



TEST REPORT

Report No. : CHTEW19030075 Report verification : 
Project No. : SQ201811002301EW
FCC ID : K6630653X3D
Applicant's name : YAESU MUSEN CO., LTD.
Address : Tennozu Parkside Building 2-5-8 Higashi-Shinagawa,
Shinagawa-ku, Tokyo 140-0002 Japan
Manufacturer..... : QUANZHOU QIXIANG ELECTRON SCIENCE &
TECHNOLOGY CO., LTD.
Address..... : Wan'An Tangxi Industrial Zone, Luojiang District, Quanzhou,
Fujian, China
Test item description : 25 Watt VHF/FM Marine Transceiver
Trade Mark : STANDARD HORIZON
Model/Type reference : GX1400GPS
Listed Model(s)..... : GX1400
Standard..... : FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 80
Date of receipt of test sample..... : Mar.01, 2019
Date of testing..... : Mar.01, 2019- Mar.13, 2019
Date of issue..... : Mar.14, 2019
Result : PASS

Compiled by
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Approved by
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Testing Laboratory Name..... : Shenzhen Huatongwei International Inspection Co., Ltd.

Address : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,
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The test report merely correspond to the test sample.

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1 TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 2](#): Frequency allocations and radio treaty matters; General rules and regulations

[FCC Rules Part 80](#): STATIONS IN THE MARITIME SERVICES

[ANSI C63.26-2015](#): American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[ANSI/TIA-603-E\(2016\)](#): Land Mobile FM or PM Communications Equipment and Performance Standards

1.2. Report revised information

Revised No.	Date of issued	Description
N/A	2019-03-14	Original

2 TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Conducted Carrier Output Power	Part 80.215 Part 2.1046(a)	Pass	Gaosheng Pan
99% Occupied Bandwidth & 26dB bandwidth	Part 80.205 Part 2.1049	Pass	Gaosheng Pan
Emission Mask	Part 80.211(f) Part 2.1049	Pass	Gaosheng Pan
Modulation Limit	Part 2.1047(b) Part 80.213	Pass	Gaosheng Pan
Audio Frequency Response	FCC Part 2.1047(a)	Pass	Gaosheng Pan
Audio Low Pass Filter Response	FCC Part 80.213, Part 2.1047(a)	Pass	Gaosheng Pan
Frequency Stability V.S. Temperature	Part 80.209 Part 2.1055	Pass	Gaosheng Pan
Frequency Stability V.S. Voltage	Part 80.209 Part 2.1055	Pass	Gaosheng Pan
Transmit Conducted Spurious Emission	Part 80.211(f)(3) Part 2.1051	Pass	Gaosheng Pan
Transmit Radiated Spurious Emission	Part 80.211(f)(3) Part 2.1053	Pass	Baojin Ling
Receiver Requirement			
Test item	Standards requirement	Result	Test Engineer
AC Power Line Conducted Emission	FCC Part 15.207	N/A	N/A
Radiated Emission	FCC Part 15.209	Pass	Shower Dai

3 SUMMARY

3.1 Client Information

Applicant:	YAESU MUSEN CO., LTD.
Address:	Tennozu Parkside Building 2-5-8 Higashi-Shinagawa, Shinagawa-ku, Tokyo 140-0002 Japan
Manufacturer:	QUANZHOU QIXIANG ELECTRON SCIENCE & TECHNOLOGY CO., LTD.
Address:	Wan'An Tangxi Industrial Zone, Luojiang District, Quanzhou, Fujian, China

3.2 Product Description

Name of EUT:	25 Watt VHF/FM Marine Transceiver
Trade mark:	STANDARD HORIZON
Model/Type reference:	GX1400GPS
Listed model(s):	GX1400
Power supply:	DC 13.8V
Hardware version:	SPP01
Software version:	SPP01
RF Specification	
Operation Frequency Range:	TX:156.025MHz to 161.600MHz
	RX:156.050MHz to 162.025MHz
Rated Output Power:	☒ High Power: 25W ☒ Low Power: 1W
Modulation Type:	Analog: FM
Channel Separation:	Analog: ☐ 12.5kHz ☒ 25kHz
Emission Designator: * ¹	Analog: 16K0G3E
Antenna Type:	External

Note:

(1) *¹ According to FCC Part 2.202 requirements, the Necessary Bandwidth is calculated as follows:

– For FM Voice Modulation

Channel Spacing = 25 KHz, D = 5 KHz max, K = 1, M = 3 KHz

$B_n = 2M + 2DK = 2 \times 3 + 2 \times 5 \times 1 = 16 \text{ KHz}$

Emission designation: 16K0G3E

3.3 Test frequency list

According to ANSI C63.26 section 5.1.2.1:

Measurements of transmitters shall be performed and, if required, reported for each frequency band in which the EUT can be operated with the device transmitting at the number of frequencies in each band specified in Table 2.

Frequency range over which EUT operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

Frequency Bands (MHz)	Test Channel	Test Frequency(MHz)	
		TX	RX
156.025 ~ 162.025	CH _L (CH1001)	156.05MHz	156.05MHz
	CH _{M2} (CH16)	156.800MHz	156.800MHz
	CH _H (CH88)	157.425MHz	157.425MHz

3.4 Operation mode

Test mode	Transmitting	Receiving	Power level		Analog Voice/PM	GPS	US Weather
			High	Low	25kHz		
TX-AWH	√		√		√		
TX-AWL	√			√	√		
RX-AW		√			√		
RX-GPS		√				√	
RX-US Weather		√					√

Note:

√: is operation mode.

Note:

● US weather Channel:

Channel	Frequency(MHz)	Restrictions
WX1	162.550	RX ONLY
WX2	162.400	RX ONLY
WX3	162.475	RX ONLY
WX4	162.425	RX ONLY
WX5	162.450	RX ONLY
WX6	162.500	RX ONLY
WX7	162.525	RX ONLY

Modulation Type	Description
UM	Un-modulation
AM2	Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
AM6	Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation, then increase the level from the audio generator by 20 dB
AM5	Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.

Pre-scan above all test mode, found below test mode which it was worse case mode, so only show the test data for worse case mode on the test report.

Test item	Modulation Type	Test mode (Worse case mode)
Conducted Output Power	UM	TX-AWH, TX-AWL
99% Occupied Bandwidth & 26dB bandwidth	AM6	TX-AWH, TX-AWL
Emission Mask	AM5	TX-AWH, TX-AWL
Modulation Limit	AM6	TX-AWH
Audio Frequency Response	AM2	TX-AWH
Frequency Stability VS Temperature	UM	TX-AWH, TX-AWL
Frequency Stability VS Voltage	UM	TX-AWH, TX-AWL
Transmit Conducted Spurious Emission	AM5	TX-AWH
Transmit Radiated Spurious Emission	AM5	TX-AWH
AC Power Line Conducted Emission	-	N/A
Radiated Emission	-	RX-GPS

3.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

●	Power Cable	Length (m) :	/
		Shield :	Unshielded
		Detachable :	Undetachable
○	Multimeter	Manufacturer :	/
		Model No. :	/

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4.2 Test Facility

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

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 762235.

IC-Registration No.: 5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B-1.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3 Environmental conditions

Atmospheric Contions	
Temperature:	21°C to 25°C
Relative Humidity:	20 % to 75 %.
Atmospheric Pressure:	860 mbar to 1060 mbar
Norminal Test Voltage:	$V_N = \text{DC } 13.8\text{V}$
Extrem Test Voltage @115% V_N :	$V_H = \text{DC } 15.87\text{V}$
Extrem Test Voltage @85% V_N :	$V_L = \text{DC } 11.73\text{V}$

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability & Occupied Bandwidth	18Hz for <1GHz 69Hz for >1GHz	(1)
Conducted Output Power	0.63dB	(1)
ERP / EIRP / RSE	2.38dB for <1GHz 3.45dB for >1GHz	(1)
Conducted Emission 9KHz-30MHz	3.35 dB	(1)
Radiated Emission 30~1000MHz	4.80 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
FM deviation	25 Hz	(1)
Audio level	0.62 dB	(1)
Low Pass Filter Response	0.76 dB	(1)
Modulation Limiting	0.42 %	(1)
Transient Frequency Behavior	6.8 %	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.5 Equipments Used during the Test

● Radiated Emission-6th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
○	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifier	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
●	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● Radiated emission-7th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
○	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	2018/04/28	2019/04/27
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	Test Software	Audix	E3	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● TS8613 Test system						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28
●	Signal & Spectrum Analyzer	R&S	FSW26	103440	2018/10/28	2019/10/27
●	RF Communication Test Set	HP	8920A	3813A10206	2018/10/28	2019/10/27
●	Digital intercom communication tester	Aeroflex	3920B	1001682041	2018/10/28	2019/10/27
●	Signal Generator	R&S	SML02	100507	2018/10/27	2019/10/26
●	Signal Generator	IFR	2032	203002\100	2018/11/11	2019/11/10
●	RF Control Unit	Tonscend	JS0806-2	N/A	N/A	N/A
●	Fliter-VHF	Microwave	N26460M1	498702	2018/03/19	2019/03/18
○	Fliter-UHF	Microwave	N25155M2	498704	2018/03/19	2019/03/18
○	Power Divider	Microwave	OPD1040-N-4	N/A	2018/11/15	2019/11/14
○	Attenuator	JFW	50FH-030-100	N/A	2018/11/15	2019/11/14
○	Attenuator	JFW	50-A-MFN-20	0322	2018/11/15	2019/11/14
●	Test software	HTW	Radio ATE	N/A	N/A	N/A

● Auxiliary Equipment						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Climate chamber	ESPEC	GPL-2	N/A	2018/11/08	2019/11/07
●	DC Power Supply	Gwinstek	SPS-2415	GER835793	2018/10/28	2019/10/27

● Radiated Spurious Emission						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	538	2017/04/05	2020/04/04
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/04/01	2020/03/31
○	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2017/03/27	2020/03/26
○	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-248	2018/04/28	2019/04/27
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	EMI Test Software	Audix	E3	N/A	N/A	N/A
●	Turntable	MATURO	TT2.0	N/A	N/A	N/A
●	Antenna Mast	MATURO	TAM-4.0-P	N/A	N/A	N/A

5 TEST CONDITIONS AND RESULTS

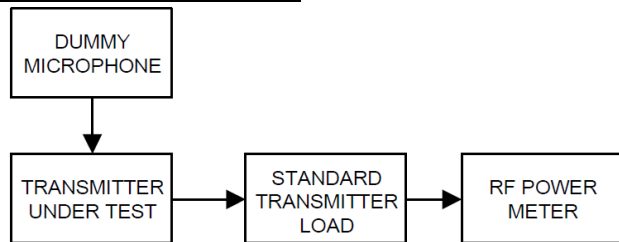
5.1 Conducted Carrier Output Power

LIMIT

FCC Part 80.215, FCC Part 2.1046

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation.

TEST CONFIGURATION



TEST PROCEDURE

- (1) Connect the equipment as illustrated
- (2) Correct for all losses in the RF path
- (3) Measure the transmitter output power
- (4) If the power output is adjustable, measurements shall be made for the highest and lowest power levels.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Please refer to appendix A on the section 6 appendix report

5.2 99% Occupied Bandwidth & 26dB Bandwidth

LIMIT

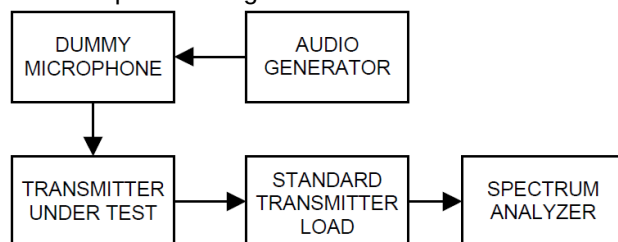
FCC Part 80.205, FCC Part 2.1049

Class of emission	Emission designator	Authorized bandwidth (kHz)
A1A	160HA1A	0.4
A1B ¹	160HA1B	0.4
A1D ¹²	16K0A1D	20.0
A2A	2K66A2A	2.8
A2B ¹	2K66A2B	2.8
A2D ¹²	16K0A2D	20.0
A3E	6K00A3E	8.0
A3N ²	2K66A3N	2.8
A3X ³	3K20A3X	25.0
F1B ⁴	280HF1B	0.3
F1B ⁵	300HF1B	0.5
F1B ⁶	16K0F1B	20.0
F1C	2K80F1C	3.0
F1D ¹²	16K0F1D	20.0
F2B ⁶	16K0F2B	20.0
F2C ⁷	16K0F2C	20.0
F2D ¹²	16K0F2D	20.0
F3C	2K80F3C	3.0
F3C ⁷	16K0F3C	20.0
F3E ⁸	16K0F3E	20.0

⁸ Applicable only when maximum frequency deviation is 5 kHz. See also paragraph (b) of this section.

