



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR220900324305

Page: 1 of 31

TEST REPORT

Application No. : SZCR2209003243AT
Applicant: Navico Auckland Ltd.
Address of Applicant: 44 Arrenway Drive, Rosedale, Auckland 0632, New Zealand
Manufacturer: Navico Auckland Ltd.
Address of Manufacturer: 44 Arrenway Drive, Rosedale, Auckland 0632, New Zealand
Factory: Shenzhen Fastrain Technology Co., Ltd.
Address of Factory: No.3 Baolong 4th Rd., Baolong Industrial Area, Longgang District, Shenzhen, China
Equipment Under Test (EUT):
EUT Name: MARINE BLACK BOX DSC/AIS VHF RADIO SYSTEM
Model No.: NRS-1, NRS-2 ♣
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark: NAVICO
Standards: EN 301 025 V2.2.1
ITU-R M.493-15(01/2019)
IEC62238:2003
Date of Receipt: 2022-09-21
Date of Test: 2022-11-07 to 2022-11-22
Date of Issue: 2022-11-30

Test Result :	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch EMC Laboratory

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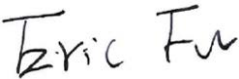
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Report No.: SZCR220900324305

Page: 2 of 31

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-11-30		Original

Authorized for issue by:				
				
		Edison Li /Project Engineer		
				
		Eric Fu /Reviewer		



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2 Test Summary

Transmitter				
Item	Standard	Method	Requirement	Result
Frequency error	EN 301 025 V2.2.1	EN 301 025 clause 8.1.2	EN 301 025 clause 8.1.3	Pass
Carrier power	EN 301 025 V2.2.1	EN 301 025 clause 8.2.2	EN 301 025 clause 8.2.3	Pass
Frequency deviation	EN 301 025 V2.2.1	EN 301 025 clause 8.3.2.1 & 8.3.3.1	EN 301 025 clause 8.3.2.2 & 8.3.3.2	Pass
Audio frequency response	EN 301 025 V2.2.1	EN 301 025 clause 8.5.2	EN 301 025 clause 8.5.3	Pass
Audio frequency harmonic distortion of the emission	EN 301 025 V2.2.1	EN 301 025 clause 8.6.2	EN 301 025 clause 8.6.3	Pass
Modulation index for DSC	EN 301 025 V2.2.1	EN 301 025 clause 8.13.2	EN 301 025 clause 8.13.3	Pass
Modulation rate for DSC	EN 301 025 V2.2.1	EN 301 025 clause 8.14.2	EN 301 025 clause 8.14.3	Pass

Radiotelephone receiver				
Harmonic distortion and rated audio-frequency output power	EN 301 025 V2.2.1	EN 301 025 clause 9.1.2	EN 301 025 clause 9.1.3	Pass
Audio frequency response	EN 301 025 V2.2.1	EN 301 025 clause 9.2.2	EN 301 025 clause 9.2.3	Pass
Blocking or desensitization	EN 301 025 V2.2.1	EN 301 025 clause 9.8.2	EN 301 025 clause 9.8.3	Pass

Receiver for DSC decoder				
Maximum usable sensitivity	EN 301 025 V2.2.1	EN 301 025 clause 10.1.2	EN 301 025 clause 10.1.3	Pass

N/A: Not applicable.





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SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR220900324305

Page: 4 of 31

Remark:

Model No.: NRS-1, NRS-2

The model NRS-1 and NRS-2 was tested fully, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only differences are the trade name, model no. and AIS board(NRS2 has AIS board inside the main unit and while NRS-1 not).

This test report (Ref. No.: SZCR220900324305) is only valid with the original test report (Ref. No.: SZEM210300219605).

According to the declaration from the applicant, review this report and original report, this report just replaces the MCU, but the specification is the same as previous, the models in this report and models in original report were identical, only difference with being the supplier of the MCU, considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report, the test items in the above table were fully retested on Model NRS-2 and shown the data in this report, other tests please refer to original report SZEM210300219605.



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3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	5
4 GENERAL INFORMATION	7
4.1 DETAILS OF E.U.T.	7
4.2 DESCRIPTION OF SUPPORT UNITS	8
4.3 TEST ENVIRONMENT	8
4.4 MEASUREMENT UNCERTAINTY	9
4.5 TEST LOCATION	10
4.6 TEST FACILITY	10
4.7 DEVIATION FROM STANDARDS	10
4.8 ABNORMALITIES FROM STANDARD CONDITIONS	10
5 EQUIPMENT LIST	11
6 RADIO SPECTRUM MATTER TEST RESULTS	12
6.1 FREQUENCY ERROR	12
6.1.1 E.U.T. Operation	12
6.1.2 Test Setup Diagram	12
6.1.3 Measurement Data	12
6.2 CARRIER POWER	13
6.2.1 E.U.T. Operation	13
6.2.2 Test Setup Diagram	13
6.2.3 Measurement Data	13
6.3 FREQUENCY DEVIATION	14
6.3.1 E.U.T. Operation	14
6.3.2 Test Setup Diagram	14
6.3.3 Measurement Data	14
6.4 AUDIO FREQUENCY RESPONSE	15
6.4.1 E.U.T. Operation	16
6.4.2 Test Setup Diagram	16
6.4.3 Measurement Data	16
6.5 AUDIO FREQUENCY HARMONIC DISTORTION OF THE EMISSION	17
6.5.1 E.U.T. Operation	17
6.5.2 Test Setup Diagram	17
6.5.3 Measurement Data	17
6.6 MODULATION INDEX FOR DSC	18
6.6.1 E.U.T. Operation	18
6.6.2 Test Setup Diagram	18



