



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 / IC TEST REPORT

Report Revision : Rev.D

Date/s Tested : 15-AUG-2016 - 01-SEP-2016
Report Issue Date : 16-JAN-2017
Manufacturer/Location : Motorola Solutions Malaysia Sdn Bhd
Requestor : AARON ISAACS
Product Type : Portable
Model Number : H51QDH9PW7AN
Frequency Band : 380-470MHz
Low / Max RF Output Power : 1 Watt/5.7 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 Registrations : 772092
IC Registrations : 109AK



The equipment was tested accordance to the requirement listed below:

(LMR)
FCC 47 CFR Part 22 / 74 / 80

PASS

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Prepared By:

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Approved By:

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Responsible Engineer

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Report Revision History

| Revision History | Description | Date | Originator |
|-------------------------|---|--------------------|-------------------|
| Rev. A | Initial report | 13-Oct-2016 | Hoe Kean Loon |
| Rev. B | Updated on the emission mask measurement. | 14-Dec-2016 | Hoe Kean Loon |
| Rev. C | Updated on band edge emission measurement. | 12-Jan-2017 | Hoe Kean Loon |
| Rev. D | Conducted Emission for both FCC and ISED shall reference to ANSI C63.26: 2015. Data is removed as justified by TCB(ACS) | 16-Jan-2017 | Hoe Kean Loon |

1.0. General Information

EUT Description:

| | |
|------------------------|-------------------------|
| Technologies | Land Mobile Radio (LMR) |
| Modulation Type | Analog, C4FM, Phase II |

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
TIA-102 CCAA-A
TIA-102 CAAB-D
TIA-102 CAAA-D
ANSI C63.26-2015

2.0. Summary of Test Results

| FCC General Rules Part (47CFR) | IC General Rules Part | Test Item | Result |
|---|-----------------------|---|--------|
| 2.1046(a), 22.565(f), 74.461, 80.215 | - | RF Power Output | Pass |
| 2.1055, 22.355, 74.464, 80.209(a)(5) | - | Frequency Stability | Pass |
| - | - | Audio Frequency Response | NA |
| - | - | Audio Low Pass Filter Response | NA |
| - | - | Modulation limiting | NA |
| 2.1049, 22.359, 74.462(b), 80.211(c), (f) | - | Occupied Bandwidth | Pass |
| 22.359(a),(b) | - | Band Edge Conducted Spurious Emission | Pass |
| - | - | Transient Frequency Behavior | NA |
| - | - | Adjacent Channel Power | NA |
| - | - | Conducted Spurious Emissions | NA |
| 2.1051, 22.359, 74.462(c), 80.211(c) | - | Radiated Spurious Emission | Pass |
| - | - | GNSS (EIRP for 1559 – 1610MHz) | NA |
| - | - | Effective Radiated Power (ERP) | NA |
| - | - | AC Power Line Conducted Spurious Emission | NA |

NA → Not Applicable

3.0. Measurement Uncertainty

| Measurement | Frequency | Expanded Uncertainty (k=1.96) (±) |
|--------------------------------|------------------|-----------------------------------|
| 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:

| Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---------------------------|----------|---------------|------------------|----------------------|
| AUDIO ANALYZER | 8903B | 3011A10475 | 13-Apr-16 | 13-Apr-17 |
| SIGNAL GENERATOR | 2042 | 203002/745 | 14-Apr-16 | 14-Apr-17 |
| MODULATION ANALYZER | 8901B | 3216A03889 | 13-Apr-16 | 13-Apr-17 |
| TRANSCEIVER INTERFACE | 8954A | 2234A00398 | 12-Apr-16 | 12-Apr-17 |
| DYNAMIC SIGNAL ANALYZER | 36570A | MY42506781 | 15-Apr-16 | 15-Apr-17 |
| SIGNAL GENERATOR | E4425B | US39260201 | 14-Apr-16 | 14-Apr-17 |
| SIGNAL GENERATOR | 2042 | 203002/747 | 14-Apr-16 | 14-Apr-17 |
| POWER SENSOR | E4412A | MY41502652 | 21-Apr-16 | 21-Apr-17 |
| POWER METER | E4416A | GB41293855 | 22-Apr-16 | 22-Apr-17 |
| POWER SUPPLY | 6031A | 3325A02771 | 19-Apr-16 | 19-Apr-17 |
| CHAMBER | SHH-641 | 92014678 | 6-Apr-16 | 5-Apr-17 |
| RF TRANSCEIVER CONTROLLER | AZ2007AI | AZ2007AI007 | CNR | CNR |

FCC Transient ATE #1:

| Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---------------------------|----------|---------------|------------------|----------------------|
| POWER SUPPLY | 6032A | 2723A02219 | 19-Apr-16 | 19-Apr-17 |
| POWER SENSOR | E4412A | MY41498918 | 21-Jun-16 | 21-Jun-17 |
| POWER METER | E4416A | GB41293866 | 21-Apr-16 | 21-Apr-17 |
| ATTENUATORS/SWITCH DRIVER | 11713A | 2508A10141 | CNR | CNR |
| STEP ATTENUATOR/11dB | 8494G | MY52300223 | 16-Jun-16 | 16-Jun-17 |
| STEP ATTENUATOR/110dB | 8496G | MY52300176 | 15-Jun-16 | 15-Jun-17 |
| OSCILLOSCOPE | MSO8064A | MY48240107 | 26-Apr-16 | 26-Apr-17 |
| AUDIO ANALYZER | 8903B | 3729A17409 | 14-Apr-16 | 14-Apr-17 |
| AUDIO ANALYZER | 8903B | 3011A08952 | 18-Apr-16 | 18-Apr-17 |
| MODULATION ANALYZER | 8901B | 3019A02766 | 13-Apr-16 | 13-Apr-17 |
| SIGNAL GENERATOR | 8657A | 3323A05725 | 13-Apr-16 | 13-Apr-17 |
| SPECTRUM ANALYZER | E4440A | MY46185415 | 22-Apr-16 | 22-Apr-17 |
| SWITCH CONTROL UNIT | 3488A | 2719A36210 | CNR | CNR |

CONDUCTED SPUR EMISSION ATE # 1

| Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------------|--------|---------------|------------------|----------------------|
| SWITCH CONTROL UNIT | 3488A | 2719A32735 | CNR | CNR |
| SPECTRUM ANALYZER | E4440A | US45303111 | 14-Apr-16 | 14-Apr-17 |
| POWER SUPPLY | 6031A | 3319A08920 | 19-Apr-16 | 19-Apr-17 |
| HIGH PASS FILTER SWITCH BOX | CS | CS001 | 22-May-16 | 22-May-17 |
| MICROWAVE GENERATOR | SMP04 | 100127 | 04-Jul-16 | 04-Jul-17 |
| MODULATION ANALYZER | 8901B | 3438A05278 | 12-Apr-16 | 12-Apr-17 |

Radiated Emission Station

| Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------------------|----------|---------------|------------------|----------------------|
| DRG HORN FREQ. | SAS-571 | 1143 | 10-Nov-14 | 10-Nov-16 |
| DRG HORN FREQ. | SAS-571 | 719 | 28-Apr-15 | 28-Apr-17 |
| BILOG ANTENNA | CBL6112B | 2964 | 23-Jan-15 | 23-Jan-17 |
| POWER SUPPLY | 6031A | 3121A02341 | 24-Feb-15 | 24-Feb-17 |
| MICROWAVE SIGNAL GENERATOR | SMP04 | 100131 | 4-Jul-16 | 4-Jul-17 |
| TEST RECEIVER | ESIB40 | 100264 | 1-Jul-16 | 1-Jul-17 |
| SIGNAL ANALYZER | FSV40 | 101103 | 25-Jun-16 | 25-Jun-17 |
| 5m Semi-anechoic Chamber | S800-HX | J2308 | 29-Jul-16 | 29-Jul-17 |
| BILOG ANTENNA | CBL6112D | 25516 | 23-Jan-16 | 23-Jan-17 |
| BROAD-BAND HORN ANTENNA | BBHA9170 | BBHA9170143 | 24-Nov-14 | 24-Nov-16 |
| DATA LOGGER | TM320 | 12249289 | 27-Apr-16 | 27-Apr-17 |
| POWER SUPPLY | 6032A | 3232A08417 | 20-Apr-15 | 20-Apr-17 |
| SYSTEM CONTROLLER | SC104V | 050806-1 | CNR | CNR |
| TURNTABLE FLUSH MOUNT 2M | FM2011 | NA | CNR | CNR |
| ANTENNA POSITIONING TOWER | TLT2 | NA | CNR | CNR |
| 18 - 40GHz PREAMPLIFIER | BBV9721 | 9721-007 | CNR | CNR |

CNR → Calibration Not Required

5.0. Test Condition

5.1. Transmitter Test Conditions

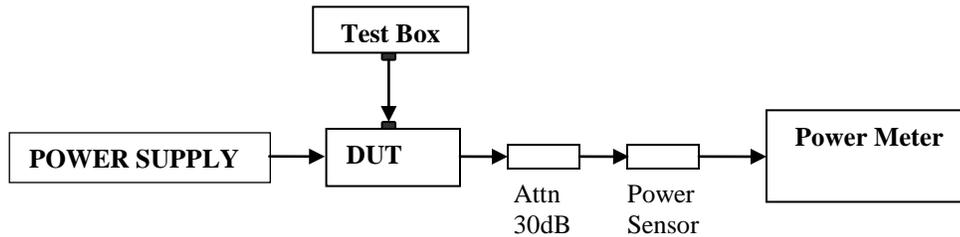
| Test Item, (Channel Spacing) | Temperature (°C) | Voltage Supply (V) | Power (W) | Modulation | Test Frequency (MHz) |
|---|---------------------|-------------------------------------|--------------|--------------------|------------------------------|
| RF Output Power | 25°C | Nominal | Low / Max | Analog | 450.65 459.125 467.775 |
| Frequency Stability | -30°C ~ 60°C | 80% ~ 120% of Nominal Volt | Max | Analog | 467.775 |
| Audio Frequency Response (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog | NA |
| Audio Low Pass Filter Response (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog | NA |
| Modulation limiting (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog | NA |
| Occupied Bandwidth (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog, Digital | 450.65 459.125 467.775 |
| Band Edge Conducted Spurious Emission(12.5kHz/20kHz/25kHz) | 25°C | Nominal | Max | Analog, Digital | 459.025 459.650 |
| Transient Frequency Behavior (UHF & VHF Band) (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog, Digital | NA |
| Adjacent Channel Power (700MHz Band) (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog, Digital | NA |
| Conducted Spurious Emissions (12.5kHz / 25kHz) | 25°C | Nominal | Low / Max | Analog, Digital | NA |
| Radiated Spurious Emission (12.5kHz / 25kHz) | 25°C | Nominal | Low / Max | Analog, Digital | 450.65 459.125 467.775 |
| GNSS (700MHz Band) (EIRP for 1559-1610MHz) (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog | NA |
| Effective Radiated Power (ERP) (700MHz & 900MHz Band) (12.5kHz / 25kHz) | 25°C | Nominal | Max | Analog | NA |
| AC Power Line Conducted Spurious Emissions* (12.5kHz) | 25°C | Nominal | Max | Analog | NA |

* – ONLY tested if portables can be operated during charging OR mobiles can be used in desktop operation connected to a power supply
 NA → Not Applicable

6.0. Transmitter Test Parameters

6.1. RF Output Power

6.1.1. Test Setup



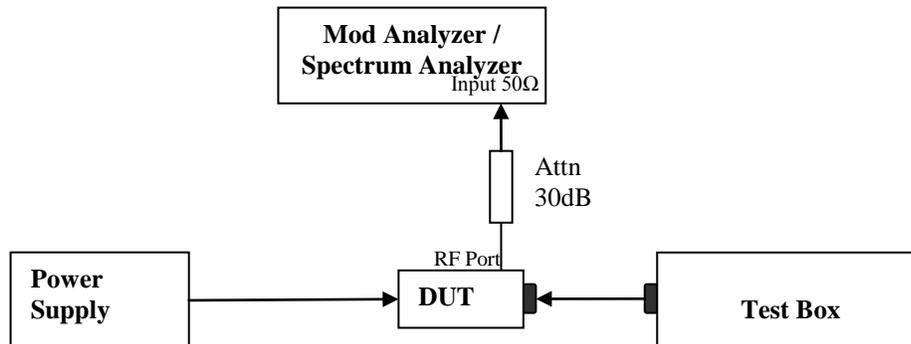
1. The DUT transmitter connected to Power Meter using the 30dB attenuator and power sensor with above setup.
2. Path loss for the measurement included.
3. All the measurement was done at low, mid, high frequency for each band.
4. Record the power into the test report.

