

**S****T****S****L****A****B**

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## FCC TEST REPORT

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Report No: STS1512123F03

Issued for

Shenzhen XinJiao Du Technology Development CO.,LTD  
Room 201, 2/F A Building, jingshun Industry Zone, 6st  
Anliang Villiage Henggang Street Longgang District,  
Shenzhen China.

Product Name:	GSM DIGITAL MOBILE PHONE
Brand Name:	JEASUNG
Model No.:	X6
Series Model:	N/A
FCC ID:	2AG3UXJDX6
Test Standard:	FCC Part 90 Rules

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### TEST RESULT CERTIFICATION

**Applicant's name**..... Shenzhen XinJiao Du Technology Development CO.,LTD  
 Address ..... Room 201, 2/F A Building, jingshun Industry Zone, 6st Anliang Villiage Henggang Street Longgang District, Shenzhen China.  
**Manufacture's Name** ..... Shenzhen XinJiao Du Technology Development CO.,LTD  
 Address ..... Room 201, 2/F A Building, jingshun Industry Zone, 6st Anliang Villiage Henggang Street Longgang District, Shenzhen China.

**Product description**

Product name ..... GSM DIGITAL MOBILE PHONE  
 Band name ..... JEASUNG  
 Model and/or type reference..... X6


**Standards**..... FCC Part 90 Rules

Test procedure..... ANSI C 63.4: 2014; TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

This device described above has been tested by STS, 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.

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Date of Test .....  
 Date of performance of tests ..... 21 Dec. 2015 ~15 Jan. 2015  
 Date of Issue ..... 16 Jan. 2015  
 Test Result..... Pass

Testing Engineer :   
 \_\_\_\_\_  
 (Tony Liu)

Technical Manager :   
 \_\_\_\_\_  
 (Vita Li)

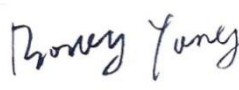
Authorized Signatory :   
 \_\_\_\_\_  
 (Bovey Yang)





Table of Contents	Page
1. SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
2. GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 EUT OPERATION MODE	9
2.3 DESCRIPTION OF TEST MODES	10
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.5 DESCRIPTION OF SUPPORT UNITS	11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	11
2.7 TEST EQUIPMENT	12
3. EMISSION TEST	13
3.1 RADIATED RECEIVE AND OUT-OF-BAND SPURIOUS EMISSION	13
3.1.1 RADIATED RECEIVE EMISSION LIMITS	13
3.1.2 RADIATION SPURIOUS EMISSION MEASUREMENT LIMITS	13
3.1.3 TEST PROCEDURE	13
3.1.4 DEVIATION FROM TEST STANDARD	14
3.1.5 TEST SETUP BLOCK DIAGRAM	15
3.1.6 RADIATED RECEIVE EMISSION TEST RESULTS BELOW 30MHZ	16
3.1.7 OUT-OF-BAND SPURIOUS TEST RESULTS ABOVE 30MHZ	17
3.2 EMISSION MASK PLOT	23
4. FREQUENCY TOLERANCE	25
4.1 DESCRIPTION OF SUPPORT UNITS	25
4.2 MEASUREMENT PROCEDURE	25
4.2.1 FREQUENCY STABILITY VERSUS ENVIRONMENTAL TEMPERATURE	25
4.2.2 FREQUENCY STABILITY VERSUS INPUT VOLTAGE	25
4.3 TEST SETUP BLOCK DIAGRAM	25
4.4 TEST RESULT	26
5. EMISSION BANDWIDTH	28
5.1 PROVISIONS APPLICABLE	28
5.2 MEASUREMENT PROCEDURE	28
5.3 TEST SETUP BLOCK DIAGRAM	28
5.4 MEASUREMENT RESULT:	29
6. MODULATION CHARACTERISTICS	31
6.1 PROVISIONS APPLICABLE	31
6.2 PROVISIONS APPLICABLE	31



Table of Contents	Page
6.2.1 MODULATION LIMIT	31
6.2.2 AUDIO FREQUENCY RESPONSE	31
6.3 TEST SETUP BLOCK DIAGRAM	31
6.4 MEASUREMENT RESULT	32
7. AUDIO LOW PASS FILTER RESPONSE	35
7.1 PROVISIONS APPLICABLE	35
7.1.1 LIMITS	35
7.2 METHOD OF MEASUREMENTS	35
7.3 TEST DATA	36
8. TRANSMITTER FREQUENCY BEHAVIOR	38
8.1 PROVISIONS APPLICABLE	38
8.2 TEST METHOD	38
8.3 DESCRIBE LIMIT LINE OF TRANSMITTER FREQUENCY BEHAVIOR	38
8.4 MEASURE RESULT	40
9. MAXIMUM TRANSMITTER POWER (CONDUCTED OUTPUT POWER)	41
9.1 PROVISIONS APPLICABLE	41
9.2 TEST PROCEDURE	41
9.3 TEST CONFIGURATION	41
9.4 TEST RESULT	42
PHOTOS OF TEST SETUP	46



## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Emission			
Standard	Item	Result	Remarks
§90.210	Radiation Spurious Emission Measurement	PASS	
§90.205	Maximum Transmitter Power	PASS	
§90.207	Modulation Characteristic	PASS	
§90.242	Audio Low Pass Filter Response	PASS	
§90.209	Occupied Bandwidth	PASS	
§90.210	Emission Mask	PASS	
§90.213	Frequency Tolerance	PASS	
§90.214	Transient 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.

FCC Registration No.: 842334; IC Registration No.: 12108A-1

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded 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	$\pm 0.70\text{dB}$
2	Spurious emissions,conducted	$\pm 1.19\text{dB}$
3	Spurious emissions,radiated( $>1\text{G}$ )	$\pm 2.83\text{dB}$
4	Spurious emissions,radiated( $<1\text{G}$ )	$\pm 3.01\text{dB}$
5	Temperature	$\pm 0.5^\circ\text{C}$
6	Humidity	$\pm 2\%$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product:	GSM DIGITAL MOBILE PHONE	
Brand Name:	JEASUNG	
Model Number:	X6	
Series Model Name:	N/A	
Series Model Difference description:	N/A	
Emission Bandwidth:	10.158KHz	
Adapter:	Input: AC100-240V, 200mA, 50/60 Hz Output: DC 5V, 500mA	
Battery	Rated Voltage: 3.7V Capacity :2500mAh	
Operation Frequency Range	Frequency Range: 400~ 470MHz	
Maximum/Minimun Transmitter Power:	3.758W(35.75dBm)/0.541W(27.33dBm)	
Channel Separation:	12.5KHz	
Emission Designator:	F3E (Analog)/FXW/FXD(Digital)	
Support data rate:	4.8kbps	
Modulation type:	Analog	F3E for 12.5KHz Channel Separation
Frequency Tolerance	1.7045ppm	
Temperature Range:	-30°C-50°C	
Test frequency list	See Note 5	
Software version number	A320_MBPCB_V3.0	
Hardware version number	M60A_A320_CTA_GC0308GC2145_FMBT_V01_2015	

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	N/A	External Antenna	NA	1.5	Antenna

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

## 5. Test frequency list

Modulation Type	Channel Separation	Test Frequency (MHz)
FM(Analog)	12.5KHz	406.100
		435.325
		469.975

## 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..

<b>EUToperation mode no.</b>	<b>Description of operation mode</b>	<b>Additional information</b>
Op1	FM+BW12.5kHz+TX	The equipment is set with FM modulation and 12.5kHz bandwidth at maximum rated power for transmitter,powered and Voice
Op2	FM+BW12.5kHz+TX	The equipment is set with FM modulation and 12.5kHz bandwidth at minimum rated power for transmitter,powered and Voice





### 2.3 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	Low Channel
Mode 2	Middle Channel
Mode 3	High Channel
Mode 4	Link Mode

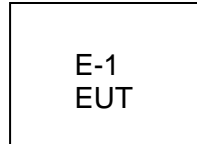
For Radiated Emission	
Final Test Mode	Description
Mode 1	Low Channel
Mode 2	Middle Channel
Mode 3	High Channel
Mode 4	Link Mode

Note:

(1) Due to the different configuration and test, in this list only some worse mode. The worst test data of the worse mode is 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-1	GSM DIGITAL MOBILE PHONE	JEASUNG	X6	N/A	EUT

**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”.

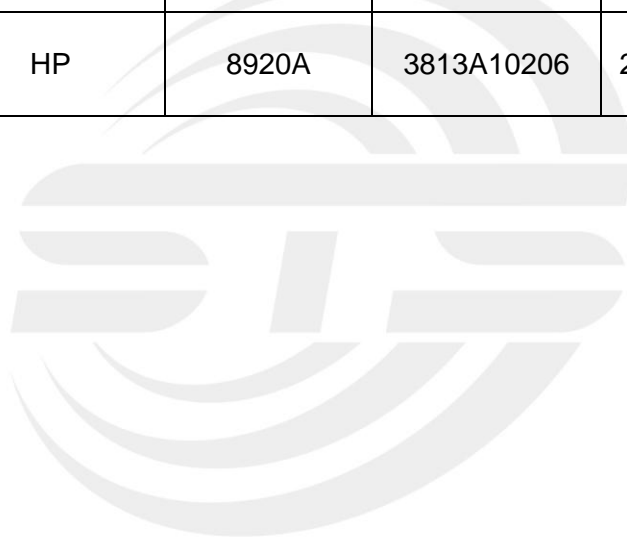
### 2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

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	2015.11.18	2016.11.17
Spectrum Analyzer	Agilent	E4407B	MY50140340	2015.10.25	2016.10.24
Test Receiver	R&S	ESCI	101427	2015.10.25	2016.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2015.11.25	2016.11.24
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	9120D-1343	2015.03.06	2016.03.05
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.06	2016.06.05
PreAmplifier	Agilent	8449B	60538	2015.10.25	2016.10.24
Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07
Attenuator	HP	215-05-20	DC-3G	2015.06.08	2016.06.07
Rf Communication Test Set	HP	8920A	3813A10206	2015.06.08	2016.06.07





### 3. EMISSION TEST

#### 3.1 RADIATED RECEIVE AND OUT-OF-BAND SPURIOUS EMISSION

##### 3.1.1 RADIATED RECEIVE EMISSION LIMITS

According to the TIA/EIA 603 D 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

##### 3.1.2 RADIATION SPURIOUS EMISSION MEASUREMENT LIMITS

###### a. §90.210

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  $f_0$  to 5.625 KHz

removed from  $f_0$ : Zero dB

(2). On any frequency removed from the center of the authorized bandwidth by a displacement

Frequency ( $f_d$  in KHz)  $f_0$  of more than 5.625 KHz but no more than 12.5 KHz: At least  $7.27(f_d - 2.88$  KHz) dB

(3). On any frequency removed from the center of the authorized bandwidth by a displacement

Frequency ( $f_d$  in KHz)  $f_0$  of more than 12.5 KHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever ever is lesser attenuation.

Limit:

At least  $50 + 10 \log(P) = 50 + 10 \log(3.758) = 55.75$  (dBc) (For UHF)

Limit:

At least  $50 + 10 \log(P) = 50 + 10 \log(0.541) = 47.33$  (dBc) (For UHF)

Note: In general, the worse case attenuation requirement shown above was applied.

Calculation: Limit (dBm) = EL - 50 - 10 log 10 (TP)

Notes:

EL is the emission level of the Output Power expressed in dBm,

In this application, the EL is 35.75 dBm.

Limit (dBm) =  $35.75 - 50 - 10 \log_{10}(3.758) = -20$  dBm

##### 3.1.3 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 1 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 1 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- e. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- f. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- g The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- h The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.



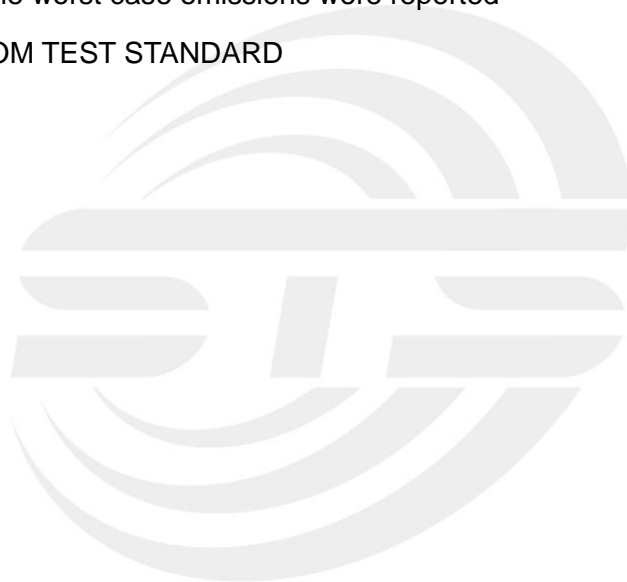
- i The maximum signal level detected by the measuring receiver shall be noted. (9)The measurement shall be repeated with the test antenna set to horizontal polarization. (10) Replace the antenna with a proper Antenna (substitution antenna). (11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting. (12)The substitution antenna shall be connected to a calibrated signal generator. (13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver. (14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- j The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver. (16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver. (17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

#### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation

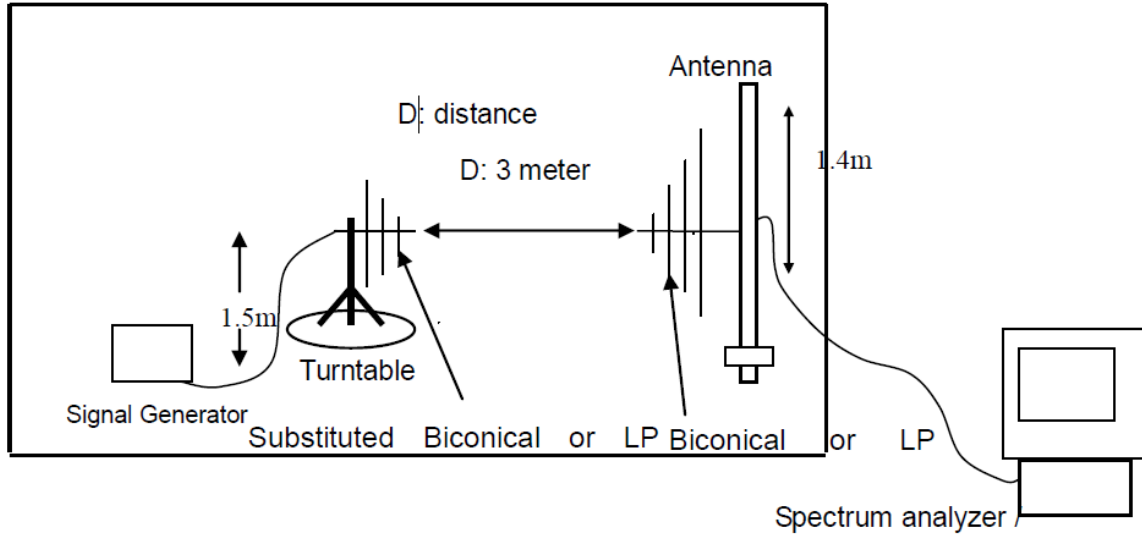


### 3.1.5 TEST SETUP BLOCK DIAGRAM

#### SUBSTITUTION METHOD: (Radiated Emissions)

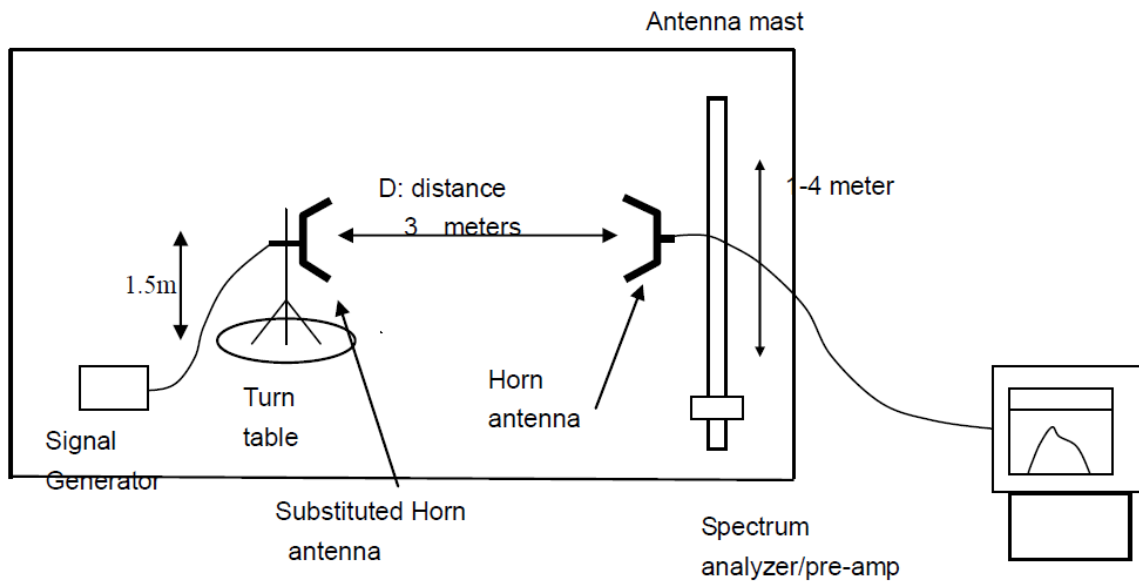
(A) Radiated Emission Test-Up Frequency Above 30MHz

