MOTOROLA SOLUTIONS

MS ISO/IEC 17025
TESTING
SAMM No. 0825

MOTOROLA PENANG ADV. COMM. LABORATORY
Motorola Solutions Malaysia Sdn Bhd
Innoplex Plot 2A, Medan Bayan Lepas,
Mukim 12 S.W.D, 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT
Report Revision : Rev.A

Date/s Tested	:	19-SEP-2017 - 2-OCT-2017
Report Issue Date	:	05-JAN-2018
Manufacturer/Location	:	Motorola Solutions Malaysia Sdn Bhd
Requestor	:	ANG BOON CHYE
Product Type	:	Portable
Model Number	:	CLU1060BBLBA
Frequency Band	:	450-470 MHz
Low / Max RF Output Power	:	1.2 Watts
Applicant Name	:	Motorola Solutions Malaysia Sdn Bhd
Applicant Address	:	Innoplex Plot 2A, Medan Bayan Lepas, Mukim 12 S.W.D, 11900 Bayan Lepas, Penang, Malaysia
FCC Test Firm Registration	:	461337

The equipment was tested accordance to the requirement listed below:

(LMR)	
FCC 47 CFR Part 90	**PASS**
ISED RSS- Gen / 119	

Prepared By:

Song Zhi Wei
Test Personnel

Approved By:

Vincent Foong
Responsible Engineer

Table of Contents

Report Revision History

Revision History	Description	Date	Originator
Rev. A	Initial Report	05-JAN-2018	Song Zhi Wei

1.0 General Information

EUT Description:

Technologies	Land Mobile Radio (LMR)
Modulation Type	Analog

General Description of Applied Standards
The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

ANSI/TIA/-603-D
ANSI C63.4-2014
ANSI C63.26-2015

2.0 Summary of Test Results

FCC General Rules Part (47CFR)	ISED General Rules Part	Test Item	Result	Remark
2.1046, 90.210	RSS-Gen, RSS-119	RF Power Output	Pass	NA
90.214	-	Frequency Stability	Pass	NA
2.1047	-	Audio Frequency Response	Pass	NA
-	-	Audio Low Pass Filter Response	NA	NA
2.1047	RSS-Gen, RSS-119	Modulation limiting	Pass	NA
2.1049, 90.210	RSS-Gen, RSS-119	Occupied Bandwidth	Pass	11K0F3E- 9.6990kHz 16K0F3E- 14.9572kHz
-	-	Band Edge Conducted Spurious Emission	NA	NA
90.214	-	Transient Frequency Behavior	Pass	NA
-	-	Adjacent Channel Power	NA	NA
2.1051, 90.210	RSS-Gen, RSS-119	Conducted Spurious Emissions	Pass	Highest Spur Level -43.48dBm
-	-	Radiated Spurious Emission	NA	Refer External Lab Report
-	-	GNSS (EIRP for 1559 – 1610MHz)	NA	NA
-	-	Effective Radiated Power (ERP)	NA	Refer External Lab Report

NA → **Not Applicable**

3.0 Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.43
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01

4.0 Equipment List

FCC Analog ATE#1: (SW version: 2.4.3& FCC_FreqStability_Rev 1.0.3)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
Audio Analyzer	8903B	3011A10475	2-May-17	2-May-18
SIGNAL GENERATOR	2042	203002/745	2-May-17	2-May-18
MODULATION ANALYZER	8901B	3216A03889	3-May-17	3-May-18
TRANSCEIVER INTERFACE	8954A	2234A00398	4-May-17	4-May-18
DSA	36570A	MY42506781	3-May-17	3-May-18
SIGNAL GENERATOR	E4424B	MY43350219	24-Mar-17	24-Mar-18
SIGNAL GENERATOR	119861/041	119861/041	7-Feb-17	7-Feb-18
POWER SENSOR	E4412A	MY41502652	9-May-17	9-May-18
POWER METER	E4416A	GB41293855	9-May-17	9-May-18
POWER SUPPLY	6031A	3325A02771	3-Mar-17	3-Mar-18
CHAMBER	SH-641	92014678	4-Apr-17	3-Apr-18

FCC Transient ATE #1: (SW version: FCC Transient ATE_R1.0.3)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
POWER SUPPLY	6032A	2818A03549	11-May-17	11-May-18
POWER SENSOR	E4412A	MY41498918	9-May-17	9-May-18
POWER METER	E4416A	MY45101016	11-Jan-17	11-Jan-18
ATTENUATORS/SWITCH DRIVER	11713A	2508A10141	CNR	CNR
STEP ATTENUATOR/11dB	8494G	MY52300223	9-May-17	9-May-18
STEP ATTENUATOR/110dB	8496G	MY52300176	9-May-17	9-May-18
OSCILLOSCOPE	MSO8064A	MY48240107	25-May-17	25-May-18
AUDIO ANALYZER	8903B	3729A17409	2-May-17	2-May-18
AUDIO ANALYZER	8903B	3011A08952	2-May-17	2-May-18
MODULATION ANALYZER	8901B	3019A02766	4-Mar-17	4-Mar-18
SIGNAL GENERATOR	8657A	3323A05725	2-May-17	2-May-18
SPECTRUM ANAYLYZER	E4440A	MY46185415	24-May-17	24-May-19
SWITCH CONTROL UNIT	-	-	CNR	CNR

CONDUCTED SPUR EMISSION ATE # 1 (SW version: 1.23.01)

Description	Model	Serial Number	Calibration Date	Calibration Due Date
SWITCH CONTROL UNIT	3488A	2719A32735	CNR	CNR
SPECTRUM ANALYZER	E4440A	US45303111	16-Feb-17	16-Feb-18
POWER SUPPLY	6032A	MY41002067	5-May-17	5-May-18
HIGH PASS FILTER SWITCH BOX	-	CS001	7-Apr-17	7-Apr-18
MICROWAVE GENERATOR	SMP 02	830682/015	19-Oct-16	19-Oct-17
MODULATION ANALYZER	8901B	3438A05278	3-Mar-17	3-Mar-18

CNR → Calibration Not Required

5.0 Test Condition

5.1. Transmitter Test Conditions

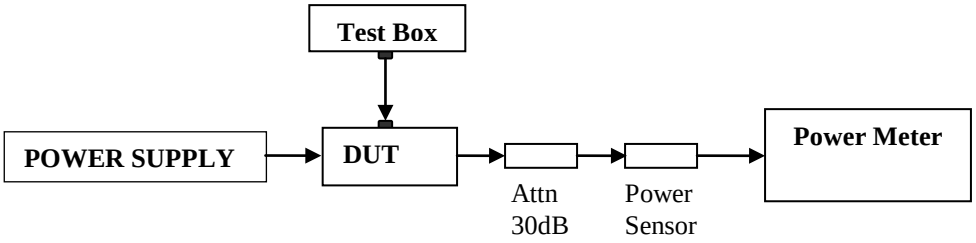
Test Item, (Channel Spacing)	Power (W)	Modulation	Test Frequency (MHz)	Tested By
RF Output Power	**Low & Max**	**Analog**	**451.1875, 461.0375 , 469.5625**	**Song Zhi Wei**
Frequency Stability	**Max**	**Analog**	**469.5625**	**Song Zhi Wei**
Audio Frequency Response (12.5kHz / 25kHz)	**Max**	**Analog**	**469.5625**	**Song Zhi Wei**
Audio Low Pass Filter Response (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Modulation limiting (12.5kHz / 25kHz)	**Max**	**Analog**	**469.5625**	**Song Zhi Wei**
Occupied Bandwidth (12.5kHz / 25kHz)	**Max**	**Analog**	**451.1875,469.5625**	**Song Zhi Wei**
Band Edge Conducted Spurious Emissions (Part 22) (12.5kHz / 20kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Transient Frequency Behavior *(UHF & VHF Band)* (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Adjacent Channel Power *(700MHz Band)* (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Conducted Spurious Emissions (12.5kHz /25kHz)	**Low / Max**	**Analog**	**451.1875, 461.0375 , 469.5625**	**Song Zhi Wei**
Radiated Spurious Emission (12.5kHz / 25kHz)	**Low / Max**	**Analog**	**NA**	**NA**
GNSS (EIRP for 1559 - 1610MHz) (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**
Effective Radiated Power (ERP) (12.5kHz / 25kHz)	**Max**	**Analog**	**NA**	**NA**

NA → Not Applicable

6.0 Transmitter Test Parameters

6.1. RF Output Power

6.1.1. Test Setup



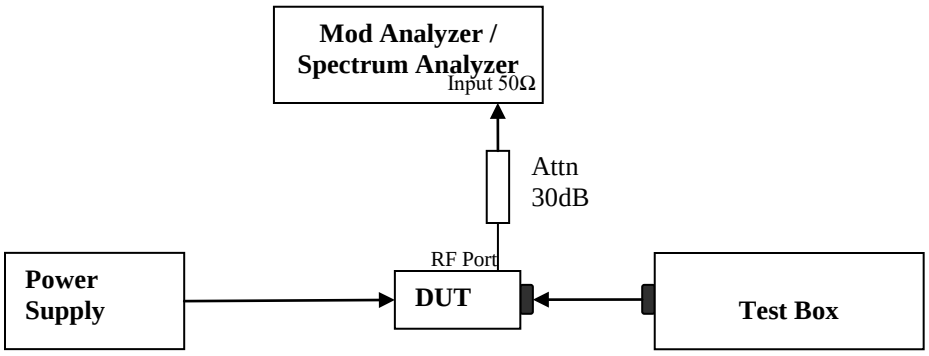
1) The DUT transmitter connected to Power Meter using the 30 dB attenuator and power sensor with above setup.
2) Path loss for the measurement included.
3) All the measurement was done at low, mid, high frequency for each band.
4) Record the power into the test report.

6.1.2. Test Result

Temperature	25˚C		Remarks
Voltage (V)	3.7V		
Frequency (MHz)	Max Power (W)	Current (A)	
451.1875	1.13	0.87	
461.0375	1.10	0.83	
469.5625	1.08	0.81	

6.2. Frequency Stability

6.2.1. Test Setup



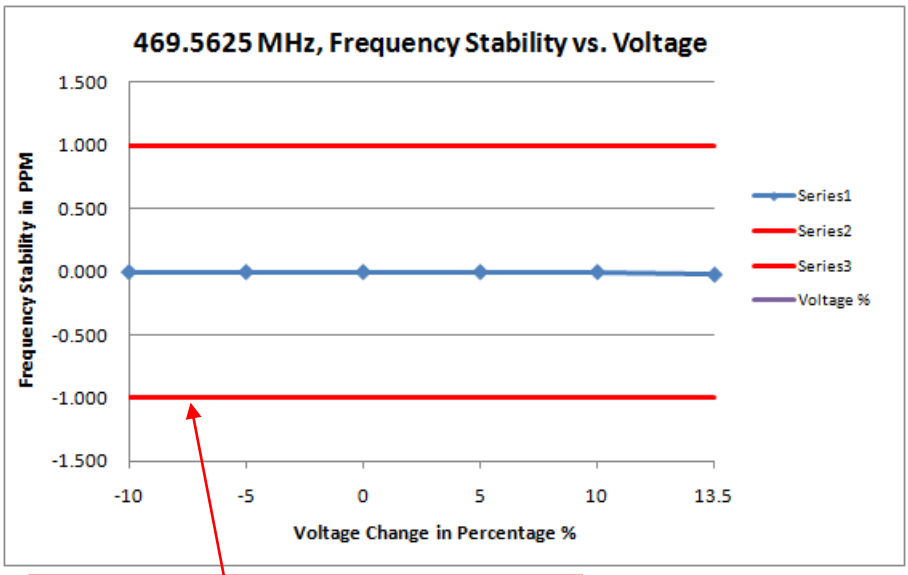
1) The DUT transmitter output port was connected to Modulation / Spectrum Analyzer.
2) Path loss for the measurement included.
3) Transmit the DUT and record the freq in MCF_{MHz}.
4) Test in 2 conditions:
   - Temperature: The frequency of the transmitter was measured from -30°C to 50°C.
   - Supply Voltage:
     -Mobile: The frequency of the transmitter was measured from 85% to 115% of the nominal operating input voltage.
     -Portable: The frequency of the transmitter was measured from nominal ± x % as specified by the manufacturer

5) Calculate the ppm frequency error by the following:

$$ppm\ error = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1\right) * 10^6$$

Where: MCF_{MHz} is the Measured Carrier Frequency in MHz
ACF_{MHz} is the Assigned Carrier Frequency in MHz

