IEC 62238:2003

TEST REPORT

For

FURUNO ELECTRIC CO.,LTD.

9-52 Ashihara-Cho, Nishinomiya City, Japan

Test Model: FM-4850

Report Type:	**Product Type:**
Original Report	MARINE VHF RADIOTELEPHONE

Report Number:	2502Q00951E-01C
Report Date:	2025/7/24
Reviewed By:	Levi Shi Project Engineer
Approved By:	Gavin Xu RF Supervisor
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan) (No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China) Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2502Q00951E-01C	Original Report	2025/7/24

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	MARINE VHF RADIOTELEPHONE
EUT Model:	FM-4850
Rated Input Voltage:	DC 12V
Serial Number:	2YLM-1
EUT Received Date:	2025/2/19
EUT Received Status:	Good

Technical Specification

Operation Frequency(MHz):	VHF: 156.05-157.425 DSC: 156.525
Rated RF Output Power (Conducted) (W):	High power level: 25 Low power level: 1
Modulation Type:	VHF: FM DSC: FSK
Channel Spacing (kHz):	25

Objective

This report is prepared on behalf of ***FURUNO ELECTRIC CO.,LTD*** in accordance with IEC 62238:2003 Maritime navigation and radiocommunication equipment and systems - VHF radiotelephone equipment incorporating Class "D" Digital Selective Calling (DSC) - Methods of testing and required test results

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the IEC 62238 First edition 2003-03, Maritime navigation and radiocommunication equipment and systems-VHF radiotelephone equipment incorporating Class “D” Digital Selective Calling (DSC)-Methods of testing and required test results.

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.

Measurement Uncertainty

Parameter	F_{lab}	Maximum allow uncertainty
Radio Frequency (RF)	$\pm 0.082 \times 10^{-6}$	$\pm 1 \times 10^{-7}$
RF power/level	±0.61dB	±0,75 dB
Maximum frequency deviation: - within 300 Hz to 6 kHz of modulation frequency - within 6 kHz to 25 kHz of modulation frequency	 ±4.57 % ±0.53 dB	 ±5 % ±3 dB
Deviation limitation	±3.25 %	±5 %
Adjacent channel power	±0.93 dB	±5 dB
Conducted spurious emission of transmitter	±2.47dB	±4 dB
Radiated spurious emission of transmitter	±3.62dB	±6 dB
Audio output power	±0,38 dB	±0,5 dB
Amplitude characteristics of receiver limiter	±1,14 dB	±1,5 dB
Sensitivity at 20 dB SINAD	±2.27 dB	±3 dB
Conducted emission of receiver	±2.47dB	±3 dB
Two-signal measurement	±3.10dB	±4 dB
Three-signal measurement	±1.20dB	±3 dB
Transmitter transient time	13.90%	±20 %
Transmitter transient frequency	±161Hz	±250 Hz

Note: 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.

Declarations

The information marked ▲ is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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Each test item follows test standards and with no deviation.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The frequencies were configured for testing in engineering mode, which was provided by manufacturer.

The extreme temperature test conditions and the normal conditions are as below which was declared by manufacturer:

NT: Normal Temperature 25℃, NV: Normal Voltage 12Vdc
LT: Low Temperature -15℃, LV: Low Voltage 10.8Vdc
HT: High Temperature +55℃, HV: High Voltage 15.6Vdc

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

Software "DscAtisTool V1.03" was used for testing.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
BEW	Terminal	TF300-6-B	H5FK-510
TDK-Lambda	DC Power Supply	Z+60-14	F-08-EM038-1

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Coaxial Cable	Yes	No	2	Terminal	EUT
MIC 1 Cable	Yes	No	2	MIC	EUT

Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated emissions below 1GHz					
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2026/9/5
Narda	Coaxial Attenuator	779-6dB	04269	2023/9/6	2026/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2024/7/1	2025/6/30
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2024/7/1	2025/6/30
Sonoma	Amplifier	310N	185914	2024/8/26	2025/8/25
R&S	EMI Test Receiver	ESCI	100224	2024/8/26	2025/8/25
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Micro-Coax	Coaxial Cable	UFA210B	99G1448	2024/9/5	2025/9/4
Agilent	Signal Generator	E8247C	MY43321350	2024/9/5	2025/9/4
Feierte	Band Rejection Filter	BSF-136-174MHz-N	F-08-EM530	2024/11/2	2025/11/1
Radiated emissions above 1GHz					
AH	Horn Antenna	SAS-571	1177	2023/2/22	2026/2/21
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2026/9/6
HUBER+SUHNER	Coaxial Cable	SUCOFLEX 126EA	MY369/26/26EA	2024/7/1	2025/6/30
Micro-Coax	Coaxial Cable	UFA210B	99G1448	2024/9/5	2025/9/4
Mini-Circuits	Preamplifier	ZVZ-183-S+	5696001267	2025/2/14	2026/2/13
R&S	Spectrum Analyzer	FSP 38	100478	2024/9/5	2025/9/4
Agilent	Signal Generator	E8247C	MY43321350	2024/9/5	2025/9/4
Mini-Circuits	High Pass Filter	VHF-650+	31052	2024/8/1	2025/7/31
RF Conducted					
R&S	Signal Analyzer	FSIQ26	831929/005	2024/11/17	2025/11/16
R&S	Spectrum Analyzer	FSU 26	200160/026	2024/9/5	2025/9/4
Micro-Coax	Coaxial Cable	UFB205A	323308-024	2024/6/1	2025/5/31
Micro-Coax	Coaxial Cable	UFB205A	323308-015	2024/6/1	2025/5/31
Micro-Coax	Coaxial Cable	UFB205A	323308-018	2024/6/1	2025/5/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-03	2024/8/23	2025/8/22
Unknown	Coaxial Cable	C-NJNJ-50	4221000000500(DS)	2024/6/1	2025/5/31
Weinschel	Coaxial Attenuator	53-20-34	LN749	2024/6/7	2025/6/6
Huaxiang	Coaxial Attenuator	DTS250-30	11022109	2024/6/7	2025/6/6
Mini-Circuits	Coaxial Power Splitters & Combiner	ZFRSC-183-S+	SF448201614	2025/2/25	2026/2/24
HP	RF Communications Test Set	8920A	3438A05201	2025/2/14	2026/2/13
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
Agilent	Signal Generator	E8247C	MY43321350	2024/9/5	2025/9/4
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2024/8/26	2025/8/25
Agilent	MXG Vector Signal Generator	N5182A	MY49060274	2024/9/5	2025/9/4
Feierte	Band Rejection Filter	BSF-136-174MHz-N	F-08-EM530	2024/11/2	2025/11/1

* 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).

Environmental Conditions

Test Item:	Radiated emissions below 1GHz	Radiated emissions above 1GHz	RF Conducted
Temperature:	23.2 ℃	25.0 ℃	23.7~24.3℃
Relative Humidity:	59.0 %	63.0 %	57~61%
ATM Pressure:	101.1 kPa	100.7 kPa	100.9~101.1kPa
Tester:	Leesin Xiang	Jayce Wang	Stu Song
Test Date:	2025/3/11	2025/3/14	2025/3/11~2025/3/12

SUMMARY OF TEST RESULTS

S/N	Clause	Description of Test	Result
1	§4	General and operational requirements	Compliance*
2	§5	General technical requirements	Compliance*
3	§7.4	Vibration Test	Compliance
4	§7.5	Temperature Tests	Compliance
5	§8.1	Transmitter frequency error	Compliance
6	§8.2	Transmitter carrier power	Compliance
7	§8.3	Transmitter frequency deviation	Compliance
8	§8.4	Sensitivity of the modulator, including microphone	Compliance
9	§8.5	Audio frequency response	Compliance
10	§8.6	Audio frequency harmonic distortion of the emission	Compliance
11	§8.7	Transmitter adjacent channel power	Compliance
12	§8.8	Transmitter conducted spurious emissions conveyed to the antenna	Compliance
13	§8.9	Transient frequency behaviour of the transmitter	Compliance
14	§8.10	Residual modulation of the transmitter	Compliance
15	§8.11	Frequency error (demodulated DSC signal)	Compliance
16	§8.12	Modulation index for DSC	Compliance
17	§8.13	Modulation rate for DSC	Compliance
18	§8.14	Test of Gennerated Call Sequences	Compliance
19	§9.1	Harmonic distortion and rated audio-frequency output power	Compliance
20	§9.2	Receiver audio frequency response	Compliance
21	§9.3	Receiver maximum useable sensitivity	Compliance
22	§9.4	Receiver co-channel rejection	Compliance
23	§9.5	Receiver adjacent channel selectivity	Compliance
24	§9.6	Receiver spurious response rejection	Compliance
25	§9.7	Receiver inter-modulation response	Compliance
26	§9.8	Receiver blocking or desensitization	Compliance
27	§9.9 & §10.7	Receiver spurious emissions at the antenna; DSC receiver spurious emissions;	Compliance
28	§9.10	Receiver residual noise level	Compliance
29	§9.11	Squelch operation	Compliance
30	§9.12	Squelch hysteresis	Compliance
31	§9.13	Multiple watch characteristic	Compliance
32	§10.1	DSC receiver maximum useable sensitivity	Compliance
33	§10.2	DSC receiver co-channel rejection	Compliance
34	§10.3	DSC receiver Adjacent channel selectivity	Compliance
35	§10.4	DSC receiver spurious response and blocking immunity	Compliance
36	§10.5	DSC receiver Inter-modulation response	Compliance
37	§10.6	DSC receiver Dynamic range	Compliance
38	§10.8	Verification of Correct Decoding of Various Types of DSC Calls	Compliance
39	§10.9	Reaction to VTS and AIS Channel Management DSC Transmissions	Compliance
40	§10.10	DSC receiver simultaneous reception	Compliance
41	§11	Electromagnetic compatibility	Compliance***
42	Annex D	Recommended standards for equipment operating in high level electromagnetic environments	Compliance

Note:
Compliance*: Please refer to the declaration letter which is provided by the manufacturer.
Compliance***: Test results please refer to the Report NO.: 2502Q00951E-01A.

3 - VIBRATION TEST

Applicable Standard

According to IEC 62238 §7.4.

Method of Measurement

According to IEC 62238 §7.4.

Requirement

According to IEC 62238 §7.4.

Test Result

Please refer to following table:

	Test Level	Test Voltage (VDC)	Performance Check
Vibration Test	2Hz to 5Hz and up to 13.2Hz with and excursion of ±1mm ± 10%	12	Compliance
	($7m/s^2$ maximum acceleration at 13.2Hz)		
	Above 13,2 Hz and up to 100 Hz with a constant maximum acceleration of 7 m/s^2	12	Compliance
	Note: Endurance Test for 2 hour sat each resonant frequency or frequency with a g level ⩾ 5 times the drive g level. If no resonant frequencies or frequency with a g level ⩾ 5 times the drive g level are found endurance test shall be performed at 30Hz.		

Test Result: Compliance

4 - TEMPERATURE TESTS

Applicable Standard

According to IEC 62238 §7.5.

Method of Measurement

According to IEC 62238 §7.5.

Requirement

According to IEC 62238 §7.5.

Test Result

Please refer to following table:

	Temperature Condition		Period (Hour)	Performance Check
Storage Test	Dry Heat	70 °C ± 3 °C	15	Compliance
	Low Temperature	–30 °C ± 3 °C	15	Compliance

	Environment Condition		Relative Humidity	Period (Hour)	Test Voltage (V_{DC})	Performance Check
Functional Test	Dry Heat	55 °C ± 3 °C	/	15	10.8	Compliance
				15	12	Compliance
				15	15.6	Compliance
	Damp Heat	40 °C ± 2 °C	93 % ± 1 %	15	10.8	Compliance
				15	12	Compliance
				15	15.6	Compliance

Test Result: Compliance

5 - TRANSMITTER FREQUENCY ERROR

Applicable Standard

The frequency error is the difference between the measured carrier frequency and its nominal value.

Limit

The frequency error shall be within ±1,5 kHz.

Method of Measurement

The carrier frequency shall be measured in the absence of modulation, with the transmitter connected to an artificial antenna (see 6.4) and tuned to channel 16.

Measurements shall be made under normal test conditions (see 6.12) and under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

This test shall be carried out with the output power switch being set at both maximum and minimum.

Test Data

Please refer to following table:

Frequency (MHz)	Power Level	Test Condition	Reading (MHz)	Frequency Error (kHz)	Limit (kHz)
156.8	Maximum	NTNV	156.8000	0.0	±1.5
		LTLV	156.8001	0.1	
		LTHV	156.8001	0.1	
		HTLV	156.8000	0.0	
		HTHV	156.8000	0.0	
156.8	Minimum	NTNV	156.8000	0.0	±1.5
		LTLV	156.8001	0.1	
		LTHV	156.8001	0.1	
		HTLV	156.8000	0.0	
		HTHV	156.8000	0.0	

Test Result: Compliance

6 - TRANSMITTER CARRIER POWER

Applicable Standard

The carrier power is the mean power delivered to the artificial antenna during one radio frequency cycle in the absence of modulation.

The rated output power is the carrier power declared by the manufacturer.

Limit

Normal test conditions

With the output power switch set at maximum, the carrier power shall remain between 6 W and 25 W and be within ±1,5 dB of the rated output power under normal test conditions. The output power shall never, however, exceed 25 W.

With the output power switch set at minimum, the carrier power shall remain between 0,1 W and 1 W.

Extreme test conditions

With the output power switch set at maximum, the carrier power shall remain between 6 W and 25 W and be within +2 dB, –3 dB of the rated output power under extreme conditions.
The output power shall never however exceed 25 W.

With the output power switch set at minimum, the carrier power shall remain between 0,1 W and 1 W.