6.6.3	Measurement Data	18
6.7	MODULATION RATE FOR DSC	19
6.7.1	E.U.T. Operation	19
6.7.2	Test Setup Diagram	19
6.7.3	Measurement Data	19
6.8	HARMONIC DISTORTION AND RATED AUDIO-FREQUENCY OUTPUT POWER	20
6.8.1	E.U.T. Operation	20
6.8.2	Test Setup Diagram	20
6.8.3	Measurement Data	20
6.9	AUDIO FREQUENCY RESPONSE	21
6.9.1	E.U.T. Operation	22
6.9.2	Test Setup Diagram	22
6.9.3	Measurement Data	22
6.10	BLOCKING OR DESENSITIZATION	23
6.10.1	E.U.T. Operation	23
6.10.2	Test Setup Diagram	23
6.10.3	Measurement Data	23
6.11	MAXIMUM USABLE SENSITIVITY	24
6.11.1	E.U.T. Operation	24
6.11.2	Test Setup Diagram	24
6.11.3	Measurement Data	24
7	PHOTOGRAPHS	25
7.1	TEST SETUP	25
7.2	EUT CONSTRUCTIONAL DETAILS	25
8	APPENDIX	26
8.1	APPENDIX A---EN301 025 TEST DATA	26



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4 General Information

4.1 Details of E.U.T.

EUT Name:	MARINE BLACK BOX DSC/AIS VHF RADIO SYSTEM
Model No.:	NRS-1, NRS-2
Power supply:	12 VDC battery system
Cable:	DC cable: longer than 300cm unshielded
Sample Type:	Mobile device
Internal Source:	More than 108MHz
Transmitter Frequency Range:	VHF:156.025MHz-157.425MHz
Receiver Frequency Range:	156.05MHz-163.275MHz
AIS Transmitter Frequency Range:	161.975MHz(CH87), 162.025MHz(CH88)
DSC Transmitter Frequency Range:	156.525MHz(CH70)
Modulation Type:	VHF:FM for Analog; DSC:FSK; AIS:GMSK;
Frequency Spacing:	VHF:25KHz
Emission Type:	16K0G3E for VHF; 16K0G2B for DSC;
Rated Output Power:	25W/1W for VHF/DSC; 2W for AIS;
VHF/DSC Antenna Connectors:	SO-239(50ohm, Dipole antenna)
AIS Antenna Connectors:	SO-239(50ohm, Dipole antenna)
VHF/DSC Antenna Gain:	6dBi
AIS Antenna Gain:	6dBi

Test Channel

Modulation Type	Channel Separation	Test Channel	Test Frequency (MHz)	
			TX	RX
FM	25KHz	L	156.025	156.050
		M(Channel 16)	156.800	156.800
		H	157.425	163.275
FSK		Channel 70	156.525	156.525



4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC power	ZHAOXIN	RXN-305D	REF. No.SEA2700
Coaxial Attenuator	Provided by client	TS4	HYT168793
Wired Handset	SIMRAD	HS100	/
Wired Speaker	/	SP100	/

4.3 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
TNVN	25	12
TLVL	-20	10.8
TLVH	-20	15.6
THVL	55	10.8
THVH	55	15.6

Note:

- The EUT just work in such extreme temperature of -20°C~+55°C and the extreme voltage of 10.8V~15.6V, so here the EUT is tested in the temperature of -20°C~+55°C and the voltage of 10.8V~15.6V.
- | | |
|----------------------------------|-----------------------------------|
| VN: Normal Voltage | TN: Normal Temperature |
| VL: Low Extreme Test Voltage | VH: High Extreme Test Voltage |
| TL: Low Extreme Test Temperature | TH: High Extreme Test Temperature |



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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25×10^{-8}
3	Duty cycle	0.37%
4	Occupied Bandwidth	3%
5	RF conducted power	0.75dB
6	Conducted Spurious emissions	0.75dB
7	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
8	Temperature test	1°C
9	Humidity test	3%
10	Supply voltages	1.5%
11	Time	3%



4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

RF conducted test					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	AUDIX	N/A	SEM001-08	2022-05-14	2025-05-13
EXA Signal Analyzer	KEYSIGHT	N9010A	SEM004-09	2022-04-07	2023-04-06
DC Power Supply	KEYSIGHT	E3642A	SEM011-07	2022-03-22	2023-03-21
Manual Step Attenuator	KEYSIGHT	8494B	SEM021-05	2022-04-07	2023-04-06
Manual Step Attenuator	KEYSIGHT	8496B	SEM021-06	2022-04-07	2023-04-06
Power Sensor	TST PASS	TSPS2023R	SEM009-22	2022-09-21	2023-09-20
Power Sensor	TST PASS	TSPS2023R	SEM009-23	2022-09-21	2023-09-20
Power Sensor	TST PASS	TSPS2023R	SEM009-24	2022-09-21	2023-09-20
Power Sensor	TST PASS	TSPS2023R	SEM009-25	2022-09-21	2023-09-20
Programmable Temperature&Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022-03-22	2023-03-21
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM028-01	2022-07-08	2023-07-07
Vector Signal Generator	Rohde & Schwarz	SMW200A	SEM006-19	2022/10/8	2023/10/7
Audio Analyzer	Rohde&Schwarz	UPV	SEM008-03	2022/9/20	2023/9/19

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2022-09-04	2023-09-03
Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-09	2022-09-04	2023-09-03
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2022-03-28	2023-03-27



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6 Radio Spectrum Matter Test Results

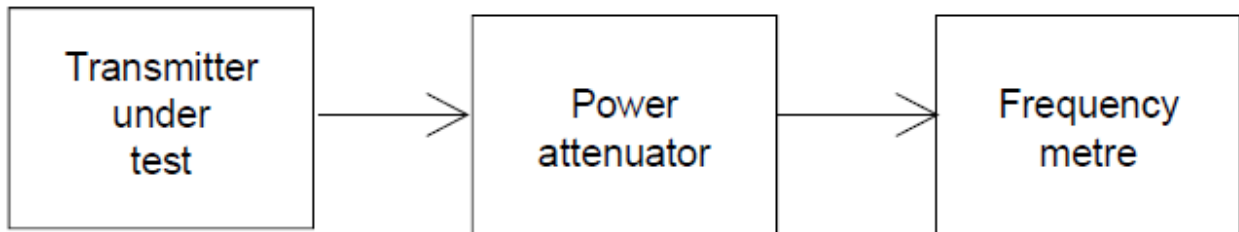
6.1 Frequency error

Test Requirement: EN 301 025 clause 8.1.3
 Test Method: EN 301 025 clause 8.1.2
 Limit: The frequency error shall be within $\pm 1,5$ kHz.

