



## FCC PART 80

### TEST REPORT

For

### Shenzhen Jiuzhou Himunication Technology Co.,Ltd

3rd Floor, Block C, Huafeng Second Industry Park, Hangcheng Road, Gushu, Xixiang town, Baoan District, Shenzhen, China

**FCC ID: RIPHM380S**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Mobile Marine Radio
<b>Test Engineer:</b> <u>Kevin Hu</u>	
<b>Report Number:</b> <u>RDG170104001</u>	
<b>Report Date:</b> <u>2017-03-14</u>	
<b>Reviewed By:</b> <u>EMC Leader</u> 	
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## **GENERAL INFORMATION**

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### **Product Description for Equipment under Test (EUT)**

The *Shenzhen Jiuzhou Himunication Technology Co.,Ltd*'s product, model number: HM380S, HM380S-BB (FCC ID: RIPH M380S) or the "EUT" in this report was a *Fixed Marine Radio*, which was measured approximately: 20.0 cm (L) x 11.2 cm (W) x 6.0 cm(H), rated with input voltage: DC 13.8V.

*Notes: This series products model: HM380S, HM380C, HM380, HM380 Non DSC, HM380-BB, HM380S-BB, HM380C-BB, HM380-BBN are identical; Model HM380S, HM380S-BB were selected for testing, the detailed information can be referred to the attached declaration which was stated and guaranteed by the applicant.*

*\* All measurement and test data in this report was gathered from production sample serial number: 170104001 (Assigned by BACL, Chengdu). The EUT supplied by the applicant was received on 2017-01-04.*

### **Objective**

This test report is prepared on behalf of *Shenzhen Jiuzhou Himunication Technology Co.,Ltd* in accordance with Part 2 and Part 80 of the Federal Communication Commissions rules and in accordance.

### **Related Submittal(s)/Grant(s)**

No related submittal(s)

### **Test Methodology**

All tests and measurements indicated in this document were performed in accordance with the Part 80 –Stations in the Maritime Services Applicable Standards: TIA 603-D and ANSI 63.4-2014.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

Item	Uncertainty	
AC Power Line Conducted Emissions	±3.34 dB	
Radio Carrier Frequency	±32 Hz	
RF Conducted test with spectrum	±0.9 dB	
RF Output Power with Power meter	±0.5 dB	
Radiated emission	30MHz~200MHz	±4.59 dB
	200MHz~1 GHz	±5.85 dB
	1 GHz~6 GHz	±4.45 dB
	6 GHz~18 GHz	±5.23 dB
Transmitter transient frequency	±18%	
Modulation Limiting	±1%	
Audio Frequency Response	±0.1dB	
Low Pass Filter Response	±1.0 dB	
Occupied Bandwidth	±0.5 kHz	
Temperature	±1.0 °C	
Humidity	±6 %	

## Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, ChengDu, Sichuan China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## **SYSTEM TEST CONFIGURATION**

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### **Description of Test Configuration**

The system was configured for testing in a test mode which has been done in the factory.

### **Equipment Modifications**

No modification was made to the EUT tested.

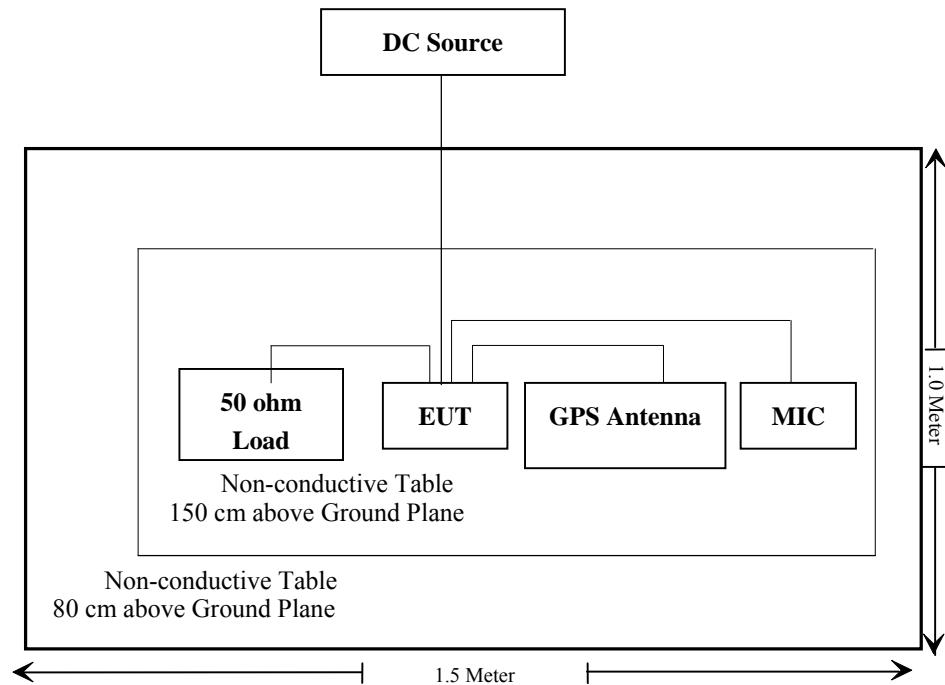
### **Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
/	Load(50 Ω)	/	/
Pro instrument	DC Power Supply	pps3300	/

### **External I/O Cable**

Cable Description	Length (m)	From/Port	To
Shielded Detachable RF Cable	0.5	EUT Transmitter port	Load

### Block Diagram of Test Setup



## **SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Results
FCC Part §1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
FCC Part §2.1046,§80.215;	RF Output Power	Compliance
FCC Part §2.1047,§80.213;	Modulation requirements	Compliance
FCC Part §2.1049,§80.205;	Bandwidth	Compliance
FCC Part §2.1051,§80.211	Emission limitations	Compliance
FCC Part §80.217	Suppression of Interference Aboard Ships	Compliance
FCC Part §2.1051,§80.211;	Radiated Spurious Emissions	Compliance
FCC Part §2.1055,§80.209;	Transmitter Frequency Tolerances	Compliance

## TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>RF Conducted test</b>					
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
HP	RF Communications Test Set	8920A	00 247	2016-08-10	2017-08-09
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	RF Attenuator	40dB	N/A	Each Time	/
N/A	RF Attenuator	10dB	N/A	Each Time	/
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## **FCC§1.1307 (b) (1) & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

### **FCC Limits for Maximum Permissible Exposure (MPE)**

#### **(B) Limits for General Population/Uncontrolled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz \*Plane-wave equivalent power density

### **Result**

#### **Calculated Formulary:**

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (mW/cm<sup>2</sup>)

P = power input to the antenna (mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (cm)

Frequency (MHz)	Antenna Gain		Rated Power (W)	The minimum Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric )				
156.025-157.425	3.5	2.24	25	150.00	0.198	0.2

Note: The Maximum power is 25 W which declared by manufacturer

**Radiation Exposure Statement:**

To comply with RF exposure requirements, the minimum permissible distance is 150 cm required between the antenna and the body of the user or nearby persons.

**Result: Compliance**

## **FCC §2.1046 & §80.215- RF OUTPUT POWER**

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### **Applicable Standard**

FCC §2.1046, §80.215

Ship station limit: 25W

### **Test Procedure**

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W      Video B/W  
100 kHz    300 kHz

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.1 °C
<b>Relative Humidity:</b>	44 %
<b>ATM Pressure:</b>	100.2 kPa

*The testing was performed by Kevin Hu on 2017-03-12.*

*Test Mode: Transmitting*

**Test Result:** Compliance. Please refer to following table.

**Output power for Radio telephony:**

Frequency	Power Level	Output Power (dBm)	Output Power (W)
156.025	High	43.83	24.15
	Low	29.32	0.86
156.8	High	43.82	24.1
	Low	29.49	0.89
157.425	High	43.86	24.32
	Low	29.65	0.92

**Output power for DSC:**

Frequency	Test Mode	Output Power (dBm)	Output Power (W)
156.525	1300 Hz	43.69	23.39
	2100 Hz	43.62	23.01

Note: Ship station limit (25W)

## **FCC §2.1047 §80.213 - MODULATION REQUIREMENTS**

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### **Applicable Standard**

FCC §2.1047 and §80.213

- (a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

### **Test Procedure**

Test Method: TIA/EIA-603 2.2.3

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.1 °C
<b>Relative Humidity:</b>	44 %
<b>ATM Pressure:</b>	100.2 kPa