6.1.2. Test Result

| | | | | |
|-----------------|---------------|-------------|---------------|-------------|
| Temperature | 25°C | | | |
| Voltage (V) | 7.5V | | | |
| Frequency (MHz) | Low Power (W) | Current (A) | Max Power (W) | Current (A) |
| 450.65000 | 0.98 | 0.95 | 5.69 | 1.91 |
| 459.12500 | 0.98 | 0.95 | 5.68 | 1.91 |
| 467.77500 | 0.98 | 0.95 | 5.67 | 1.91 |

6.2. Frequency Stability

6.2.1. Test Setup

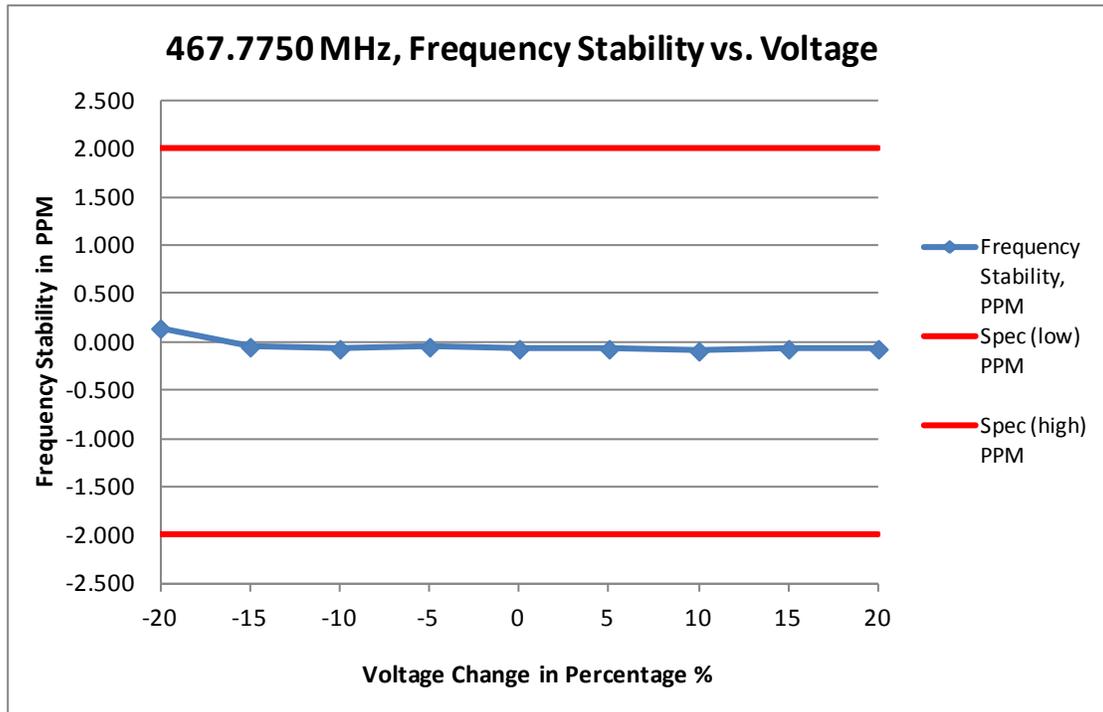


- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Transmit the DUT and record the freq in MCF_{MHz} .
- 4) Test in 2 conditions: Different Temperature & Supply Voltage input.
 - Temperature: Vary voltage per test condition in Clause 5.1
 - Supply Voltage: Vary temperature per test condition in Clause 5.1
- 5) Calculate the ppm frequency error by the following:

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

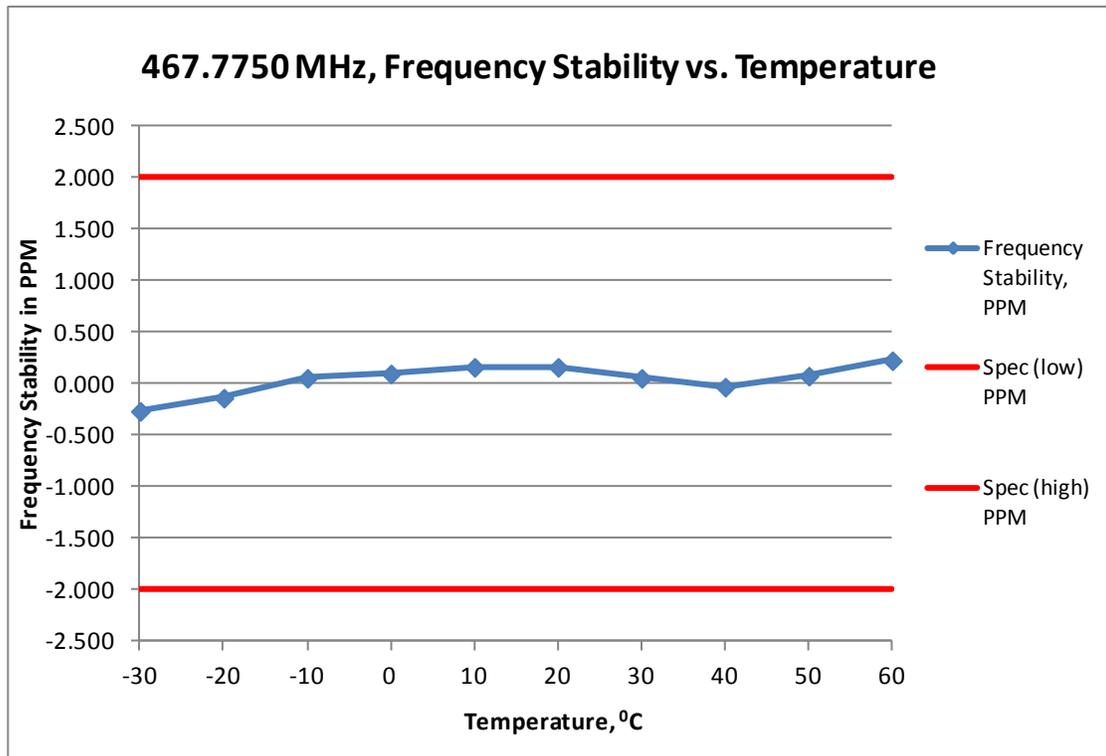
Where: MCF_{MHz} is the Measured Carrier Frequency in MHz
 ACF_{MHz} is the Assigned Carrier Frequency in MHz

6.2.2. Test Result



(i) Frequency Stability VS Voltage

| Frequency / Channel Spacing | | 467.7750 MHz / 12.5 kHz | | | |
|-----------------------------|------------|-------------------------|--------------------------|----------------|-----------------|
| Temperature, °C | | 25 | | | |
| Voltage % | Voltage, V | Frequency, MHz | Frequency Stability, PPM | Spec (low) PPM | Spec (high) PPM |
| -20 | 6.000 | 467.775070 | 0.150 | -2.000 | 2.000 |
| -15 | 6.375 | 467.774980 | -0.043 | -2.000 | 2.000 |
| -10 | 6.750 | 467.774970 | -0.064 | -2.000 | 2.000 |
| -5 | 7.125 | 467.774980 | -0.043 | -2.000 | 2.000 |
| 0 | 7.500 | 467.774970 | -0.064 | -2.000 | 2.000 |
| 5 | 7.875 | 467.774970 | -0.064 | -2.000 | 2.000 |
| 10 | 8.250 | 467.774960 | -0.086 | -2.000 | 2.000 |
| 15 | 8.625 | 467.774970 | -0.064 | -2.000 | 2.000 |
| 20 | 9.000 | 467.774970 | -0.064 | -2.000 | 2.000 |



(ii) Frequency Stability VS temperature

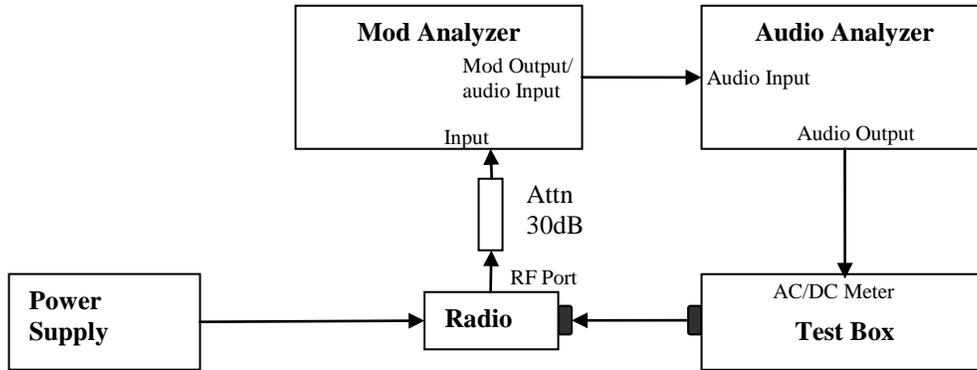
| Frequency / Channel Spacing | | 467.7750 MHz / 12.5 kHz | | |
|-----------------------------|----------------|--------------------------|----------------|-----------------|
| Voltage, V | | 7.5 | | |
| Temperature, °C | Frequency, MHz | Frequency Stability, PPM | Spec (low) PPM | Spec (high) PPM |
| -30 | 467.774880 | -0.257 | -2.000 | 2.000 |
| -20 | 467.774940 | -0.128 | -2.000 | 2.000 |
| -10 | 467.775030 | 0.064 | -2.000 | 2.000 |
| 0 | 467.775050 | 0.107 | -2.000 | 2.000 |
| 10 | 467.775080 | 0.171 | -2.000 | 2.000 |
| 20 | 467.775080 | 0.171 | -2.000 | 2.000 |
| 30 | 467.775030 | 0.064 | -2.000 | 2.000 |
| 40 | 467.774990 | -0.021 | -2.000 | 2.000 |
| 50 | 467.775040 | 0.086 | -2.000 | 2.000 |
| 60 | 467.775110 | 0.235 | -2.000 | 2.000 |

6.2.3. Test Limit

As per manufacturer declared spec +/- 2ppm

6.3. Audio Frequency Response

6.3.1. Test Setup

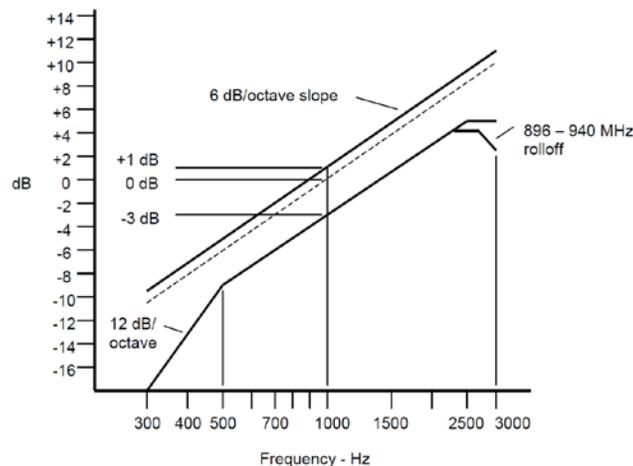


- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Set the audio bandwidth filter to 15 kHz and 50kHz.
- 4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 20% of the maximum deviation.
- 5) On audio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

6.3.2. Test Result

Not Applicable

6.3.3. Test Limit

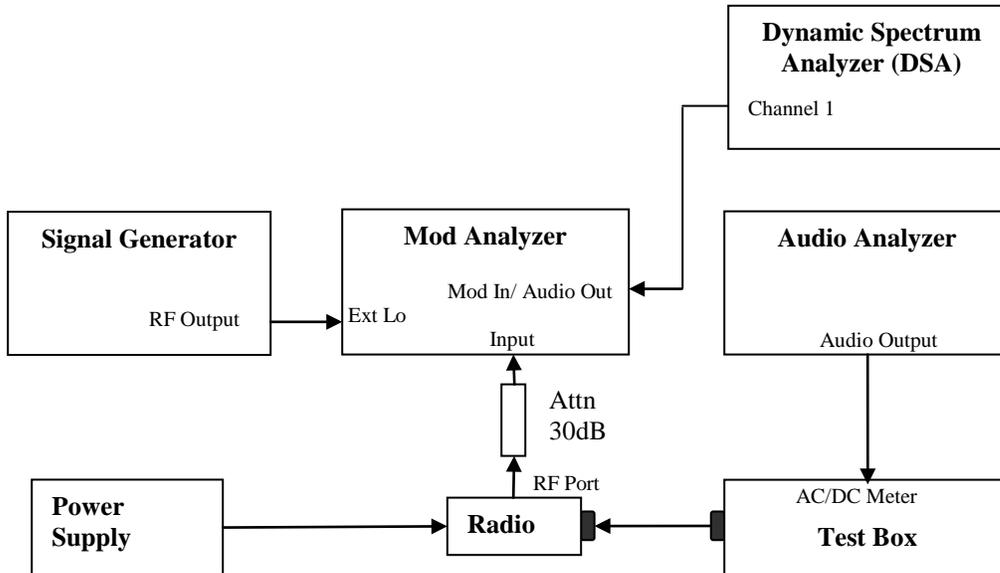


Note:

- o There are additional 6 dB per octave attenuation is allowed from 2.5KHz to 3KHz in equipment 25MHz to 869MHz radio.
- o 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

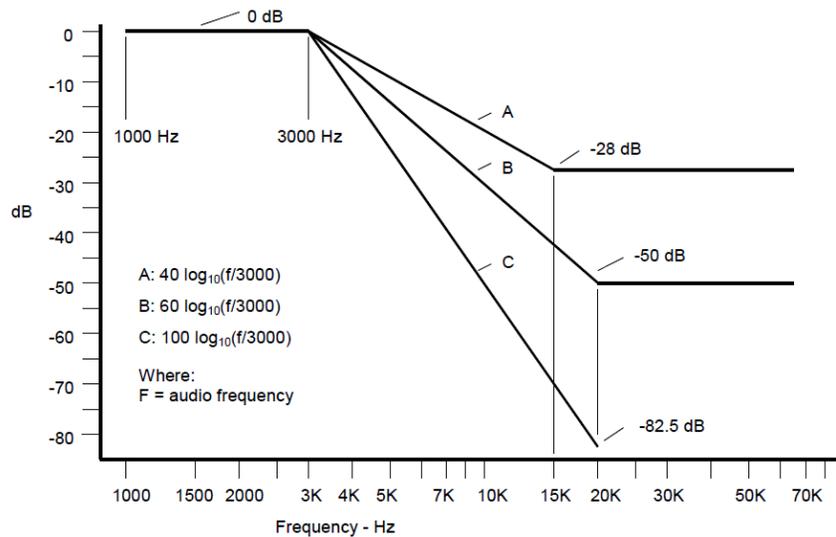


- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Press 23.1SPCL on modulation analyzer to enable the external LO from Sigen.
- 4) Set the Sigen frequency to $F_c + 1.5\text{MHz}$, RF output level to 0dBm without modulation.
-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

6.4.2. Test Result

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.

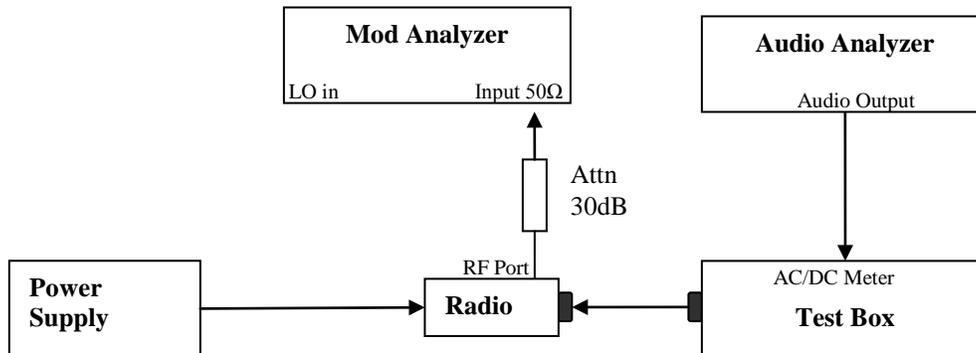
- c) For equipment operating on channels between 896 MHz through 901 MHz, between 935 MHz through 940 MHz, and 12.5 or 15 kHz spaced channels in the frequency range 138-174 MHz and 406-512 MHz.

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 maximum deviation.
- 5) Record the frequency deviation as 0dB input level at 1kHz audio frequency.
- 6) Repeat the step and record the frequency deviation from -20dB to 20dB by 5dB increments and different audio freq 300Hz, 2.5 KHz and 3 KHz.