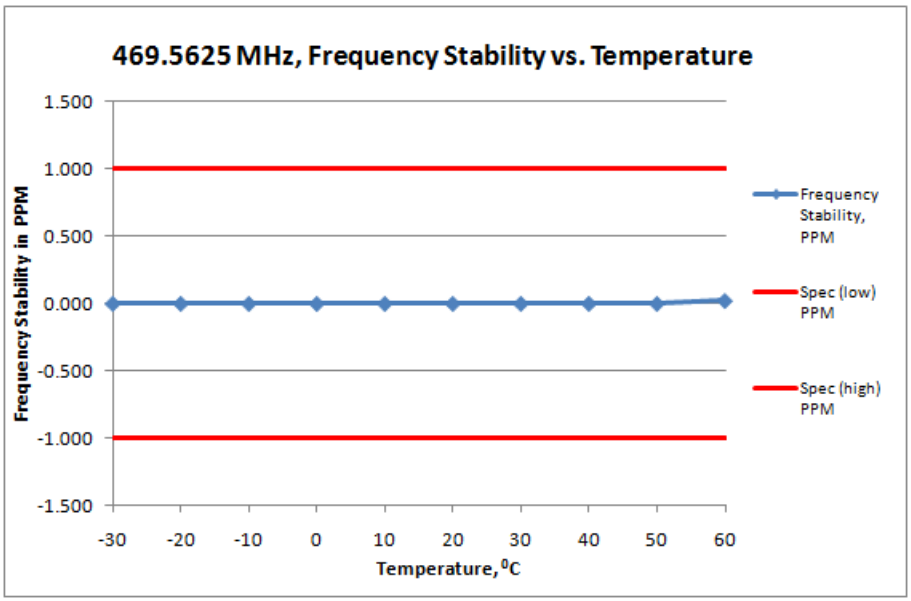
6.2.2. Test Result



Manufacturer specified battery operating end point

(i) Frequency Stability VS Voltage

Frequency / Channel Spacing	469.5625 MHz / 12.5 kHz				
Temperature, °C	25				
Voltage %	Voltage, V	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-10	3.330	469.562500	0.000	-1.000	1.000
-5	3.515	469.562500	0.000	-1.000	1.000
0	3.700	469.562490	0.000	-1.000	1.000
5	3.885	469.562500	0.000	-1.000	1.000
10	4.070	469.562500	0.000	-1.000	1.000
13.5	4.200	469.562490	-0.021	-1.000	1.000



(ii) Frequency Stability VS temperature

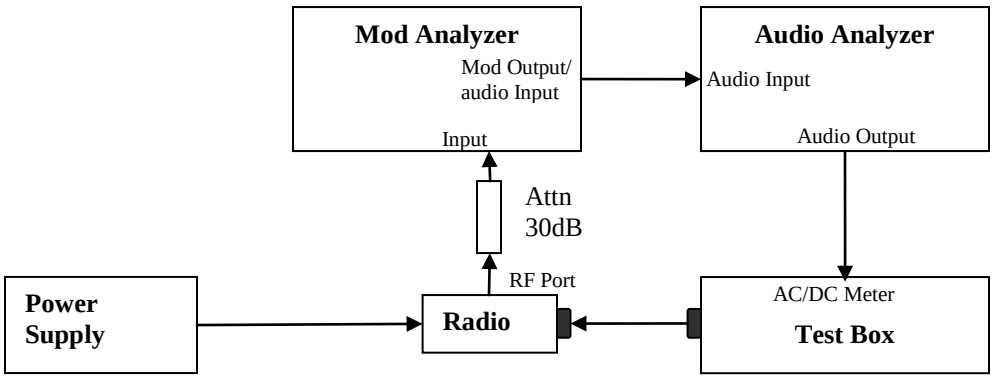
Frequency / Channel Spacing	469.5625 MHz / 12.5 kHz			
Voltage, V	3.7			
Temperature, °C	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-30	469.562500	0.000	-1.000	1.000
-20	469.562500	0.000	-1.000	1.000
-10	469.562500	0.000	-1.000	1.000
0	469.562500	0.000	-1.000	1.000
10	469.562500	0.000	-1.000	1.000
20	469.562500	0.000	-1.000	1.000
30	469.562500	0.000	-1.000	1.000
40	469.562500	0.000	-1.000	1.000
50	469.562500	0.000	-1.000	1.000
60	469.562510	0.021	-1.000	1.000

6.2.3. Test Limit

As per manufacturer declared spec +/- 1ppm

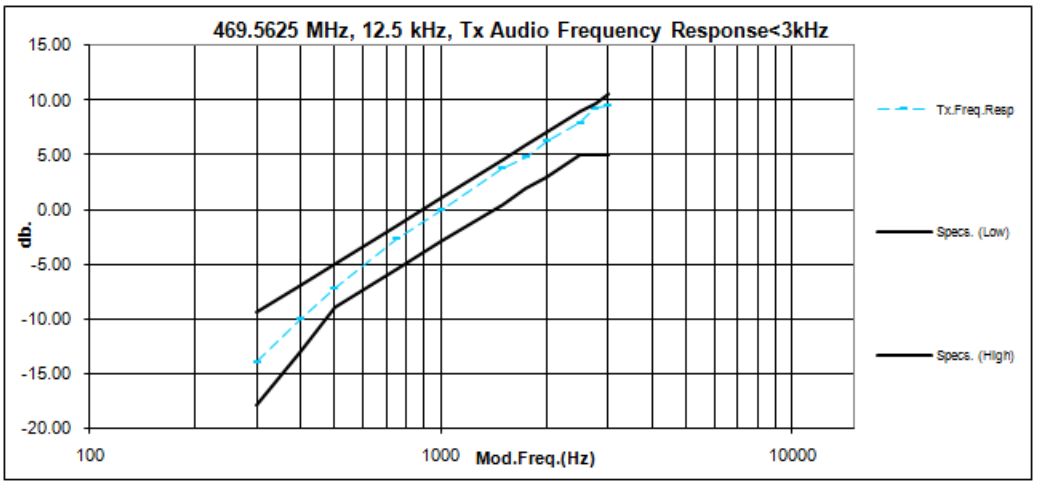
6.3. Audio Frequency Response

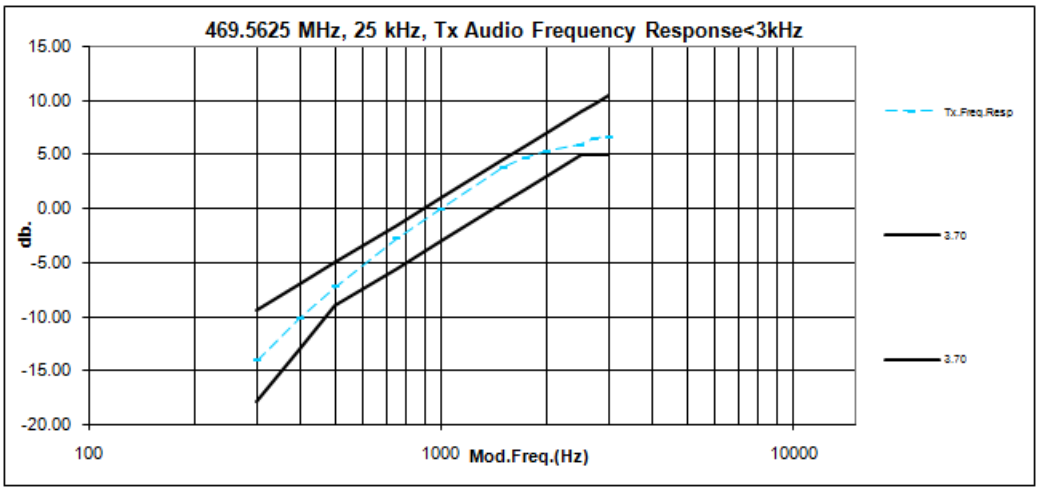
6.3.1. Test Setup



1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Set the audio bandwidth filter to 15 kHz and 50 kHz.
4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 20% of the Full rated system deviation.
5) On audio analyzer, set the rated level as reference to zero.
6) Vary the audio frequency from 300 Hz to 3 kHz. Record the change in dB on the audio analyzer.

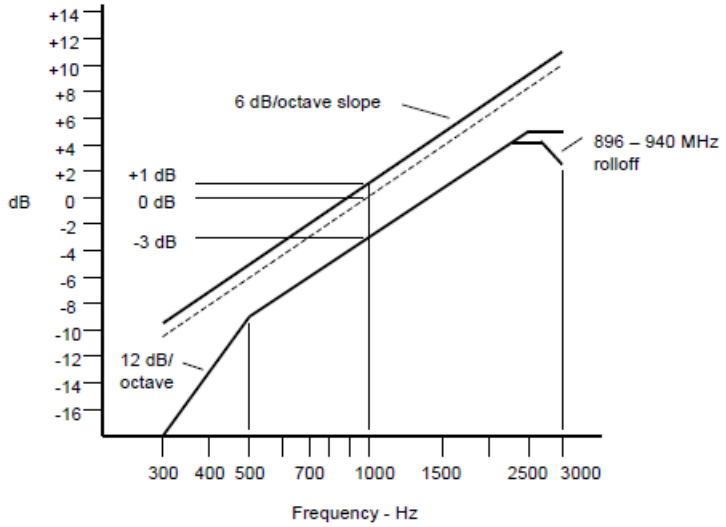
6.3.2. Test Result





NOT FOR FCC REVIEW

6.3.3. Test Limit

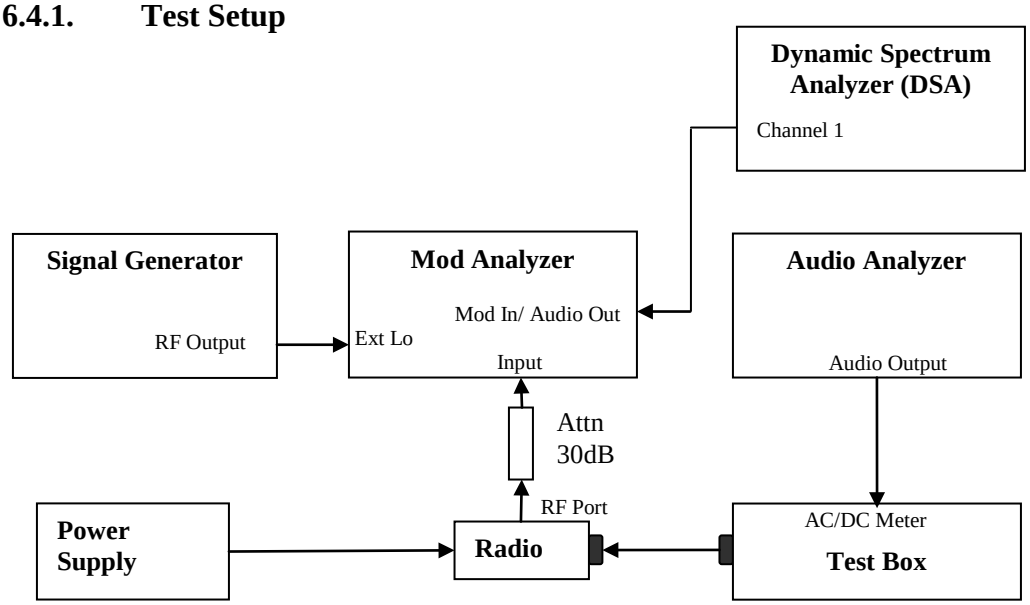


Note:

- *There are additional 6 dB per octave attenuation is allowed from 2.5KHz to 3KHz in equipment 25MHz to 869MHz radio.*
- *Additional 6 dB per octave attenuation is allowed from 2.3KHz to 2.7KHz & additional 12 dB per octave attenuation is allowed from 2.7KHz to 3KHz in equipment 896MHz to 940MHz radio.*

6.4. Audio Low Pass Filter Response

6.4.1. Test Setup

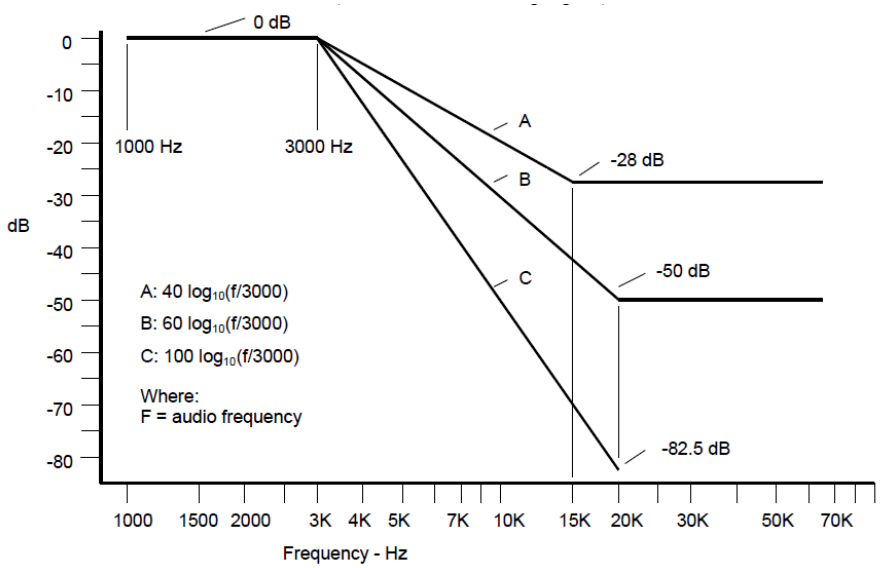


1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Press 23.1SPCL on modulation analyzer to enable the external LO from Sigen.
4) Set the Sigen frequency to Fc + 1.5 MHz, RF output level to 0dBm without modulation.
5) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the Full rated system deviation.
6) Up the amplitude by 20dB.
7) On DSA, get the reference point to 0dB.
8) Vary the frequency on audio analyzer from 3 kHz to 20 kHz, record the audio tone from DSA.

