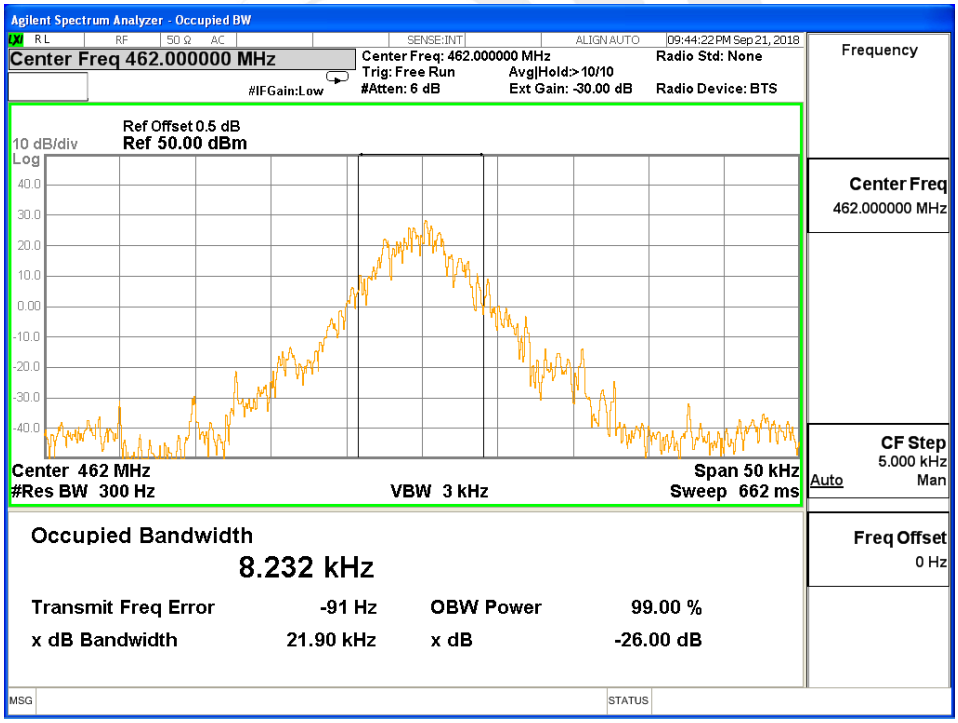
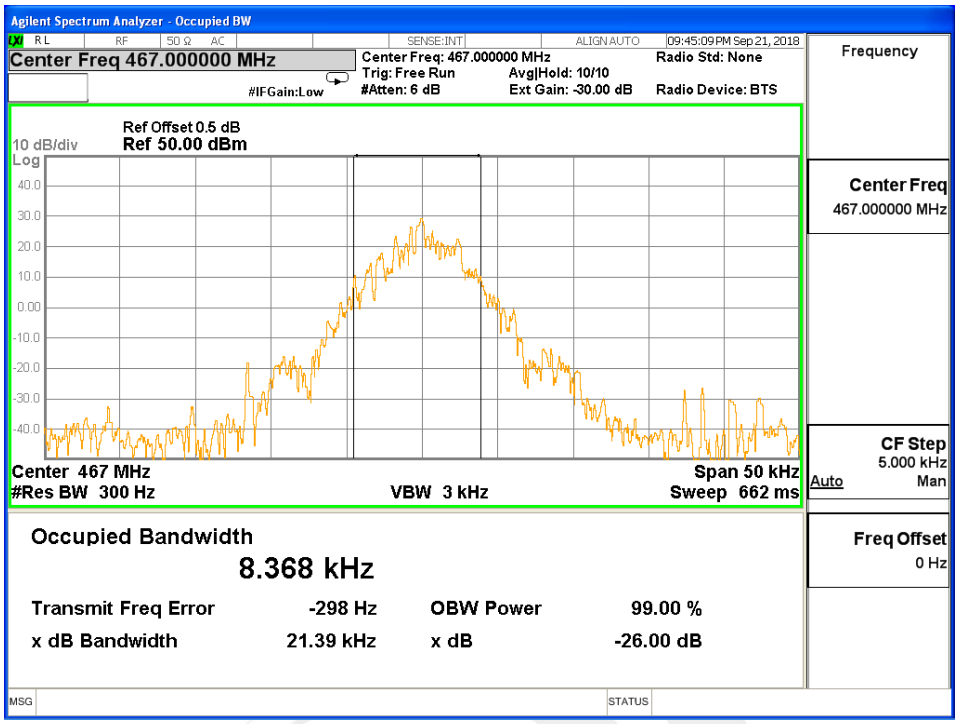
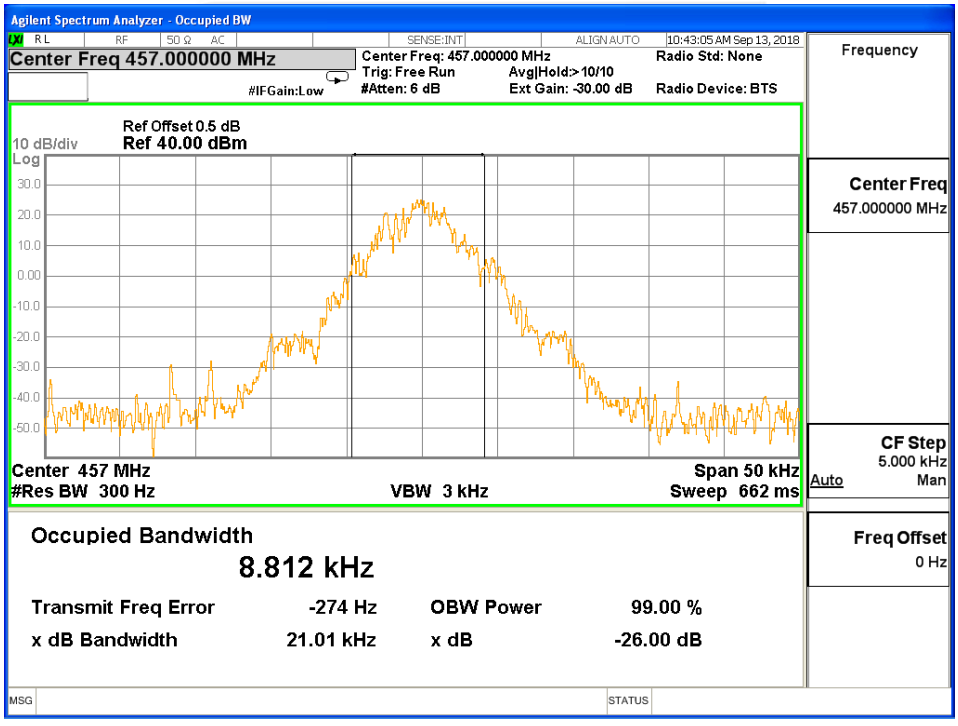


CH401 Model 1



CH 01 Model 2



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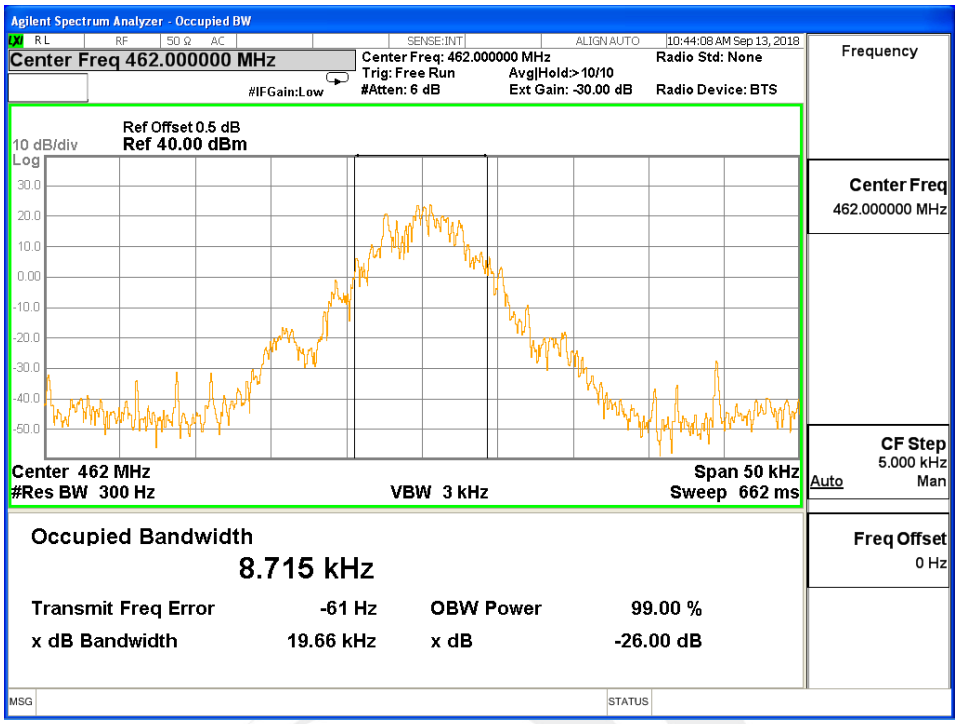

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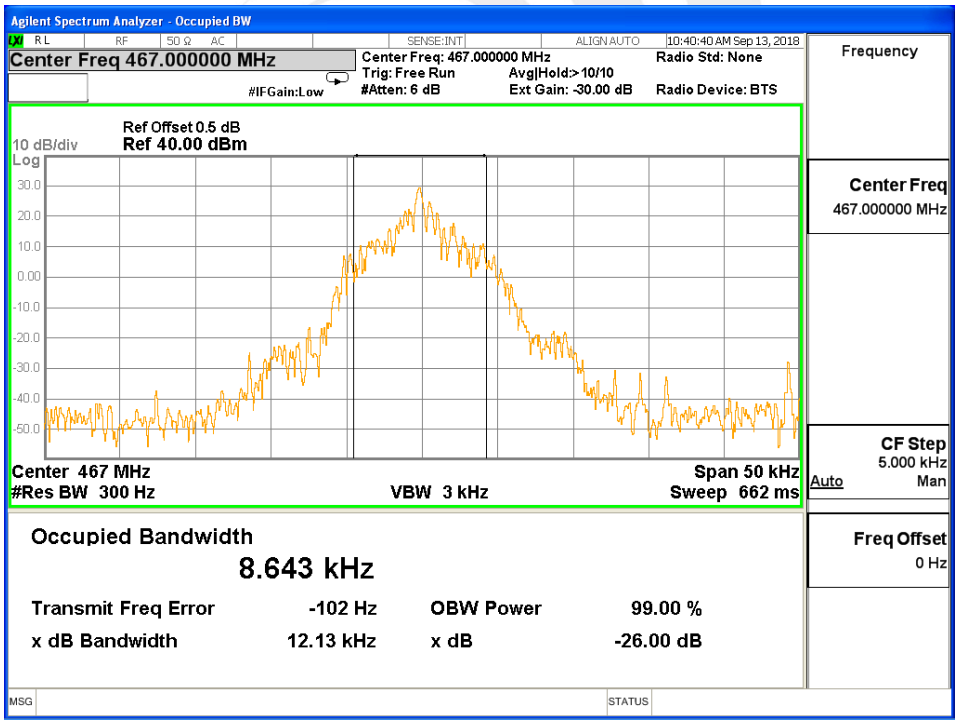


5. EMISSION MASK

5.1 PROVISIONS APPLICABLE

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

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

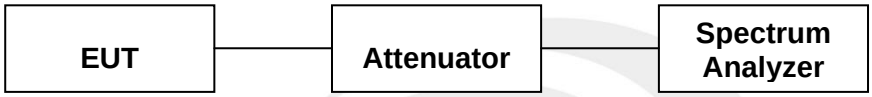
5.2 MEASUREMENT PROCEDURE

a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Set EUT as digital data mode.