Ground Plane



(B) Radiated Emission Test-Up Frequency Above 1GHz

Ground plane





## 3.1.6 RADIATED RECEIVE EMISSION TEST RESULTS Below 30MHz

Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC 5V from Adapter AC 120V/60Hz		
Test Mode :	Mode 4		

Remark: We tested and recorded All Op, recorded worst case at Op 1.

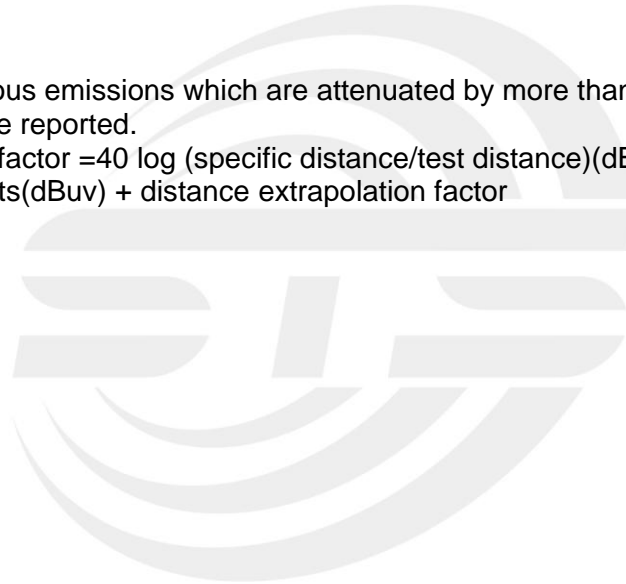
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log(\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor



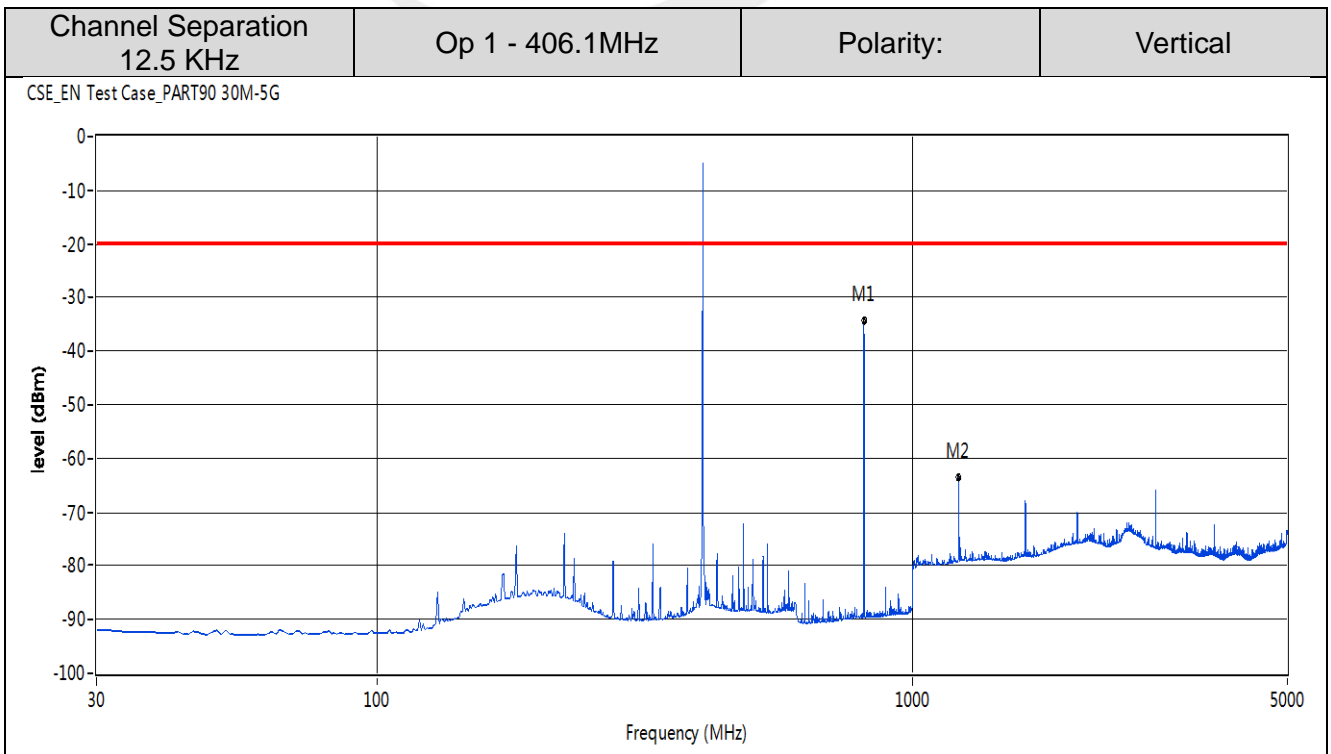
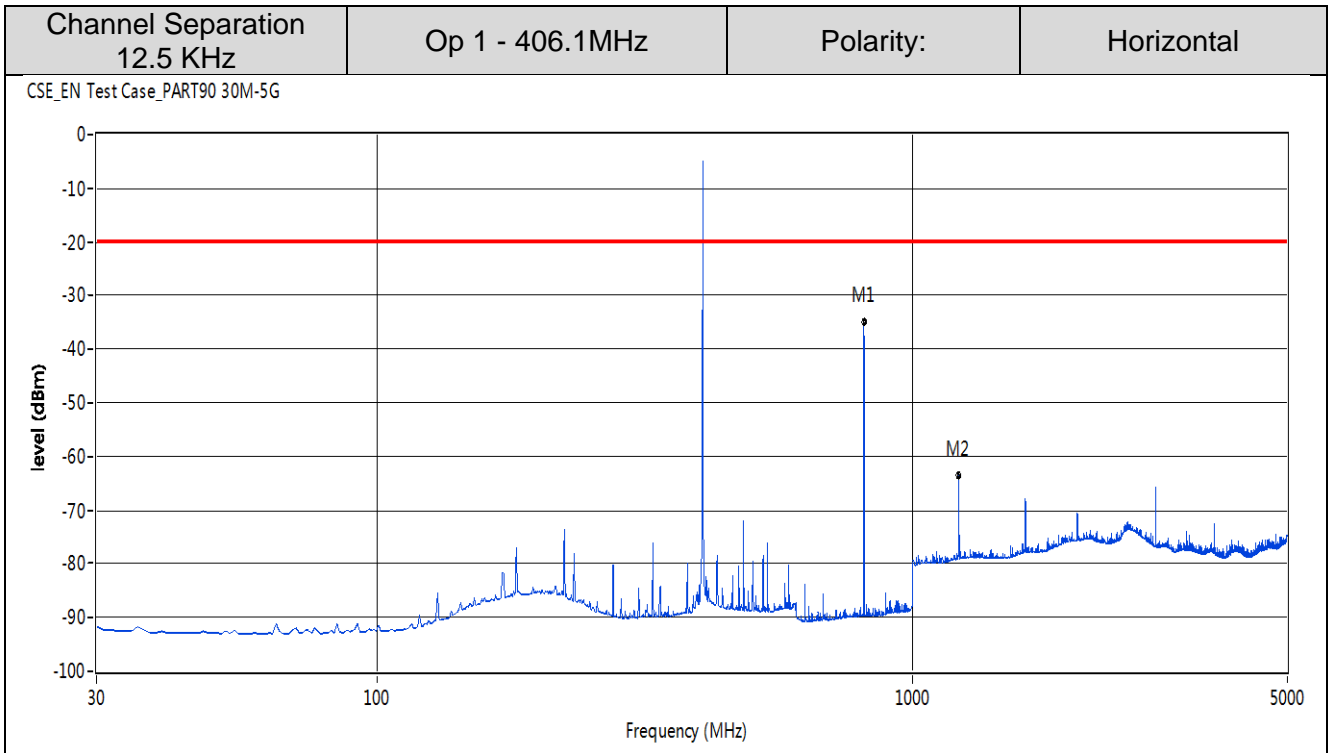


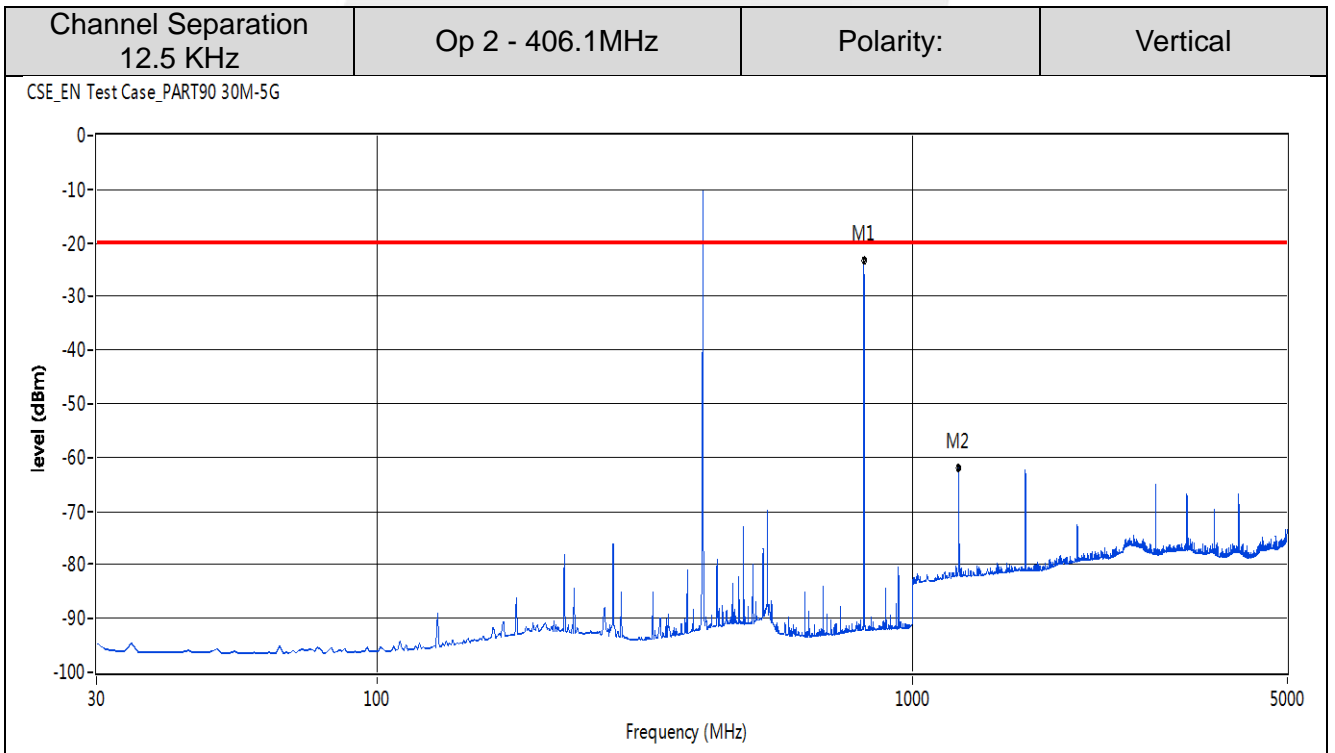
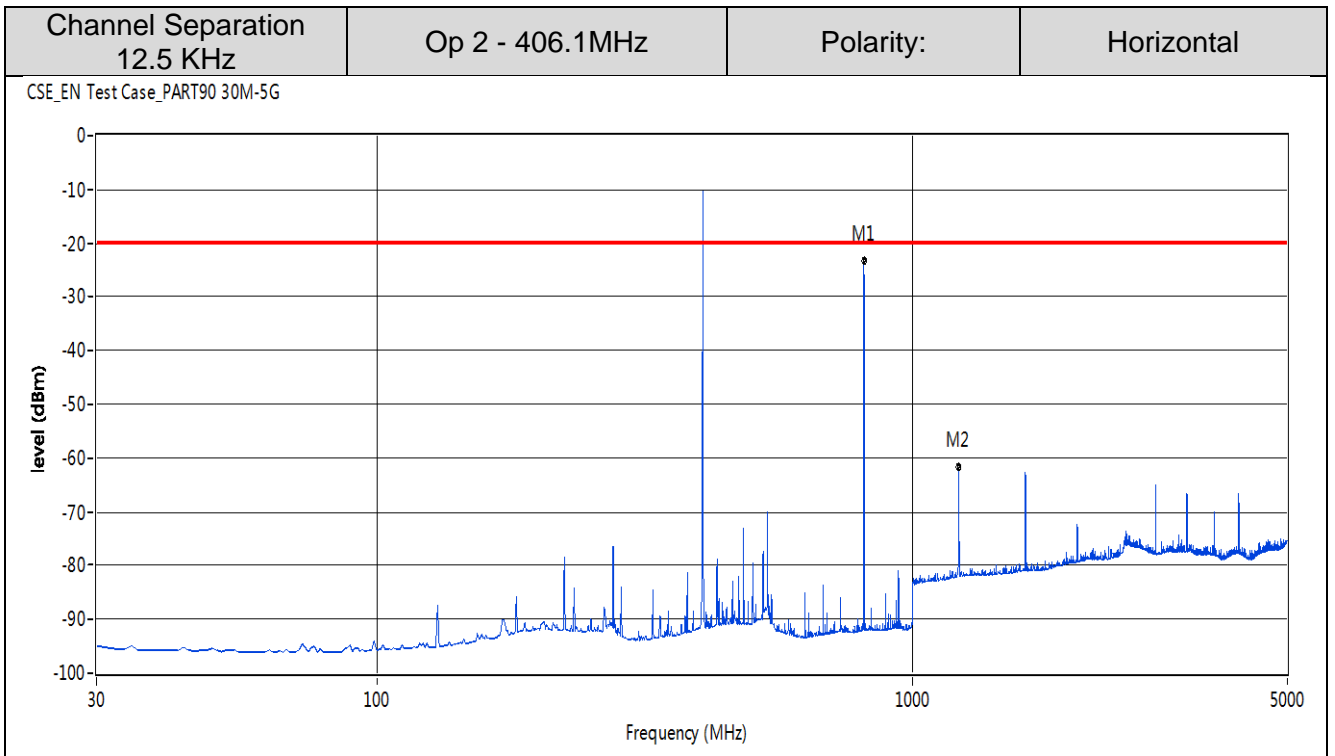