6.5.2. Test Result

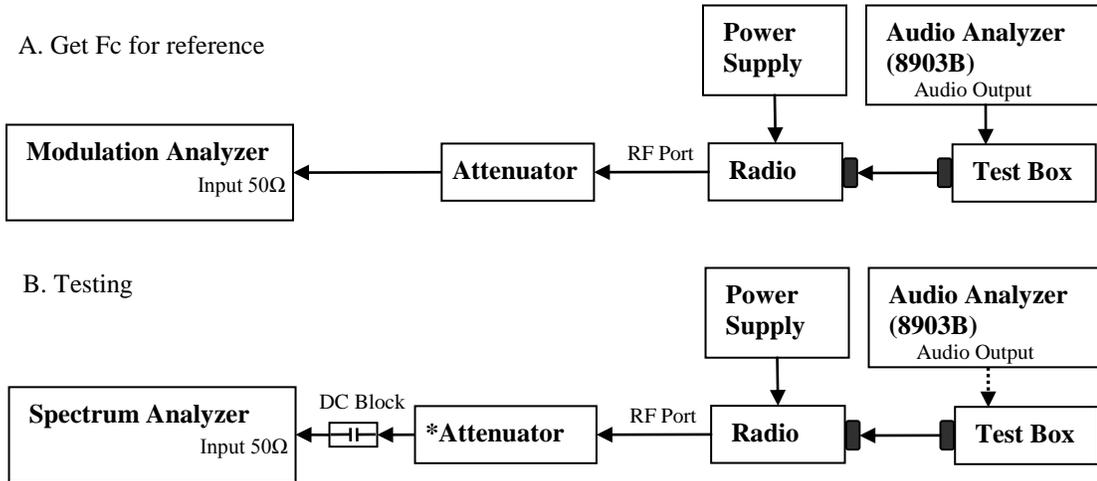
Not Applicable

6.5.3. Test Limit

Modulation shall not exceed 100 percent if amplitude modulation is employed.

6.6. Occupied Bandwidth

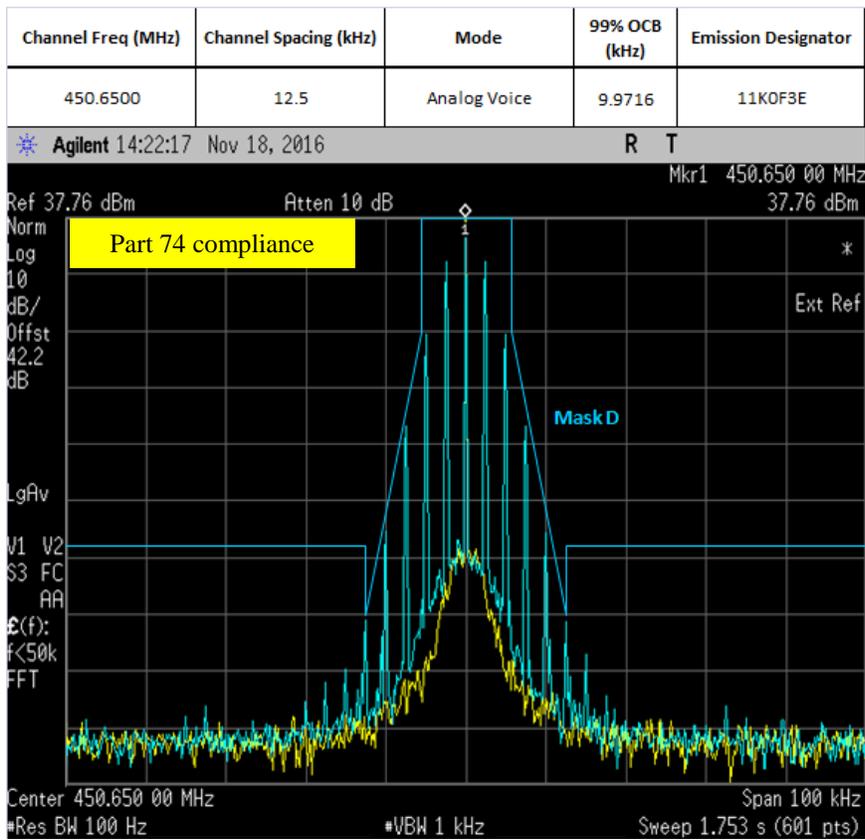
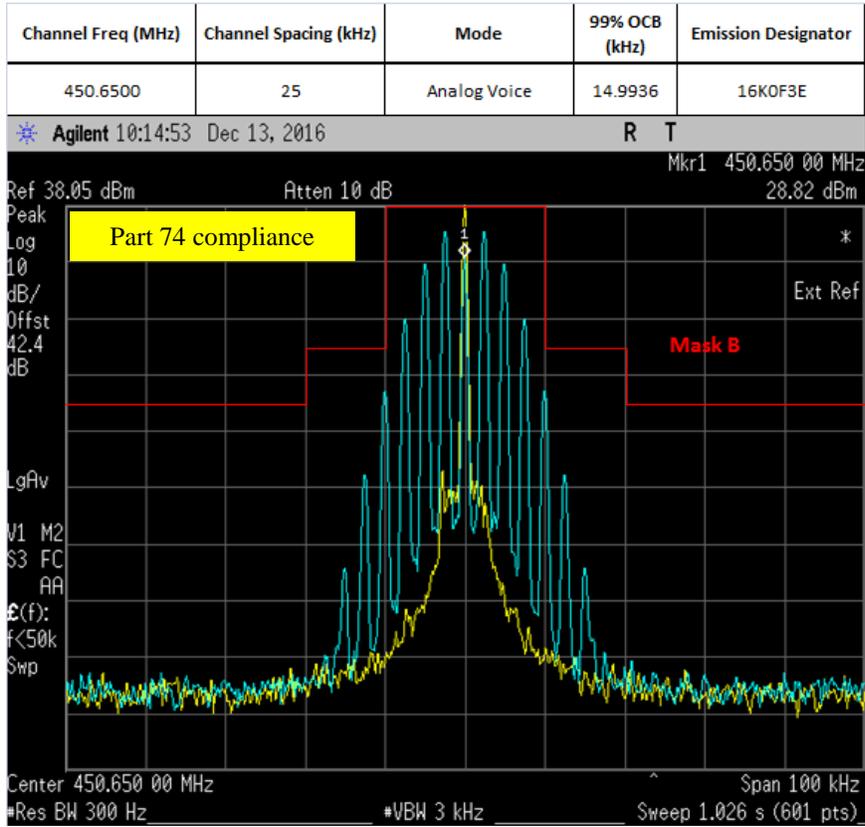
6.6.1. Test Setup (Analog)

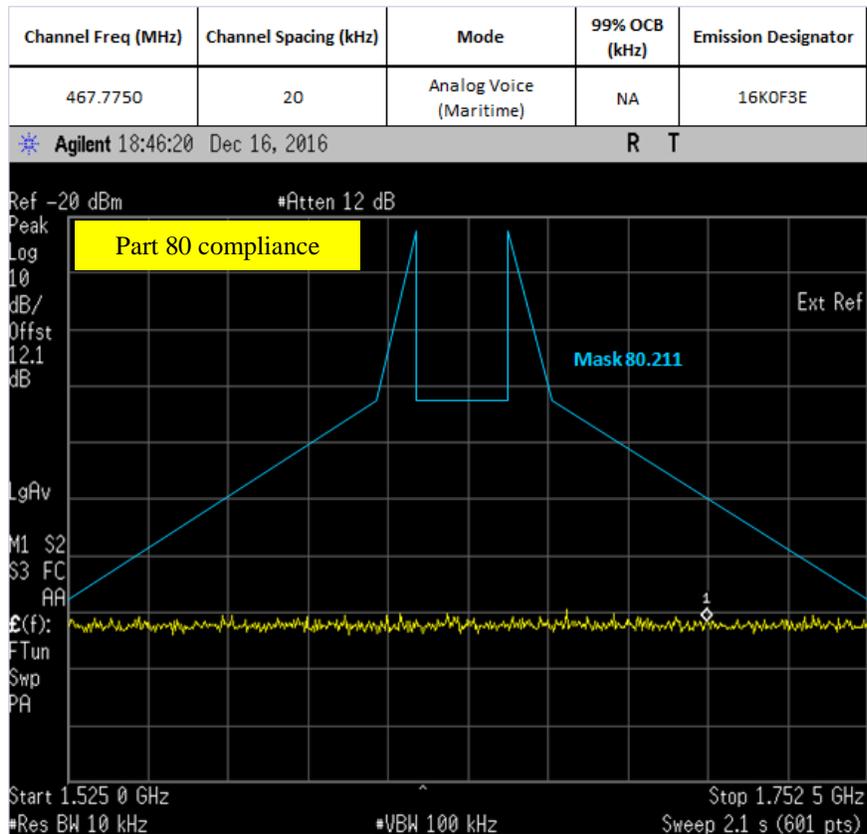
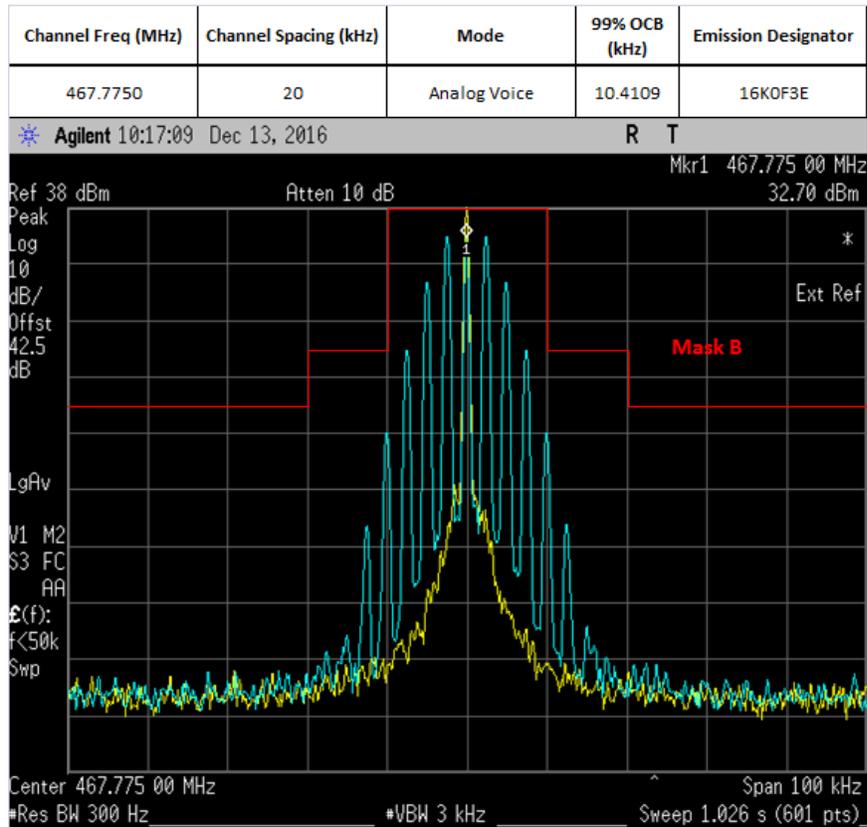


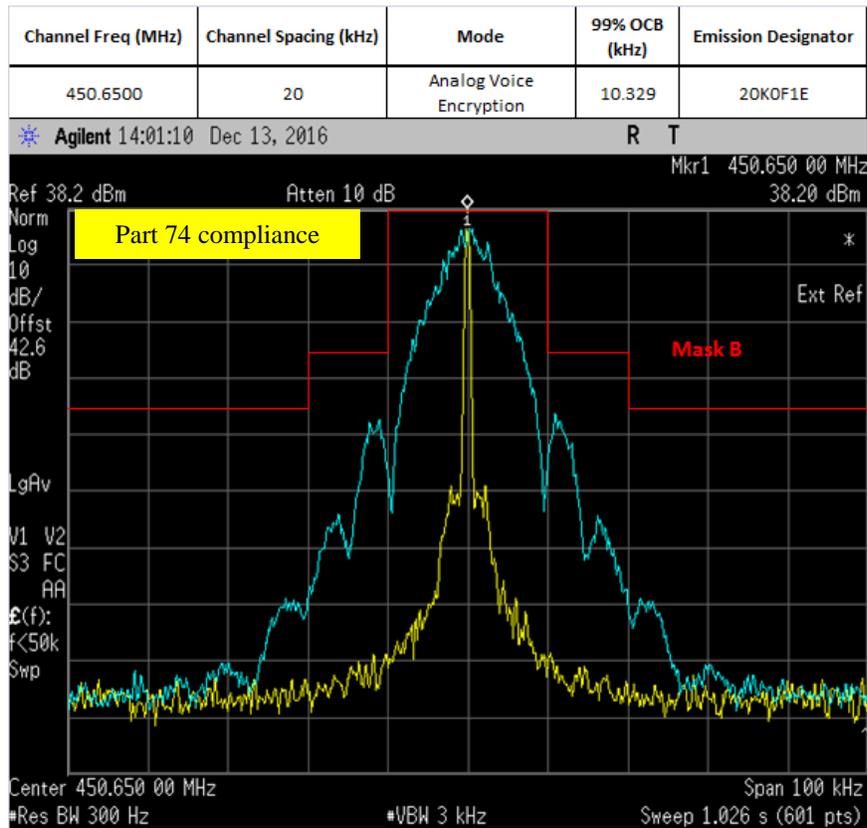
- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Set the audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
- 3) Transmit the radio and set the audio analyzer to 2.5 kHz audio frequency and 50% of the rated deviation. Up the amplitude by 16 dB. 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 to 100 KHz 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.