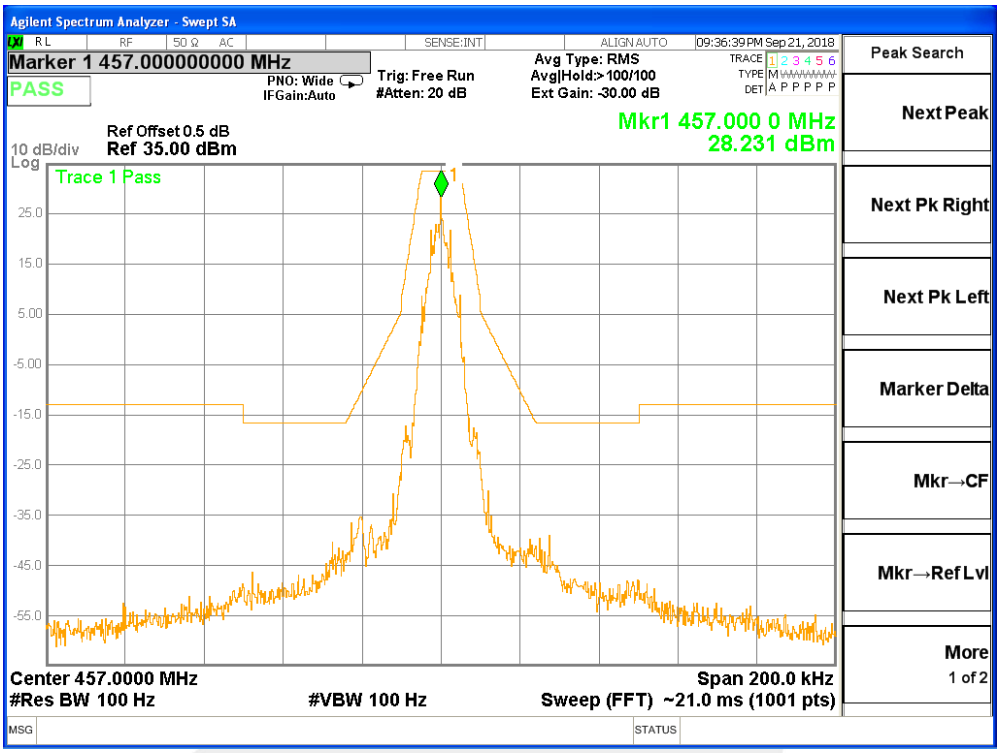
c Set SPA Center Frequency=fundamental frequency, RBW=100Hz, VBW=100Hz, span =200KHz.

5.3 TEST SETUP BLOCK DIAGRAM

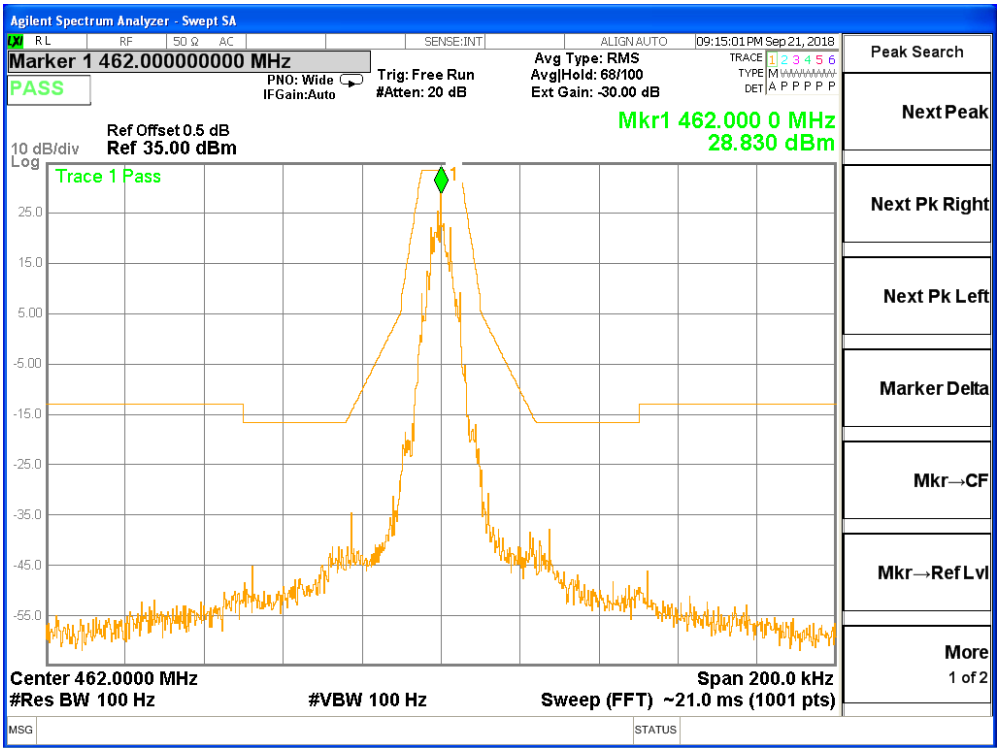


5.4 MEASUREMENT RESULT

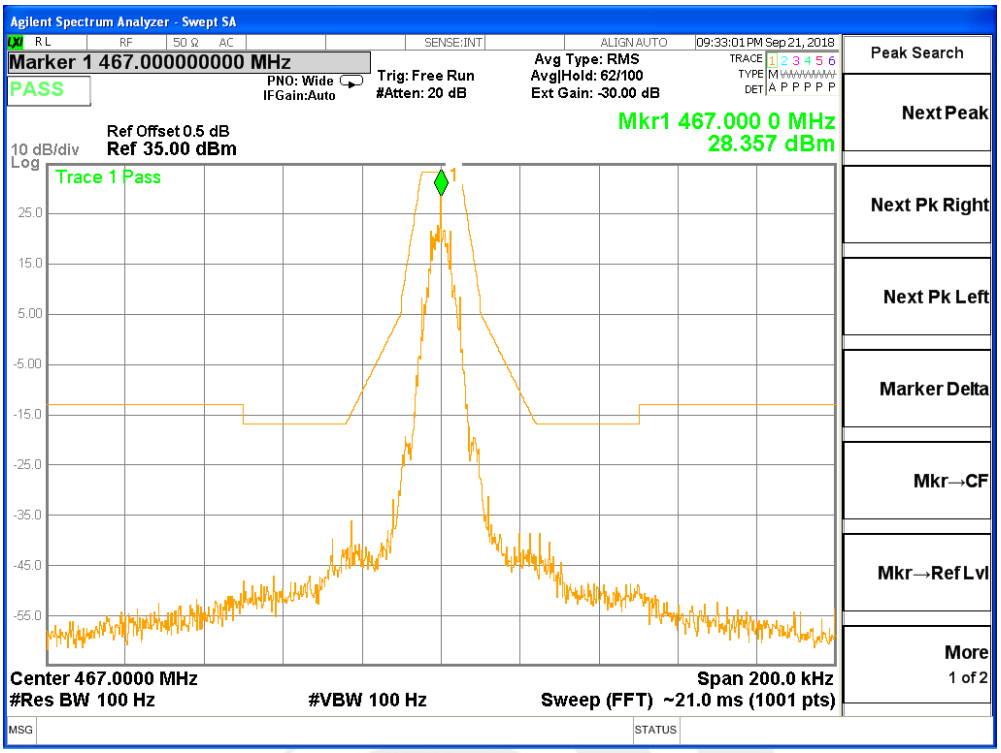
CH 01 Model 1



CH 201 Model 1



CH 401 Model 1



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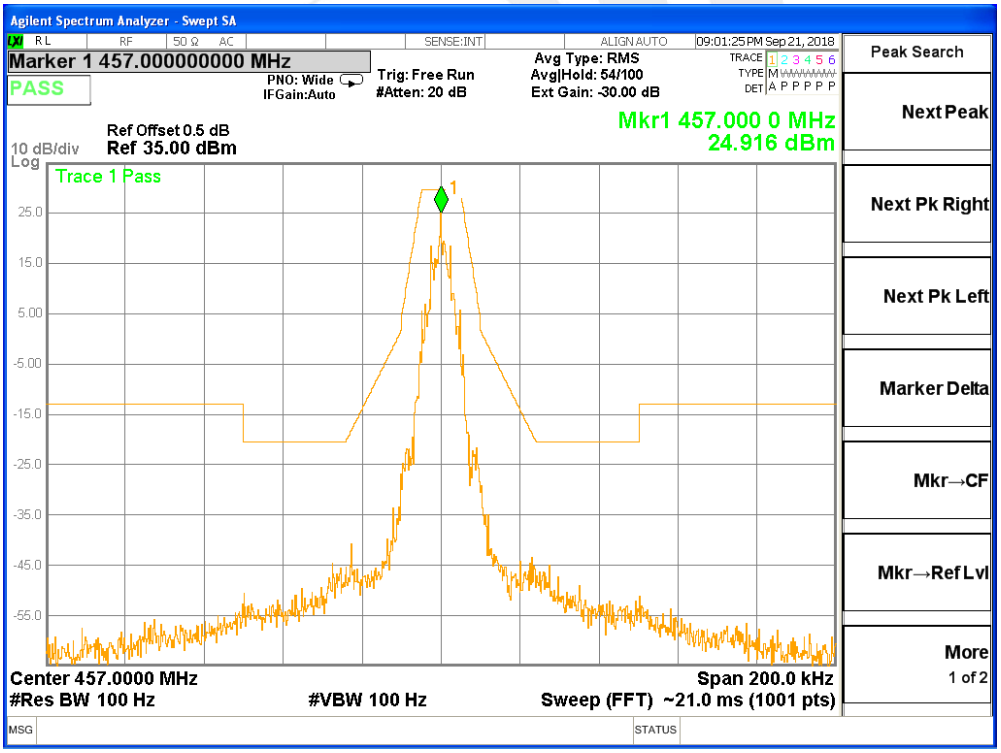

