NVLAP TESTING
NVLAP LAB CODE 600341-0

BACL Bay Area Compliance Labs Corp.

TEST REPORT

Applicant:	**Quanzhou Risen Electronics Co., Ltd**
Address:	**No. 26 Zishan Road, Jiangnan High-Tech. Industrial Zone, Licheng District, Quanzhou, Fujian, China**
Product Name:	**VHF Marine Transceiver**
FCC ID:	**2AGRS-RS-509MG**
Standard(s):	**47 CFR Part 2 47 CFR Part 80 ANSI C63.26-2015**
Report Number:	**2402Z38638E-RF-00A**
Report Date:	**2024/12/26**

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Reviewed By: Pedro Yun	**Approved By:** Gavin Xu
Title: Project Engineer	Title: RF Supervisor

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402Z38638E-RF-00A	Original Report	2024/12/26

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	VHF Marine Transceiver
EUT Model:	RS-509MG
Multiple Model:	RS-509M ,MR-200, MR-200G
Types Of Equipment:	VHF Ship Station
Modulation Mode:	FM, DSC
Channel Spacing:	25kHz
DSC Function:	Support
AIS Function:	Not Support
Operation Frequency:	FM: 156.05-157.425MHz DSC: 156.525 MHz
Maximum Output Power:	25W(High power Level) 1W(Low power Level)
Emission Type:	G3E, G2B
Rated Input Voltage:	DC 13.8 V
Serial Number:	2TXQ-2(Model: RS-509MG) 2TXQ-3(Model: RS-509M)
EUT Received Date:	2024/11/4
EUT Received Status:	Good
Note: There are four models, the difference between them is that the models RS-509MG and MR-200G have GPS function, RS-509M and MR-200 have no GPS function. Please refer to the declaration letter for more detail, which was provided by manufacturer.	

1.2 Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
Hand Mic	Recent	HM-509	/

1.3 Antenna Information Detail▲:

Antenna Manufacturer	Antenna Connector	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range
Quanzhou Risen Electronics Co., Ltd	N-Type	Monopole	50	0dBi(-2.15dBd) 156~162MHz

1.4 Equipment Modifications

No modifications are made to the EUT during all test items.

2. SUMMARY OF TEST RESULTS

Rules	Description of Test	Results
§2.1055; §80.209	Transmitter Frequency Tolerances	Compliant
§2.1047; §80.213	Modulation Requirements	Compliant
§2.1046; §80.215	Transmitter Power	Compliant
§2.1049; §80.205, §80.211	Bandwidth And Emission Mask	Compliant
§2.1051; §80.211	Transmitter Unwanted Emissions(Conducted)	Compliant
§80.217	Suppression of Interference Aboard Ships	Compliant
§2.1053; §80.211	Transmitter Unwanted Emissions(Radiated)	Compliant
§1.1310 & §2.1091	RF Exposure	Compliant

3. DESCRIPTION OF TEST CONFIGURATION

3.1 Operation Frequency Detail:

Channel	Transmit Frequency (MHz)	Receive Frequency (MHz)	Channel Number	Transmitting Frequency (MHz)	Receiving Frequency (MHz)
01A	**156.050**	156.050	27	157.350	161.950
05A	156.250	156.250	28	157.400	162.000
6	156.300	156.300	63A	156.175	156.175
07A	156.350	156.350	65A	156.275	156.275
8	156.400	156.400	66A	156.325	156.325
9	156.450	156.450	67	**156.375***	156.375
10	156.500	156.500	68	156.425	156.425
11	156.550	156.550	69	156.475	156.475
12	156.600	156.600	70	**156.525**	156.525
13	156.65*	156.650	71	**156.575***	156.575
14	156.700	156.700	72	156.625	156.625
15	…….	156.750	73	156.675	156.675
16	**156.800**	156.800	74	156.725	156.725
17	156.850*	156.850	77	**156.875***	156.875
18A	156.900	156.900	78A	156.925	156.925
19A	156.950	156.950	79A	156.975	156.975
20	157.000	161.600	80A	157.025	157.025
20A	157.000	157.000	81A	157.075	157.075
21A	157.050	157.050	82A	157.125	157.125
22A	157.100	157.100	83A	157.175	157.175
23A	157.150	157.150	84	157.225	161.825
24	157.200	161.800	85	157.275	161.875
25	157.250	161.850	86	157.325	161.925
26	157.300	161.900	87	157.375	157.375
/	/	/	88A	**157.425**	157.425

Note:
1. The channel frequency plan for USA maritime radio communications, is set forth in §80.373(f).
2. All above channels support High and low power level, except the channels mark with '*' are only low power level.
3. 156.525MHz is for DSC.
4. The channels in bold was tested in the report.

3.2 EUT Operation Condition:

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

3.3 EUT Exercise Software

No software was used during test.

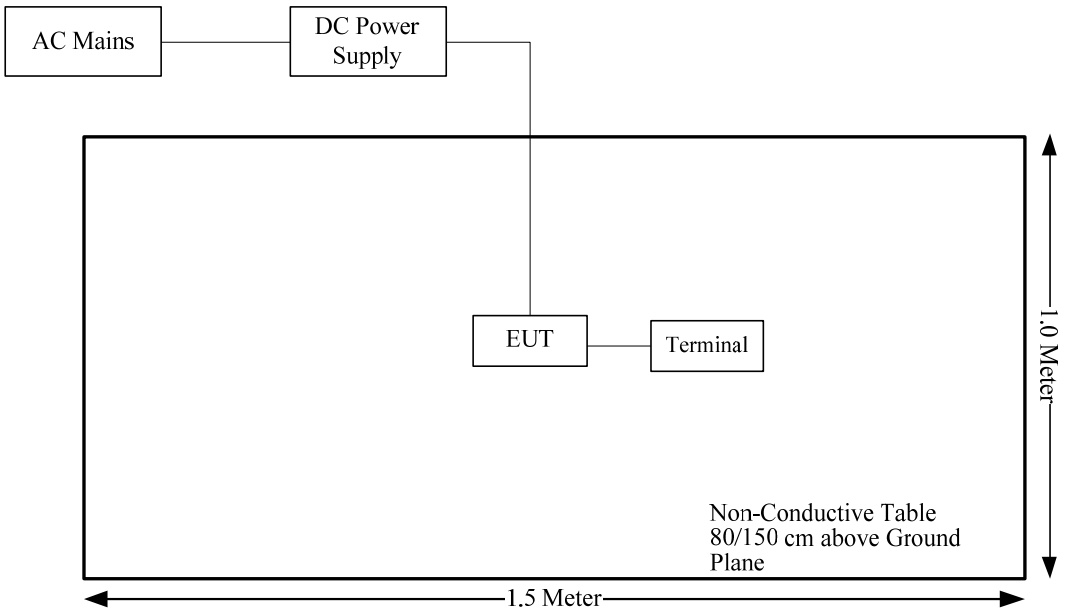
3.4 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
BEW	Terminal	TF300-6-B	H5FK-510
TDK-Lambda	DC Power Supply	KYT173381	LOC-825A153-0016