Method of Measurement

The transmitter shall be connected to an artificial antenna (see 6.4) and the power delivered to this artificial antenna shall be measured. The measurements shall be made on channel 16, the highest frequency channel and the lowest frequency channel under normal test conditions (see 6.12) and channel 16 under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

During the test on channel 16, a check should be made that the power output falls to zero after 5 min and before 6 min of continuous transmission.

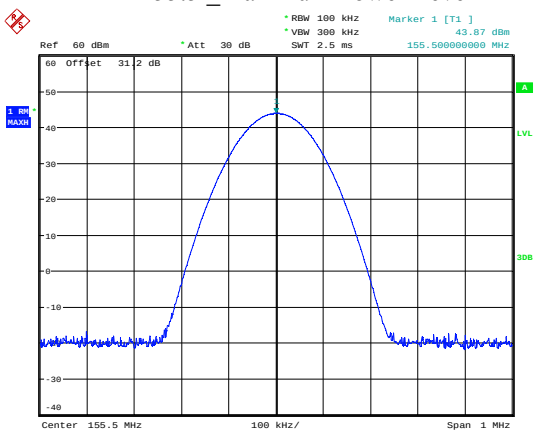
Test Data

Please refer to following table:

Carrier Frequency (MHz)	Test Condition	Maximum continuous transmission time (s)	Limit (s)	Maximum Power Level			Minimum Power Level	
				Reading (dBm)	Limit 1 (dBm)	Limit 2 (dBm)	Reading (dBm)	Limit 3 (dBm)
156.8	NTNV	301.306	300~360	43.74	43.98+/-1.5	37.78~43.98	29.59	20~30
	LT/LV			43.74	43.98+2/-3		29.60	
	LT/HV			43.74			29.60	
	HT/LV			43.73			29.58	
	HT/HV			43.72			29.58	
156.05	NTNV	/		43.93	43.98+/-1.5		29.84	
157.425	NTNV	/		43.94	43.98+/-1.5		29.01	

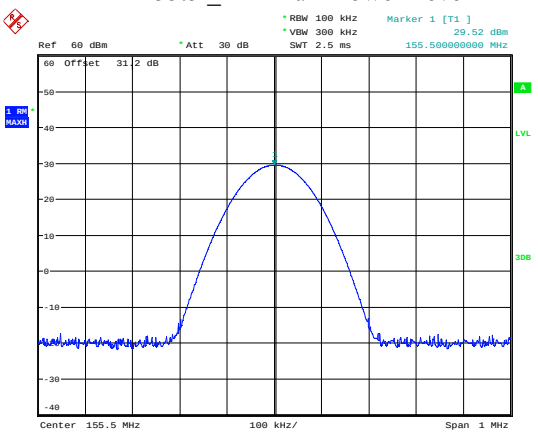
Test Result: Compliance

155.5 _Maximum Power Level



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 10:12:09

155.5 _Minimum Power Level



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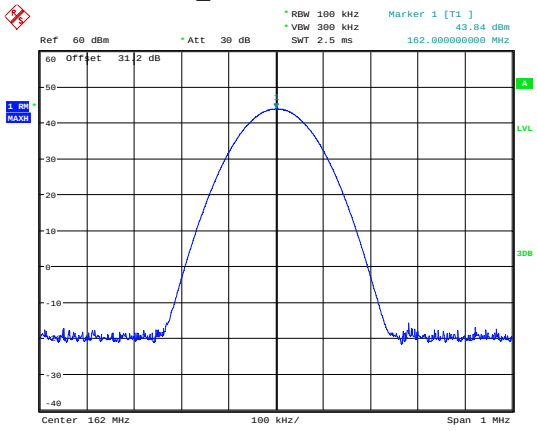
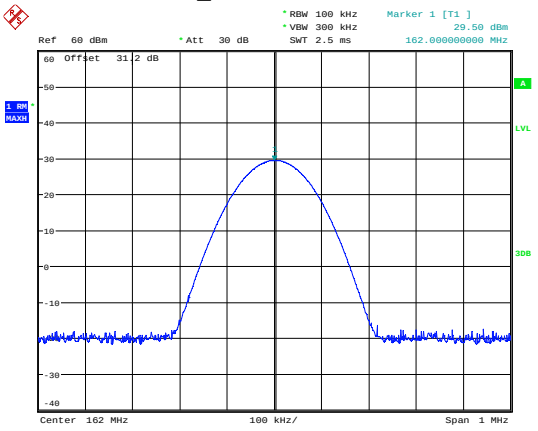
Date: 11.MAR.2025 10:12:50

162 _Maximum Power Level



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 10:16:15

162 _Minimum Power Level



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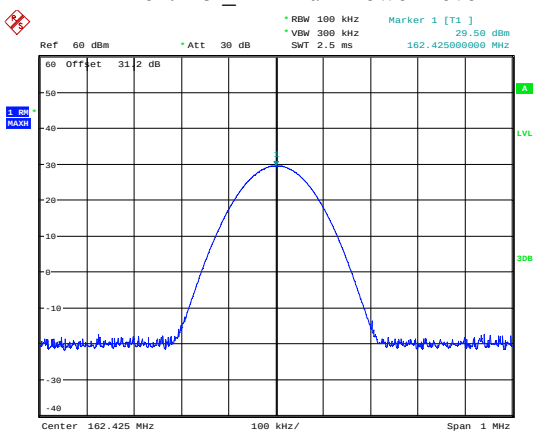
Date: 11.MAR.2025 10:16:49

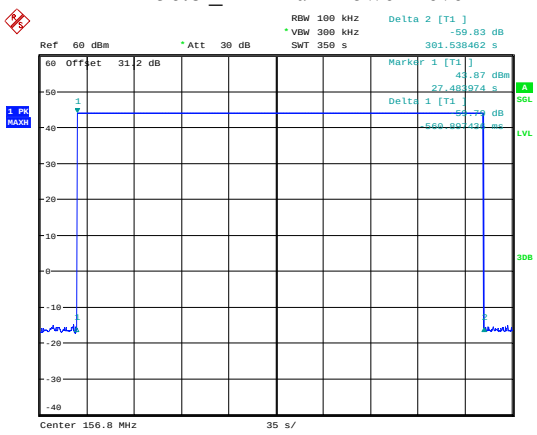
162.425 _Minimum Power Level



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 10:18:32

TOT

156.8 _Minimum Power Level



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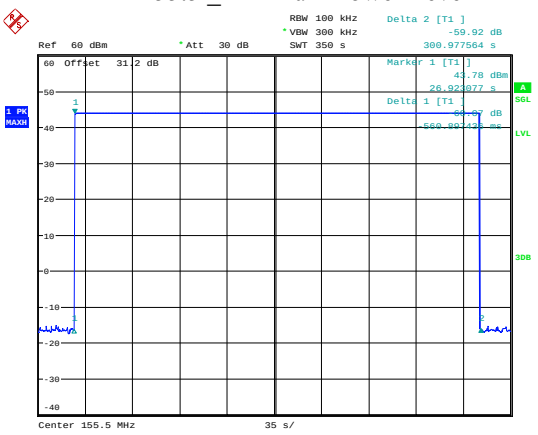
Date: 11.MAR.2025 11:25:58

155.5 _Minimum Power Level



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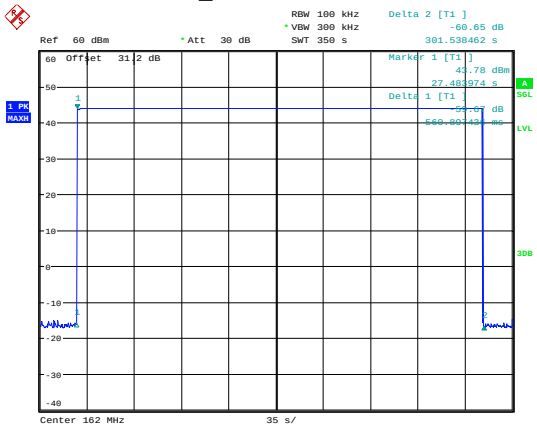
162 _Minimum Power Level



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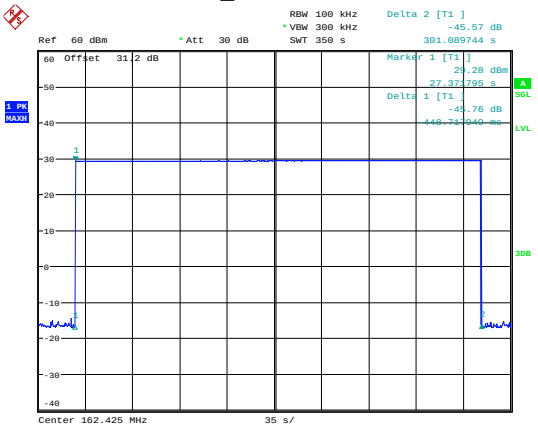
162.425 _Minimum Power Level



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7 - TRANSMITTER FREQUENCY DEVIATION

Applicable Standard

For the purposes of this standard, the frequency deviation is the difference between the instantaneous frequency of the modulated radio frequency signal and the carrier frequency.

Limit

Maximum permissible frequency deviation:

The maximum frequency deviation shall be ±5 kHz.

Reduction of frequency deviation at modulation frequencies above 3 kHz:

For modulation frequencies between 3 kHz and 6 kHz the frequency deviation shall not exceed the frequency deviation with a modulation frequency of 3 kHz. For a modulation frequency of 6 kHz, the frequency deviation shall not exceed ±1,5 kHz, as shown in Figure 1.

For modulation frequencies between 6 kHz and 25 kHz, the frequency deviation shall not exceed that given by a linear response of frequency deviation (in dB) against modulation frequency, starting at the point where the modulation frequency is 6 kHz and the frequency deviation is ±1,5 kHz and inclined at 14 dB/octave, with the frequency deviation diminishing as the modulation frequency increases, as shown in Figure 1 as far as practicable.

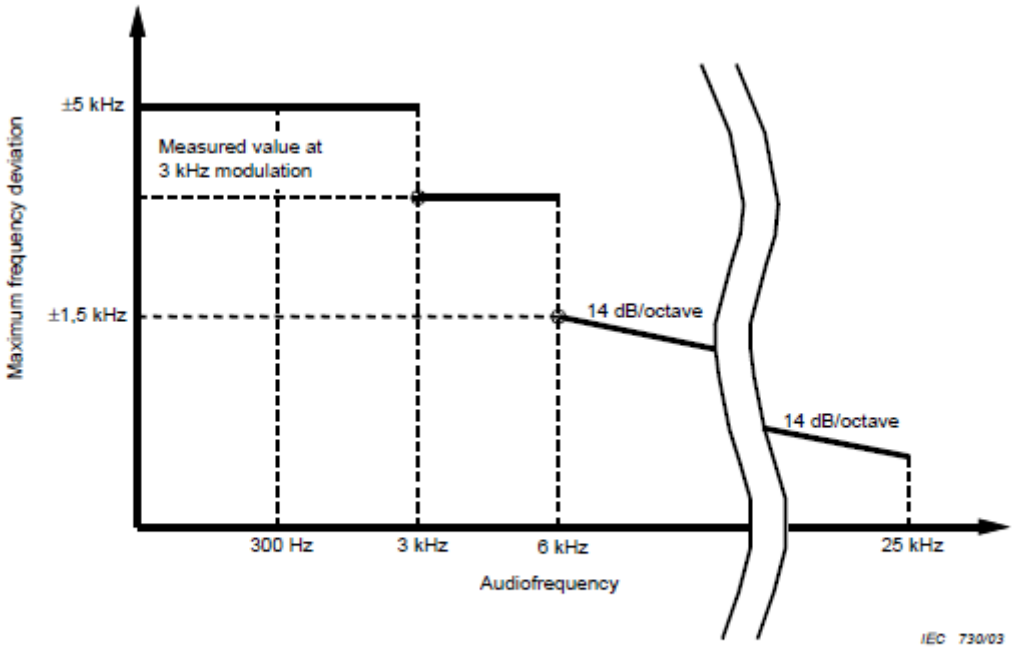


Figure 1 – Frequency deviation

Method of Measurement

Maximum permissible frequency deviation:

The frequency deviation shall be measured at the output with the transmitter connected to an artificial antenna (see 6.4) and tuned to channel 16, by means of a deviation meter capable of measuring the maximum deviation, including that due to any harmonics and intermodulation products which may be generated in the transmitter.

The modulation frequency shall be varied between 100 Hz and 3 kHz. The level of this test signal shall be 20 dB above the level which produces normal test modulation (see 6.3). This test shall be carried out with the output power switch set at both maximum and minimum.

Reduction of frequency deviation at modulation frequencies above 3 kHz:

The transmitter shall operate under normal test conditions (see 6.12) connected to a load as specified in 6.4.

The transmitter shall be modulated by the normal test modulation (see 6.3) and tuned to channel 16. With the input level of the modulation signal being kept constant, the modulation frequency shall be varied between 3 kHz and 25 kHz and the frequency deviation shall be measured.