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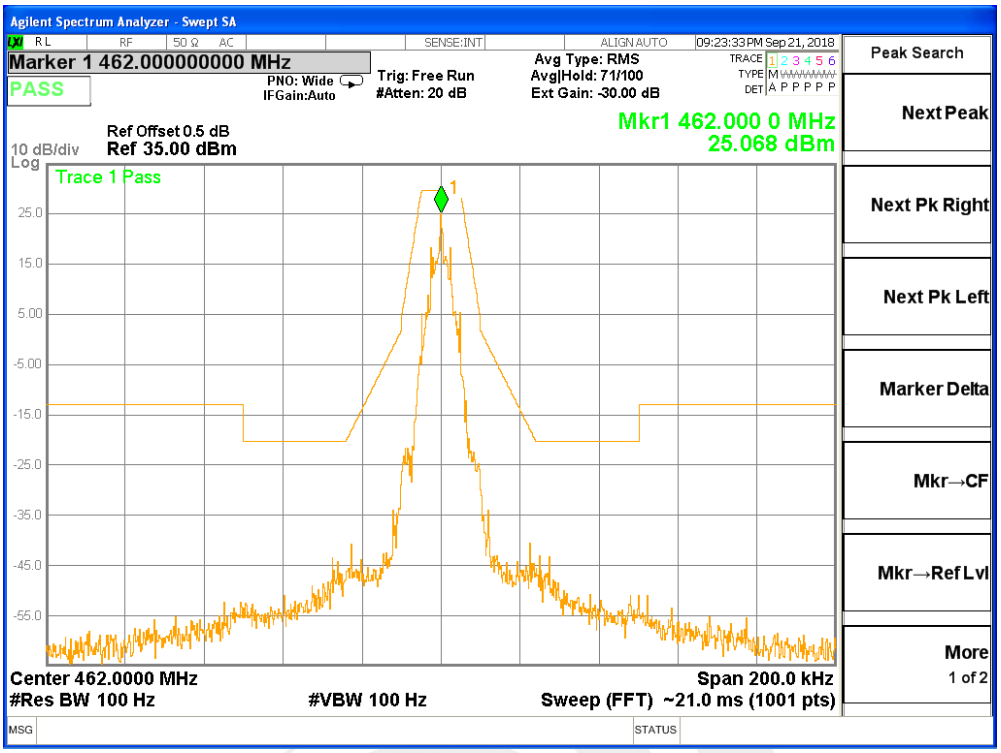

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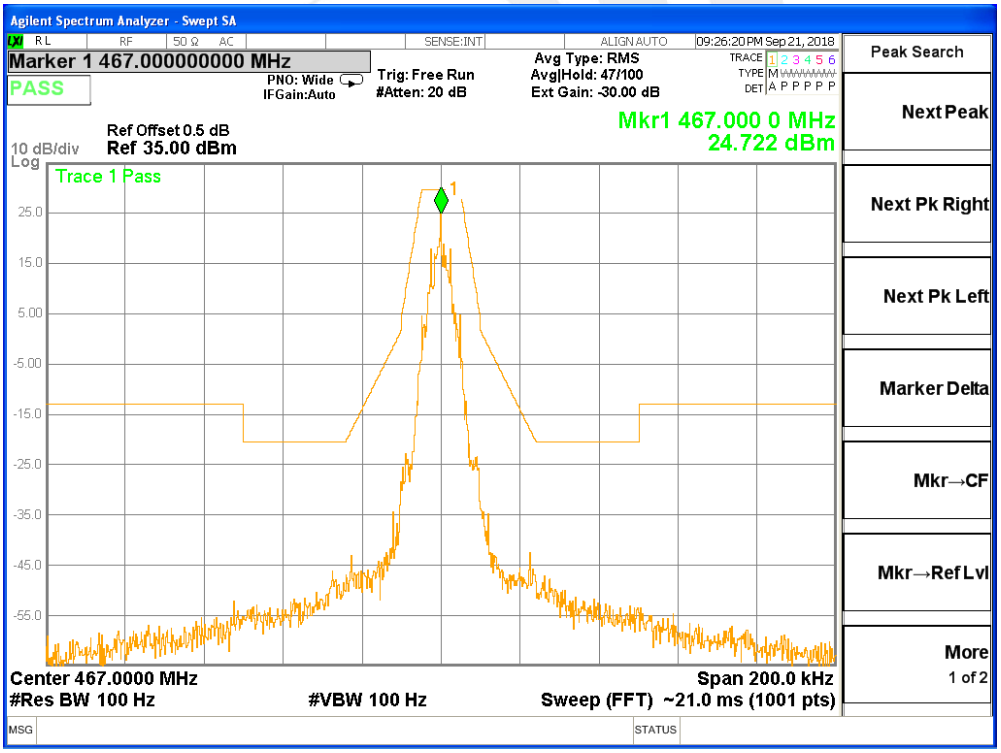


6. TRANSMITTER RADIATED SPURIOUS EMSSION

6.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 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 25KHz channel bandwidth:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

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

6.2TEST PROCEDURE

a. 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.

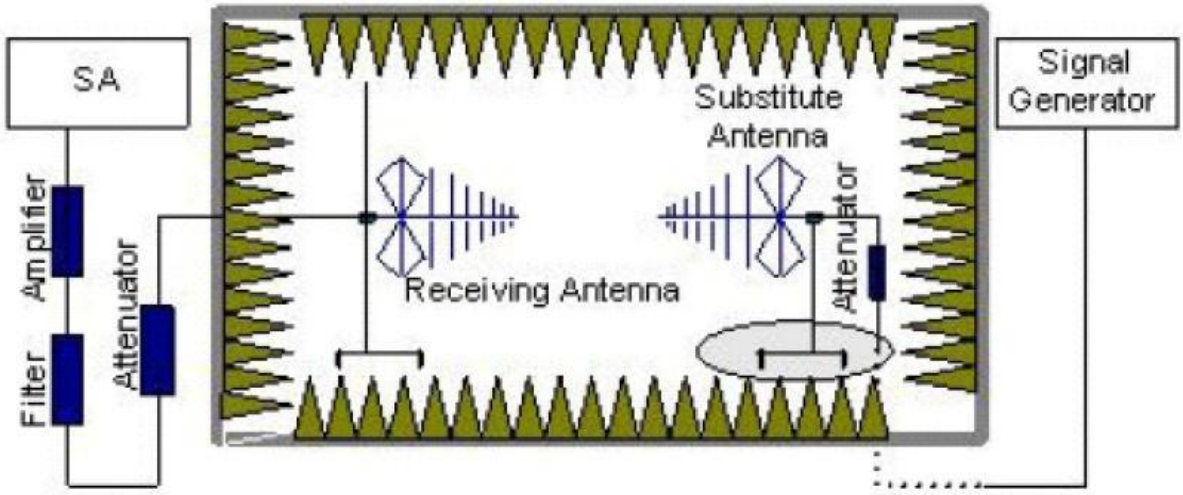
b. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions 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.

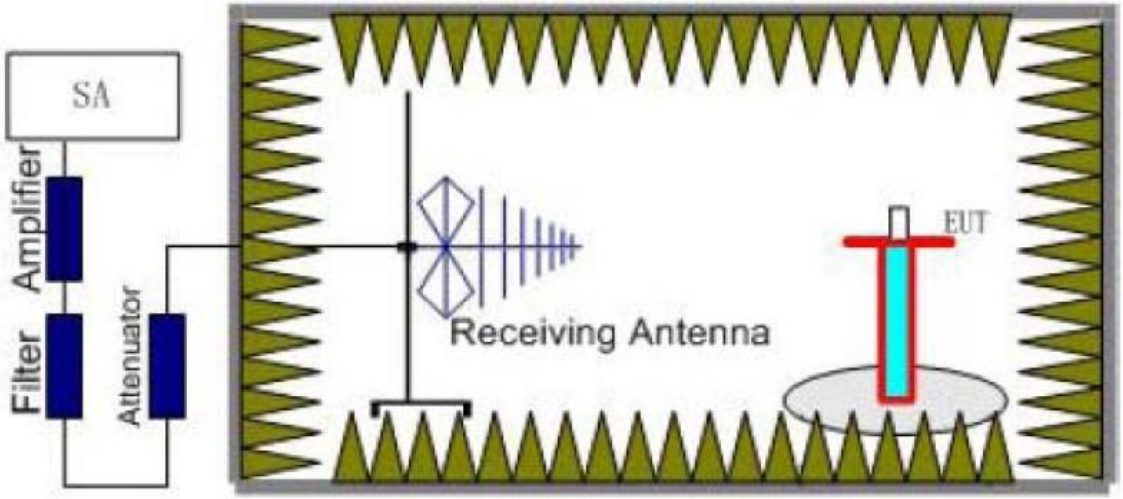
c. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100KHz,VBW=300KHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (P_r).

d. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

e. 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:
Amplifier for substituation test; The measurement results are amend as described below:
Power(EIRP)=P_{Mea}- P_{cl}+ G_a

6.3 TEST CONFIGURATION





6.4 TEST RESULT

CH 1					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
914.00	-34.88	0.44	6.4	-31.07	Horizontal	-13	Pass
1371.00	-37.9	1.02	8.63	-32.44	Horizontal	-13	Pass
1828.00	-34.38	1.52	10.2	-27.85	Horizontal	-13	Pass
914.00	-37.73	0.44	6.4	-33.92	Vertical	-13	Pass
1371.00	-34.37	1.02	8.63	-28.91	Vertical	-13	Pass
1828.00	-37.76	1.52	10.2	-31.23	Vertical	-13	Pass