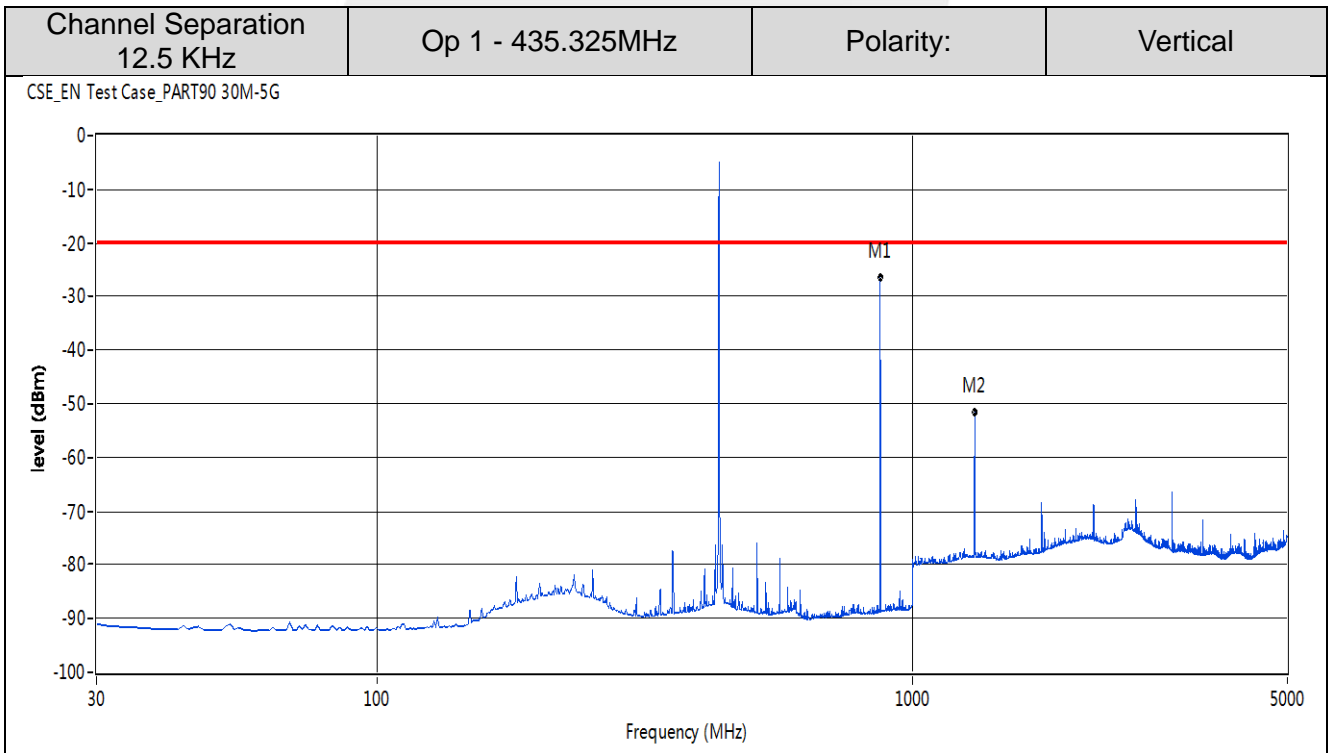
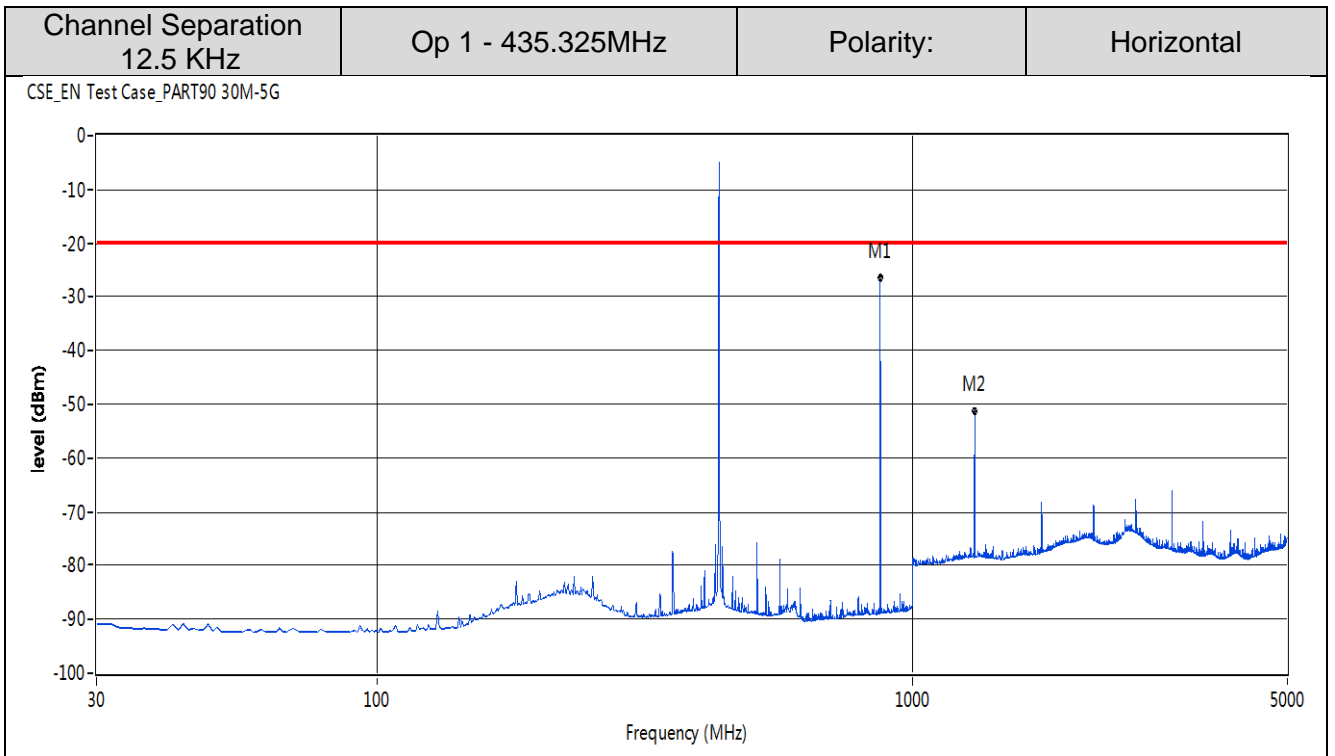
3.1.7 OUT-OF-BAND SPURIOUS TEST RESULTS ABOVE 30MHz

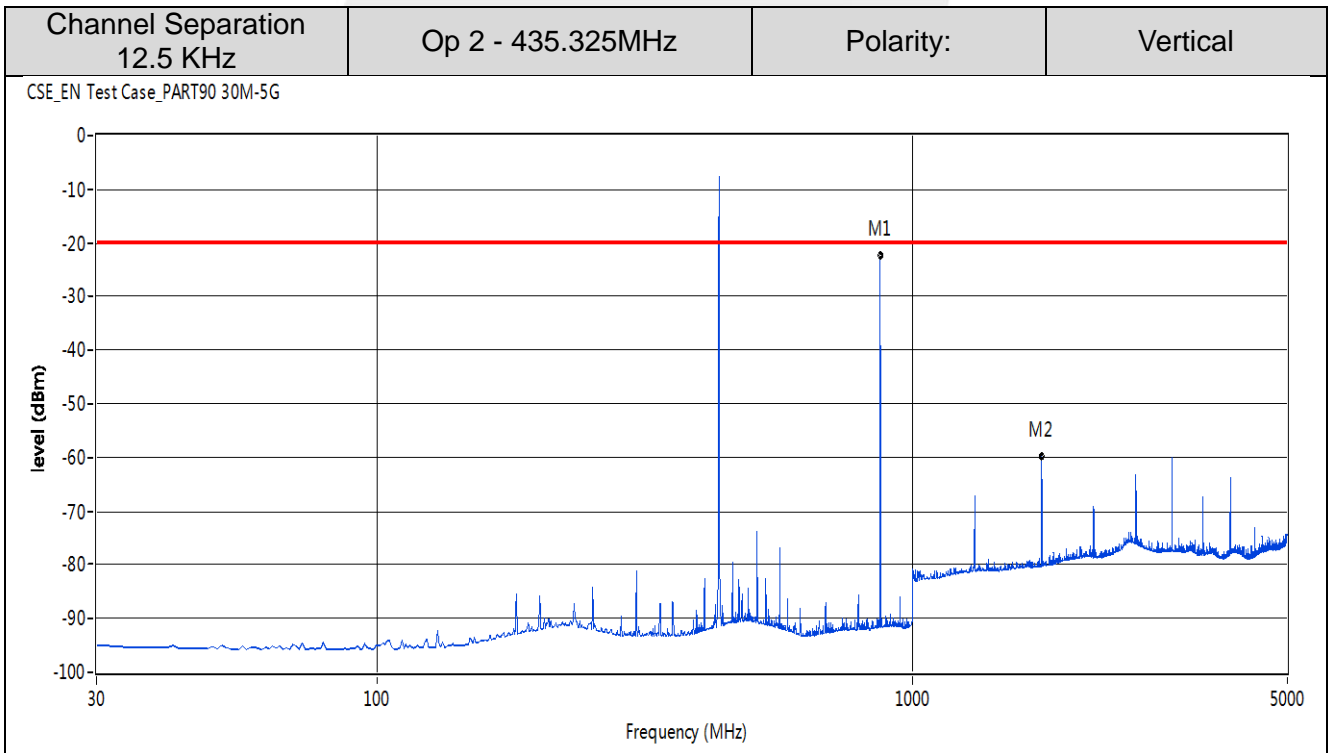
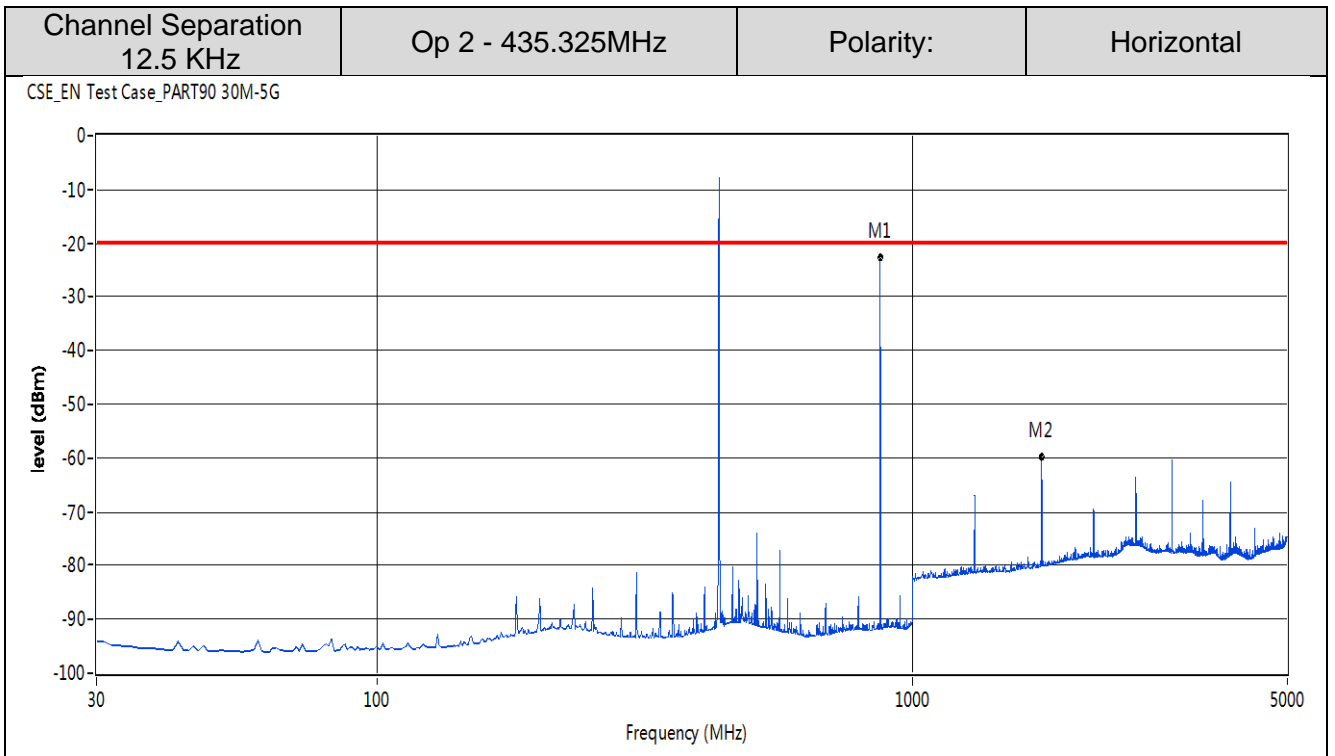
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Mode :	Mode 1/2/3
Test Voltage :	DC 5V from Adapter AC 120V/60Hz		

