



# TEST REPORT

**Report Reference No.** ..... : **TRE1709011503** R/C.....: 17710  
**FCC ID** ..... : **AMW7001**  
**Applicant's name** ..... : **Uniden America Corporation**  
 Address ..... : 3001 Gateway Drive Suite 130, Irving, Texas, United States  
 Manufacturer..... : Uniden America Corporation  
 Address..... : 3001 Gateway Drive Suite 130, Irving, Texas, United States  
**Test item description**..... : **FLOATING VHF MARINE RADIO**  
 Trade Mark..... : UNIDEN, West Marine  
 Model/Type reference ..... : MHS335BT  
 Listed Model(s)..... : VHF470B, VHF470G  
**Standard**..... : **IEC 61097-8**  
 Date of receipt of test sample..... : Sept. 15, 2017  
 Date of testing..... : Sept. 18, 2017 – Oct. 16, 2017  
 Date of issue..... : Oct. 16, 2017  
**Result** ..... : **PASS**

Compiled by  
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*Hans Hu*

**Testing Laboratory Name**..... : **Shenzhen Huatongwei International Inspection Co., Ltd**  
 Address ..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,  
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## Contents

<b>1.</b>	<b><u>TEST STANDARDS AND TEST DESCRIPTION</u></b>	<b>3</b>
1.1.	Test Standards	3
1.2.	Report version	3
1.3.	Test Description	4
<b>2.</b>	<b><u>SUMMARY</u></b>	<b>5</b>
2.1.	Client Information	5
2.2.	Product Description	5
2.3.	Test frequency list	6
2.4.	EUT operation mode	6
2.5.	EUT configuration	6
<b>3.</b>	<b><u>TEST ENVIRONMENT</u></b>	<b>7</b>
3.1.	Address of the test laboratory	7
3.2.	Test Facility	7
3.3.	Environmental conditions	8
3.4.	Statement of the measurement uncertainty	9
3.5.	Equipments Used during the Test	10
<b>4.</b>	<b><u>TEST CONDITIONS AND RESULTS</u></b>	<b>12</b>
4.1.	Calling sensitivity	12
4.2.	Adjacent channel selectivity	13
4.3.	Co-channel rejection	14
4.4.	Intermodulation response	15
4.5.	Spurious response and blocking immunity	16
4.6.	Dynamic range	17
4.7.	Conducted spurious emissions into the antenna	18
<b>5.</b>	<b><u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u></b>	<b>19</b>

# **1. TEST STANDARDS AND TEST DESCRIPTION**

## **1.1. Test Standards**

The tests were performed according to following standards:

[IEC 61097-8:2003](#)-Global maritime distress and safety system (GMDSS) – Part 8: Shipborne watchkeeping receivers for the reception of digital selective calling (DSC) in the maritime MF, MF/HF and VHF bands – Operational and performance requirements, methods of testing and required test results

## **1.2. Report version**

Version No.	Date of issue	Description
00	Oct. 16, 2017	Original

### 1.3. Test Description

VHF watchkeeping receiver			
Test item	Standards requirement (IEC61097-8)	Result	
		Pass	N/A
Calling sensitivity	Sub-clause 9.1	<input checked="" type="checkbox"/>	
Adjacent channel selectivity	Sub-clause 9.2	<input checked="" type="checkbox"/>	
Co-channel rejection	Sub-clause 9.3	<input checked="" type="checkbox"/>	
Intermodulation response	Sub-clause 9.4	<input checked="" type="checkbox"/>	
Spurious response and blocking immunity	Sub-clause 9.5	<input checked="" type="checkbox"/>	
Dynamic range	Sub-clause 9.6	<input checked="" type="checkbox"/>	
Conducted spurious emissions into the antenna	Sub-clause 9.7	<input checked="" type="checkbox"/>	

Note:

N/A means not applicable

## 2. SUMMARY

### 2.1. Client Information

Applicant:	Uniden America Corporation
Address:	3001 Gateway Drive Suite 130, Irving, Texas, United States
Manufacturer:	Uniden America Corporation
Address:	3001 Gateway Drive Suite 130, Irving, Texas, United States