CH 201					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
924.00	-36.8	0.44	6.4	-32.99	Horizontal	-13	Pass
1386.00	-39.85	1.13	8.63	-34.5	Horizontal	-13	Pass
1848.00	-36.16	1.57	10.2	-29.68	Horizontal	-13	Pass
924.00	-39.67	0.44	6.4	-35.86	Vertical	-13	Pass
1386.00	-36.13	1.13	8.63	-30.78	Vertical	-13	Pass
1848.00	-39.52	1.57	10.2	-33.04	Vertical	-13	Pass

CH 401					Model 1		
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
934.00	-35.76	0.46	6.4	-31.97	Horizontal	-13	Pass
1401.00	-38.9	1.17	8.63	-33.59	Horizontal	-13	Pass
1868.00	-34.85	1.63	10.2	-28.43	Horizontal	-13	Pass
934.00	-38.53	0.46	6.4	-34.74	Vertical	-13	Pass
1401.00	-35.31	1.17	8.63	-30	Vertical	-13	Pass
1868.00	-38.25	1.63	10.2	-31.83	Vertical	-13	Pass

Note: $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$

We were not recorded other points as values lower than limits

CH 1				Model 2			
Frequency	Result					Limit (dBm)	Conclusion
	P_{meas} (dBm)	Cable loss	Antenna Gain(dBi)	P_{Meas} E.I.R.P(dBm)	Polarization Of Max. EIRP		
914.00	-34.88	0.44	6.4	-31.07	Horizontal	-13	Pass
1371.00	-37.9	1.02	8.63	-32.44	Horizontal	-13	Pass
1828.00	-34.38	1.52	10.2	-27.85	Horizontal	-13	Pass
914.00	-37.73	0.44	6.4	-33.92	Vertical	-13	Pass
1371.00	-34.37	1.02	8.63	-28.91	Vertical	-13	Pass
1828.00	-37.76	1.52	10.2	-31.23	Vertical	-13	Pass

CH 201				Model 2			
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
924.00	-36.8	0.44	6.4	-32.99	Horizontal	-13	Pass
1386.00	-39.85	1.13	8.63	-34.5	Horizontal	-13	Pass
1848.00	-36.16	1.57	10.2	-29.68	Horizontal	-13	Pass
924.00	-39.67	0.44	6.4	-35.86	Vertical	-13	Pass
1386.00	-36.13	1.13	8.63	-30.78	Vertical	-13	Pass
1848.00	-39.52	1.57	10.2	-33.04	Vertical	-13	Pass

CH 401				Model 2			
Frequency	Result					Limit (dBm)	Conclusion
	Pmeas (dBm)	Cable loss	Antenna Gain(dBi)	PMeas E.I.R.P(dBm)	Polarization Of Max. EIRP		
934.00	-35.76	0.46	6.4	-31.97	Horizontal	-13	Pass
1401.00	-38.9	1.17	8.63	-33.59	Horizontal	-13	Pass
1868.00	-34.85	1.63	10.2	-28.43	Horizontal	-13	Pass
934.00	-38.53	0.46	6.4	-34.74	Vertical	-13	Pass
1401.00	-35.31	1.17	8.63	-30	Vertical	-13	Pass
1868.00	-38.25	1.63	10.2	-31.83	Vertical	-13	Pass

Note: $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$

We were not recorded other points as values lower than limits

7. SPURIOUS EMSSION ON ANTENNA PORT

7.1 PROVISIONS APPLICABLE

According to the TIA/EIA 603 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 25KHz channel bandwidth:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

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

7.2 MEASUREMENT PROCEDURE

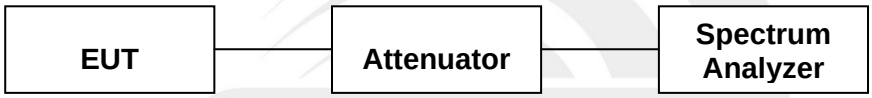
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range.

c. Set EUT as digital data mode.

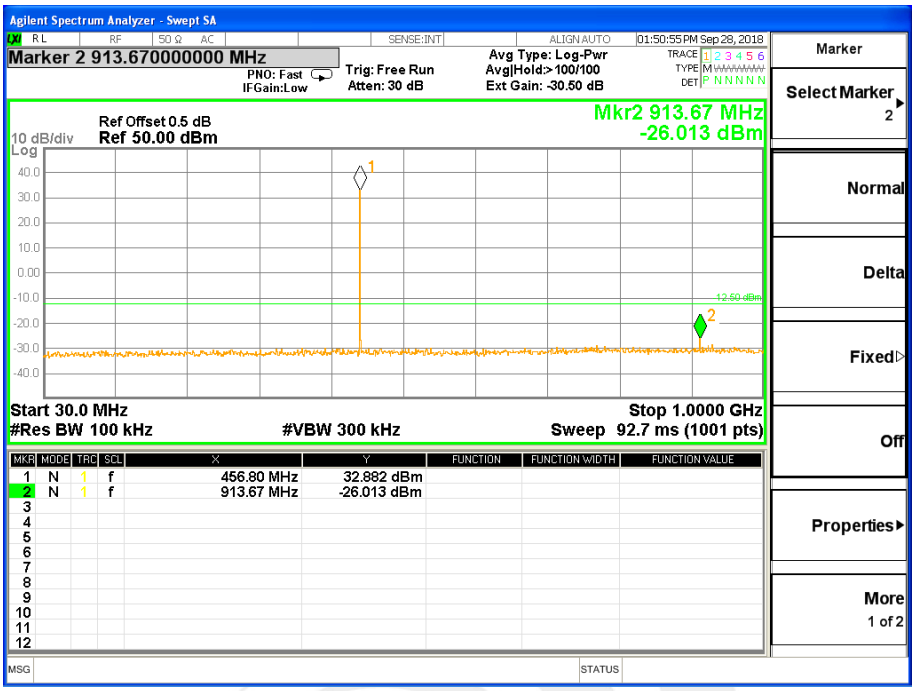
d Set RBW 100kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz. VBW=3MHz from the 1GHz to 10th Harmonic.