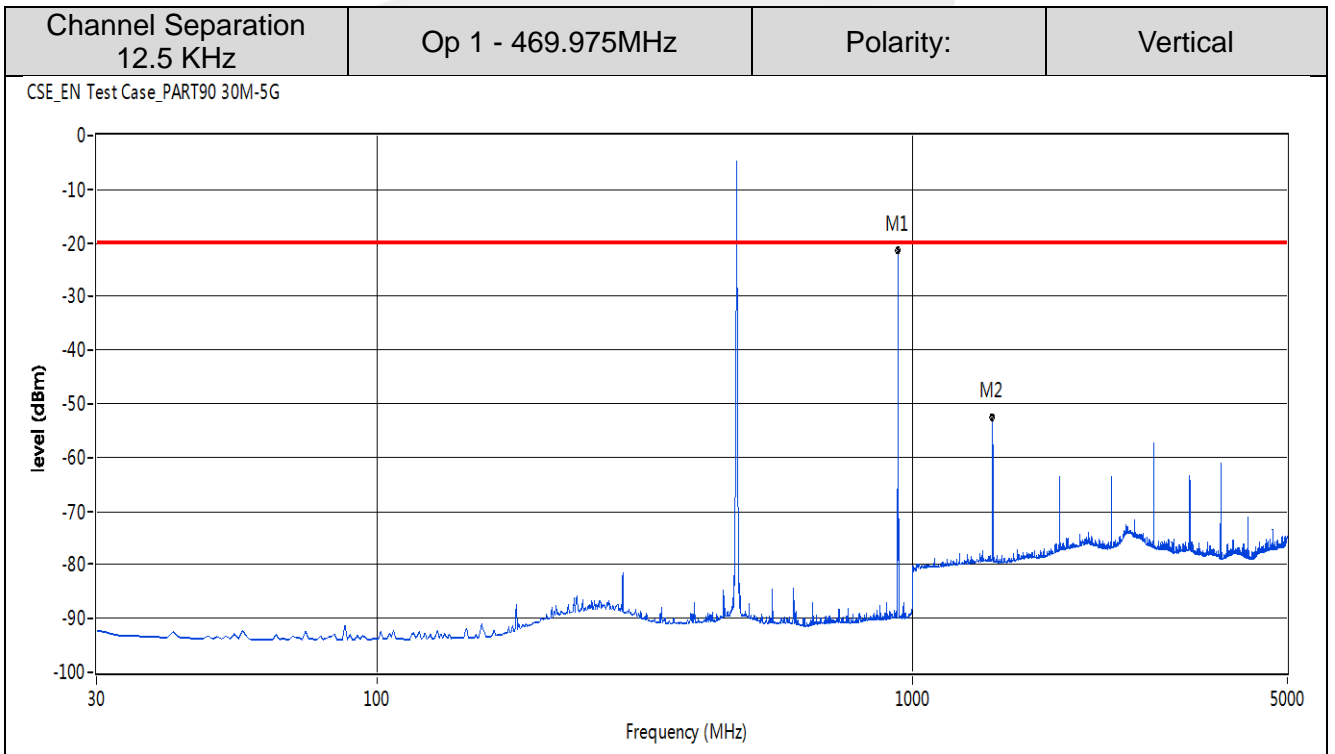
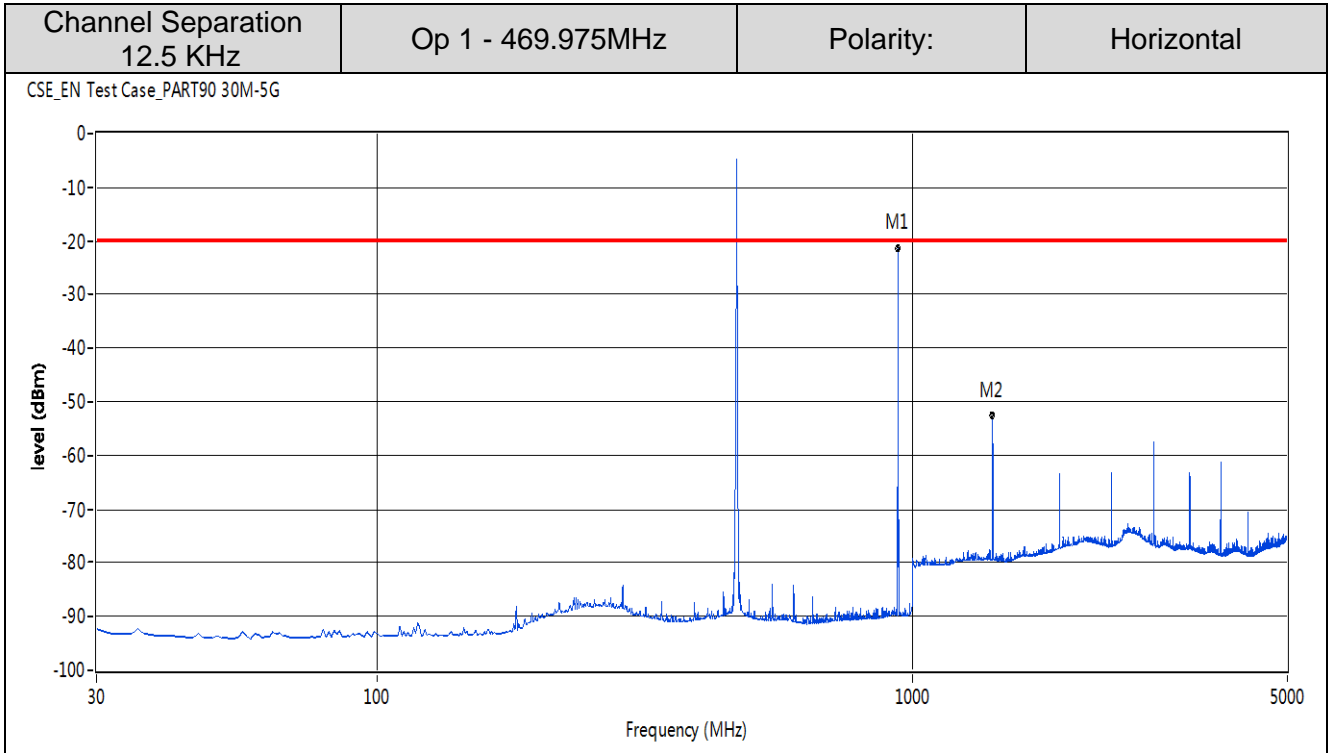
Remark: We tested and recorded All Op, recorded worst case at Op 1 and Op 2 .

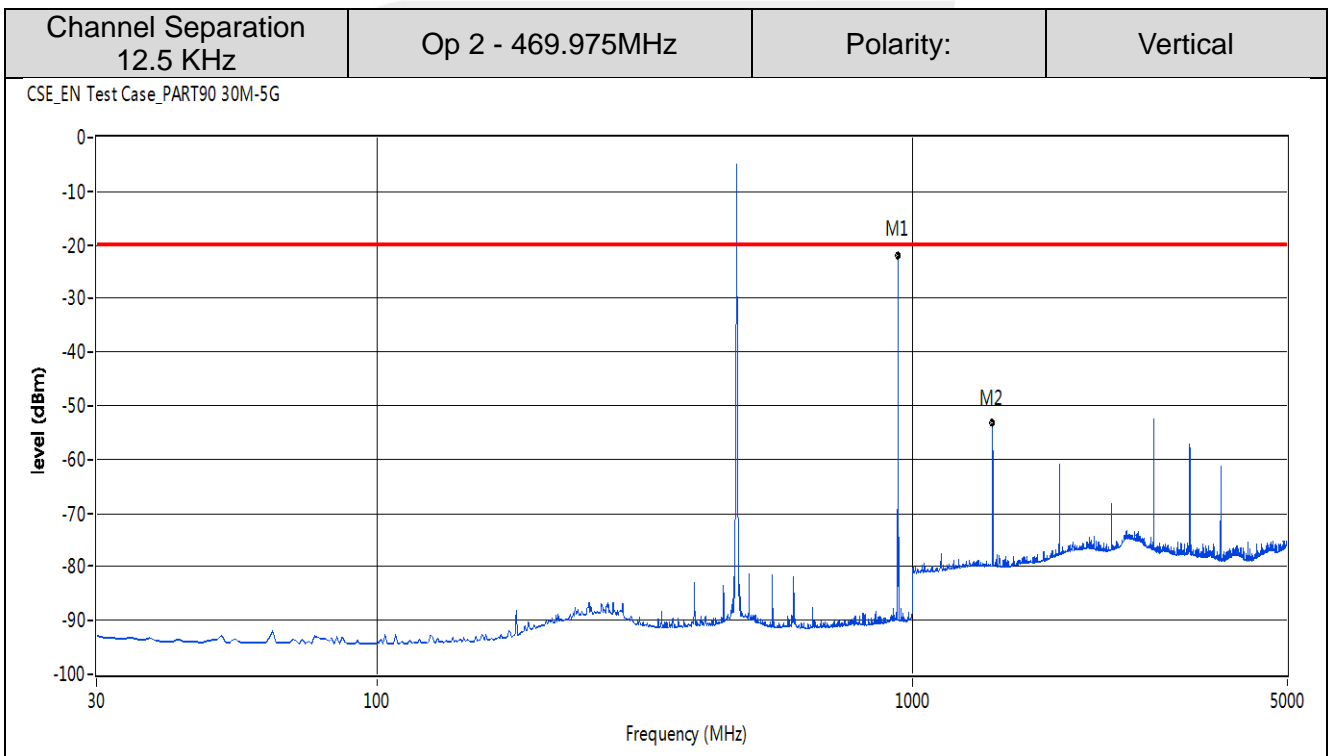
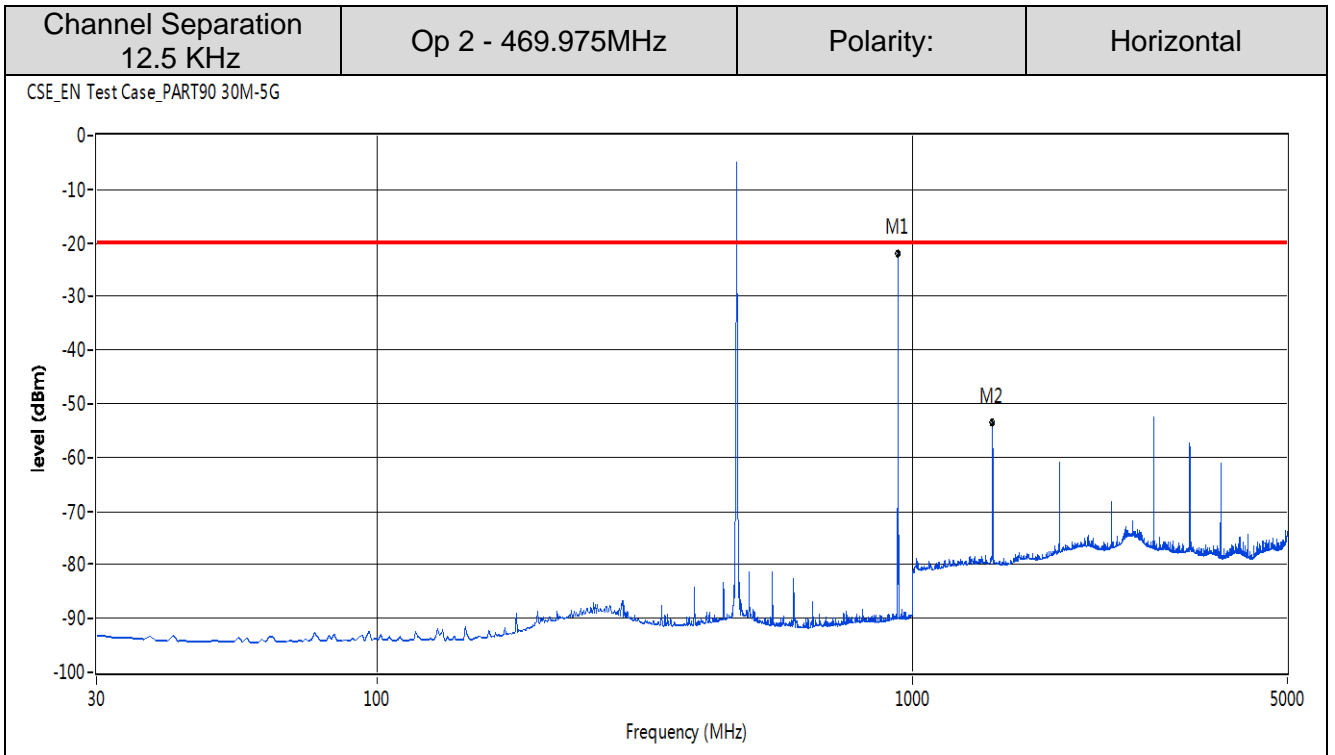














### 3.2 EMISSION MASK PLOT

- Emission mask acc to §90.210
- a. - The detailed procedure employed for Emission Mask measurements are specified as following:
  - The transmitter shall be modulated by a 2.5 KHz 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 channel spacing ) .

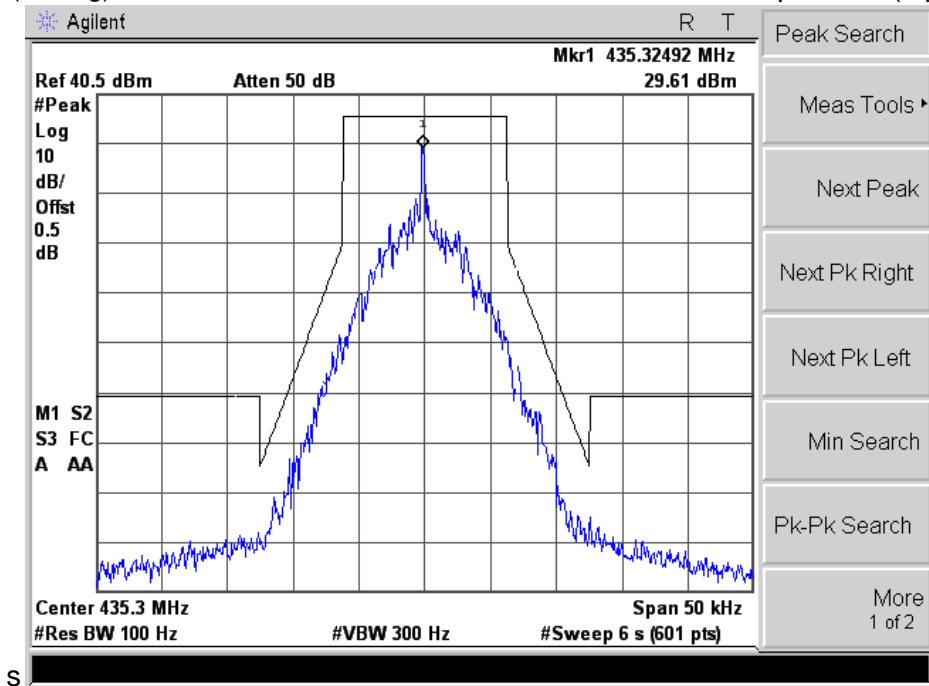
*Emission Mask D— 12.5 kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (2) 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  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.
- (3) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.



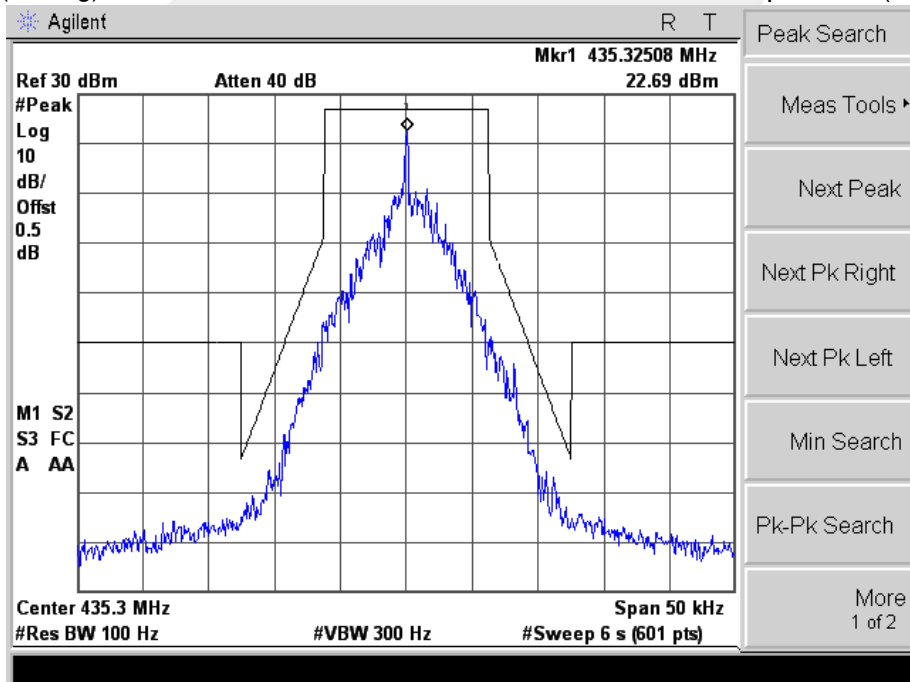
Remark 1: We tested and recorded Op 1 and Op 2 .