6.4.2. Test Result

NA → **Not Applicable**

6.4.3. Test Limit



For audio frequencies above 3000 Hz, the audio response of the post limiter low-pass filter shall meet or exceed the following requirements:

a) For equipment operating on 20, 25 or 30 kHz channel bandwidth in the 25 MHz to 174 MHz range:

At frequencies from 3000 Hz through 15,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: $40 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

At frequencies above 15,000 Hz, the attenuation shall be greater than the attenuation at 1000 Hz, by at least: 28 dB.

b) For equipment operating with 25 kHz bandwidth channels between 406 and 512 MHz through 896 MHz, and between 929 MHz through 930 MHz:

At frequencies from 3000 Hz through 20,000 Hz, the attenuation shall be greater than the attenuation at 1000 Hz by at least: $60 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

At frequencies above 20,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: 50 dB.

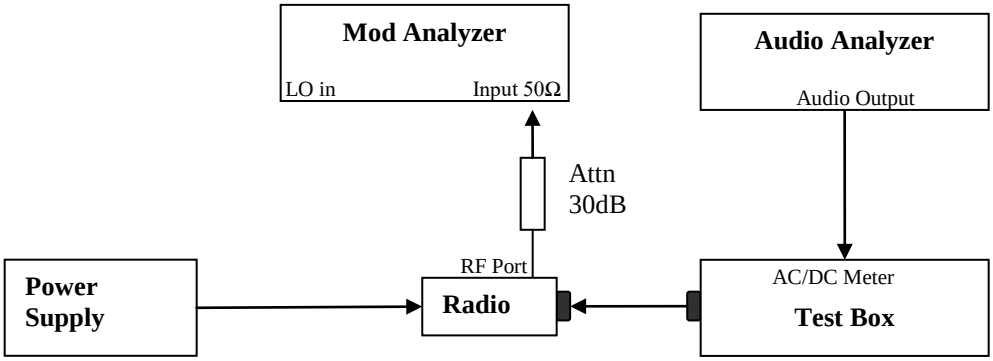
c) For equipment operating on channels between 896 MHz through 901 MHz, between 935 MHz through 940 MHz, and 12.5 or 15 kHz spaced channels in the frequency range 138-174 MHz and 406-512 MHz.

At frequencies from 3000 Hz through 20,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: $100 \log_{10}(f / 3000)$ dB

where: f is the audio frequency in Hz.

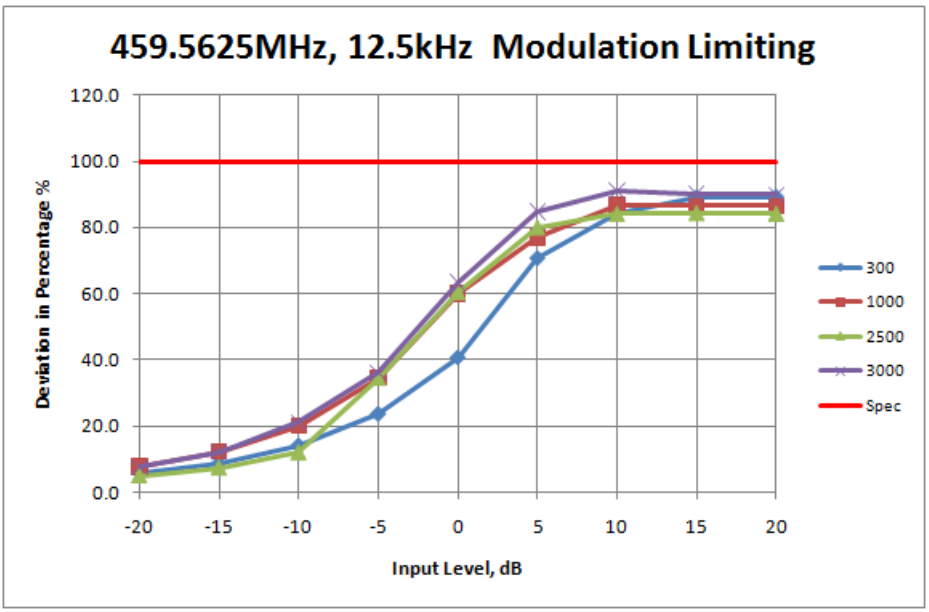
6.5. Modulation Limiting

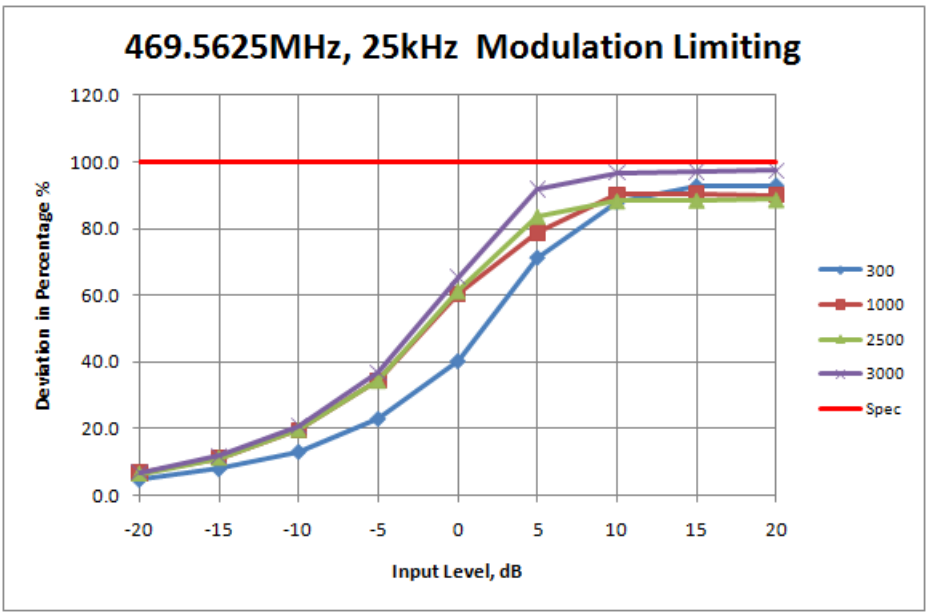
6.5.1. Test Setup



1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Path loss for the measurement included.
3) Set the audio bandwidth filter to 15 kHz.
4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the Full rated system deviation.
5) Record the frequency deviation as 0dB input level at 1kHz audio frequency.
6) Repeat the step and record the frequency deviation from -20 dB to 20dB by 5 dB increments and different audio freq 300 Hz, 2.5 kHz and 3 kHz.

6.5.2. Test Result





NOT FOR FCC REVIEW

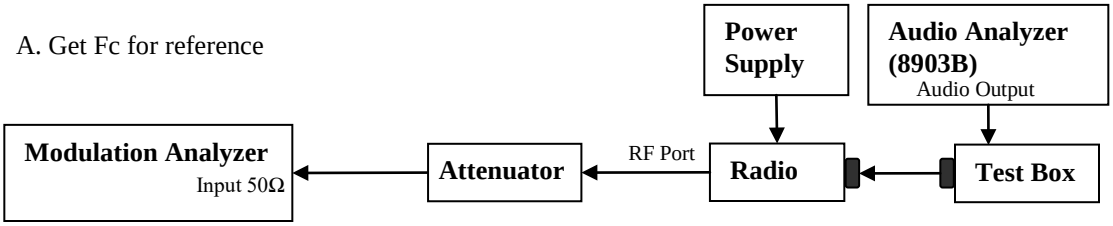
6.5.3. Test Limit

Modulation Limiting shall not exceed 100 percent.

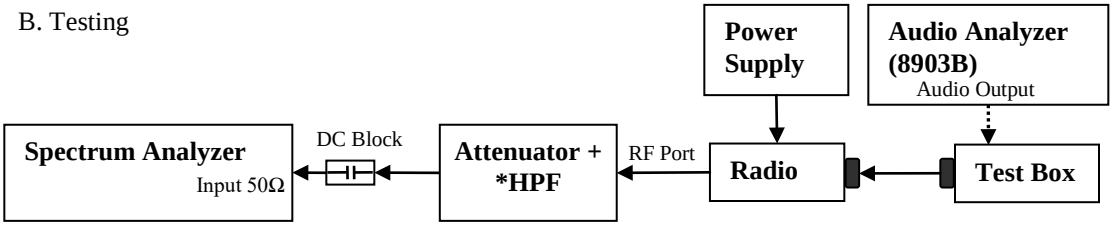
6.6. Occupied Bandwidth

6.6.1. Test Setup (Analog)

A. Get Fc for reference



B. Testing

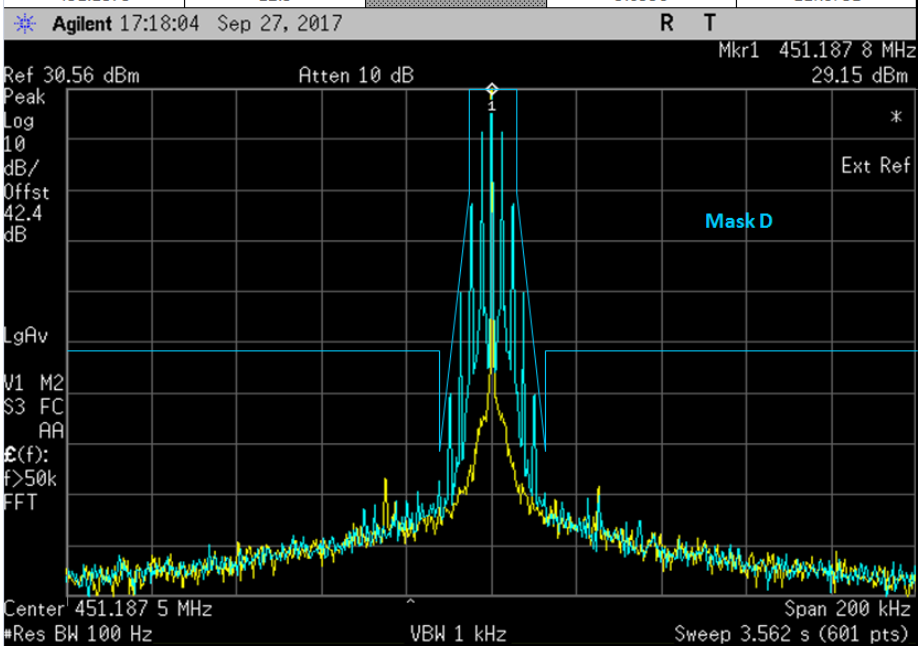


1) The DUT transmitter output port was connected to Modulation Analyzer.
2) Set the audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
3) Transmit the radio and set the audio analyzer to 2.5 kHz audio frequency and 50% of the rated deviation. Up the amplitude by 16 dB. Dekey the DUT.
4) Path loss for the measurement included.
5) Select the Occupied Bandwidth measurement for 99% Emissions Bandwidth Measurement.
6) Key in the Fc and Resolution Bandwidth (1 ~ 5 % of emission designator).
7) Transmit the DUT and record the occupied Bandwidth frequency.
8) Preset the spectrum analyzer for sideband spectrum measurement.
9) Set the span and Resolution Bandwidth (according to FCC/ ISED standard).
10) Save the screen shot as modulated signal
11) Remove the audio tone from audio analyzer to capture unmodulated signal.