6.1.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

The detailed test data see: Appendix 301 025.

6.2 Carrier power

Test Requirement: EN 301 025 clause 8.2.3

Test Method: EN 301 025 clause 8.2.2

Limit: **Normal test conditions**

The rated output power of the equipment shall be between 6 W and 25 W.

With the output power switch set at maximum, the carrier power shall be within $\pm 1,5$ 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.

The maximum continuous transmission time shall be between 5 min and 6 min.

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.

The maximum continuous transmission time shall be between 5 min and 6 min.

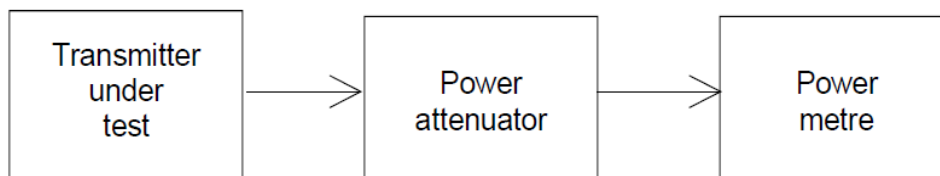
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.2.2 Test Setup Diagram



6.2.3 Measurement Data

The detailed test data see: Appendix 301 025.



6.3 Frequency deviation

Test Requirement	EN 301 025 clause 8.3.2.2 & 8.3.3.2
Test Method:	EN 301 025 clause 8.3.2.1 & 8.3.3.1
Limit:	The maximum permissible frequency deviation shall be: • 25 kHz channels: ± 5 kHz. • 12,5 kHz channels: $\pm 2,5$ kHz.

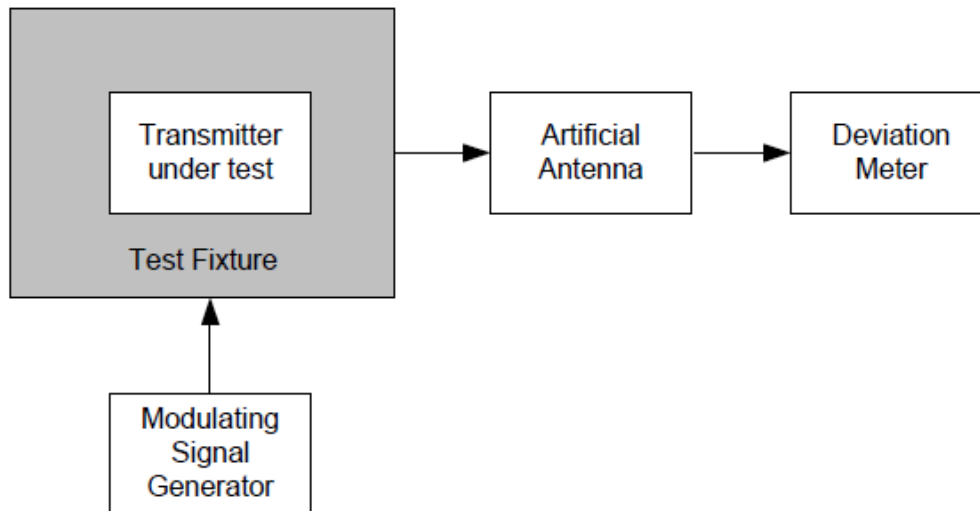
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.3.2 Test Setup Diagram



6.3.3 Measurement Data

The detailed test data see: Appendix 301 025.



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6.4 Audio frequency response

Test Requirement EN 301 025 clause 8.5.3
 Test Method: EN 301 025 clause 8.5.2
 Limit: The audio frequency response shall be within +1 dB and -3 dB of a 6 dB/octave line passing through the reference point. The upper limit frequency shall be 2,55 kHz for 12,5 kHz channels.