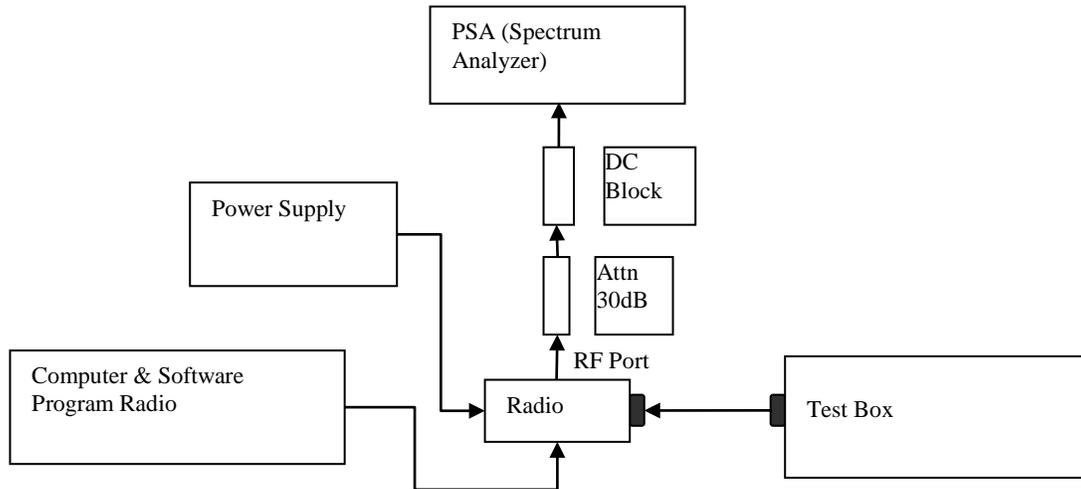
6.6.2. Test Result (Analog)





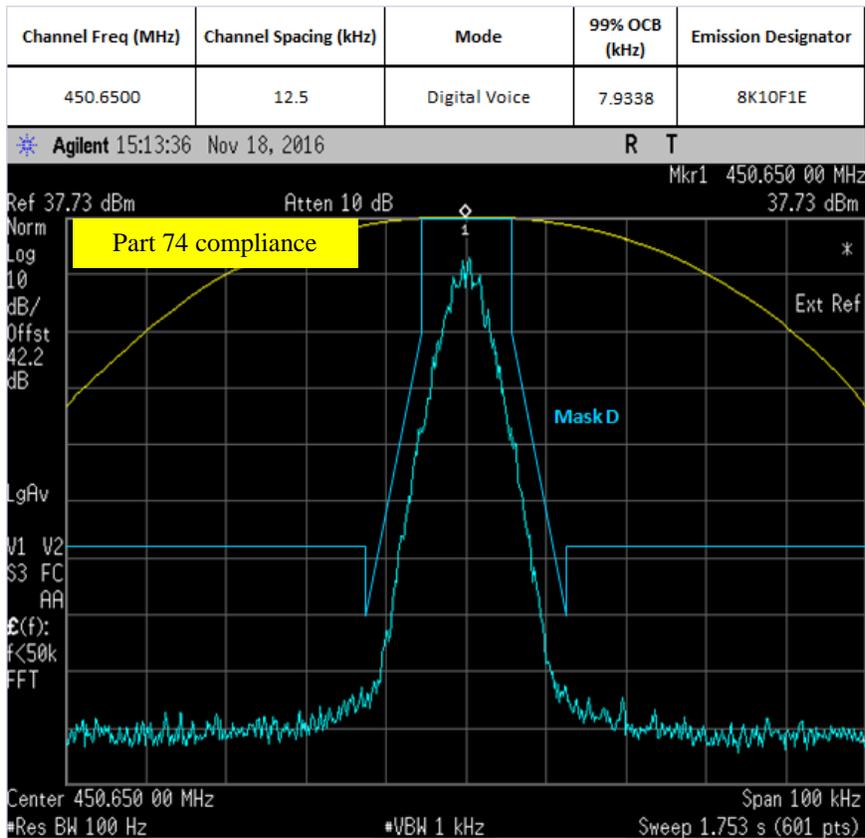
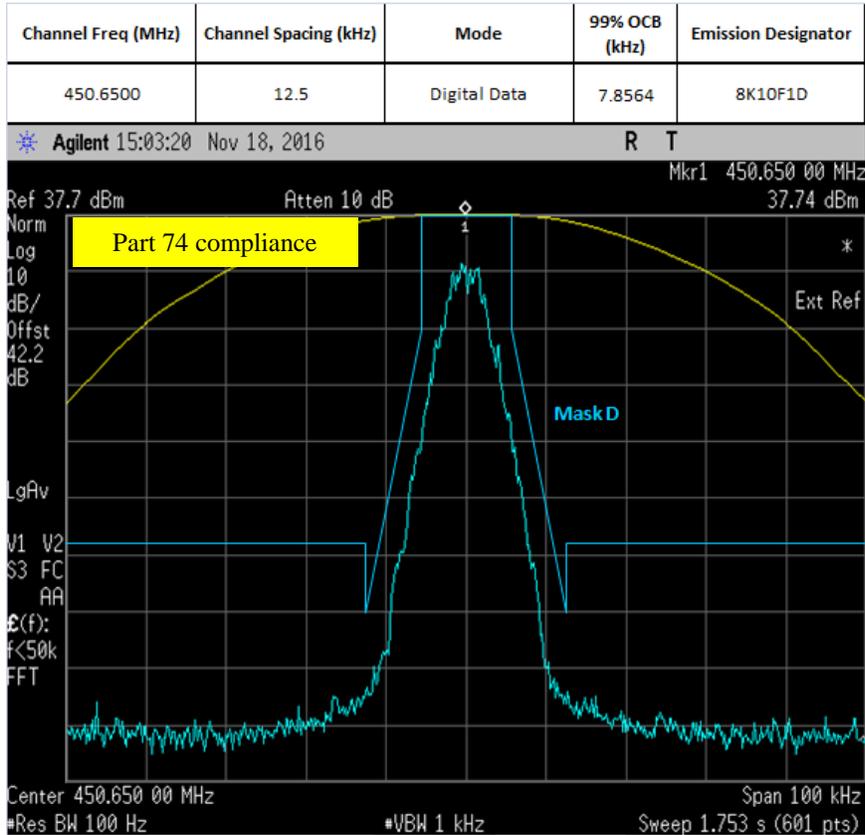


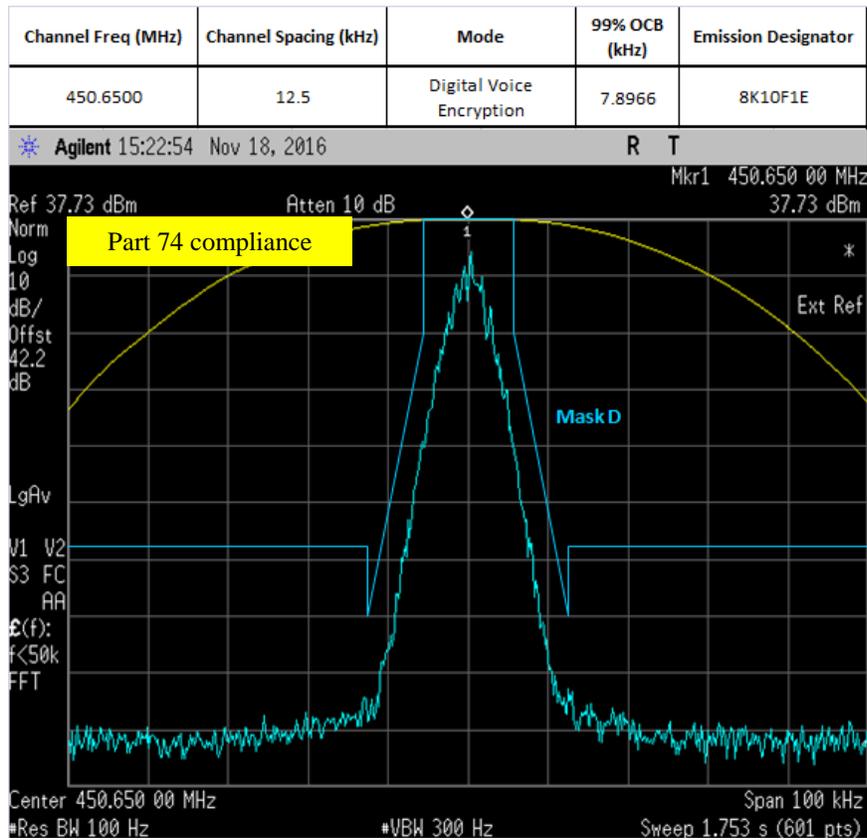
6.6.3. Test Result (Digital)



- 1) Program and set radio to operate in desire test frequency and digital mode with modulation. (4FSK, C4FM, CQPSK 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 RBandwidth (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 to 100 KHz and Resolution Bandwidth (according to FCC/ ISED standard).
- 8) Capture the screen shot as modulated signal.

6.6.4. Test Result (Digital)



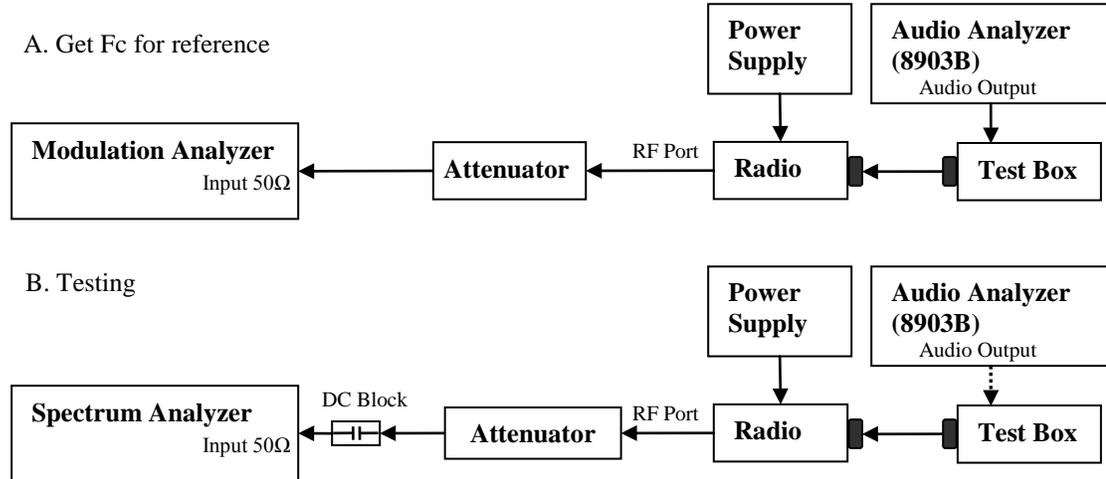


6.6.5. Test Limit

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.

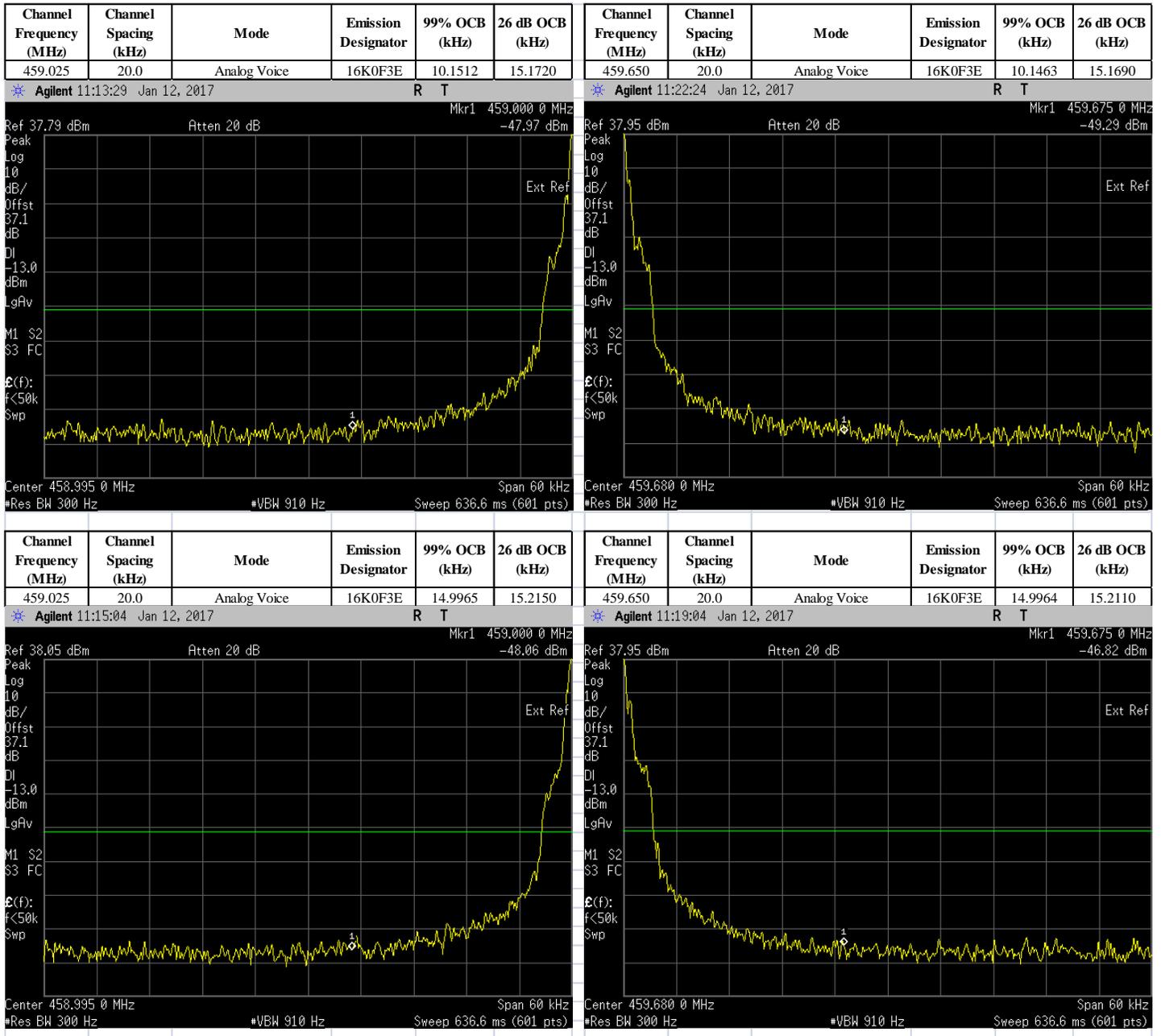
6.7. Band Edge Conducted Spurious Emission (Part 22)

6.7.1. Test Setup (Analog)

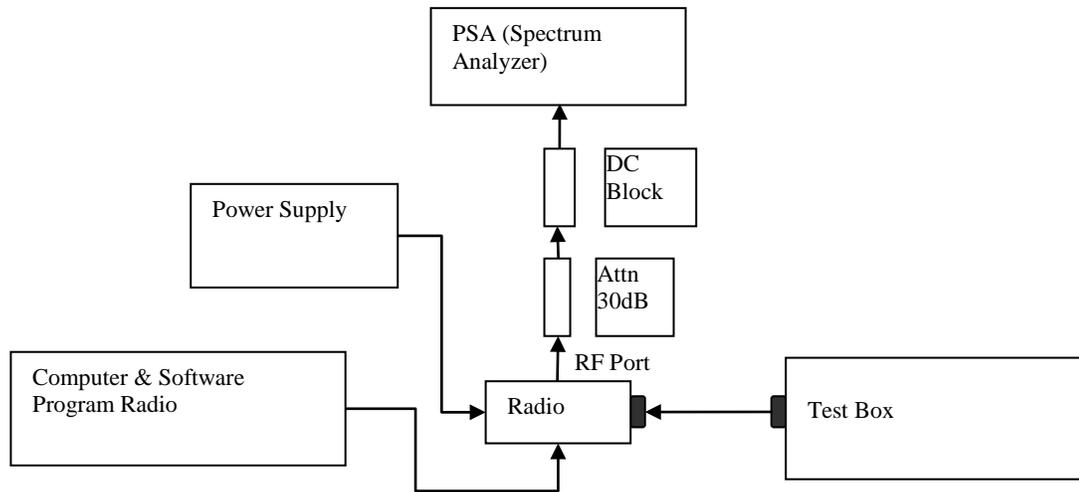


- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Set the audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
- 3) Path loss for the measurement included.
- 4) Select the Occupied Bandwidth measurement for 99% and 26dB Emissions Bandwidth Measurement.
- 5) Key in the Fc and RBandwidth= 100Hz.
- 6) Transmit the DUT and record the occupied Bandwidth frequencies.
- 7) Preset the spectrum analyzer for band edge measurement.
- 8) The band edges of lowest and highest channels were measured.
- 9) The center frequency of spectrum is the band edge frequency, span is 60 kHz and RBW is at least 1% of Emission Bandwidth.
- 10) Save the screen shot as modulated signal.
- 11) Remove the audio tone from audio analyzer to capture unmodulated signal.