TEST CONFIGURATION

Test setup for Analog:



TEST PROCEDURE

- (1) Connect the equipment as illustrated
- (2) Spectrum set as follow:
 Centre frequency = the nominal EUT channel center frequency,
 The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient)
 RBW = 1% to 5% of the anticipated OBW, VBW $\geq 3 \times \text{RBW}$, Sweep = auto,
 Detector function = peak, Trace = max hold
- (3) Set 99% Occupied Bandwidth and 26dB Bandwidth
- (4) Measure and record the results in the test report.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to appendix B on the section 6 appendix report

5.3 Emission Mask

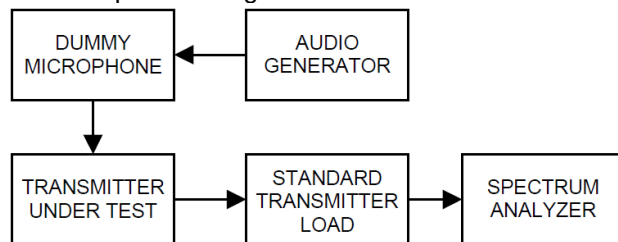
LIMIT

FCC Part 80.211(f), FCC Part 2.1049

- (1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;
- (2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

TEST CONFIGURATION

Test setup for Analog:



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Spectrum set as follow:
Centre frequency = fundamental frequency, span=120kHz for 12.5kHz channel spacing,
RBW=100Hz, VBW=1000Hz, Sweep = auto,
Detector function = peak, Trace = max hold
- 3) Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0dB reference for the measurement.
- 4) Apply Input Modulation Signal to EUT according to Section 3.4
- 5) Measure and record the results in the test report.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable

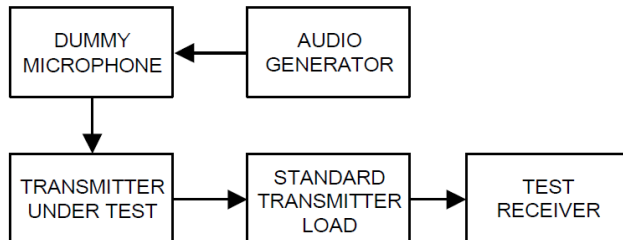
Please refer to appendix C on the section 6 appendix report

5.4 Modulation Limit

LIMIT

FCC Part 80.213, FCC Part 2.1047(b)
5kHz for 25 KHz Channel Spacing System

TEST CONFIGURATION



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- 3) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤ 0.25 Hz to $\geq 15,000$ Hz. Turn the de-emphasis function off.
- 4) Apply Input Modulation Signal to EUT according to Section 3.4 and vary the input level from -20 to $+20$ dB.
- 5) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level
- 6) Repeat step 4-5 with input frequency changing to 300Hz, 1004Hz, 1500Hz and 2500Hz in sequence.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable

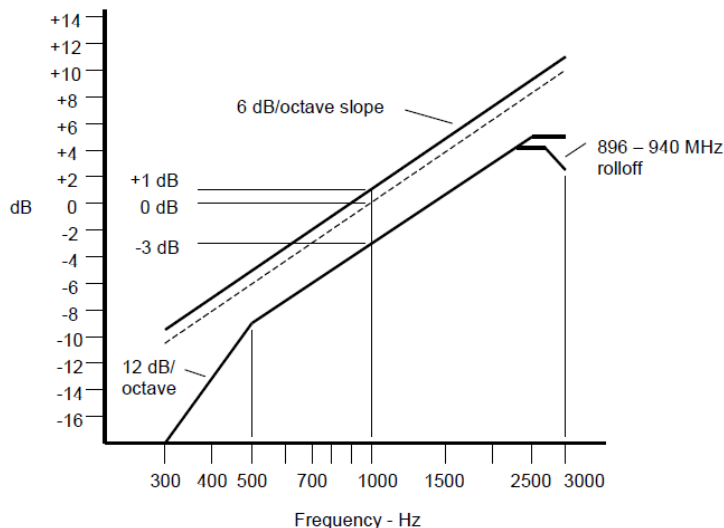
Please refer to appendix D on the section 6 appendix report

5.5 Audio Frequency Response

LIMIT

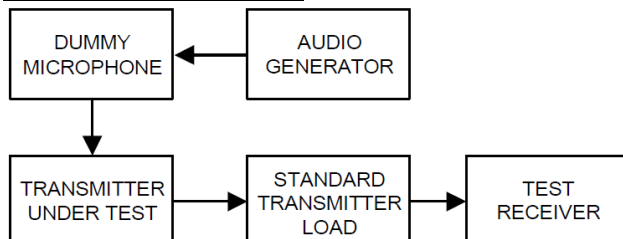
FCC Part 80.213(e) ,FCC Part 2.1047(a):

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.



An additional 6 dB per octave attenuation is allowed from 2500 Hz to 3000 Hz in equipment operating in the 25 MHz to 869 MHz range.

TEST CONFIGURATION



TEST PROCEDURE

- 1) Connect the equipment as illustrated.
- 2) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for 50 Hz to 15,000 Hz. Turn the de-emphasis function off.
- 3) Set the DMM to measure rms voltage.
- 4) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- 5) Apply Input Modulation Signal to EUT according to Section 3.4
- 6) Set the test receiver to measure rms deviation and record the deviation reading.
- 7) Record the DMM reading as V_{REF} .
- 8) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.
- 9) Vary the audio frequency generator output level until the deviation reading that was recorded in step 6) is obtained.
- 10) Record the DMM reading as V_{FREQ} .
- 11) Calculate the audio frequency response at the present frequency as:

$$\text{audio frequency response} = 20 \log_{10} (V_{FREQ} / V_{REF})$$
- 12) Repeat steps 8) through 11) for all the desired test frequencies

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

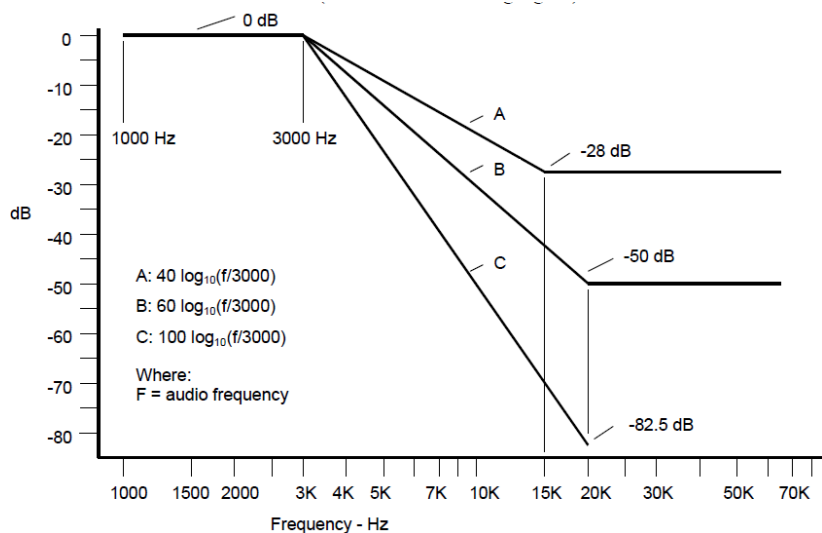
Please refer to appendix E on the section 6 appendix report

5.6 Audio Low Pass Filter Response

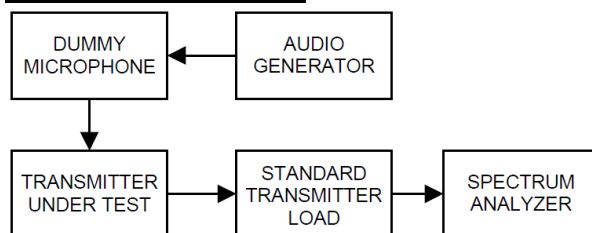
LIMIT

FCC Part 2.1047(b), FCC Part 80.213(e)

Coast station transmitters operated in the 156-162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20 kHz it must have an attenuation greater than at 1 kHz by at least $60\log_{10}(f/3)$ dB where “f” is the audio frequency in kilohertz. At frequencies above 20 kHz the attenuation must be at least 50 dB greater than at 1 kHz.



TEST CONFIGURATION



TEST PROCEDURE

- 1) Configure the EUT as shown in figure .
- 2) Apply a 1000 Hz tone from the audio signal generator and adjust the level per manufacturer's specifications. Record the dB level of the 1000 Hz tone as LEV_{REF} .
- 3) Set the audio signal generator to the desired test frequency between 3000 Hz and the upper low pass filter limit. Record the dB level at the test frequency as LEV_{FREQ} .
- 4) Calculate the audio frequency response at the test frequency as:
 low pass filter response = $LEV_{FREQ} - LEV_{REF}$

TEST MODE:

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to appendix F on the section 8 appendix report

5.7 Frequency stability VS Temperature

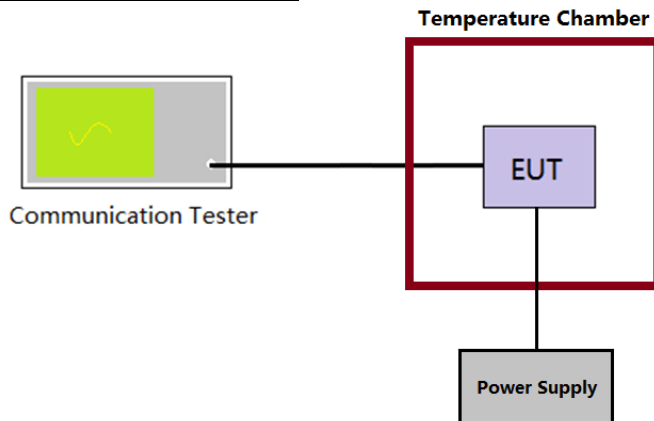
LIMIT

FCC Part 80.209, FCC Part 2.1055

Frequency bands and categories of stations	Tolerances ¹
(5) Band 156-162 MHz:	
(i) Coast stations:	
For carriers licensed to operate with a carrier power:	
Below 3 watts	10.
3 to 100 watts	5. ⁷
(ii) Ship stations	10. ⁴
(iii) Survival craft stations operating on 121.500 MHz	50.
(iv) EPIRBs:	
Operating on 121.500 and 243.000 MHz	50.
Operating on 156.750 and 156.800 MHz. ⁶	10.
(6) Band 216-220 MHz:	
(i) Coast stations:	
For all emissions	5.
(ii) Ship stations:	
For all emissions	5.
(7) Band 400-466 MHz:	
(i) EPIRBs operating on 406-406.1 MHz	5.
(ii) On-board stations	5.
(iii) Radiolocation and telecommand stations.	5.
(8) Band 1626.5-1646.5 MHz:	
(i) Ship earth stations	5.

⁷For transmitters operated at private coast stations with antenna heights less than 6 meters (20 feet) above ground and output power of 25 watts or less the frequency tolerance is 10 parts in 10^6 .

TEST CONFIGURATION



TEST PROCEDURE

- 1) The EUT output port was connected to communication tester.
- 2) The EUT was placed inside the temperature chamber.
- 3) Turn EUT off and set the chamber temperature to -30°C . After the temperature stabilized for approximately 30 minutes recorded the frequency as MCF_{MHz} .
- 4) Calculate the ppm frequency error by the following:

$$\text{ppm error} = (MCF_{\text{MHz}} / ACF_{\text{MHz}} - 1) * 10^6$$

where
 MCF_{MHz} is the Measured Carrier Frequency in MHz
 ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 5) Repeat step 3 measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Please refer to appendix G on the section 6 appendix report

5.8 Frequency stability VS Voltage

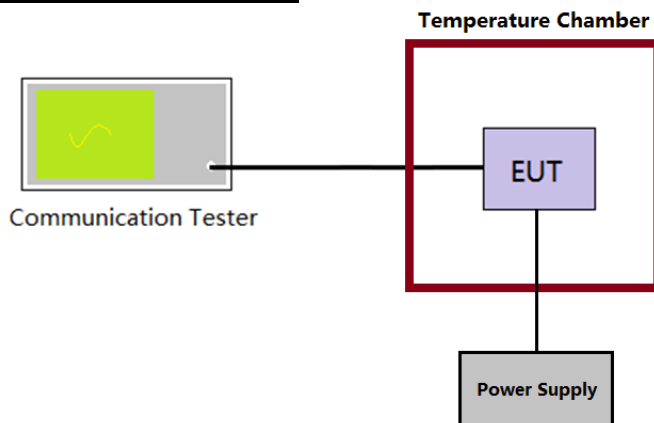
LIMIT

FCC Part 80.209, FCC Part 2.1055

Frequency bands and categories of stations	Tolerances ¹
(5) Band 156-162 MHz:	
(i) Coast stations:	
For carriers licensed to operate with a carrier power:	
Below 3 watts	10.
3 to 100 watts	5. ⁷
(ii) Ship stations	10. ⁴
(iii) Survival craft stations operating on 121.500 MHz	50.
(iv) EPIRBs:	
Operating on 121.500 and 243.000 MHz	50.
Operating on 156.750 and 156.800 MHz. ⁶	10.
(6) Band 216-220 MHz:	
(i) Coast stations:	
For all emissions	5.
(ii) Ship stations:	
For all emissions	5.
(7) Band 400-466 MHz:	
(i) EPIRBs operating on 406-406.1 MHz	5.
(ii) On-board stations	5.
(iii) Radiolocation and telecommand stations.	5.
(8) Band 1626.5-1646.5 MHz:	
(i) Ship earth stations	5.