*The testing was performed by Kevin Hu on 2017-03-12.*

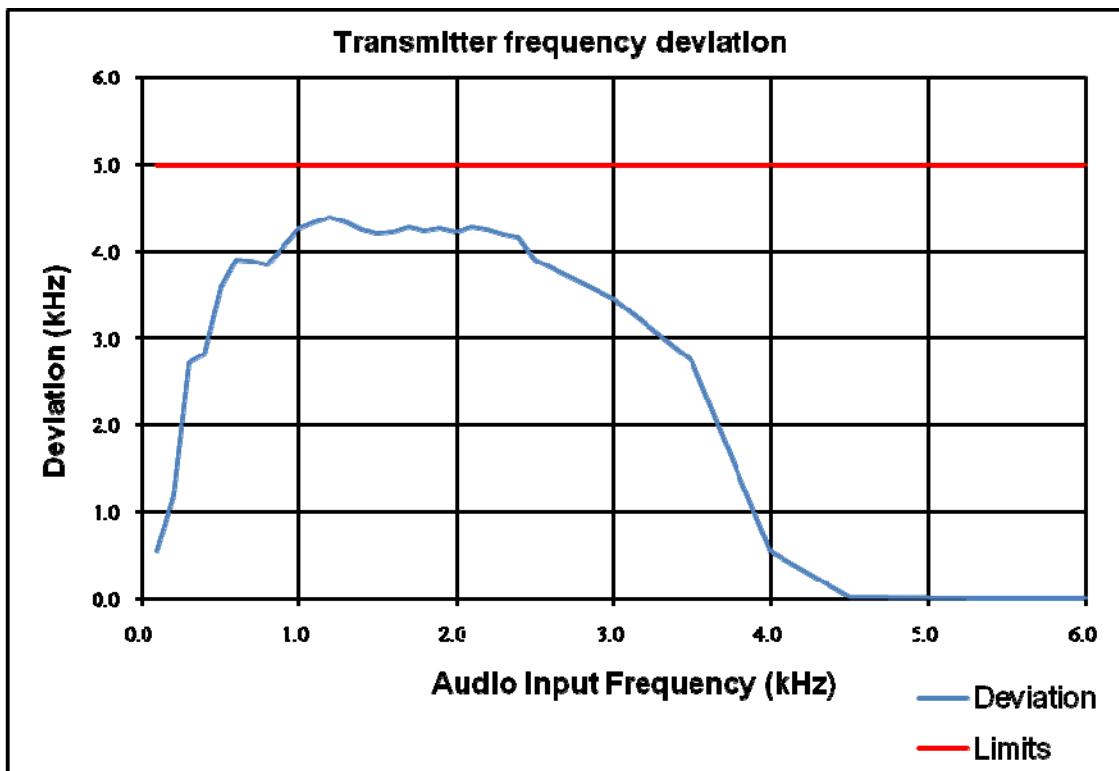
*Test Mode: Transmitting*

**Result:** Compliance.

**Maximum Deviation**

Carrier Frequency: 156.8 MHz

<b>Modulation Frequency (Hz)</b>	<b>Maximum Deviation (kHz)</b>	<b>Limit (Hz)</b>
100	0.55	5000
200	1.18	5000
300	2.72	5000
400	2.82	5000
500	3.59	5000
600	3.90	5000
700	3.89	5000
800	3.85	5000
900	4.05	5000
1000	4.26	5000
1100	4.34	5000
1200	4.39	5000
1300	4.34	5000
1400	4.25	5000
1500	4.20	5000
1600	4.22	5000
1700	4.27	5000
1800	4.24	5000
1900	4.26	5000
2000	4.22	5000
2100	4.28	5000
2200	4.25	5000
2300	4.20	5000
2400	4.16	5000
2500	3.91	5000
3000	3.46	5000
3500	2.75	5000
4000	0.56	5000
4500	0.02	5000
5500	0.01	5000
6000	0.01	5000



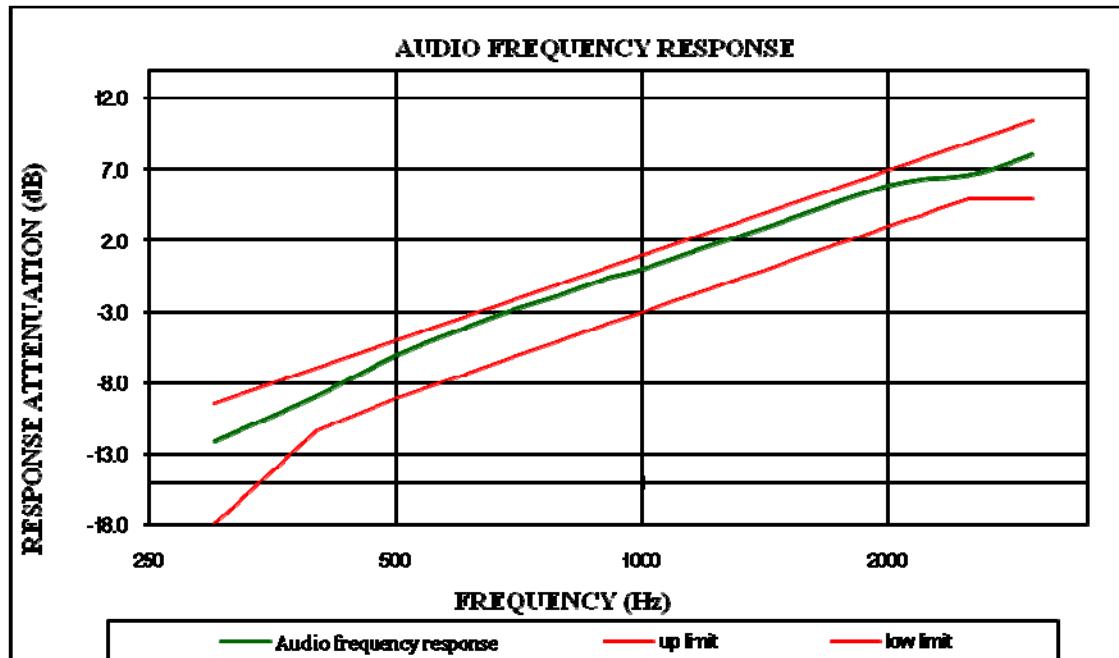
**Carrier Frequency: 156.525 MHz For DSC:**

Test mode	Frequency deviation(Hz)
1300Hz	1302
2100Hz	2098

**Audio Frequency Response**

Carrier Frequency: 156.8 MHz

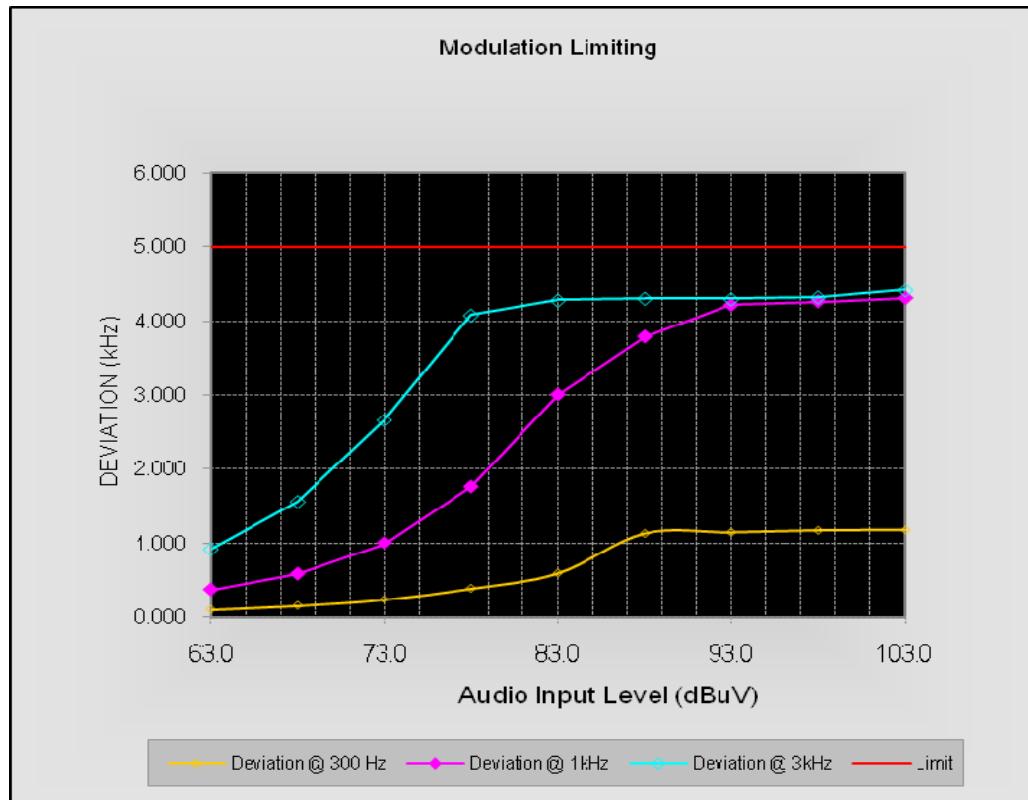
Modulation Frequency (kHz)	Response data (dB)
300	-12.09
400	-8.90
500	-6.06
600	-4.23
700	-2.79
800	-1.75
900	-0.68
1000	0.00
1200	1.58
1400	2.84
1600	4.03
1800	5.06
2000	5.88
2200	6.33
2400	6.48
2600	6.80
2800	7.41
3000	8.06