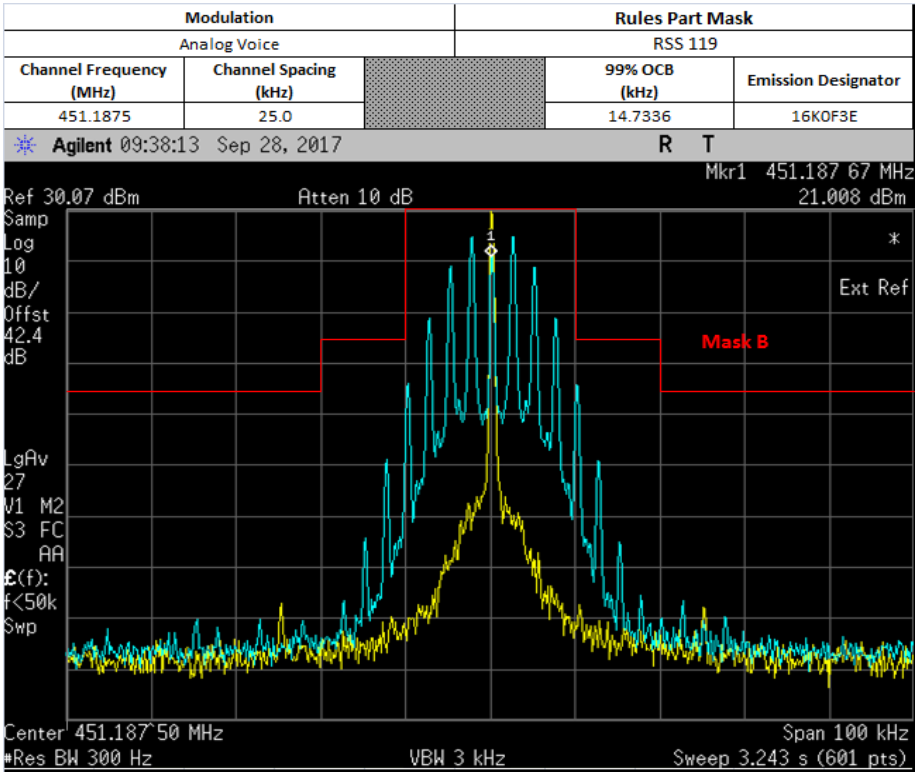
* Only HPF added for Mask 80.211 measurement with attenuator.

6.6.2. Test Result (Analog)

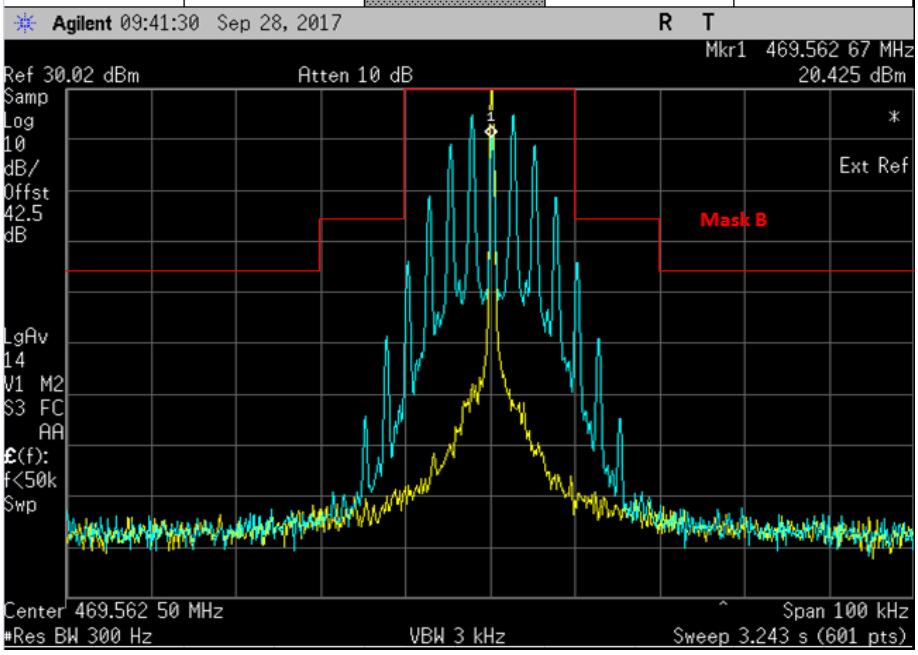
Modulation			Rules Part Mask	
Analog Voice			FCC Part 90 / RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
451.1875	12.5		9.6990	11K0F3E



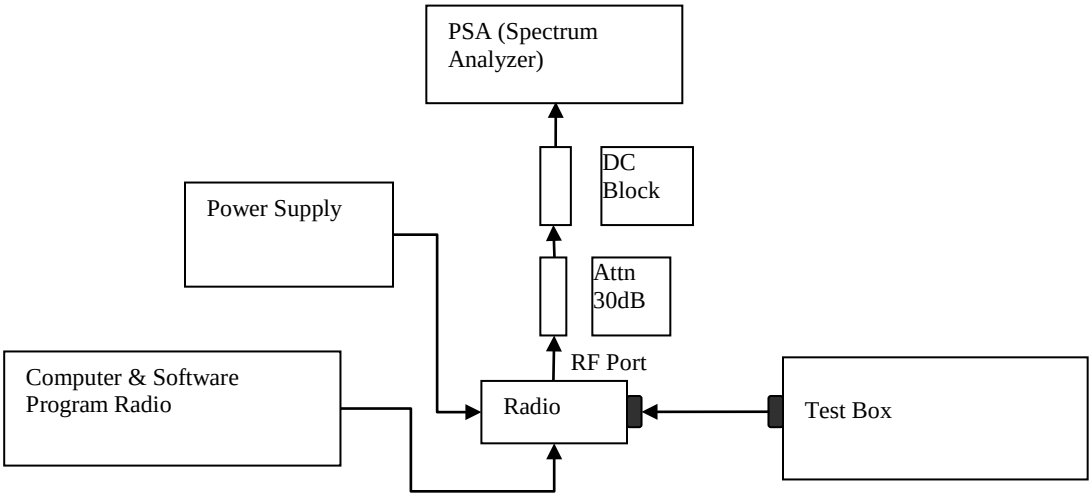
Modulation			Rules Part Mask	
Analog Voice			RSS 119	
Channel Frequency (MHz)	**Channel Spacing (kHz)**		**99% OCB (kHz)**	**Emission Designator**
451.1875	25.0		14.7336	16K0F3E



Modulation			Rules Part Mask	
Analog Voice			RSS 119	
Channel Frequency (MHz)	Channel Spacing (kHz)		99% OCB (kHz)	Emission Designator
469.5625	25.0		14.9572	16K0F3E



6.6.3. Test Setup (Digital)



1) Program and set radio to operate in desire test frequency and digital mode with modulation. (*4FSK, C4FM or other digital modulation form).
2) Path loss for the measurement included.
3) Select the Occupied Bandwidth measurement for 99% Emissions Bandwidth Measurement.
4) Key in the Fc and Resolution Bandwidth (1 ~ 5 % of emission designator).
5) Transmit the DUT and record the occupied Bandwidth frequency.
6) Preset the spectrum analyzer for modulation emission spectrum measurement.
7) Set the span and Resolution Bandwidth (according to FCC/ ISED standard).
8) Capture the screen shot as modulated signal.

*Note:

- For Digital Modulation, 12.5 kHz Data F1D & FXD would be the same. Therefore only measurements with F1D modulation shown below.
- For Digital Modulation, 12.5 kHz Data F1E & FXE would be the same. Therefore only measurements with F1E modulation shown below.

6.6.4. Test Result (Digital)

NA → **Not Applicable**

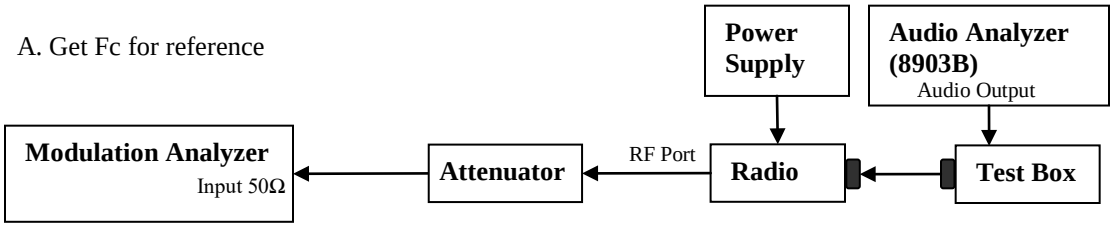
6.6.5. Test Limit

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

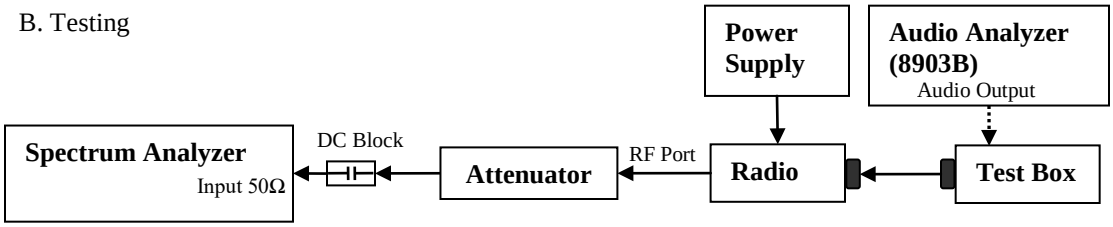
6.7. Band Edge Conducted Spurious Emission (Part 22)

6.7.1. Test Setup (Analog)

A. Get Fc for reference



B. Testing



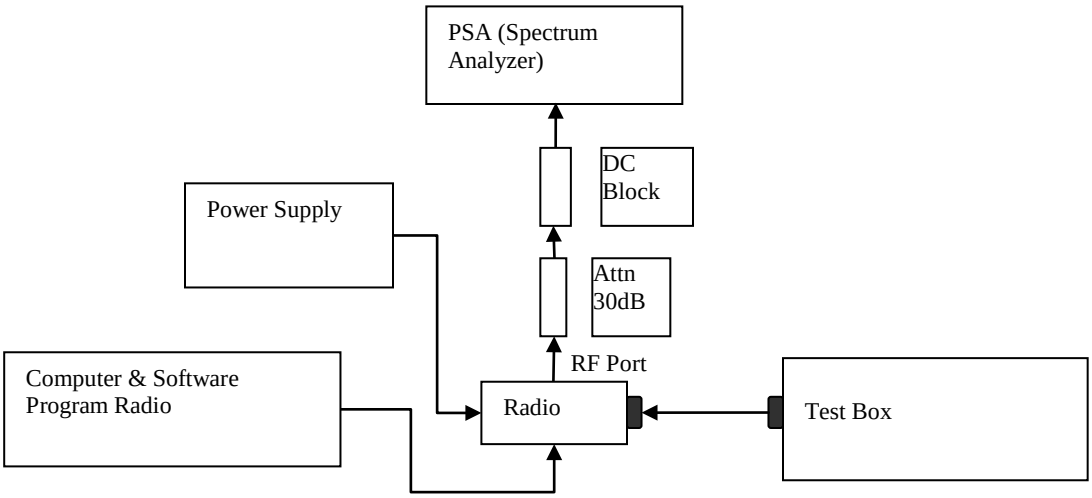
2) The DUT transmitter output port was connected to Modulation Analyzer.
3) Set the audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
4) Transmit the radio and set the audio analyzer to 2.5 kHz audio frequency and 50% of the rated deviation. Up the amplitude by 16 dB. Dekey the DUT.
5) Path loss for the measurement included.
6) Select the Occupied Bandwidth measurement for 99% and 26dB Emissions Bandwidth Measurement.
7) Key in the Fc and Resolution Bandwidth.
8) Transmit the DUT and record the occupied Bandwidth frequencies.
9) Preset the spectrum analyzer for band edge measurement.
10) The band edges of lowest and highest channels were measured.
11) Key in the Lowest and highest channel frequency, span is 60 kHz and Resolution Bandwidth is at least 1% of Emission Bandwidth.
12) Save the screen shot as modulated signal.
13) Remove the audio tone from audio analyzer to capture unmodulated signal.

*Note:
- For emission designator ending with F3E, 16K0F3E is the worst case and therefore only 16K0F3E will be shown.

6.7.2. Test Result (Analog)

NA → **Not Applicable**

6.7.3. Test Setup (Digital)



1) Program and set radio to operate in desire test frequency and digital mode with modulation. (*4FSK, C4FM or other digital modulation form).
2) Path loss for the measurement included.
3) Select the Occupied Bandwidth measurement for 99% and 26dB Emissions Bandwidth Measurement.
4) Key in the Fc and Resolution Bandwidth.
5) Transmit radio record the occupied Bandwidth frequencies.
6) Preset the spectrum analyzer for band edge measurement.
7) Key in the lowest and highest channels frequency, span is 60 kHz and Resolution Bandwidth is at least 1% of Emission Bandwidth.
8) Save the screen shot.