⁷For transmitters operated at private coast stations with antenna heights less than 6 meters (20 feet) above ground and output power of 25 watts or less the frequency tolerance is 10 parts in 10⁶.

TEST CONFIGURATION



TEST PROCEDURE

- 1) The EUT output port was connected to communication tester.
- 2) The EUT was placed inside the temperature chamber at 25°C
- 3) Record the carrier frequency of the transmitter as MCF_{MHz}
- 4) Calculate the ppm frequency error by the following:

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

where
 MCF_{MHz} is the Measured Carrier Frequency in MHz
 ACF_{MHz} is the Assigned Carrier Frequency in MHz
- 5) Repeat step 3 measure with varied $\pm 15\%$ of the nominal value measured at the input to the EUT

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Please refer to appendix H on the section 6 appendix report

5.9 Transmit Conducted Spurious Emission

LIMIT

FCC Part 80.211(f)(3), FCC Part 2.1051

FCC Rules	Attenuation Limit (dBc)
§ 80.211(f)(3)	At least $43 + 10\log_{10}$ (mean power in watts) dB

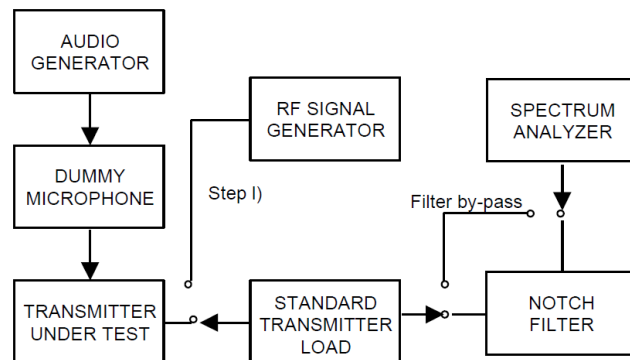
$43 + 10 \log (P_{\text{watts}})$

Calculation: $\text{Limit (dBm)} = EL - 43 - 10\log_{10} (TP)$

Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P (dBm).

$\text{Limit (dBm)} = P \text{ (dBm)} - 43 - 10 \log (P_{\text{watts}}) = -13 \text{ dBm}$

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the equipment as illustrated, with the notch filter by-passed.
2. Apply Input Modulation Signal to EUT according to Section 3.4
3. Adjust the spectrum analyzer for the following settings:
Below 1GHz: RBW=100kHz, VBW=300kHz
Above 1GHz: RBW=1MHz, VBW=3MHz
Detector=Peak, Sweep time=Auto, Trace=Max hold
4. Scan frequency range up to 10th harmonic.
5. Record the frequencies and levels of spurious emissions

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable

Please refer to appendix I on the section 6 appendix report

5.10 Transmitter Radiated Spurious Emission

Radiated spurious emissions are emissions from the equipment when transmitting into a nonradiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

LIMIT

FCC Part 80.211(f)(3), FCC Part 2.1051

FCC Rules	Attenuation Limit (dBc)
§ 80.211(f)(3)	At least $43 + 10\log_{10}$ (mean power in watts) dB

$43 + 10 \log (P_{\text{watts}})$

Calculation: $\text{Limit (dBm)} = EL - 43 - 10\log_{10} (TP)$

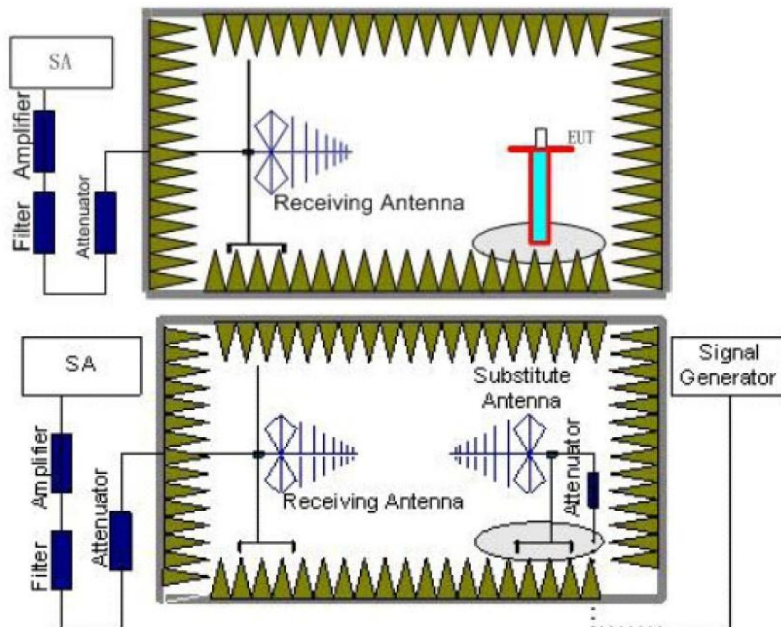
Notes: EL is the emission level of the Output Power expressed in dBm,

In this application, the EL is P (dBm).

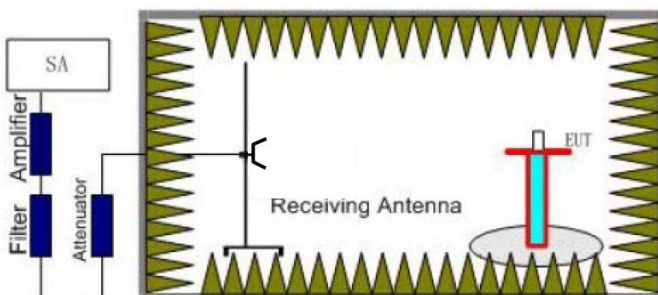
$\text{Limit (dBm)} = P(\text{dBm}) - 43 - 10 \log (P_{\text{watts}}) = -13 \text{ dBm}$

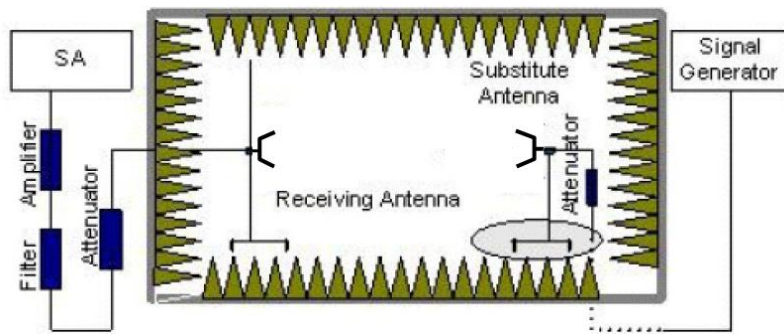
TEST CONFIGURATION

Below 1GHz:



Above 1GHz:





TEST PROCEDURE

1. Standard Transmitter Load with a 50Ω input impedance and an output impedance matched to the test equipment.
2. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.0 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
3. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
The measurement results are obtained as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} - \text{Ga}$$
 We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:

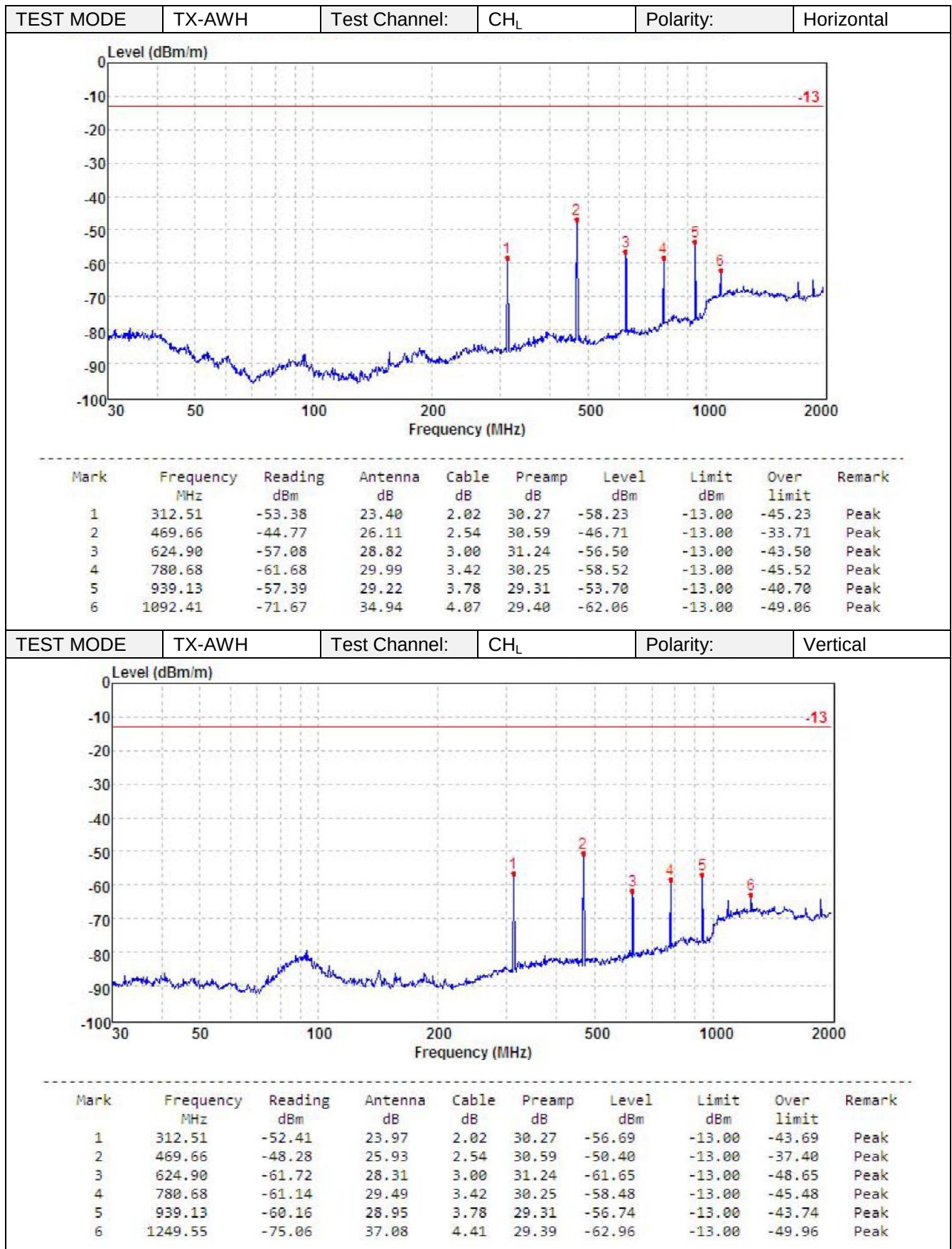
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} - \text{Ga}$$
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.

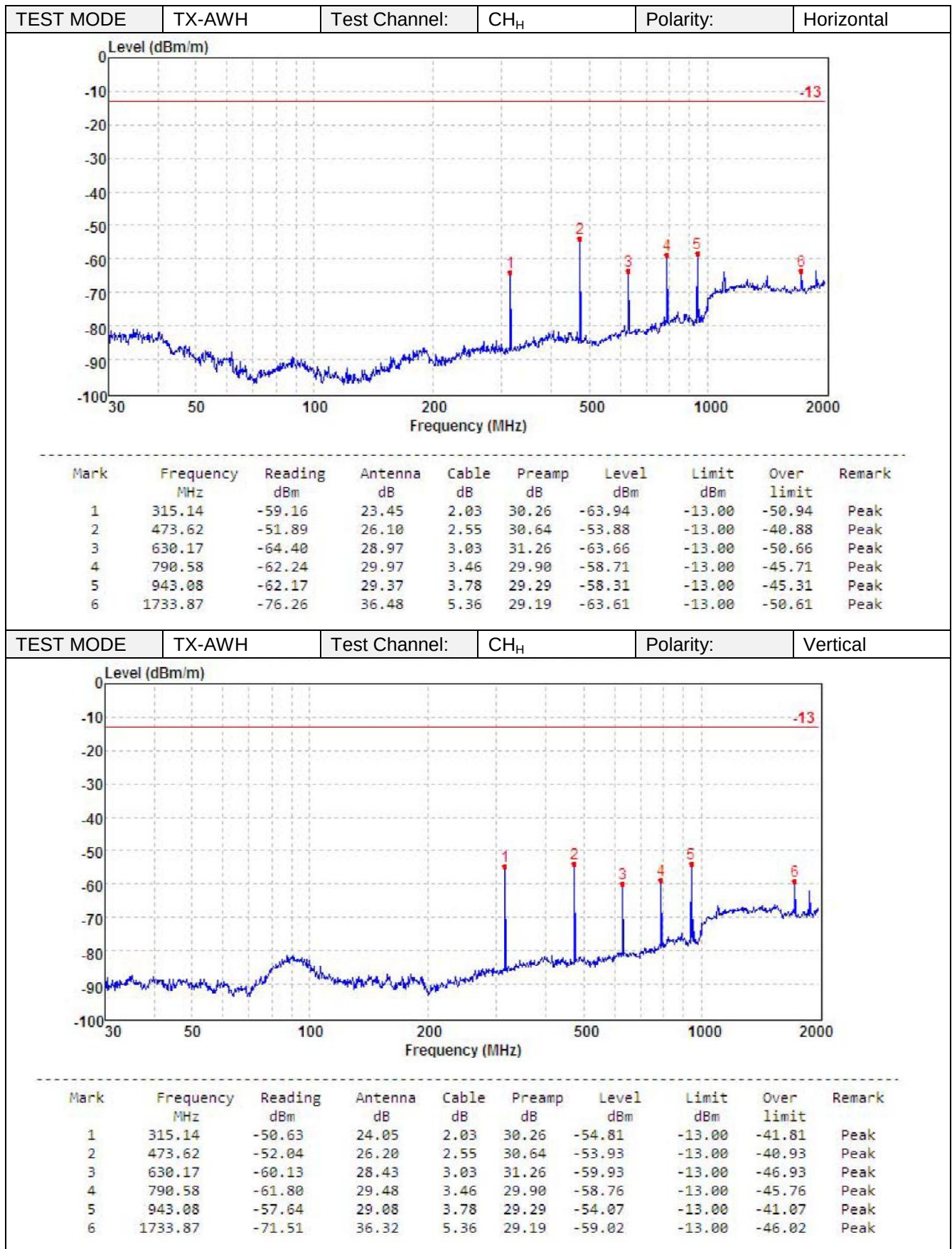
TEST MODE

Please reference to the section 3.4

TEST RESULTS

☒ Passed ☐ Not Applicable





5.11 AC Power Line Conducted Spurious Emission

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4. Cables and peripherals were moved to find the maximum emission levels for each frequency.