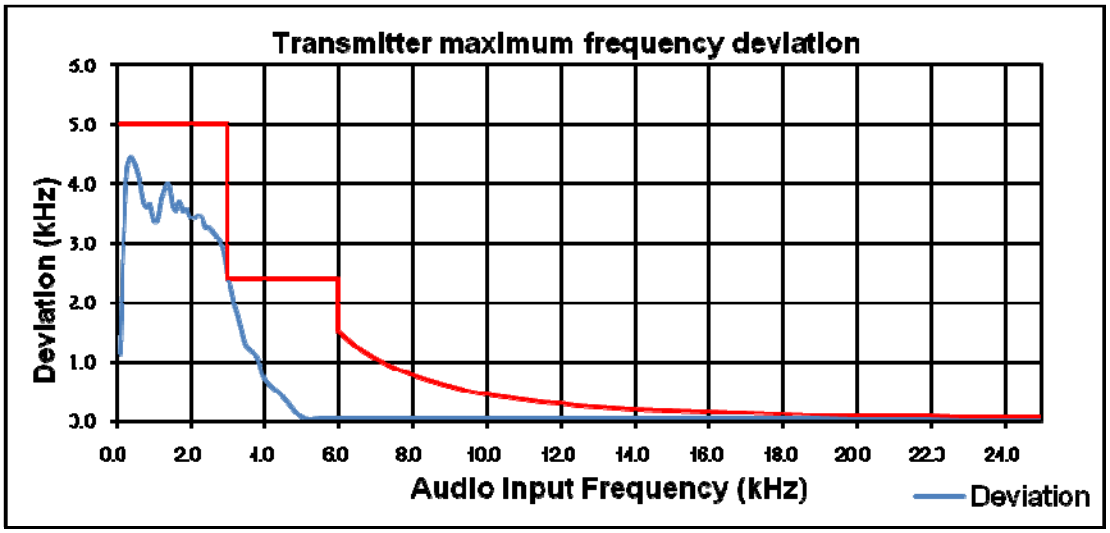
Test Data

Please refer to following table:

Test Result: Compliance

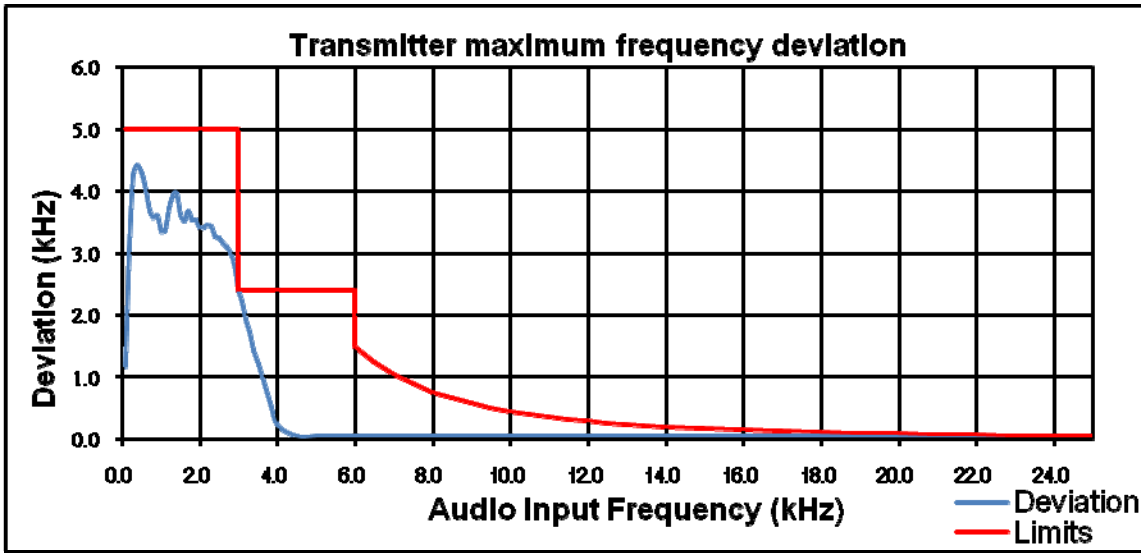
Frequency: 156.8MHz, High Power

Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit
kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz
0.1	1.13	5.00	1.9	3.56	5.00	3.6	1.06	2.41	11.5	0.05	0.33
0.2	2.99	5.00	2.0	3.43	5.00	3.8	0.69	2.41	12.0	0.05	0.30
0.3	4.26	5.00	2.1	3.43	5.00	4.0	0.41	2.41	12.5	0.05	0.27
0.4	4.44	5.00	2.2	3.46	5.00	4.5	0.07	2.41	13.0	0.05	0.25
0.5	4.30	5.00	2.3	3.44	5.00	5.0	0.05	2.41	14.0	0.05	0.21
0.6	4.05	5.00	2.4	3.27	5.00	5.5	0.05	2.41	15.0	0.05	0.18
0.7	3.68	5.00	2.5	3.26	5.00	6.0	0.05	2.41	16.0	0.05	0.15
0.8	3.61	5.00	2.6	3.19	5.00	6.0	0.05	1.50	17.0	0.05	0.13
0.9	3.65	5.00	2.7	3.11	5.00	6.5	0.05	1.25	18.0	0.05	0.12
1.0	3.37	5.00	2.8	3.01	5.00	7.0	0.05	1.05	19.0	0.05	0.10
1.1	3.38	5.00	2.9	2.82	5.00	7.5	0.05	0.89	20.0	0.05	0.09
1.2	3.72	5.00	3.0	2.41	5.00	8.0	0.05	0.77	21.0	0.05	0.08
1.3	3.93	5.00	3.0	2.40	2.41	8.5	0.05	0.67	22.0	0.05	0.07
1.4	3.99	5.00	3.1	2.24	2.41	9.0	0.05	0.58	23.0	0.05	0.07
1.5	3.63	5.00	3.2	1.96	2.41	9.5	0.05	0.52	24.0	0.05	0.06
1.6	3.54	5.00	3.3	1.75	2.41	10.0	0.05	0.46	25.0	0.05	0.05
1.7	3.68	5.00	3.4	1.48	2.41	10.5	0.05	0.41	/	/	/
1.8	3.54	5.00	3.5	1.25	2.41	11.0	0.05	0.37	/	/	/


Transmitter maximum frequency deviation
Deviation (kHz)
5.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
Audio Input Frequency (kHz)
Deviation

Frequency: 156.8MHz, Low Power

Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit	Audio Input Frequency	Test Value	Limit
kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz	kHz
0.1	1.17	5.00	1.9	3.55	5.00	3.6	1.00	2.41	11.5	0.05	0.33
0.2	3.07	5.00	2.0	3.42	5.00	3.8	0.59	2.41	12.0	0.05	0.30
0.3	4.26	5.00	2.1	3.42	5.00	4.0	0.23	2.41	12.5	0.05	0.27
0.4	4.43	5.00	2.2	3.46	5.00	4.5	0.05	2.41	13.0	0.05	0.25
0.5	4.29	5.00	2.3	3.44	5.00	5.0	0.05	2.41	14.0	0.05	0.21
0.6	4.02	5.00	2.4	3.27	5.00	5.5	0.05	2.41	15.0	0.05	0.18
0.7	3.68	5.00	2.5	3.25	5.00	6.0	0.05	2.41	16.0	0.05	0.15
0.8	3.58	5.00	2.6	3.18	5.00	6.0	0.05	1.50	17.0	0.05	0.13
0.9	3.61	5.00	2.7	3.10	5.00	6.5	0.05	1.25	18.0	0.05	0.12
1.0	3.36	5.00	2.8	3.01	5.00	7.0	0.05	1.05	19.0	0.05	0.10
1.1	3.38	5.00	2.9	2.81	5.00	7.5	0.05	0.89	20.0	0.05	0.09
1.2	3.73	5.00	3.0	2.41	5.00	8.0	0.05	0.77	21.0	0.05	0.08
1.3	3.94	5.00	3.0	2.40	2.41	8.5	0.05	0.67	22.0	0.05	0.07
1.4	3.98	5.00	3.1	2.22	2.41	9.0	0.05	0.58	23.0	0.05	0.07
1.5	3.63	5.00	3.2	1.93	2.41	9.5	0.05	0.52	24.0	0.05	0.06
1.6	3.52	5.00	3.3	1.73	2.41	10.0	0.05	0.46	25.0	0.05	0.05
1.7	3.69	5.00	3.4	1.44	2.41	10.5	0.05	0.41	/	/	/
1.8	3.54	5.00	3.5	1.21	2.41	11.0	0.05	0.37	/	/	/



8 - TRANSMITTER SENSITIVITY OF THE MODULATOR, INCLUDING MICROPHONE

Applicable Standard

This characteristic expresses the capability of the transmitter to produce sufficient modulation when an audiofrequency signal corresponding to the normal mean speech level is applied to the microphone.

Limit

The resulting frequency deviation shall be between ±2,5 kHz and ±4,5 kHz.

Method of measurement

An acoustic signal with a frequency of 1 kHz and a sound level of 94 dB(A) shall be applied to the microphone. The resulting deviation shall be measured. This test shall be repeated at frequencies of 300 Hz and 500 Hz.

Test Data

Please refer to following table:

Carrier Frequency (MHz)	Acoustic signal	Audio signal Frequency (kHz)	Frequency deviation (kHz)	Limit (kHz)
156.8	1kHz/94 dB(A)	0.3	2.8	±2.5~ ±4.5 kHz
		0.5	2.8	

Test Result: Compliance

9 - TRANSMITTER AUDIO FREQUENCY RESPONSE

Applicable Standard

The audiofrequency response is the frequency deviation of the transmitter as a function of the modulating frequency.

Limit

The audiofrequency response shall be within +1 dB and –3 dB of a 6 dB/octave line passing through the reference point (see Figure 2).

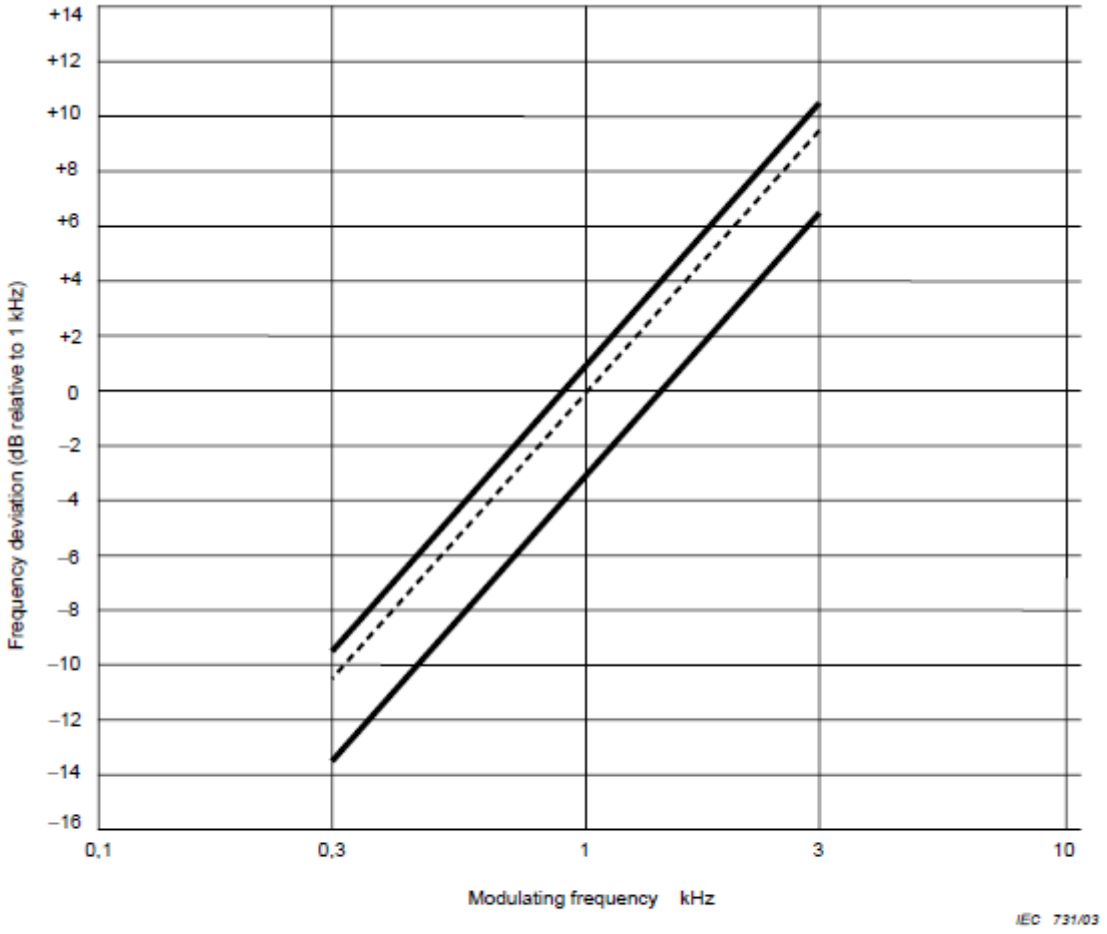


Figure 2 – Audiofrequency response

Method of Measurement

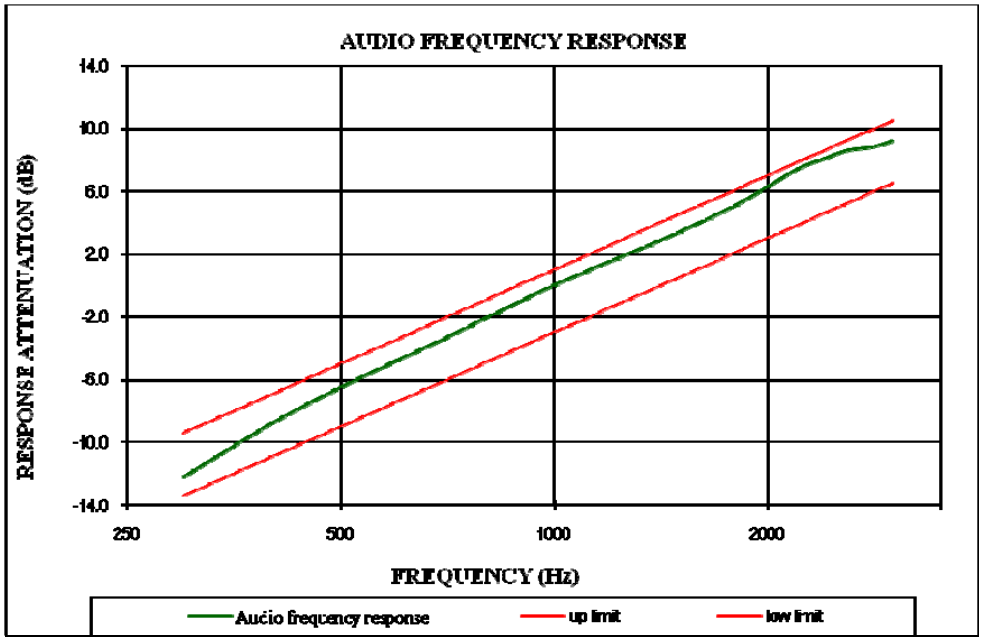
A modulating signal at a frequency of 1 kHz shall be applied to the transmitter and the deviation shall be measured at the output. The audio input level shall be adjusted so that the frequency deviation is ±1 kHz. This is the reference point in Figure 2 (1 kHz corresponds to 0 dB).