6.7.2. Test Result (Analog)



6.7.3. Test Setup (Digital)

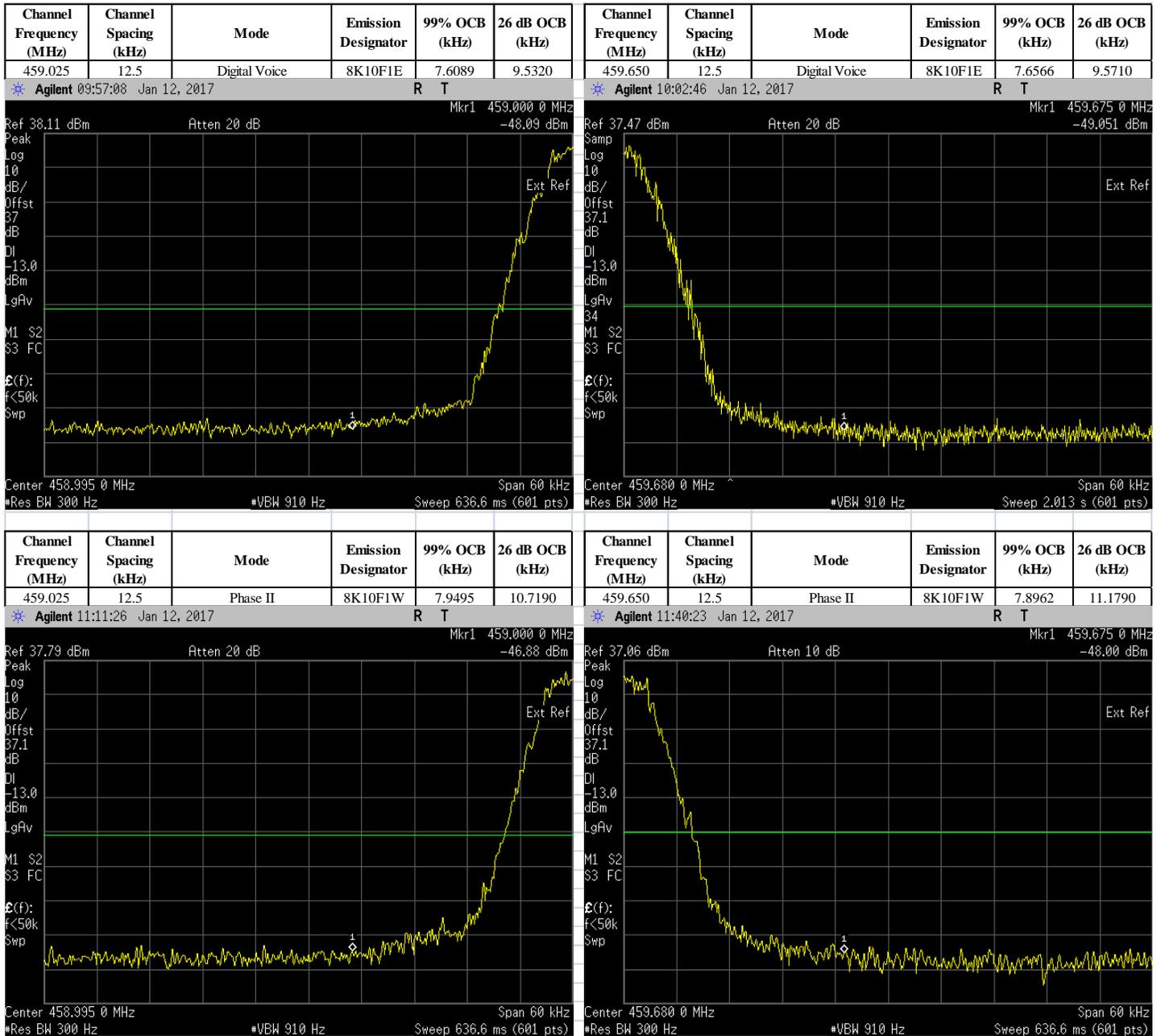


- 1) Program and set radio to operate in desire test frequency and digital mode with modulation. (*4FSK, C4FM or other digital modulation form).
- 2) Path loss for the measurement included.
- 3) Select the Occupied Bandwidth measurement for 99% and 26dB Emissions Bandwidth Measurement.
- 4) Key in the Fc and RBandwidth= 100Hz.
- 5) Transmit radio record the occupied Bandwidth frequencies.
- 6) Preset the spectrum analyzer for band edge measurement.
- 7) The band edges of lowest and highest channels were measured.
- 8) The center frequency of spectrum is the band edge frequency, span is 60 kHz and RBW is at least 1% of Emission Bandwidth.
- 9) Save the screen shot.

**Note:

- For Digital Modulation for 12.5 kHz Voice (F1E) and 12.5 kHz Data (F1D) would be the same. Therefore only measurements with F1E modulation shown below.

6.7.4. Test Result (Digital)

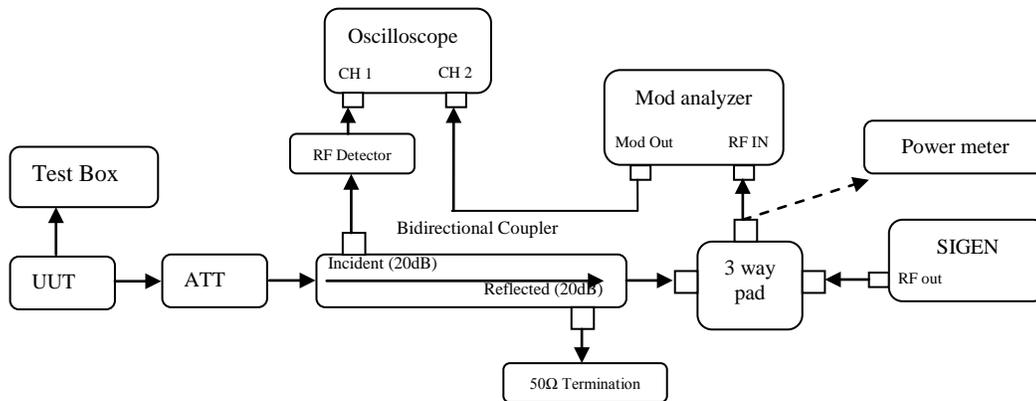


6.7.5. Test Limit

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 Siggen with the assigned center frequency, internal 1kHz FM tone.
FM Deviation: Analog 25kHz Channel Spacing = 25kHz
Analog 12.5kHz Channel Spacing = 12.5kHz
C4FM = 12.5kHz
- 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 ≤ -11 dBm into power meter when UUT is keying up.
- 6) Note the power level on power meter and dekey the UUT.
- 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) Set the horizontal sweep rate on the storage oscilloscope to 10 milliseconds per division and adjust the display to continuously view the 1000 Hz. Adjust the vertical amplitude control of the oscilloscope to display the 1000 Hz at ± 4 divisions vertically centered on the display.
- 10) Reduce 30dB attenuation and transmit the radio to get the trigger line.
- 11) Capture the screen shot for key-up (rising edge) and de-key (falling edge) mode.

6.8.2. Test Result

Not Applicable

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_{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.

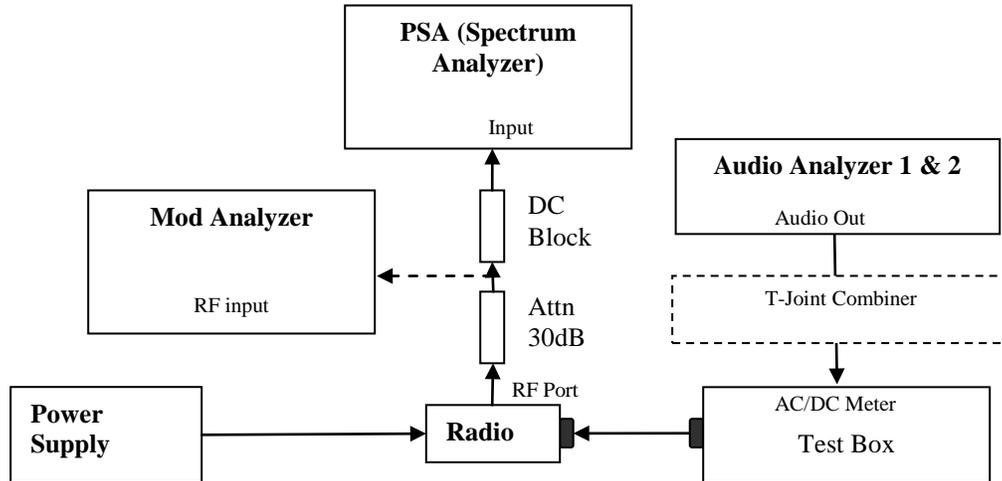
² During the time from the end of t_2 to the beginning of t_3 , the frequency difference must not exceed the limits specified in §90.213.

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)

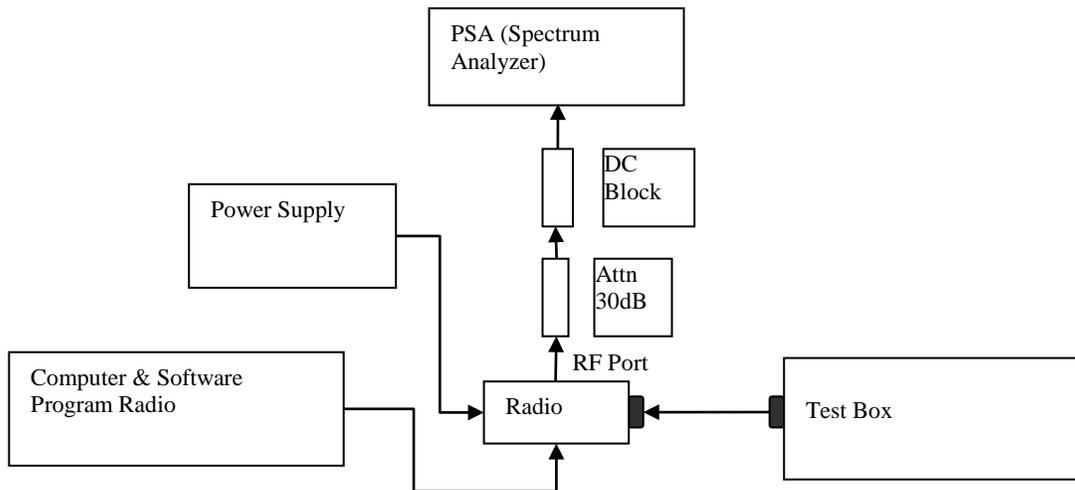


- 1) The DUT transmitter output port was connected to modulation analyzer.
- 2) Path loss for the measurement included.
- 3) Transmit the radio and turn on 1st audio analyzer with audio frequency 650Hz, 50% rated deviation, and record the amplitude value as AmpT1.
- 4) Turn off Audio analyzer 1 and turn on audio analyzer 2, set the audio frequency to 2.2 kHz and 50% deviation. Record the amplitude as AmpT2.
- 5) Turn both audio analyzers ON and up 10dB amplitude level.
- 6) Connect the output to PSA and set to assigned center frequency.
- 7) Set Span, RBW and VBW as shown in FCC rules part 90.534.
- 8) Transmit the radio and record the ACP value in dBc.

6.9.2. Test Result (Analog)

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, CQPSK or other digital modulation form).
- 2) Path loss for the measurement included.
- 3) Prepare setup as per picture.
- 4) Turn on the ACP Measurement – Press Measure, ACP.
- 5) Set Span, RBW and VBW as shown in FCC rules part 90.534.
- 6) Transmit the radio and record the ACP value in dBc.

6.9.4. Test Result (Digital)

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

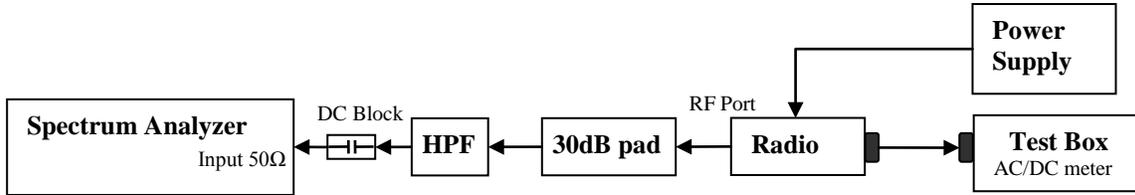
| Offset from center frequency (kHz) | Measurement bandwidth (kHz) | Maximum ACP (dBc) |
|------------------------------------|-----------------------------|-------------------|
| 9.375 | 6.25 | -40 |
| 15.625 | 6.25 | -60 |
| 21.875 | 6.25 | -60 |
| 37.5 | 25 | -60 |
| 62.5 | 25 | -65 |
| 87.5 | 25 | -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 Spectrum Analyzer with above setup.
- 2) Program and set radio to operate in desire test frequency and mode. (Analog / digital modulation form).
- 3) Adjust the PSA RBW = 100kHz for spur emission below 1GHz, and 1MHz for spur emission above 1GHz.
- 4) Set the Ref offset from the pathloss offset calibration file.
- 5) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:
- 6) (a) The lowest radio frequency to $F_c - \text{Test BW}$
- 7) (b) $F_c + \text{Test BW}$ to $\text{Freq} < 2F_c$.
- 8) Record the levels of spurious emissions and dekey the UUT.
- 9) Turn On HPF path and Key up the UUT.
- 10) Adjust the PSA Freq for incremental coverage of range from $2F_c$ to $10F_c$.
- 11) The levels recorded are the absolute levels of conducted spurious emissions in dBm.