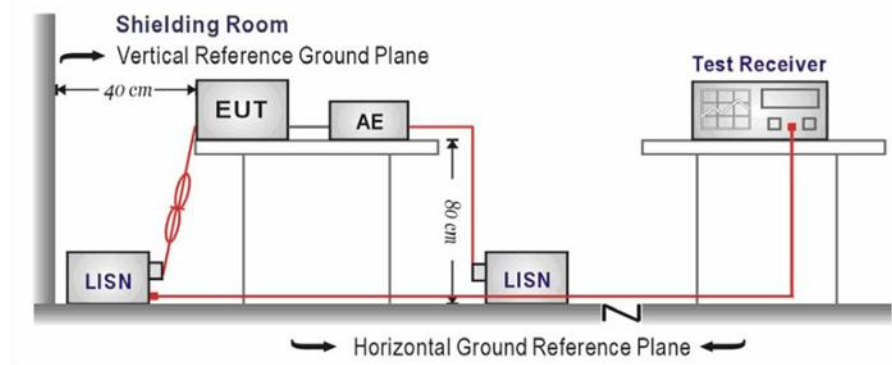
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE

Please reference to the section 3.4

TEST RESULTS

☐ Passed ☒ Not Applicable

5.12 Radiated Emission

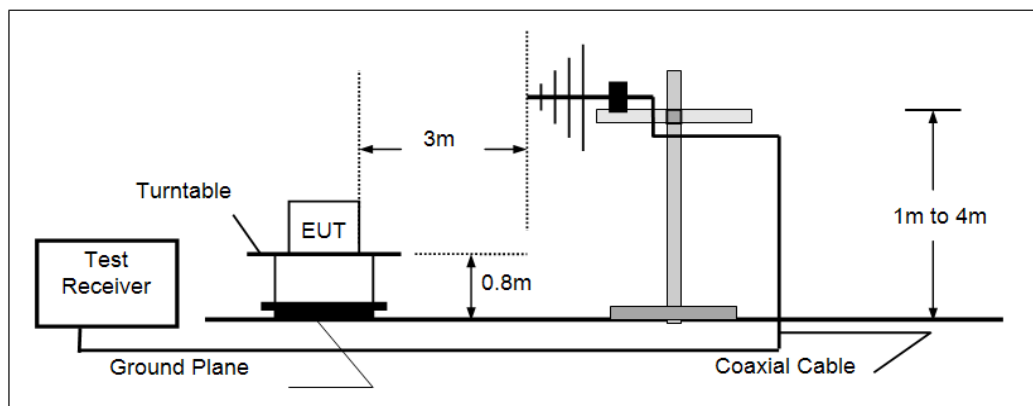
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

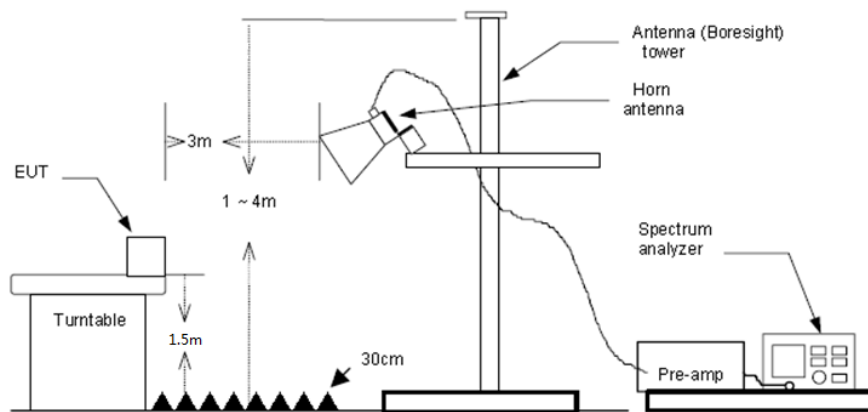
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

➤ 30MHz ~ 1GHz



➤ Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE

Please reference to the section 3.4

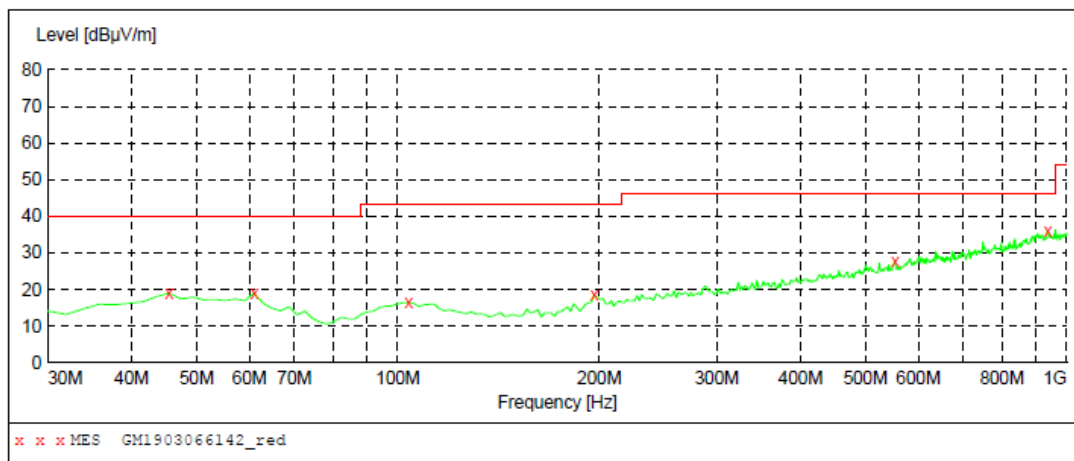
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:

The EUT shall be scanned from 30 MHz to the 5th harmonic of the highest oscillator frequency in the digital devices or 1 GHz whichever is higher.

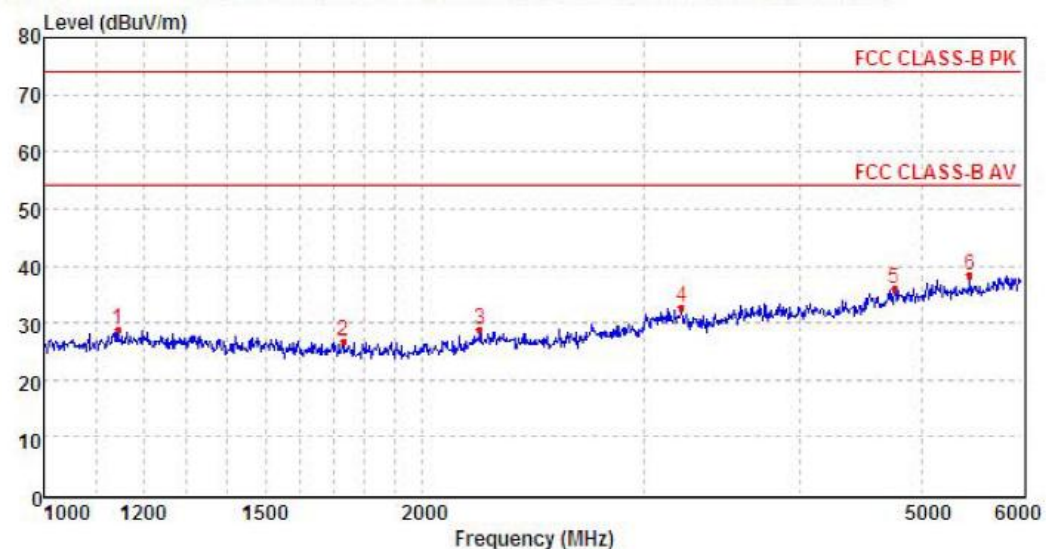
TEST MODE	RX-GPS+US Weather Channel	Polarity:	Horizontal
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MEASUREMENT RESULT: "GM1903066142_red"

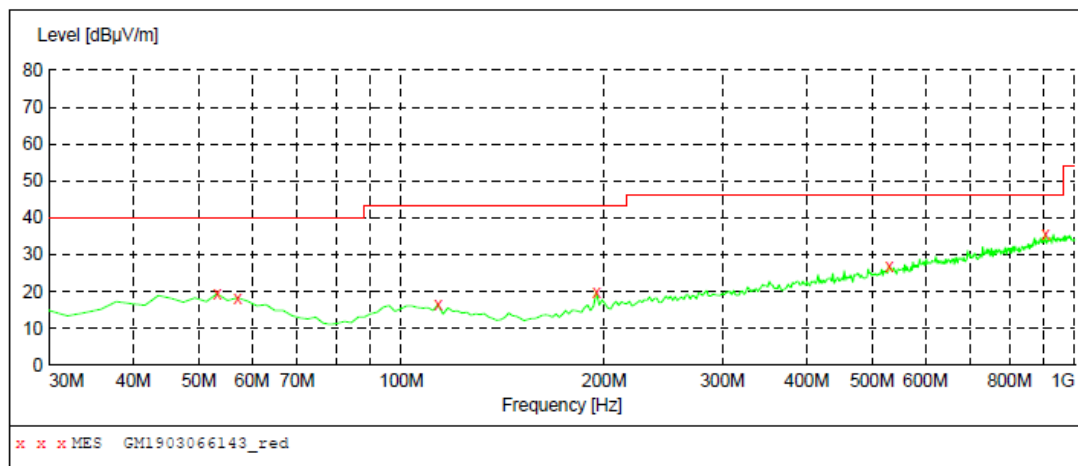
3/6/2019 10:36PM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.520000	19.00	-8.7	40.0	21.0	QP	100.0	171.00	HORIZONTAL
61.040000	19.10	-10.2	40.0	20.9	QP	100.0	251.00	HORIZONTAL
103.720000	16.50	-10.3	43.5	27.0	QP	100.0	91.00	HORIZONTAL
196.840000	18.50	-9.5	43.5	25.0	QP	100.0	286.00	HORIZONTAL
553.800000	27.60	0.0	46.0	18.4	QP	100.0	359.00	HORIZONTAL
935.980000	35.80	8.1	46.0	10.2	QP	100.0	0.00	HORIZONTAL



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1145.88	35.56	25.88	4.54	37.26	28.72	74.00	-45.28	Peak
2	1730.27	33.09	25.26	5.82	37.33	26.84	74.00	-47.16	Peak
3	2223.59	32.36	27.64	6.48	37.60	28.88	74.00	-45.12	Peak
4	3216.29	33.78	28.70	7.74	37.38	32.84	74.00	-41.16	Peak
5	4753.26	30.77	31.41	9.52	35.82	35.88	74.00	-38.12	Peak
6	5456.44	31.04	31.73	10.17	34.50	38.44	74.00	-35.56	Peak