The modulation frequency shall then be varied between 300 Hz and 3 kHz, with the level of the audiofrequency signal being kept constant and equal to the value specified above.

Test Data

Please refer to following table:

Channel Spacing: FM 25kHz		Carrier Frequency: 156.8 MHz
Modulation Frequency (Hz)	**Response Data (dB)**	
300	-12.20	
400	-8.80	
500	-6.50	
600	-4.80	
700	-3.40	
800	-2.10	
900	-0.97	
1000	0.00	
1200	1.50	
1400	2.80	
1600	3.98	
1800	5.10	
2000	6.28	
2200	7.40	
2400	8.10	
2600	8.60	
2800	8.80	
3000	9.20	



Test Result: Compliance

10 - TRANSMITTER AUDIO FREQUENCY HARMONIC DISTORTION OF THE EMISSION

Applicable Standard

The harmonic distortion of the emission modulated by any audiofrequency signal is defined as the ratio, expressed as a percentage, of the root mean square (r.m.s.) voltage of all the harmonic components of the fundamental frequency to the total r.m.s. voltage of the signal after linear demodulation.

Limit

The harmonic distortion shall not exceed 10 %.

Method of Measurement

General

The RF signal produced by the transmitter shall be applied via an appropriate coupling device to a linear demodulator with a de-emphasis network of 6 dB/octave. This test shall be carried out with the output power switch at both maximum and minimum.

Normal test conditions

Under normal test conditions (see 6.12), the RF signal shall be modulated successively at frequencies of 300 Hz, 500 Hz and 1 kHz with a constant modulation index of 3.

The distortion of the audiofrequency signal shall be measured at all the frequencies specified above.

Test Data

Please refer to following table:

Channel Frequency (MHz)	output power	Test Condition	Audio signal Frequency (kHz)	Frequency Deviation (kHz)	Distortion (%)	Limit (%)
156.8	maximum	NTNV	0.3	0.9	2.0	<10
			0.5	1.5	1.6	
			1	3	1.3	
156.8	minimum	NTNV	0.3	0.9	2.0	<10
			0.5	1.5	1.6	
			1	3	1.3	

Test Result: Compliance

11 - TRANSMITTER ADJACENT CHANNEL POWER

Applicable Standard

The adjacent channel power is that part of the total power output of a transmitter under defined conditions of modulation which falls within a specified passband centred on the nominal frequency of either of the adjacent channels. This power is the sum of the mean power produced by the modulation hum and noise of the transmitter.

Limit

The adjacent channel power shall not exceed a value of 70 dB below the carrier power of the transmitter without any need to be below 0,2 µW.

Method of Measurement

Please refer to IEC 62238 §8.7.2 for the measurement method.

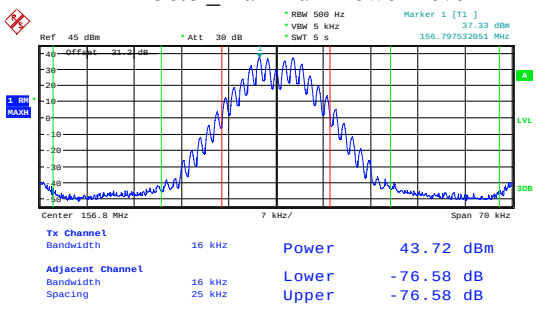
Test Data

Please refer to following table and plots:

Carrier Frequency (MHz)	Power Level	Adjacent Channel Power Ratio dB	Limit dB
156.8	Maximum	76.58	70

Test Result: Compliance

156.8 _Maximum Power Level



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12 - TRANSMITTER CONDUCTED SPURIOUS EMISSIONS CONVEYED TO THE ANTENNA

Applicable Standard

Conducted spurious emissions are emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions.

Limit

The power of any conducted spurious emission on any discrete frequency shall not exceed 0,25 μW.

Method of Measurement

Conducted spurious emissions shall be measured with the unmodulated transmitter connected to the artificial antenna (see 6.4).

The measurements shall be made over a range from 9 kHz to 2 GHz, excluding the channel on which the transmitter is operating and its adjacent channels.

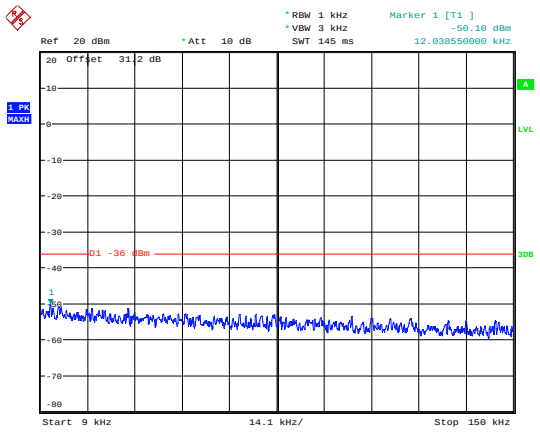
The measurements for each spurious emission shall be made using a tuned radio measuring instrument or a spectrum analyzer.

Test Data

Note: The conducted spurious emissions were tested at maximum power level, which was the worst case, and there was a band reject filter between the EUT and test equipment when testing.

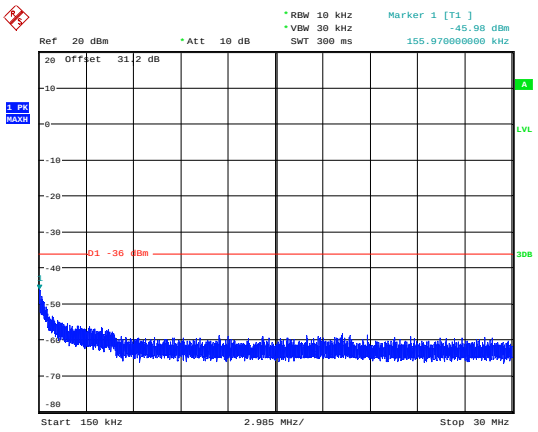
Please refer to following plots:

156.8-1



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 13:30:02

156.8-2



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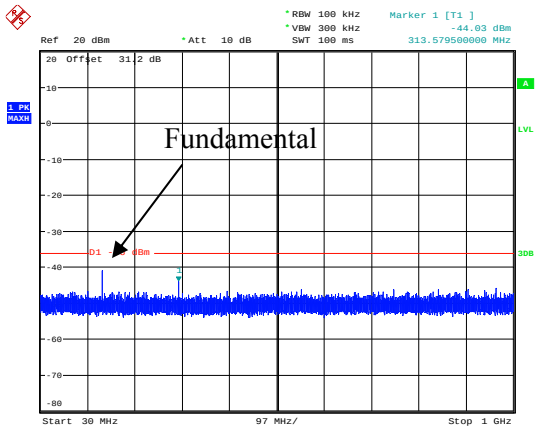
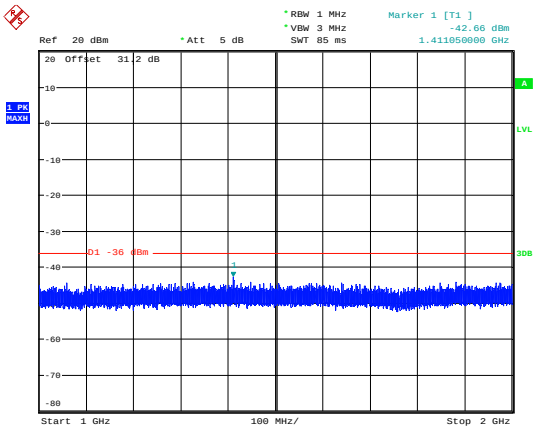
Date: 11.MAR.2025 13:41:55

156.8-3



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 13:51:54

156.8-4



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 14:06:58

Test Result: Compliance

13 - TRANSIENT FREQUENCY BEHAVIOUR OF THE TRANSMITTER

Applicable Standard

The transient frequency behaviour of the transmitter is the variation in time of the transmitter frequency difference from the nominal frequency of the transmitter when the RF output power is switched on and off.

t_{on} according to the method of measurement described in 8.10.2 the switch-on instant t_{on} of a transmitter is defined by the condition when the output power, measured at the antenna terminal, exceeds 0,1 % of the nominal power;

t_1 period of time starting at t_{on} and finishing according to Table 2;

t_2 period of time starting at the end of t_1 and finishing according to Table 2;

t_{off} switch-off instant defined by the condition when the nominal power falls below 0,1 % of the nominal power;

t_3 period of time that finishing at t_{off} and starting according to Table 2.

Table 2 – Transmitter transient timing (ms)

t_1	5,0
t_2	20,0
t_3	5,0

NOTE 1 During the periods t_1 and t_3 the frequency difference should not exceed the value of 1 channel separation.
NOTE 2 During the period t_2 the frequency difference should not exceed the value of half a channel separation.

Limit

During the periods of time t1 and t3 the frequency difference shall not exceed ±25 kHz.

The frequency difference after the end of t2 shall be within the limit of the frequency error given in 8.1.

During the period of time t2 the frequency difference shall not exceed ±12,5 kHz.

Before the start of t3 the frequency difference shall be within the limit of the frequency error given in 8.1.

Method of Measurement

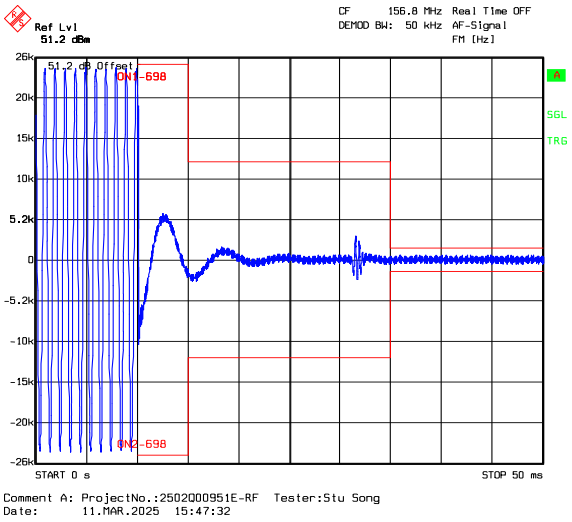
Please refer to IEC 62238 §8.9.2 for the measurement method.

Test Data

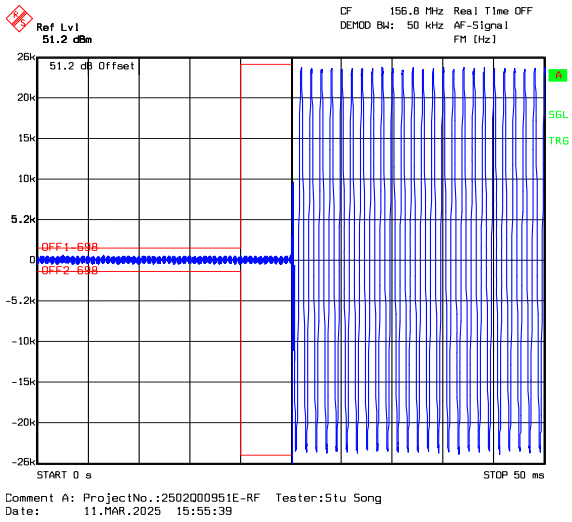
Please refer to following table:

Test Result: Compliance

156.8 _ON



156.8 _ OFF



14 - RESIDUAL MODULATION OF THE TRANSMITTER

Applicable Standard

The residual modulation of the transmitter is the ratio, in dB, of the demodulated RF signal in the absence of wanted modulation, to the demodulated RF signal produced when the normal test modulation is applied.

Limit

The residual modulation shall not exceed –40 dB.

Method of measurement

The normal test modulation defined in 6.3 shall be applied to the transmitter. The high frequency signal produced by the transmitter shall be applied, via an appropriate coupling device, to a linear demodulator with a de-emphasis network of 6 dB/octave. The time constant of this de-emphasis network shall be at least 750 μs.

Precautions shall be taken to avoid the effects of emphasizing the low audiofrequencies produced by internal noise.

The signal shall be measured at the demodulator output using an r.m.s. voltmeter.

The modulation shall then be switched off and the level of the residual audiofrequency signal at the output shall be measured again.

Test Data

Please refer to following table:

Channel Frequency	Result dB	Limit dB
156.8MHz	-45.0	⩽-40

Test Result: Compliance

15 - TRANSMITTER FREQUENCY ERROR (DSC SIGNAL)

Applicable Standard

The frequency error for the B-state and the Y-state is the difference between the measured frequency from the demodulator and the nominal values.

Limit

The measured frequency from the demodulator at any time for the B-state shall be within 2 100 Hz ± 10 Hz and for the Y-state within 1 300 Hz ± 10 Hz.

Method of Measurement

The transmitter shall be connected to the artificial antenna as specified in 6.4 and a suitable FM demodulator. The transmitter shall be set to channel 70.

The transmitter shall be set to transmit a continuous B-state or Y-state.

The measurement shall be performed by measuring the demodulated output, for both the continuous B-state and Y-state.