## MODULATION LIMITING

Carrier Frequency: 156.8 MHz

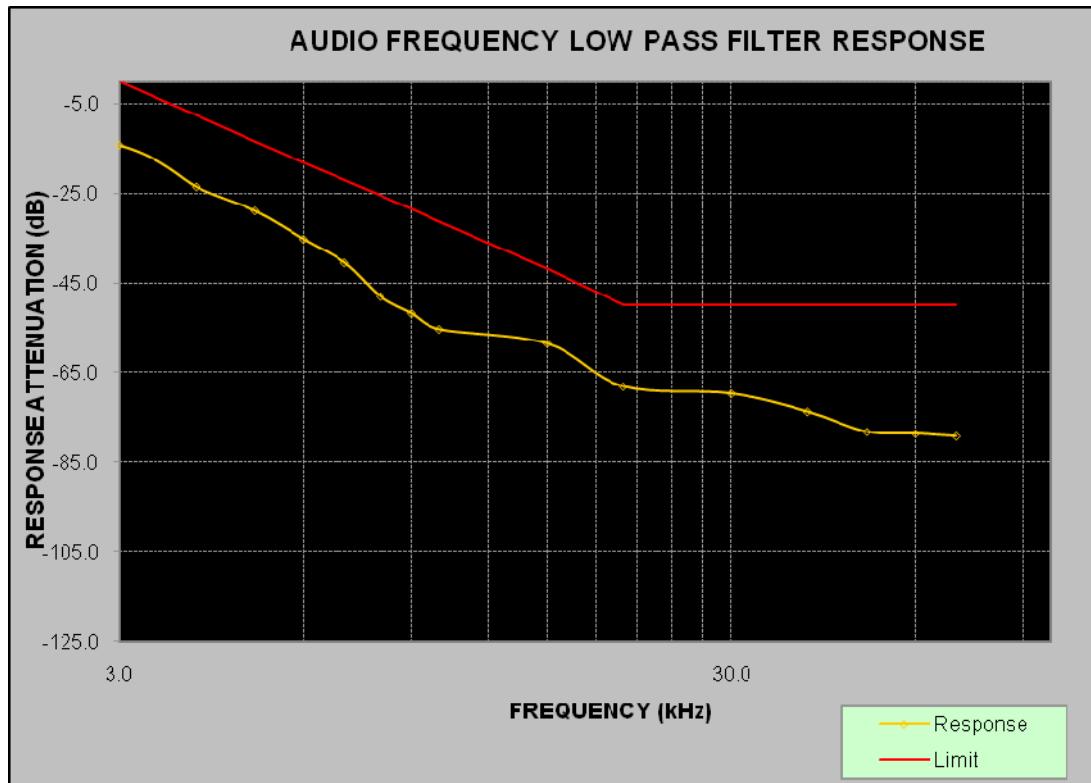
Audio Input Level [dBuV]	Frequency Deviation (kHz)			Limit [kHz]
	@ 300 Hz	@ 1kHz	@ 3 kHz	
103.0	1.172	4.300	4.414	5.0
98.0	1.167	4.257	4.320	5.0
93.0	1.141	4.208	4.293	5.0
88.0	1.125	3.783	4.302	5.0
83.0	0.593	3.000	4.277	5.0
78.0	0.389	1.758	4.077	5.0
73.0	0.240	0.999	2.661	5.0
68.0	0.157	0.582	1.560	5.0
63.0	0.104	0.370	0.917	5.0



**Audio Frequency Low Pass Filter Response**

Carrier Frequency: 156.8 MHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-14.2	0.0
4.0	-23.5	-7.5
5.0	-28.9	-13.3
6.0	-35.2	-18.1
7.0	-40.5	-22.1
8.0	-48.0	-25.6
9.0	-51.8	-28.6
10.0	-55.3	-31.4
15.0	-58.5	-41.9
20.0	-68.1	-50.0
30.0	-69.7	-50.0
40.0	-73.7	-50.0
50.0	-78.2	-50.0
60.0	-78.6	-50.0
70.0	-79.2	-50.0



## **FCC §2.1049 & §80.205 - BANDWIDTH**

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### **Applicable Standard**

FCC §2.1049 and §80.205

(a) An emission designator shows the necessary bandwidth for each class of emission of a station except that in ship earth stations it shows the occupied or necessary bandwidth, whichever is greater. The class of emission and corresponding emission designator and authorized bandwidth can refer to §80.205

(b) For land stations the maximum authorized frequency deviation for F3E or G3E emission is as follows:

(1) 5 kHz in the 72.0-73.0 MHz, 75.4-76.0 MHz and 156-162 MHz bands;

(2) 15 kHz for stations which were authorized for operation before December 1, 1961, in the 73.0-74.6 MHz band.

### **Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band  $\pm 30$  kHz from the carrier frequency.

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.5~25.8 °C
<b>Relative Humidity:</b>	42~48 %
<b>ATM Pressure:</b>	100.6~101 kPa

*The testing was performed by Kevin Hu from 2017-03-08 to 2017-03-12.*

*Test Mode: Transmitting*

Test mode	Frequency(MHz)	Power level	99% Bandwidth(kHz)	26 dB Emission Bandwidth(kHz)	Limit(kHz)
Radio Telephony	156.8	High	12.986	15.761	20
		Low	12.866	15.752	20

Test mode	Frequency(MHz)	99% Bandwidth(kHz)	26 dB Emission Bandwidth(kHz)	Limit(kHz)
DSC	2100Hz	12.866	17.315	20
	1300Hz		10.701	20

Per CFR 47 §2.201& §2.202&, Bn = 2M + 2D

**For FM Mode (Channel Spacing: 25 kHz)**

Emission Designator 16K0G3E

In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} = 16K0$$

G3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0G3E.

**For DSC Mode (Channel Spacing: 25 kHz)**

Emission Designator 16K0G2B

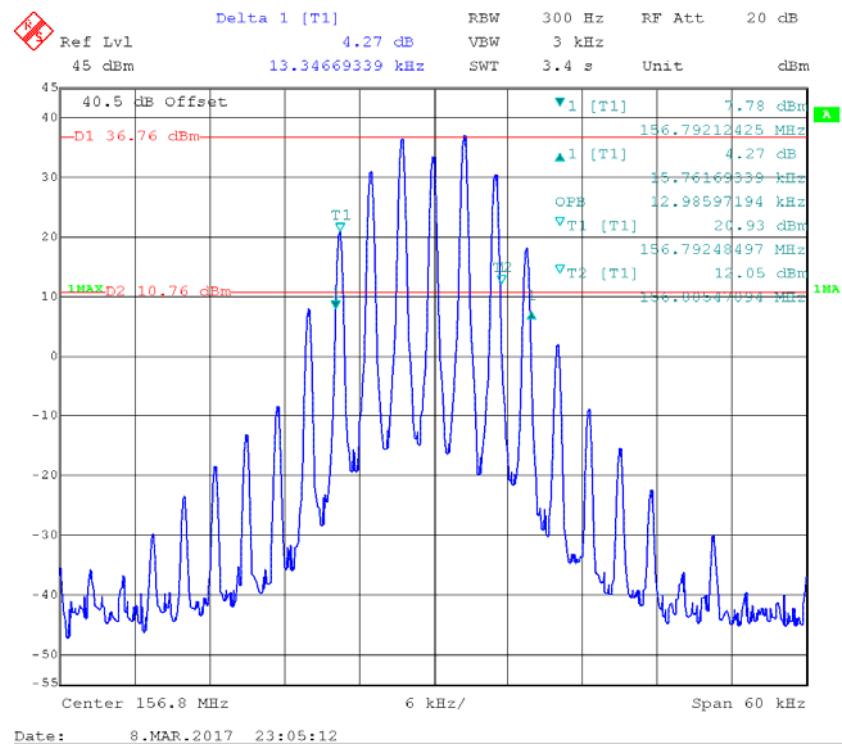
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} = 16K0$$

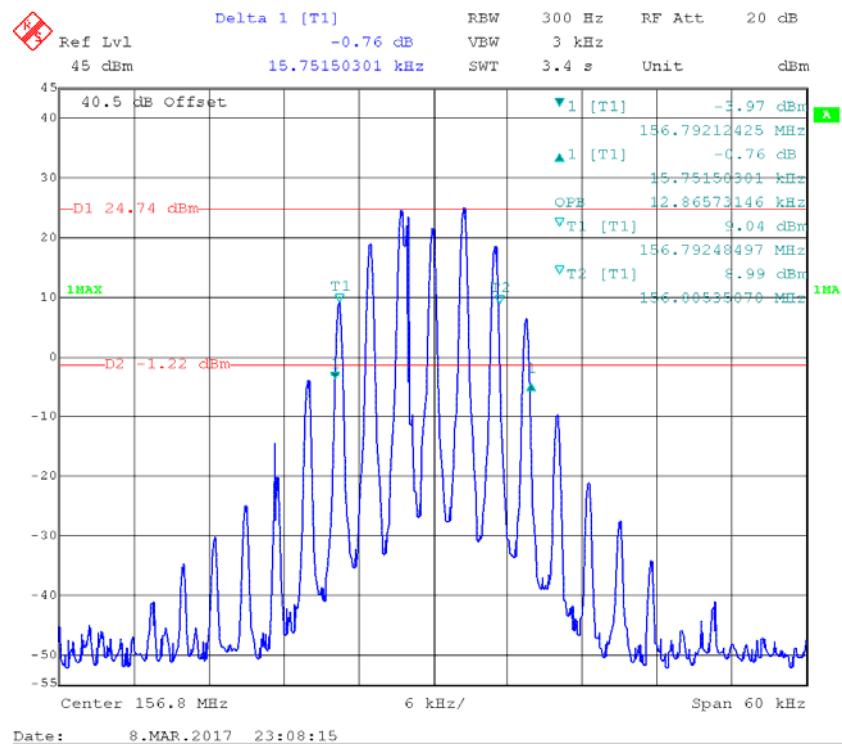
G2B portion of the designator indicates digital transmission

Therefore, the entire designator for 25 kHz channel spacing DSC mode is 16K0G2B.