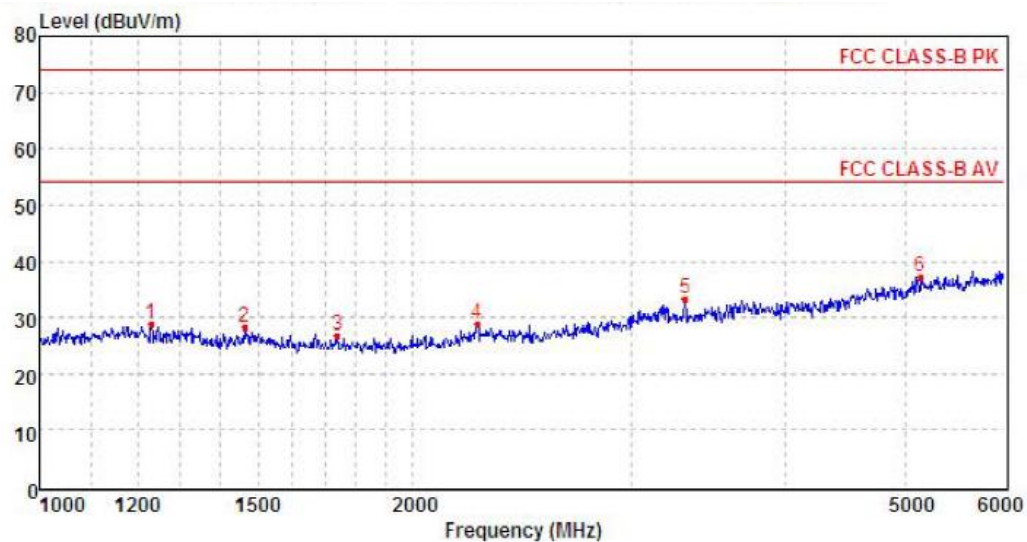
TEST MODE	RX-GPS+US Weather Channel	Polarity:	Vertical
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MEASUREMENT RESULT: "GM1903066143_red"

3/6/2019 10:40PM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	19.40	-9.0	40.0	20.6	QP	100.0	0.00	VERTICAL
57.160000	18.30	-9.3	40.0	21.7	QP	100.0	126.00	VERTICAL
113.420000	16.50	-11.1	43.5	27.0	QP	100.0	171.00	VERTICAL
194.900000	19.90	-9.8	43.5	23.6	QP	100.0	136.00	VERTICAL
530.520000	26.80	-0.5	46.0	19.2	QP	100.0	3.00	VERTICAL
904.940000	35.50	7.7	46.0	10.5	QP	100.0	217.00	VERTICAL



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1231.02	35.00	26.27	4.71	37.21	28.77	74.00	-45.23	Peak
2	1464.69	34.41	25.83	5.18	37.09	28.33	74.00	-45.67	Peak
3	1739.60	33.09	25.28	5.84	37.34	26.87	74.00	-47.13	Peak
4	2255.70	31.93	27.84	6.53	37.59	28.71	74.00	-45.29	Peak
5	3315.76	34.58	28.20	7.86	37.29	33.35	74.00	-40.65	Peak
6	5133.96	30.83	31.76	9.78	35.11	37.26	74.00	-36.74	Peak

6 APPENDIX REPORT

**Appendix A:Maximum Transmitter Power**

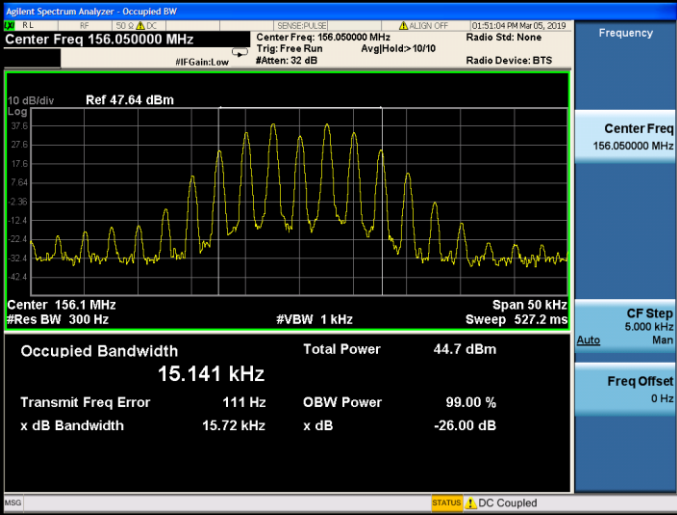
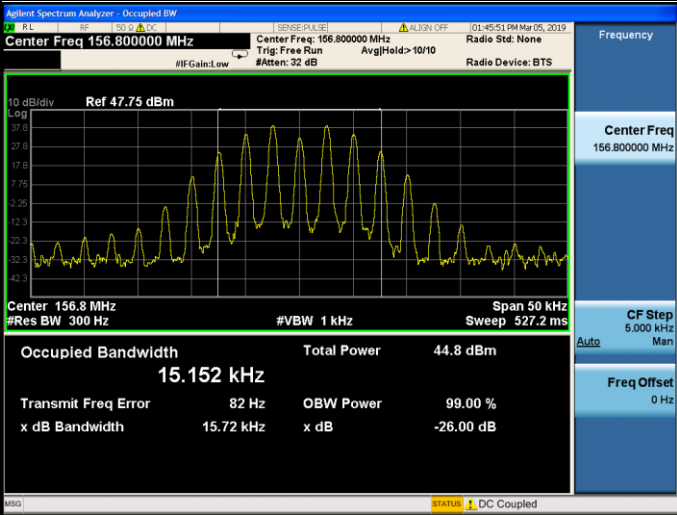
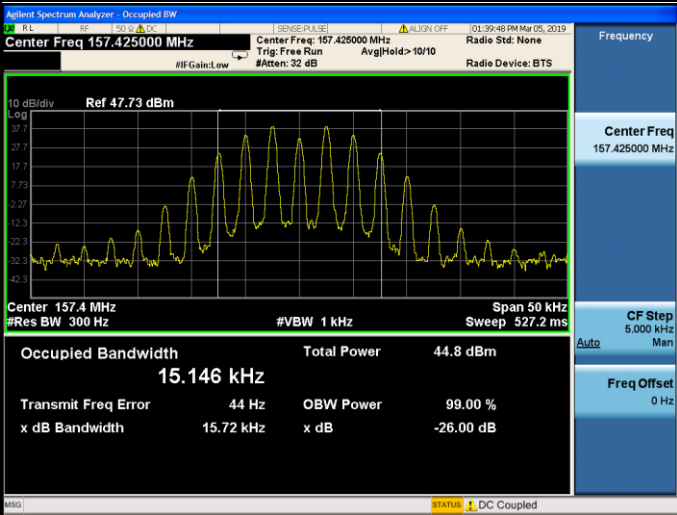
Operation Mode	Modulation Type	Test Channel	Measured Power(dBm)	Measured Power(W)	Rated Power(W)	Percentage (%)	Limit (%)	Result
TX-AWH	FM	CH _L	43.9	24.38	25.00	-2.5	±20	PASS
TX-AWH	FM	CH _{M2}	43.9	24.32	25.00	-2.7	±20	PASS
TX-AWH	FM	CH _H	43.9	24.27	25.00	-2.9	±20	PASS
TX-AWL	FM	CH _L	29.1	0.81	1.00	-18.9	±20	PASS
TX-AWL	FM	CH _{M2}	29.1	0.81	1.00	-18.9	±20	PASS
TX-AWL	FM	CH _H	29.1	0.81	1.00	-19.1	±20	PASS

**Appendix B:Occupied Bandwidth**

Operation Mode	Modulation Type	Test Channel	Occupied Bandwidth		99% Limit(kHz)	Result
			99%(kHz)	26dB(kHz)		
TX-AWH	FM	CH _L	15.141	15.720	≤20	PASS
TX-AWH	FM	CH _{M2}	15.152	15.720	≤20	PASS
TX-AWH	FM	CH _H	15.146	15.720	≤20	PASS
TX-AWL	FM	CH _L	15.157	17.940	≤20	PASS
TX-AWL	FM	CH _{M2}	15.163	17.940	≤20	PASS
TX-AWL	FM	CH _H	15.165	17.910	≤20	PASS

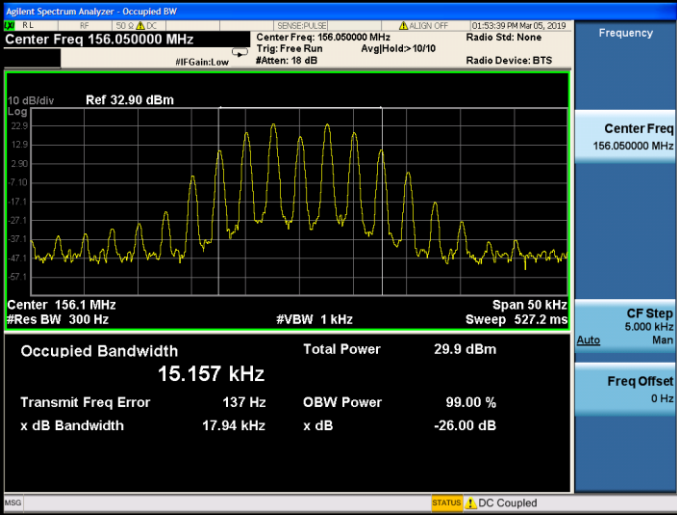
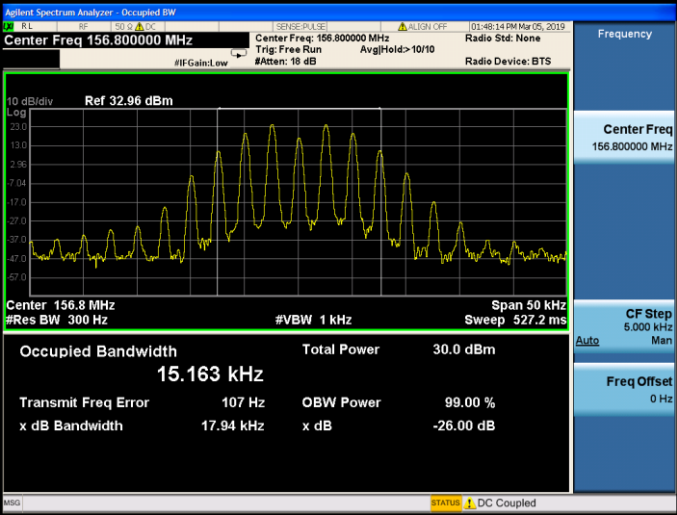
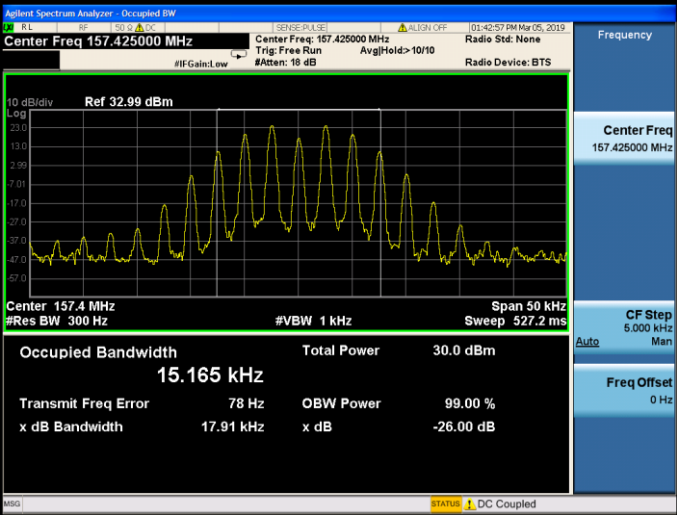


Appendix B:Occupied Bandwidth

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-AWH	FM	CH _L	 Agilent Spectrum Analyzer - Occupied BW Center Freq 156.050000 MHz Center Freq: 156.050000 MHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref 47.64 dBm 10 dB/div Log Center 156.1 MHz #Res BW 300 Hz #VBW 1 kHz Span 50 kHz Sweep 527.2 ms Occupied Bandwidth 15.141 kHz Total Power 44.7 dBm Transmit Freq Error 111 Hz OBW Power 99.00 % x dB Bandwidth 15.72 kHz x dB -26.00 dB Frequency Center Freq 156.050000 MHz CF Step 5.000 kHz Man Freq Offset 0 Hz Auto STATUS DC Coupled
TX-AWH	FM	CH _{M2}	 Agilent Spectrum Analyzer - Occupied BW Center Freq 156.800000 MHz Center Freq: 156.800000 MHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref 47.75 dBm 10 dB/div Log Center 156.8 MHz #Res BW 300 Hz #VBW 1 kHz Span 50 kHz Sweep 527.2 ms Occupied Bandwidth 15.152 kHz Total Power 44.8 dBm Transmit Freq Error 82 Hz OBW Power 99.00 % x dB Bandwidth 15.72 kHz x dB -26.00 dB Frequency Center Freq 156.800000 MHz CF Step 5.000 kHz Man Freq Offset 0 Hz Auto STATUS DC Coupled
TX-AWH	FM	CH _H	 Agilent Spectrum Analyzer - Occupied BW Center Freq 157.425000 MHz Center Freq: 157.425000 MHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref 47.73 dBm 10 dB/div Log Center 157.4 MHz #Res BW 300 Hz #VBW 1 kHz Span 50 kHz Sweep 527.2 ms Occupied Bandwidth 15.146 kHz Total Power 44.8 dBm Transmit Freq Error 44 Hz OBW Power 99.00 % x dB Bandwidth 15.72 kHz x dB -26.00 dB Frequency Center Freq 157.425000 MHz CF Step 5.000 kHz Man Freq Offset 0 Hz Auto STATUS DC Coupled