### 2.2. Product Description

Name of EUT:	FLOATING VHF MARINE RADIO	
Trade mark:	UNIDEN, West Marine	
Model/Type reference:	MHS335BT	
Listed Model(s):	VHF470B, VHF470G	
Power supply:	DC 7.4V from re-charge Lion battery DC 6.0V from dry battery	
Adapter information:	Model:SAW12-120-1000UD Input:100-240Va.c.,50/60Hz,0.3A Output: 12Vd.c., 1000mA	
Marine Radio		
Operation Frequency Range:	156.525MHz(RX:CH70)	
Rated Output Power:	6W (37.78dBm)	
Modulation Type:	Analog Voice:	FM
	Digital Data:	FSK
Channel Separation:	Analog Voice:	<input type="checkbox"/> 12.5kHz <input checked="" type="checkbox"/> 25kHz
Emission Designator:	Analog Voice:	<input type="checkbox"/> 12.5kHz Channel Separation: <input checked="" type="checkbox"/> 25kHz Channel Separation: 16K0F3E
	Digital Data:	<input type="checkbox"/> 12.5kHz Channel Separation: <input checked="" type="checkbox"/> 25kHz Channel Separation: 16K0G2B
Antenna Type:	External	
Maximum Transmitter Power:	5.97W for 25kHz Channel Separation	

Note:

Pre-scan the test voltage 7.4V and 6.0V, only show the worst test result at 7.4V.

### 2.3. Test frequency list

Mode	Modulation	Test Channel	Test Frequency (MHz)	
			TX	RX
Digital Data(DSC)	FSK	CH <sub>M</sub> (CH70)	156.525	156.525

### 2.4. EUT operation mode

Test mode	Transmitting	Receiving	States			Digital Data(DSC)/FSK
			B	Y	B+Y	25kHz
TX1	√		√			√
TX2	√			√		√
TX3	√				√	√
RX1		√				√

√ : is operation mode.

### 2.5. EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
		Shield :	Unshielded
		Detachable :	Undetachable
<input type="radio"/>	Multimeter	Manufacturer :	/
		Model No. :	/

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

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

Phone: 86-755-26748019 Fax: 86-755-26748089

#### **3.2. Test Facility**

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

##### **CNAS-Lab Code: L1225**

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

##### **A2LA-Lab Cert. No.: 3902.01**

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

##### **FCC-Registration No.: 762235**

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

##### **IC-Registration No.:5377B-1**

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

##### **ACA**

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

### 3.3. Environmental conditions

Normal Conditon	Temperature	15 °C to 35 °C		
	Relative humidity	20 % to 75 %.		
	Voltage	<input checked="" type="checkbox"/> Mains voltage	Nominal mains voltage	
<input type="checkbox"/> Lead-acid battery		1.1 * the nominal voltage of the battery		
<input type="checkbox"/> Other		the normal test voltage shall be that declared by the equipment provider		
Extreme Conditon	Temperature	<input type="checkbox"/> -15 °C and +55 °C for equipment intended for mounting below deck		
		<input checked="" type="checkbox"/> -25 °C and +55 °C for equipment intended for mounting above deck.		
		<input type="checkbox"/> -10 °C to +55 °C for Base stations for indoor/controlled climate conditions		
	Voltage	<input type="checkbox"/> Mains voltage	± 10 %* the nominal mains voltage	
		<input type="checkbox"/> Secondary battery power sources	1,3 and 0,9 multiplied by the nominal voltage of the battery	
<input checked="" type="checkbox"/> Other		For equipment using other power sources, the extreme test voltages shall be as stated by the manufacturer.		

Normal Conditon	V <sub>N</sub> =nominal Voltage	DC 7.4V
	T <sub>N</sub> =normal Temperature	25 °C
Extreme Conditon	V <sub>L</sub> =lower Voltage	DC 6.0V
	T <sub>L</sub> =lower Temperature	-20 °C
	V <sub>H</sub> =higher Voltage	DC 7.4V
	T <sub>H</sub> =higher Temperature	55 °C



### 3.4. Statement of the measurement uncertainty

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

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

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 9KHz-30MHz	2.20 dB	(1)
Radiated Emission 30~1000MHz	4.65 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	35 Hz	(1)
FM deviation	25 Hz	(1)
Audio level	0.62 dB	(1)
Low Pass Filter Response	0.76 dB	(1)
Modulation Limiting	0.42 %	(1)

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

### 3.5. Equipments Used during the Test

AC&DC Power Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2016/11/13
EMI Test Receiver	Rohde&Schwarz	ESCS 30	100038	2016/11/13
Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2016/11/13
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
Artificial Mains	Rohde&Schwarz	ESH3-Z6	100210	2016/11/13
Artificial Mains	Rohde&Schwarz	ESH3-Z6	100211	2016/11/13
Test cable	ENVIROFLEX	3651	1101902	2016/11/13