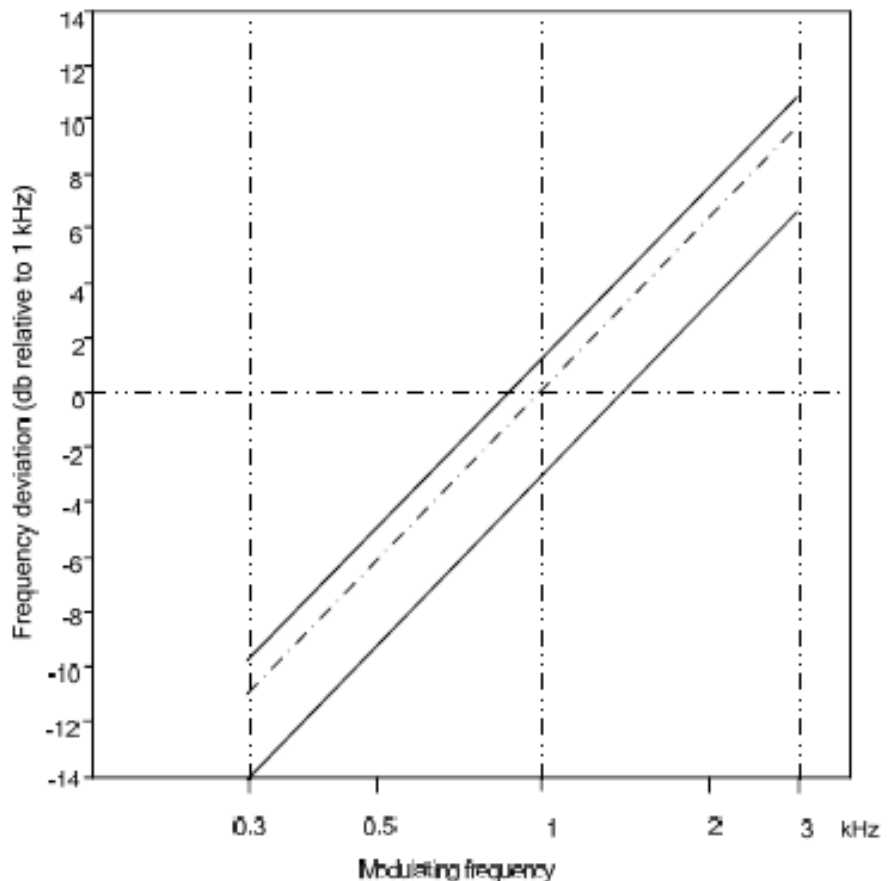


Figure 2: Audio frequency response



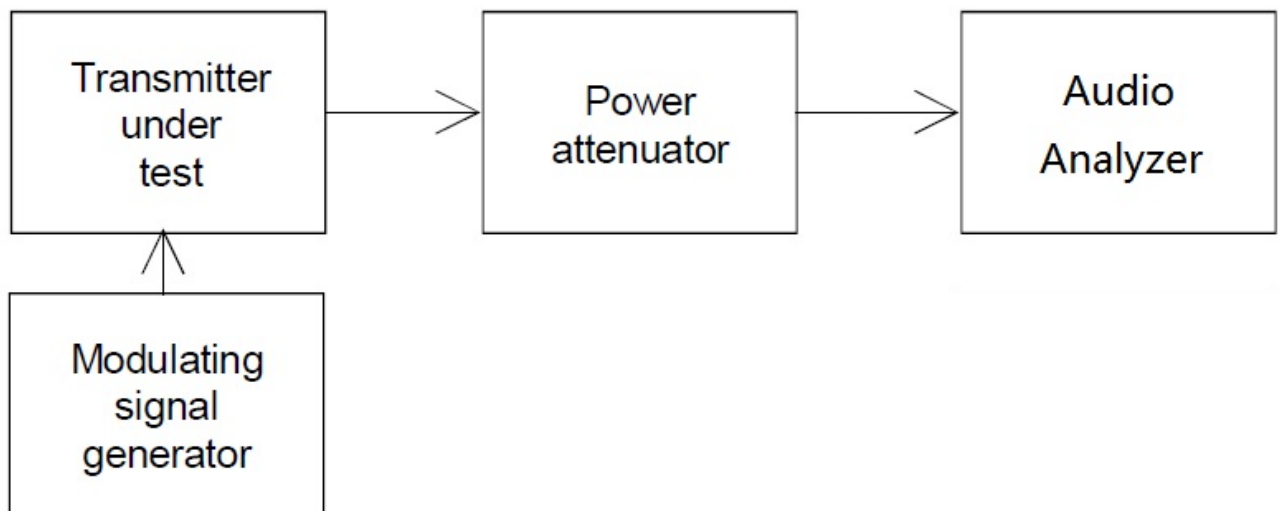
6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.4.2 Test Setup Diagram



6.4.3 Measurement Data

The detailed test data see: Appendix 301 025.



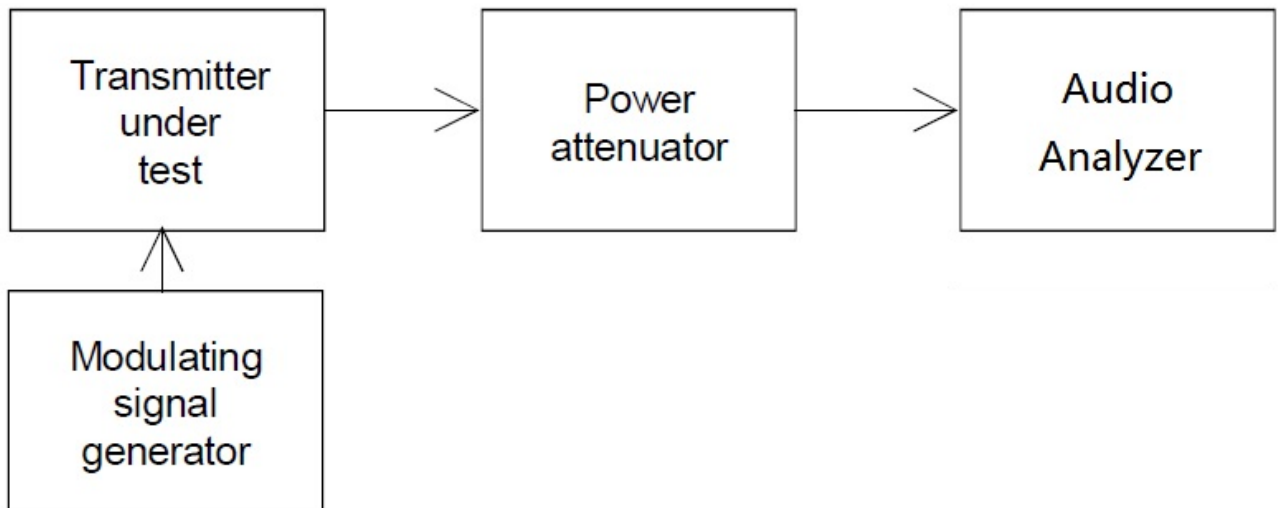
6.5 Audio frequency harmonic distortion of the emission

Test Requirement EN 301 025 clause 8.6.3
 Test Method: EN 301 025 clause 8.6.2
 Limit: The harmonic distortion shall not exceed 10 %.

6.5.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.5.2 Test Setup Diagram



6.5.3 Measurement Data

The detailed test data see: Appendix 301 025.