Appendix B:Occupied Bandwidth

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-AWL	FM	CH _L	
TX-AWL	FM	CH _{M2}	
TX-AWL	FM	CH _H	

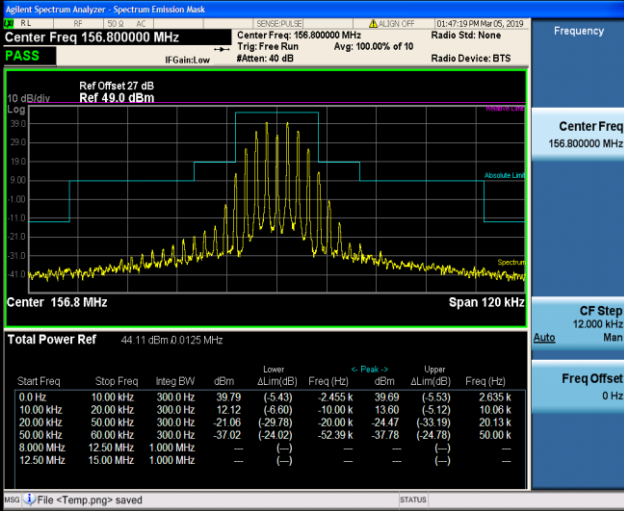
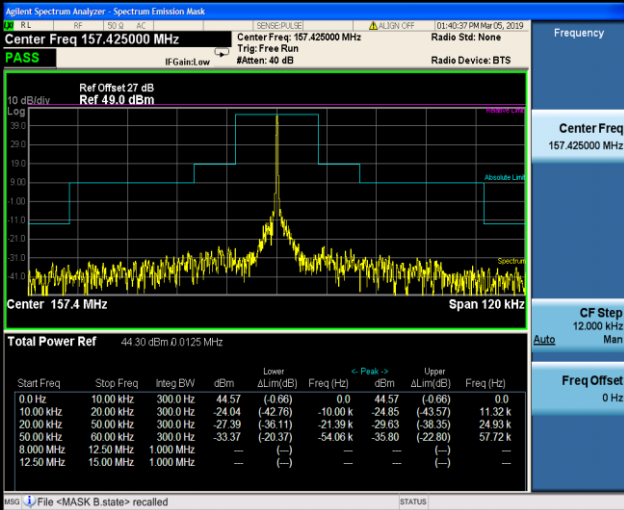
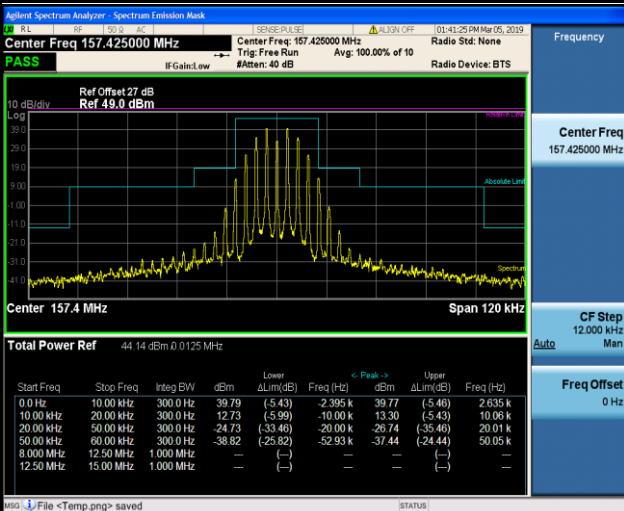


Appendix C:Emission Mask

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																																															
TX-AWH	FM	CH _L	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.050000 MHz Center Freq: 156.050000 MHz Radio Std: None Trig: Free Run #Atten: 40 dB Radio Device: BTS Ref Offset 27 dB Ref 49.0 dBm Center 156.1 MHz Span 120 kHz Total Power Ref 44.20 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak ></th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>44.43</td><td>(-0.71)</td><td>0.0</td><td>44.45</td><td>(-0.69)</td><td>119.8</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-24.64</td><td>(-43.28)</td><td>-10.48 k</td><td>-21.13</td><td>(-39.77)</td><td>118.0 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-28.69</td><td>(-37.33)</td><td>-24.09 k</td><td>-26.66</td><td>(-35.30)</td><td>21.03 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-36.08</td><td>(-23.08)</td><td>-50.05 k</td><td>-33.24</td><td>(-20.24)</td><td>50.29 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> Frequency Center Freq 156.050000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	44.43	(-0.71)	0.0	44.45	(-0.69)	119.8	10.00 kHz	20.00 kHz	300.0 Hz	-24.64	(-43.28)	-10.48 k	-21.13	(-39.77)	118.0 k	20.00 kHz	50.00 kHz	300.0 Hz	-28.69	(-37.33)	-24.09 k	-26.66	(-35.30)	21.03 k	50.00 kHz	60.00 kHz	300.0 Hz	-36.08	(-23.08)	-50.05 k	-33.24	(-20.24)	50.29 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)																																																										
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12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
TX-AWH	FM	CH _L	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.050000 MHz Center Freq: 156.050000 MHz Radio Std: None Trig: Free Run Avg: 100.00% of 10 Radio Device: BTS Ref Offset 27 dB Ref 49.0 dBm Center 156.1 MHz Span 120 kHz Total Power Ref 44.07 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak ></th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>39.76</td><td>(-5.38)</td><td>-2.335 k</td><td>39.62</td><td>(-5.52)</td><td>2.575 k</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>11.07</td><td>(-7.57)</td><td>-10.00 k</td><td>13.62</td><td>(-5.02)</td><td>10.12 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-20.98</td><td>(-29.61)</td><td>-20.00 k</td><td>-24.46</td><td>(-33.10)</td><td>20.13 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-37.27</td><td>(-24.27)</td><td>-50.00 k</td><td>-38.02</td><td>(-25.02)</td><td>52.75 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> Frequency Center Freq 156.050000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	39.76	(-5.38)	-2.335 k	39.62	(-5.52)	2.575 k	10.00 kHz	20.00 kHz	300.0 Hz	11.07	(-7.57)	-10.00 k	13.62	(-5.02)	10.12 k	20.00 kHz	50.00 kHz	300.0 Hz	-20.98	(-29.61)	-20.00 k	-24.46	(-33.10)	20.13 k	50.00 kHz	60.00 kHz	300.0 Hz	-37.27	(-24.27)	-50.00 k	-38.02	(-25.02)	52.75 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)																																																										
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12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
TX-AWH	FM	CH _{M2}	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.800000 MHz Center Freq: 156.800000 MHz Radio Std: None Trig: Free Run #Atten: 40 dB Radio Device: BTS Ref Offset 27 dB Ref 49.0 dBm Center 156.8 MHz Span 120 kHz Total Power Ref 44.24 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak ></th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>44.47</td><td>(-0.75)</td><td>0.0</td><td>44.47</td><td>(-0.75)</td><td>0.0</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-24.60</td><td>(-43.32)</td><td>-10.12 k</td><td>-24.31</td><td>(-43.03)</td><td>14.20 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-29.03</td><td>(-37.75)</td><td>-21.45 k</td><td>-29.35</td><td>(-38.07)</td><td>32.54 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-34.96</td><td>(-21.96)</td><td>-50.41 k</td><td>-32.98</td><td>(-19.98)</td><td>50.11 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> Frequency Center Freq 156.800000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	44.47	(-0.75)	0.0	44.47	(-0.75)	0.0	10.00 kHz	20.00 kHz	300.0 Hz	-24.60	(-43.32)	-10.12 k	-24.31	(-43.03)	14.20 k	20.00 kHz	50.00 kHz	300.0 Hz	-29.03	(-37.75)	-21.45 k	-29.35	(-38.07)	32.54 k	50.00 kHz	60.00 kHz	300.0 Hz	-34.96	(-21.96)	-50.41 k	-32.98	(-19.98)	50.11 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak >	Upper ΔLim(dB)	Freq (Hz)																																																										
0.0 Hz	10.00 kHz	300.0 Hz	44.47	(-0.75)	0.0	44.47	(-0.75)	0.0																																																										
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8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
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Appendix C:Emission Mask

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-AWH	FM	CH _{M2}	
TX-AWH	FM	CH _H	
TX-AWH	FM	CH _H	

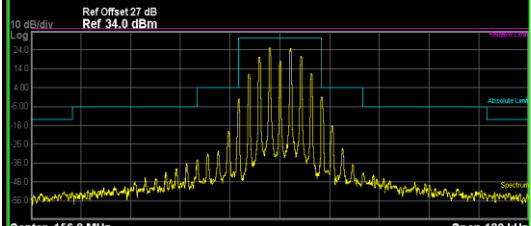
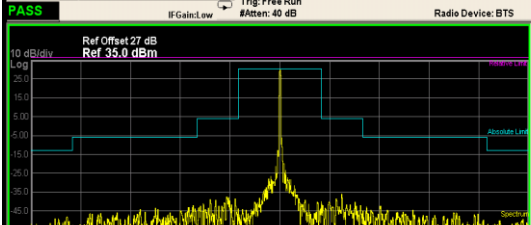
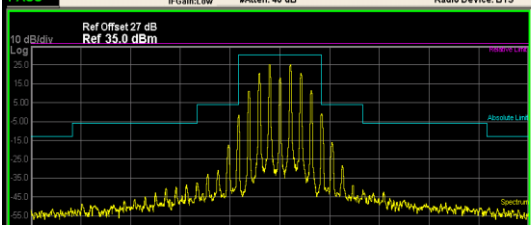


Appendix C:Emission Mask

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																																															
TX-AWL	FM	CH _L	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.050000 MHz Center Freq: 156.050000 MHz Radio Std: None Trig: Free Run #Atten: 40 dB Radio Device: BTS Ref Offset 27 dB Ref 34.0 dBm 10 dB/div Log 24.0 18.0 12.0 6.0 0.0 -6.0 -12.0 -18.0 -24.0 Center 156.1 MHz Span 120 kHz Total Power Ref 29.42 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>29.72</td><td>(-0.70)</td><td>0.0</td><td>29.72</td><td>(-0.70)</td><td>119.8</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-38.96</td><td>(-42.88)</td><td>-17.97 k</td><td>-38.44</td><td>(-42.35)</td><td>15.28 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-42.21</td><td>(-36.13)</td><td>-24.33 k</td><td>-39.71</td><td>(-33.63)</td><td>23.37 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-46.70</td><td>(-33.70)</td><td>-53.05 k</td><td>-47.18</td><td>(-34.18)</td><td>54.66 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> File <MASK B.state> recalled (STATUS) Frequency Center Freq 156.050000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	29.72	(-0.70)	0.0	29.72	(-0.70)	119.8	10.00 kHz	20.00 kHz	300.0 Hz	-38.96	(-42.88)	-17.97 k	-38.44	(-42.35)	15.28 k	20.00 kHz	50.00 kHz	300.0 Hz	-42.21	(-36.13)	-24.33 k	-39.71	(-33.63)	23.37 k	50.00 kHz	60.00 kHz	300.0 Hz	-46.70	(-33.70)	-53.05 k	-47.18	(-34.18)	54.66 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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TX-AWL	FM	CH _L	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.050000 MHz Center Freq: 156.050000 MHz Radio Std: None Trig: Free Run Avg: 100.00% of 10 Radio Device: BTS Ref Offset 27 dB Ref 34.0 dBm 10 dB/div Log 24.0 18.0 12.0 6.0 0.0 -6.0 -12.0 -18.0 -24.0 Center 156.1 MHz Span 120 kHz Total Power Ref 29.31 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>25.02</td><td>(-5.40)</td><td>-2.455 k</td><td>24.85</td><td>(-5.56)</td><td>2.695 k</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-3.861</td><td>(-7.78)</td><td>-10.00 k</td><td>-0.899</td><td>(-4.82)</td><td>10.12 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-34.70</td><td>(-28.62)</td><td>-20.00 k</td><td>-38.43</td><td>(-32.35)</td><td>20.13 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-50.73</td><td>(-37.73)</td><td>-50.23 k</td><td>-50.98</td><td>(-37.98)</td><td>51.43 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> File <Temp.png> saved (STATUS) Frequency Center Freq 156.050000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	25.02	(-5.40)	-2.455 k	24.85	(-5.56)	2.695 k	10.00 kHz	20.00 kHz	300.0 Hz	-3.861	(-7.78)	-10.00 k	-0.899	(-4.82)	10.12 k	20.00 kHz	50.00 kHz	300.0 Hz	-34.70	(-28.62)	-20.00 k	-38.43	(-32.35)	20.13 k	50.00 kHz	60.00 kHz	300.0 Hz	-50.73	(-37.73)	-50.23 k	-50.98	(-37.98)	51.43 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
TX-AWL	FM	CH _{M2}	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.800000 MHz Center Freq: 156.800000 MHz Radio Std: None Trig: Free Run #Atten: 40 dB Radio Device: BTS Ref Offset 27 dB Ref 34.0 dBm 10 dB/div Log 24.0 18.0 12.0 6.0 0.0 -6.0 -12.0 -18.0 -24.0 Center 156.8 MHz Span 120 kHz Total Power Ref 29.50 dBm 0.0125 MHz <table><thead><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr></thead><tbody><tr><td>0.0 Hz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>29.74</td><td>(-0.73)</td><td>0.0</td><td>29.74</td><td>(-0.73)</td><td>0.0</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-37.66</td><td>(-41.63)</td><td>-13.18 k</td><td>-40.48</td><td>(-44.45)</td><td>11.80 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-41.05</td><td>(-35.02)</td><td>-20.91 k</td><td>-41.44</td><td>(-35.41)</td><td>24.51 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-45.12</td><td>(-32.12)</td><td>-50.77 k</td><td>-48.95</td><td>(-35.95)</td><td>53.53 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></tbody></table> File <MASK B.state> recalled (STATUS) Frequency Center Freq 156.800000 MHz CF Step 12.000 kHz Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 Hz	10.00 kHz	300.0 Hz	29.74	(-0.73)	0.0	29.74	(-0.73)	0.0	10.00 kHz	20.00 kHz	300.0 Hz	-37.66	(-41.63)	-13.18 k	-40.48	(-44.45)	11.80 k	20.00 kHz	50.00 kHz	300.0 Hz	-41.05	(-35.02)	-20.91 k	-41.44	(-35.41)	24.51 k	50.00 kHz	60.00 kHz	300.0 Hz	-45.12	(-32.12)	-50.77 k	-48.95	(-35.95)	53.53 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										