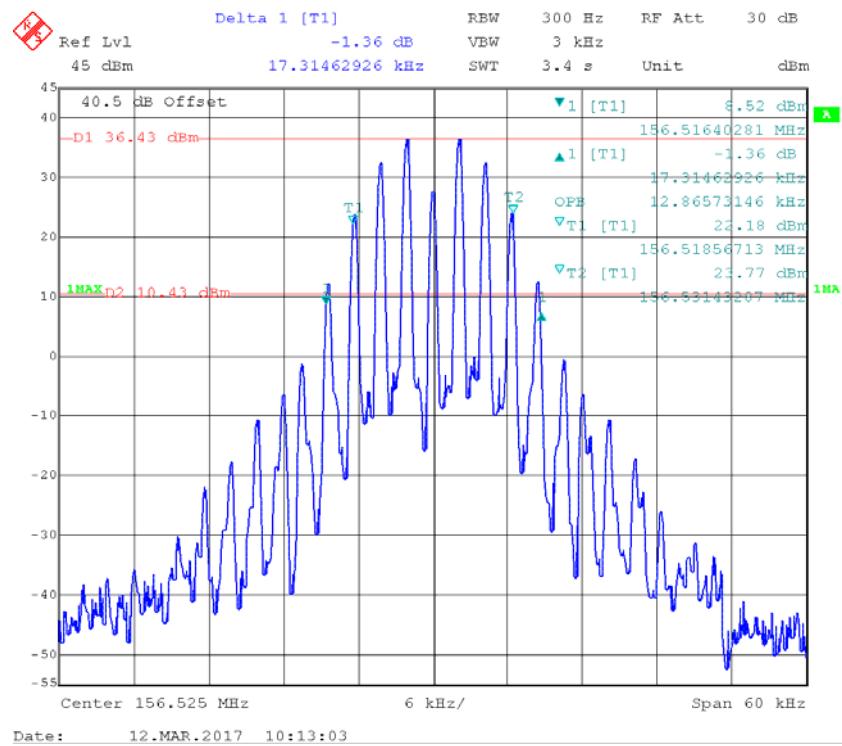
**99% Occupied Bandwidth & 26 dB Emissions Bandwidth (156.8 MHz, High Power)**



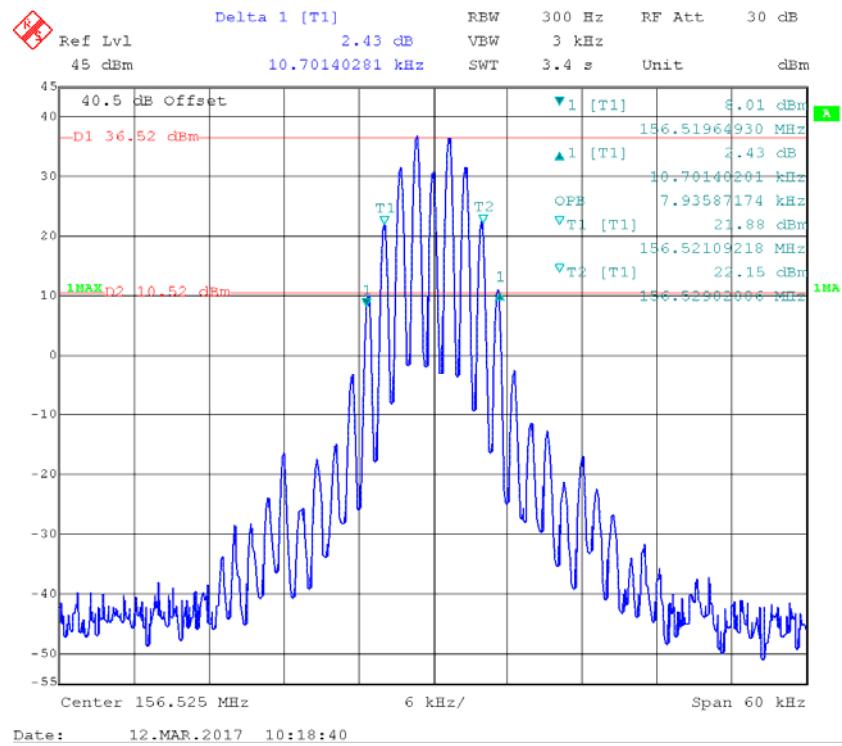
**99% Occupied Bandwidth & 26 dB Emissions Bandwidth (156.8 MHz, Low Power)**



**99% Occupied Bandwidth & 26 dB Emissions Bandwidth (156.525 MHz, DSC2100)**



**99% Occupied Bandwidth & 26 dB Emissions Bandwidth (156.525 MHz, DSC1300)**



## **§2.1051 &§80.211 - EMISSION LIMITATIONS.**

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### **Applicable Standard**

According to FCC§80.211

### **Test Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz, and 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.1 °C
<b>Relative Humidity:</b>	44 %
<b>ATM Pressure:</b>	100.2 kPa

*The testing was performed by Kevin Hu on 2017-03-12.*

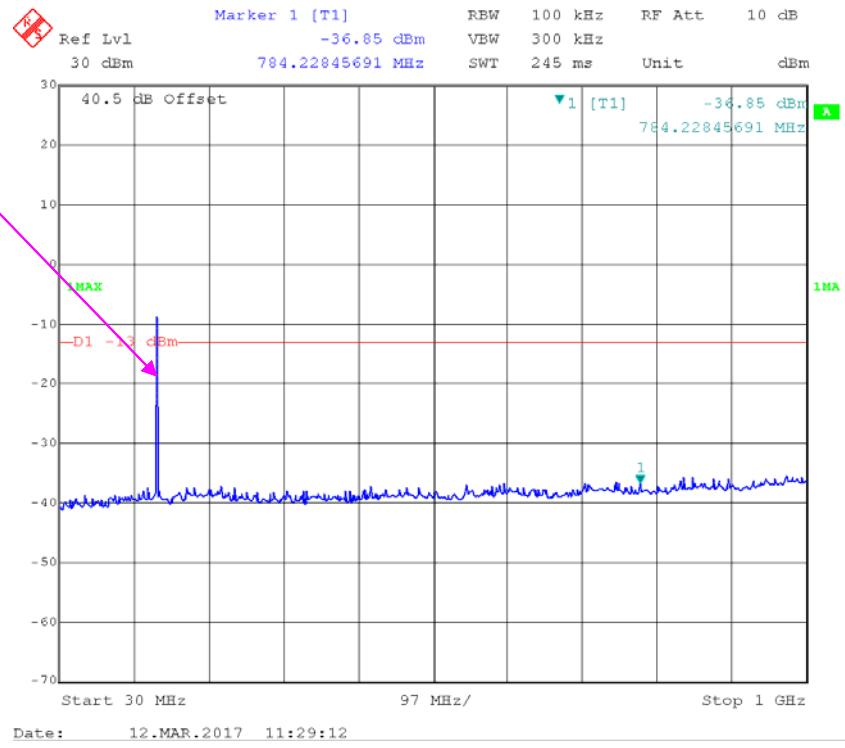
*Test Mode: Transmitting*

Please refer to the following plots.