*Note:
- For Digital Modulation, 12.5 kHz Data F1D & FXD would be the same. Therefore only measurements with F1D modulation shown below.
- For Digital Modulation, 12.5 kHz Data F1E & FXE would be the same. Therefore only measurements with F1E modulation shown below.

6.7.4. Test Result (Digital)

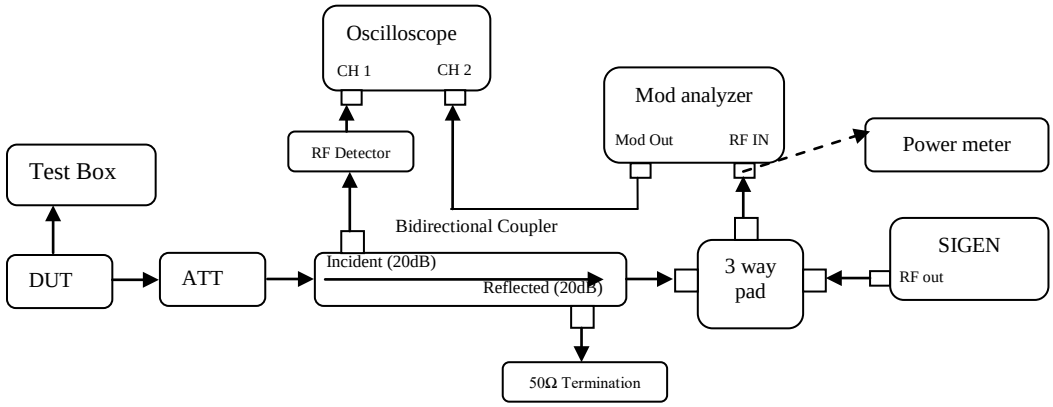
NA → **Not Applicable**

6.7.5. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

6.8. Transient Frequency Behavior

6.8.1. Test Setup

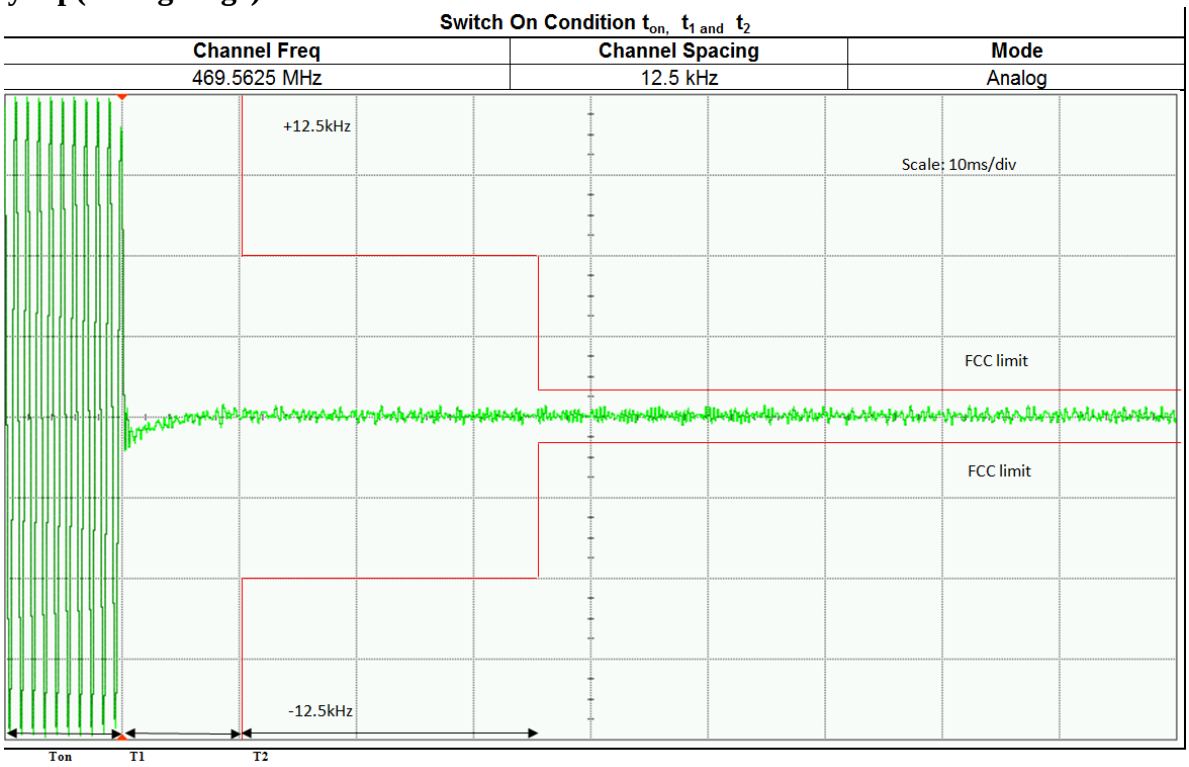


1) Connect the setup as figure above.
2) Path loss for the measurement included.
3) Set on Sigen with the assigned center frequency, internal 1 kHz FM tone.
   FM Deviation: Analog 25kHz Channel Spacing = 25 kHz
   Analog 12.5 kHz Channel Spacing = 12.5 kHz
   C4FM = 12.5 kHz
4) Turn on 50 kHz high pass filter and 15 kHz low pass filter on modulation analyzer.
5) Supply sufficient attenuation ATT to provide the output power of ≤ -11dBm into power meter when DUT is keying up.
6) Note the power level on power meter and dekey the DUT.
7) Adjust the amplitude of the signal generator to the level power meter, maintained the amplitude throughout the rest of the measurement.
8) Connect the output to modulation analyzer.
9) Reduce 30dB attenuation and transmit the radio to get the trigger line.
10) Capture the screen shot for key-up (rising edge) and de-key (falling edge) mode.

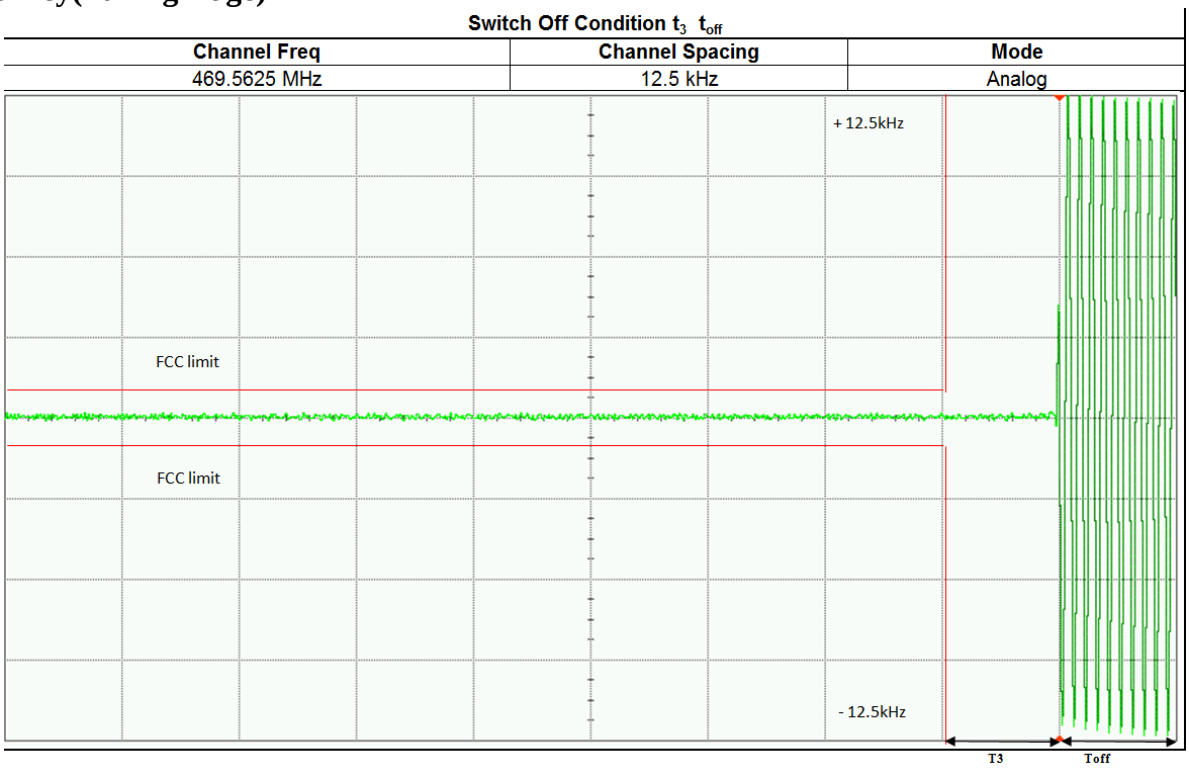
6.8.2. Test Result

Analog : 469.5625MHz ,12.5kHz,FCC Part 90

Key-Up(Rising Edge)

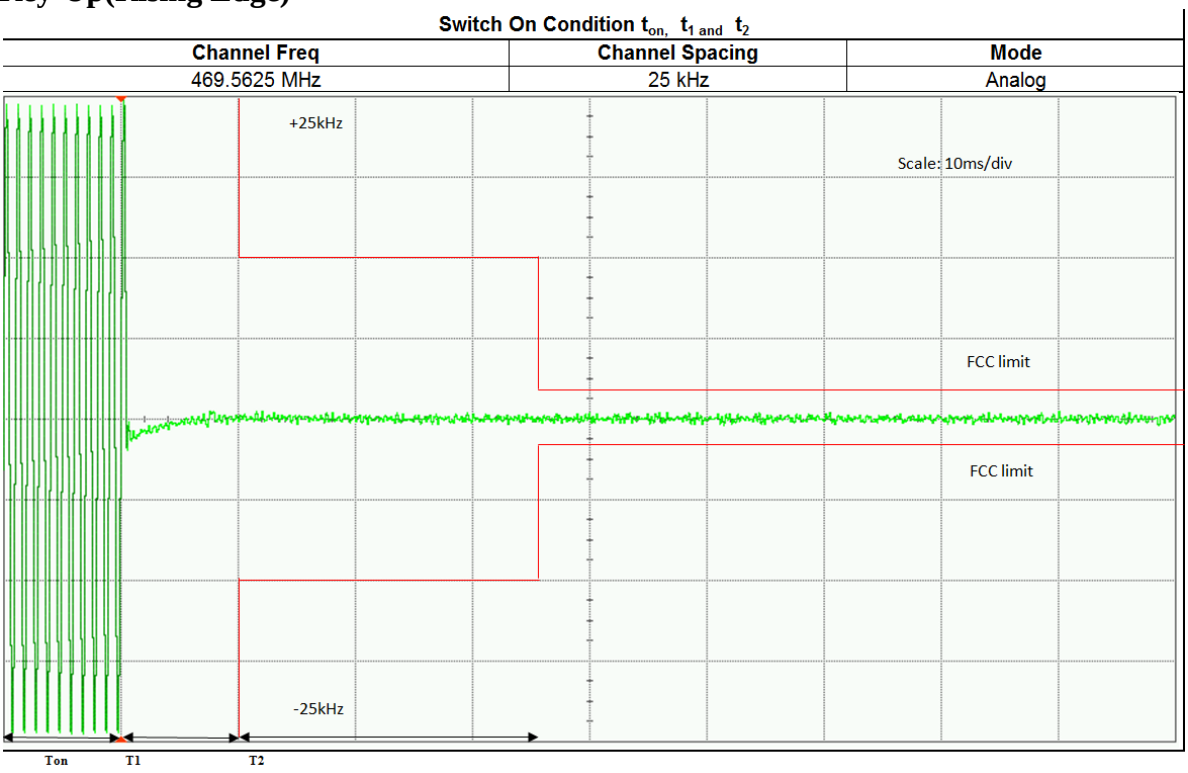


De-Key(Falling Edge)

