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## **TEST REPORT**

### **Salcom 12-62 (148-174 MHz) VHF POCSAG Paging Transmitter**

*tested to the specification*

**EN 301 489-2 V2.1.0 (2017-03)**

**Electro Magnetic Compatibility (EMC) standard  
for radio equipment and services;  
Part 2: Specific conditions for radio paging equipment;  
Harmonised Standard covering the essential requirements  
of article 3.1 (b) of Directive 2014/53/EU**

*for*

**Sea Air and Land Communications (SALCOM) Ltd**

A handwritten signature in black ink, appearing to read "Andrew Cutler", is written over a light blue rectangular background.

This Test Report is issued with the authority of:

\_\_\_\_\_  
**Andrew Cutler - General Manager**



Tests indicated as  
not accredited are outside  
the scope of the  
laboratory's accreditation

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## 1. STATEMENT OF COMPLIANCE

The **Salcom 12-62 VHF POCSAG Paging Transmitter** complies with EN 301 489-2 V2.1.0, 2017 (Draft) when tested in accordance with EN 301 489-1 V2.1.1, 2017 (Draft).

## 2. RESULTS SUMMARY

The results of testing, carried out in July 2017, are summarised below.

### Emissions

Clause	Phenomena	Application	Results.
8.2	Radiated emissions 30 – 6000 MHz	Enclosure.	Not applicable. Device is not a standalone ancillary. See EN 300 224 report
8.3	Conducted emissions.	DC power input/output port	Complies.
8.4	Conducted emissions	AC input/output port	Not Applicable. DC Powered Device
8.5	Harmonic Emissions	AC mains port	Not Applicable. DC Powered Device
8.6	Voltage Fluctuations and Flicker	AC mains port	Not Applicable. DC Powered Device
8.7	Conducted emissions	Telecom port	Not applicable. No telecom port.

### Immunity

Clause	Phenomena	Application	Results.
9.2	RF electromagnetic field 80 – 2700 MHz	Enclosure	Complies.
+9.2	RF electromagnetic field 2700 - 6000 MHz	Enclosure	Complies.
9.3	Electrostatic discharge	Enclosure	Complies
9.4	Fast transients, Common mode	Signal, telecom & control ports, DC & AC power input ports	Not applicable. DC powered device with no cables exceeding 3 metres.
9.5	RF common mode. 0.15 – 80MHz	Signal, telecom & control ports, DC & AC power ports	Not applicable. DC powered device with no cables exceeding 3 metres.
9.6	Transients and surges	DC power input ports	Not applicable – EUT is not for vehicular use.
9.7	Voltage dips and interruptions	AC mains power input ports	Not applicable – EUT is a DC powered device only.
9.8	Surges common and differential mode	Telecom port	Not applicable – EUT is DC powered device only with no signal ports that connect to outdoor cables.

+ Test falls outside the scope of accreditation for this laboratory.

### 3. INTRODUCTION

This report describes the tests and measurements for the purpose of determining compliance with the specification under the following conditions:

**The test sample was selected by the client.**

**This report relates only to the sample tested.**

**This report contains no corrections or erasures.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

### 4. CLIENT INFORMATION

**Company Name** Salcom Technologies Ltd

**Address** 10 Vanadium place  
Addington  
Christchurch 8024

**Country** New Zealand

**Contact** Mr John Croft

### 5. DESCRIPTION OF TEST SAMPLE

**Brand Name** Salcom

**Model Number** 12-62-0150

**Product** VHF (138-174 MHz) POCSAG Transmitter

**Manufacturer** Sea Air Land Communications Ltd

**Manufactured in** New Zealand

**Serial Number** 1231

## 6. TEST RESULTS

### Conducted emissions

Conducted Emissions testing was carried out over the frequency range of 150 kHz to 30 MHz which was carried out at the laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room

The device was placed on top of the emissions table, which is 0.8 m x 0.8 m, 80 cm above the screened room floor which acts as the horizontal ground plane.

In addition the device was positioned 40 cm away from the screened room wall which acts as the vertical ground plane.

The artificial mains network was bonded to the screened room floor.

At all times the device was kept more than 80 cm from the artificial mains network.

Testing was carried out at the DC supply port.

The supplied plots are combined plots showing the worst case quasi peak and average results when each port was tested.

Quasi peak and average detectors have been used with resolution bandwidths of 9 kHz.