6.10.2. Test Result (Analog)

Not Applicable

6.10.3. Test Result (Digital)

Not Applicable

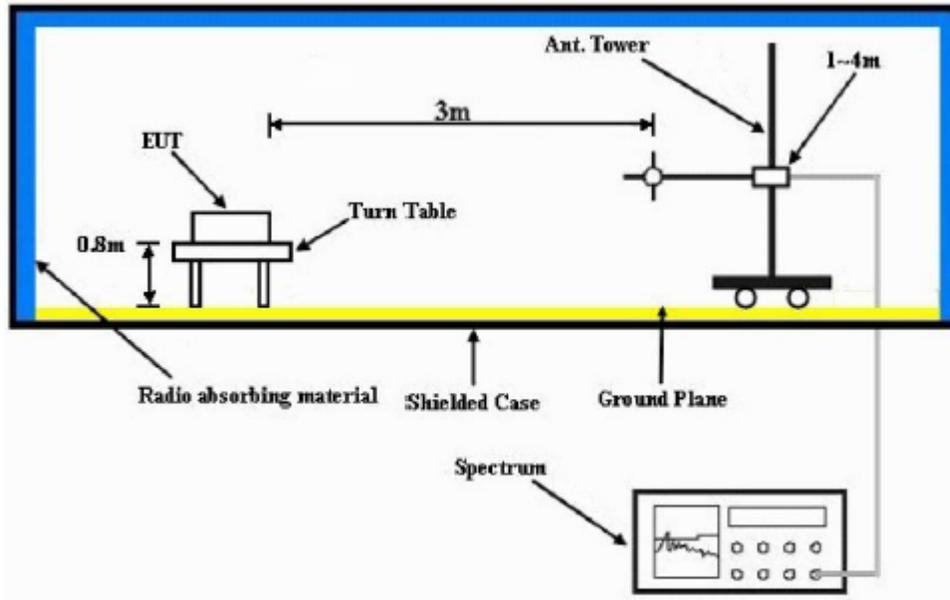
6.10.4. Test Limit

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 |
|-----------------|---|---|---|---|---|
| 12.5kHz | 43 + log ₁₀ (P) (-13 dBm) | 43 + log ₁₀ (P) (-13 dBm) | 43 + log ₁₀ (P) (-13 dBm) | Not Applicable | 50 + log ₁₀ (P) (-20 dBm) |
| 25kHz | | Not Applicable | | 43 + log ₁₀ (P) (-13 dBm) | 43 + log ₁₀ (P) (-13 dBm) |

6.11. Radiated Spurious Emission

6.11.1. Test Setup



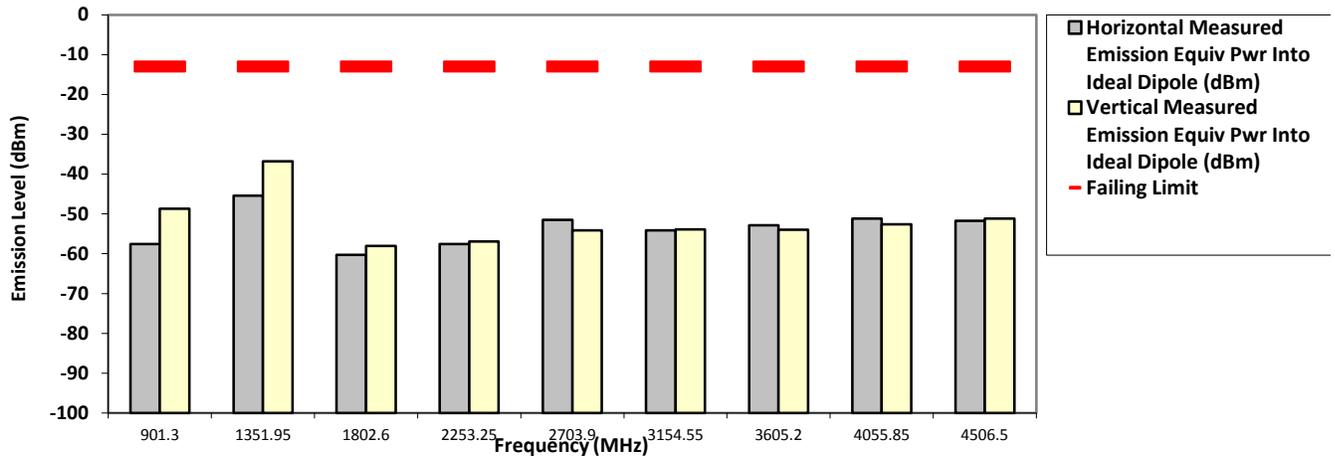
- 12) The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1MHz, VBW = 3MHz. Detector mode is positive peak.
- 13) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the 0.8m height of Turn Table, rotated the 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.
- 14) The substitution antenna is substituted for EUT 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.
- 15) Final Radiated Spurious Emission = “Read Value” + Measured substitution value.

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Analog
450.650000 MHz **25 kHz** **5.700 Watt(s) /Max Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 901.3000 | -13.0000 | -57.5800 * | -48.7200 * |
| 1351.9500 | -13.0000 | -45.4300 * | -36.8000 * |
| 1802.6000 | -13.0000 | -60.2466 ** | -58.0769 ** |
| 2253.2500 | -13.0000 | -57.5253 ** | -56.8998 ** |
| 2703.9000 | -13.0000 | -51.5066 ** | -54.1164 ** |
| 3154.5500 | -13.0000 | -54.1390 ** | -53.9189 ** |
| 3605.2000 | -13.0000 | -52.8364 ** | -53.9686 ** |
| 4055.8500 | -13.0000 | -51.1523 ** | -52.6066 ** |
| 4506.5000 | -13.0000 | -51.7569 ** | -51.1655 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

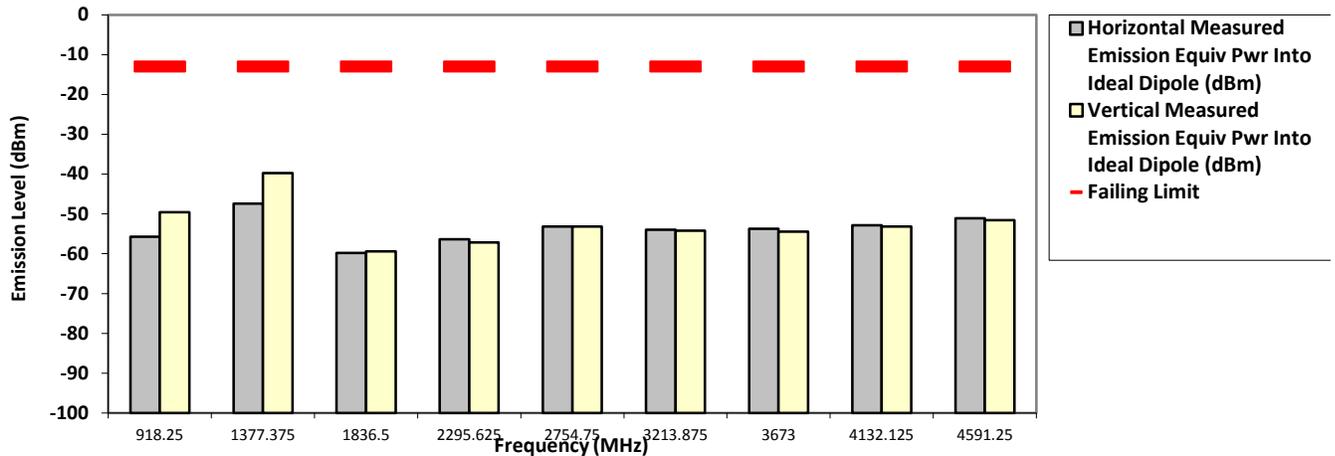
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN S/N: 426CSP2994
 Battery Part No: NNTN8128BR Accy Part No: NA
 Test Mode: TX Analog
 459.125000 MHz 20 kHz 5.700 Watt(s) /Max Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equip Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equip Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 918.2500 | -13.0000 | -55.7200 * | -49.6100 * |
| 1377.3750 | -13.0000 | -47.4200 * | -39.7800 * |
| 1836.5000 | -13.0000 | -59.8147 ** | -59.3903 ** |
| 2295.6250 | -13.0000 | -56.3426 ** | -57.1858 ** |
| 2754.7500 | -13.0000 | -53.1765 ** | -53.1650 ** |
| 3213.8750 | -13.0000 | -53.9734 ** | -54.1900 ** |
| 3673.0000 | -13.0000 | -53.7471 ** | -54.4299 ** |
| 4132.1250 | -13.0000 | -52.8324 ** | -53.1337 ** |
| 4591.2500 | -13.0000 | -51.1205 ** | -51.6022 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

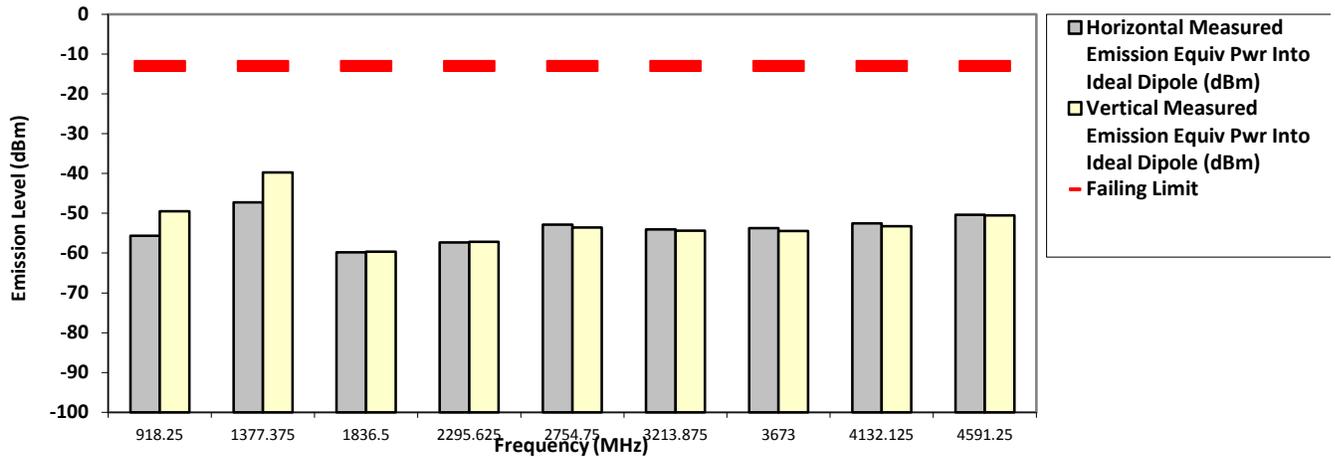
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Analog
459.125000 MHz **25 kHz** **5.700 Watt(s) /Max Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 918.2500 | -13.0000 | -55.6400 * | -49.4900 * |
| 1377.3750 | -13.0000 | -47.2600 * | -39.7200 * |
| 1836.5000 | -13.0000 | -59.8209 ** | -59.6625 ** |
| 2295.6250 | -13.0000 | -57.3111 ** | -57.1473 ** |
| 2754.7500 | -13.0000 | -52.8462 ** | -53.5595 ** |
| 3213.8750 | -13.0000 | -54.0530 ** | -54.3691 ** |
| 3673.0000 | -13.0000 | -53.7500 ** | -54.4655 ** |
| 4132.1250 | -13.0000 | -52.5284 ** | -53.2755 ** |
| 4591.2500 | -13.0000 | -50.3767 ** | -50.5549 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

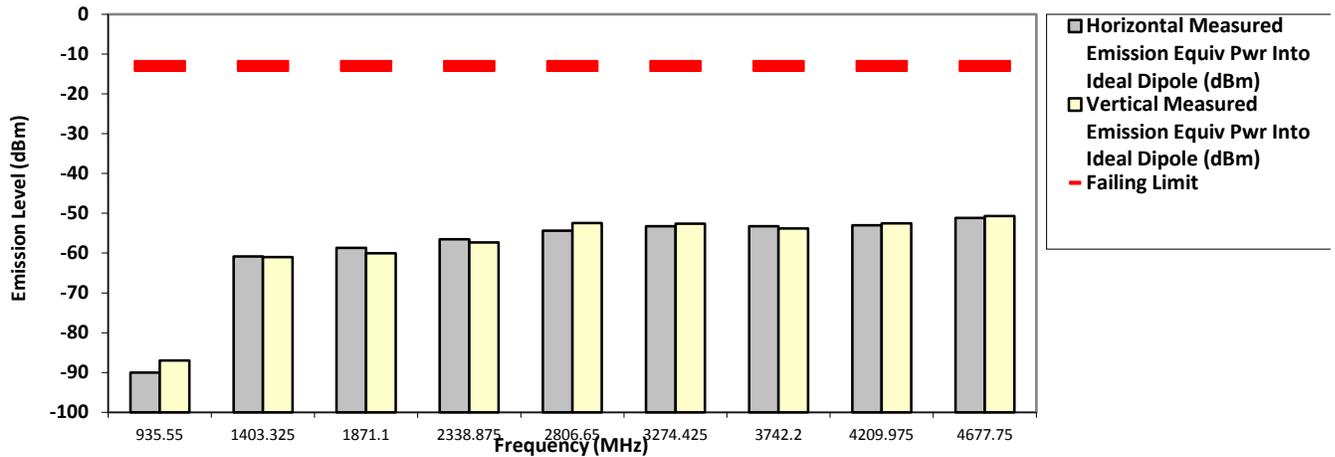
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Analog
467.775000 MHz **25 kHz** **1.000 Watt(s) /Low Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 935.5500 | -13.0000 | -90.0227 ** | -86.9581 ** |
| 1403.3250 | -13.0000 | -60.8524 ** | -60.9620 ** |
| 1871.1000 | -13.0000 | -58.6995 ** | -60.0216 ** |
| 2338.8750 | -13.0000 | -56.4917 ** | -57.3107 ** |
| 2806.6500 | -13.0000 | -54.3894 ** | -52.4725 ** |
| 3274.4250 | -13.0000 | -53.2166 ** | -52.6361 ** |
| 3742.2000 | -13.0000 | -53.2888 ** | -53.8100 ** |
| 4209.9750 | -13.0000 | -53.0164 ** | -52.5482 ** |
| 4677.7500 | -13.0000 | -51.2061 ** | -50.7131 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