Modulation Characteristic				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
RF Cable	Chengdu E-Microwave	----	----	2016/11/13

Frequency Stability				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
Signal Generator	Rohde&Schwarz	SMT03	100059	2016/11/13
Climate Chamber	ESPEC	EL-10KA	05107008	2016/11/13
RF Cable	Chengdu E-Microwave	----	----	2016/11/13

Transmitter Radiated Spurious Emission& Effective Radiated Power				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Ultra-Broadband Antenna	Rohde&Schwarz	HL562	100015	2016/11/13
EMI Test Receiver	Rohde&Schwarz	ESI 26	100009	2016/11/13
RF Test Panel	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
HORN ANTENNA	Rohde&Schwarz	HF906	100039	2016/11/13
Loop Antenna	Rohde&Schwarz	HZ-9	838622\013	2016/11/13
Turntable	ETS	2088	2149	N/A
Antenna Mast	ETS	2075	2346	N/A
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2016/11/13
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2016/11/13
HORN ANTENNA	ShwarzBeck	9120D	1012	2016/11/13
HORN ANTENNA	ShwarzBeck	9120D	1011	2016/11/13
TURNTABLE	MATURO	TT2.0	----	N/A
ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
Test cable	Siva Cables Italy	RG 58A/U	W14.02	2016/11/13

Maximum Transmitter Power & Spurious Emssion On Antenna Port & Occupied Bandwidth & Emission Mask				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Receiver	Rohde&Schwarz	ESI 26	100009	2016/11/13
Attenuator	R&S	ESH3-22	100449	2016/11/13
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
High-Pass Filter	Anritsu	MP526B	6220875256	2016/11/13
High-Pass Filter	Anritsu	MP526D	6220878392	2016/11/13
Spectrum Analyzer	Aglient	E4407B	MY44210775	2016/11/13
Spectrum Analyzer	Rohde&Schwarz	FSP40	1164.4391.40	2016/11/13
SPECTRUM ANALYZER	Agilent	E4407B	MY44210775	2016/11/13
Attenuator	Chengdu E-Microwave	EMCAXX-10RNZ-3	----	2016/11/13
RF Cable	Chengdu E-Microwave	----	----	2016/11/13
Combiner	Chengdu E-Microwave	EMPD-T-2-180-10-600	----	2016/11/13

Transient Frequency Behavior				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Signal Generator	Rohde&Schwarz	SMT03	100059	2016/11/13
Storage Oscilloscope	Tektronix	TDS3054B	B033027	2016/11/13
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2016/11/13
RF Cable	Chengdu E-Microwave	----	----	2016/11/13

The calibration interval was one year.

## 4. TEST CONDITIONS AND RESULTS

### 4.1. Calling sensitivity

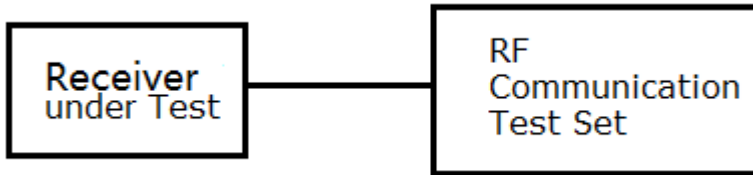
To determine the maximum usable sensitivity which is the minimum level of the signal (e.m.f.) at the nominal frequency of the receiver which, when applied to the receiver input with a standard test signal, will produce a specified BER.

#### Limit

IEC 61097 Sub-clause 9.1.3

The BER shall be equal to or less than  $10^{-2}$ .

#### TEST CONFIGURATION



#### TEST PROCEDURE

Please refer to IEC 61097 Sub-clause 9.1.2 for the measurement method.

#### TEST MODE:

Please reference to the section 2.4

#### TEST RESULTS

**Passed**       **Not Applicable**

Please refer to the below test data:

Operation Mode	Test Condition		Test Channel	Measured (error ratio)	Limit (error ratio)	Result
	Temperature ( °C )	Voltage (V)				
RX1	T <sub>N</sub>	V <sub>N</sub>	CH <sub>M</sub>	0.0062	≤10 <sup>-2</sup>	Pass
				0.0055		
	T <sub>L</sub>	V <sub>H</sub>		0.0064	≤10 <sup>-2</sup>	Pass
				0.0067		
				0.0058		
	T <sub>H</sub>	V <sub>L</sub>		0.0052	≤10 <sup>-2</sup>	Pass
				0.0051		
		V <sub>H</sub>		0.0059	≤10 <sup>-2</sup>	Pass
				0.0057		
V <sub>L</sub>	0.0058	≤10 <sup>-2</sup>	Pass			