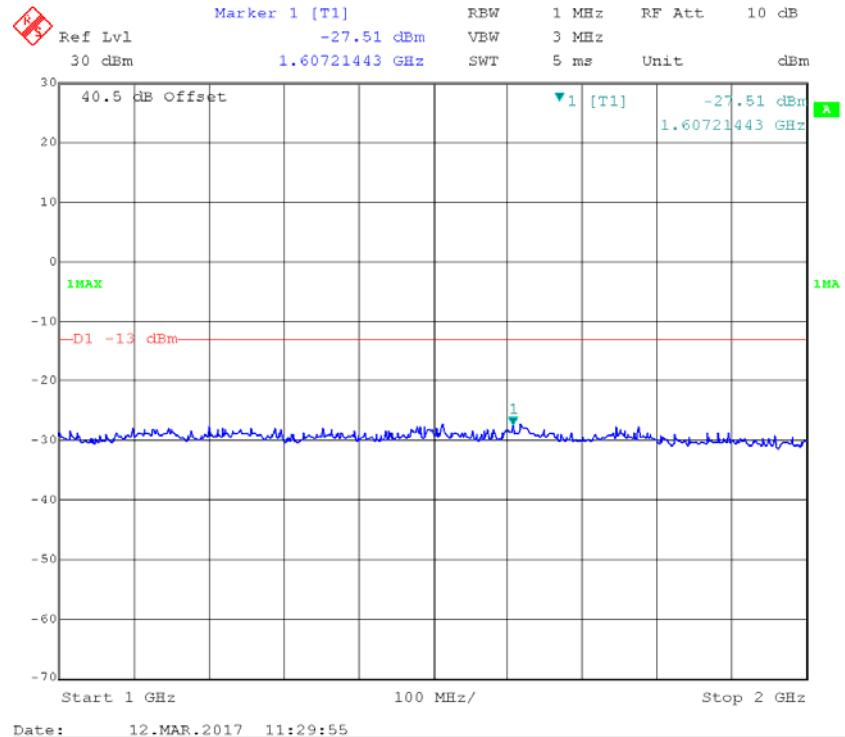
**Radio Telephony (156.8 MHz):**

**30 MHz – 1 GHz, High Power**

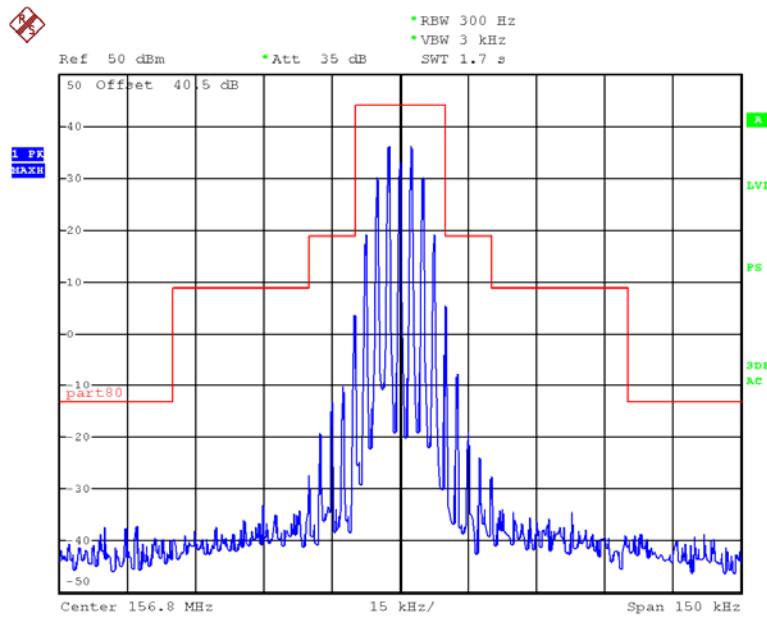
Fund. test with  
notch filter



**1 GHz – 2 GHz, High Power**

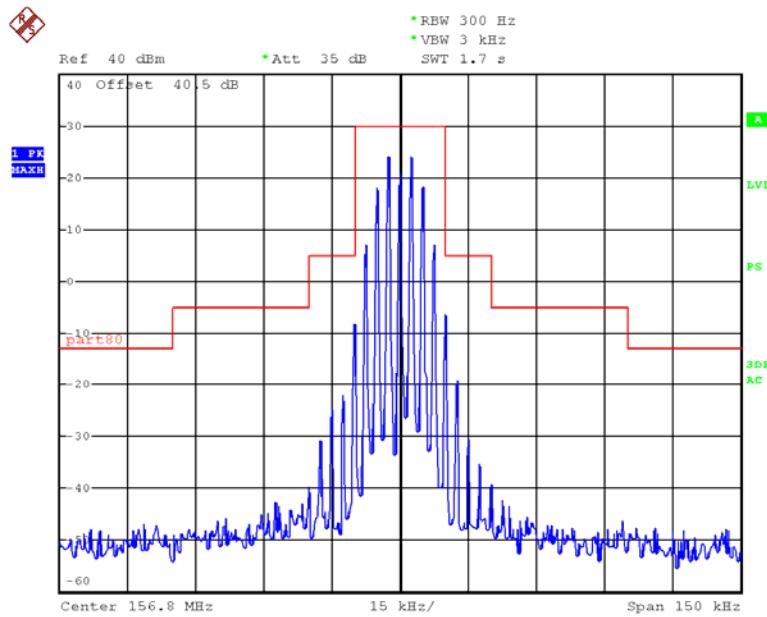


### Emission Mask, High Power



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### Emission Mask, Low Power