Appendix C:Emission Mask

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																																															
TX-AWL	FM	CH _{M2}	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 156.800000 MHz Center Freq: 156.800000 MHz Radio Std: None Trig: Free Run Avg: 100.00% of 10 Radio Device: BTS Ref Offset 27 dB Ref 34.0 dBm Center 156.8 MHz Span 120 kHz 10 dB/div Log  Center 156.8 MHz Span 120 kHz Total Power Ref 29.37 dBm 0.0125 MHz <table><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr><tr><td>0.0 kHz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>25.06</td><td>(-5.41)</td><td>-2.335 k</td><td>24.94</td><td>(-5.53)</td><td>2.575 k</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-2.839</td><td>(-6.81)</td><td>-10.00 k</td><td>-0.817</td><td>(-4.78)</td><td>10.12 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-35.04</td><td>(-29.01)</td><td>-20.00 k</td><td>-41.27</td><td>(-35.23)</td><td>20.07 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-51.17</td><td>(-38.17)</td><td>-52.03 k</td><td>-51.50</td><td>(-38.50)</td><td>51.73 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></table> File <Temp.png> saved STATUS Frequency Center Freq 156.800000 MHz CF Step 12.000 kHz Auto Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 kHz	10.00 kHz	300.0 Hz	25.06	(-5.41)	-2.335 k	24.94	(-5.53)	2.575 k	10.00 kHz	20.00 kHz	300.0 Hz	-2.839	(-6.81)	-10.00 k	-0.817	(-4.78)	10.12 k	20.00 kHz	50.00 kHz	300.0 Hz	-35.04	(-29.01)	-20.00 k	-41.27	(-35.23)	20.07 k	50.00 kHz	60.00 kHz	300.0 Hz	-51.17	(-38.17)	-52.03 k	-51.50	(-38.50)	51.73 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—																																																										
TX-AWL	FM	CH _H	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 157.425000 MHz Center Freq: 157.425000 MHz Radio Std: None Trig: Free Run Avg: 100.00% of 10 Radio Device: BTS Ref Offset 27 dB Ref 35.0 dBm Center 157.4 MHz Span 120 kHz 10 dB/div Log  Center 157.4 MHz Span 120 kHz Total Power Ref 29.53 dBm 0.0125 MHz <table><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr><tr><td>0.0 kHz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>29.77</td><td>(-0.75)</td><td>0.0</td><td>29.79</td><td>(-0.73)</td><td>119.8</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-37.40</td><td>(-41.42)</td><td>-12.82 k</td><td>-36.07</td><td>(-40.09)</td><td>14.92 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-42.09</td><td>(-36.11)</td><td>-20.85 k</td><td>-42.30</td><td>(-36.32)</td><td>24.33 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-48.26</td><td>(-35.26)</td><td>-51.31 k</td><td>-49.60</td><td>(-36.60)</td><td>58.62 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></table> File <MASK B.state> recalled STATUS Frequency Center Freq 157.425000 MHz CF Step 12.000 kHz Auto Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 kHz	10.00 kHz	300.0 Hz	29.77	(-0.75)	0.0	29.79	(-0.73)	119.8	10.00 kHz	20.00 kHz	300.0 Hz	-37.40	(-41.42)	-12.82 k	-36.07	(-40.09)	14.92 k	20.00 kHz	50.00 kHz	300.0 Hz	-42.09	(-36.11)	-20.85 k	-42.30	(-36.32)	24.33 k	50.00 kHz	60.00 kHz	300.0 Hz	-48.26	(-35.26)	-51.31 k	-49.60	(-36.60)	58.62 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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TX-AWL	FM	CH _H	Agilent Spectrum Analyzer - Spectrum Emission Mask Center Freq 157.425000 MHz Center Freq: 157.425000 MHz Radio Std: None Trig: Free Run Avg: 100.00% of 10 Radio Device: BTS Ref Offset 27 dB Ref 35.0 dBm Center 157.4 MHz Span 120 kHz 10 dB/div Log  Center 157.4 MHz Span 120 kHz Total Power Ref 29.42 dBm 0.0125 MHz <table><tr><th>Start Freq</th><th>Stop Freq</th><th>Integ BW</th><th>dBm</th><th>Lower ΔLim(dB)</th><th>Freq (Hz)</th><th>Peak dBm</th><th>Upper ΔLim(dB)</th><th>Freq (Hz)</th></tr><tr><td>0.0 kHz</td><td>10.00 kHz</td><td>300.0 Hz</td><td>25.08</td><td>(-5.44)</td><td>-2.395 k</td><td>25.01</td><td>(-5.51)</td><td>2.515 k</td></tr><tr><td>10.00 kHz</td><td>20.00 kHz</td><td>300.0 Hz</td><td>-1.996</td><td>(-6.02)</td><td>-10.00 k</td><td>-0.887</td><td>(-4.91)</td><td>10.06 k</td></tr><tr><td>20.00 kHz</td><td>50.00 kHz</td><td>300.0 Hz</td><td>-37.39</td><td>(-31.41)</td><td>-20.01 k</td><td>-41.23</td><td>(-35.25)</td><td>20.07 k</td></tr><tr><td>50.00 kHz</td><td>60.00 kHz</td><td>300.0 Hz</td><td>-51.07</td><td>(-38.07)</td><td>-50.35 k</td><td>-50.63</td><td>(-37.63)</td><td>50.47 k</td></tr><tr><td>8.000 MHz</td><td>12.50 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr><tr><td>12.50 MHz</td><td>15.00 MHz</td><td>1.000 MHz</td><td>—</td><td>(—)</td><td>—</td><td>—</td><td>(—)</td><td>—</td></tr></table> File <Temp.png> saved STATUS Frequency Center Freq 157.425000 MHz CF Step 12.000 kHz Auto Man Freq Offset 0 Hz	Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)	0.0 kHz	10.00 kHz	300.0 Hz	25.08	(-5.44)	-2.395 k	25.01	(-5.51)	2.515 k	10.00 kHz	20.00 kHz	300.0 Hz	-1.996	(-6.02)	-10.00 k	-0.887	(-4.91)	10.06 k	20.00 kHz	50.00 kHz	300.0 Hz	-37.39	(-31.41)	-20.01 k	-41.23	(-35.25)	20.07 k	50.00 kHz	60.00 kHz	300.0 Hz	-51.07	(-38.07)	-50.35 k	-50.63	(-37.63)	50.47 k	8.000 MHz	12.50 MHz	1.000 MHz	—	(—)	—	—	(—)	—	12.50 MHz	15.00 MHz	1.000 MHz	—	(—)	—	—	(—)	—
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	Peak dBm	Upper ΔLim(dB)	Freq (Hz)																																																										
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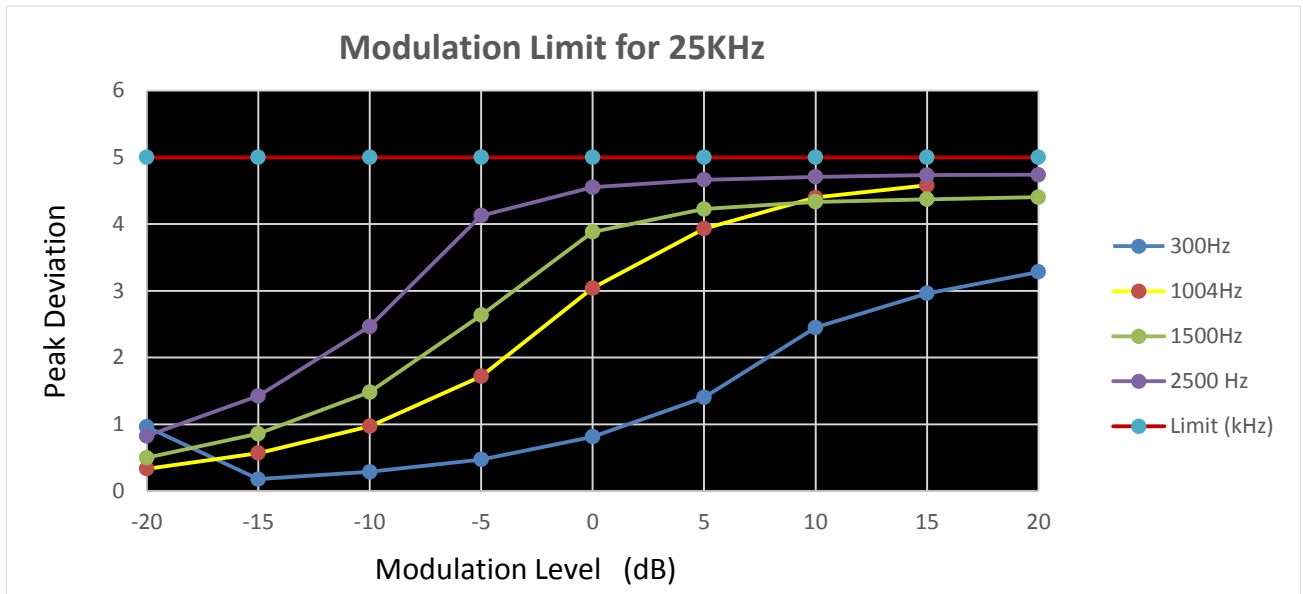
**Appendix D:Modulation Limit**

Operation Mode	Modulation Type	Test Channel	Modulation Level (dB)	Peak frequency deviation (kHz)				Limit (kHz)	Result
				300Hz	1004Hz	1500Hz	2500 Hz		
TX-AWH	FM	CH _{M2}	-20	0.962	0.334	0.5	0.825	5	PASS
TX-AWH	FM	CH _{M2}	-15	0.178	0.568	0.859	1.425	5	PASS
TX-AWH	FM	CH _{M2}	-10	0.287	0.971	1.483	2.465	5	PASS
TX-AWH	FM	CH _{M2}	-5	0.472	1.72	2.635	4.126	5	PASS
TX-AWH	FM	CH _{M2}	0	0.813	3.041	3.882	4.552	5	PASS
TX-AWH	FM	CH _{M2}	5	1.403	3.929	4.224	4.665	5	PASS
TX-AWH	FM	CH _{M2}	10	2.45	4.397	4.332	4.708	5	PASS
TX-AWH	FM	CH _{M2}	15	2.962	4.581	4.372	4.734	5	PASS
TX-AWH	FM	CH _{M2}	20	3.283	4.64	4.403	4.737	5	PASS