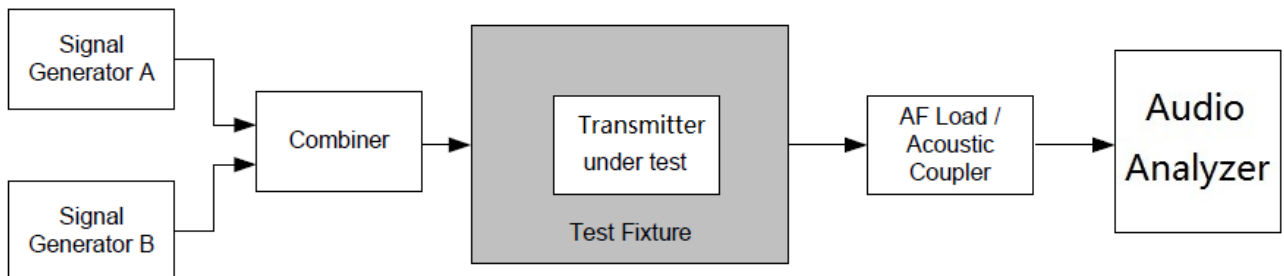
6.6 Modulation index for DSC

Test Requirement: EN 301 025 clause 8.13.3
 Test Method: EN 301 025 clause 8.13.2
 Limit: The modulation index shall be $2,0 \pm 10 \%$.

6.6.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.6.2 Test Setup Diagram



6.6.3 Measurement Data

The detailed test data see: Appendix 301 025.



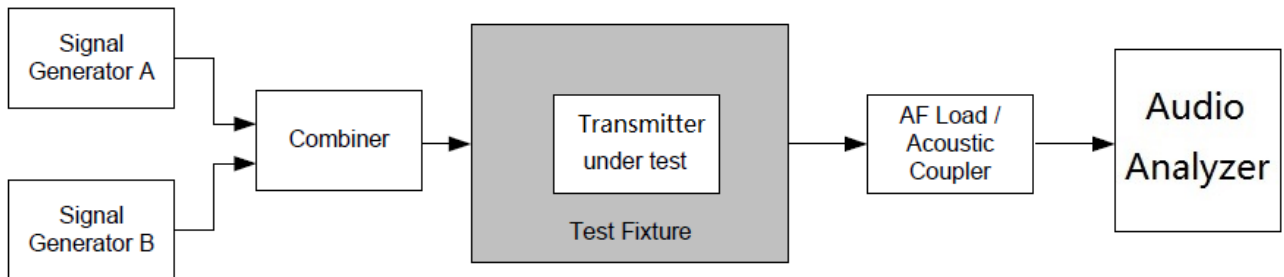
6.7 Modulation rate for DSC

Test Requirement: EN 301 025 clause 8.14.3
 Test Method: EN 301 025 clause 8.14.2
 Limit: The frequency shall be 600 Hz $\pm$ 30 ppm corresponding to a modulation rate of 1 200 baud.

6.7.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 20: TX mode, Keep the EUT in transmitting mode.

6.7.2 Test Setup Diagram



6.7.3 Measurement Data

The detailed test data see: Appendix 301 025.



6.8 Harmonic distortion and rated audio-frequency output power

Test Requirement: EN 301 025 clause 9.1.3
 Test Method: EN 301 025 clause 9.1.2
 Limit: The rated audio-frequency output power shall be at least:

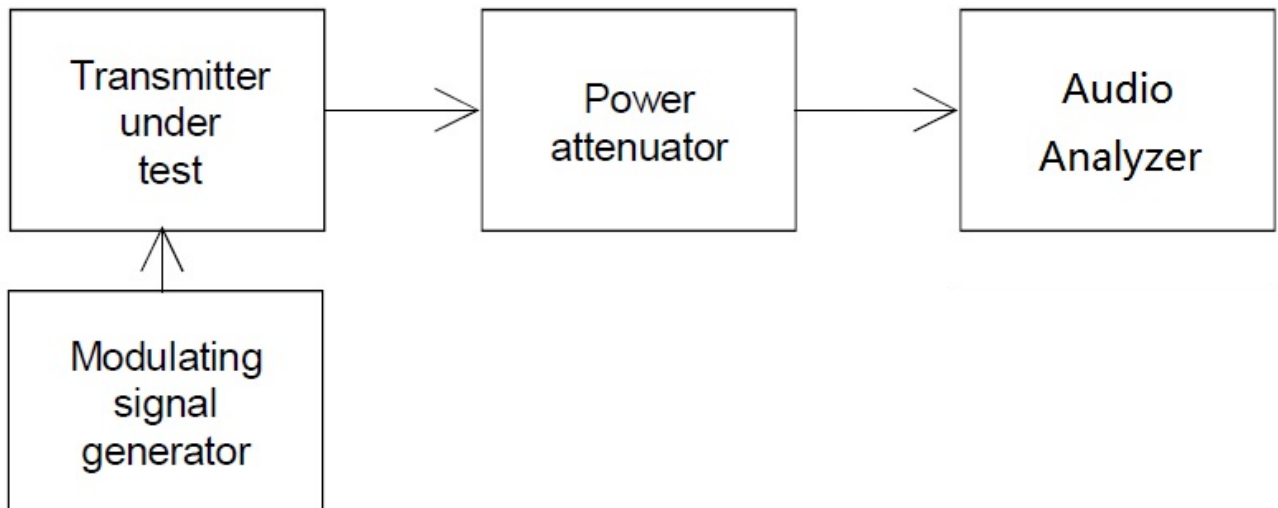
- 2 W in a loudspeaker;
- 1 mW in the handset earphone.

The harmonic distortion shall not exceed 10 %.

6.8.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 21: RX mode, Keep the EUT in receiving mode.

6.8.2 Test Setup Diagram



6.8.3 Measurement Data

The detailed test data see: Appendix 301 025.



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6.9 Audio frequency response

Test Requirement: EN 301 025 clause 9.2.3

Test Method: EN 301 025 clause 9.2.2

Limit: The audio frequency response shall not deviate by more than +1 dB or -3 dB from a characteristic giving the output level as a function of the audio frequency, decreasing by 6 dB per octave and passing through the measured point at 1 kHz (see figure 5).