FM (Analog)The Worst Emission Mask for 12.5 KHz channel Separation (Op 1)



S

FM (Analog)The Worst Emission Mask for 12.5 KHz channel Separation (Op 2)





#### 4. FREQUENCY TOLERANCE

##### 4.1 DESCRIPTION OF SUPPORT UNITS

- a. According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.
- b. According to FCC Part 2 Section 2.1055(d)(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 manufacturer.
- c. According to FCC Part 90 Section 90.213, the frequency tolerance must be maintained within
- d. §90.213 requires for mobile stations 2.5ppm (12.5 kHz)

##### 4.2 MEASUREMENT PROCEDURE

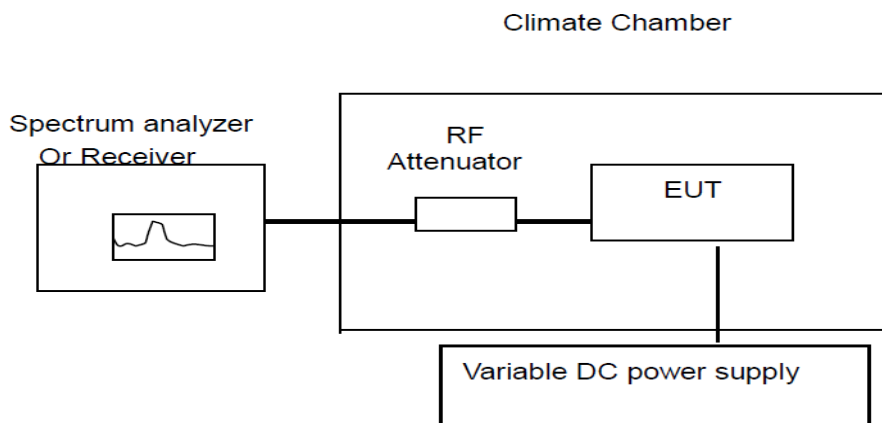
###### 4.2.1 FREQUENCY STABILITY VERSUS ENVIRONMENTAL TEMPERATURE

- a. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
- b. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1 KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
- c. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
- d. Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-30^{\circ}\text{C}$  is measured, record all measured frequencies on each temperature step.

###### 4.2.2 FREQUENCY STABILITY VERSUS INPUT VOLTAGE

- a. Setup the configuration per figure 1 for frequencies measured at temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environment chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. The EUT shall be powered by DC 3.7V
- b. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1 KHz and Video Resolution Bandwidth to 1 KHz. Record this frequency as reference frequency.
- c. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

##### 4.3 TEST SETUP BLOCK DIAGRAM





## 4.4 TEST RESULT

(1) Frequency stability versus input voltage (Supply nominal voltage is DC 3.7V)

Remark:We tested and recorded All Op, middle channel record bad situation in the Op - 1.

**FOR UHF BAND TEST RESULT -PASS**

Middle Channel @ 12.5 KHz Channel Separation -Op 1			
Reference Frequency	435.325 MHz	Result	Limit (2.5ppm)
Environment Temperature	Power Supply	Frequency Deviation	
(°C)	(V)	(MHz)	ppm
50	DC 3.7V	435.325251	0.576581
40	DC 3.7V	435.325424	0.973985
30	DC 3.7V	435.325345	0.792511
20	DC 3.7V	435.325426	0.978579
10	DC 3.7V	435.325457	1.049790
0	DC 3.7V	435.325463	1.063573
-10	DC 3.7V	435.325429	0.985471
-20	DC 3.7V	435.325284	0.652386
-30	DC 3.7V	435.325436	1.001551

(2) Frequency stability versus input voltage (Battery Fully Charged voltage is DC 4.07V/+10%)

Remark:We tested and recorded All Op, middle channel record bad situation in the Op - 1.

Middle Channel @ 12.5 KHz Channel Separation -Op 1			
Reference Frequency	435.325 MHz	Result	Limit (2.5ppm)
Environment Temperature	Power Supply	Frequency Deviation	
(°C)	(V)	(MHz)	ppm
50	DC 4.07V	435.325535	1.228967
40	DC 4.07V	435.325448	1.029116
30	DC 4.07V	435.325336	0.771837
20	DC 4.07V	435.325347	0.797106
10	DC 4.07V	435.325356	0.817780
0	DC 4.07V	435.325258	0.592661
-10	DC 4.07V	435.325345	0.792511
-20	DC 4.07V	435.325363	0.833860
-30	DC 4.07V	435.3253745	0.860277



(3) Frequency stability versus input voltage (Battery Half Charged voltage is DC 3.36V/-10%)

Remark: We tested and recorded All Op, middle channel record bad situation in the Op - 1.

Middle Channel @ 12.5 KHz Channel Separation - Op 1			
Reference Frequency	435.325 MHz	Result	Limit (2.5ppm)
Environment Temperature	Power Supply	Frequency Deviation	
(°C)	(V)	(MHz)	ppm
50	DC 3.36V	435.325556	1.277207
40	DC 3.36V	435.325487	1.118704
30	DC 3.36V	435.325374	0.859128
20	DC 3.36V	435.325356	0.817780
10	DC 3.36V	435.325456	1.047493
0	DC 3.36V	435.325654	1.502326
-10	DC 3.36V	435.325374	0.859128
-20	DC 3.36V	435.325365	0.838454
-30	DC 3.36V	435.325423	0.971688

(4) Frequency stability versus input voltage (Battery Announced ultimate voltage of manufacturers DC 3V)

Remark: We tested and recorded All Op, middle channel record bad situation in the Op - 1.

Middle Channel @ 12.5 KHz Channel Separation - Op 1			
Reference Frequency	435.325 MHz	Result	Limit (2.5ppm)
Environment Temperature	Power Supply	Frequency Deviation	
(°C)	(V)	(MHz)	ppm
50	DC 5.78V	435.325541	1.242750
40	DC 5.78V	435.325442	1.015333
30	DC 5.78V	435.325258	0.592661
20	DC 5.78V	435.325465	1.068167
10	DC 5.78V	435.325742	1.704474
0	DC 5.78V	435.325456	1.047493
-10	DC 5.78V	435.325632	1.451789
-20	DC 5.78V	435.325325	0.746569
-30	DC 5.78V	435.325345	0.792511

## 5. EMISSION BANDWIDTH

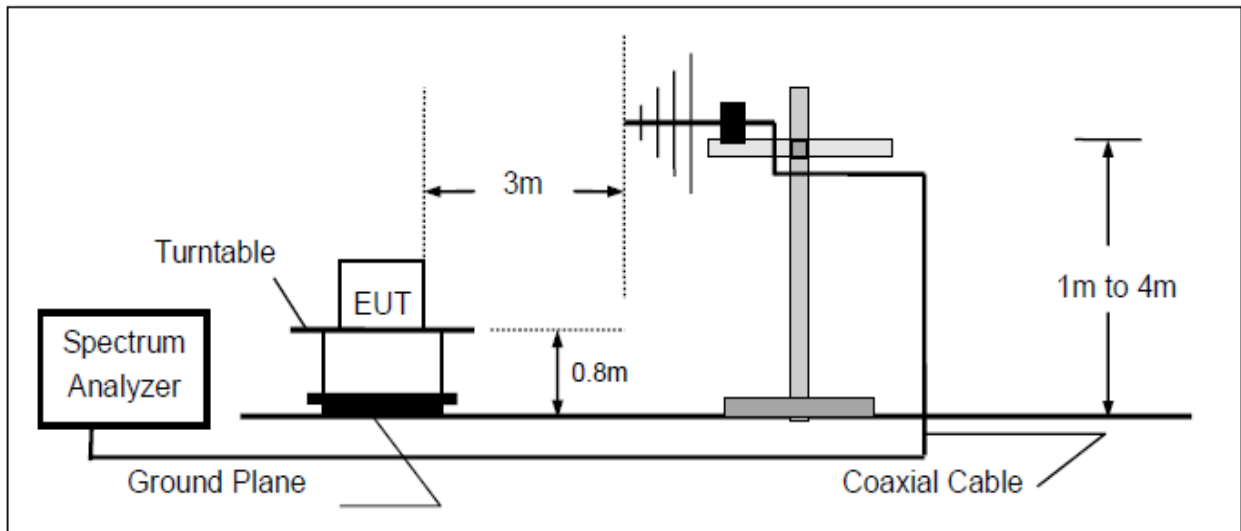
### 5.1 PROVISIONS APPLICABLE

- a. According to FCC Part 90 Section 90.209: The authorized bandwidth shall be 11.25 KHz for 12.5 KHz.

### 5.2 MEASUREMENT PROCEDURE

- a. The EUT was placed on a turn table which is 0.8m above ground plane.  
The EUT was modulated by 3.0 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) .
- b. Set SPA Center Frequency = fundamental frequency, RBW=VBW= 100/300 Hz, Span =50 KHz.
- c. Set SPA Max hold. Mark peak, -26 dB.

### 5.3 TEST SETUP BLOCK DIAGRAM

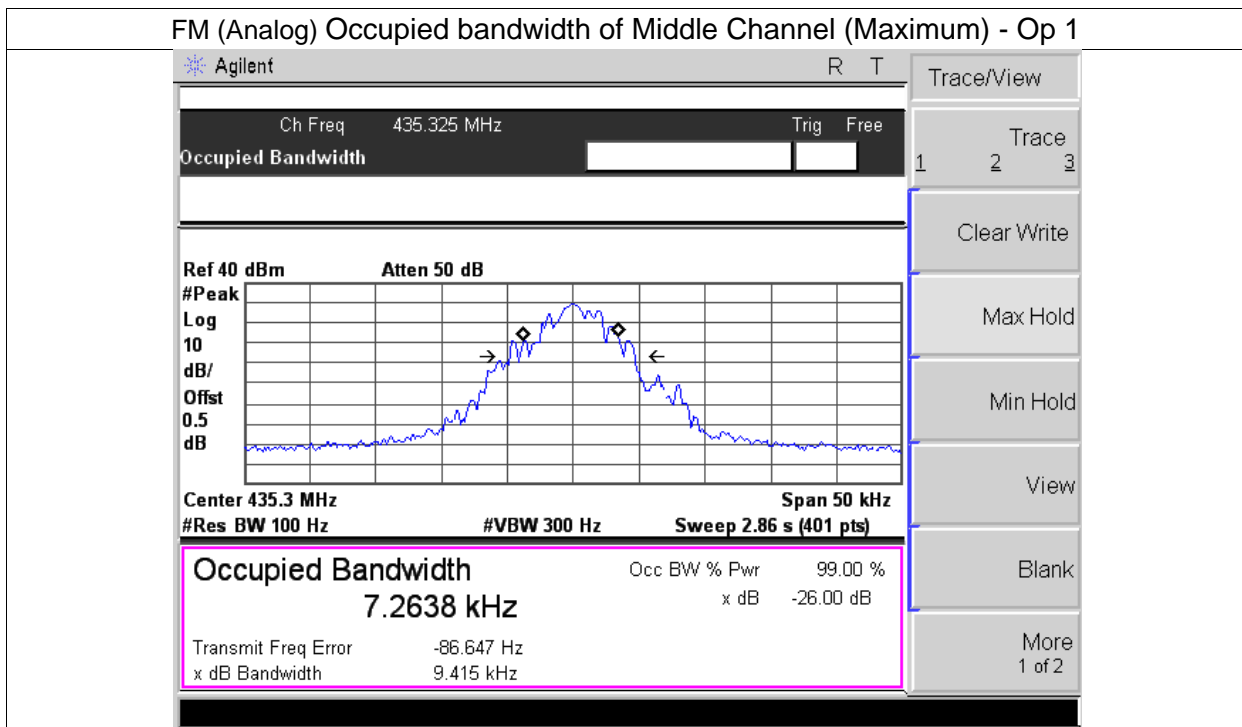




5.4 MEASUREMENT RESULT:

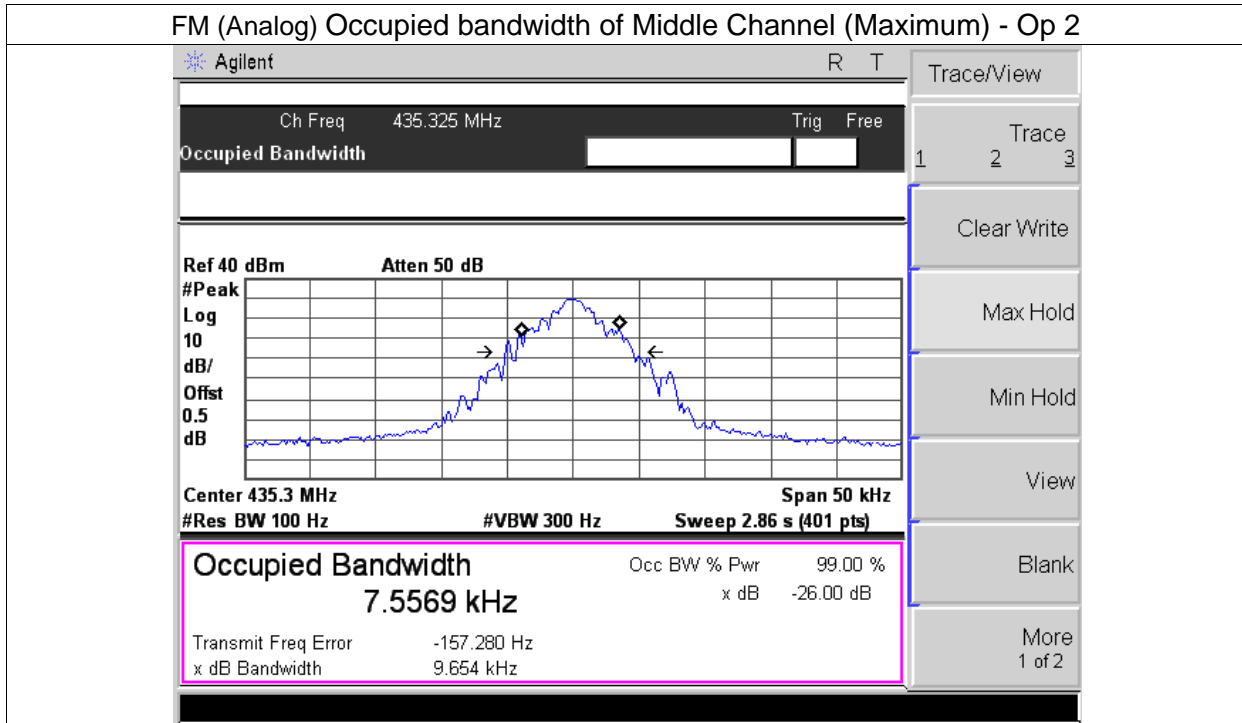
Remark: We tested and recorded Op 1 and Op 2.