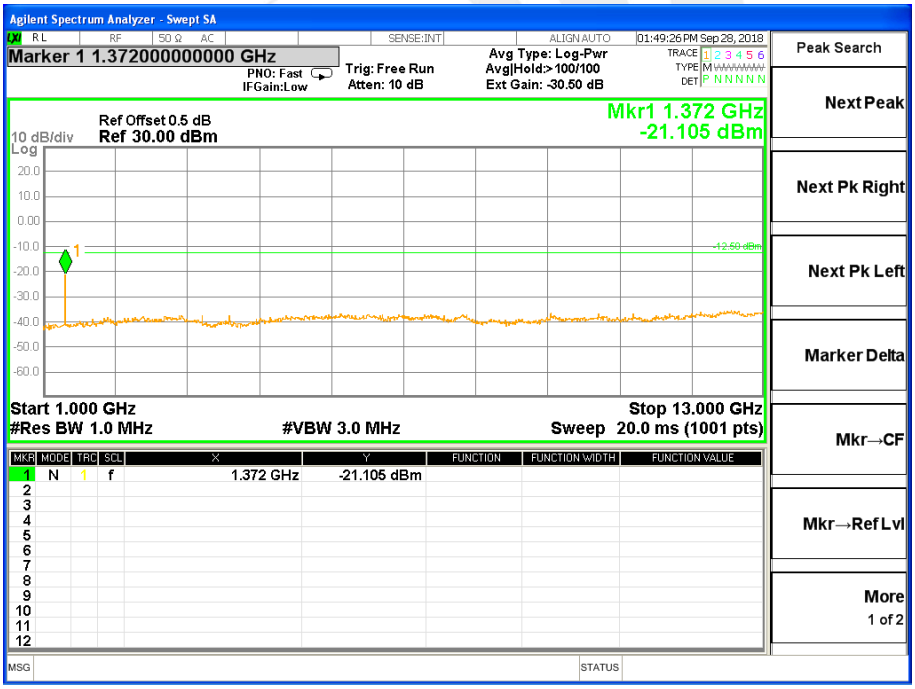
7.3 TEST SETUP BLOCK DIAGRAM



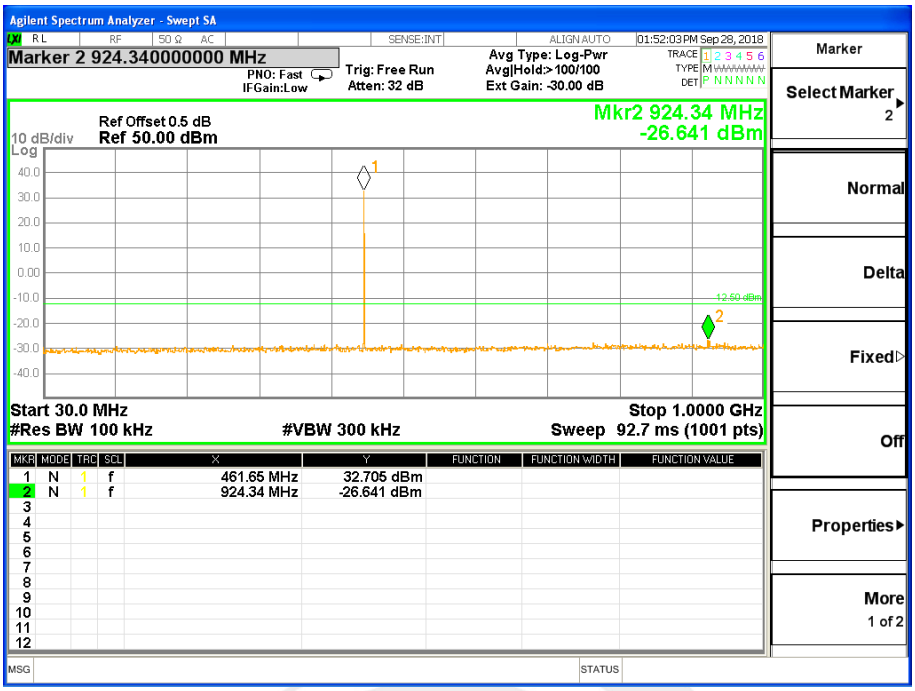
7.4 TEST RESULT

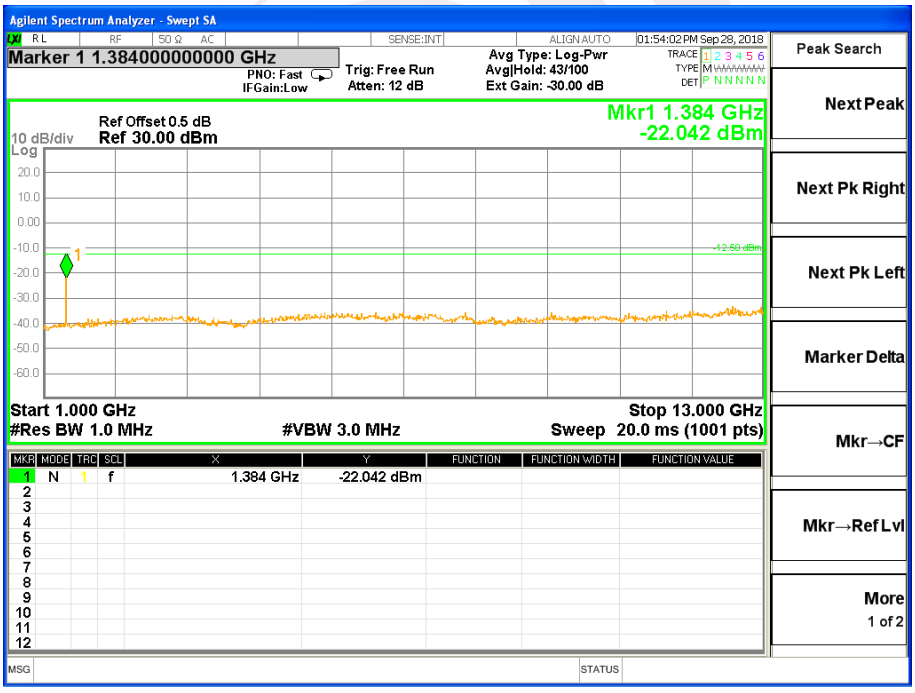
CH 01 Model 1



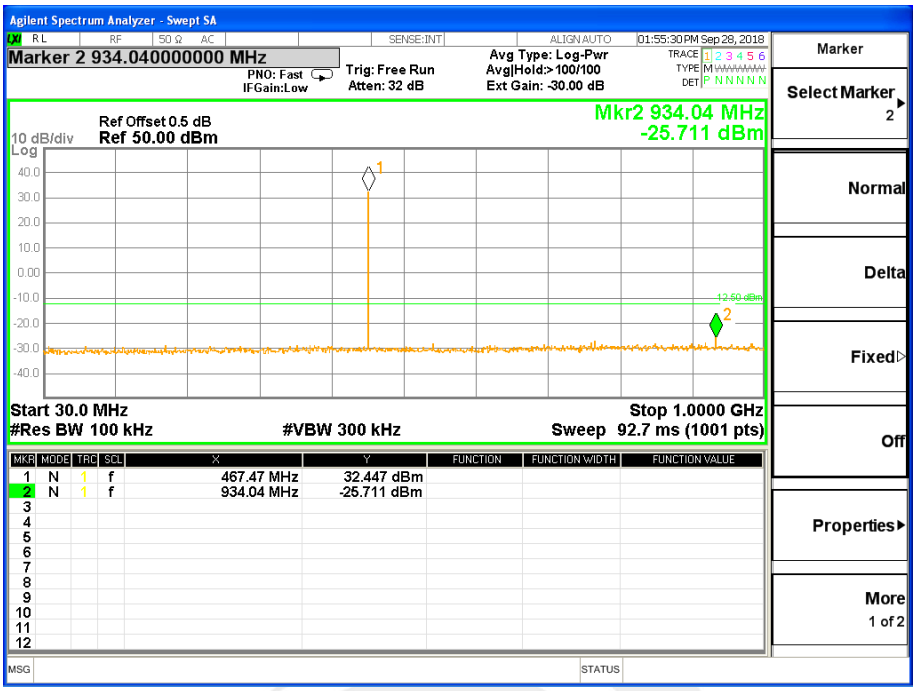


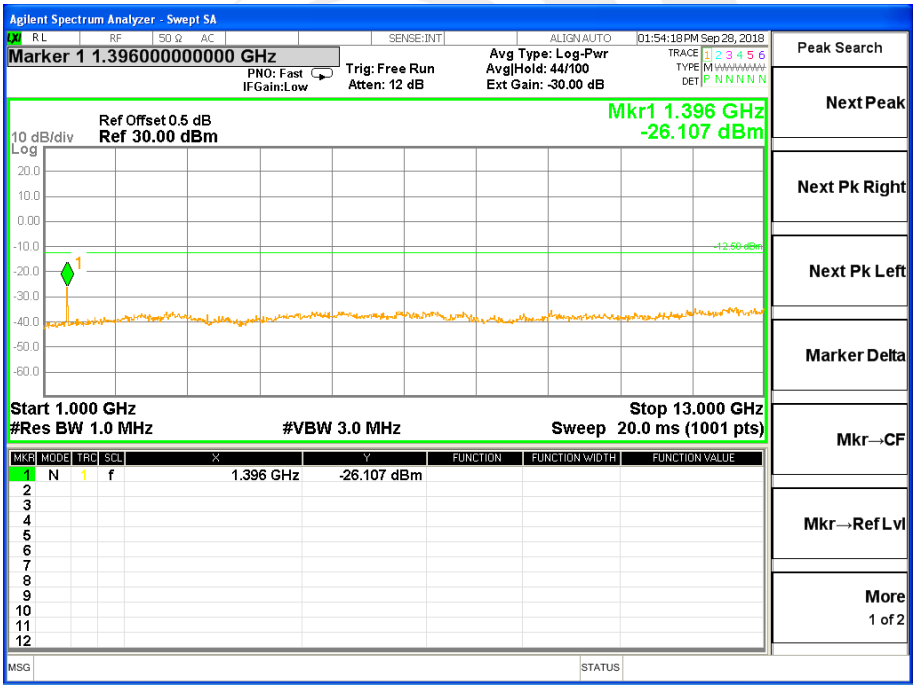
CH 201 Model 1



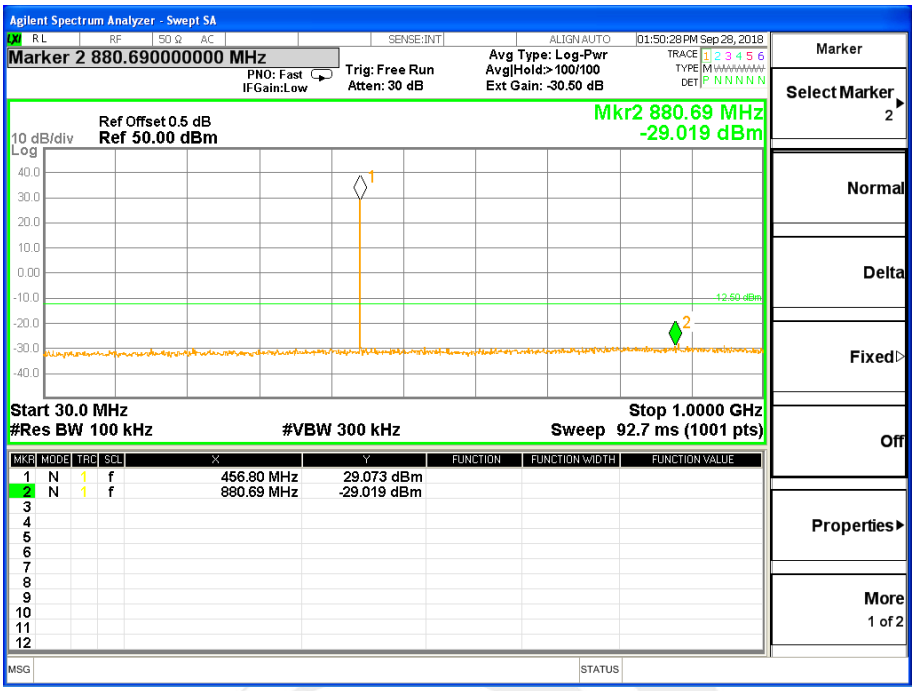


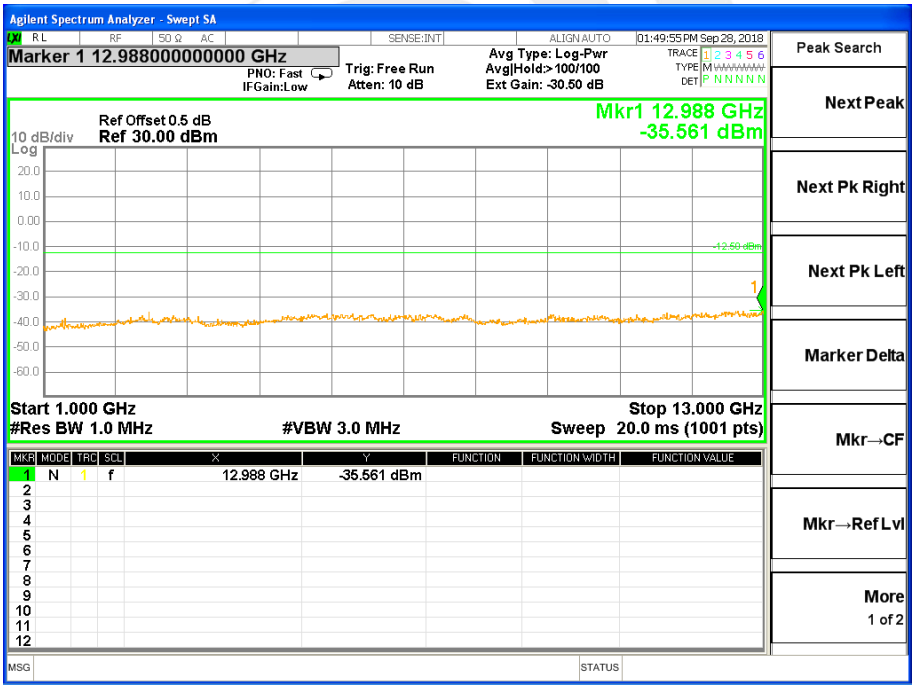
CH 401 Model 1



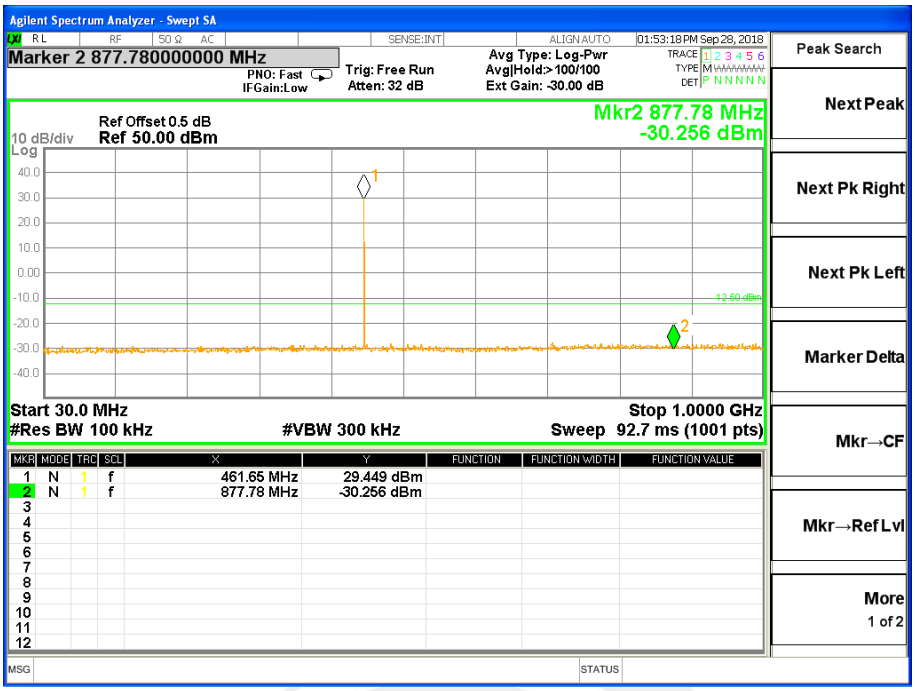


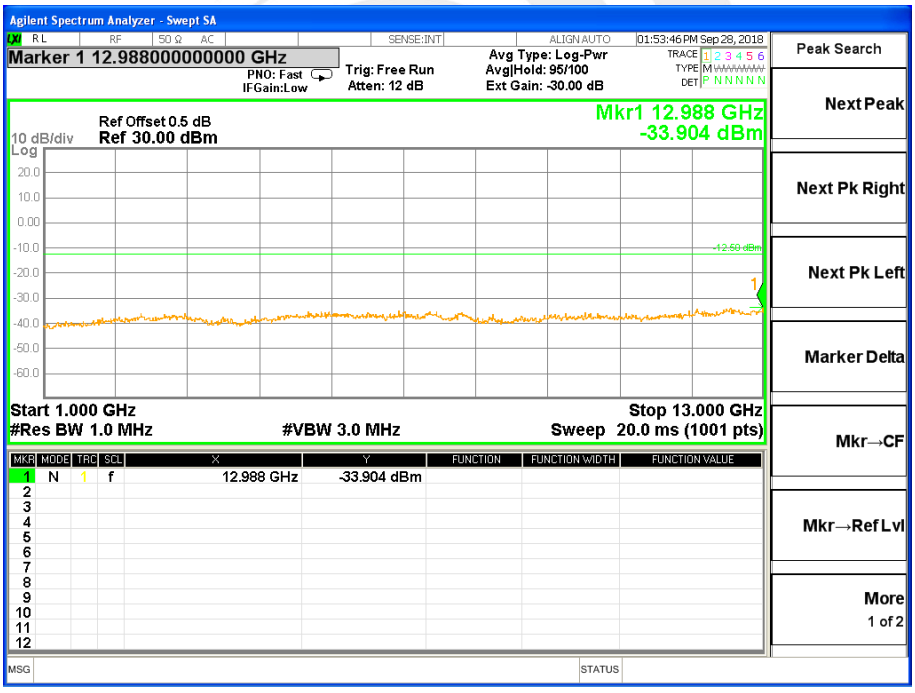
CH 01 Model 2


Agilent Spectrum Analyzer - Swept SA
Marker 2 880.690000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ext Gain: -30.50 dB
01:50:28 PM Sep 28, 2018
Ref Offset 0.5 dB
10 dB/div
Ref 50.00 dBm
Mkr2 880.69 MHz
-29.019 dBm
12.50 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 92.7 ms (1001 pts)
1 N 1 f 456.80 MHz 29.073 dBm
2 N 1 f 880.69 MHz -29.019 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2

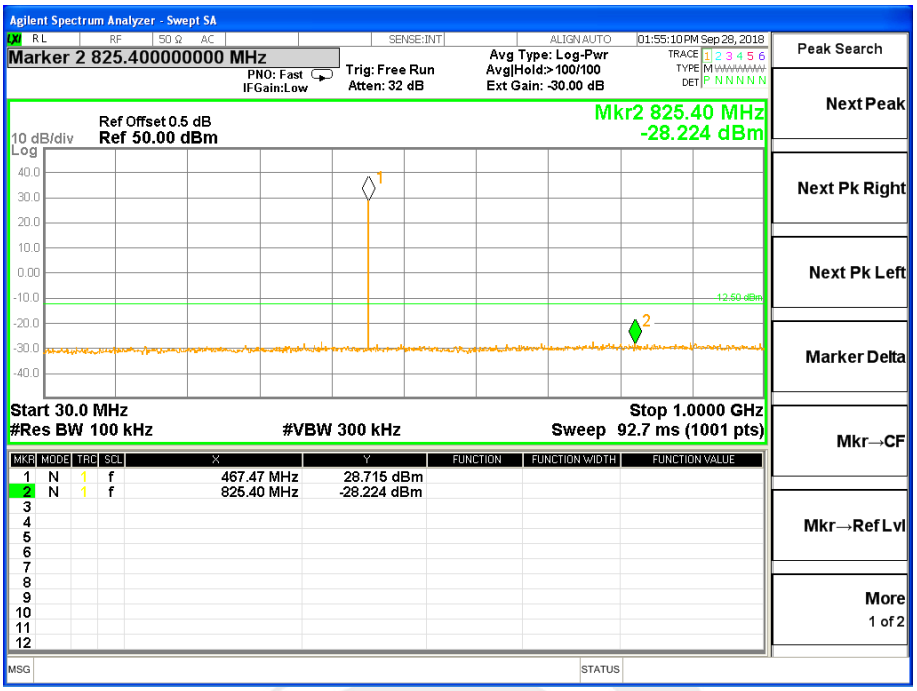

Agilent Spectrum Analyzer - Swept SA
Marker 1 12.988000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ext Gain: -30.50 dB
01:49:55 PM Sep 28, 2018
Ref Offset 0.5 dB
10 dB/div
Ref 30.00 dBm
Mkr1 12.988 GHz
-35.561 dBm