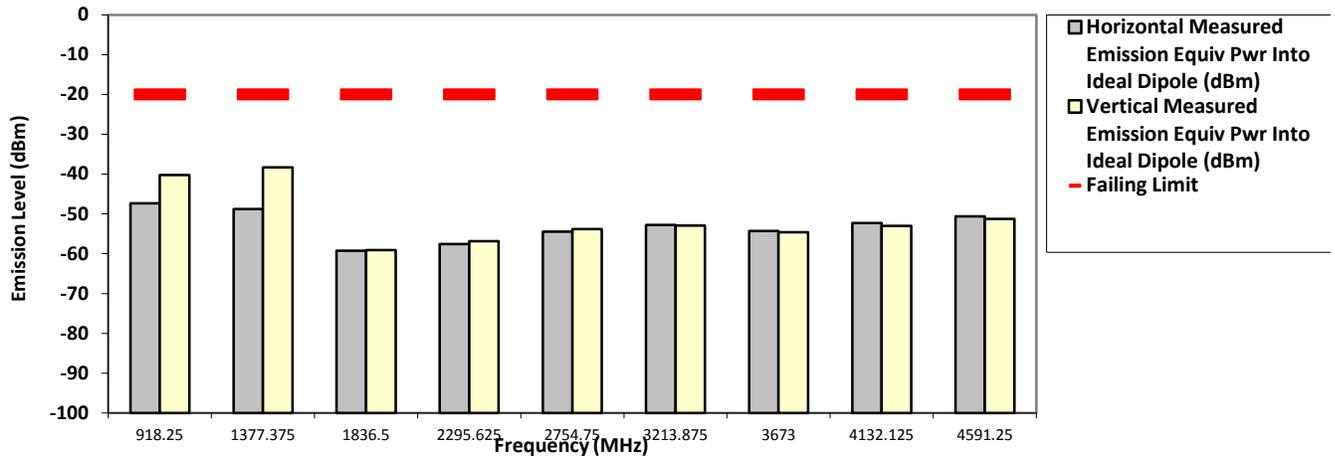
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX C4FM
459.125000 MHz **12.5 kHz** **5.700 Watt(s) /Max Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 918.2500 | -20.0000 | -47.3200 * | -40.2100 * |
| 1377.3750 | -20.0000 | -48.7800 * | -38.3000 * |
| 1836.5000 | -20.0000 | -59.2084 ** | -59.0920 ** |
| 2295.6250 | -20.0000 | -57.5479 ** | -56.8217 ** |
| 2754.7500 | -20.0000 | -54.4696 ** | -53.7719 ** |
| 3213.8750 | -20.0000 | -52.8041 ** | -52.8911 ** |
| 3673.0000 | -20.0000 | -54.2824 ** | -54.6100 ** |
| 4132.1250 | -20.0000 | -52.2747 ** | -53.0064 ** |
| 4591.2500 | -20.0000 | -50.6391 ** | -51.2776 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

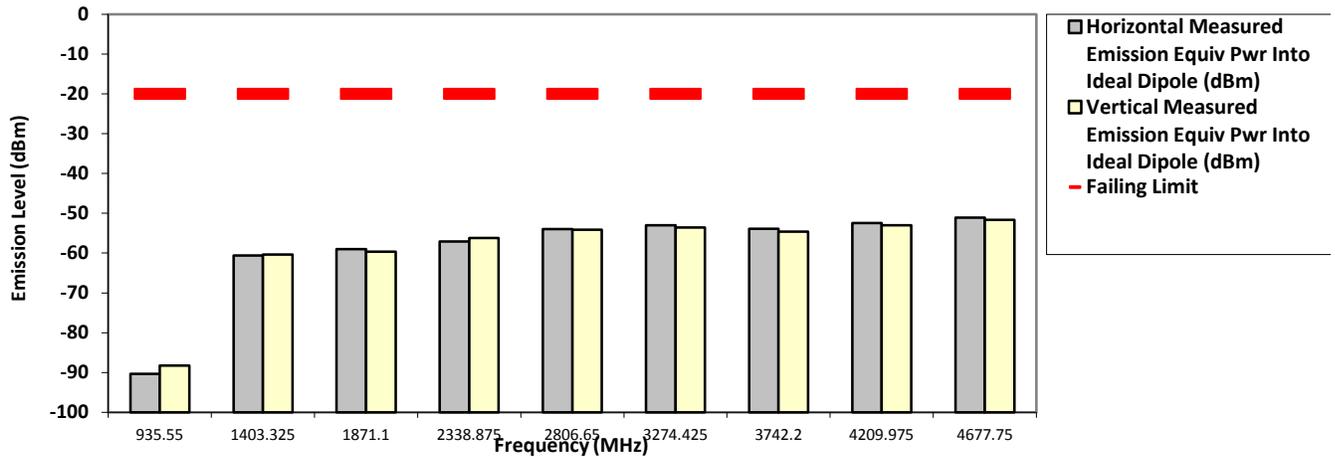
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX C4FM
467.775000 MHz **12.5 kHz** **1.000 Watt(s) /Low Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 935.5500 | -20.0000 | -90.3313 ** | -88.2422 ** |
| 1403.3250 | -20.0000 | -60.5758 ** | -60.3302 ** |
| 1871.1000 | -20.0000 | -58.9755 ** | -59.6318 ** |
| 2338.8750 | -20.0000 | -57.1010 ** | -56.2042 ** |
| 2806.6500 | -20.0000 | -53.9931 ** | -54.1615 ** |
| 3274.4250 | -20.0000 | -53.0034 ** | -53.5537 ** |
| 3742.2000 | -20.0000 | -53.9017 ** | -54.5975 ** |
| 4209.9750 | -20.0000 | -52.4553 ** | -52.9997 ** |
| 4677.7500 | -20.0000 | -51.1105 ** | -51.6289 ** |
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RADIATED SPURIOUS EMISSIONS



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 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

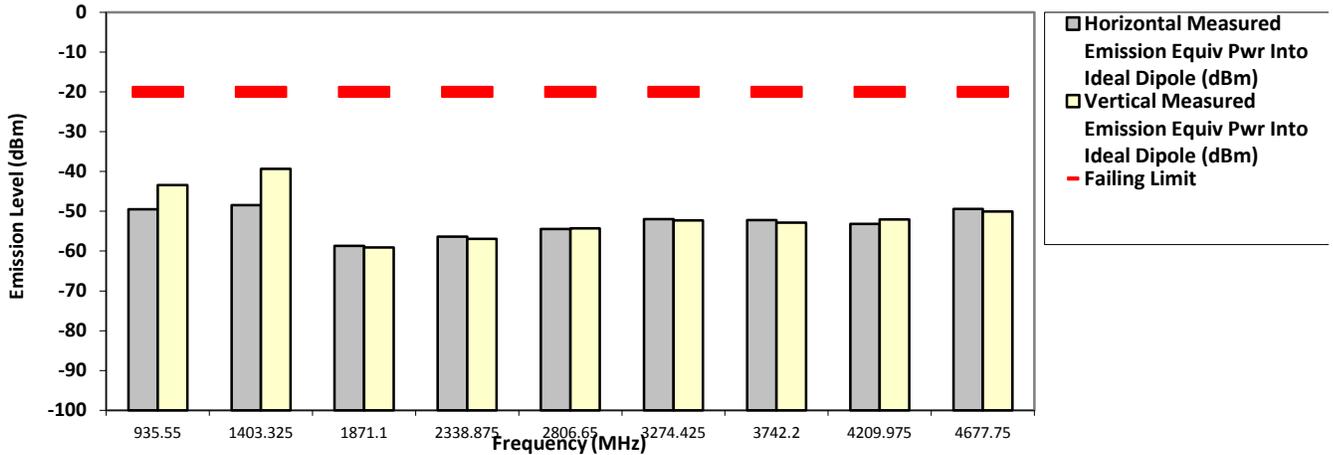
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX C4FM
467.775000 MHz 12.5 kHz 5.700 Watt(s) /Max Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 935.5500 | -20.0000 | -49.4900 * | -43.3900 * |
| 1403.3250 | -20.0000 | -48.4300 * | -39.3100 * |
| 1871.1000 | -20.0000 | -58.6531 ** | -59.0691 ** |
| 2338.8750 | -20.0000 | -56.3852 ** | -56.9311 ** |
| 2806.6500 | -20.0000 | -54.4225 ** | -54.3160 ** |
| 3274.4250 | -20.0000 | -51.9565 ** | -52.3200 ** |
| 3742.2000 | -20.0000 | -52.2144 ** | -52.8519 ** |
| 4209.9750 | -20.0000 | -53.2005 ** | -52.0749 ** |
| 4677.7500 | -20.0000 | -49.4453 ** | -50.0653 ** |
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RADIATED SPURIOUS EMISSIONS



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 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

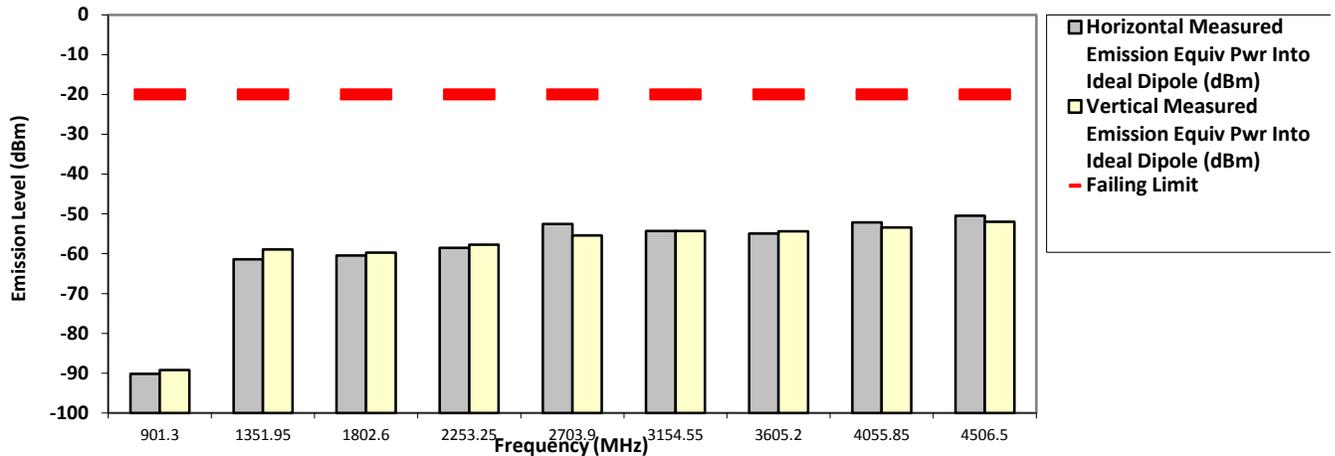
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Phase II
450.650000 MHz 12.5 kHz 1.000 Watt(s) /Low Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 901.3000 | -20.0000 | -90.1958 ** | -89.1860 ** |
| 1351.9500 | -20.0000 | -61.3792 ** | -58.9522 ** |
| 1802.6000 | -20.0000 | -60.4368 ** | -59.7119 ** |
| 2253.2500 | -20.0000 | -58.5307 ** | -57.6991 ** |
| 2703.9000 | -20.0000 | -52.5434 ** | -55.4345 ** |
| 3154.5500 | -20.0000 | -54.3170 ** | -54.2845 ** |
| 3605.2000 | -20.0000 | -54.9140 ** | -54.3612 ** |
| 4055.8500 | -20.0000 | -52.1150 ** | -53.4363 ** |
| 4506.5000 | -20.0000 | -50.4279 ** | -51.9701 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

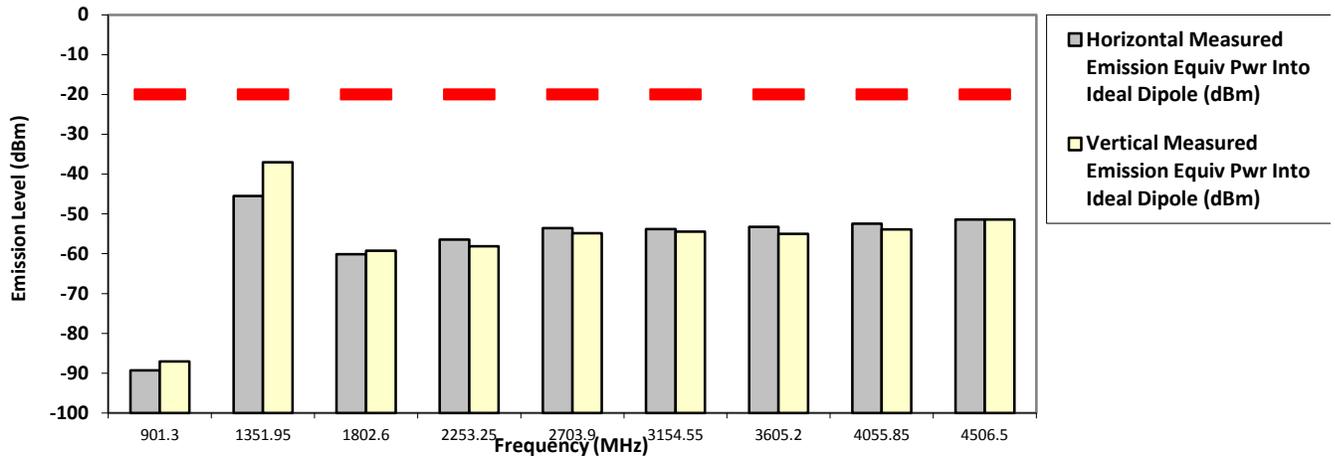
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Phase II
450.650000 MHz 12.5 kHz 5.700 Watt(s) /Max Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 901.3000 | -20.0000 | -89.2431 ** | -87.0629 ** |
| 1351.9500 | -20.0000 | -45.4900 * | -37.0300 * |
| 1802.6000 | -20.0000 | -60.1215 ** | -59.2207 ** |
| 2253.2500 | -20.0000 | -56.4753 ** | -58.0964 ** |
| 2703.9000 | -20.0000 | -53.5799 ** | -54.8676 ** |
| 3154.5500 | -20.0000 | -53.8288 ** | -54.4618 ** |
| 3605.2000 | -20.0000 | -53.2162 ** | -54.9918 ** |
| 4055.8500 | -20.0000 | -52.4441 ** | -53.8533 ** |
| 4506.5000 | -20.0000 | -51.4137 ** | -51.4087 ** |
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RADIATED SPURIOUS EMISSIONS



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 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