The measurements shall be carried out under normal test conditions (see 6.12) and extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

Test Data

Please refer to following table:

Frequency	Mode	Test Condition	Frequency Deviation	Limit
			Hz	Hz
156.525MHz	B-state	NTNV	2100	2100 Hz ± 10
		LTLV	2100	
		LTHV	2100	
		HTLV	2100	
		HTHV	2100	
	Y-state	NTNV	1300	1300 Hz ± 10
		LTLV	1300	
		LTHV	1300	
		HTLV	1300	
		HTHV	1300	

Test Result: Compliance

16 - TRANSMITTER MODULATION INDEX FOR DSC

Applicable Standard

This test measures the modulation index in the B and Y states.

Limit

The modulation index shall be 2,0 ± 10 %.

Method of Measurement

The transmitter shall be set to transmit continuous B and then Y signals. The frequency deviations shall be measured.

Test Data

Please refer to following table:

Frequency (MHz)	Mode	Modulation Index	Limit
156.525	B-State	1.97	2.0+/-10%
	Y-State	1.97	

Test Result: Compliance

17 - TRANSMITTER MODULATION RATE FOR DSC

Applicable Standard

The modulation rate is the bit stream speed measured in bits per second.

Limit

The frequency shall be 600 Hz ± 30 × 10^{-6} corresponding to a modulation rate of 1 200 baud.

Method of Measurement

The transmitter shall be set to transmit continuous dot pattern.

The RF output terminal of the transmitter, via a suitable attenuator, shall be connected to a linear FM demodulator. The output of the demodulator shall be limited in bandwidth by a low pass filter with a cut-off frequency of 1 kHz and a slope of 12 dB/octave.

The frequency of the output shall be measured.

Test Data

Please refer to following table:

Frequency (MHz)	Mode	Frequency (ppm)	Limit (ppm)
156.525	B-State	6	± 30 ppm
	Y-State	6	

Test Result: Compliance

18 - TRANSMITTER TESTING OF GENNERATED CALL SEQUENCES

Applicable Standard

Generated call sequences are calls which comply with the requirements of ITU-R Recommendation M.493-10.

Limit

The requirements of ITU-R Recommendation M.493-10 regarding message composition and content shall be met.

The generated calls shall be analyzed with the calibrated apparatus for correct configuration of the signal format, including time diversity.

It shall be verified that, after transmission of a DSC call, the transmitter re-tunes to the original channel. However, in the case of a distress call, the transmitter shall tune to channel 16 and automatically select the maximum power.

The telecommands used and the channels tested for switching shall be stated in the test report.

Method of Measurement

The output of the transmitter shall be suitably connected to an apparatus for decoding and printing out the information content of the call sequences generated by the equipment.

The transmitter shall be set to transmit DSC calls as specified in annex A.

Test Data

Please refer to following table:

Format Specifier	Category	1st telecommand (Symbol No.)	2st telecommand (Symbol No.)
Distress	/	100	126
All Ships	Urgency	100	126
All Ships	Safety	100	126
Individual	Urgency	100	126
Individual	Safety	100	126
Individual	Routine	100	126
Group	Routine	100	126

Test Result: Compliance

19 - RECEIVER HARMONIC DISTORTION AND RATED AUDIO-FREQUENCY OUTPUT POWER

Applicable Standard

The harmonic distortion at the receiver output is defined as the ratio, expressed as a percentage, of the total r.m.s. voltage of all the harmonic components of the modulation audiofrequency to the total r.m.s. voltage of the signal delivered by the receiver.

The rated audiofrequency output power is the value stated by the manufacturer to be the maximum power available at the output, for which all the requirements of this standard are met.

Limit

The rated audiofrequency output power shall be at least:

- 2 W in a loudspeaker;
- 1 mW in the handset earphone.

The harmonic distortion shall not exceed 10 %.

Test Procedure

Test signals at levels of +60 dBμV (e.m.f.) and +100 dBμV (e.m.f.), at a carrier frequency equal to the nominal frequency of the receiver and modulated by the normal test modulation (see 6.3) shall be applied in succession to the receiver input under the conditions specified in 6.1.

For each measurement, the receiver's audiofrequency volume control shall be set so as to obtain, in a resistive load which simulates the receiver's operating load, the rated audiofrequency output power (see 9.1.1). The value of this load shall be stated by the manufacturer.

Under normal test conditions (see 6.12) the test signal shall be modulated successively at 300 Hz, 500 Hz and 1 kHz with a constant modulation index of 3 (ratio between the frequency deviation and the modulation frequency). The harmonic distortion and audiofrequency output power shall be measured at all the frequencies specified above.

Test Data

Please refer to following table:

Frequency (MHz)	Test Signals Levels (dBuV)	Modulation Frequency (Hz)	Loudspeaker				Handset Earphone			
			Audio Frequency Output Power (W)	Limit (W)	Harmonic Distortion (%)	Limit (%)	Audio Frequency Output Power (mW)	Limit (mW)	Harmonic Distortion (%)	Limit (%)
156.8	60	300	5.8	≥2	4.2	≤10	2200	≥1	4.5	<10
		500	6.3		4.3		1800		4.0	
		1000	4.4		2.9		1500		2.9	
	100	300	5.8		4.6		2200		4.8	
		500	6.3		4.9		1800		4.2	
		1000	4.4		3.3		1500		3.3	

Test Result: Compliance

20 - RECEIVER AUDIO FREQUENCY RESPONSE

Applicable Standard

The audiofrequency response is defined as the variation in the receiver's audiofrequency output level as a function of the modulation frequency of the radio frequency signal with constant deviation applied to its input.

Limit

The audiofrequency response shall not deviate by more than +1 dB or –3 dB from a characteristic giving the output level as a function of the audiofrequency, decreasing by 6 dB/octave and passing through the measured point at 1 kHz (see Figure 5).

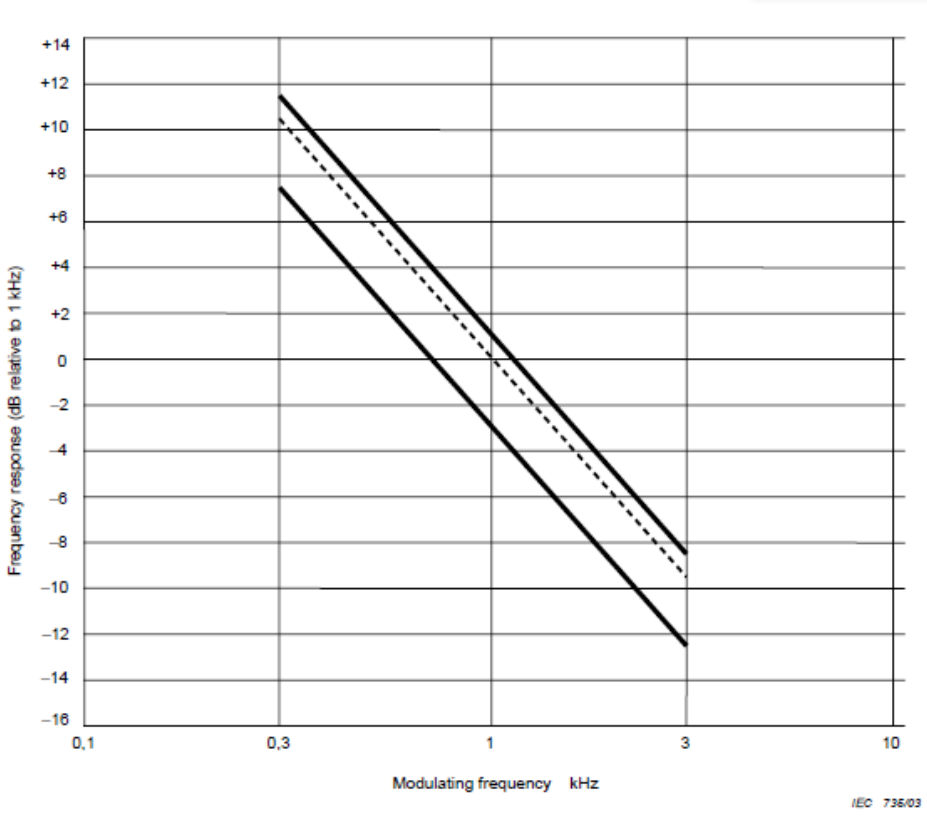


Figure 5 – Receiver audiofrequency response

Method of Measurement

A test signal of +60 dBµV (e.m.f.), at a carrier frequency equal to the nominal frequency of the receiver and modulated with normal test modulation (see 6.3) shall be applied to the receiver antenna port under the conditions specified in 6.1.

The receiver's audiofrequency power control shall be set so as to produce a power level equal to 50 % of the rated output power (see 9.1). This setting shall remain unchanged during the test.

The frequency deviation shall then be reduced to ±1 kHz and the audio output is the reference point in Figure 5 (1 kHz corresponds to 0 dB).

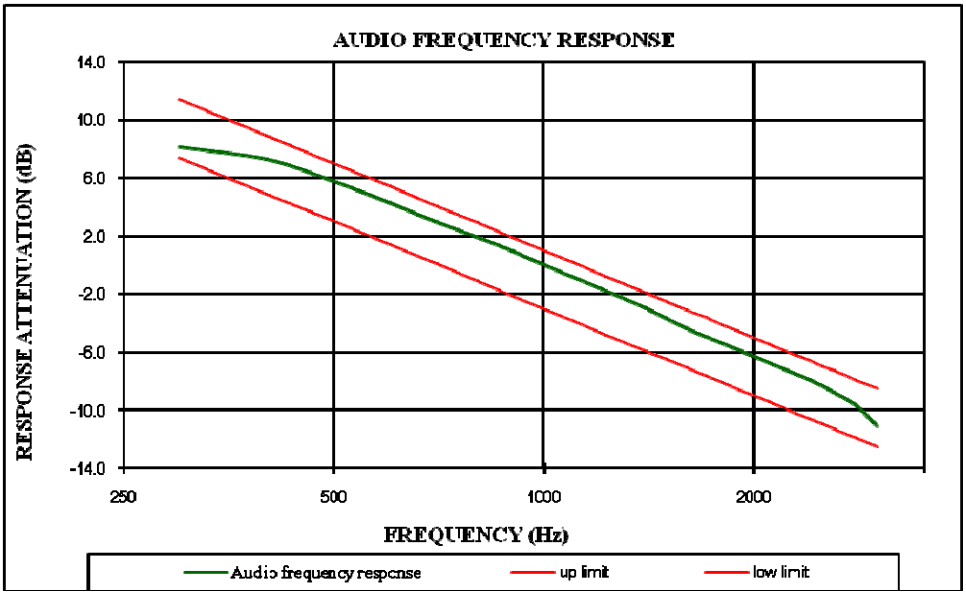
The frequency deviation shall remain constant while the modulation frequency is varied between 300 Hz and 3 kHz and the output level shall then be measured.

The measurement shall be repeated with a test signal at frequencies 1,5 kHz above and below the nominal frequency of the receiver.

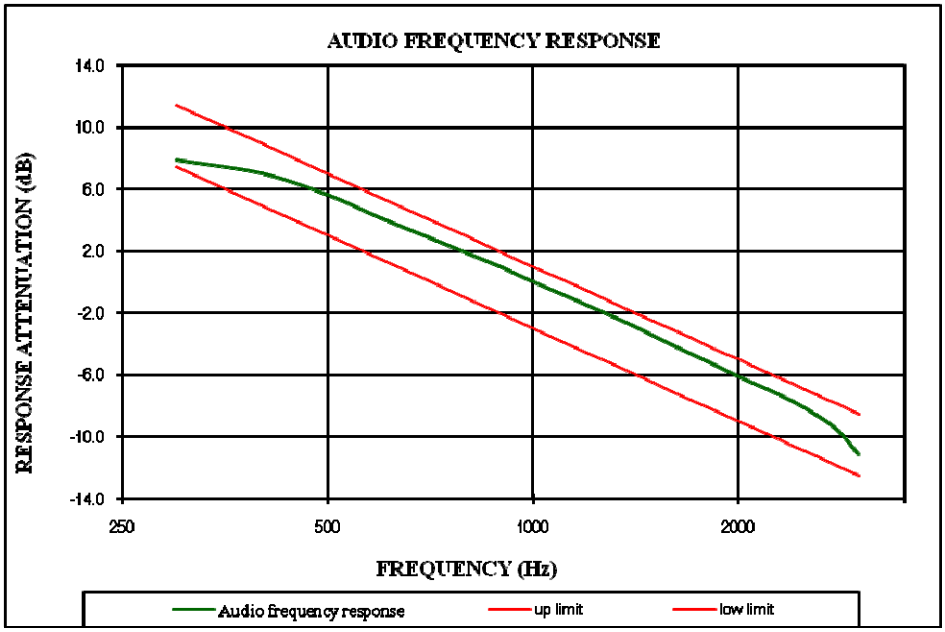
Test Data

Please refer to following table:

