



Product Service

**Choose certainty.
Add value.**

Report On

FCC and Industry Canada Testing of the Park Air Systems Ltd T6-TRV
In accordance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC
47 CFR Part 2, Industry Canada RSS-141 and Industry Canada RSS-
GEN

COMMERCIAL-IN-CONFIDENCE

FCC ID: C8LT6-TRV
IC: 2137AT6TRV

Document 75934311 Report 01 Issue 2

June 2016



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC and Industry Canada Testing of the
Park Air Systems Ltd T6-TRV
In accordance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC
47 CFR Part 2, Industry Canada RSS-141 and Industry Canada RSS-
GEN

Document 75934311 Report 01 Issue 2

June 2016

PREPARED FOR

Park Air Systems Ltd
Northfields
Market Deeping
Peterborough
PE6 8UE

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Ryan Henley
Authorised Signatory

DATED

17 June 2016

This report has been up-issued to Issue 2 to include and amended application form.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

J Tuckwell

N Rousell





CONTENTS

Section	Page No
1	REPORT SUMMARY 3
1.1	Introduction 4
1.2	Brief Summary of Results 5
1.3	Application Form 6
1.4	Product Information 8
1.5	Test Conditions 8
1.6	Deviations from the Standard 8
1.7	Modification Record 8
2	TEST DETAILS 9
2.1	AC Line Conducted Emissions 10
2.2	Power and Emissions 13
2.3	Frequency Stability 15
2.4	Bandwidth of Emission 17
2.5	Types of Emission 21
2.6	Spurious Emissions at Antenna Terminals 24
2.7	Radiated Spurious Emissions 33
2.8	Modulation Requirements 41
3	TEST EQUIPMENT USED 45
3.1	Test Equipment Used 46
3.2	Measurement Uncertainty 48
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 49
4.1	Accreditation, Disclaimers and Copyright 50



Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Park Air Systems Ltd T6-TRV

In accordance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry
Canada RSS-141 and Industry Canada RSS-GEN



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the Park Air Systems Ltd T6-TRV to the requirements of FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and Industry Canada RSS-GEN.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Park Air Systems Ltd
Model Number(s)	T6-TRV
Serial Number(s)	140356
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15 (2015) FCC 47 CFR Part 87(2015) FCC 47 CFR Part 2 (2015) Industry Canada RSS-141 (Issue 2, 2010) Industry Canada RSS-GEN (Issue 4, 2014)
Incoming Release Date	Application Form 3 May 2016
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	55210 21 March 2016
Start of Test	16 May 2016
Finish of Test	14 June 2016
Name of Engineer(s)	J Tuckwell N Rousell



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry Canada RSS-141 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause					Test Description	Result	Comments/Base Standard
	Part 15	Part 87	Part 2	RSS-141	RSS-GEN			
Transmit								
2.1	15.207	-	-	-	-	AC Line Conducted Emissions	Pass	
2.2	-	87.131	-	4.1	-	Power and Emissions	Pass	
2.3	-	87.133	2.1055	5.1	6.11	Frequency Stability	Pass	
2.4	-	87.135	-	5.1	6.6	Bandwidth of Emission	Pass	
2.5	-	87.137	-	5.1	-	Types of Emission	Pass	
2.6	-	87.139 (a)	2.1051	5.2	-	Spurious Emissions at Antenna Terminals	Pass	
2.7	-	87.139 (a)	2.1053	5.2	-	Radiated Spurious Emissions	Pass	
2.8	-	87.141	2.1047 (d)	5.1	-	Modulation Requirements	Pass	



1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	T6-TRV
Part Number	24-05655031
Hardware Version	1
Software Version	V01P11
FCC ID (if applicable)	C8LT6-TRV
Industry Canada ID (if applicable)	2137AT6TRV
Technical Description (Please provide a brief description of the intended use of the equipment)	Ground to air transceiver for use in the VHF aeronautical band using 25/8.33kHz channel spacing

POWER SOURCE	
☒ AC mains	State voltage
AC supply frequency	50 (Hz)
110-240 VAC	
3 A Max Current	
47-63 Hz	
☒ Single phase	☐ Three phase
And / Or	
☒ External DC supply	
Nominal voltage	24 V
Max Current	15 A
Extreme upper voltage	32 V
Extreme lower voltage	21 V
Battery	
☐ Nickel Cadmium	☐ Lead acid (Vehicle regulated)
☐ Alkaline	☐ Leclanche
☐ Lithium	☐ Other Details :
Volts nominal.	
End point voltage as quoted by equipment manufacturer	V