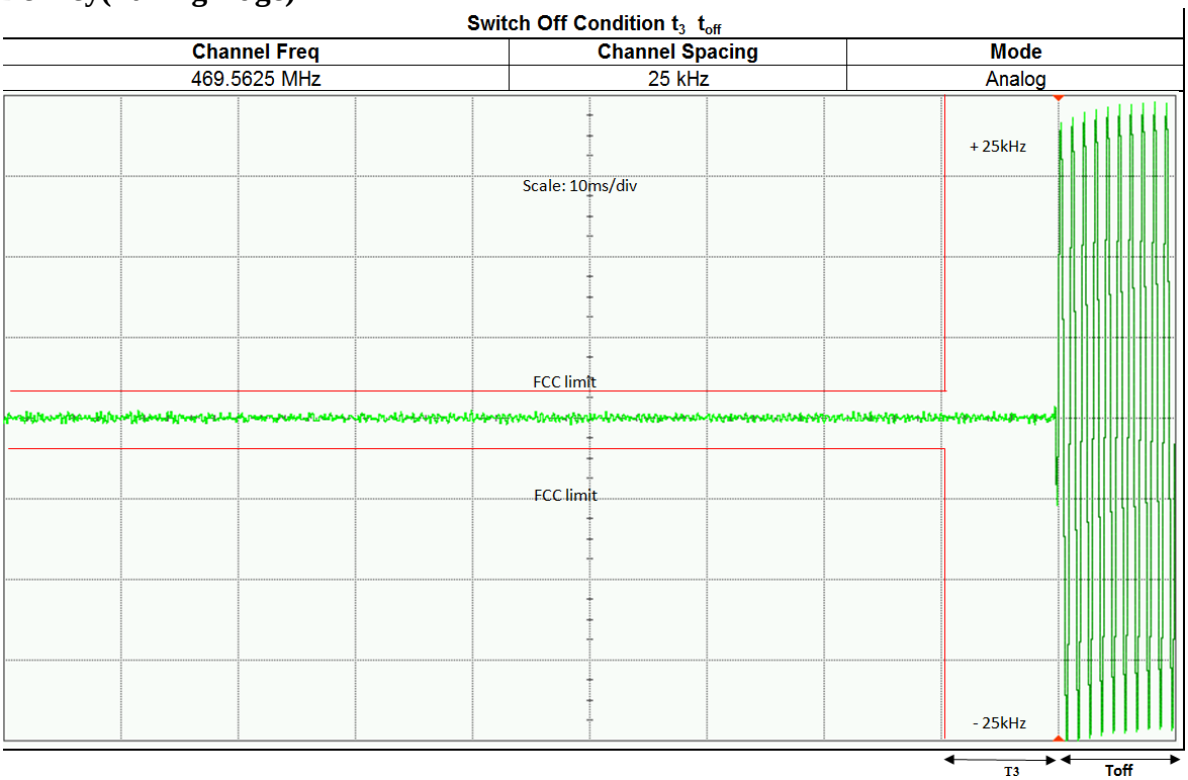


Analog : 469.5625MHz ,25.0kHz (NOT FOR FCC REVIEW)

Key-Up(Rising Edge)



De-Key(Falling Edge)



6.8.3. Test Limit

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies 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 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

[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.

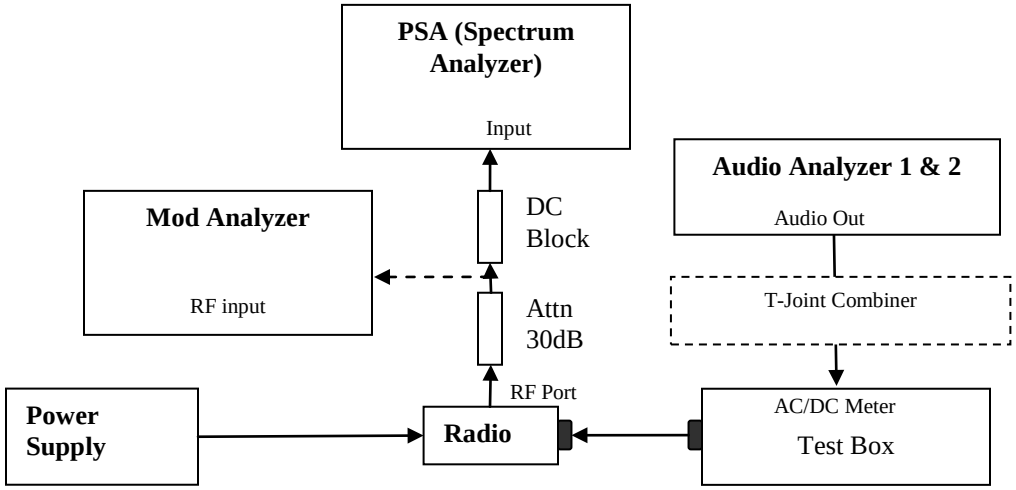
[2] During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in §90.213.

[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.

6.9. Adjacent Channel Power

6.9.1. Test Setup (Analog)

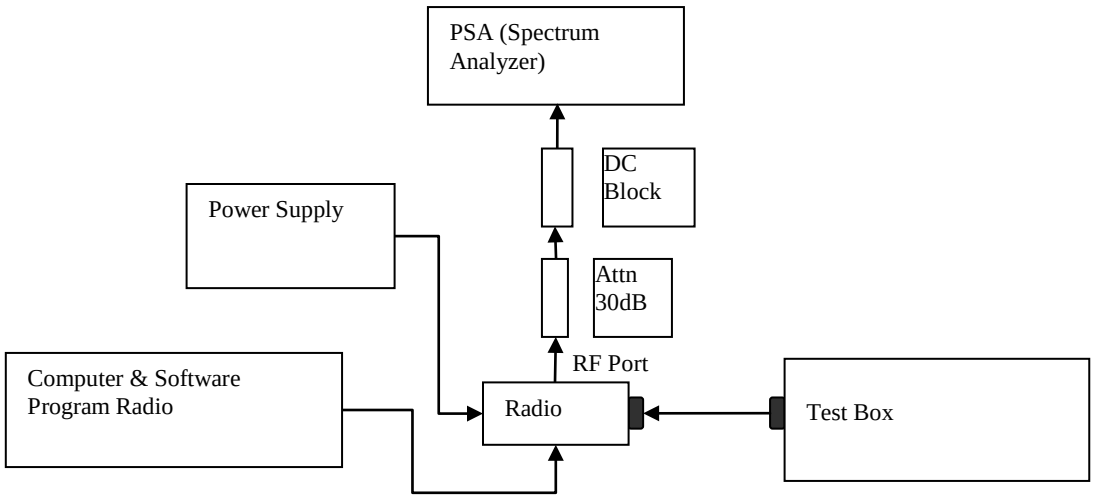


1) The DUT transmitter output port was connected to modulation analyzer.
2) Transmit the radio and turn on 1st audio analyzer with audio frequency 650Hz, 50% rated deviation, and record the amplitude value as AmpT1.
3) Turn off Audio analyzer 1 and turn on audio analyzer 2, set the audio frequency to 2.2 kHz and 50% deviation. Record the amplitude as AmpT2.
4) Turn both audio analyzers ON and up 10dB amplitude level.
5) Connect the output to PSA and set to assigned center frequency.
6) Set Span, Resolution Bandwidth and Video Bandwidth per rules part.
7) Transmit the radio and record the Adjacent Channel Power value in dBc.

6.9.2. Test Result

NA → **Not Applicable**

6.9.3. Test Setup (Digital)



1) Program and set radio to operate in desire test frequency and digital mode with modulation. (4FSK, C4FM or other digital modulation form).
2) Prepare setup as per picture.
3) Turn on the ACP Measurement – Press Measure, ACP.
4) Set Span, Resolution Bandwidth and Video Bandwidth as per rules part.
5) Transmit the radio and record the Adjacent Channel Power value in dBc.

6.9.4. Test Result

NA → **Not Applicable**

6.9.5. Test Limit

12.5 kHz Mobile Transmitter ACP Requirements

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP relative (dBc)
9.375	6.25	−40
15.625	6.25	−60
21.875	6.25	−60
37.50	25.00	−60
62.50	25.00	−65
87.50	25.00	−65
150.00	100	−65
250.00	100	−65
350.00	100	−65
>400 to 12 MHz	30 (s)	−75
12 MHz to paired receive band	30 (s)	−75
In the paired receive band	30 (s)	−100

25 kHz Mobile Transmitter ACP Requirements

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP relative (dBc)
15.625	6.25	−40
21.875	6.25	−60
37.50	25	−60
62.50	25	−65
87.50	25	−65
150.00	100	−65
250.00	100	−65
350.00	100	−65
>400 kHz to 12 MHz	30 (s)	−75
12 MHz to paired receive band	30 (s)	−75
In the paired receive band	30 (s)	−100

12.5 kHz Base Transmitter ACP Requirements

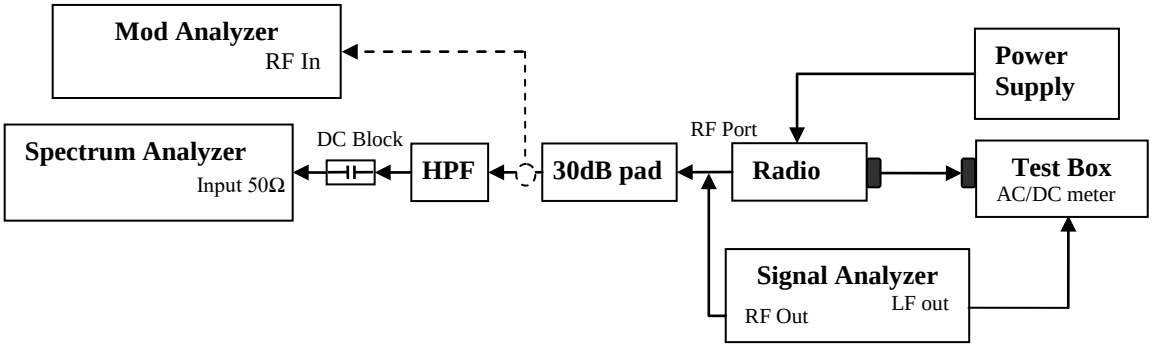
Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP (dBc)
9.375	6.25	−40
15.625	6.25	−60
21.875	6.25	−60
37.5	25	−60
62.5	25	−65
87.5	25	−65
150	100	−65
250	100	−65
350.00	100	−65
>400 kHz to 12 MHz	30 (s)	−80
12 MHz to paired receive band	30 (s)	−80
In the paired receive band	30 (s)	[1]-85

25 kHz Base Transmitter ACP Requirements

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP (dBc)
15.625	6.25	−40
21.875	6.25	−60
37.5	25	−60
62.5	25	−65
87.5	25	−65
150	100	−65
250	100	−65
350	100.00	−65
>400 kHz to 12 MHz	30 (s)	−80
12 MHz to paired receive band	30 (s)	−80
In the paired receive band	30 (s)	[1]-85

6.10. Conducted Spurious Emission

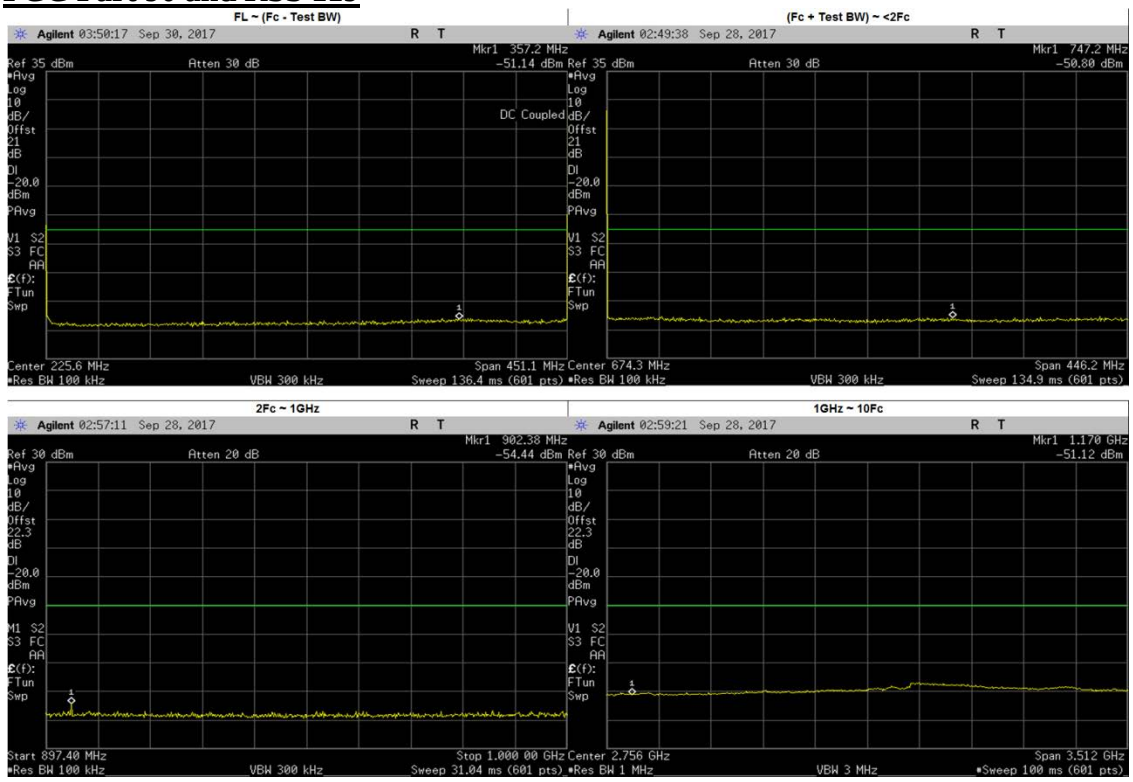
6.10.1. Test Setup



1) The DUT transmitter output port was connected to Modulation Analyzer or Spectrum Analyzer with above setup.
2) For analog measurement, turn off the High Pass Filter path and turn on 15 kHz low pass filter on modulation analyzer. Set Sigen to LF out ON with the assigned center frequency. Key up the DUT to get the 50% of rated deviation at mod analyzer and up amplitude 16dB with internal 2.5 kHz FM tone.
3) For Digital Measurement, Program and set radio to operate in desire test frequency and digital mode with modulation. (4FSK, C4FM or other digital modulation form).
4) Path loss for the measurement included.
5) Set the spectrum Resolution Bandwidth as per rules part.
6) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:
    a. 9 KHz to Fc – Test Bandwidth
    b. Fc + Test Bandwidth to 2Fc – 5MHz.
7) Key up the DUT, record all the frequencies and levels of spurious emissions from step 5) and dekey the DUT.
8) Turn On HPF path and Key up the DUT.
9) Adjust the PSA Freq for coverage of range from 2Fc to 10Fc, record the spur and harmonics level in dBm.
10) Whichever Spur level in step 7) & step 9) is within 20dB from the test limit, replace the DUT with the Sigen and adjust the signal level to reproduce the frequencies & levels. Record the signal generator levels in dBm.