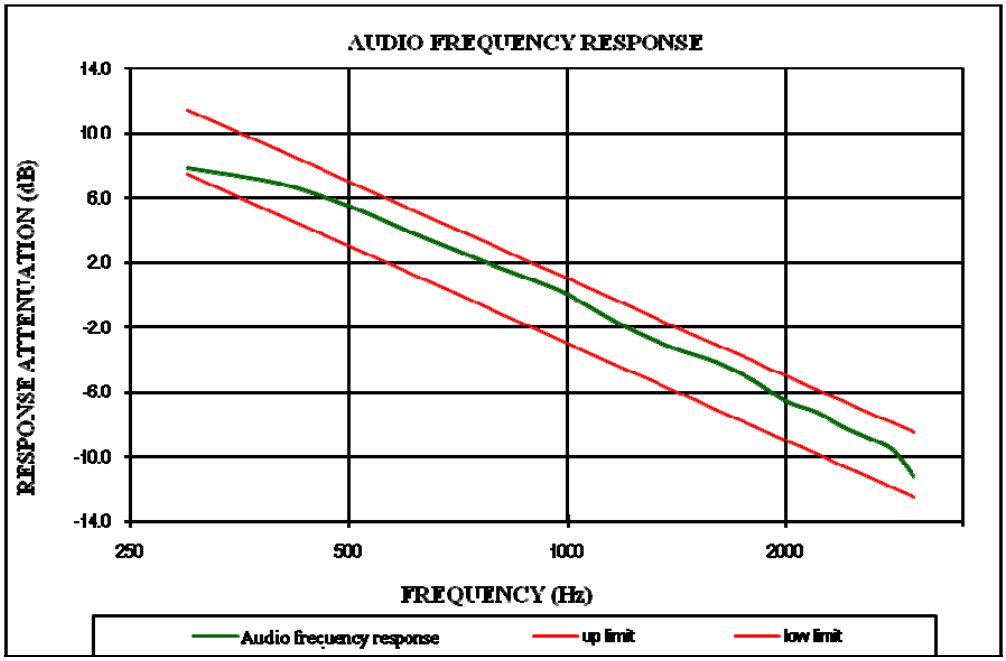
Channel Spacing: FM 25kHz		Nominal Frequency: 156.8 MHz, Test Signal Frequency Offset: None
Modulation Frequency (Hz)	**Response Data (dB)**	
300	8.10	
400	7.26	
500	5.80	
600	4.30	
700	3.00	
800	1.97	
900	0.98	
1000	0.00	
1200	-1.56	
1400	-3.00	
1600	-4.35	
1800	-5.40	
2000	-6.33	
2200	-7.15	
2400	-7.89	
2600	-8.72	
2800	-9.70	
3000	-11.10	



Channel Spacing: FM 25kHz		Nominal Frequency: 156.8 MHz, Test Signal Frequency Offset: +1.5kHz
Modulation Frequency (Hz)	**Response Data (dB)**	
300	7.90	
400	7.00	
500	5.60	
600	4.10	
700	2.90	
800	1.88	
900	0.93	
1000	0.00	
1200	-1.48	
1400	-2.84	
1600	-4.09	
1800	-5.14	
2000	-6.10	
2200	-6.95	
2400	-7.74	
2600	-8.60	
2800	-9.65	
3000	-11.13	



Channel Spacing: FM 25kHz		Nominal Frequency: 156.8 MHz, Test Signal Frequency Offset: -1.5kHz
Modulation Frequency (Hz)	**Response Data (dB)**	
300	7.80	
400	6.85	
500	5.47	
600	4.00	
700	2.78	
800	1.75	
900	0.85	
1000	0.00	
1200	-1.98	
1400	-3.30	
1600	-4.16	
1800	-5.30	
2000	-6.60	
2200	-7.25	
2400	-8.20	
2600	-8.82	
2800	-9.60	
3000	-11.20	



Test Result: Compliance

21 - RECEIVER MAXIMUM USEABLE SENSITIVITY

Applicable Standard

The maximum usable sensitivity of the receiver is the minimum level of the signal (e.m.f.) at the nominal frequency of the receiver which, when applied to the receiver input with normal test modulation (see 6.3), will produce:

– in all cases, an audiofrequency output power equal to 50 % of the rated output power (see 9.1); and
– a Signal + Noise + Distortion to Noise + Distortion (SINAD) ratio of 20 dB, measured at the receiver output through a psophometric telephone filtering network such as described in ITU-T Recommendation P.53.

Limit

The maximum usable sensitivity shall not exceed +6 dBμV (e.m.f.) under normal test conditions and +12 dBμV (e.m.f.) under extreme test conditions.

Method of Measurement

A test signal at a carrier frequency equal to the nominal frequency of the receiver, modulated by the normal test modulation (see 6.3) shall be applied to the receiver input. An audiofrequency load and a measuring instrument for measuring SINAD ratio (through a psophometric network as specified in 9.3.1) shall be connected to the receiver output terminals.

The level of the test signal shall be adjusted until a SINAD ratio of 20 dB is obtained, using the psophometric network and with the receiver's audiofrequency power control adjusted to produce 50 % of the rated output power. Under these conditions, the level of the test signal at the input is the value of the maximum usable sensitivity.

The measurements shall be made under normal test conditions (see 6.12) and under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

A receiver output power variation of ±3 dB relative to 50 % of the rated output power may be allowed for sensitivity measurements under extreme test conditions.

Test Data

Please refer to following table:

Frequency	Test Condition	Result	Limit
		dBμV(e.m.f)	dBμV(e.m.f)
156.8MHz	NTNV	-7.0	⩽6
	LTLV	-7.0	⩽12
	LTHV	-7.0	
	HTLV	-6.0	
	HTHV	-6.0	

Test Result: Compliance

22 -RECEIVER CO-CHANNEL REJECTION

Applicable Standard

The co-channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal, both signals being at the nominal frequency of the receiver.

Limit

The co-channel rejection ratio shall be between –10 dB and 0 dB.

Method of Measurement

The two input signals shall be connected to the receiver via a combining network (see 6.1).
The wanted signal shall have normal test modulation (see 6.3). The unwanted signal shall be modulated by 400 Hz with a deviation of ±3 kHz. Both input signals shall be at the nominal frequency of the receiver under test and the measurement repeated for displacements of the unwanted signal of ±3 kHz.

The wanted input signal shall be set to the value corresponding to the measured maximum usable sensitivity (see 9.3).

The amplitude of the unwanted input signal shall then be adjusted until the SINAD ratio (psophometrically weighted) at the output of the receiver is reduced to 14 dB.

The co-channel rejection ratio shall be expressed as the ratio in dB of the level of the unwanted signal to the level of the wanted signal at the receiver input for which the specified reduction in SINAD ratio occurs.

Test Data

Please refer to following table:

Frequency (MHz)	Measurement Offset (kHz)	Measured Value (dB)	Limit (dB)
156.8	-3.0	-9.0	-10≤Limit≤0
	0.0	-9.0	
	+3.0	-8.5	

Test Result: Compliance

23 -RECEIVER ADJACENT CHANNEL SELECTIVITY

Applicable Standard

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal which differs in frequency from the wanted signal by 25 kHz.

Limit

The adjacent channel selectivity shall be not less than 70 dB under normal test conditions and not less than 60 dB under extreme test conditions.

Method of Measurement

The two input signals shall be applied to the receiver input via a combining network (see 6.1).

The wanted signal shall be at the nominal frequency of the receiver and shall have normal test modulation (see 6.3). The unwanted signal shall be modulated by 400 Hz with a deviation of ±3 kHz, and shall be at the frequency of the channel immediately above that of the wanted signal.

The wanted input signal level shall be set to the value corresponding to the maximum usable sensitivity. The amplitude of the unwanted input signal shall then be adjusted until the SINAD ratio at the receiver output, psophometrically weighted, is reduced to 14 dB. The measurement shall be repeated with an unwanted signal at the frequency of the channel below that of the wanted signal.

The adjacent channel selectivity shall be expressed as the lower value of the ratios in dB for the upper and lower adjacent channels of the level of the unwanted signal to the level of the wanted signal.

The measurements shall then be repeated under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously) with the wanted signal set to the value corresponding to the maximum usable sensitivity under these conditions.

Test Data

Please refer to following table:

Frequency(MHz)	Test Condition	Measured Channel	Measured Result (dB)	Limit (dB)
156.8	NTNV	Upper	75.0	≥70
		Lower	76.0	
	LTLV	Upper	75.0	≥60
		Lower	76.0	
	LTHV	Upper	75.0	
		Lower	76.0	
	HTLV	Upper	75.0	≥60
		Lower	76.0	
	HTHV	Upper	75.0	
		Lower	76.0	

Test Result: Compliance

24 - RECEIVER SPURIOUS RESPONSE REJECTION

Applicable Standard

The spurious response rejection is a measure of the capability of the receiver to discriminate between the wanted modulated signal at the nominal frequency and an unwanted signal at any other frequency at which a response is obtained.

Limit

At any frequency separated from the nominal frequency of the receiver by more than 25 kHz, the spurious response rejection ratio shall be not less than 70 dB.

Method of Measurement

Two input signals shall be applied to the receiver input via a combining network (see 6.1). The wanted signal shall be at the nominal frequency of the receiver and shall have normal test modulation (see 6.3).

The unwanted signal shall be modulated by 400 Hz with a deviation of ±3 kHz.

The wanted input signal level shall be set to the value corresponding to the maximum usable sensitivity. The amplitude of the unwanted input signal shall be adjusted to an e.m.f. of +86 dBμV. The frequency shall then be swept over the frequency range from 100 kHz to 2 000 MHz.

At any frequency at which a response is obtained, the input level shall be adjusted until the SINAD ratio psophometrically weighted, is reduced to 14 dB.

The spurious response rejection ratio shall be expressed as the ratio in dB between the unwanted signal and the wanted signal at the receiver input when the specified reduction in the SINAD ratio is obtained.

Test Data

Please refer to following table:

Frequency (MHz)	Measured Result (worst case) (dB)	Limit (dB)
156.8	73.5	≥70

Test Result: Compliance

25 -RECEIVER INTER-MODULATION RESPONSE

Applicable Standard

The intermodulation response is a measure of the capability of a receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

Limit

The intermodulation response ratio shall be greater than 68 dB.

Method of Measurement

Three signal generators, A, B and C shall be connected to the receiver via a combining network (see 6.1). The wanted signal, represented by signal generator A shall be at the nominal frequency of the receiver and shall have normal test modulation (see 6.3). The unwanted signal from signal generator B shall be unmodulated and adjusted to the frequency 50 kHz above (or below) the nominal frequency of the receiver. The second unwanted signal from signal generator C shall be modulated by 400 Hz with a deviation of ±3 kHz, and adjusted to a frequency 100 kHz above (or below) the nominal frequency of the receiver.

The wanted input signal shall be set to a value corresponding to the maximum usable sensitivity. The amplitude of the two unwanted signals shall be maintained equal and shall be adjusted until the SINAD ratio at the receiver output, psophometrically weighted, is reduced to 14 dB. The frequency of signal generator B shall be adjusted slightly to produce the maximum degradation of the SINAD ratio. The level of the two unwanted test signals shall be readjusted to restore the SINAD ratio of 14 dB. The intermodulation response ratio shall be expressed as the ratio in dB between the two unwanted signals and the wanted signal at the receiver input, when the specified reduction in the SINAD ratio is obtained.

Test Data

Please refer to following table:

Frequency (MHz)	Measured Result (worst case) (dB)	Limit (dB)
156.8	72.0	>68

Test Result: Compliance

26 - RECEIVER BLOCKING OR DESENSITIZATION

Applicable Standard

Blocking is a change (generally a reduction) in the wanted output power of the receiver or a reduction of the SINAD ratio due to an unwanted signal on another frequency.

Limit

The blocking level for any frequency within the specified ranges, shall be not less than 90 dBμV (e.m.f.), except at frequencies on which spurious responses are found.

Method of Measurement

Two input signals shall be applied to the receiver via a combining network (see 6.1). The modulated wanted signal shall be at the nominal frequency of the receiver and shall have normal test modulation (see 6.3). Initially, the unwanted signal shall be switched off and the wanted signal set to the value corresponding to the maximum usable sensitivity.

The output power of the wanted signal shall be adjusted, where possible, to 50 % of the rated output power and in the case of stepped volume controls, to the first step that provides an output power of at least 50 % of the rated output power. The unwanted signal shall be unmodulated and the frequency shall be swept between +1 MHz and +10 MHz, and also between –1 MHz and –10 MHz, relative to the nominal frequency of the receiver. The input level of the unwanted signal, at all frequencies in the specified ranges, shall be so adjusted that the unwanted signal causes:

a) a reduction of 3 dB in the output level of the wanted signal; or
b) a reduction to 14 dB of the SINAD ratio at the receiver output using a psophometric telephone filtering network such as described in ITU-T Recommendation P.53 whichever occurs first. This level shall be noted.

Test Data

Please refer to following table:

Frequency (MHz)	Measurement Offset (MHz)	Measured Result (dBμV)	Limit (dBμV)
156.8	-10.0	100.0	>90
	-5.0	101.0	
	-2.0	100.0	
	-1.0	99.0	
	1.0	99.0	
	2.0	100.0	
	5.0	101.0	
	10.0	100.0	

Test Result: Compliance

27 - RECEIVER SPURIOUS EMISSIONS

Applicable Standard

Spurious emissions from the receiver are components at any frequency, present at the receiver input port.

The level of spurious emissions shall be measured as the power level at the antenna.

Limit

The power of any spurious emission shall not exceed 2 nW at any frequency in the range between 9 kHz and 2 GHz.

Method of Measurement

Spurious emissions shall be measured as the power level of any discrete signal at the input terminals of the receiver. The receiver input terminals are connected to a spectrum analyzer or selective voltmeter having an input impedance of 50 Ω and the receiver is switched on.

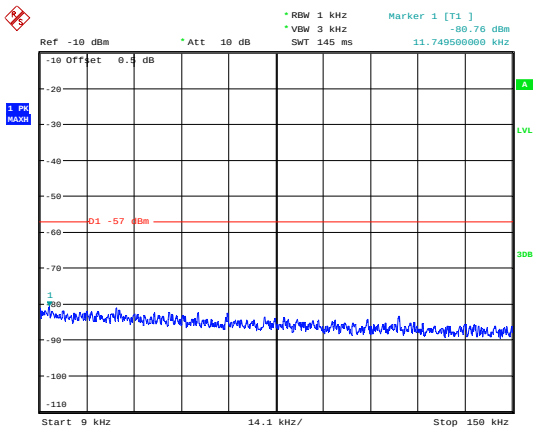
If the detecting device is not calibrated in terms of power input, the level of any detected components shall be determined by a substitution method using a signal generator.