Appendix D:Modulation Limit

TEST PLOT RESULT



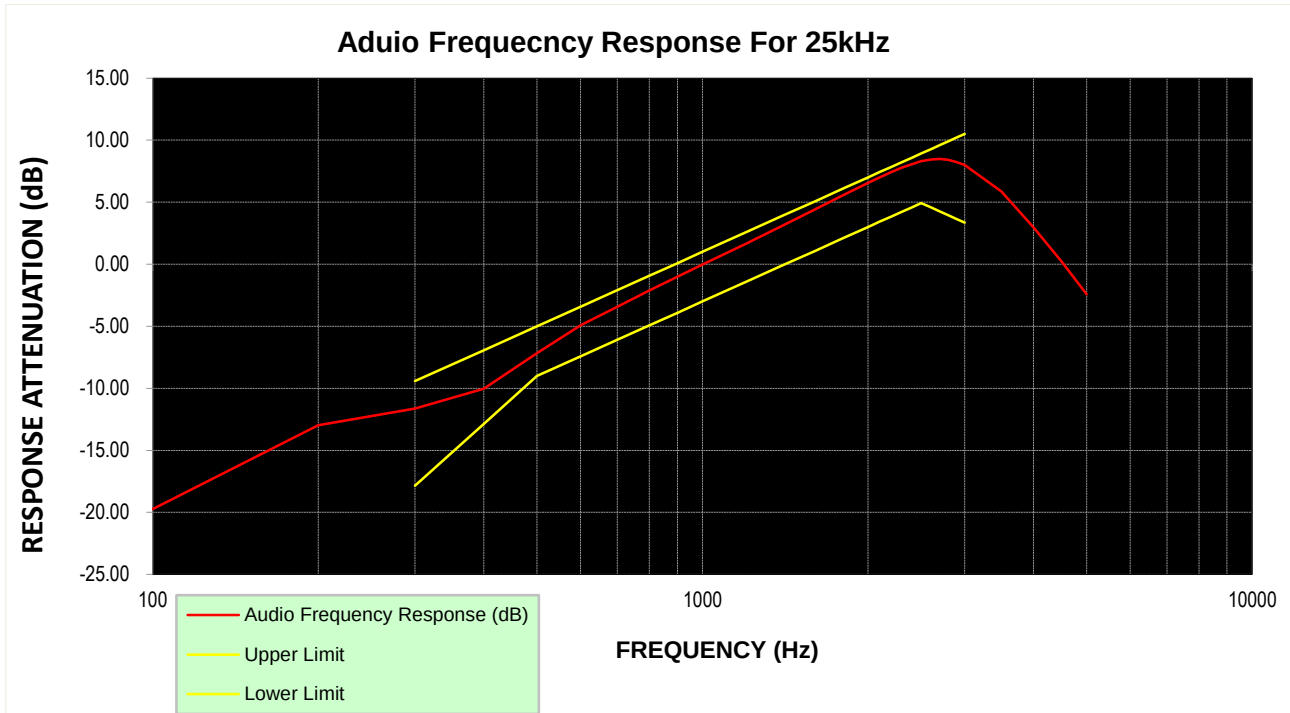
**Appendix E:Aduio Frequency Response**

Operation Mode	Modulation Type	Test Channel	Frequency (Hz)	Audio Frequency Response (dB)	Lower Limit	Upper Limit	Result
TX-AWH	FM	CH _{M2}	100	-19.74			PASS
TX-AWH	FM	CH _{M2}	200	-12.97			PASS
TX-AWH	FM	CH _{M2}	300	-11.63	-17.84	-9.42	PASS
TX-AWH	FM	CH _{M2}	400	-10.03	-12.86	-6.93	PASS
TX-AWH	FM	CH _{M2}	500	-7.18	-9.00	-5.00	PASS
TX-AWH	FM	CH _{M2}	600	-4.92	-7.42	-3.42	PASS
TX-AWH	FM	CH _{M2}	700	-3.42	-6.09	-2.09	PASS
TX-AWH	FM	CH _{M2}	800	-2.11	-4.93	-0.93	PASS
TX-AWH	FM	CH _{M2}	900	-1.01	-3.91	0.09	PASS
TX-AWH	FM	CH _{M2}	1000	-0.02	-3.00	1.00	PASS
TX-AWH	FM	CH _{M2}	1200	1.66	-1.42	2.58	PASS
TX-AWH	FM	CH _{M2}	1400	3.13	-0.09	3.91	PASS
TX-AWH	FM	CH _{M2}	1600	4.41	1.07	5.07	PASS
TX-AWH	FM	CH _{M2}	1800	5.54	2.09	6.09	PASS
TX-AWH	FM	CH _{M2}	2000	6.55	3.00	7.00	PASS
TX-AWH	FM	CH _{M2}	2100	7.00	3.42	7.42	PASS
TX-AWH	FM	CH _{M2}	2200	7.40	3.83	7.83	PASS
TX-AWH	FM	CH _{M2}	2300	7.77	4.21	8.21	PASS
TX-AWH	FM	CH _{M2}	2400	8.06	4.58	8.58	PASS
TX-AWH	FM	CH _{M2}	2500	8.30	4.93	8.93	PASS
TX-AWH	FM	CH _{M2}	2600	8.45	4.59	9.27	PASS
TX-AWH	FM	CH _{M2}	2700	8.48	4.27	9.60	PASS
TX-AWH	FM	CH _{M2}	2800	8.40	3.95	9.91	PASS
TX-AWH	FM	CH _{M2}	2900	8.24	3.65	10.22	PASS
TX-AWH	FM	CH _{M2}	3000	8.01	3.35	10.51	PASS
TX-AWH	FM	CH _{M2}	3500	5.86			PASS
TX-AWH	FM	CH _{M2}	4000	2.97			PASS
TX-AWH	FM	CH _{M2}	4500	0.22			PASS
TX-AWH	FM	CH _{M2}	5000	-2.43			PASS



Appendix E:Aduio Frequency Response

TEST PLOT RESULT



Note: The highest audio frequency response at 3kHz<3.125kHz, so meet the requirement.

**Appendix F:Audio Low Pass Filter Response**

Operation Mode	Modulation Type	Test Channel	Frequency (KHz)	dB relative to 1 KHz	Limit	Result
TX-AWH	FM	CH _{M2}	1	-16.64	0.00	PASS
TX-AWH	FM	CH _{M2}	3	-25.58	0.00	PASS
TX-AWH	FM	CH _{M2}	4	-41.97	-7.50	PASS
TX-AWH	FM	CH _{M2}	5	-55.65	-13.30	PASS
TX-AWH	FM	CH _{M2}	6	-58.21	-18.10	PASS
TX-AWH	FM	CH _{M2}	8	-58.60	-25.60	PASS
TX-AWH	FM	CH _{M2}	10	-58.62	-31.40	PASS
TX-AWH	FM	CH _{M2}	15	-58.41	-41.90	PASS
TX-AWH	FM	CH _{M2}	20	-58.04	-50.00	PASS
TX-AWH	FM	CH _{M2}	30	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	40	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	50	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	60	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	70	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	80	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	90	-58.66	-50.00	PASS
TX-AWH	FM	CH _{M2}	100	-58.66	-50.00	PASS



Appendix F:Audio Low Pass Filter Response

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-AWH	FM	CH _{M2}	

**Appendix G:Frequency Stability Test & Temperature**

Operation Mode	Modulation Type	Test Conditions		Frequency error (ppm)			Limit (ppm)	Result
		Voltage	Temperature	CH _L	CH _{M2}	CH _H		
TX-AWH	FM	V _N	-30	<u>0.140</u>	0.131	0.129	±10	PASS
TX-AWH	FM	V _N	-20	0.121	0.130	0.121	±10	PASS
TX-AWH	FM	V _N	-10	0.116	0.112	0.105	±10	PASS
TX-AWH	FM	V _N	0	0.100	0.105	0.103	±10	PASS
TX-AWH	FM	V _N	10	0.092	0.095	0.090	±10	PASS
TX-AWH	FM	V _N	20	0.085	0.086	0.078	±10	PASS
TX-AWH	FM	V _N	30	0.094	0.100	0.089	±10	PASS
TX-AWH	FM	V _N	40	0.104	0.106	0.097	±10	PASS
TX-AWH	FM	V _N	55	0.110	0.117	0.109	±10	PASS
TX-AWL	FM	V _N	-30	0.135	0.131	0.136	±10	PASS
TX-AWL	FM	V _N	-20	0.124	0.119	0.127	±10	PASS
TX-AWL	FM	V _N	-10	0.105	0.115	0.111	±10	PASS
TX-AWL	FM	V _N	0	0.101	0.109	0.105	±10	PASS
TX-AWL	FM	V _N	10	0.089	0.099	0.091	±10	PASS
TX-AWL	FM	V _N	20	0.080	0.084	0.082	±10	PASS
TX-AWL	FM	V _N	30	0.092	0.093	0.094	±10	PASS
TX-AWL	FM	V _N	40	0.097	0.107	0.101	±10	PASS
TX-AWL	FM	V _N	55	0.107	0.110	0.107	±10	PASS

**Appendix H:Frequency Stability Test & Voltage**

Operation Mode	Modulation Type	Test Conditions		Frequency error (ppm)			Limit (ppm)	Result
		Voltage	Temperature	CH _L	CH _{M2}	CH _H		
TX-AWH	FM	V _N	T _N	0.085	0.086	0.078	±10	PASS
TX-AWH	FM	V _L	T _N	0.105	<u>0.109</u>	0.099	±10	PASS
TX-AWH	FM	V _H	T _N	0.096	0.099	0.085	±10	PASS
TX-AWL	FM	V _N	T _N	0.080	0.084	0.082	±10	PASS
TX-AWL	FM	V _L	T _N	0.102	0.104	0.108	±10	PASS
TX-AWL	FM	V _H	T _N	0.091	0.096	0.094	±10	PASS



Appendix I:Spurious Emission On Antenna Port

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT																																				
TX-AWH	FM	CH _L	Agilent Spectrum Analyzer - Sweep SA Center Freq 515.000000 MHz Ref Offset 26 dB Ref 0.00 dBm Mkr3 779.81 MHz -50.763 dBm Start 30.0 MHz #Res BW 100 kHz Stop 1.0000 GHz #VBW 300 kHz Sweep 92.73 ms (1001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>166.10 MHz</td><td>-1.813 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>312.27 MHz</td><td>-43.733 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>779.81 MHz</td><td>-50.763 dBm</td><td></td><td></td><td></td></tr></table> 30MHz~1GHz	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	166.10 MHz	-1.813 dBm				2	N	1	f	312.27 MHz	-43.733 dBm				3	N	1	f	779.81 MHz	-50.763 dBm			
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																															
1	N	1	f	166.10 MHz	-1.813 dBm																																		
2	N	1	f	312.27 MHz	-43.733 dBm																																		
3	N	1	f	779.81 MHz	-50.763 dBm																																		
TX-AWH	FM	CH _L	Agilent Spectrum Analyzer - Sweep SA Center Freq 1.280250000 GHz Ref Offset 26 dB Ref 0.00 dBm Mkr1 1.218 6 GHz -48.365 dBm Start 1.0000 GHz #Res BW 1.0 MHz Stop 1.5605 GHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) File <Temp.png> saved 1GHz~10th Harmonic																																				
TX-AWH	FM	CH _{M2}	Agilent Spectrum Analyzer - Sweep SA Center Freq 515.000000 MHz Ref Offset 26 dB Ref 0.00 dBm Mkr3 783.69 MHz -51.424 dBm Start 30.0 MHz #Res BW 100 kHz Stop 1.0000 GHz #VBW 300 kHz Sweep 92.73 ms (1001 pts) <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>167.07 MHz</td><td>-3.295 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>313.24 MHz</td><td>-44.638 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>783.69 MHz</td><td>-51.424 dBm</td><td></td><td></td><td></td></tr></table> 30MHz~1GHz	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	167.07 MHz	-3.295 dBm				2	N	1	f	313.24 MHz	-44.638 dBm				3	N	1	f	783.69 MHz	-51.424 dBm			
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																															
1	N	1	f	167.07 MHz	-3.295 dBm																																		
2	N	1	f	313.24 MHz	-44.638 dBm																																		
3	N	1	f	783.69 MHz	-51.424 dBm																																		



Appendix I:Spurious Emission On Antenna Port

Operation Mode	Modulation Type	Test Channel	TEST PLOT RESULT
TX-AWH	FM	CH _{M2}	Agilent Spectrum Analyzer - Sweep SA Center Freq 1.284000000 GHz Ref Offset 26 dB Ref 0.00 dBm Mkr1 1.233 448 GHz -48.389 dBm Start 1.0000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) Stop 1.5680 GHz File <Temp.png> saved Frequency Auto Tune Center Freq 1.284000000 GHz Start Freq 1.000000000 GHz Stop Freq 1.568000000 GHz CF Step 56.800000 MHz Auto Man Freq Offset 0 Hz 1GHz~10th Harmonic
TX-AWH	FM	CH _H	Agilent Spectrum Analyzer - Sweep SA Center Freq 515.000000 MHz Ref Offset 26 dB Ref 0.00 dBm Mkr3 787.57 MHz -52.974 dBm Start 30.0 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 92.73 ms (1001 pts) Stop 1.0000 GHz File <Temp.png> saved Frequency Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.000000000 GHz CF Step 97.000000 MHz Auto Man Freq Offset 0 Hz 30MHz~1GHz
TX-AWH	FM	CH _H	Agilent Spectrum Analyzer - Sweep SA Center Freq 1.287125000 GHz Ref Offset 26 dB Ref 0.00 dBm Mkr1 1.416 9 GHz -48.090 dBm Start 1.0000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) Stop 1.5743 GHz File <Temp.png> saved Frequency Auto Tune Center Freq 1.287125000 GHz Start Freq 1.000000000 GHz Stop Freq 1.574250000 GHz CF Step 57.425000 MHz Auto Man Freq Offset 0 Hz 1GHz~10th Harmonic

----End of Report----