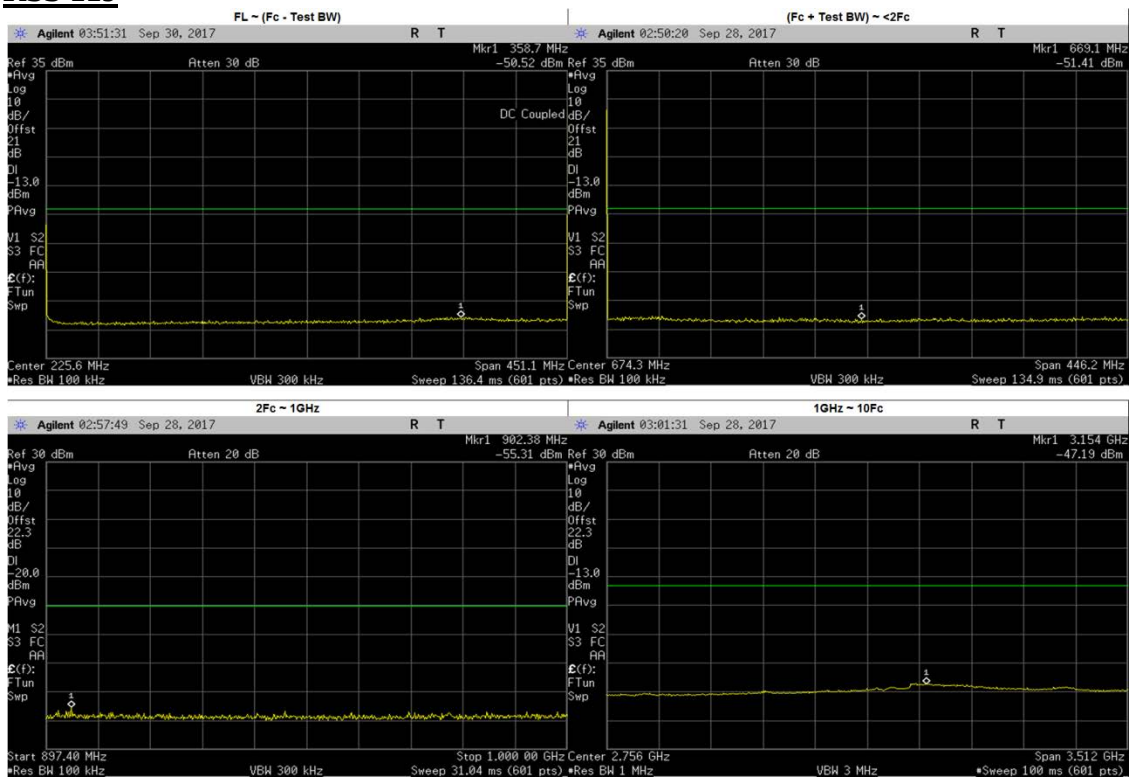
6.10.2. Test Result (Analog)

Analog: 451.1875 MHz, 12.5 kHz Channel Spacing, Max Power
FCC Part 90 and RSS 119



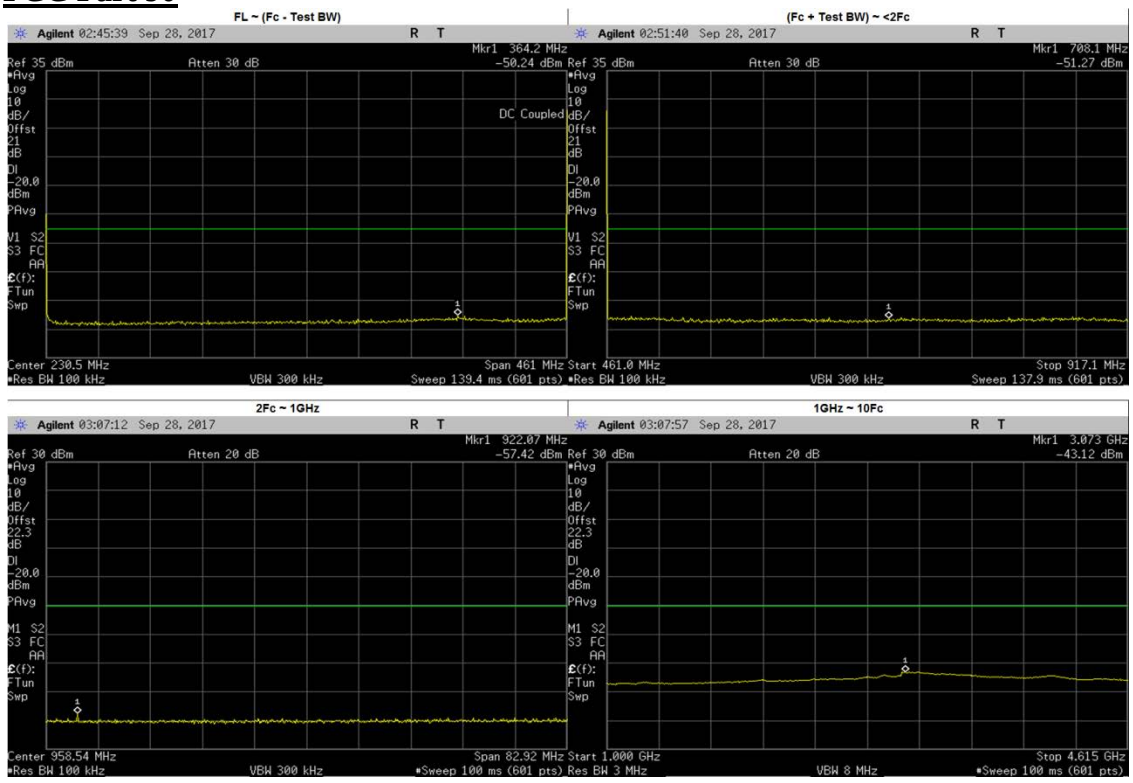
Frequency Range	Highest Spur Frequency (MHz)	Spurious Level (MHz)	Failing Limit (dBm)
FL ~ (Fc - Test BW)	357.2000	-51.14	-20
(Fc + Test BW) ~ <2Fc	747.2000	-50.80	-20
2Fc ~ 1GHz	902.3800	-54.44	-20
1GHz ~ 10Fc	1353.5625	-51.00	-20
	1804.7500	-50.57	-20
	2255.9375	-50.36	-20
	2707.1250	-49.57	-20
	3158.3125	-47.38	-20
	3609.5000	-48.75	-20
	4060.6875	-48.57	-20
	4511.8888	-49.65	-20

Analog: 451.1875 MHz, 25.0 kHz Channel Spacing, Max Power
RSS 119



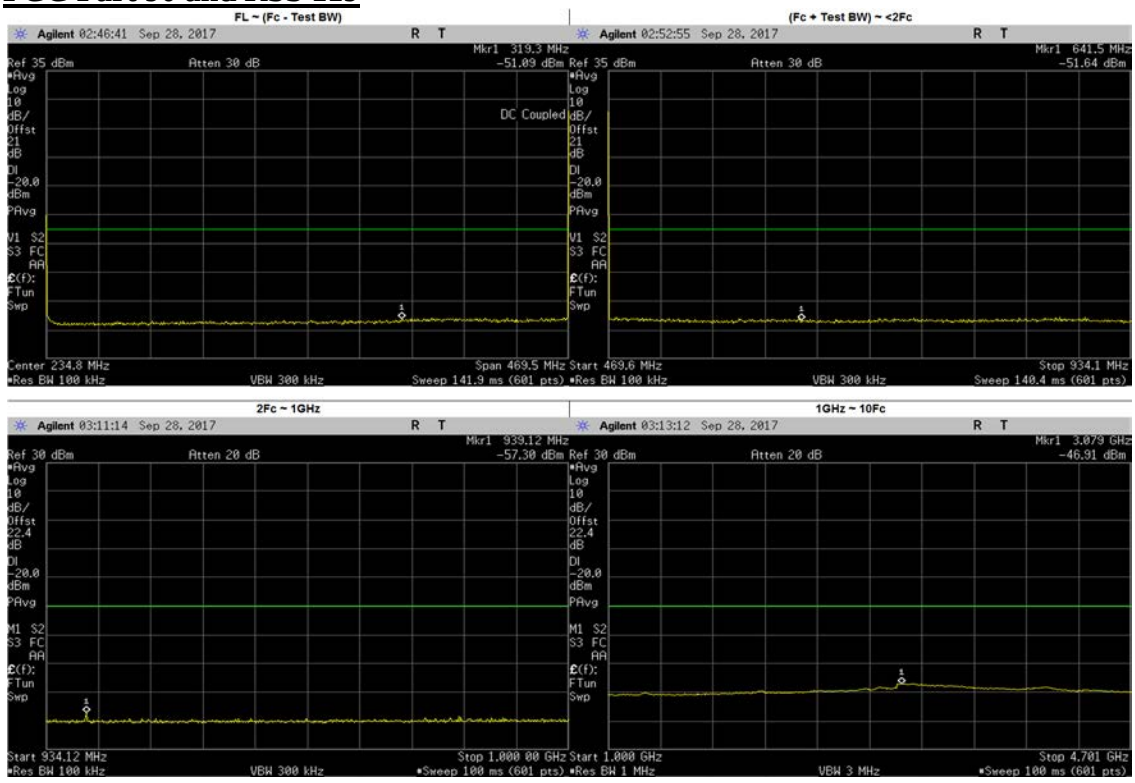
Frequency Range	Highest Spur Frequency (MHz)	Spurious Level (MHz)	Failing Limit (dBm)
FL ~ (Fc - Test BW)	358.7000	-50.52	-13
(Fc + Test BW) ~ <2Fc	669.1000	-51.41	-13
2Fc ~ 1GHz	902.3800	-55.31	-13
1GHz ~ 10Fc	1353.5625	-51.08	-13
	1804.7500	-50.66	-13
	2255.9375	-50.32	-13
	2707.1250	-49.68	-13
	3158.3125	-47.28	-13
	3609.5000	-48.53	-13
	4060.6875	-48.52	-13
	4511.8888	-49.21	-13