3.5 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length(m)	From Port	To
Coaxial Cable	Yes	No	1.0	Terminal	EUT
DC Power cable	No	No	2.1	DC power Supply	EUT

3.6 Block Diagram of Test Setup



3.7 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

3.8 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
RF Frequency	0.082×10^{-6}
Unwanted Emissions, radiated	±3.62 dB
Unwanted Emissions, conducted	±2.47 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
Audio Frequency/Low Pass Filter Response	4.02%
Modulation Limiting	1.19%

4. REQUIREMENTS AND TEST RESULTS

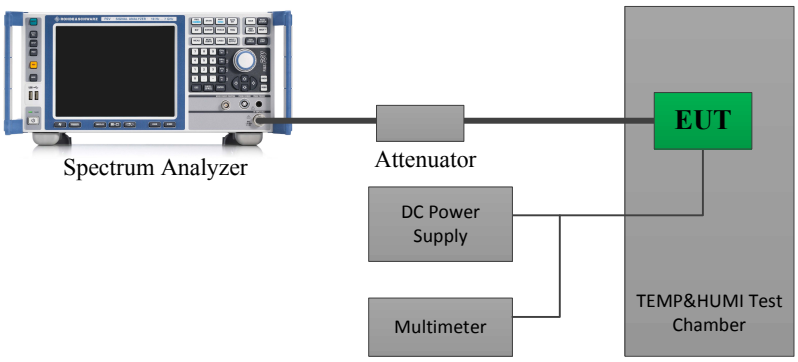
4.1 Transmitter frequency tolerances

4.1.1 Applicable Standard

FCC §80.209

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.

4.1.2 Block Diagram of Test Setup



4.1.3 Test Procedure

According to ANSI C63.26-2015 Section 5.6:

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

a) At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, and

b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

4.1.4 Test Data And Result

Serial Number:	2TXQ-2	Test Date:	2024/11/29
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jojo Zhou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	23.1	Relative Humidity: (%)	31	ATM Pressure: (kPa)	102.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101947	2024/9/5	2025/9/4
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-03	2024/8/23	2025/8/22
Huaxiang	Coaxial Attenuator	DTS250-30	11022109	2024/6/7	2025/6/6
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30173	2024/9/6	2025/9/5
All-sun	Multimeter	EM305A	8348897	2024/8/16	2025/8/15
TDK-Lambda	DC Power Supply	Z+60-14	F-08-EM038-1	N/A	N/A

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Unmodulation, Test Frequency: 156.8MHz, Limit: ±10.0 ppm			
Temperature	**Voltage Supplied**	**Measured Frequency**	**Frequency Error**
(℃)	**(V_{DC})**	**(MHz)**	**(ppm)**
-30	13.8	156.8003003	1.92
-20		156.8002918	1.86
-10		156.8002834	1.81
0		156.8002742	1.75
10		156.8002687	1.71
20		156.8002600	1.66
30		156.8002538	1.62
40		156.8002445	1.56
50		156.8002366	1.51
20	11.73	156.8002745	1.75
20	15.87	156.8002472	1.58

Note: the operation voltage range was declared by manufacturer.

Unmodulation, 156.525MHz,Limit: ±10.0 ppm			
Temperature	Voltage Supplied	Measured Frequency	Frequency Error
(℃)	(V_{DC})	(MHz)	(ppm)
-30	13.8	156.5252649	1.69
-20		156.5252558	1.63
-10		156.5252472	1.58
0		156.5252366	1.51
10		156.5252263	1.45
20		156.5252170	1.39
30		156.5252084	1.33
40		156.5252001	1.28
50		156.5251915	1.22
20	11.73	156.5252334	1.49
20	15.87	156.5252017	1.29

Note: the operation voltage range was declared by manufacturer.

4.2 Modulation requirements

4.2.1 Applicable Standard

FCC §80.213

(a) Transmitters must meet the following modulation requirements:

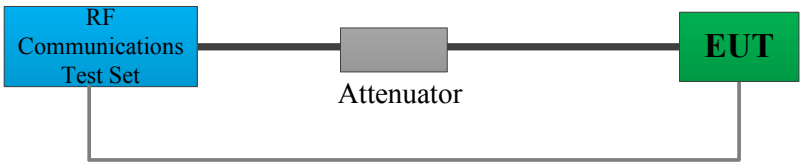
(1) When double sideband emission is used the peak modulation must be maintained between 75 and 100 percent;
(2) When phase or frequency modulation is used in the 156-162 MHz band the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ±5 kHz is defined as 100 percent peak modulation; and
(3) In single sideband operation the upper sideband must be transmitted. Single sideband transmitters must automatically limit the peak envelope power to their authorized operating power and meet the requirements in § 80.207(c).

(b) Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent. This requirement does not apply to survival craft transmitters, to transmitters that do not require a license or to transmitters whose output power does not exceed 3 watts.

(c) Coast station transmitters operated in the 72.0-73.0 MHz and 75.4-76.0 MHz bands 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 15 kHz it must have an attenuation greater than at 1 kHz by at least 40log10 (f/3) dB where "f" is the frequency in kilohertz. At frequencies above 15 kHz the attenuation must be at least 28 dB greater than at 1 kHz.

(d) Ship and coast station transmitters operating in the 156-162 MHz and 216-220 bands must be capable of proper operation with a frequency deviation that does not exceed ±5 kHz when using any emission authorized by § 80.207.

4.2.2 Block Diagram of Test Setup



4.2.3 Test Procedure

According to ANSI C63.26-2015 Section 5.3.2:

Modulation limiting test methodology

Modulation limiting is the ability of a transmitter circuit to limit the transmitter from producing deviations in excess of a rated system deviation.

a) Connect the equipment as illustrated in Figure.
b) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
c) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤0.25 Hz to ≥15000 Hz. Turn the de-emphasis function off.
d) 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. This is the 0 dB reference level.
e) Increase the level from the audio generator by 20 dB in 5 dB increments recording the deviation as measured from the test receiver in each step. Verify that the audio level used to make the OBW measurement is included in the sweep.
f) Repeat for step e) at 300 Hz, 2500 Hz and 3000 Hz at a minimum using the 0 dB reference level obtained in step d).
g) Set the test receiver to measure peak negative deviation and repeat step d) through step f).
h) The values recorded in step f) and step g) are the modulation limiting.
i) Plot the data set as a percentage of deviation relative to the 0 dB reference point versus input voltage.

According to ANSI C63.26-2015 Section 5.3.3:

Audio frequency response test methodology—Constant Input

a) Connect the equipment as illustrated in Figure.
b) 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.
c) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
d) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
e) Set the test receiver to measure rms deviation and record the deviation reading as DEVREF.
f) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.