26 dB Bandwidth Measurement Result For UHF Band - Op 1			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
406.100MHz	10.158KHz	11.25	Pass
435.325MHz	9.415KHz	11.25	Pass
469.975MHz	9.840KHz	11.25	Pass





26 dB Bandwidth Measurement Result For UHF Band - Op 2			
Operating Frequency	12.5 KHz Channel Separation		
	Test Data	Limits	Result
406.100MHz	9.671KHz	11.25	Pass
435.325MHz	9.654KHz	11.25	Pass
469.975MHz	9.233KHz	11.25	Pass



## 6. MODULATION CHARACTERISTICS

### 6.1 PROVISIONS APPLICABLE

According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the

- frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

### 6.2 PROVISIONS APPLICABLE

#### 6.2.1 MODULATION LIMIT

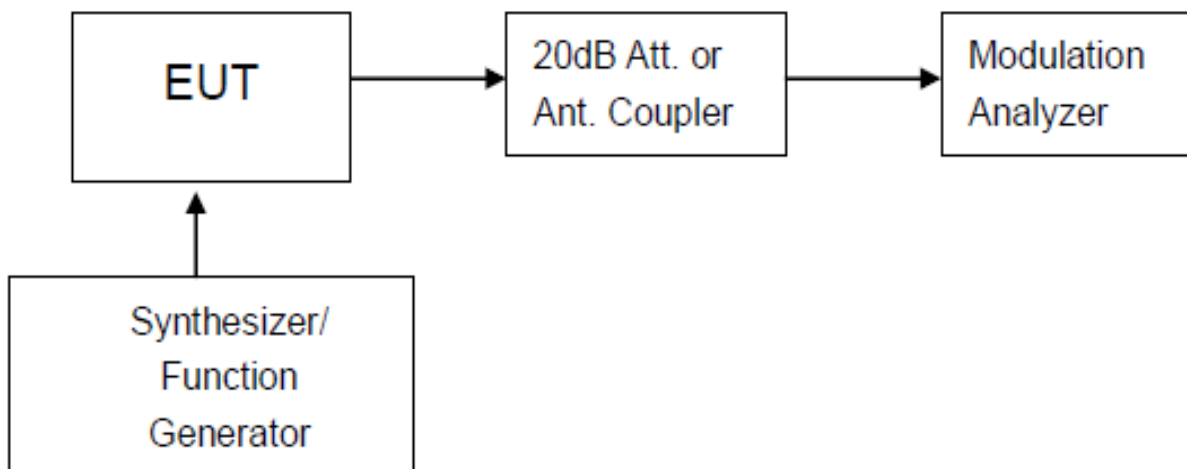
Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system

- deviation at 1KHz using this level as a reference (0dB) and vary the input level from -20 to +20dB. Record the frequency deviation obtained as a function of the input level.
- Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

#### 6.2.2 Audio Frequency Response

- Configure the EUT as shown in figure 1..
- Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).
- Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.
- Audio Frequency Response =  $20\log_{10} (\text{Deviation of test frequency}/\text{Deviation of 1 KHz reference})$ .

### 6.3 TEST SETUP BLOCK DIAGRAM



Modulation Characteristic Measurement Configuration

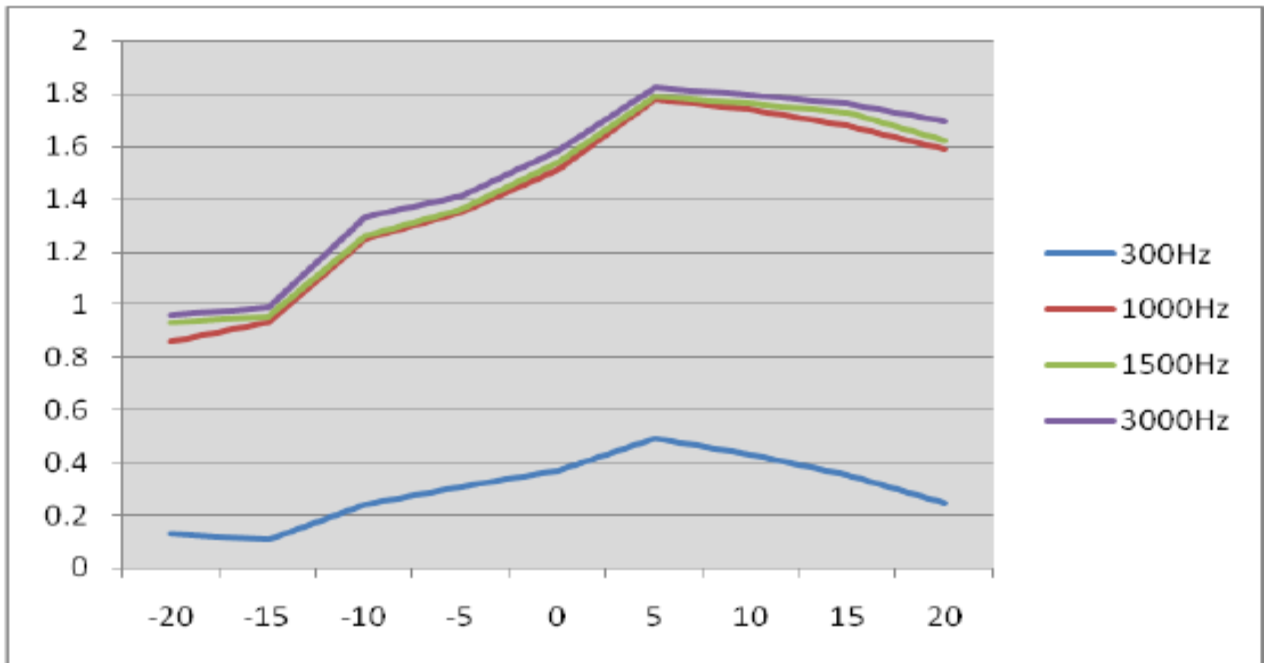


6.4 MEASUREMENT RESULT

a. Modulation Limit:

Remark: We tested and recorded Op 1 to Op 2, recorded worst case at Op 1.

Middle Channel @ 12.5 KHz Channel Separations for UHF Band -Op 5				
Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.14	0.836	0.914	0.941
-15	0.16	0.927	0.938	0.974
-10	0.23	1.241	1.253	1.327
-5	0.33	1.349	1.370	1.432
0	0.36	1.491	1.535	1.585
5	0.45	1.765	1.766	1.808
10	0.42	1.728	1.757	1.789
15	0.35	1.674	1.714	1.741
20	0.25	1.590	1.622	1.678







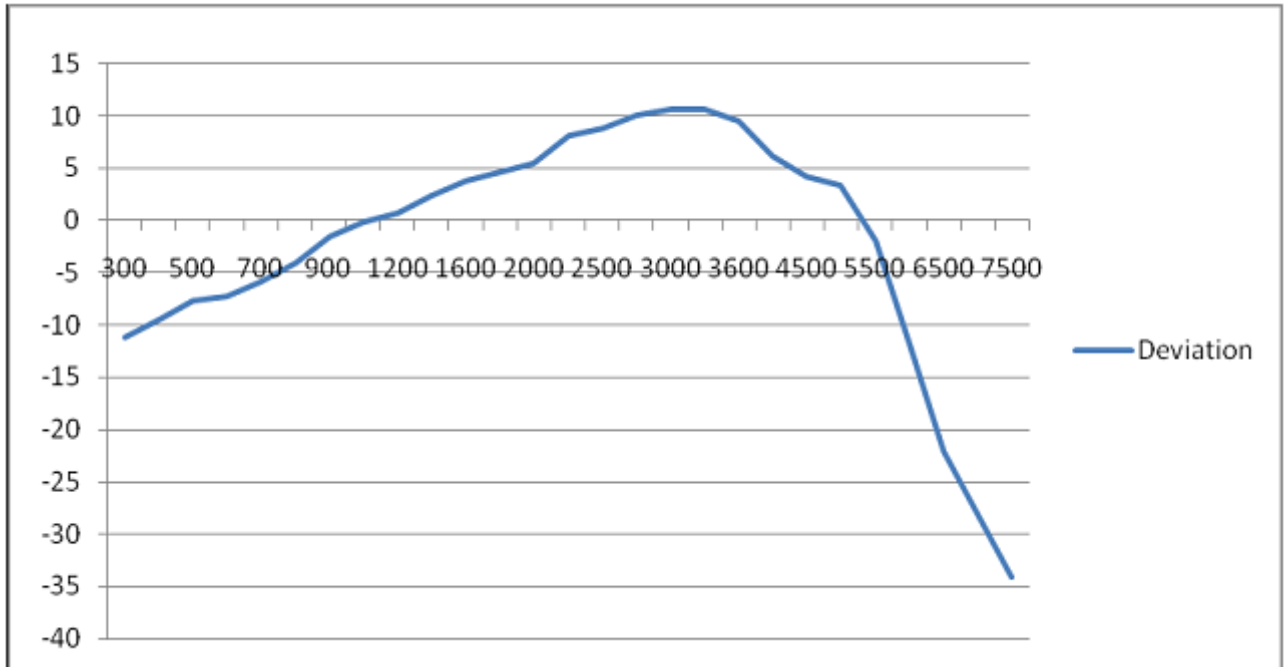
## b. Audio Frequency Response:

12.5 KHz Middle Channel Separations for UHF Band -Op 5		
Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.138	-11.235
400	0.170	-9.543
500	0.204	-7.716
600	0.218	-7.308
700	0.253	-5.854
800	0.316	-4.053
900	0.423	-1.490
1000	0.498	-0.178
1200	0.541	0.655
1400	0.660	2.360
1600	0.785	3.798
1800	0.870	4.637
2000	0.954	5.491
2400	1.294	8.120
2500	1.407	8.833
2800	1.617	10.035
3000	1.737	10.651
3200	1.724	10.605
3600	1.531	9.597
4000	1.036	6.186
4500	0.817	4.160
5000	0.740	3.349
5500	0.402	-1.903
6000	0.124	-11.875
6500	0.033	-22.118
7000	0.015	-28.139
7500	0.008	-34.159
9000	--	--
10000	--	--
14000	--	---
18000	--	--



20000	--	--
30000	--	--

Frequency Response of Middle Channel





## 7. AUDIO LOW PASS FILTER RESPONSE

### 7.1 PROVISIONS APPLICABLE

#### 7.1.1 LIMITS

- 2.1047(a): Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be
- a. submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
  - b. 90.242(b)(8): Recommended audio filter attenuation characteristics are given below:

Audio band	Minimum Attenuation Rel. to 1 KHz Attenuation
3 –20 KHz	$60 \log_{10}(f/3)$ dB where f is in KHz
20 – 30 KHz	50dB

### 7.2 METHOD OF MEASUREMENTS

- a. The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to 50 KHz.



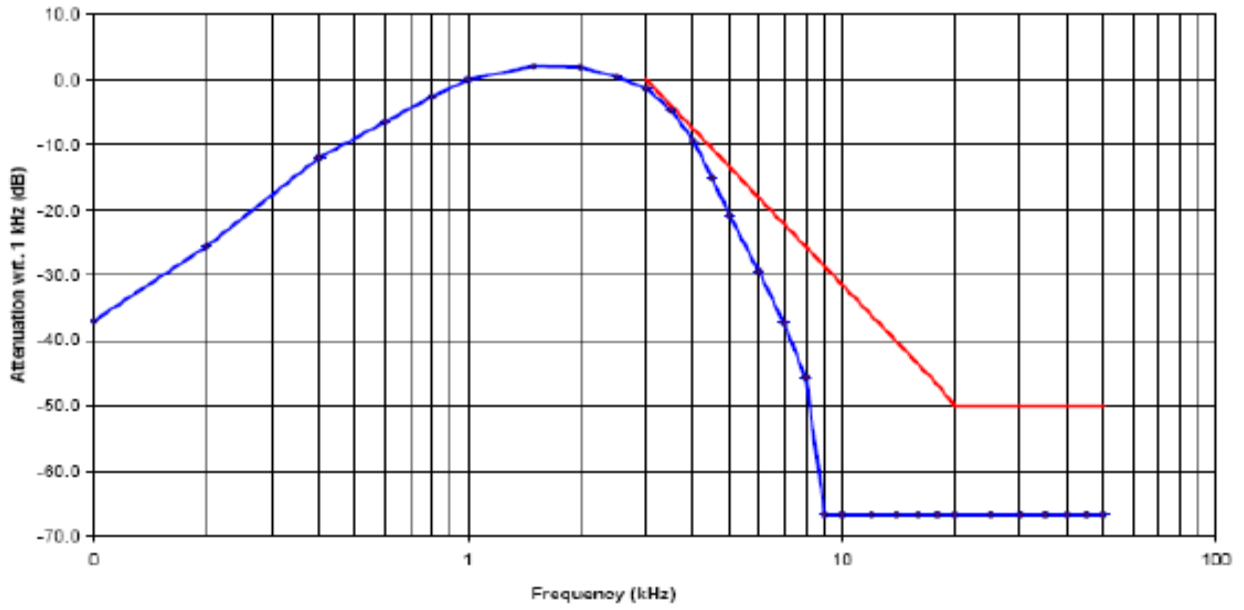


## 7.3 TEST DATA

Remark: We tested and recorded Op 1 to Op 2, recorded worst case at Op 1.

12.5 KHz Channel Spacing, F3E, Frequency of All Modulation States - Op 1					
Frequency (KHz)	Audio In (dBV)	Audio out (dBV)	Attenuation (Out_In) dB	Attenuation Rel.to 3 KHz	Recommended Attenuation ( dB)
0.1	-75.77	-30.25	45.60	-36.7	
0.2	-75.77	-18.35	57.09	-25.5	
0.4	-75.77	-5.27	70.39	-12.0	
0.6	-75.77	0.24	76.09	-6.4	
0.8	-75.77	4.08	79.69	-2.6	
1.0	-75.77	6.67	82.60	0.0	
1.5	-75.77	8.74	84.29	2.1	
2.0	-75.77	8.54	84.40	1.9	
2.5	-75.77	7.12	82.89	0.5	
3.0	-75.77	5.33	81.19	-1.4	0
3.5	-75.77	2.02	77.80	-4.3	-4
4.0	-75.77	-2.62	73.19	-9.7	-7
4.5	-75.77	-8.41	67.50	-15.3	-11
5.0	-75.77	-14.05	61.70	-21.5	-13
6.0	-75.77	-22.68	53.20	-29.4	-18
7.0	-75.77	-30.62	45.40	-37.5	-22
8.0	-75.77	-38.95	36.69	-45.5	-26
9.0	-75.77	-60	-15.80	-66.7	-29
10.0	-75.77	-60	-15.80	-66.7	-31
12.0	-75.77	-60	-15.81	-66.7	-36
14.0	-75.77	-60	-15.80	-66.7	-40
16.0	-75.77	-60	-15.80	-66.7	-44
18.0	-75.77	-60	-15.80	-66.7	-47
20.0	-75.77	-60	-15.80	-66.7	-50
25.0	-75.77	-60	-15.81	-66.7	-50
30.0	-75.77	-60	-15.80	-66.7	-50
35.0	-75.77	-60	-15.81	-66.7	-50
40.0	-75.77	-60	-15.81	-66.7	-50
45.0	-75.77	-60	-15.81	-66.7	-50
50.0	-75.77	-60	-15.80	-66.7	-50

Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the **Note:** Frequency Response of All Modulation States is performed to show the roll-off at 3 KHz in comparison with the recommended audio filter attenuation.