FREQUENCY INFORMATION	
Frequency Range	118 to 136.975 MHz
Channel Spacing (where applicable)	25kHz / 8.33kHz
Receiver Frequency Range (if different)	to MHz
Channel Spacing (if different)	
Test Frequencies*	Bottom 118.000 MHz Channel Number (if applicable)
	Middle 127.500 MHz Channel Number (if applicable)
	Top 136.975 MHz Channel Number (if applicable)
Intermediate Frequencies	70 MHz
Highest Internally Generated Frequency :	206.975 MHz



Product Service

POWER CHARACTERISTICS			
Maximum TX power	50	W	
Minimum TX power	5	W (if variable)	
Is transmitter intended for :			
Continuous duty		☒ Yes	☐ No
Intermittent duty		☒ Yes	☐ No
If intermittent state DUTY CYCLE			
Transmitter ON		seconds	
Transmitter OFF		seconds	

ANTENNA CHARACTERISTICS			
☒ Antenna connector		State impedance	50 Ohm
☐ Temporary antenna connector		State impedance	Ohm
☐ Integral antenna	Type	State impedance	dBi
☐ External antenna	Type	State impedance	dBi

MODULATION CHARACTERISTICS			
☒ Amplitude		☐ Frequency	
☐ Phase		☐ Other (please provide details):	
Can the transmitter operate un-modulated?			☐ Yes ☐ No

CLASS OF EMISSION USED	
ITU designation or Class of Emission:	
1	6K80A3EJN
(if applicable) 2	5K00A3EJN
(if applicable) 3	
If more than three classes of emission, list separately:	

BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	264	V	Extreme test voltages (Mix)	99	V
Nominal DC Voltage	24	V	DC Maximum Current	15	A
Maximum temperature	55	°C	Minimum temperature	-20	°C

I hereby declare that that the information supplied is correct and complete.

Name: Phil Ackerman

Position held:

Consultant

Engineer

Date: 3rd May 2016



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Park Air Systems Ltd T6-TRV. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 110 V AC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Park Air Systems Ltd T6-TRV

In accordance with FCC 47 CFR Part 15, FCC 47 CFR Part 87, FCC 47 CFR Part 2, Industry
Canada RSS-141 and Industry Canada RSS-GEN



Product Service

2.1 AC LINE CONDUCTED EMISSIONS**2.1.1 Specification Reference**

FCC 47 CFR Part 15, Clause 15.207

2.1.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.1.3 Date of Test

17 May 2016

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with KDB 174176 D01 v01 and ANSI C63.10, clause 6.2.

Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in Clause 15.207 of FCC 47 CFR Part 15.