4.2.4 Test Data And Result

Serial Number:	2TXQ-2	Test Date:	2024/12/18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jojo Zhou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	22.1	Relative Humidity: (%)	31	ATM Pressure: (kPa)	102.3

Test Equipment List and Details:

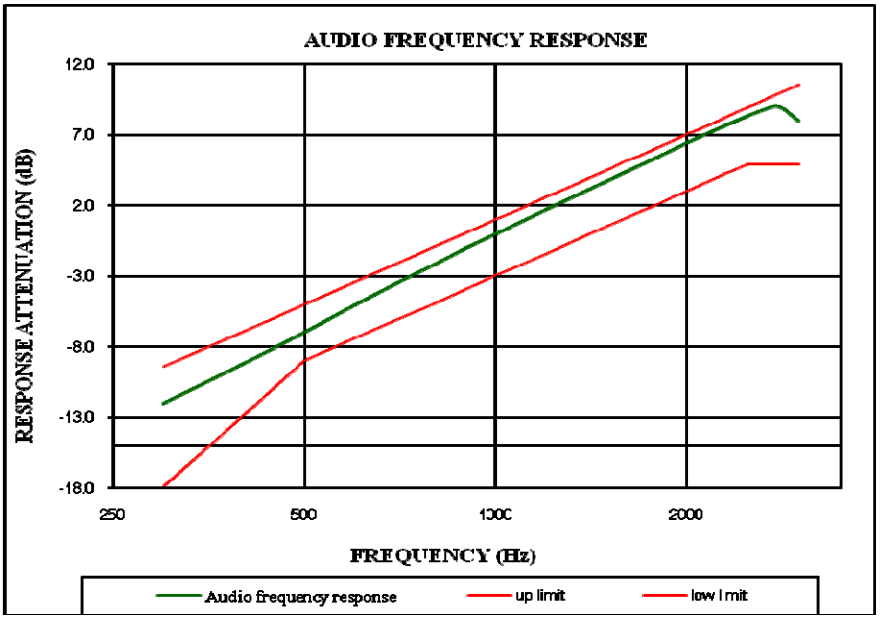
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-03	2024/8/23	2025/8/22
Huaxiang	Coaxial Attenuator	DTS250-30	11022109	2024/6/7	2025/6/6
HP	RF Communications Test Set	8920A	3438A05201	2024/10/17	2025/10/16
R&S	Audio Analyzer	UPV	103447	2024/11/25	2025/11/24

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

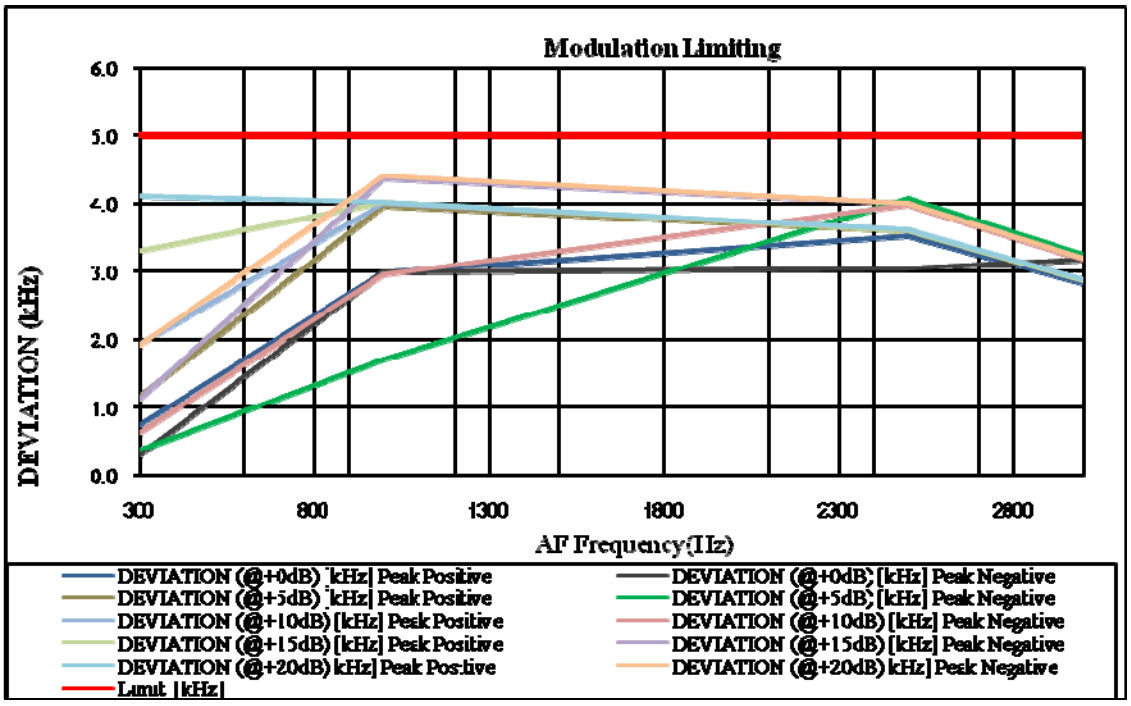
Audio Frequency Response

Channel Spacing: 25kHz		**Carrier Frequency: 156.800 MHz**
Modulation Frequency (Hz)	**Response data (dB)**	
300	-11.99	
400	-9.25	
500	-6.96	
600	-5.07	
700	-3.50	
800	-2.19	
900	-1.05	
1000	0.00	
1200	1.67	
1400	3.09	
1600	4.33	
1800	5.43	
2000	6.41	
2200	7.27	
2400	8.00	
2600	8.64	
2800	9.00	
3000	7.99	



Modulation Limiting

Carrier Frequency: 156.800 MHz, Channel Spacing:25kHz											
Audio Frequency (Hz)	DEVIATION (@+0dB)		DEVIATION (@+5dB)		DEVIATION (@+10dB)		DEVIATION (@+15dB)		DEVIATION (@+20dB)		Limit [kHz]
	[kHz]		[kHz]		[kHz]		[kHz]		kHz]		
	Peak Positive	Peak Negative	Peak Positive	Peak Negative	Peak Positive	Peak Negative	Peak Positive	Peak Negative	Peak Positive	Peak Negative	
300	0.733	0.294	1.170	0.376	1.939	0.628	3.302	1.123	4.121	1.906	5.000
1000	3.000	3.000	3.975	1.715	4.004	2.965	4.014	4.364	4.015	4.397	5.000
2500	3.527	3.048	3.592	4.069	3.619	3.982	3.601	4.005	3.610	4.003	5.000
3000	2.838	3.184	2.861	3.252	2.865	3.176	2.876	3.197	2.886	3.194	5.000



4.3 Transmitter power

4.3.1 Applicable Standard

FCC §80.215

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms:

(1) For single sideband emission: Peak evelope power
(2) For G3E emission: Carrier power;
(3) For PON and F3N emission: Mean power;
(4) For all emissions in the 1626.5-1646.5 MHz band: equivalent isotropic radiated power.
(5) For all other emissions: the carrier power multiplied by 1.67.