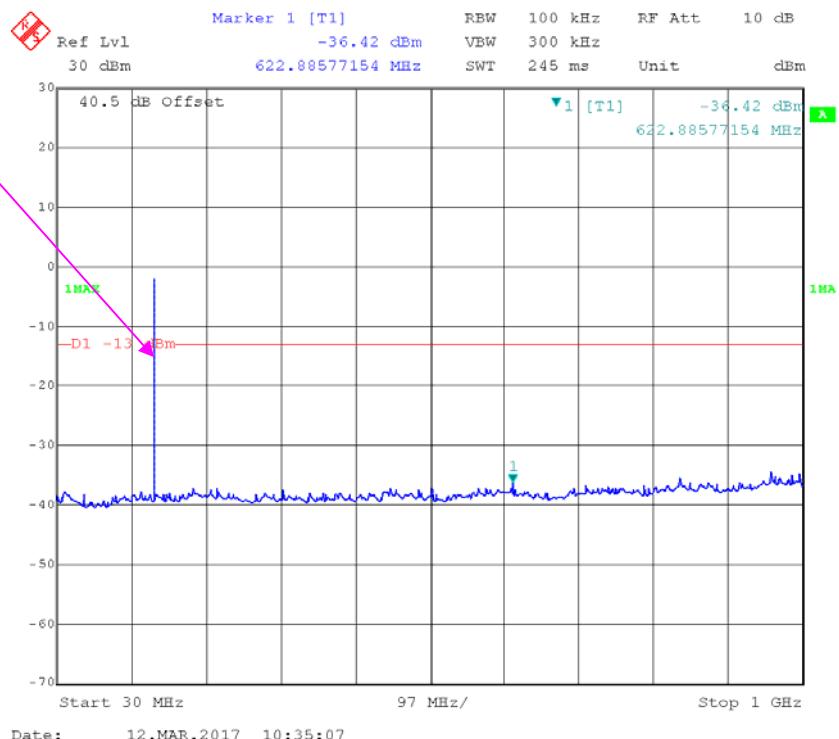


Date: 12.MAR.2017 13:20:33

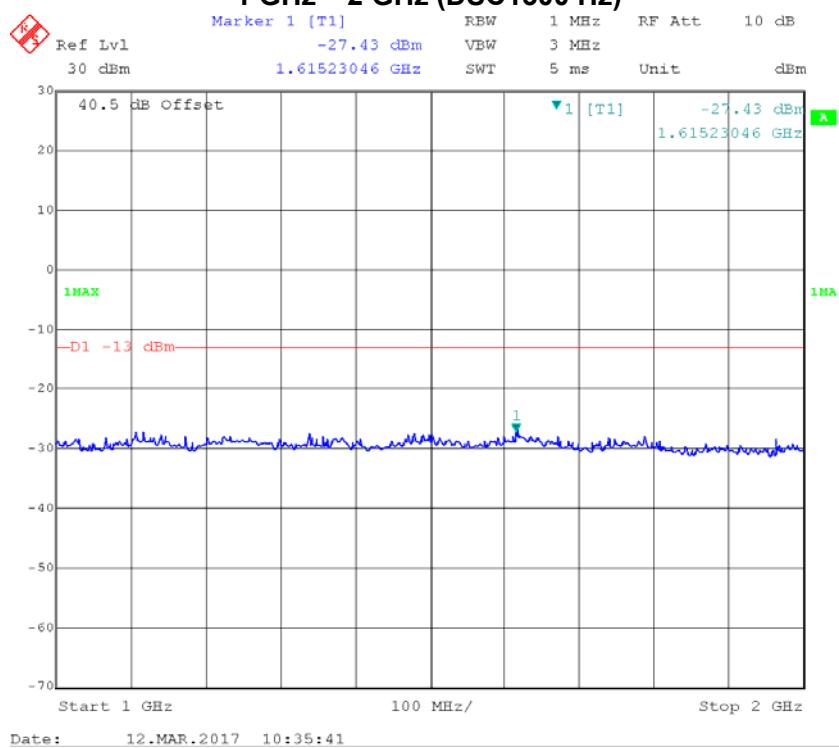
**DSC (156.525 MHz):**

**30 MHz – 1 GHz ( DSC1300 Hz)**

Fund.test with  
notch filter

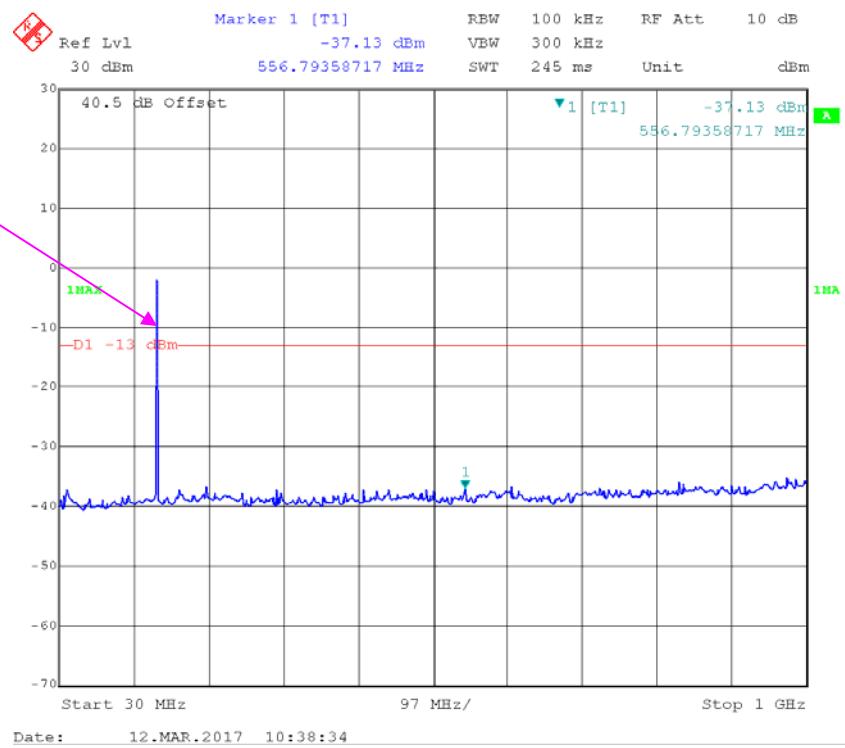


**1 GHz – 2 GHz ( DSC1300 Hz)**

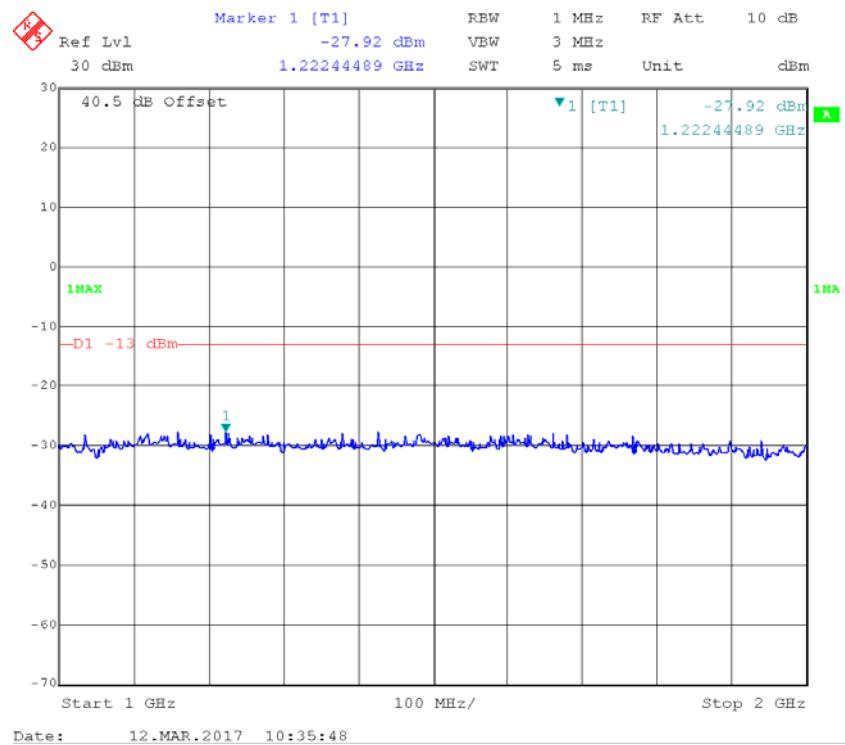


**30 MHz – 1 GHz (DSC2100 Hz)**

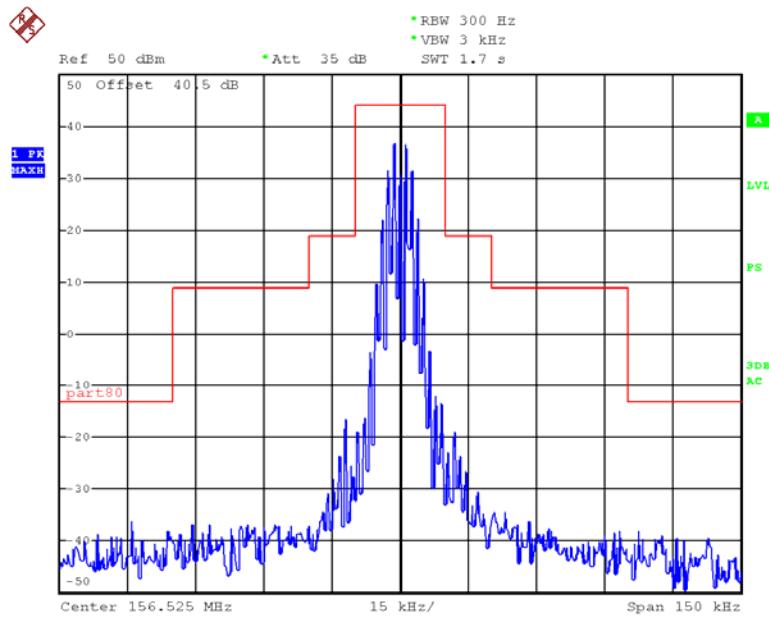
Fund. test with  
notch filter



**1 GHz – 2 GHz (DSC2100Hz)**

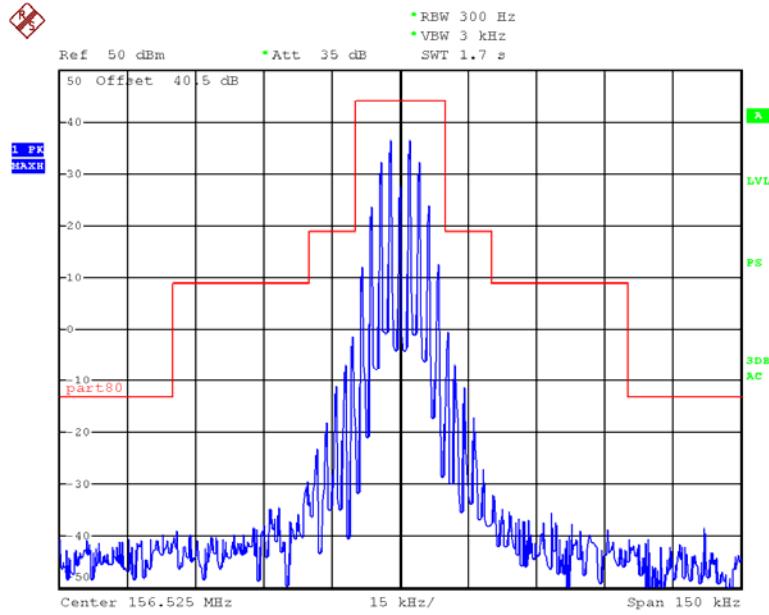


## Emission Mask (DSC1300Hz)



Date: 12.MAR.2017 11:59:58

## Emission Mask (DSC2100Hz)



Date: 12.MAR.2017 11:57:50

## **FCC§80.217 - SUPPRESSION OF INTERFERENCE ABOARD SHIPS**

### **Applicable Standard**

FCC §80.217

(a) A voluntarily equipped ship station receiver must not cause harmful interference to any receiver required by statute or treaty.  
(b) The electromagnetic field from receivers required by statute or treaty must not exceed the following value at a distance over sea water of one nautical mile from the receiver

Frequency of interfering emissions	Field intensity in microvolts per meter
Below 30 MHz	0.1
30 to 100 MHz	.3
100 to 300 MHz	1.0
Over 300 MHz	3.0

or Deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

Frequency of interfering emissions	Power to artificial antenna in microwatts
Below 30 MHz	400
30 to 100 MHz	4,000
100 to 300 MHz	40,000
Over 300 MHz	400,000

### **Test Procedure**

The EUT was connected to a spectrum analyser via a 10 dB attenuator. The spectrum was measured between 9 kHz to 2 GHz. A resolution bandwidth of 100 kHz was used below 1GHz and 1 MHz was used above 1GHz. The traces were recorded as shown on the following pages.