## 8. TRANSMITTER FREQUENCY BEHAVIOR

### 8.1 PROVISIONS APPLICABLE

§90.214 Transient frequency behavior.

Time intervals <sup>1,2</sup>	Maximum frequency difference <sup>3</sup>	All equipment	
		150 to 174 MHz	421 to 512 MHz
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

<sup>1</sup>  $t_{on}$  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.

<sup>2</sup> 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.

<sup>3</sup> Difference between the actual transmitter frequency and the assigned transmitter frequency.

<sup>4</sup> 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.

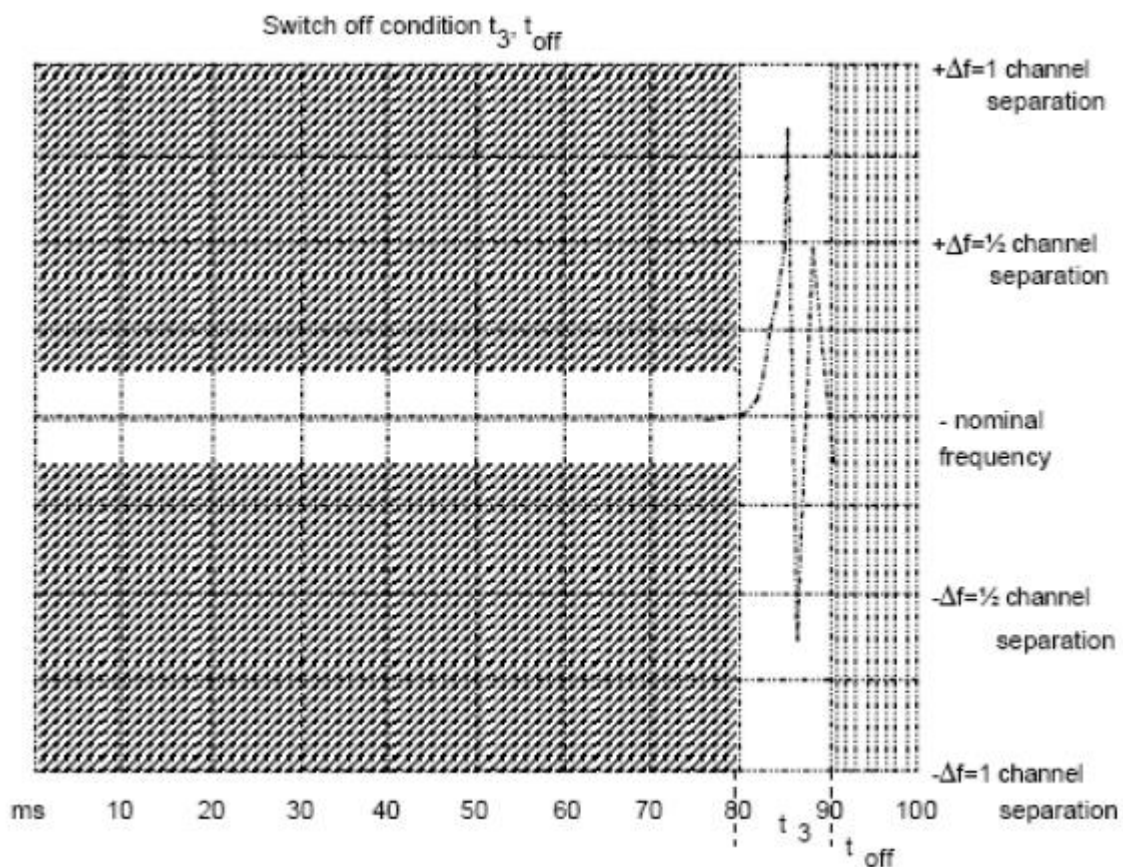
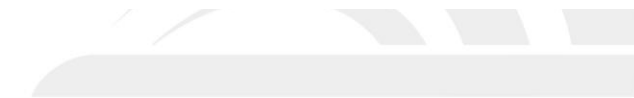
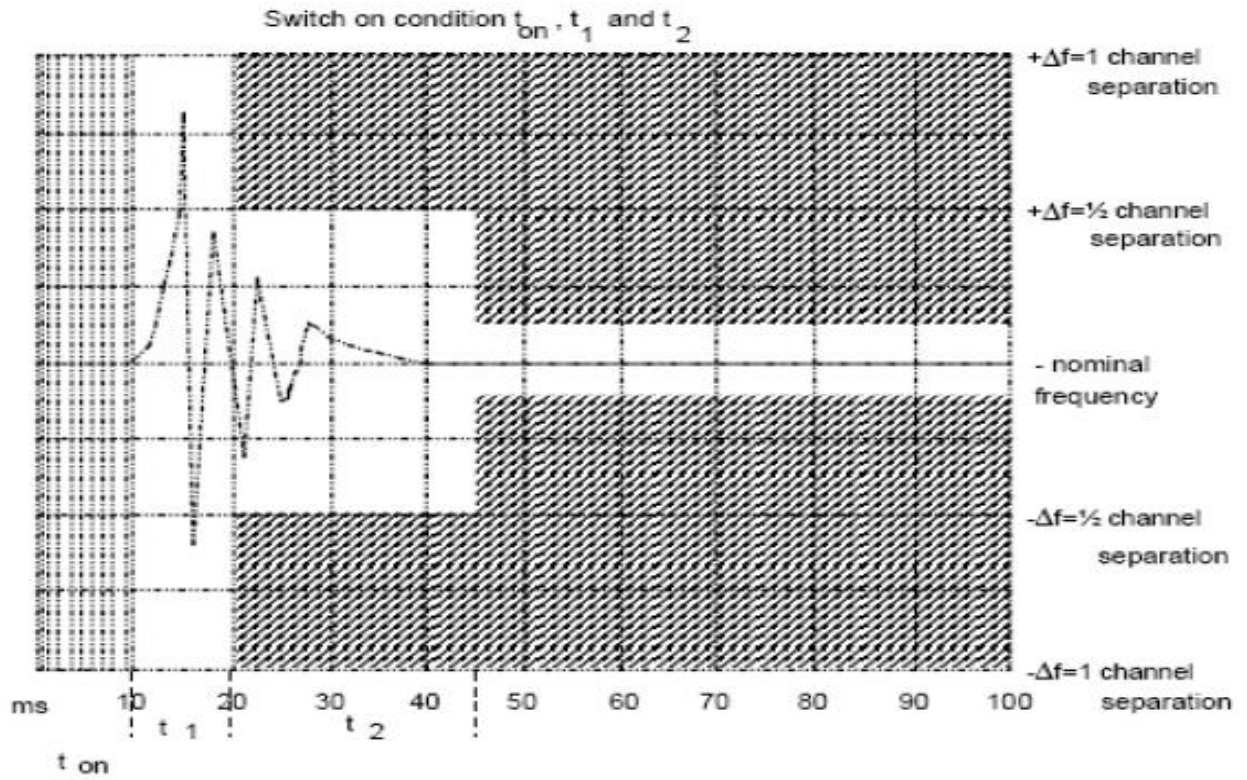
### 8.2 TEST METHOD

TIA/EIA-603 2.2.19

### 8.3 DESCRIBE LIMIT LINE OF TRANSMITTER FREQUENCY BEHAVIOR

TIA/EIA-603 2.2.19

- Ton: the switch-on instant  $t_{on}$  of a transmitter is defined by the condition when the output power, measured at the antenna terminal, exceeds 0,1 % of the full output power (-30 dbc).
- T1: period of time starting at  $t_{on}$  and finishing according to above 11.1
- T2: period of time starting at the end of  $t_1$  and finishing according to above 11.1
- toff: switch-off instant defined by the condition when the output power falls below 0,1 % of the full output power (-30 dBc).
- T3: period of time that finishing at  $t_{off}$  and starting according to above 11.1

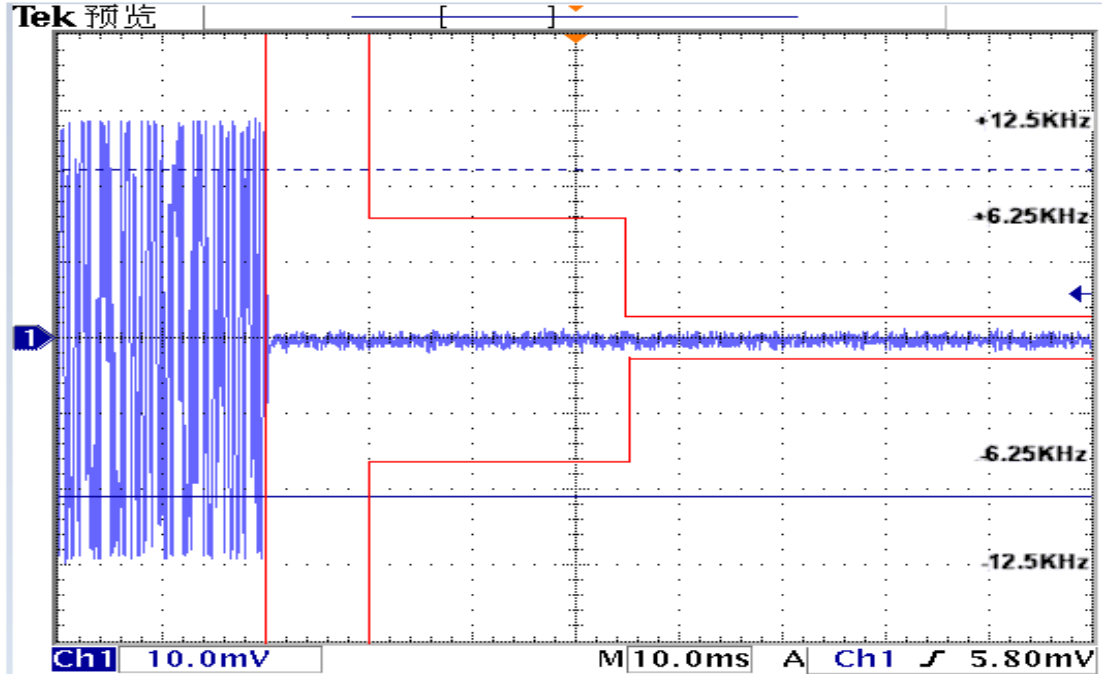




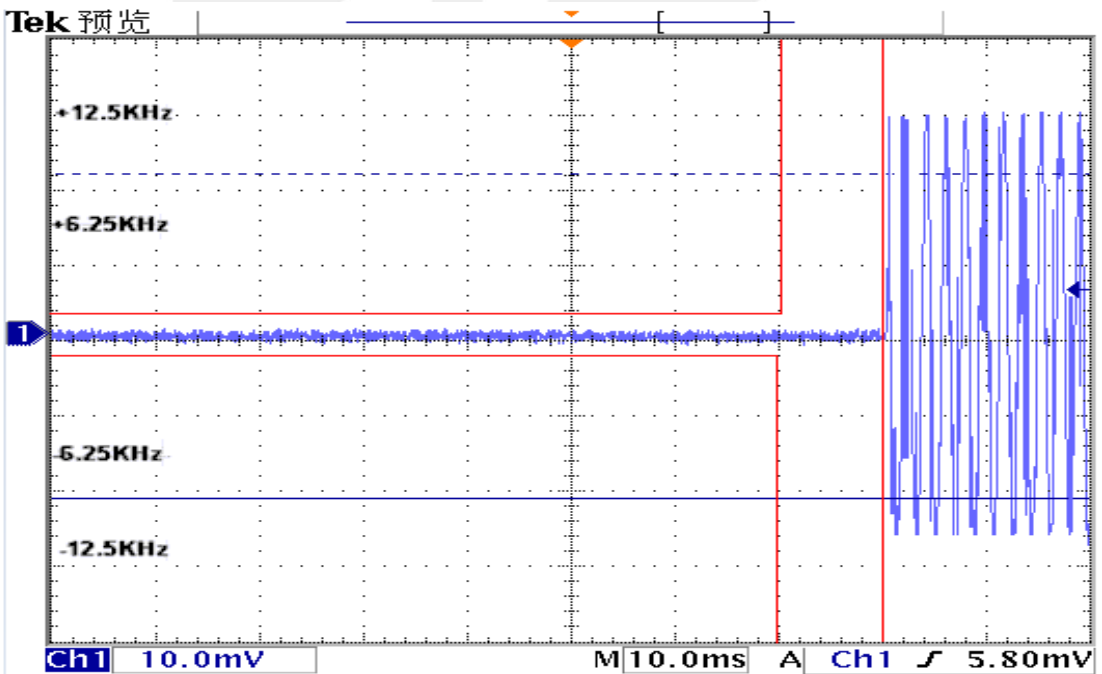
### 8.4 MEASURE RESULT

Remark: We tested and recorded All Op, recorded worst case at Op 1.

FOR UHF BAND  
Transmitter Frequency Behaviour @ 12.5 KHz Channel Separation--Off to On



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





## 9. MAXIMUM TRANSMITTER POWER (CONDUCTED OUTPUT POWER)

### 9.1 PROVISIONS APPLICABLE

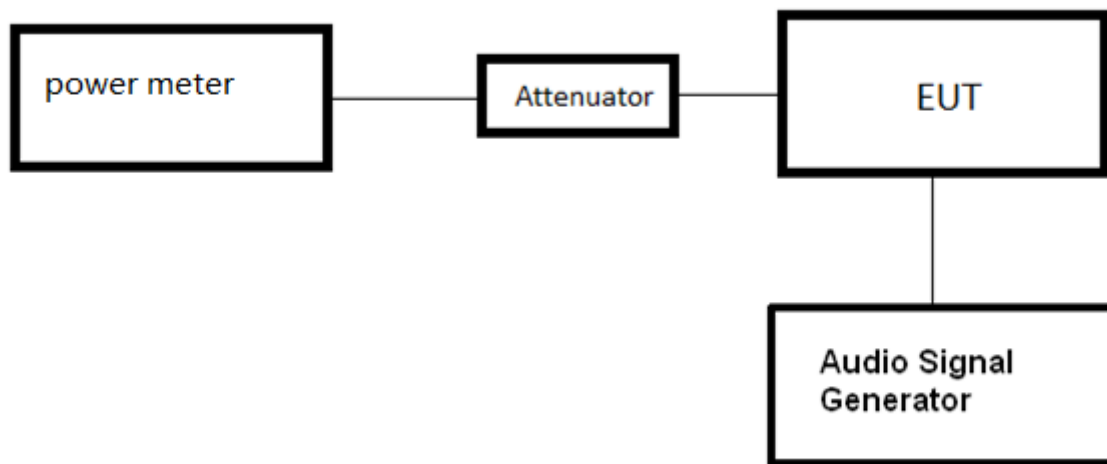
Per FCC §2.1046 And §90.205: Maximum ERP Is Dependent Upon The Station'S Antenna Haat And Required Service Area.

### 9.2 TEST PROCEDURE

The RF Output Of Two-Way Radio Was Connected To A Power Meter Through An Appropriate Attenuator. The Transmitter Shall Be Modulated By A 2.5 KHz 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)

Measure and record the transmitter output power, the use of measurement to capture the real peak of transmitting equipment test.