The measurements shall extend over the frequency range of 9 kHz to 2 GHz.

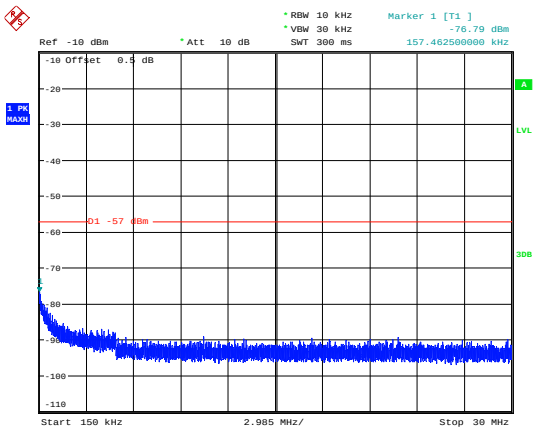
Test Data

Please refer to following plots (worst case):

BY1300



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:21:01



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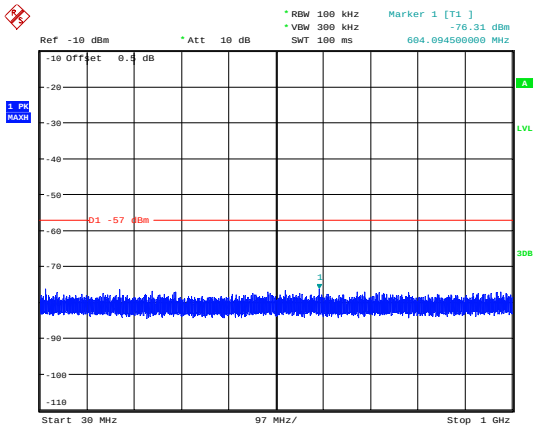
Date: 11.MAR.2025 16:25:13



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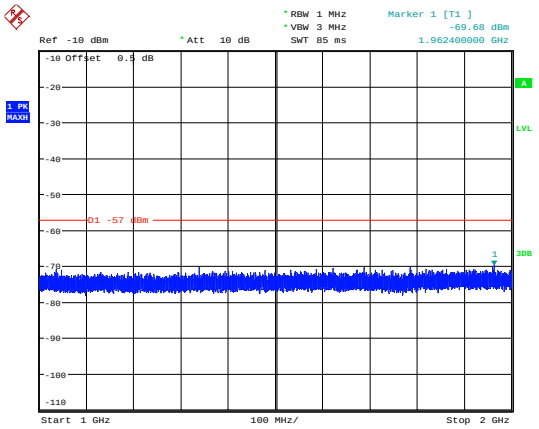
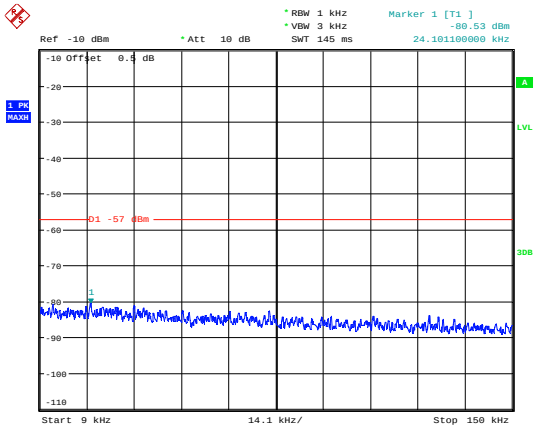
Date: 11.MAR.2025 16:27:47

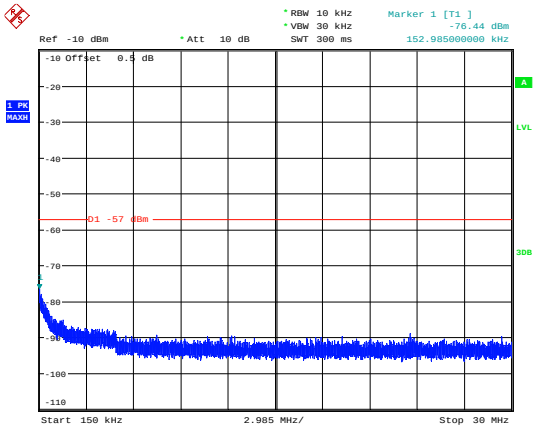


ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:32:54

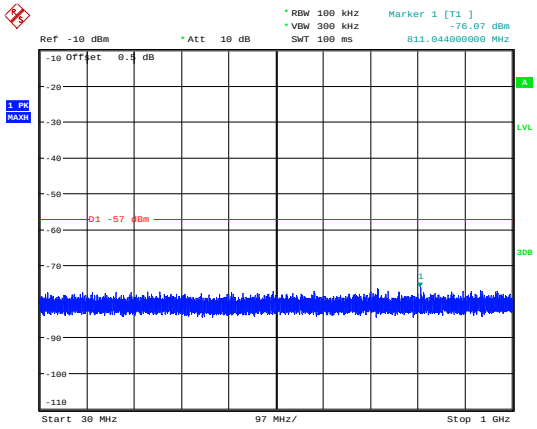
BY2100



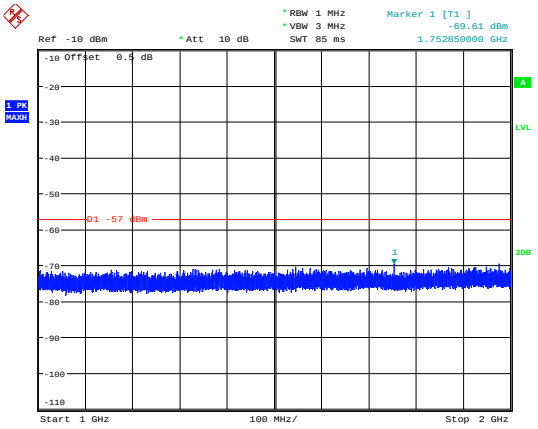
ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:22:51



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:26:54

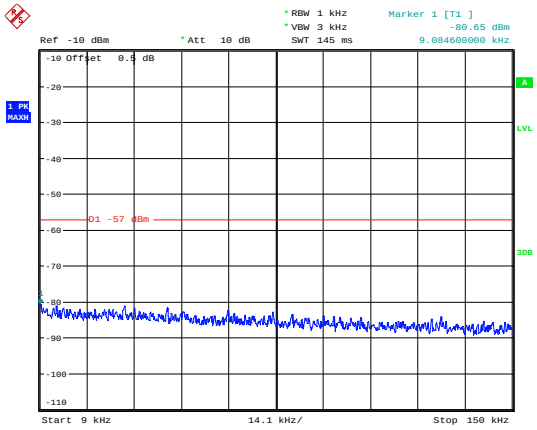


ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:29:21



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 16:34:48

156.8



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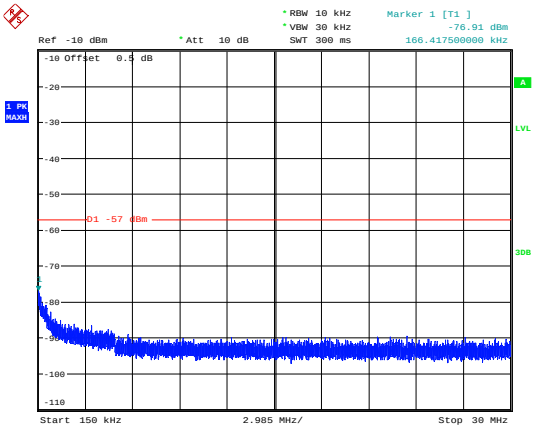
Date: 11.MAR.2025 14:21:54



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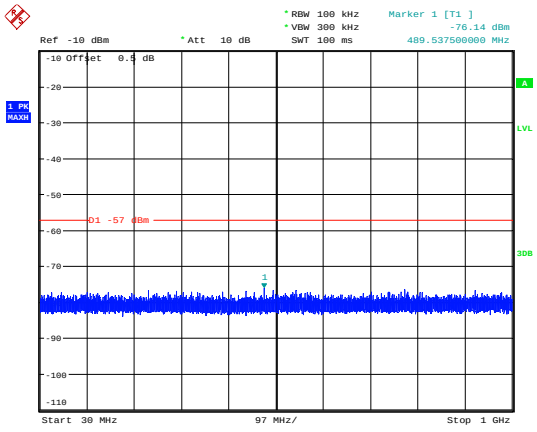
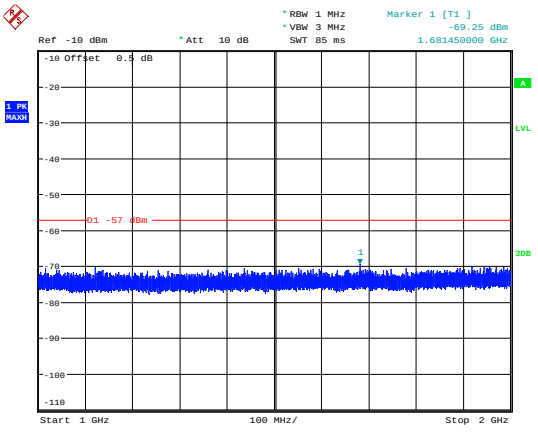
Date: 11.MAR.2025 14:43:07



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 14:52:21



ProjectNo.:2502Q00951E-RF Tester:Stu Song
Date: 11.MAR.2025 15:00:14

Test Result: Compliance

28 - RECEIVER RESIDUAL NOISE LEVEL

Applicable Standard

The receiver residual noise level is defined as the ratio, in dB, of the audiofrequency power of the noise and hum resulting from spurious effects of the power supply system or from other causes, to the audiofrequency power produced by a high-frequency signal of average level, modulated by the normal test modulation and applied to the receiver input.

Limit

The receiver residual noise level shall not exceed -40 dB.

Method of Measurement

A test signal with a level of +30 dBμV (e.m.f.) at a carrier frequency equal to the nominal frequency of the receiver, and modulated by the normal test modulation specified in 6.3, shall be applied to the receiver input. An audiofrequency load shall be connected to the output terminals of the receiver. The audiofrequency power control shall be set so as to produce the rated output power level conforming to 9.1.

The output signal shall be measured by an r.m.s. voltmeter having a –6 dB bandwidth of at least 20 kHz. The modulation shall then be switched off and the audiofrequency output level measured again.

Test Data

Please refer to following table:

Frequency (MHz)	Residual Noise Level (worst case) (dB)	Limit (dB)
156.8	-43.2	≤-40

Test Result: Compliance

29 - RECEIVER SQUELCH OPERATION

Applicable Standard

The purpose of the squelch facility is to mute the receiver audio output signal when the level of the signal at the receiver input is less than a given value.

Limit

Under the conditions specified in 9.11.2 a), the audiofrequency output power shall not exceed –40 dB relative to the rated output power.

Under the conditions specified in 9.11.2 b), the input level shall not exceed +6 dBμV (e.m.f.) and the SINAD ratio shall be at least 20 dB.

Under the conditions specified in 9.11.2 c), the input signal shall not exceed +6 dBμV (e.m.f.) when the control is set at maximum.

Method of Measurement

a) With the squelch facility switched off, a test signal of +30 dBμV (e.m.f.), at a carrier frequency equal to the nominal frequency of the receiver and modulated by the normal test modulation specified in 6.3, shall be applied to the input terminals of the receiver. An audiofrequency load and a psophometric filtering network shall be connected to the output terminals of the receiver. The receiver's audiofrequency power control shall be set so as to produce the rated output power defined in 9.1.
The output signal shall be measured with the aid of an r.m.s. voltmeter.
The input signal shall then be suppressed, the squelch facility switched on and the audiofrequency output level measured again.

b) With the squelch facility switched off again, a test signal modulated by the normal test modulation shall be applied to the receiver input at a level of +6 dBμV (e.m.f.) and the receiver shall be set to produce 50 % of the rated output power.
The level of the input signal shall then be reduced and the squelch facility shall be switched on.
The input signal shall then be increased until the above-mentioned output power is reached.
The SINAD ratio and the input level shall then be measured.

c) (Applicable only to equipment with continuously adjustable squelch control.) With the squelch facility switched off, a test signal with normal test modulation shall be applied to the receiver input at a level of +6 dBμV (e.m.f.), and the receiver shall be adjusted to give 50 % of the rated audio output power.
The level of the input signal shall then be reduced and the squelch facility shall be switched on at its maximum position and the level of the input signal increased until the output power again is 50 % of the rated audio output power.

Test Data

Please refer to following table:

Frequency (MHz)	Test Condition	Result	Limit
156.8	Condition a)	-44.0dB	≤-40dB (relative tothe rated output power)
	Condition b)	29.0dB	SINAD ≥20dB
	Condition c)	3.0dBuV (e.m.f.)	Input Signal ≤6dBuV (e.m.f.)

Test Result: Compliance

30 - RECEIVER SQUELCH HYSTERESIS

Applicable Standard

Squelch hysteresis is the difference in dB between the receiver input signal levels at which the squelch opens and closes.

Limit

The squelch hysteresis shall be between 3 dB and 6 dB.

Method of Measurement

If there is any squelch control on the exterior of the equipment it shall be placed in its maximum muted position. With the squelch facility switched on, an unmodulated input signal at a carrier frequency equal to the nominal frequency of the receiver shall be applied to the input of the receiver at a level sufficiently low to avoid opening the squelch. The input signal shall be increased at the level just opening the squelch. This input level shall be recorded. With the squelch still open, the level of the input signal shall be slowly decreased until the squelch mutes the receiver audio output again.

Test Data

Please refer to following table:

Frequency (MHz)	Test squelch Hysteresis (dB)			Limit
	Open	Close	Difference	dB
156.8	-117.0	-121.0	4.0	3~6

Test Result: Compliance

31 - RECEIVER MULTIPLE WATCH CHARACTERISTIC

Applicable Standard

The scanning period is the time between the start of two successive samples of the priority channel in the absence of a signal on that channel.