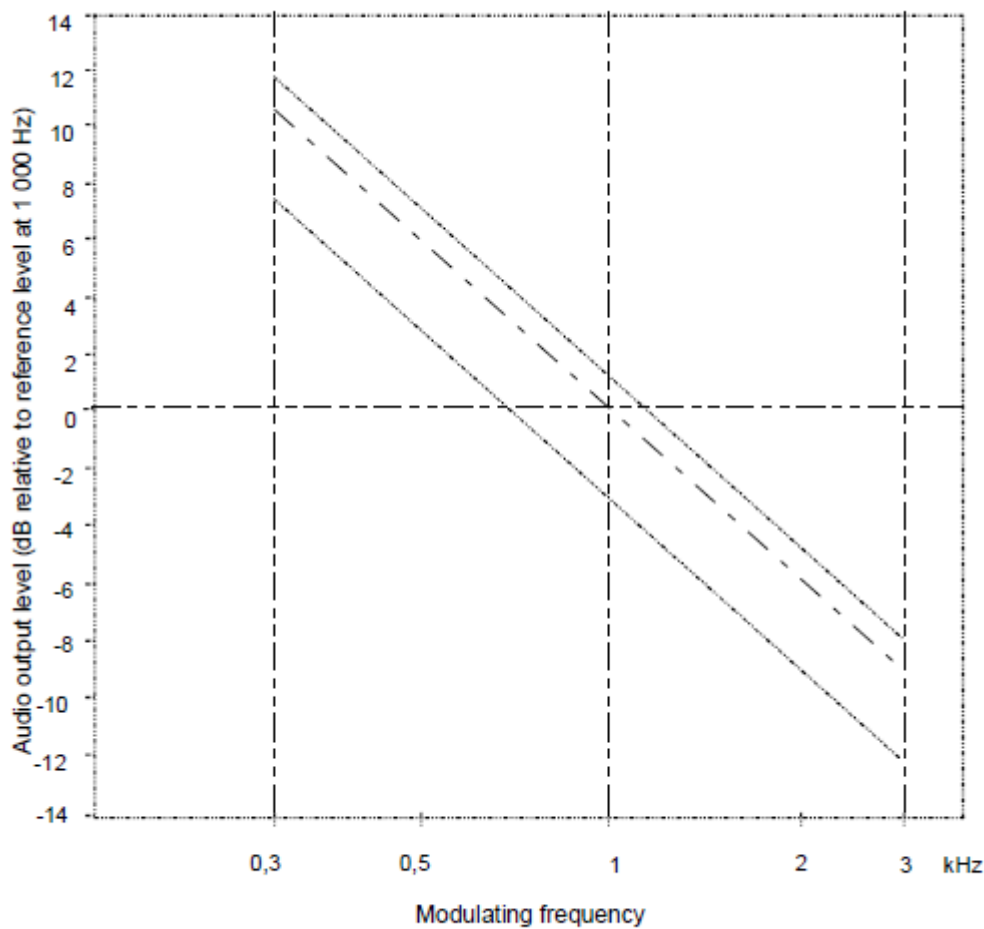


Figure 5: Audio frequency response



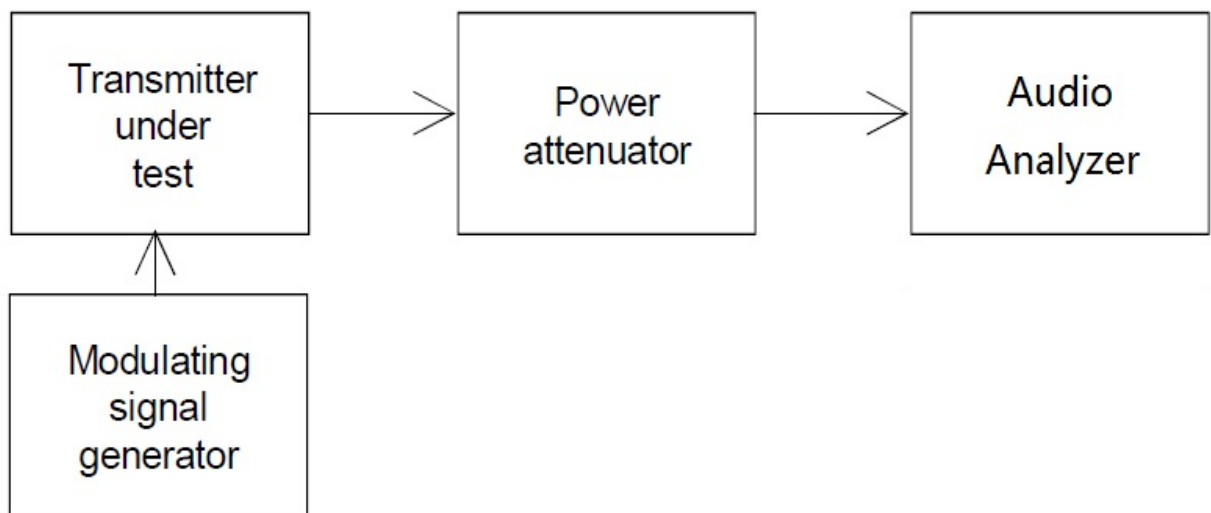
6.9.1 E.U.T. Operation

Operating Environment:

Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

Test mode: 21: RX mode, Keep the EUT in receiving mode.

6.9.2 Test Setup Diagram



A test signal of +60 dB μ V (e.m.f.), at a carrier frequency equal to the nominal frequency of the receiver and modulated with normal test modulation (see clause 6.4) shall be applied to the receiver antenna port under the conditions specified in clause 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 clause 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.

6.9.3 Measurement Data

The detailed test data see: Appendix 301 025.