## 4.2. Adjacent channel selectivity

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

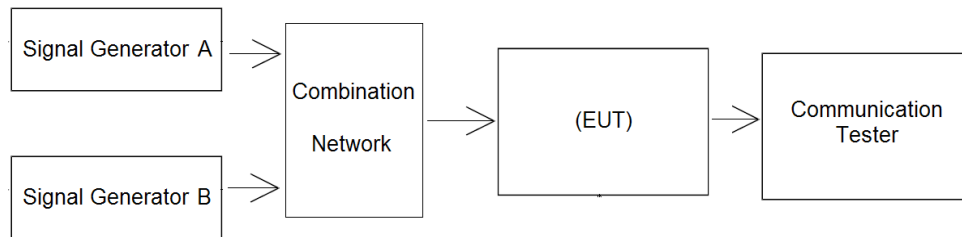
IEC 61097 Sub-clause 9.2.3

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

### TEST PROCEDURE

Please refer to IEC61097 Sub-clause 9.2.2 for the measurement method.

### TEST CONFIGURATION



### TEST MODE:

Please reference to the section 2.4

### TEST RESULTS

Passed       Not Applicable

Please refer to the below test data:

Operation Mode	Test Condition		Test Channel	Measurement Position	Measured (error ratio)	Limit (error ratio)	Result	
	Temperature ( °C )	Voltage ( V )						
RX1	T <sub>N</sub>	V <sub>N</sub>	CH <sub>M</sub>	Lower adjacent	0.0052	≤ 10 <sup>-2</sup>	Pass	
				Upper adjacent	0.0064			
	T <sub>L</sub>	V <sub>H</sub>		Lower adjacent	0.0039	≤ 10 <sup>-2</sup>	Pass	
				Upper adjacent	0.0084			
				V <sub>L</sub>	Lower adjacent	0.0035	≤ 10 <sup>-2</sup>	Pass
					Upper adjacent	0.0062		
	T <sub>H</sub>	V <sub>H</sub>		Lower adjacent	0.0077	≤ 10 <sup>-2</sup>	Pass	
				Upper adjacent	0.0065			
				V <sub>L</sub>	Lower adjacent	0.0087	≤ 10 <sup>-2</sup>	Pass
					Upper adjacent	0.0075		

### 4.3. Co-channel rejection

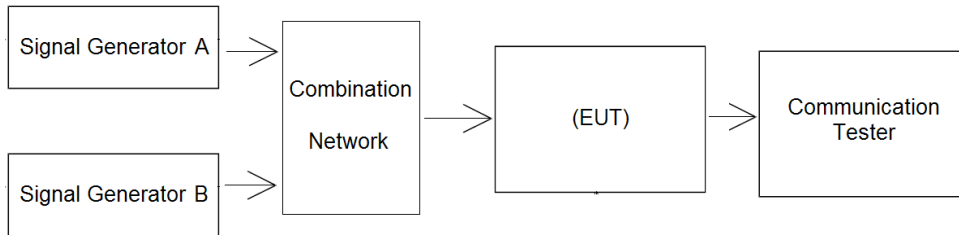
The co-channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal, both signals being at the nominal frequency of the receiver.

#### LIMIT

IEC 61097 Sub-clause 9.3.3

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

#### TEST CONFIGURATION



#### TEST PROCEDURE

Please refer to IEC 61097 Sub-clause 9.3.2 for the measurement method.

#### TEST MODE:

Please reference to the section 2.4

#### TEST RESULTS

Passed       Not Applicable

Please refer to the below test data:

Operation Mode	Test Channel	Measurement Offset(kHz)	Measured (error ratio)	Limit(error ratio)	Result
RX1	CH <sub>M</sub>	-3	0.0034	$\leq 10^{-2}$	Pass
		0	0.0025		
		3	0.0017		