### **Test Data**

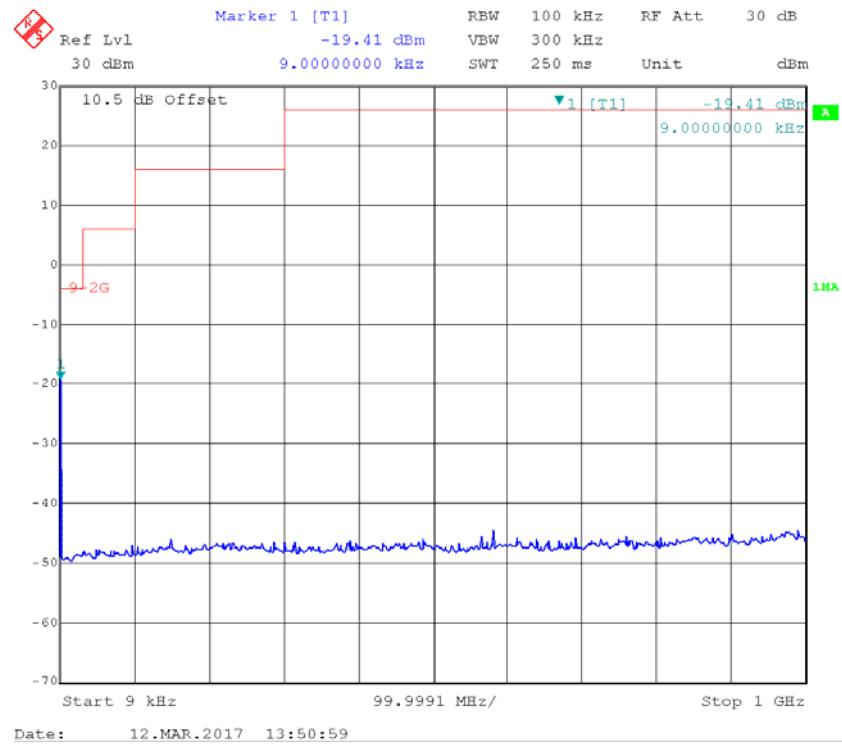
#### **Environmental Conditions**

<b>Temperature:</b>	25.1 °C
<b>Relative Humidity:</b>	44 %
<b>ATM Pressure:</b>	100.2 kPa

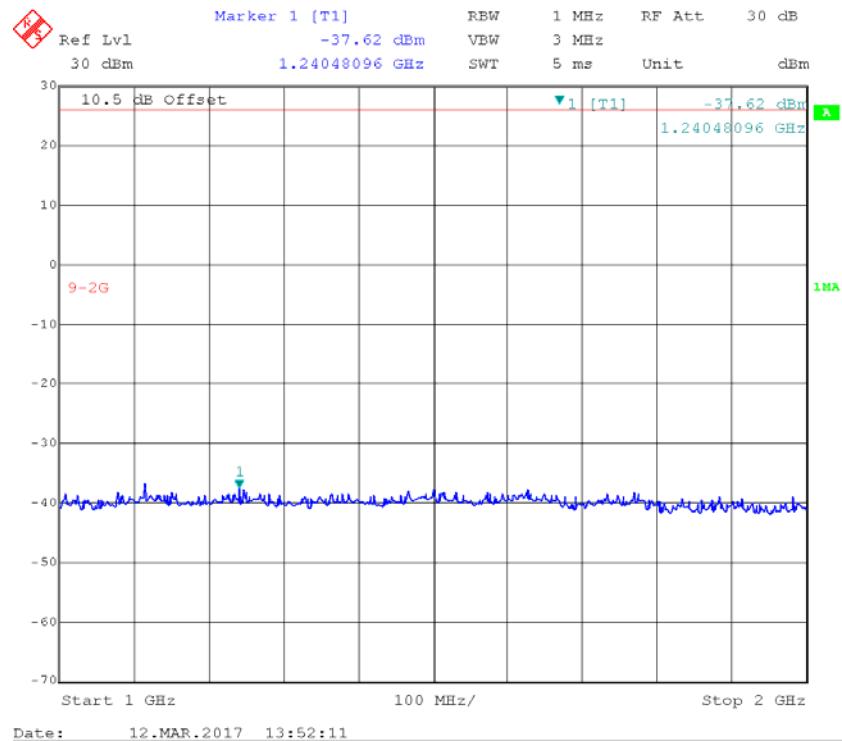
*The testing was performed by Kevin Hu on 2017-03-12.*

*Test Mode: Transmitting*

**9 kHz – 1GHz, 156.8 MHz**

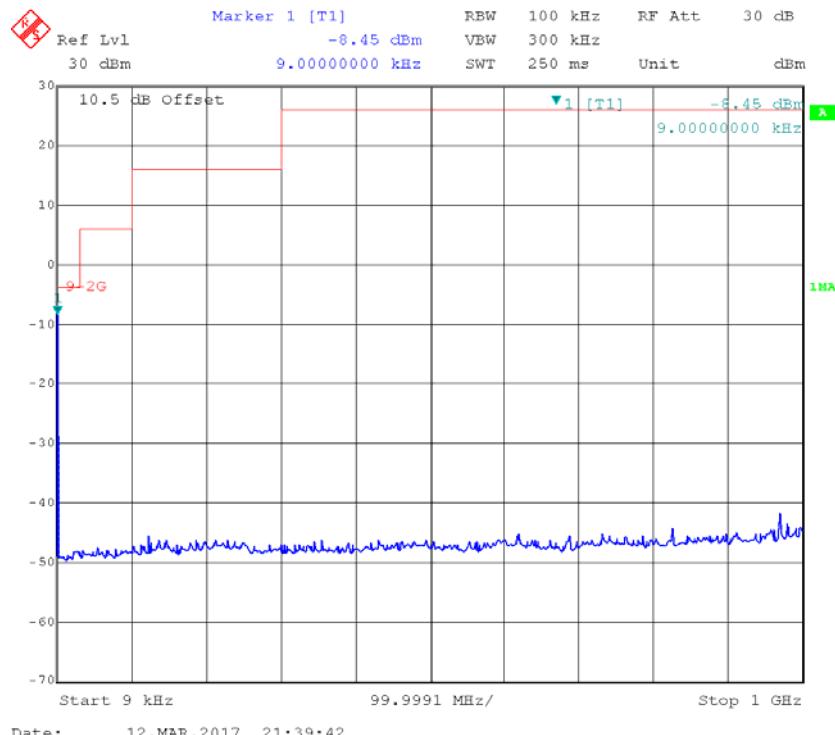


**1GHz – 2 GHz, 156.8 MHz**

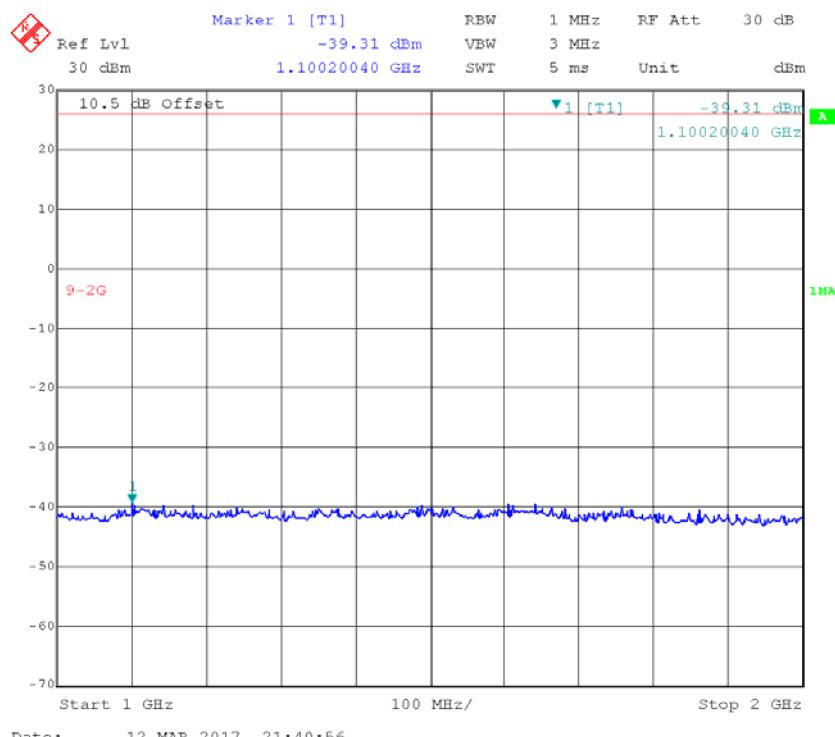


**DSC**

**9 kHz – 1GHz, 156.525 MHz**



**1GHz – 2 GHz, 156.525 MHz**



## FCC §2.1053&§80.211 - RADIATED SPURIOUS EMISSIONS

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### Applicable Standard

FCC §2.1053, § 80.211

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \log_{10} (\text{TXpwr in Watts}/0.001)$ -the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

### Test Data

#### Environmental Conditions

Temperature:	26.3 °C
Relative Humidity:	52 %
ATM Pressure:	100.9 kPa

*The testing was performed by Kevin Hu on 2017-03-05.*

*Test Mode: Transmitting*

HM380S:

**30 MHz – 2 GHz:**

Frequency (MHz)	Polar (H/V)	Turn Table Angle Degree	Substituted			Absolute Level (dBm)	FCC Part 80	
			SG Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
Radio telephony: 156.8 MHz								
313.600	H	40.62	-37.1	0.0	0.3	-37.4	-13.0	24.4
313.600	V	43.80	-32.4	0.0	0.3	-32.7	-13.0	19.7
470.400	H	38.59	-35.9	0.0	0.4	-36.3	-13.0	23.3
470.400	V	40.58	-31.5	0.0	0.4	-31.9	-13.0	18.9
627.200	H	43.69	-27.4	0.0	0.4	-27.8	-13.0	14.8
627.200	V	45.28	-24.1	0.0	0.4	-24.5	-13.0	11.5
784.000	H	37.22	-31.6	0.0	0.5	-32.1	-13.0	19.1
784.000	V	39.41	-26.6	0.0	0.5	-27.1	-13.0	14.1
940.800	H	35.86	-29.9	0.0	0.5	-30.4	-13.0	17.4
940.800	V	36.91	-25.6	0.0	0.5	-26.1	-13.0	13.1
1097.600	H	32.59	-67.3	7.4	1.4	-61.3	-13.0	48.3
1097.600	V	33.46	-66.8	7.4	1.4	-60.8	-13.0	47.8
1254.400	H	31.42	-68.8	7.8	1.3	-62.3	-13.0	49.3
1254.400	V	31.92	-68.5	7.8	1.3	-62.0	-13.0	49.0
1411.200	H	32.48	-68.3	9.0	1.4	-60.7	-13.0	47.7
1411.200	V	33.28	-67.2	9.0	1.4	-59.6	-13.0	46.6
1568.000	H	31.52	-69.8	9.9	1.2	-61.1	-13.0	48.1
1568.000	V	31.94	-70	9.9	1.2	-61.3	-13.0	48.3