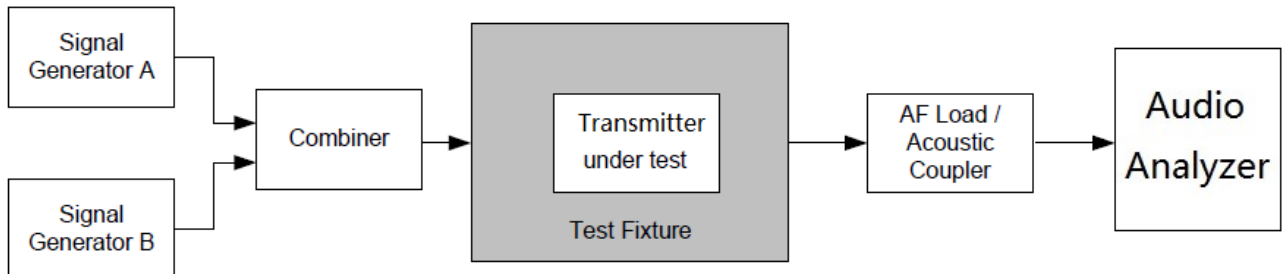
6.10 Blocking or desensitization

Test Requirement	EN 301 025 clause 9.8.3
Test Method:	EN 301 025 clause 9.8.2
Limit:	The blocking level for any frequency within the specified ranges, shall be not less than 90 dBuV (e.m.f.), except at frequencies on which spurious responses are found.

6.10.1 E.U.T. Operation

Operating Environment:					
Temperature:	22.1 °C	Humidity:	53.6 % RH	Atmospheric Pressure:	1015 mbar
Test mode:	21: RX mode, Keep the EUT in receiving mode.				

6.10.2 Test Setup Diagram



6.10.3 Measurement Data

The detailed test data see: Appendix 301 025.

6.11 Maximum usable sensitivity

Test Requirement: EN 301 025 clause 10.1.3
 Test Method: EN 301 025 clause 10.1.2
 Limit: The bit error ratio shall be equal to or less than 10^{-2} .

6.11.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.1 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar
 Test mode: 21: RX mode, Keep the EUT in DSC receiving mode.

6.11.2 Test Setup Diagram

DSC standard test signal containing DSC calls shall be applied to the receiver input. The input level shall be 0 dBuV under normal test conditions and +6 dBuV under extreme test conditions.

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.

6.11.3 Measurement Data

The detailed test data see: Appendix 301 025.



7 Photographs

7.1 Test Setup



7.2 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZCR2209003243AT

8 Appendix

8.1 Appendix A---EN301 025 Test data.

1. Transmitter/Frequency error

Test Frequency (MHz)	Temperature (°C)	Power Supplied (V Dc)	Measured Result for High Power (KHz)	Measured Result for Low Power (KHz)	Limit (KHz)	Verdict
Normal condition						
156.8	Tnor=25	Vnor=12	0.011	0.015	±1.5	Pass
Extreme condition						
156.8	Tmin=-20	Vmin=10.8	0.010	0.012	±1.5	Pass
	Tmin =-20	Vmax=15.6	0.011	0.011	±1.5	Pass
	Tmax=55	Vmin=10.8	0.012	0.010	±1.5	Pass
	Tmax =55	Vmax=15.6	0.010	0.011	±1.5	Pass

2. Transmitter/Carrier power

Unknown carrier power.

Test Channel	Temperature (°C)	Power Supplied (V Dc)	Channel Separation (KHz)	Measured Result (dBm)	Limit (dBm)	Verdict
Highest RF output power (conducted)						
Normal condition						
L	Tnor=25	Vnor=12	25	42.1	42.48±1.5	Pass
M				42.4	42.48±1.5	Pass
H				42.5	42.48±1.5	Pass
Extreme condition						
L	Tmin=-20	Vmin=10.8	25	43.6	41.98+2,-3	Pass
	Tmin =-20	Vmax=15.6		43.5	41.98+2,-3	Pass



	Tmax=55	Vmin=10.8		42.7	41.98+2,-3	Pass
	Tmax =55	Vmax=15.6		42.8	41.98+2,-3	Pass
M	Tmin=-20	Vmin=10.8		43.5	41.98+2,-3	Pass
	Tmin =-20	Vmax=15.6		43.2	41.98+2,-3	Pass
	Tmax=55	Vmin=10.8		42.9	41.98+2,-3	Pass
	Tmax =55	Vmax=15.6		42.7	41.98+2,-3	Pass
H	Tmin=-20	Vmin=10.8		42.9	41.98+2,-3	Pass
	Tmin =-20	Vmax=15.6		42.8	41.98+2,-3	Pass
	Tmax=55	Vmin=10.8		42.4	41.98+2,-3	Pass
	Tmax =55	Vmax=15.6		42.6	41.98+2,-3	Pass
Lowest RF output power (conducted)						
Normal condition						
L	Tnor=25	Vnor=12	25	29.4	20~30dBm	Pass
M				29.5	20~30dBm	Pass
H				29.4	20~30dBm	Pass
Extreme condition						
L	Tmin=-20	Vmin=10.8	25	29.6	20~30dBm	Pass
	Tmin =-20	Vmax=15.6		29.7	20~30dBm	Pass
	Tmax=55	Vmin=10.8		29.5	20~30dBm	Pass
	Tmax =55	Vmax=15.6		29.7	20~30dBm	Pass
M	Tmin=-20	Vmin=10.8		29.6	20~30dBm	Pass
	Tmin =-20	Vmax=15.6		29.5	20~30dBm	Pass
	Tmax=55	Vmin=10.8		29.5	20~30dBm	Pass
	Tmax =55	Vmax=15.6		29.7	20~30dBm	Pass
H	Tmin=-20	Vmin=10.8		29.4	20~30dBm	Pass
	Tmin =-20	Vmax=15.6		29.6	20~30dBm	Pass
	Tmax=55	Vmin=10.8		29.6	20~30dBm	Pass
	Tmax =55	Vmax=15.6		29.7	20~30dBm	Pass

Note: The rated high power: 25W=43.98dBm, The rated low power: 1W=30dBm



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3. Transmitter/Frequency deviation