### 9.3 TEST CONFIGURATION





9.4 TEST RESULT

The maximum Conducted Power (CP) is

Remark:We tested and recorded All Op.

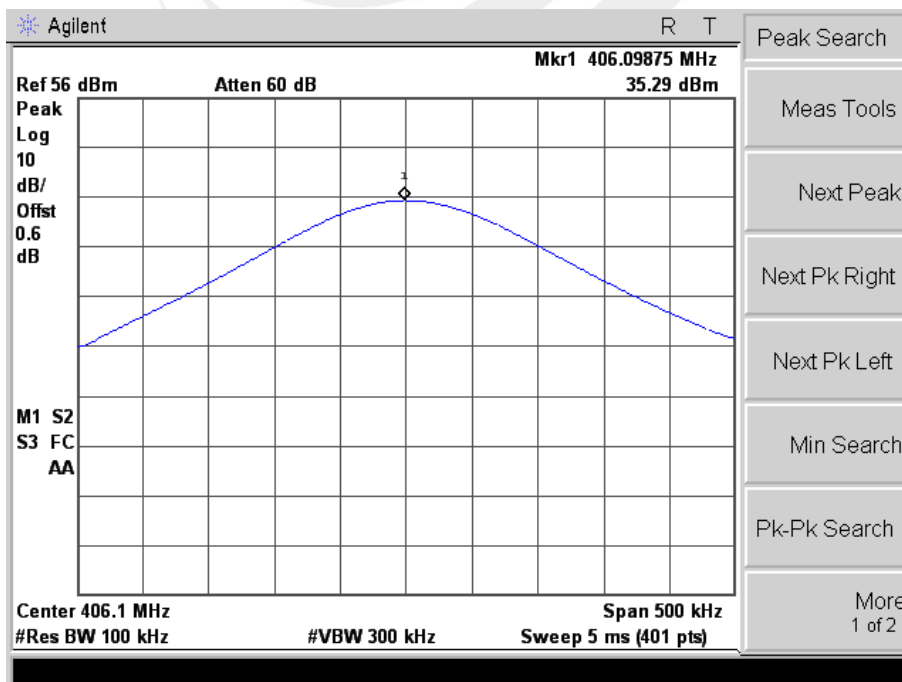
3.758W(35.75dBm) for 12.5 KHz Channel Separation for UHF -OP1

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
12.5KHz	Bottom(406.100MHz)	35.29
	Middle(435.325MHz)	<b>35.75</b>
	Top (469.975MHz)	34.30

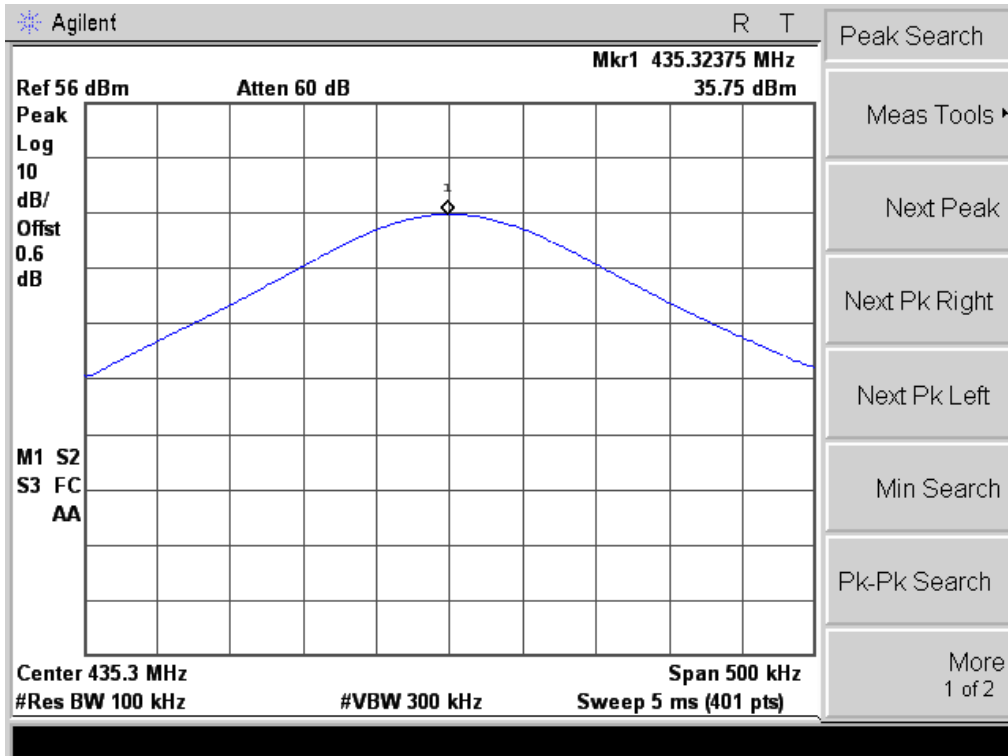
0.541W(27.33dBm) for 12.5 KHz Channel Separation for UHF -OP2

Conducted Power Measurement Results		
Channel Separation	Channel	Measurement Result (dBm)
12.5KHz	Bottom(406.100MHz)	26.17
	Middle(435.325MHz)	26.27
	Top (469.975MHz)	<b>27.33</b>

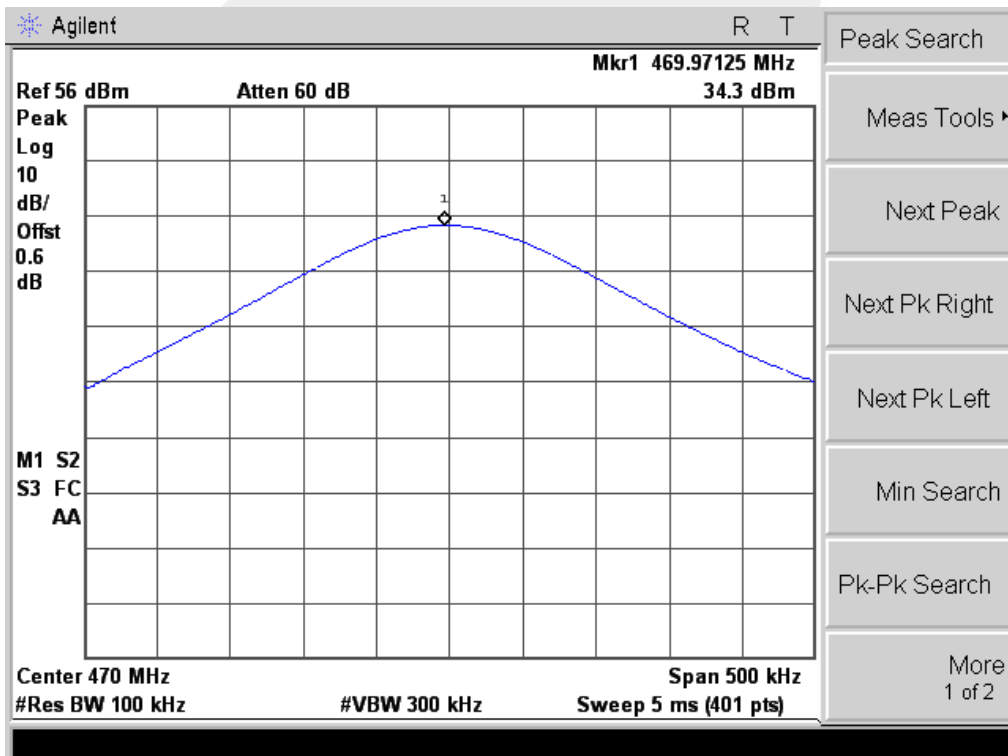
High power 12.5KHz(406.10MHz)



High power 12.5KHz(435.325MHz)

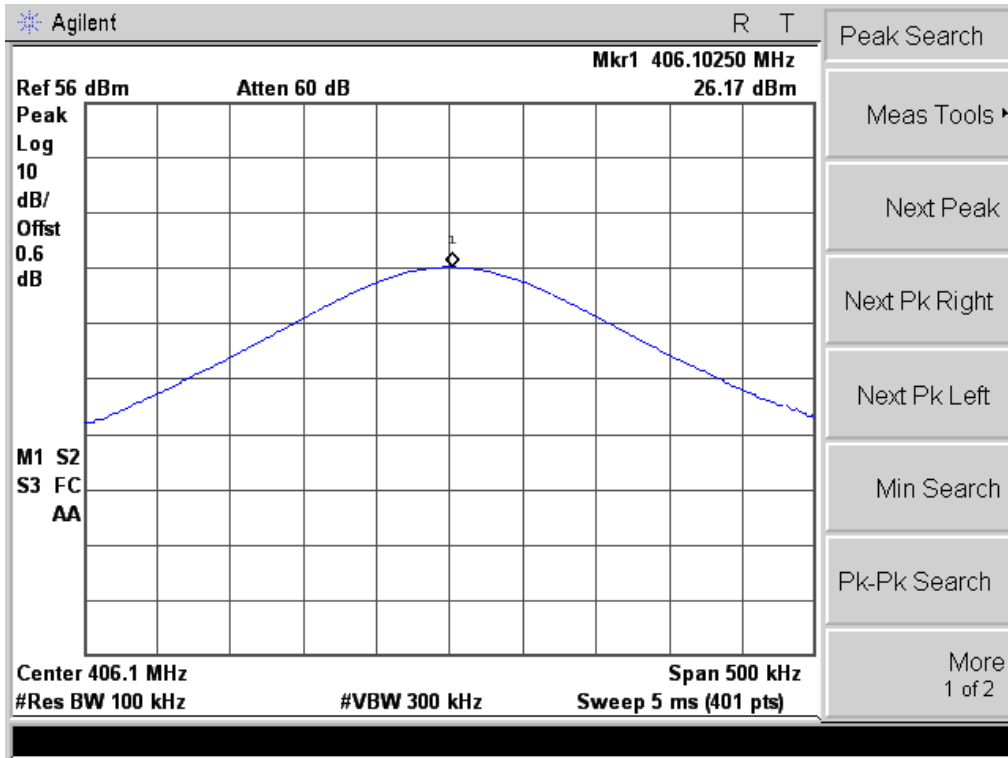


High power 12.5KHz(469.975MHz)

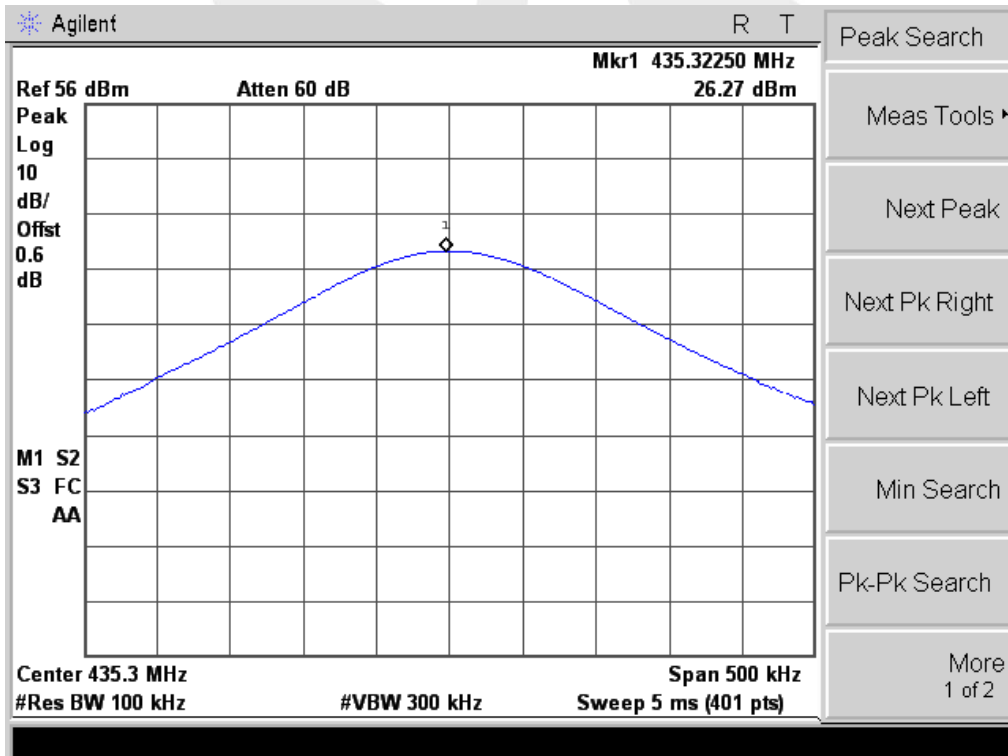




### Low power 12.5KHz(406.10MHz)

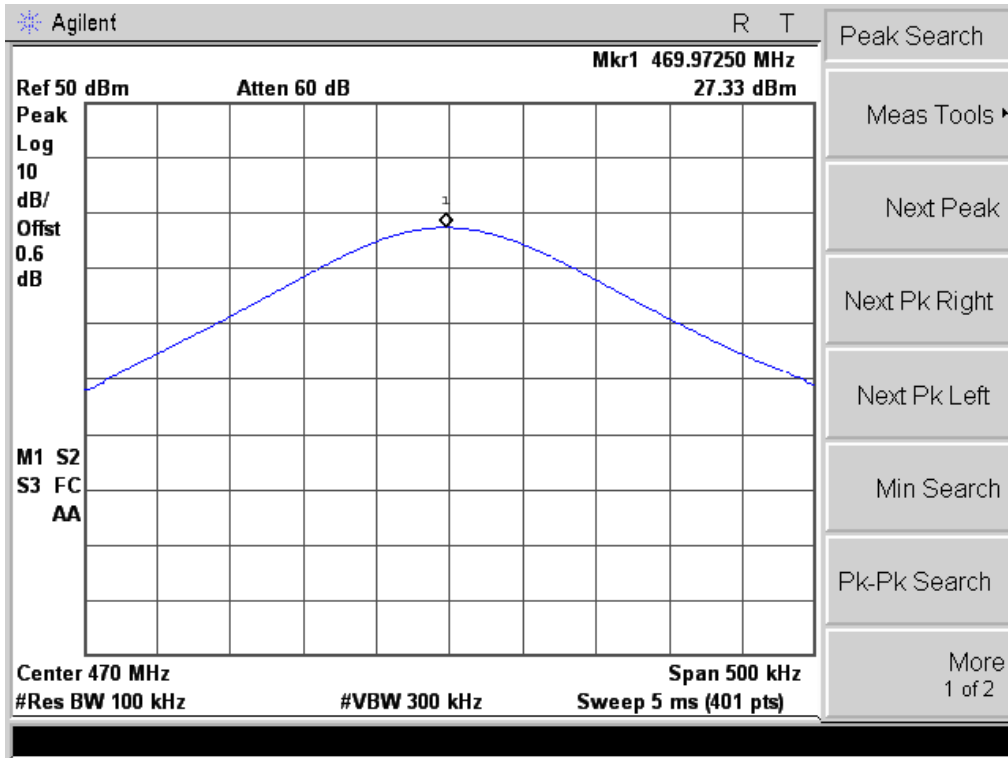


### Low power 12.5KHz(435.325MHz)





Low power 12.5KHz(469.975MHz)



PHOTOS OF TEST SETUP

Radiated Measurement Photos  
30MHz- 1GHz



Above 1GHz