-12.50 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 13.000 GHz
Sweep 20.0 ms (1001 pts)
1 N 1 f 12.988 GHz -35.561 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More 1 of 2

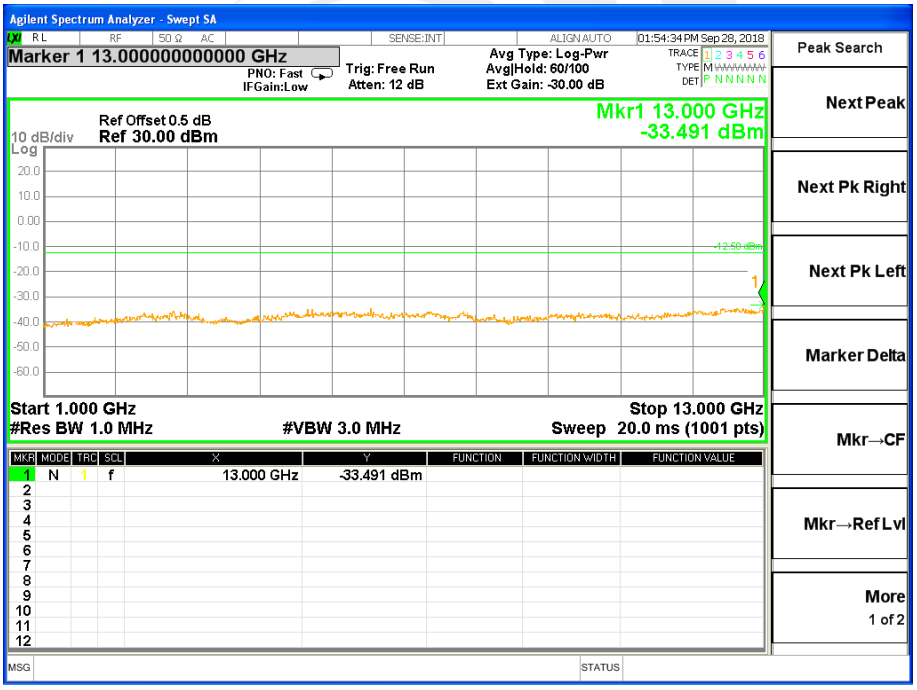
CH 201 Model 2





CH 401 Model 2





8. FREQUENCY STABILITY

8.1 PROVISIONS 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)

		Mobile stations	
Frequency range (MHz)	Fixed and base stations	Over 2 watts output power	2 watts or less output power
Below 25	[1 2 3]100	100	200
25-50	20	20	50
72-76	5		50
150-174	[5 11]5	[6]5	[4 6]50
216-220	1.0		1.0
220-222[12]	0.1	1.5	1.5
421-512	[7 11 14]2.5	[8]5	[8]5
806-809	[14]1.0	1.5	1.5
809-824	[14]1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	[14]0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928[13]	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	[9]300	300	300
Above 2450[10]			

8.2 MEASUREMENT PROCEDURE

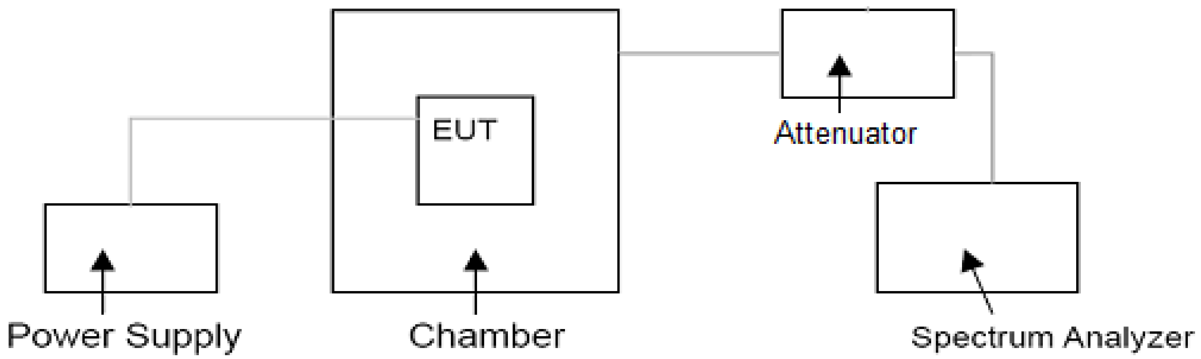
a. The EUT was connected to the spectrum analyzer through sufficent attenuation.

b. The EUT was set in the climate chamber and connected to an external DC power supply

c. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded.

d 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.