(e) Ship stations frequencies above 27500 kHz. The maximum power must not exceed the values listed below.

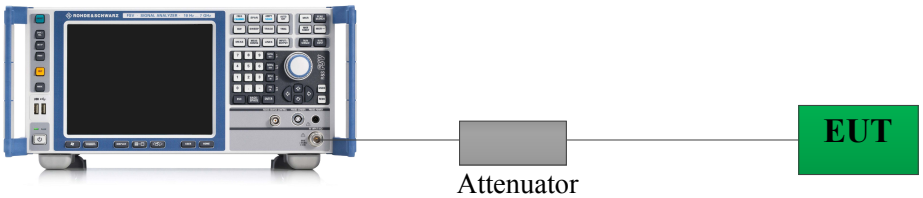
(1) Ship stations 156-162 MHz - 25W[6]

[6]Reducible to 1 watt or less, except for transmitters limited to public correspondence channels and used in an automated system.

(g) The carrier power of ship station radiotelephone transmitters, except portable transmitters, operating in the 156-162 MHz band must be at least 8 but not more than 25 watts. Transmitters that use 12 volt lead acid storage batteries as a primary power source must be measured with a primary voltage between 12.2 and 13.7 volts DC. Additionally, unless otherwise indicated, equipment in radiotelephone ship stations operating in the 156-162 MHz band must meet the following requirements:

(1) All transmitters and remote control units must be capable of reducing the carrier power to one watt or less;
(2) Except as indicated in (g)(4) of this section, all transmitters manufactured after January 21, 1987, or in use after January 21, 1997, must automatically reduce the carrier power to one watt or less when the transmitter is tuned to 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650 MHz;
(3) [Reserved]
(4) Hand-held portable transmitters are not required to comply with the automatic reduction of carrier power in (g)(2) of this section; and
(5) Transmitters dedicated for use on public correspondence duplex channels as additional equipment to a VHF ship station in the Great Lakes which meet all pertinent rules in this part are not required to reduce their carrier power to one watt.

4.3.2 Block Diagram of Test Setup



Note: The Insertion loss of the RF cable, Attenuators was offset into the Spectrum Analyzer.

4.3.3 Test Procedure

C63.26-2015, Clause 5.2.3.3

This procedure can be used to measure the peak power in either a CW-like or noise-like narrowband RF signal. The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.
a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 × OBW.
d) Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the peak amplitude level

4.3.4 Test Data And Result

Serial Number:	2TXQ-2, 2TXQ-3	Test Date:	2024/11/29
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jojo Zhou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	23.1	Relative Humidity: (%)	31	ATM Pressure: (kPa)	102.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101947	2024/9/5	2025/9/4
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-03	2024/8/23	2025/8/22
Huaxiang	Coaxial Attenuator	DTS250-30	11022109	2024/6/7	2025/6/6
HP	RF Communications Test Set	8920A	3438A05201	2024/10/17	2025/10/16

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

RS-509MG

Test Frequency (MHz)	High Power Level		Low Power Level	
	Conducted Output Power (dBm)	Limit (dBm)	Conducted Output Power (dBm)	Limit (dBm)
156.050	43.70	43.98	29.30	30.00
156.800	43.71	43.98	29.28	30.00
157.425	43.72	43.98	29.27	30.00
156.375	/	43.98	29.27	30.00
156.575	/	43.98	29.22	30.00
156.875	/	43.98	29.21	30.00
156.525 (DSC B1300)	43.63	43.98	29.23	30.00
156.525 (DSC Y2100)	43.63	43.98	29.23	30.00

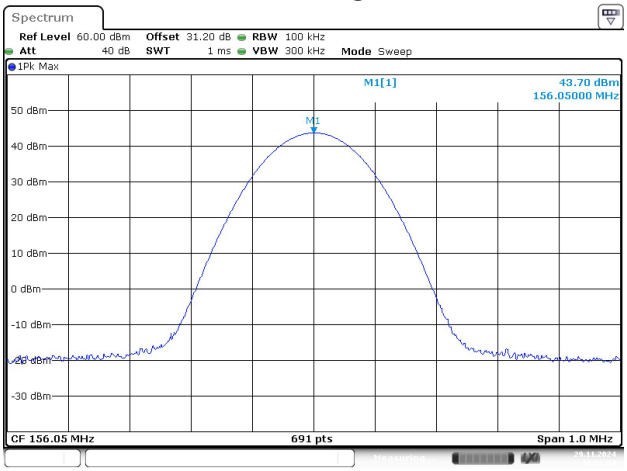
RS-509M

Test Frequency (MHz)	High Power Level		Low Power Level	
	Conducted Output Power (dBm)	Limit (dBm)	Conducted Output Power (dBm)	Limit (dBm)
156.050	43.68	43.98	28.86	30.00
156.800	43.67	43.98	28.87	30.00
157.425	43.66	43.98	28.88	30.00
156.375	/	43.98	28.85	30.00
156.575	/	43.98	28.87	30.00
156.875	/	43.98	28.88	30.00
156.525 (DSC B1300)	43.67	43.98	28.96	30.00
156.525 (DSC Y2100)	43.68	43.98	28.95	30.00

Note: Per the test data above, the two model have identical power level. Therefore, other RF Conducted test only performed with model: RS-509MG.

Model: RS-509MG

156.050 MHz High Power



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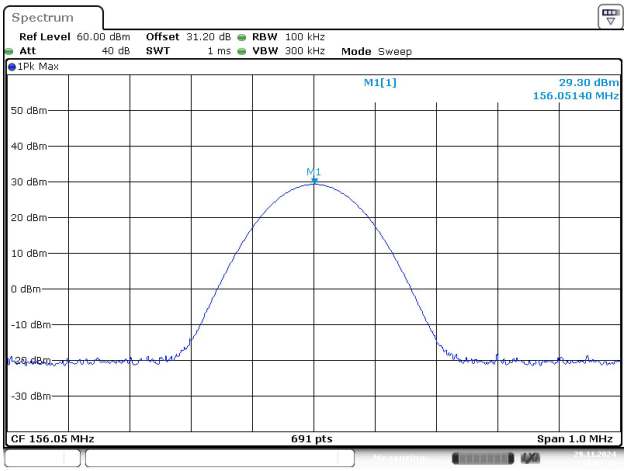
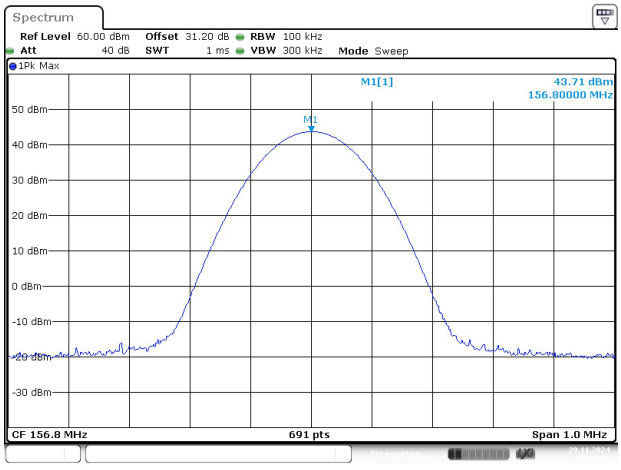
Date: 29.NOV.2024 10:00:04