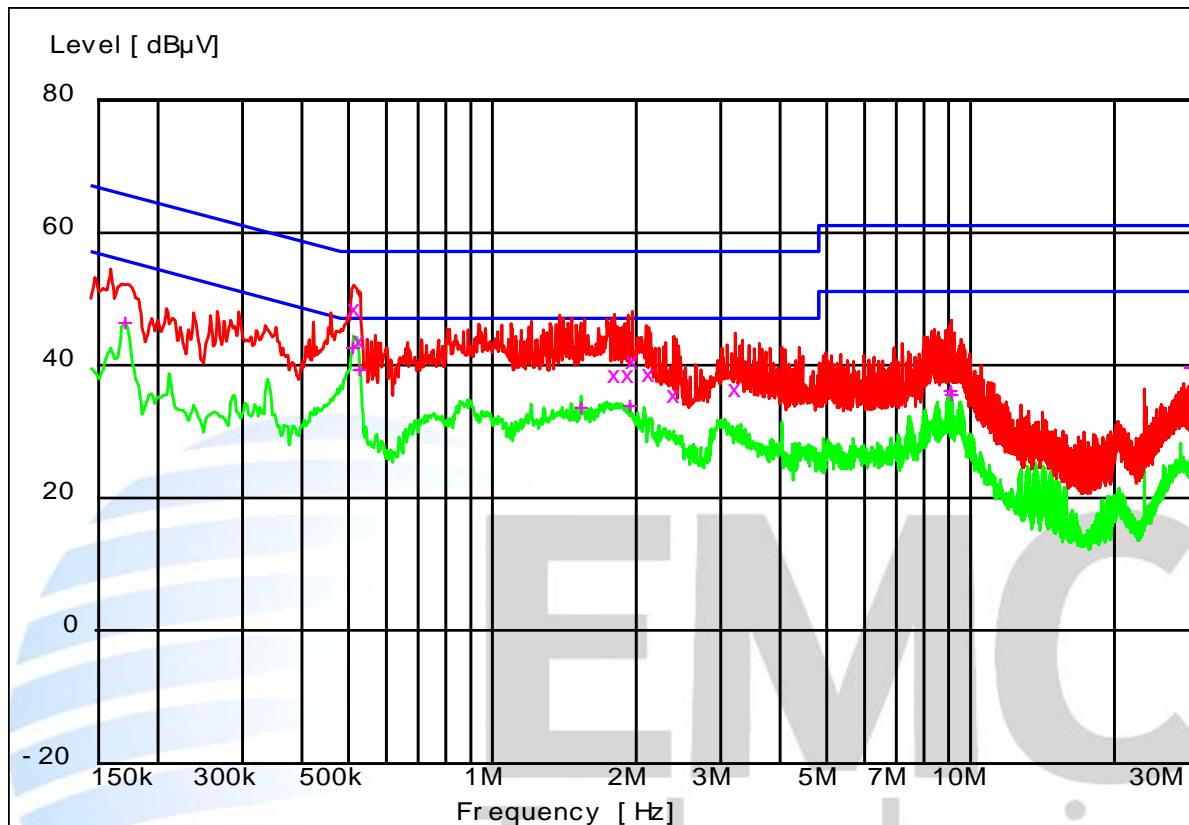
**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is: (0.15-30 MHz)  $\pm$  2.8 dB

## Conducted Emissions – DC Input Power Port

**Setup:** VHF Transmitter is programmed to output 5 Watts with a max on air period of 300 seconds using 12-62 program in laptop. The output was terminated onto a load. The unit was powered using 13.8 V dc supply.

Peak --- Average -- Quasi Peak X Average +



### Final Quasi-Peak Measurements

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Phase	Rechecks (dBµV)
0.534000	47.40	56.0	8.6	N	
0.549000	42.60	56.0	13.4	L1	
1.872000	37.40	56.0	18.6	N	
1.998000	37.50	56.0	18.5	N	
2.040500	39.60	56.0	16.4	N	
2.207000	37.60	56.0	18.4	N	
2.490500	34.50	56.0	21.5	N	
3.345500	35.40	56.0	20.6	L1	

### Final Average Measurements

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Phase	Rechecks (dBµV)
0.177000	45.50	54.6	9.1	N	
0.531000	41.80	46.0	4.2	N	
0.549000	38.30	46.0	7.7	L1	
1.593000	32.60	46.0	13.4	L1	
2.013500	33.00	46.0	13.0	L1	
9.438500	35.20	50.0	14.8	N	
9.479000	34.60	50.0	15.4	L1	
30.000000	38.70	50.0	11.3	L1	

## **EMC Immunity Performance Criteria**

The device shall meet the following minimum performance criteria:

### **Performance criteria for Continuous phenomena applied to Transmitters (CT)**

For pocket transmitters, a communication link shall be established before the test and during the test the modulation of the carrier of the EUT, caused by the modulation of the immunity test source, shall be less than 25% of the system peak modulation.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained during the test.

Where the EUT is a transmitter only and can be operated in standby mode, tests shall be repeated with the EUT in this mode to ensure that unintentional transmission does not occur.

### **Performance criteria for Transient phenomena applied to Transmitters (TT).**

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of communication link.

At the conclusion of the total test comprising the series of individual exposures the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained during the test.

Where the EUT is a transmitter only and can be operated in standby mode, tests shall be repeated with the EUT in this mode to ensure that unintentional transmission does not occur.

### **Performance criteria for Continuous phenomena applied to Receivers (CR)**

For pocket paging receivers, during the test no false call shall occur.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained during the test.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

## **Performance criteria for Transient phenomena applied to Receivers (TR).**

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of communication link.