Test Frequency (MHz)	Modulation Frequency (Hz)	Input level	Maximum Deviation(KHz)		Limit (KHz)	Verdict
			High Power	Low Power		
156.8	100	20dB 3KHz	2.44	2.18	±5.0	Pass
	200	20dB 3KHz	1.74	1.28	±5.0	Pass
	300	20dB 3KHz	1.48	1.67	±5.0	Pass
	400	20dB 3KHz	2.19	2.03	±5.0	Pass
	500	20dB 3KHz	2.77	2.84	±5.0	Pass
	1000	20dB 3KHz	3.47	3.52	±5.0	Pass
	1500	20dB 3KHz	3.66	3.73	±5.0	Pass
	2000	20dB 3KHz	3.29	3.59	±5.0	Pass
	2500	20dB 3KHz	3.88	3.71	±5.0	Pass
	3000	20dB 3KHz	3.31	3.24	±5.0	Pass

4. Transmitter/Audio Frequency Response

Test Frequency (MHz)	Modulation Frequency (Hz)	Upper Limit	Lower Limit	Modulation Index(dB) Relative. To 1KHz	Verdict
156.8	300	-9.5	-13.5	-9.53	Pass
	500	-5	-9	-5.26	Pass
	800	-0.9	-4.9	-1.75	Pass
	1000	1	-3	0	Pass
	1500	4.5	0.5	3.19	Pass
	1800	6.1	2.1	5.77	Pass
	2000	7	3	5.34	Pass
	2500	9	5	7.71	Pass
	3000	10.5	6.5	7.86	Pass



5. Transmitter/Audio frequency harmonic distortion of the emission

Test Frequency (MHz)	Temperature (°C)	Power Supplied (V Dc)	Modulation Frequency (Hz)	AF Distortion(%)		Limit (%)	Verdict
				High Power	Low Power		
Normal condition							
156.8	Tnor=25	Vnor=12	300	1.5	1.5	≤10	Pass
			500	1.5	1.5	≤10	Pass
			1000	1.6	1.6	≤10	Pass
Extreme condition							
156.8	Tmin=-20	Vmin=10.8	1000	1.6	1.6	≤10	Pass
	Tmin =-20	Vmax=15.6	1000	1.6	1.6	≤10	Pass
	Tmax=55	Vmin=10.8	1000	1.6	1.6	≤10	Pass
	Tmax =55	Vmax=15.6	1000	1.6	1.6	≤10	Pass

6. Transmitter/Modulation index for DSC

Test State	Temperature (°C)	Power Supplied (V Dc)	Measured Frequency (Hz)	Modulation index	Measured Result (Hz)	Verdict
Normal condition, Assigned Frequency:156.525MHz(Channel 70)						
B-state	Tnor=25	Vnor=12	2100	2±10%	4080	Pass
Y-state	Tnor=25	Vnor=12	1300	2±10%	2560	Pass

7. Transmitter/Modulation rate for DSC

Test Frequency (MHz)	Temperature (°C)	Power Supplied (V Dc)	Modulation Rate (bit/s)	Frequency Error (ppm)	Limit (ppm)	Verdict
156.525	Tnor=25	Vnor=12	1200	11	≤30	Pass



8. Receiver/Harmonic distortion and rated audio-frequency output power

Signal Level (dbuV)	Modulation Frequency (Hz)	AF Loudspeaker		Limit		Verdict
		Pout(W)	Dist.(%)	Output Power(W)	AF Distortion (%)	
Normal condition, Assigned Frequency:156.8MHz						
60	300	4.4	0.6	>2	≤10	Pass
	500	6.9	0.6	>2	≤10	Pass
	1000	6.1	1.3	>2	≤10	Pass

9.Receiver/Audio Frequency Response for receiver

Modulation Frequency (Hz)	Upper Limit (dB)	Lower Limit (dB)	Relative Audio Power			Max Level	Min Level	Verdict
			F _n (dB)	F _n (-1.5KHz)	F _n (+1.5KHz)			
Normal condition, Assigned Frequency:156.8MHz								
300	11.5	7.5	8.1	8.0	8.3	8.3	8.0	Pass
500	7	3	5.5	5.1	5.2	5.5	5.1	Pass
800	2.9	-1.1	1.7	1.4	1.6	1.7	1.4	Pass
1000	1	-3	0	0	0	0	0	Pass
1500	-1.5	-5.5	-3.2	-3.5	-3.4	-3.2	-3.5	Pass
2000	-5	-9	-6.1	-7.4	-6.9	-6.1	-7.4	Pass
3000	-8.5	-12.5	-10.5	-10.7	-12.1	-10.5	-12.1	Pass



10. Receiver/Blocking or desensitisation

Frequencies of the signal			Blocking Level (dBuV)	Block Limit (dBuV)	Verdict
Wanted signal A (MHz)	Unwanted signal B (MHz)				
Normal condition(Tnor=25, Vnor=12)					
156.8	-10	146.8	103.4	≥90	Pass
	-5	151.8	105.1	≥90	Pass
	-2	154.8	104.2	≥90	Pass
	-1	155.8	103.5	≥90	Pass
	+1	157.8	102.2	≥90	Pass
	+2	158.8	101.7	≥90	Pass
	+5	161.8	102.6	≥90	Pass
	+10	166.8	104.6	≥90	Pass

11. DSC Receiver/Maximum useable sensitivity

Test Freq. (MHz)	Temp. (°C)	Power Supplied (V Dc)	Carrier Freq. (KHz)	Input Level (dBuV)	BER (%)	BER limit (%)	Verdict
Normal condition							
156.525	Tnor=25	Vnor=12	Fn	0	0.02	≤1	Pass
			Fn+1.5	0	0.02	≤1	Pass
			Fn-1.5	0	0.01	≤1	Pass
Extreme condition							
156.525	Tmin=-20	Vmin=10.8	Fn	6	0.01	≤1	Pass
	Tmin =-20	Vmax=15.6	Fn	6	0.04	≤1	Pass
	Tmax=55	Vmin=10.8	Fn	6	0.05	≤1	Pass
	Tmax =55	Vmax=15.6	Fn	6	0.03	≤1	Pass

- End of the Report -