156.050 MHz Low Power



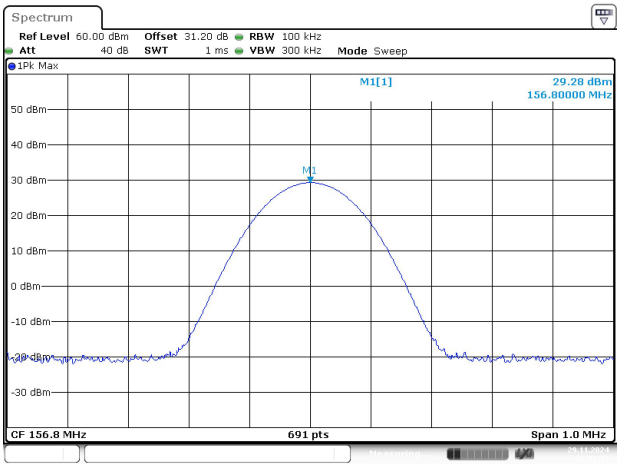
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:01:10

156.800 MHz High Power



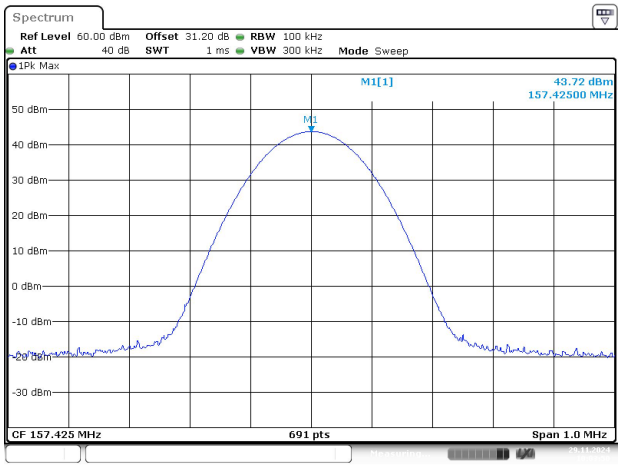
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:02:02

156.800 MHz Low Power



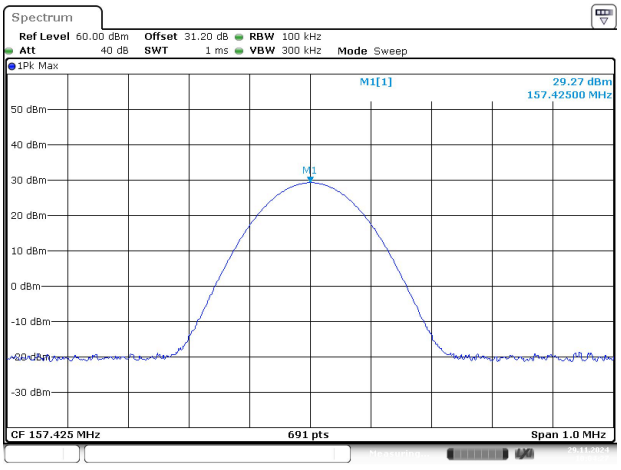
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:02:35

157.425 MHz High Power



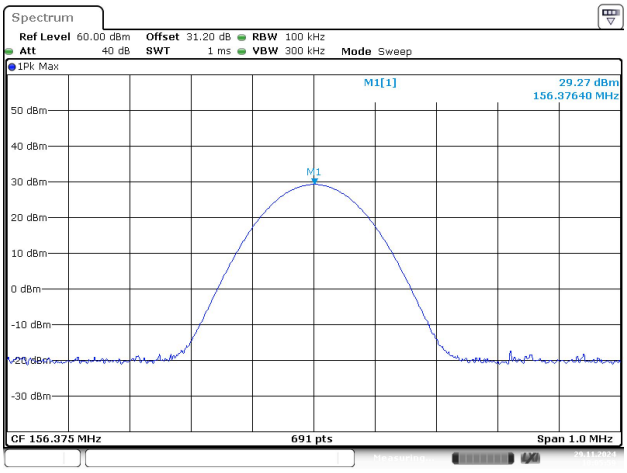
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:03:50

157.425 MHz Low Power



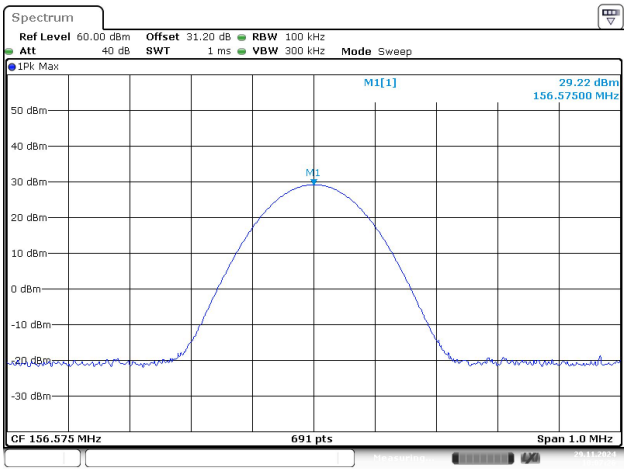
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:04:27

156.375 MHz Low Power



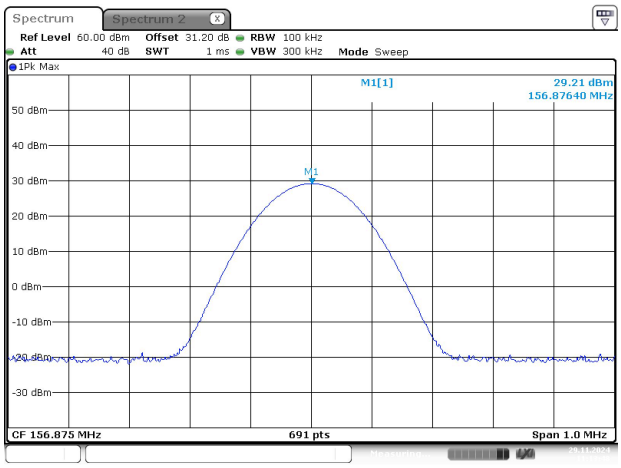
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:05:59