At the conclusion of the total test comprising the series of individual exposures the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained during the test.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

### **Set-up:**

The device was powered from a 13.8 Vdc power supply

The Transmitter was configured to deliver 5 watts output power with a Max-on-air period of 300 seconds using 12-62 software running on a laptop computer.

The transmitter output was continuously monitored on a power meter.

In addition the operation of the transmitter was logged using a computer program which showed whether the transmitter was paging correctly.



## Radio Frequency Electromagnetic Field

Testing was carried out between 80 – 6000 MHz at 3 V/m in 1% steps in accordance with the requirements listed in EN 301 489-1 v2.1.1 2017-02 (Draft).

The RF signal was 80% AM modulated using a 1000 Hz tone.

In addition, a spot frequency test was performed at 80 MHz, 104 MHz, 136 MHz, 165 MHz, 200 MHz, 260 MHz, 330 MHz, 430 MHz, 560 MHz, 715 MHz and 920 MHz +/-1 MHz and at the edge frequencies of the exclusion band. The frequencies that fall within the exclusion band of the transmitter were excluded from the test.

The antenna was positioned 155 cm above the floor surface with the tip of the antenna being 1.5 meters from the device under test

Testing was carried out using both vertical and horizontal polarisations with a dwell time of 3 seconds.

During the test the RF field was continuously monitored using an isotropic field probe which was placed close to the device under test.

The radiated RF was injected onto all the four faces of the transmitter:

- front face
- DC , USB and RJ 6 ports facing test antenna)
- rear side facing test antenna)
- (Device output port facing test antenna)

The device is required to meet criteria A & B.

The calibration uncertainties for Radiated Susceptibility to EN 61000-4-3 between 80 - 6000 MHz are +/- 1.1 V/m.

## Observations

No effects or responses were observed during the tests.

**Result:** Complies.

The device displayed immunity to Radiated RF Electromagnetic Fields throughout the test and continued to operate normally after the test.

## Electrostatic Discharge

Performance Criterion: Transient Phenomena

Electrostatic Discharge testing was required to be carried out at  $\pm 4$  kV for contact discharges and  $\pm 8$  kV for air discharges.

The calibration uncertainties for Electrostatic Discharge to EN 61000-4-2 are:

- DC Voltage	1%
- Peak Current	5%
- Rise Time	6%
- Curve decay points at 30 and 60 nS	5%

10 x  $\pm 4$  kV Contact discharges were applied at one second intervals as follows:

Point of Contact	Observation	Result
HCP	No effects observed	Pass
VCP (Front)	No effects observed	Pass
VCP (Rear)	No effects observed	Pass
VCP (Left hand side)	No effects observed	Pass
VCP (Right hand side)	No effects observed	Pass
Case (top) centre	No effects observed	Pass
Case (Right Side) DC port	No effects observed	Pass
Case (Left Side) transmitter output port	No effects observed	Pass
Case (Front) centre	No effects observed	Pass
Case (Base plate)	No effects observed	Pass
Right side DC port	No effects observed	Pass
Right Side serial output-USB port	No effects observed	Pass
Right Side (RJ port)*2	No effects observed	Pass
Top (Led lights)*2	No effects observed	Pass

10 x  $\pm 8$  kV Air discharges were applied at one second intervals as follows:

Point of Contact	Observation	Result
Top LED Lights *2	Discharged to case; no effects observed	Pass
DC port	Discharged to case; no effects observed	Pass
Serial port to USB port	Discharged to case; no effects observed	Pass
RJ port*2	Discharged to case; no effects observed	Pass
DUT output port	Discharged to case; no effects observed	Pass

**Result:** Complies.

The device displayed immunity to Electrostatic Discharges during the test and continued to operate normally after the test.

## 7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Artificial Mains Network	Rohde & Schwarz	ESH 2-Z5	881362/032	3628
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612
Bilog Antenna	EMCO	3141	9707-1071	E1596
Coupling Clamp	Schaffner	CDN 125	606	-
Coupling Network	CIM	CDN-DC2-16A	-	E3792
Coupling Network	CIM	CDN-M1	-	-
Coupling Network	CIM	CDN-T8	-	E3796
Current Clamp	FCC	-	42	E3790
ESD Gun	Schaffner	NSG 435	1261	E1426
Horn Antenna	EMCO	3115	9511-4629	E1526
Interference Test System	Keytek	EMC Pro Plus	S012233	E3788
Log Periodic Antenna	Schwarzbeck	VUSLP911	9111-2801	3785
Measurement Receiver	Rohde & Schwarz	ESHS 10	838693/002	3800
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Power Amplifier	Amplifier Research	30W1000B	-	EMC4022
Power Amplifier	IFI	M75	B373-1098	RFS 3773
Power Amplifier	Ophir	5263FE	1002	-
Signal Generator	Rohde & Schwarz	SML02	1090.300012	EMC4013
Signal Generator	Rohde & Schwarz	SMP04	1035 5005.04	E1560
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709

All test equipment was within calibration at the time of testing.

## 8. ACCREDITATIONS

The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

## 9. PHOTOGRAPHS



Conducted emissions test setup



Radiated Immunity test setup