8.3 TEST SETUP BLOCK DIAGRAM



8.4 TEST RESULT

CH 1 Mode 1

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	457.0000	457.0000	0.000	2.5 ppm	PASS
-20		457.0000	457.0005	1.094		
-10		457.0000	457.0000	0.000		
0		457.0000	457.0005	1.094		
10		457.0000	456.9995	1.094		
20		457.0000	457.0000	0.000		
30		457.0000	457.0005	1.094		
40		457.0000	457.0005	1.094		
50		457.0000	456.9995	1.094		
60		457.0000	457.0000	0.000		
25	Maximum Voltage	457.0000	457.0005	1.094		
	BEP	457.0000	457.0000	0.000		

CH 201 Mode 1

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	462.0000	462.0005	1.082	2.5 ppm	PASS
-20		462.0000	462.0005	1.082		
-10		462.0000	462.0000	0.000		
0		462.0000	462.0005	1.082		
10		462.0000	462.0000	0.000		
20		462.0000	461.9995	1.082		
30		462.0000	462.0005	1.082		
40		462.0000	462.0000	0.000		
50		462.0000	461.9995	1.082		
60		462.0000	462.0005	1.082		
25	Maximum Voltage	462.0000	462.0005	1.082		
	BEP	462.0000	462.0000	0.000		

CH 401 Mode 1

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	467.0000	467.0000	0.000	2.5 ppm	PASS
-20		467.0000	467.0005	1.071		
-10		467.0000	467.0000	0.000		
0		467.0000	466.9995	1.071		
10		467.0000	467.0005	1.071		
20		467.0000	467.0000	0.000		
30		467.0000	467.0005	1.071		
40		467.0000	466.9995	1.071		
50		467.0000	466.9995	1.071		
60		467.0000	467.0000	0.000		
25	Maximum Voltage	467.0000	467.0005	1.071		
	BEP	467.0000	467.0000	0.000		

CH 1 Mode 2

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	457.0000	457.0000	0.000	2.5 ppm	PASS
-20		457.0000	457.0000	0.000		
-10		457.0000	457.0005	1.094		
0		457.0000	457.0005	1.094		
10		457.0000	457.0005	1.094		
20		457.0000	456.9995	1.094		
30		457.0000	457.0000	0.000		
40		457.0000	457.0000	0.000		
50		457.0000	457.0005	1.094		
60		457.0000	457.0000	0.000		
25	Maximum Voltage	457.0000	457.0000	0.000		
	BEP	457.0000	457.0005	1.094		

CH 201 Mode 2

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	462.0000	462.0000	0.000	2.5 ppm	PASS
-20		462.0000	461.9995	1.082		
-10		462.0000	462.0005	1.082		
0		462.0000	462.0000	0.000		
10		462.0000	462.0005	1.082		
20		462.0000	461.9995	1.082		
30		462.0000	462.0000	0.000		
40		462.0000	461.9995	1.082		
50		462.0000	462.0005	1.082		
60		462.0000	462.0000	0.000		
25	Maximum Voltage	462.0000	461.9995	1.082		
	BEP	462.0000	462.0005	1.082		

CH 401 Mode 2

Temperature (°C)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	ppm	Limit	Result
-30	Normal Voltage	467.0000	466.9995	1.071	2.5 ppm	PASS
-20		467.0000	467.0000	0.000		
-10		467.0000	467.0005	1.071		
0		467.0000	467.0000	0.000		
10		467.0000	466.9995	1.071		
20		467.0000	467.0005	1.071		
30		467.0000	467.0005	1.071		
40		467.0000	466.9995	1.071		
50		467.0000	467.0000	0.000		
60		467.0000	466.9995	1.071		
25	Maximum Voltage	467.0000	467.0000	0.000		
	BEP	467.0000	467.0005	1.071		

9. TRANSMITTER FREQUENCY BEHAVIOR

9.1 PROVISIONS 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.

9.2 MEASUREMENT PROCEDURE

Use Digital portable radio which manufactured by VictelGlobal Communications Corporation

a. Limited which uses same protocol as the DUT connect to RX antenna by 20Att in order to avoid damaging DUT;

b. Connect DUT into Test discriminator and Storage Oscilloscope and keep DUT stats ON;

c. Inut 1KHz signal into digital portable radio;

d Set the modulation domain analyzer to trigger on the rising edge of the waveform in order to capture a single-shot turn-on of the transmitter signals;

e Keep the digital protable radio in OFF state and Key the PTT of digital portable radio;

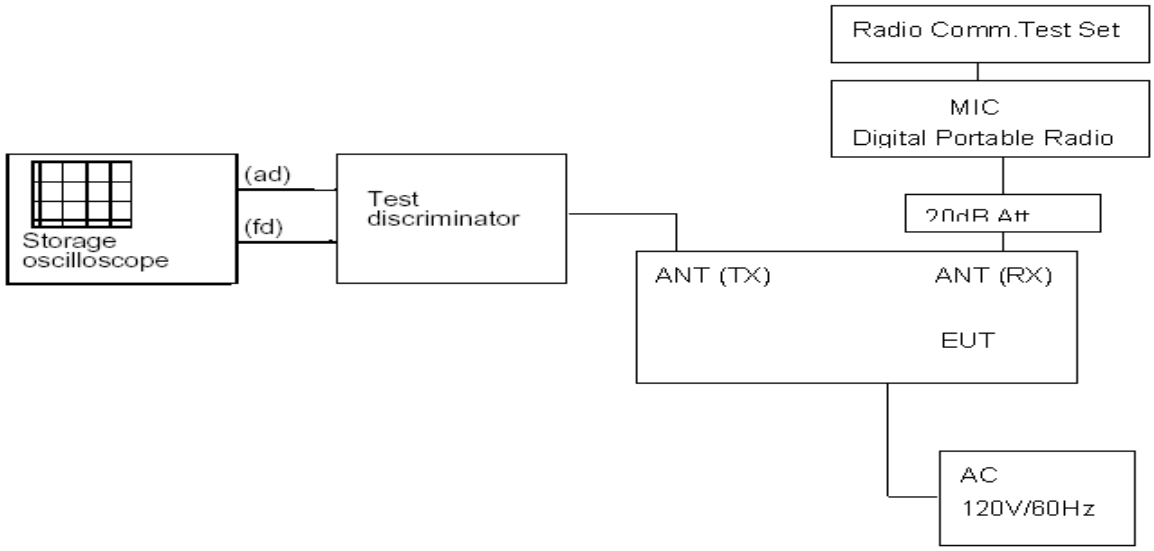
f Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the periods t_1 and t_2,and shall also remain within limits following t_2;

g Adjust the modulation domain anzlyzer to trigger on the falling edge of the transmitter waveform in order to capture a single-shot turn-off transmitter of the transmitter signal.

h Keep the digital portable radio in ON state and Unkey the PTT of digital portable radio;

f Observe the stored oscilloscope of modulation domain analyzer.The signal trace shall be maintained within the allowable limits during the period t_3