156.575 MHz Low Power



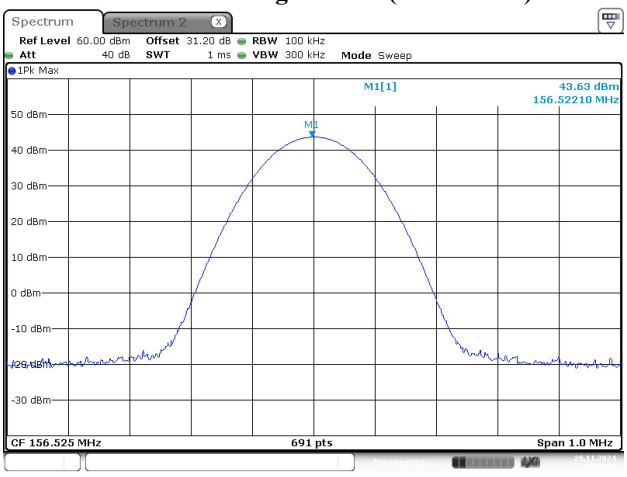
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:07:26

156.875 MHz Low Power



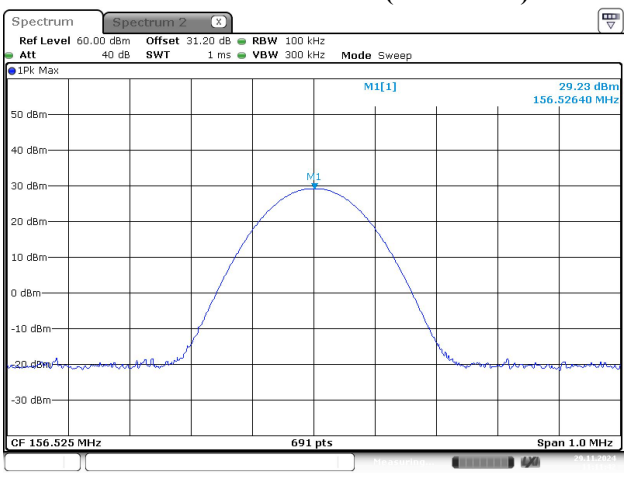
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:13:48

156.525 MHz High Power-(DSC B1300)



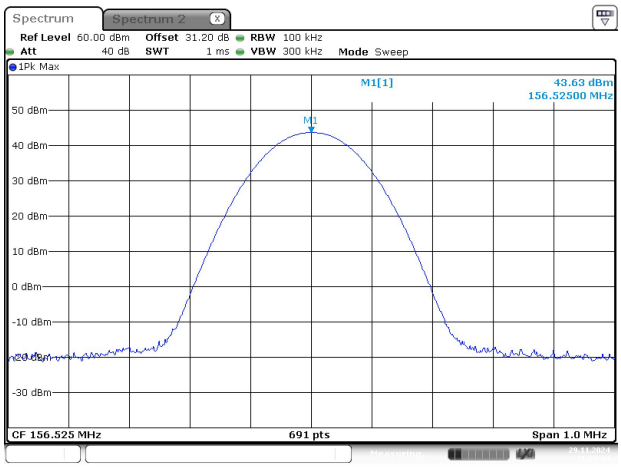
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:09:00

156.575 MHz Low Power-(DSC B1300)



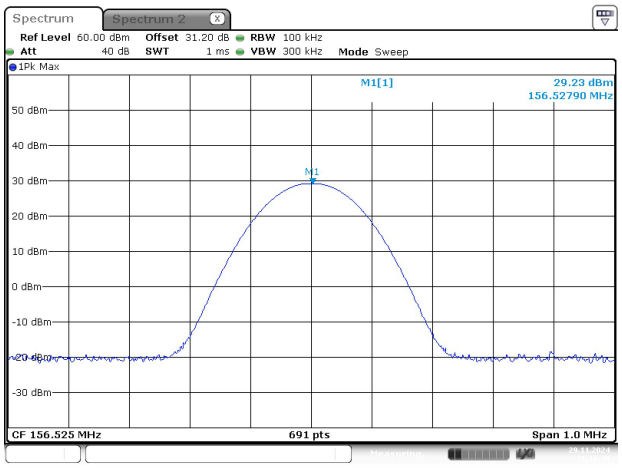
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:11:42

156.525 MHz High Power-(DSC Y2100)



ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:09:34

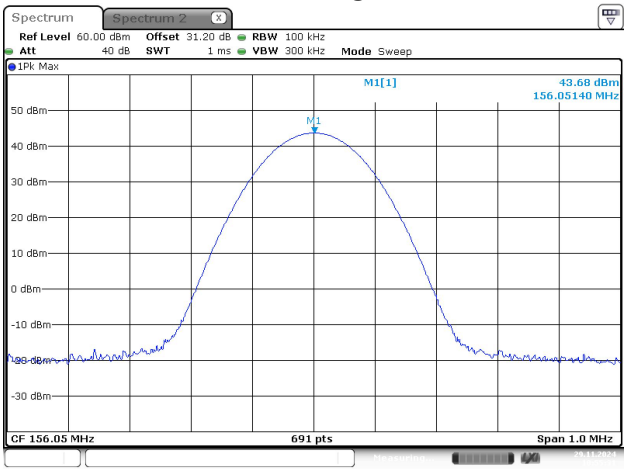
156.525 MHz Low Power-(DSC Y2100)



ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:10:49

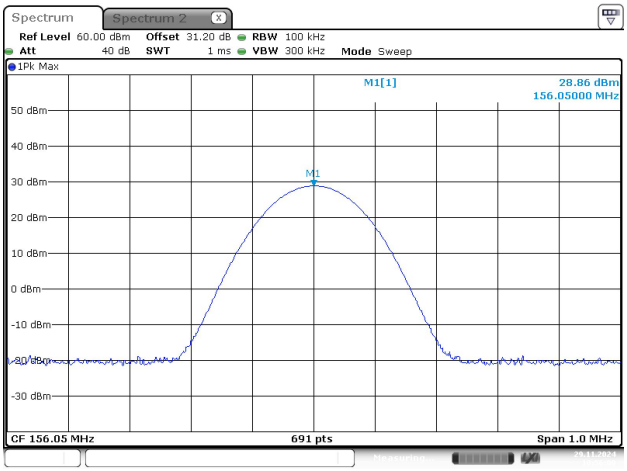
RS-509M

156.050 MHz High Power



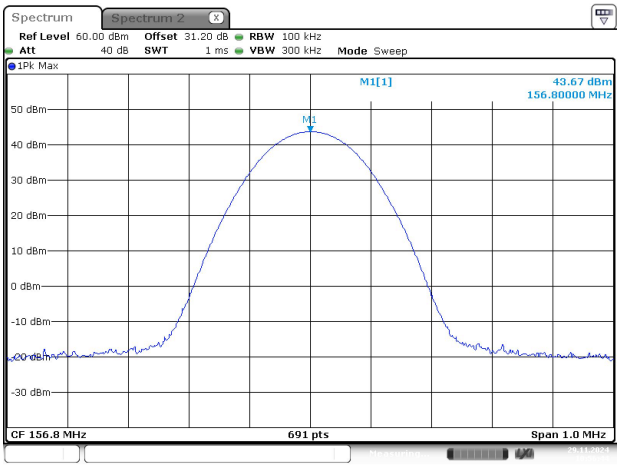
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:55:31