The dwell time on the priority channel is the time between the start and finish of any sample of the priority channel in the absence of a signal on that channel.

The dwell time on the additional channel is the time between the start and finish of any sample of the additional channel.

Limit

The scanning period shall not exceed 2 s.
The dwell time on the priority channel shall not exceed 150 ms.
The dwell time on the additional channel shall be between 850 ms and 2 s as indicated by the time of the gap between two output bursts.

Method of Measurement

The equipment shall be adjusted to scan the priority channel and one additional channel.

The squelch shall be operational and so adjusted that the receiver just mutes on both the channels.

A test signal at the carrier frequency equal to the nominal frequency of the additional channel of the receiver, modulated by the normal test modulation (see 6.3) shall be connected to the receiver via a combining network (see 6.1). A second test signal with a frequency equal to the nominal frequency of the priority channel having no modulation shall be connected to the receiver via the other input of the combining network. The level of the two test signals shall be +12 dBμV (e.m.f.) at the receiver input.

A storage oscilloscope shall be connected to the audio output. Initially, the output of the test signal on the priority channel shall be switched off. The scanning process is started and the output observed on the oscilloscope. The gap between and the duration of the audio bursts shall be measured. Now the test signal on the priority channel shall be switched on and the scanning shall stop on the priority channel after the last burst and within the dwell time on the priority channel. The measurement shall be carried out where the additional channel is a simplex channel and repeated where it is a duplex channel.

The measurements shall be made under normal and under extreme test conditions.

Test Data

Please refer to following table:

Frequency (MHz)	Test Condition	Scanning Period (s)	Limit (s)	Dwell time on the Priority Channel (ms)	Limit (ms)	Dwell time on the Additional Channel (s)	Limit (s)
156.8	NTNV	1.2	⩽2	110	⩽150	1.4	0.85 - 2
	LTLV	1.2		110		1.4	0.85 - 2
	LTHV	1.2		110		1.4	0.85 - 2
	HTLV	1.2		110		1.4	0.85 - 2
	HTHV	1.2		110		1.4	0.85 - 2

Test Result: Compliance

32 - DSC RECEIVER MAXIMUM USEABLE SENSITIVITY

Applicable Standard

The maximum usable sensitivity of the receiver is the minimum level of the signal (e.m.f.) at the nominal frequency of the receiver which when applied to the receiver input with a test modulation will produce a bit error ratio of 10^{-2}.

Limit

The bit error ratio shall be equal to or less than 10^{-2}.

Method of Measurement

DSC standard test signal (see 6.8) containing DSC calls shall be applied to the receiver input.
The input level shall be 0 dBμV under normal test conditions (see 6.12) and +6 dBμV under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

The measurement shall be repeated under normal test conditions at the nominal carrier frequency ±1,5 kHz.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency	Test Condition	Frequency Offset	Input level	BER	Limit
(MHz)		kHz	dBμV (e.m.f)	%	
156.525	NTNV	0	0	0.15	$<10^{-2}$
		-1.5		0.18	
		1.5		0.12	
	LTLV	0	6	0.15	
	LTHV	0		0.15	
	HTLV	0		0.16	
	HTHV	0		0.16	

Test Result: Compliance

33 - DSC RECEIVER CO-CHANNEL REJECTION

Applicable Standard

The co-channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal, both signals being at the nominal frequency of the receiver.

Limit

The bit error ratio shall be equal to or less than 10^{-2}

Method of Measurement

The two input signals shall be connected to the receiver input terminal via a combining network (see 6.1). The wanted signal shall be the DSC standard test signal (see 6.8) containing DSC calls. The level of the wanted signal shall be +3 dBμV. The unwanted signal shall be modulated by 400 Hz with a deviation of ±3 kHz. Both input signals shall be at the nominal frequency of the receiver under test and the measurement shall be repeated for displacements of the unwanted signal of up to ±3 kHz.

The input level of the unwanted signal shall be –5 dBμV.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency	Frequency Offset	BER	Limit (%)
(MHz)	kHz	%	
156.525	0	0.25	≤1
	-3	0.56	
	3	0.48	

Test Result: Compliance

34 - DSC RECEIVER ADJACENT CHANNELSELECTIVITY

Applicable Standard

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal which differs in frequency from the wanted signal by 25 kHz.

Limit

The bit error ratio shall be equal to or less than 10^{-2}

Method of Measurement

The two input signals shall be connected to the receiver input terminal via a combining network (see 6.1).

The wanted signal shall be the DSC standard test signal (see 6.8) containing DSC calls. The level of the wanted signal shall be +3 dBμV under normal test conditions and +9 dBμV under extreme test conditions.

The unwanted signal shall be modulated to 400 Hz with a deviation of ±3 kHz. The unwanted signal shall be tuned to the centre frequency of the upper adjacent channel. The input level of the unwanted signal shall be 73 dBμV under normal test conditions and 63 dBμV under extreme test conditions.

The bit error ratio in the decoder output shall be determined as described in 6.9.

The measurement shall be repeated with the unwanted signal tuned to the centre frequency of the lower adjacent channel.

The measurement shall be carried out under normal test conditions (see 6.12) and under extreme test conditions (see 6.13.1 and 6.13.2 applied simultaneously).

Test Data

Please refer to following table:

Carrier Frequency (MHz)	Test Condition	Carrier frequency offset (kHz)	Bit Error Ratio (%)	Limit (%)
156.525	NTNV	-25	0.13	≤1
		25	0.13	
	LTHV	-25	0.19	
		25	0.19	
	LTLV	-25	0.19	
		25	0.19	
	HTLV	-25	0.22	
		25	0.22	
	HTHV	-25	0.23	
		25	0.22	

Test Result: Compliance

35 - DSC RECEIVER SPURIOUS RESPONSE AND BLOCKING IMMUNITY

Applicable Standard

The spurious response and blocking immunity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal with frequencies outside the pass band of the receiver.

Limit

The bit error ratio shall be equal to or less than 10^{-2}

Method of Measurement

The two input signals shall be connected to the receiver input terminal via a combining network (see 6.1).

The wanted signal shall be the DSC standard test signal (see 6.8) containing DSC calls. The level of the wanted signal shall be +3 dBμV.

For the spurious response test, the unwanted signal shall be unmodulated. The frequency shall be varied over the range 9 kHz to 2 GHz with the exception of the channel of the wanted signal and its adjacent channels. The unwanted signal level shall be 73 dBμV. Where spurious response occurs, the bit error ratio shall be determined. For the blocking test, the unwanted signal shall be unmodulated. The frequency shall be varied between –10 MHz and –1 MHz and also between +1 MHz and +10 MHz relative to the nominal frequency of the wanted signal. The unwanted signal shall be at a level of 93 dBμV. Where blocking occurs, the bit error ratio shall be determined.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency (MHz)	Frequency Offset (MHz)	BER (%)	Limit (%)
156.525	-10	0.11	≤1
	-1	0.14	
	1	0.24	
	10	0.24	
	9 kHz~2 GHz	0.32	

Test Result: Compliance

36 - DSC RECEIVER INTER-MODULATION RESPONSE

Applicable Standard

The intermodulation response is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

Limit

The bit error ratio shall be equal to or less than 10^{-2}.

Method of Measurement

The three input signals shall be connected to the receiver input terminal via a combining network (see 6.1).

The wanted signal represented by signal generator A shall be at the nominal frequency of the receiver and shall be the DSC standard test signal (see 6.8) containing DSC calls. The level of the wanted signal shall be +3 dBμV.

The unwanted signals shall be applied, both at the same level. The unwanted signal from signal generator B shall be unmodulated and adjusted to a frequency 50 kHz above (or below) the nominal frequency of the receiver. The second unwanted signal from signal generator C shall be modulated by 400 Hz with a deviation of ±3 kHz and adjusted to a frequency 100 kHz above (or below) the nominal frequency of the receiver.

The input level of the unwanted signals shall be 68 dBμV.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency (MHz)	BER (%) (worst case)	Limit (%)
156.525MHz	0.21	≤1

Test Result: Compliance

37 - DSC RECEIVER DYNAMIC RANGE

Applicable Standard

The dynamic range of the equipment is the range from the minimum to the maximum level of a radio frequency input signal at which the bit error ratio in the output of the decoder does not exceed a specified value.

Limit

The bit error ratio shall be equal to or less than 10^{-2}.

Method of Measurement

A test signal in accordance with the DSC standard test signal (see 6.8) containing consecutive DSC calls, shall be applied to the receiver input. The level of the test signal shall alternate between 100 dBμV and 0 dBμV.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency (MHz)	BER (%)	Limit (%)
156.525	0.28	⩽1

Test Result: Compliance

38 - VERIFICATION OF CORRECT DECODING OF VARIOUS TYPES OF DSC CALLS

Applicable Standard

DSC call sequences are calls that comply with ITU-R Recommendation M.493-10.

Limit

The requirements of ITU-R Recommendation M.493-10 regarding message composition and content shall be met.

The decoded call sequences at the output of the receiver shall be examined for correct technical format, including error-check characters.

When receiver measurements are made by use of a printer or a computer, a check shall be made to ensure accordance between printer output and display indication.

It shall be verified that the equipment is capable of switching to a channel identified in the DSC call.

The telecommands used and channels tested for switching shall be stated in the test report.

Method of Measurement

The input terminal of the receiver shall be suitably connected to a calibrated apparatus for generation of digital selective call signals.

DSC calls as specified in annex A shall be applied to the receiver.

Test Data

Please refer to following table:

Format Specifier	Category	1st telecommand (Symbol No.)	2st telecommand (Symbol No.)
Distress	/	100	126
All Ships	Urgency	100	126
All Ships	Safety	100	126
Individual	Urgency	100	126
Individual	Safety	100	126
Individual	Routine	100	126
Group	Routine	100	126

Test Result: Compliance

39 - REACTION TO VTS AND AIS CHANNEL MANAGEMENT DSC TRANSMISSIONS

Applicable Standard

VTS and AIS channel management DSC transmissions are any DSC transmissions that are in accordance with Recommendation ITU-R M.825 or M.1371.

Limit

The equipment shall not sound an alarm, display a message (an accurate, informative display is permissible but not required), transmit a response or suggest a transmitted response, lock up, or require operator intervention.

Method of Measurement

The input terminal of the receiver shall be connected as per 10.8.2. DSC polling and regional channel management in accordance with Annex 3 of ITU-R M.1371-1 shall be applied to the receiver. A DSC transmission of format specifier symbol 112 and then with 116, category symbol 103, and otherwise similar to a distress call described in Table 4 of ITU-R M.493-10 shall also be made.

Test Data

Please refer to following table:

Items	Confirm (Y or N)
Not sound an alarm	Y
Not display a message (An accurate informative display is permissible but not required)	Y
Not transmit a response	Y
Not suggest a transmitted response	Y
Not lock up	Y
Not require operator intervention	Y

Test Result: Compliance

40 - DSC RECEIVER SIMULTANEOUS RECEPTION

Applicable Standard

Simultaneous reception is the ability of the unit to correctly receive DSC traffic and radiotelephony traffic at the same time.

Limit

For radiotelephony operation the SINAD ratio shall be no less than 20 dB in the presence of the DSC test signal.

The DSC bit error ratio shall be equal to or less than 10^{-2}.

Method of Measurement

The radiotelephone shall be set for operation on channel 16.

Two input signals shall be connected to the receiver input terminal via combining network (see 6.1).

The radiotelephone test signal shall be at a carrier frequency equal to the nominal frequency of the receiver, modulated by the normal test modulation (see 6.3) shall be applied to the receiver input.

An audiofrequency load and a measuring instrument for measuring SINAD ratio (through a psophometric network as specified in 9.3.1) shall be connected to the receiver output terminals.

The radiotelephone test signal level shall be set for 20 dBμV.

The SINAD shall be measured with and without the presence of the DSC test signal.

The DSC standard test signal input level shall be 0 dBμV (see 6.8) containing DSC calls.

The bit error ratio in the decoder output shall be determined as described in 6.9.

Test Data

Please refer to following table:

Frequency	SINAD (dB)		BER Measured Value (%)	BER Limit (%)
(MHz)	Measure Value	Limit		
156.8	25	≥20	0.30	≤1

Test Result: Compliance

42 - RECOMMENDED STANDARDS FOR EQUIPMENT OPERATING IN HIGH LEVEL ELECTROMAGNETIC ENVIRONMENTS

Applicable Standard

In some areas of the world, high power transmitters are located in close proximity to navigable waterways which can produce large power levels ranging from typically –40 dBm to –10 dBm. This has been observed, for instance, in the New Orleans/Baton Rouge waterway areas in the USA. Such power levels generate in-band nonlinear reactions, such as desensitization or intermodulation in the receiver input of greater severity than those anticipated by the blocking and intermodulation tests of this standard.

Equipment intended for use in such areas is recommended to meet the requirements of the test below. Receivers meeting the requirements below should be capable of useful reception in such environments better than 95 % of the time.

Optional circuitry accessible by operator, for example a switched RF attenuator, may be used to meet the limits required by the test.

Limit

The SINAD ratio of the radio receiver tuned to the wanted frequency of 156,650 MHz. at the receiver audiofrequency output, psophometrically weighted, shall indicate a level no less than 14 dB, averaged over a 1 min measurement interval.

Method of Measurement

Please refer to IEC 62238 §D.2 for the measurement method.

Test Data

Please refer to following table:

Frequency (MHz)	SINAD Ratio Result (dB)	Limit (dB)
156.65	18.5	≥14dB

Test Result: Compliance

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the attachment 2502Q19430E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2502Q19430E-RF-INP EUT INTERNAL PHOTOGRAPHS

EXHIBIT B - TEST SETUP PHOTOGRAPHS

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