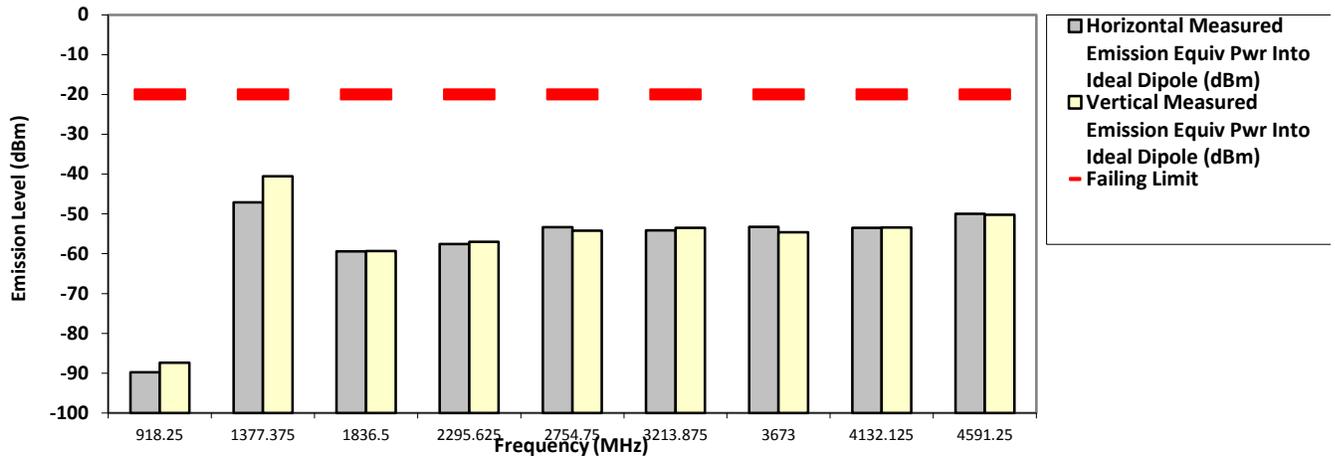
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN S/N: 426CSP2994
Battery Part No: NNTN8128BR Accy Part No: NA
Test Mode: TX Phase II
459.125000 MHz 12.5 kHz 5.700 Watt(s) /Max Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 918.2500 | -20.0000 | -89.7919 ** | -87.4009 ** |
| 1377.3750 | -20.0000 | -47.1300 * | -40.5300 * |
| 1836.5000 | -20.0000 | -59.3733 ** | -59.3211 ** |
| 2295.6250 | -20.0000 | -57.5514 ** | -56.9680 ** |
| 2754.7500 | -20.0000 | -53.3310 ** | -54.1850 ** |
| 3213.8750 | -20.0000 | -54.1582 ** | -53.4857 ** |
| 3673.0000 | -20.0000 | -53.2557 ** | -54.5997 ** |
| 4132.1250 | -20.0000 | -53.4968 ** | -53.4211 ** |
| 4591.2500 | -20.0000 | -49.9628 ** | -50.1926 ** |
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RADIATED SPURIOUS EMISSIONS



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 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

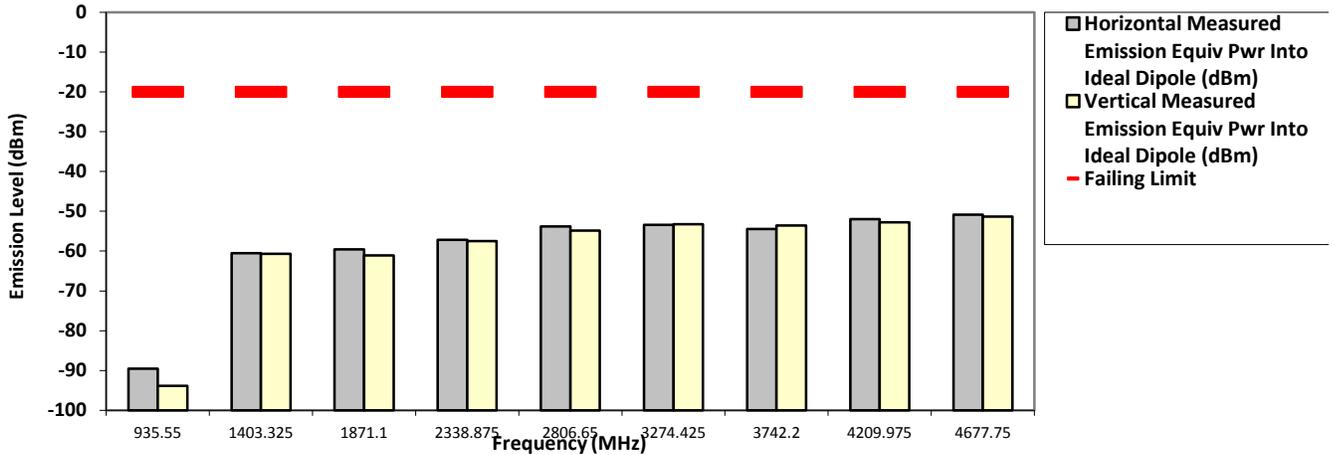
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN **S/N:** 426CSP2994
Battery Part No: NNTN8128BR **Accy Part No:** NA
Test Mode: TX Phase II
467.775000 MHz **12.5 kHz** **1.000 Watt(s) /Low Power**

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 935.5500 | -20.0000 | -89.5407 ** | -93.8706 ** |
| 1403.3250 | -20.0000 | -60.5557 ** | -60.6511 ** |
| 1871.1000 | -20.0000 | -59.5649 ** | -61.0454 ** |
| 2338.8750 | -20.0000 | -57.1725 ** | -57.4717 ** |
| 2806.6500 | -20.0000 | -53.8246 ** | -54.8497 ** |
| 3274.4250 | -20.0000 | -53.3981 ** | -53.2188 ** |
| 3742.2000 | -20.0000 | -54.4617 ** | -53.5379 ** |
| 4209.9750 | -20.0000 | -52.0012 ** | -52.7805 ** |
| 4677.7500 | -20.0000 | -50.8714 ** | -51.3005 ** |
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RADIATED SPURIOUS EMISSIONS



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 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

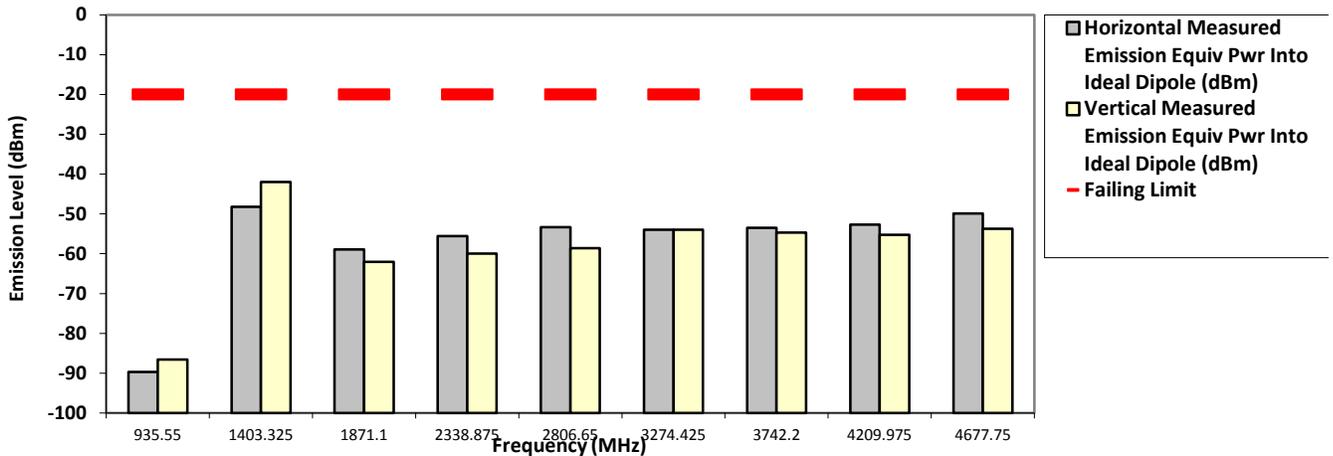
Remarks: Passed Results Marginal Results Failed Results

SAC Transmitter Radiated Emission:

Model #: H51QDH9PW7AN S/N: 426CSP2994
Battery Part No: NNTN8128BR Accy Part No: NA
Test Mode: TX Phase II
467.775000 MHz 12.5 kHz 5.700 Watt(s) /Max Power

| Frequency (MHz) | Failing Limit | Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm) |
|-----------------|---------------|--|--|
| 935.5500 | -20.0000 | -89.6445 ** | -86.5993 ** |
| 1403.3250 | -20.0000 | -48.2300 * | -41.9600 * |
| 1871.1000 | -20.0000 | -58.9305 ** | -62.0545 ** |
| 2338.8750 | -20.0000 | -55.5541 ** | -59.9762 ** |
| 2806.6500 | -20.0000 | -53.2962 ** | -58.6037 ** |
| 3274.4250 | -20.0000 | -53.9763 ** | -53.9761 ** |
| 3742.2000 | -20.0000 | -53.5275 ** | -54.6690 ** |
| 4209.9750 | -20.0000 | -52.6627 ** | -55.2399 ** |
| 4677.7500 | -20.0000 | -49.9162 ** | -53.7453 ** |
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RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the TIA/EIA-603D document.
 Motorola Penang EMC Lab - Test Performed by: Qawiman&Nazrin Wed, Aug 31, 2016
 FCC Registration: 772092 Industry Canada: 109AK

Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.

*Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported
 Temp(Deg): 24.3 Hum(%RH): 69.5

System MU: 5.01 dB

Remarks: Passed Results Marginal Results Failed Results

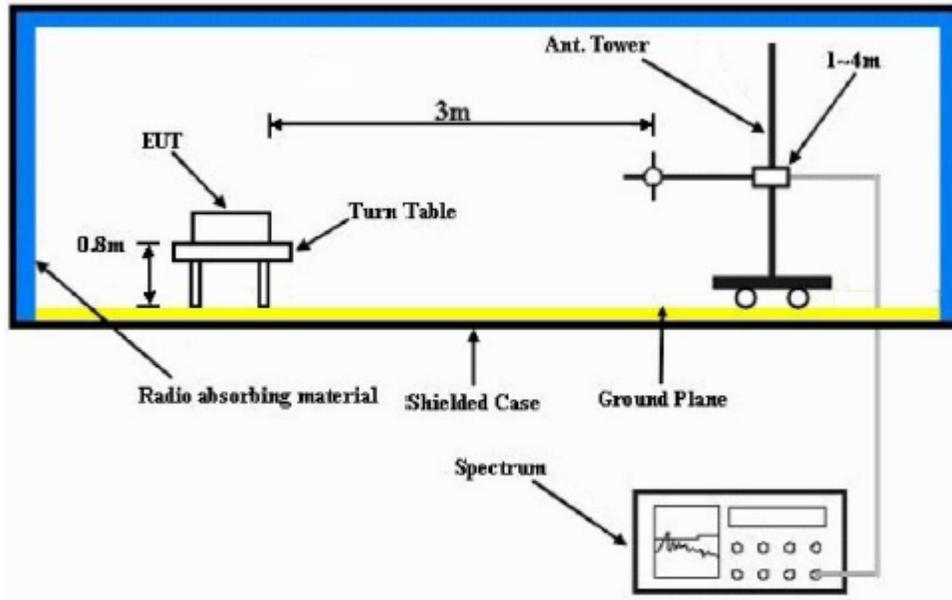
6.11.4. Test Limit

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 |
|-----------------|---|---|---|---|---|
| 12.5kHz | 43 + log ₁₀ (P) (-13 dBm) | 43 + log ₁₀ (P) (-13 dBm) | 43 + log ₁₀ (P) (-13 dBm) | Not Applicable | 50 + log ₁₀ (P) (-20 dBm) |
| 25kHz | | Not Applicable | | 43 + log ₁₀ (P) (-13 dBm) | |

6.12. Effective Radiated Power (ERP) / GNSS (EIRP for 1559 - 1610MHz)

6.12.1. Test Setup



- 1) The spectrum setting for Equivalent Isotropically Radiated Power (EIRP) is RBW = 100 kHz, VBW = 300 kHz. Detector Mode is RMS.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT 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 EUT 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) $EIRP = \text{“Read Value”} + \text{Measured substitution value} + 2.15$.

6.12.2. Test Result

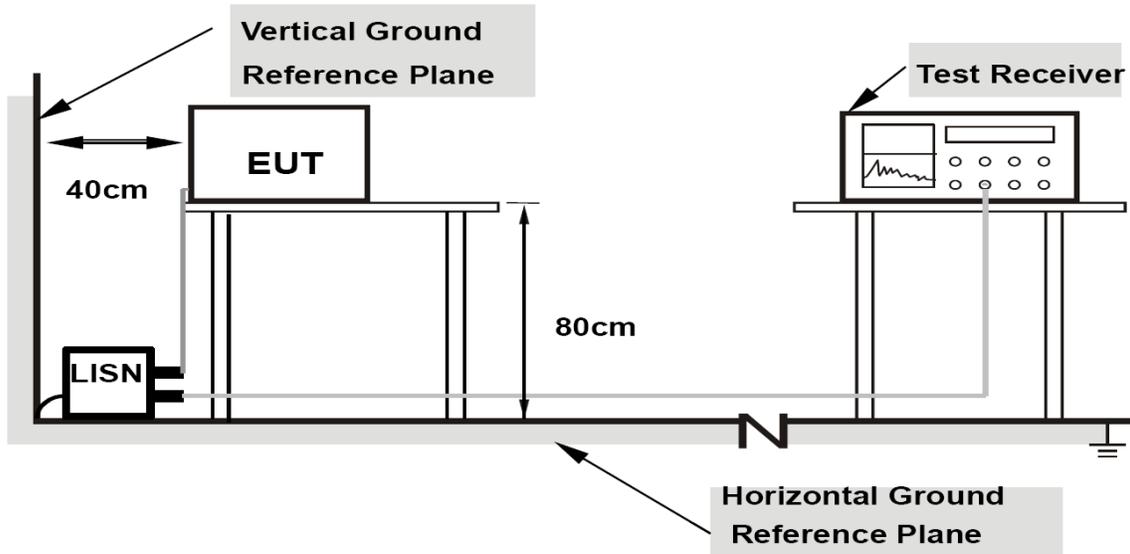
Not Applicable

6.12.3. Test Limit

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

6.13. AC Power Line Conducted Spur Emissions

6.13.1. Test Setup



- 1) Tests were conducted for both Receive and Transmit Mode of the EUT.
- 2) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
- 3) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 4) The frequency range from 150 kHz to 30MHz was measured.

6.13.2. Test Results

Not Applicable

6.13.3. Test Limits

For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.

**Limits for conducted disturbance at the mains ports
of class A ITE**

| Frequency range MHz | Limits dB(μ V) | |
|---|------------------------|---------|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 79 | 66 |
| 0,50 to 30 | 73 | 60 |
| NOTE The lower limit shall apply at the transition frequency. | | |

**Limits for conducted disturbance at the mains ports
of class B ITE**

| Frequency range MHz | Limits dB(μ V) | |
|---|------------------------|----------|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 66 to 56 | 56 to 46 |
| 0,50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |
| NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz. | | |