156.050 MHz Low Power



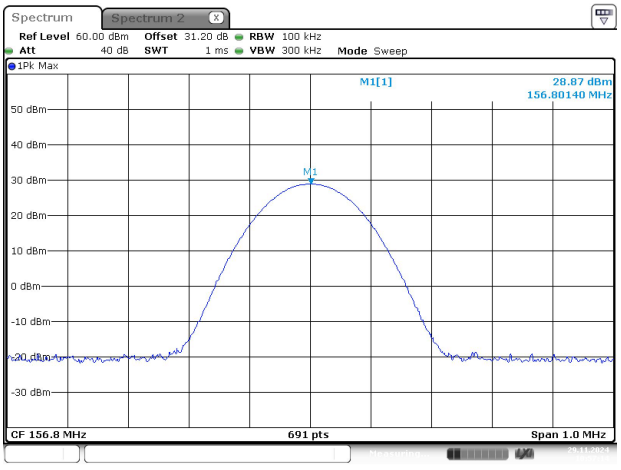
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:56:00

156.800 MHz High Power



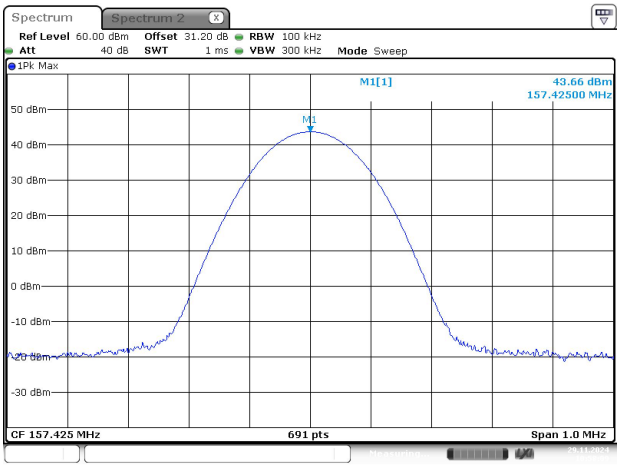
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:56:44

156.800 MHz Low Power



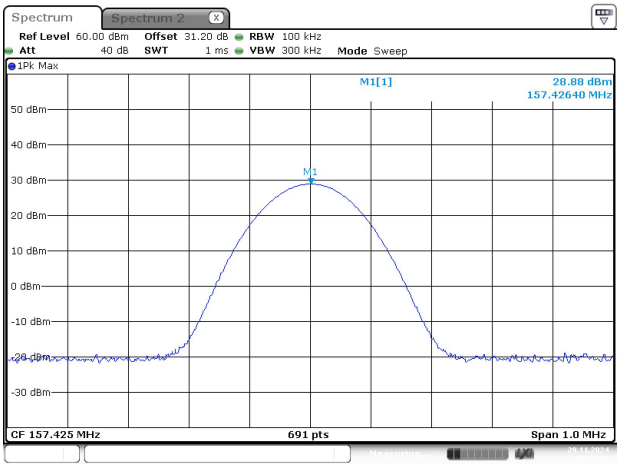
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:57:14

157.425 MHz High Power



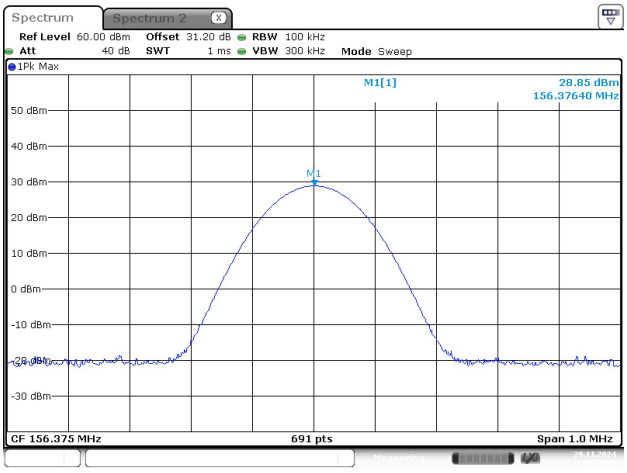
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:58:09

157.425 MHz Low Power



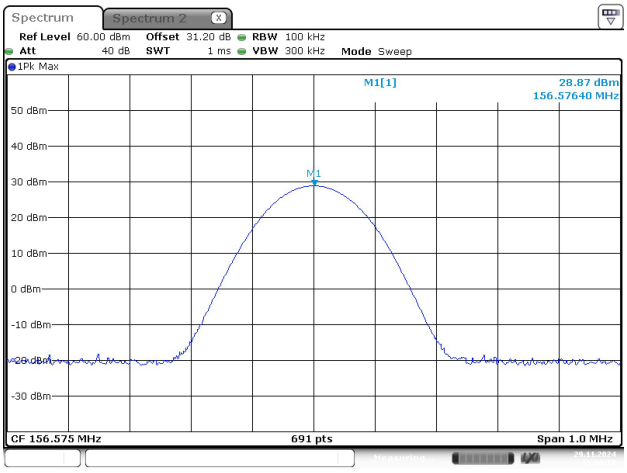
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:58:38

156.375 MHz Low Power



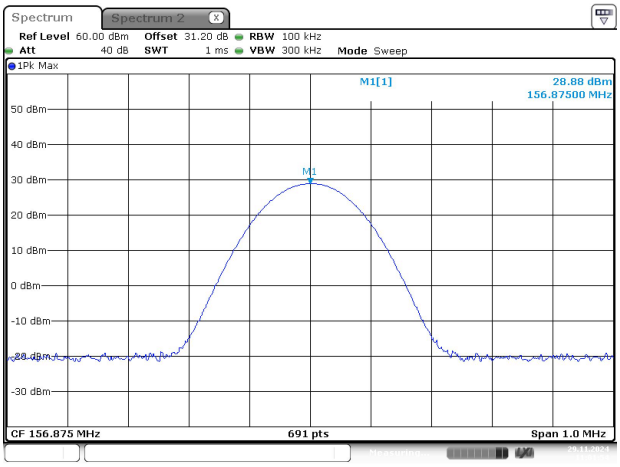
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:59:30