Frequency (MHz)	Polar (H/V)	Turn Table Angle Degree	Substituted			Absolute Level (dBm)	FCC Part 80	
			SG Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
DSC: 156.525 MHz								
313.050	H	39.56	-38.2	0.0	0.3	-38.5	-13.0	25.5
313.050	V	42.12	-34	0.0	0.3	-34.3	-13.0	21.3
469.575	H	36.99	-37.5	0.0	0.4	-37.9	-13.0	24.9
469.575	V	39.11	-33	0.0	0.4	-33.4	-13.0	20.4
626.100	H	42.47	-28.6	0.0	0.4	-29.0	-13.0	16.0
626.100	V	44.35	-25	0.0	0.4	-25.4	-13.0	12.4
782.625	H	35.53	-33.3	0.0	0.5	-33.8	-13.0	20.8
782.625	V	37.76	-28.3	0.0	0.5	-28.8	-13.0	15.8
939.150	H	34.92	-30.9	0.0	0.5	-31.4	-13.0	18.4
939.150	V	35.84	-26.8	0.0	0.5	-27.3	-13.0	14.3
1095.675	H	33.24	-66.7	7.4	1.4	-60.7	-13.0	47.7
1095.675	V	34.83	-65.4	7.4	1.4	-59.4	-13.0	46.4
1252.200	H	31.53	-68.7	7.8	1.3	-62.2	-13.0	49.2
1252.200	V	31.95	-68.4	7.8	1.3	-61.9	-13.0	48.9
1408.725	H	32.17	-68.6	9.0	1.4	-61.0	-13.0	48.0
1408.725	V	33.87	-66.6	9.0	1.4	-59.0	-13.0	46.0
1565.250	H	31.59	-69.7	9.9	1.2	-61.0	-13.0	48.0
1565.250	V	32.08	-69.9	9.9	1.2	-61.2	-13.0	48.2

**Note:**

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

HM380S-BB:

**30 MHz – 2 GHz:**

Frequency (MHz)	Polar (H/V)	Turn Table Angle Degree	Substituted			Absolute Level (dBm)	FCC Part 80	
			SG Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
Radio telephony: 156.8 MHz								
313.600	H	39.67	-38.1	0.0	0.3	-38.4	-13.0	25.4
313.600	V	42.85	-33.3	0.0	0.3	-33.6	-13.0	20.6
470.400	H	37.64	-36.9	0.0	0.4	-37.3	-13.0	24.3
470.400	V	39.63	-32.4	0.0	0.4	-32.8	-13.0	19.8
627.200	H	42.74	-28.3	0.0	0.4	-28.7	-13.0	15.7
627.200	V	44.33	-25	0.0	0.4	-25.4	-13.0	12.4
784.000	H	36.27	-32.6	0.0	0.5	-33.1	-13.0	20.1
784.000	V	38.46	-27.5	0.0	0.5	-28.0	-13.0	15.0
940.800	H	34.91	-30.8	0.0	0.5	-31.3	-13.0	18.3
940.800	V	35.96	-26.6	0.0	0.5	-27.1	-13.0	14.1
1097.600	H	32.54	-67.3	7.4	1.4	-61.3	-13.0	48.3
1097.600	V	33.21	-67.1	7.4	1.4	-61.1	-13.0	48.1
1254.400	H	31.33	-68.9	7.8	1.3	-62.4	-13.0	49.4
1254.400	V	31.73	-68.6	7.8	1.3	-62.1	-13.0	49.1
1411.200	H	32.15	-68.7	9.0	1.4	-61.1	-13.0	48.1
1411.200	V	32.95	-67.6	9.0	1.4	-60.0	-13.0	47.0
1568.000	H	31.51	-69.8	9.9	1.2	-61.1	-13.0	48.1
1568.000	V	31.70	-70.2	9.9	1.2	-61.5	-13.0	48.5

Frequency (MHz)	Polar (H/V)	Turn Table Angle Degree	Substituted			Absolute Level (dBm)	FCC Part 80	
			SG Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
DSC: 156.525 MHz								
313.050	H	38.61	-39.1	0.0	0.3	-39.4	-13.0	26.4
313.050	V	41.17	-35	0.0	0.3	-35.3	-13.0	22.3
469.575	H	36.04	-38.5	0.0	0.4	-38.9	-13.0	25.9
469.575	V	38.16	-33.9	0.0	0.4	-34.3	-13.0	21.3
626.100	H	41.52	-29.6	0.0	0.4	-30.0	-13.0	17.0
626.100	V	43.40	-26	0.0	0.4	-26.4	-13.0	13.4
782.625	H	34.58	-34.3	0.0	0.5	-34.8	-13.0	21.8
782.625	V	36.81	-29.2	0.0	0.5	-29.7	-13.0	16.7
939.150	H	33.97	-31.8	0.0	0.5	-32.3	-13.0	19.3
939.150	V	34.89	-27.7	0.0	0.5	-28.2	-13.0	15.2
1095.675	H	32.92	-67	7.4	1.4	-61.0	-13.0	48.0
1095.675	V	34.41	-65.9	7.4	1.4	-59.9	-13.0	46.9
1252.200	H	31.26	-69	7.8	1.3	-62.5	-13.0	49.5
1252.200	V	31.89	-68.5	7.8	1.3	-62.0	-13.0	49.0
1408.725	H	31.68	-69.1	9.0	1.4	-61.5	-13.0	48.5
1408.725	V	33.52	-66.9	9.0	1.4	-59.3	-13.0	46.3
1565.250	H	31.25	-70.1	9.9	1.2	-61.4	-13.0	48.4
1565.250	V	32.01	-69.9	9.9	1.2	-61.2	-13.0	48.2

**Note:**

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

## **FCC §2.1055 & §80.209 - TRANSMITTER FREQUENCY TOLERANCES**

### **Applicable Standard**

FCC §2.1055, §80.209

### **Test Procedure**

Frequency Stability vs. Temperature:

From  $-20^{\circ}$  to  $+50^{\circ}$  centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBs), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

The frequency stability shall be measured with variation of primary supply voltage as follows

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25.1 °C
<b>Relative Humidity:</b>	44 %
<b>ATM Pressure:</b>	100.2 kPa

*The testing was performed by Kevin Hu on 2017-03-12.*

*Test Mode: Transmitting*

**For Radio Telephony mode:**

<b>Reference Frequency: 156.8 MHz, Limit: <math>\pm 10.0</math> ppm</b>			
<b>Test Environment</b>		<b>Frequency Measure with Time Elapsed</b>	
<b>Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Error (ppm)</b>
Frequency Stability versus Input Temperature			
55	13.8	156.799982	0.115
50	13.8	156.799988	0.077
40	13.8	156.800009	0.057
30	13.8	156.799992	0.051
20	13.8	156.799997	0.019
10	13.8	156.799999	0.006
0	13.8	156.800013	0.083
-10	13.8	156.799987	0.083
-20	13.8	156.799991	0.057

<b>Reference Frequency: 156.8 MHz, Limit: <math>\pm 10.0</math> ppm</b>			
<b>Test Environment</b>		<b>Frequency Measure with Time Elapsed</b>	
<b>Temperature (°C)</b>	<b>Power Supplied (V<sub>DC</sub>)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Error (ppm)</b>
Frequency Stability versus Input Temperature			
55	11.73	156.800024	0.153
50	11.73	156.79999	0.064
40	11.73	156.800003	0.019
30	11.73	156.800002	0.013
20	11.73	156.800013	0.083
10	11.73	156.799988	0.077
0	11.73	156.799991	0.057
-10	11.73	156.799993	0.045
-20	11.73	156.799998	0.013

<b>Reference Frequency: 156.8 MHz, Limit: <math>\pm 10.0</math> ppm</b>			
<b>Test Environment</b>		<b>Frequency Measure with Time Elapsed</b>	
<b>Temperature (°C)</b>	<b>Power Supplied (V<sub>dc</sub>)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Error (ppm)</b>
Frequency Stability versus Input Temperature			
55	15.87	156.799988	0.077
50	15.87	156.79999	0.064
40	15.87	156.799999	0.006
30	15.87	156.800012	0.077
20	15.87	156.799993	0.045
10	15.87	156.800006	0.038
0	15.87	156.799991	0.057
-10	15.87	156.79999	0.064
-20	15.87	156.799999	0.006

\*\*\*\*\* END OF REPORT \*\*\*\*\*