#### 4.4. Intermodulation response

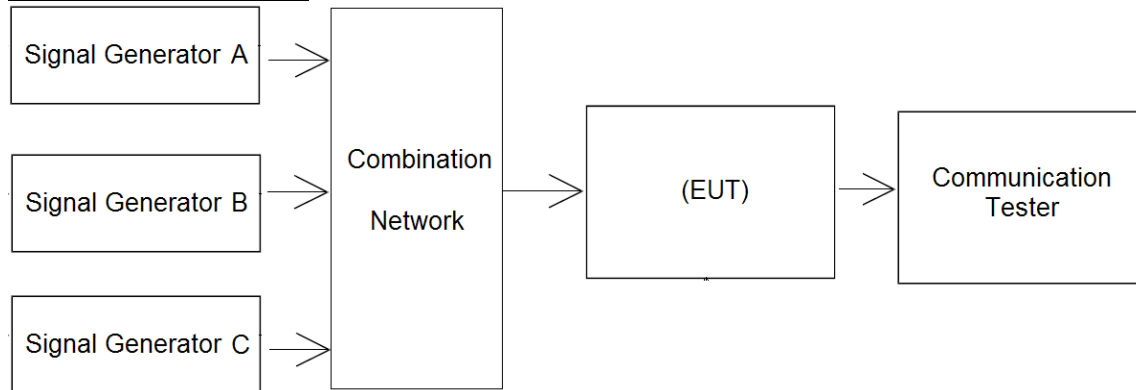
The intermodulation response is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

##### LIMIT

IEC 61097 Sub-clause 9.4.3

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

##### TEST CONFIGURATION



##### TEST PROCEDURE

Please refer to IEC 61097 Sub-clause 9.4.2 for the measurement method.

##### TEST MODE:

Please reference to the section 2.4

##### TEST RESULTS

Passed       Not Applicable

Please refer to the below test data:

Operation Mode	Test Channel	Measurement Offset(kHz)		Measured (error ratio)	Limit (error ratio)	Result
		SG B	SG C			
RX1	CH <sub>M</sub>	-50	-100	0.0088	≤ 10 <sup>-2</sup>	Pass
		50	100	0.0074		

#### 4.5. Spurious response and blocking immunity

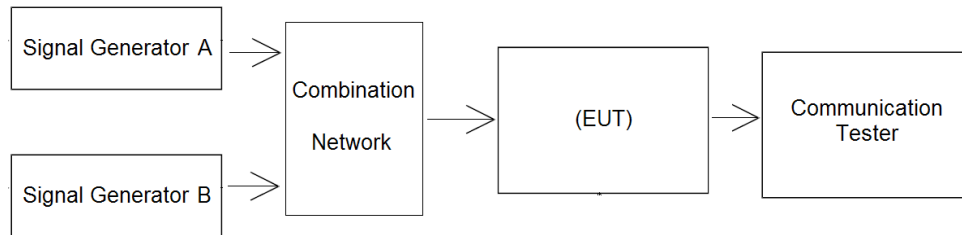
The spurious response and blocking immunity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted modulated signal with frequencies outside the pass band of the receiver.

##### LIMIT

IEC 61097 Sub-clause 9.5.3

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

##### TEST CONFIGURATION



##### TEST PROCEDURE

Please refer to IEC 61097 Sub-clause 9.5.2 for the measurement method

##### TEST MODE:

Please reference to the section 2.4

##### TEST RESULTS

**Passed**       **Not Applicable**

Please refer to the below test data:

Operation Mode	Test Channel	Spurious Frequency (MHz)	Measured (error ratio)	Limit (error ratio)	Result
RX1	CH <sub>M</sub>	156.298	0.0068	≤ 10 <sup>-2</sup>	Pass
		156.753	0.0074		
		138.625	0.0056		
		174.425	0.0065		

Operation Mode	Test Channel	Measurement Offset (MHz)	Measured (error ratio)	Limit (error ratio)	Result
RX1	CH <sub>M</sub>	-10	0.0077	≤ 10 <sup>-2</sup>	Pass
		-5	0.0085		
		-2	0.0079		
		-1	0.0078		
		1	0.0081		
		2	0.0067		
		5	0.0075		
		10	0.0074		



## 4.6. Dynamic range

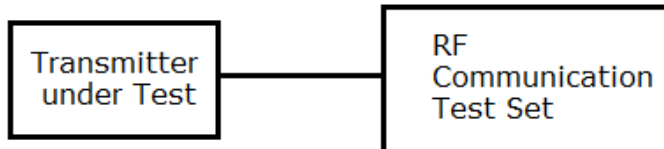
The dynamic range of the equipment is the range from the minimum to the maximum level of a radio frequency input signal at which the bit error ratio in the output of the decoder does not exceed a specified value.