156.575 MHz Low Power



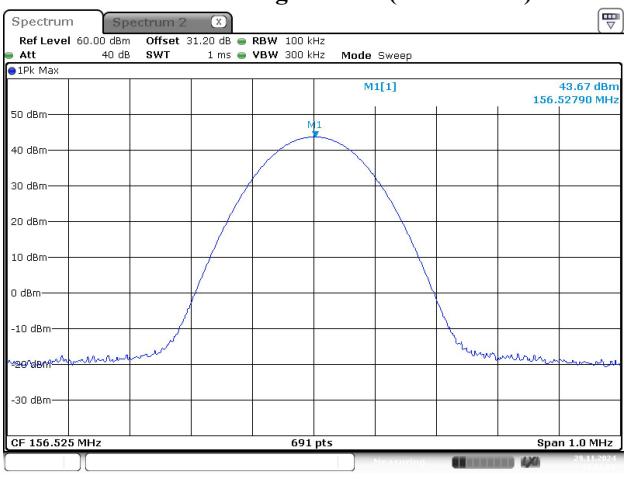
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:00:18

156.875 MHz Low Power



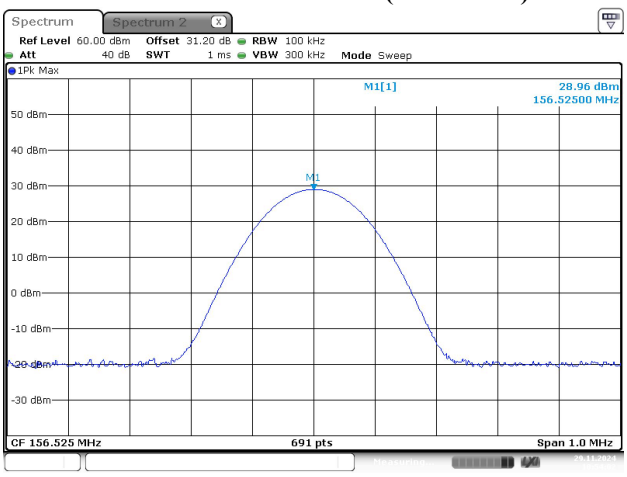
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 11:01:54

156.525 MHz High Power-(DSC B1300)



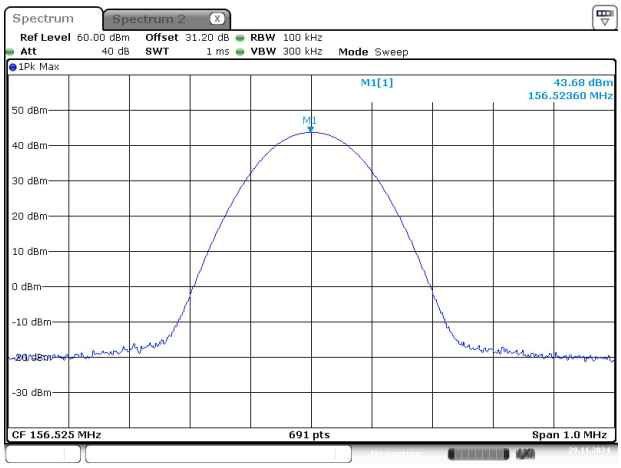
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:51:58

156.575 MHz Low Power-(DSC B1300)



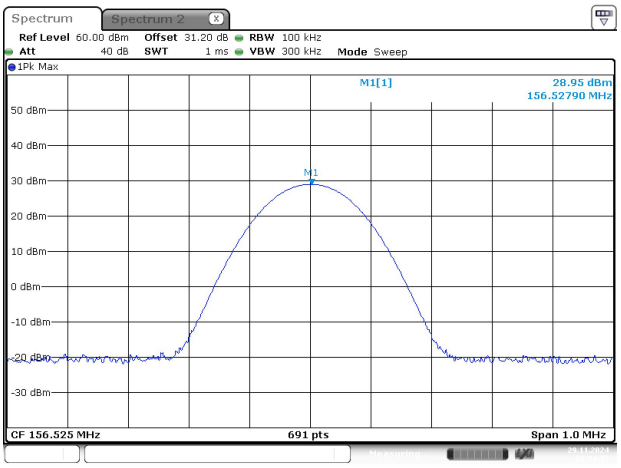
ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:54:02

156.525 MHz High Power-(DSC Y2100)



ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:52:35

156.525 MHz Low Power-(DSC Y2100)



ProjectNo.:2402Z38638E-RF Tester:Jojo Zhou
Date: 29.NOV.2024 10:54:34

4.4 Bandwidths and Emission Mask

4.4.1 Applicable Standard

FCC §80.205 Bandwidths

(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 following table gives the class of emission and corresponding emission designator and authorized bandwidth:

Class of emission	Emission designator	Authorized bandwidth (kHz)
G3E[8]	16K0G3E	20.0

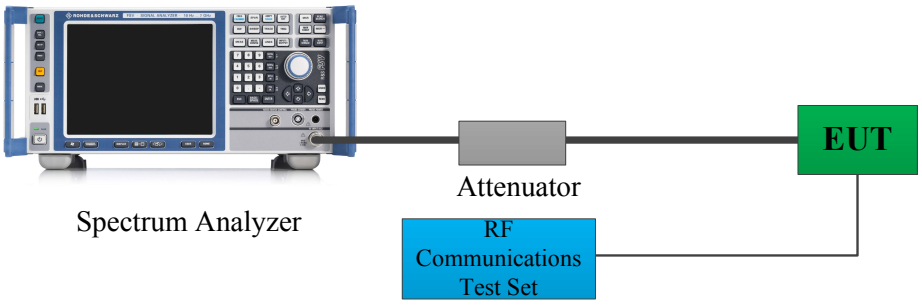
[8] Applicable only when maximum frequency deviation is 5 kHz. See also paragraph (b) of this section.

(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.

FCC §80.211 Emission limitations

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:
(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 10log10 (mean power in watts) dB.

4.4.2 Block Diagram of Test Setup



Note: The Insertion loss of the RF cable, Attenuators was offset into the Spectrum Analyzer.

4.4.3 Test Procedure

According to ANSI C63.26-2015 Section 5.4.4:

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:

a) The spectrum analyzer center frequency is set to 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 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

According to ANSI C63.26-2015 Section 5.7.3:

f) See Annex I for example emission mask plots.

4.4.4 Test Data And Result

Serial Number:	2TXQ-2	Test Date:	2024/11/29-2024/12/18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jojo Zhou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	22.1~23.1	Relative Humidity: (%)	31	ATM Pressure: (kPa)	102.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101947	2024/9/5	2025/9/4
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-03	2024/8/23	2025/8/22
Huaxiang	Coaxial Attenuator	DTS250-30	11022109	2024/6/7	2025/6/6
HP	RF Communications Test Set	8920A	3438A05201	2024/10/17	2025/10/16

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Frequency (MHz)	Occupied Bandwidth		
	High Power Level (kHz)	Low Power Level (kHz)	Limit (kHz)
156.050	10.564	10.564	20.0
156.800	10.564	10.564	20.0
157.425	10.564	10.564	20.0
156.375	/	10.564	20.0
156.575	/	10.564	20.0
156.875	/	10.564	20.0
156.525 (DSC B1300)	6.512	6.512	20.0
156.525 (DSC Y2100)	8.828	8.828	20.0