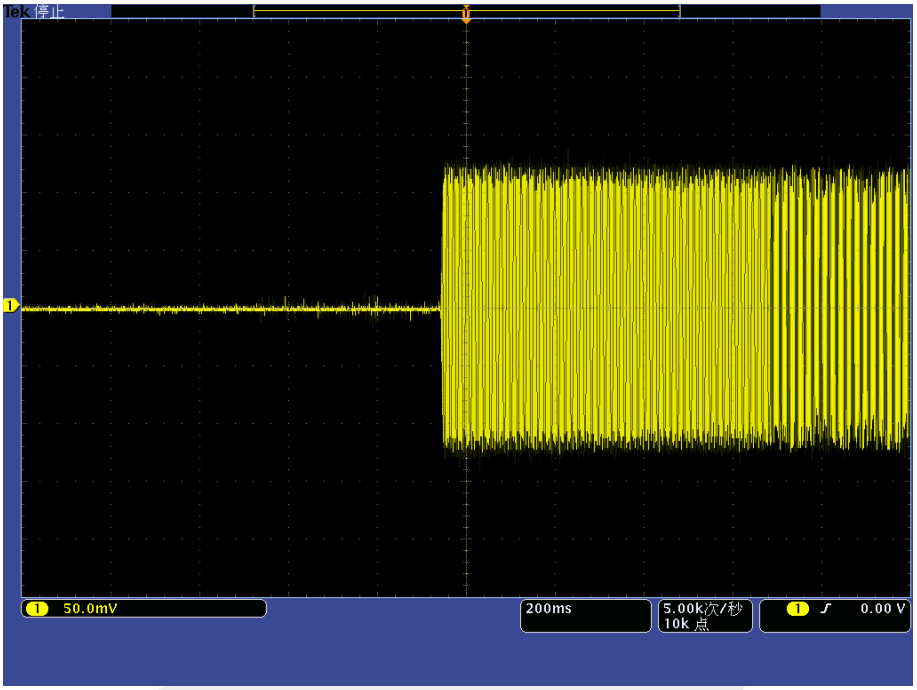
9.3 TEST SETUP BLOCK DIAGRAM



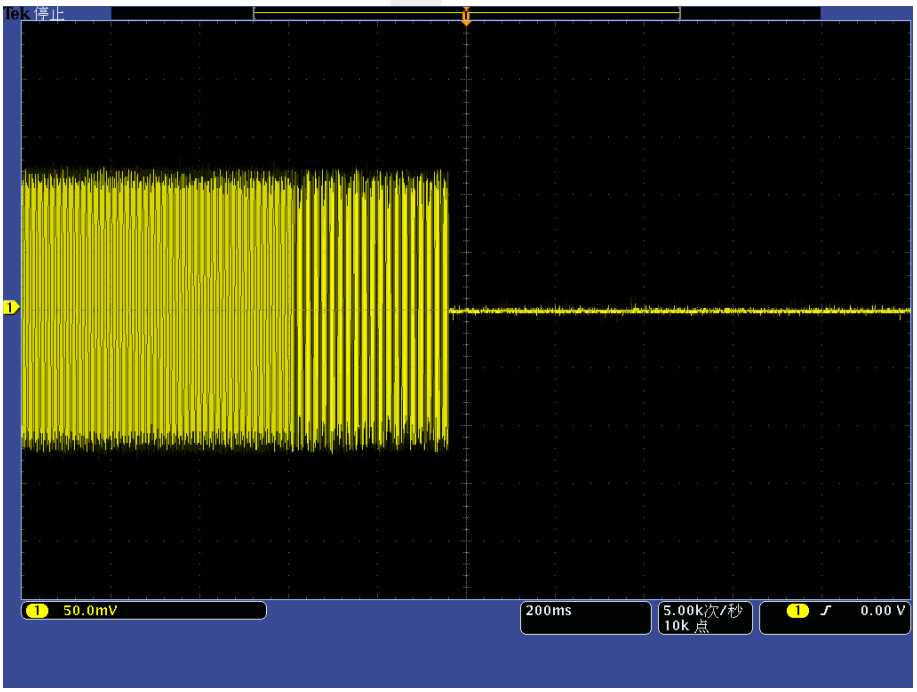
9.4 TEST RESULT

Mode 1

Transmitter Frequency Behaviour @ 25 KHz Channel Separation------Off – On

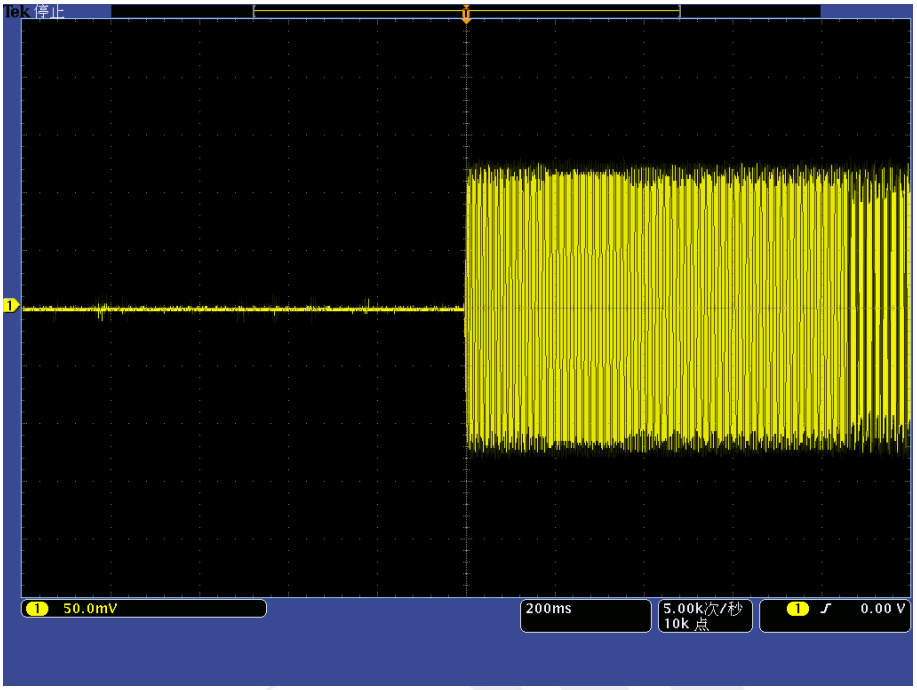


Transmitter Frequency Behaviour @ 25 KHz Channel Separation------On – Off

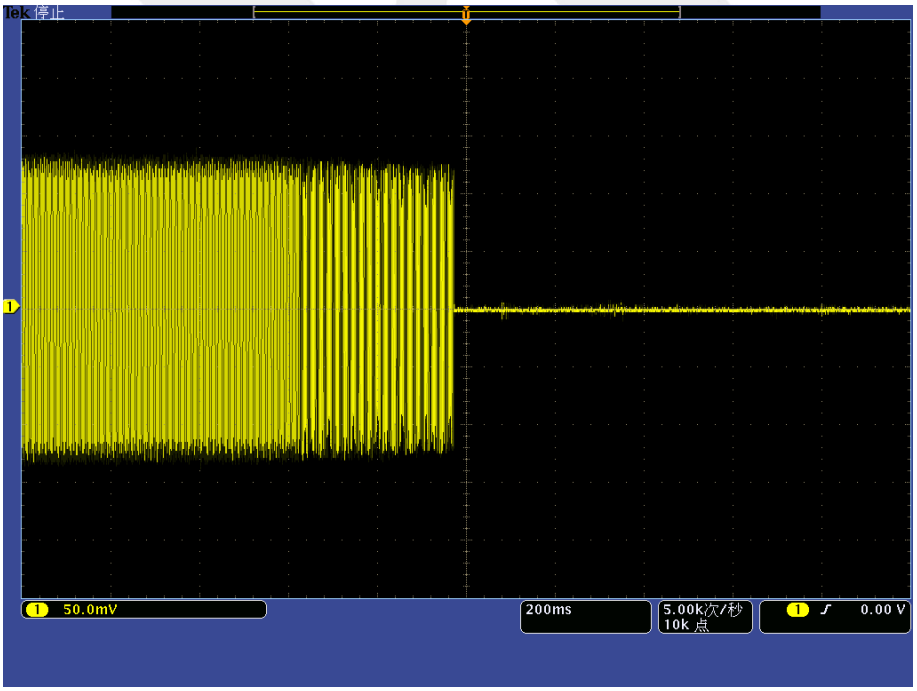


Mode 2

Transmitter Frequency Behaviour @ 25.0 KHz Channel Separation------Off – On



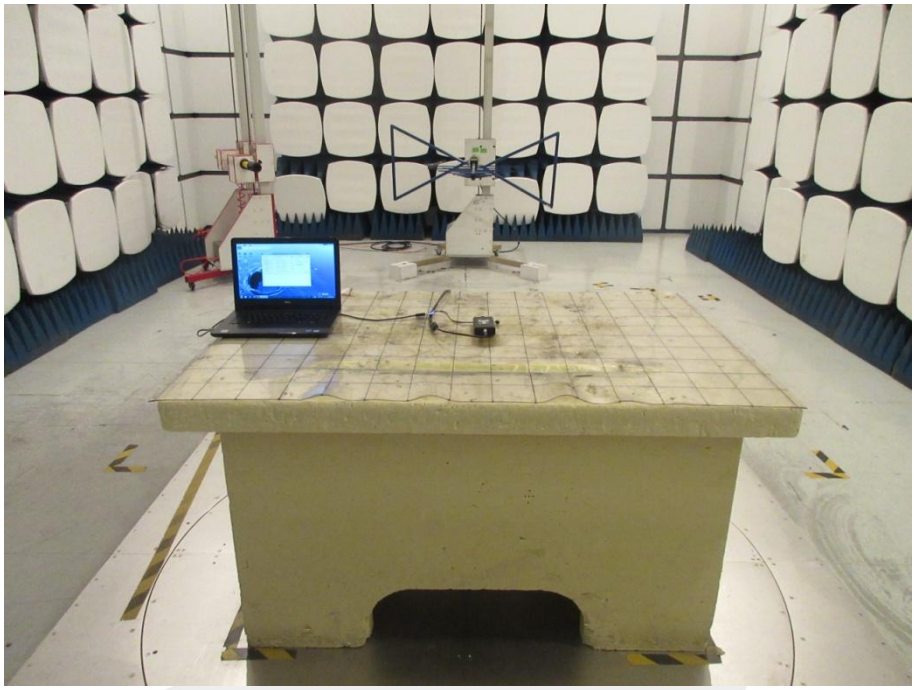
Transmitter Frequency Behaviour @ 25.0 KHz Channel Separation------On – Off



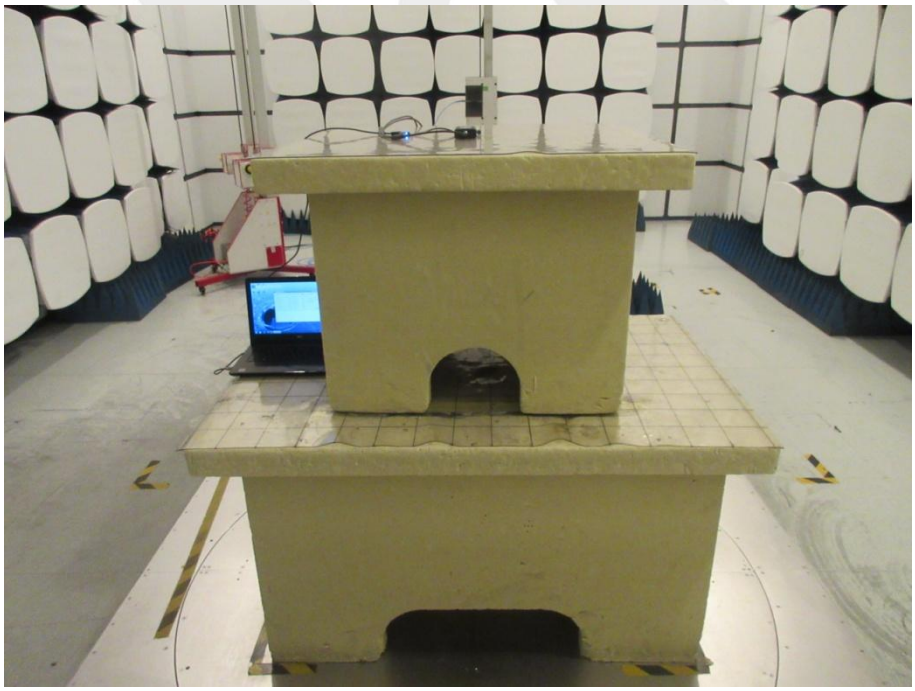
10. PHOTOS OF TEST SETUP

Radiated Measurement Photos

30MHz- 1GHz



Above 1GHz



※※※※※END OF THE REPORT※※※※※