Analog: 461.0375 MHz, 12.5 kHz Channel Spacing, Max Power
FCC Part 90



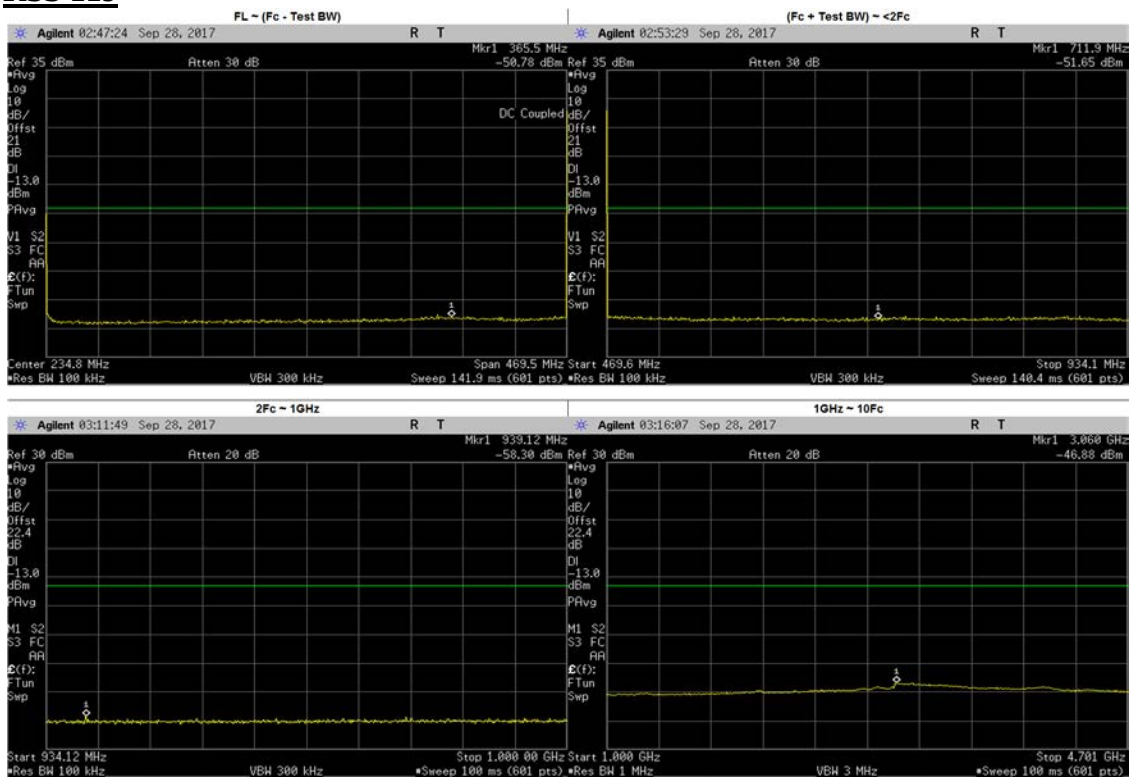
Frequency Range	Highest Spur Frequency (MHz)	Spurious Level (MHz)	Failing Limit (dBm)
FL ~ (Fc - Test BW)	364.2000	-50.24	-20
(Fc + Test BW) ~ <2Fc	708.1000	-51.27	-20
2Fc ~ 1GHz	922.0700	-57.42	-20
1GHz ~ 10Fc	1383.1125	-46.69	-20
	1844.1500	-46.59	-20
	2305.1875	-46.02	-20
	2766.2250	-45.06	-20
	3227.2625	-43.48	-20
	3688.3000	-44.92	-20
	4149.3375	-44.84	-20
	4610.3750	-46.11	-20

Analog: 469.5625 MHz, 12.5 kHz Channel Spacing, Max Power
FCC Part 90 and RSS 119



Frequency Range	Highest Spur Frequency (MHz)	Spurious Level (MHz)	Failing Limit (dBm)
FL ~ (Fc - Test BW)	319.3000	-51.09	-20
(Fc + Test BW) ~ <2Fc	641.5000	-51.64	-20
2Fc ~ 1GHz	939.1200	-57.30	-20
1GHz ~ 10Fc	1408.6875	-50.86	-20
	1878.2500	-50.50	-20
	2347.8125	-50.06	-20
	2817.3750	-48.61	-20
	3286.9375	-47.43	-20
	3756.5000	-48.70	-20
	4226.0625	-48.99	-20
	4695.6250	-49.91	-20

Analog: 469.5625 MHz, 25.0 kHz Channel Spacing, Max Power
RSS 119



Frequency Range	Highest Spur Frequency (MHz)	Spurious Level (MHz)	Failing Limit (dBm)
FL ~ (Fc - Test BW)	365.5000	-50.78	-13
(Fc + Test BW) ~ <2Fc	711.9000	-51.65	-13
2Fc ~ 1GHz	939.1250	-58.30	-13
1GHz ~ 10Fc	1408.6875	-50.67	-13
	1878.2500	-50.40	-13
	2347.8125	-49.76	-13
	2817.3750	-48.72	-13
	3286.9375	-47.39	-13
	3756.5000	-48.53	-13
	4226.0625	-49.13	-13
	4695.6250	-49.73	-13

6.10.3. Test Result (Digital)

NA → **Not Applicable**

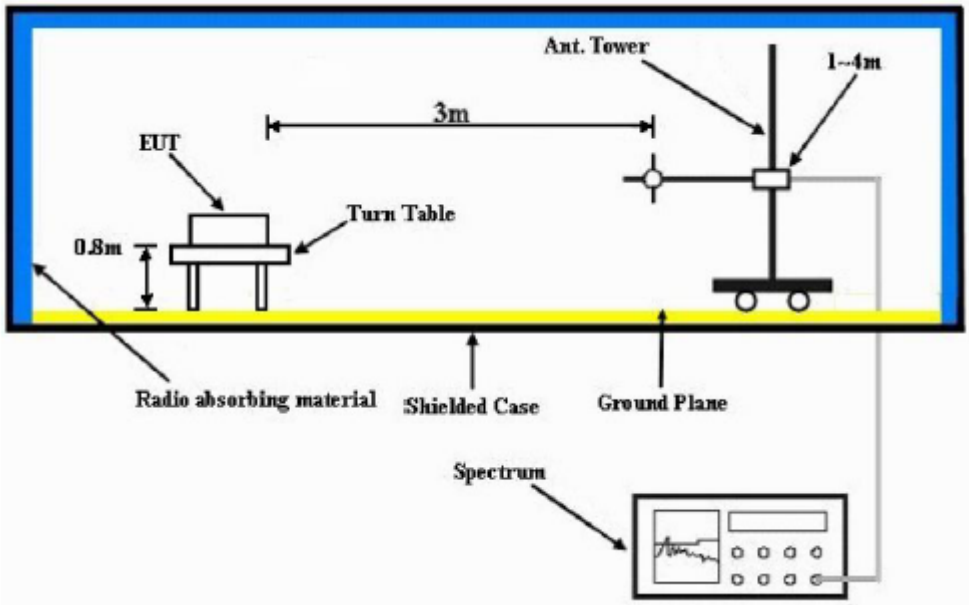
6.10.4. Test Limit

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least:

Channel Spacing	Part 22	Part 24D	Part 74	Part 80	Part 90 (UHF, VHF, 800, 900)	Part 90 (700)
12.5kHz	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	Not Applicable	50 + log10(P) (-20 dBm)	43 + log10(P) (-13 dBm)
25kHz		Not Applicable		43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)

6.11. Radiated Spurious Emission

6.11.1. Test Setup



1) The Resolution Bandwidth for scanning Radiated Emission below 1 GHz is 100 kHz with Video Bandwidth = 300 kHz and Resolution Bandwidth for above 1 GHz is 1 MHz with Video Bandwidth = 3 MHz. Detector mode is positive peak.
2) In the semi- anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
3) The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
4) Final Radiated Spurious Emission = “Read Value” + Measured substitution value.

6.11.2. Test Result (Analog)

NA → **Not Applicable**

6.11.3. Test Result (Digital)

NA → **Not Applicable**

6.11.4. Test Limit

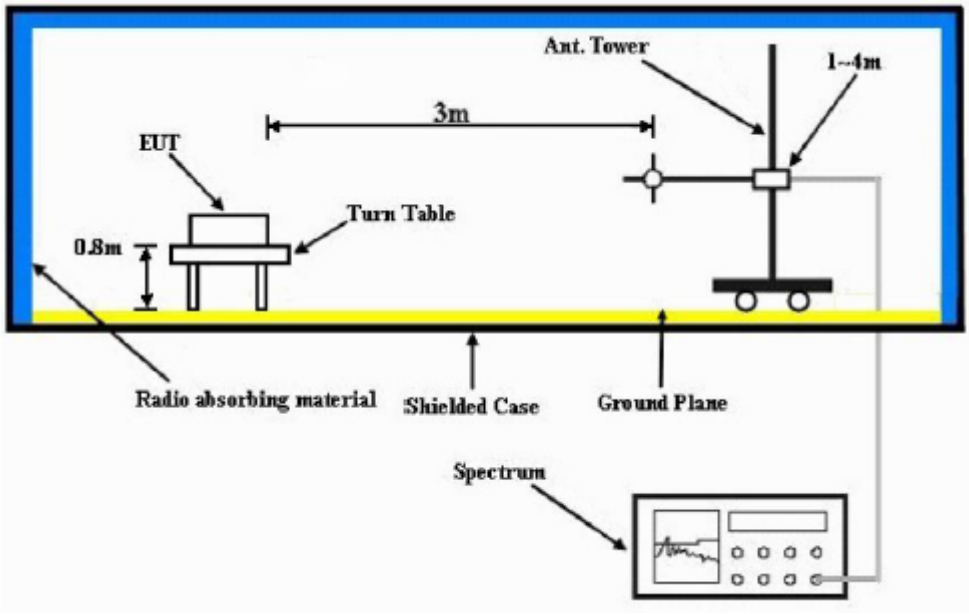
Table below summarized the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least

Channel Spacing	Part 22	Part 24D	Part 74	Part 80	Part 90 (UHF, VHF, 800, 900)	Part 90 (700)
12.5kHz	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	Not Applicable	50 + log10(P) (-20 dBm)	43 + log10(P) (-13 dBm)
25kHz		Not Applicable		43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)

Channel Spacing	RSS 134	RSS 182	RSS 119 (UHF, VHF, 800, 900)	RSS 119 (700)
12.5kHz	43 + log10(P) (-13 dBm)	Not Applicable	50 + log10(P) (-20 dBm)	43 + log10(P) (-13 dBm)
25kHz	Not Applicable	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)	43 + log10(P) (-13 dBm)

6.12. Effective Radiated Power (ERP)

6.12.1. Test Setup



1) The Resolution Bandwidth for Equivalent Radiated Power (ERP) below 1 GHz is 100 kHz with Video Bandwidth = 300 kHz and Resolution Bandwidth for EIRP above 1 GHz is 1 MHz with Video Bandwidth = 3 MHz. Detector Mode is RMS.
2) In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The “Read Value” is the spectrum reading of maximum power value.
3) The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.

6.12.2. Test Result

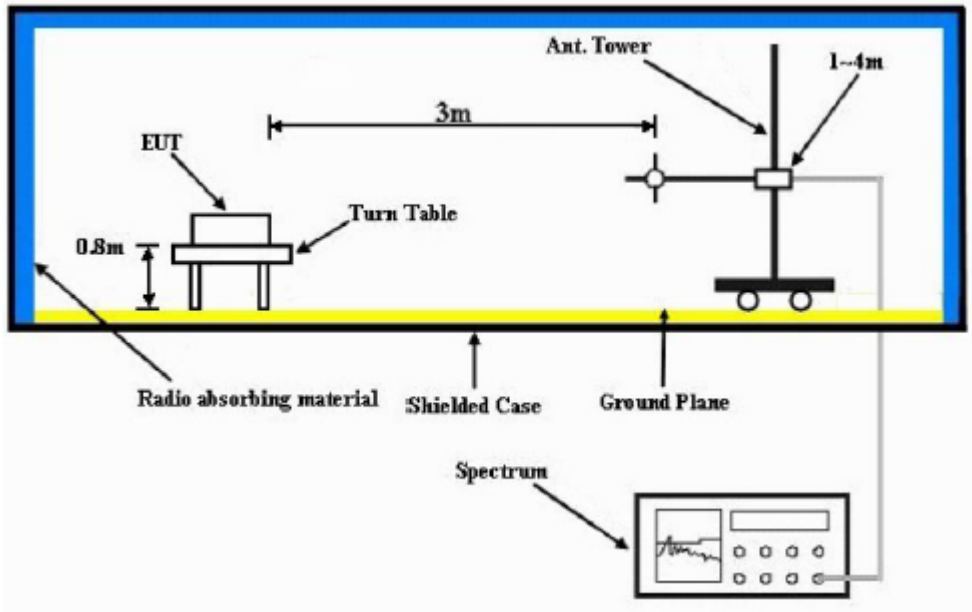
NA → **Not Applicable**

6.12.3. Test Limit

The maximum output power of the transmitter for mobile stations is 100 watts (20 dB). Power is given in terms of effective radiated power (ERP).

6.13. GNSS (EIRP for 1559 - 1610MHz)

6.13.1. Test Setup



4) The Resolution Bandwidth for Equivalent Isotropically Radiated Power (EIRP) below 1 GHz is 100 kHz with Video Bandwidth = 300 kHz and Resolution Bandwidth for EIRP above 1 GHz is 1 MHz with Video Bandwidth = 3 MHz. Detector Mode is RMS.
5) In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The “Read Value” is the spectrum reading of maximum power value.
6) The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
7) EIRP = “Read Value” + Measured substitution value + 2.15.

6.13.1. Test Result

NA → **Not Applicable**

6.13.2. Test Limit

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

~ End of Report ~