### Limit

IEC 61097 Sub-clause 9.6.3

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

### TEST CONFIGURATION



### TEST PROCEDURE

Please refer to IEC 61097 Sub-clause 9.6.2 for the measurement method

### TEST MODE:

Please reference to the section 2.4

### TEST RESULTS

Passed       Not Applicable

Please refer to the below test data:

Operation Mode	Test Channel	Measured(error ratio)	Limit(error ratio)	Result
RX1	CH <sub>M</sub>	0.0072	$\leq 10^{-2}$	Pass

### 4.7. Conducted spurious emissions into the antenna

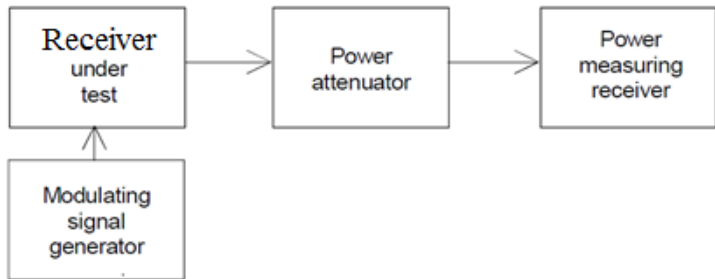
To determine internally generated signals conducted to the antenna terminal and which may be radiated.

**Limit**

IEC 61097 Sub-clause 9.7.3

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

**TEST CONFIGURATION**



**TEST PROCEDURE**

Please refer to IEC 61097 Sub-clause 9.7.2 for the measurement method.

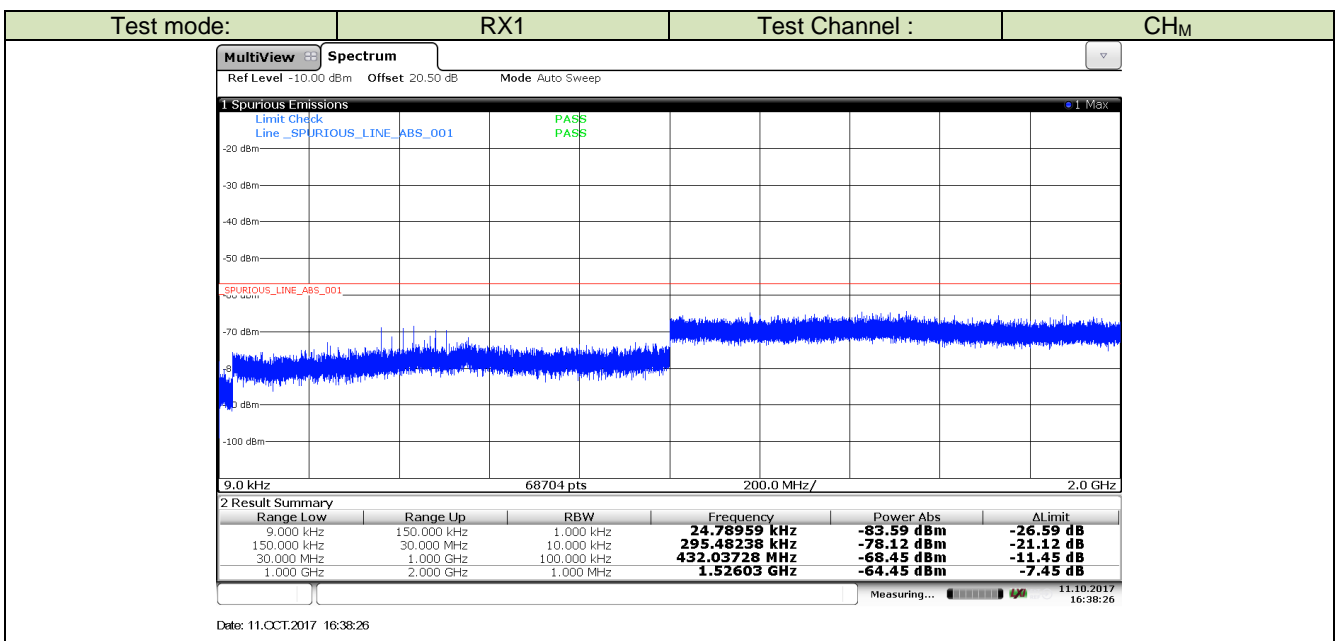
**TEST MODE:**

Please reference to the section 2.4

**TEST RESULTS**

Passed       Not Applicable

Please refer to the below test data:



## **5. External and Internal Photos of the EUT**

Reference to the test report No.: TRE1709011501.

-----End of Report-----