2.1.6 Environmental Conditions

Ambient Temperature	22.5°C
Relative Humidity	32.0%



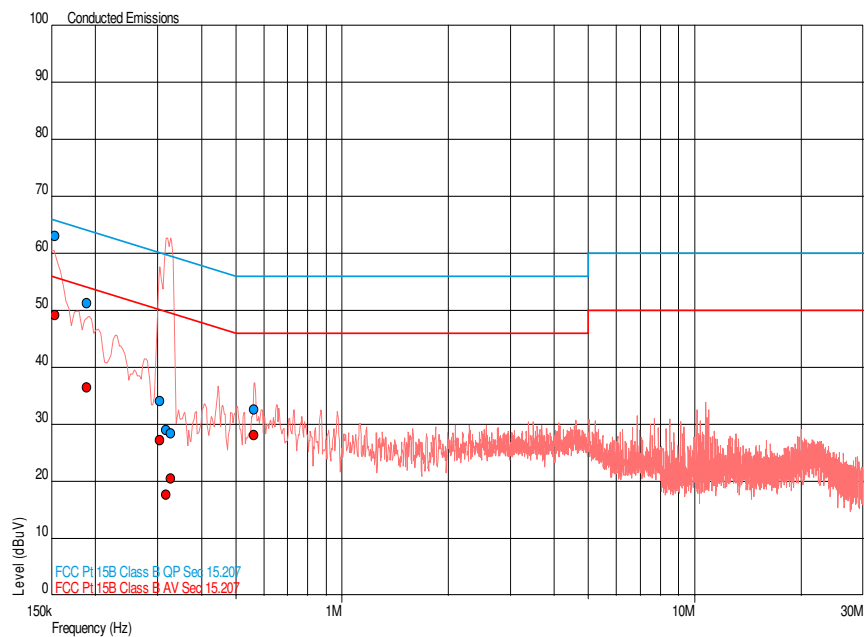
Product Service

2.1.7 Test Results

Transmit, Live Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.153	63.1	65.8	-2.7	49.2	55.8	-6.6
0.189	51.3	64.1	-12.8	36.6	54.1	-17.5
0.305	34.1	60.1	-26.0	27.3	50.1	-22.8
0.317	29.0	59.8	-30.7	17.6	49.8	-32.1
0.328	28.4	59.5	-31.1	20.5	49.5	-29.0
0.564	32.6	56.0	-23.4	28.1	46.0	-17.9

Transmit, Live Line, AC Line Conducted Emissions Plot

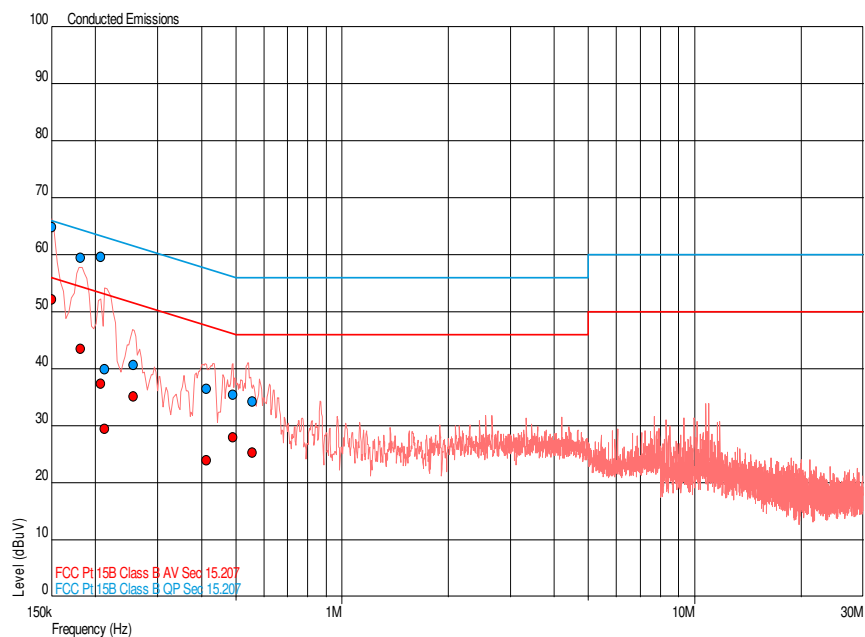




Transmit, Neutral Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBμV)	QP Limit (dBμV)	QP Margin (dBμV)	AV Level (dBμV)	AV Limit (dBμV)	AV Margin (dBμV)
0.150	64.8	66.0	-1.1	52.1	56.0	-3.9
0.181	59.5	64.4	-4.9	43.5	54.4	-10.9
0.207	59.6	63.3	-3.8	37.5	53.3	-15.9
0.213	40.0	63.1	-23.1	29.4	53.1	-23.7
0.256	40.7	61.6	-20.9	35.2	51.6	-16.4
0.412	36.4	57.6	-21.2	24.0	47.6	-23.6
0.491	35.5	56.1	-20.6	28.0	46.1	-18.2
0.556	34.2	56.0	-21.8	25.2	46.0	-20.8

Transmit, Neutral Line, AC Line Conducted Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.



Product Service

2.2 POWER AND EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.131
Industry Canada RSS-141, Clause 4.1

2.2.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.2.3 Date of Test

1 June 2016 and 14 June 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02 r02, Clause 5.1.1.

Remarks

The EUT was powered with 110 V AC and 60 Hz frequency.

2.2.6 Environmental Conditions

Ambient Temperature	22.7°C
Relative Humidity	51.7-52.8%



Product Service

2.2.7 Test Results

Transmit, Unmodulated, Power and Emissions Result

118.000 MHz	127.500 MHz	136.975 MHz
Maximum Power (W)	Maximum Power (W)	Maximum Power (W)
53.321	51.452	50.571

FCC 47 CFR Part 87, Limit Clause 87.131

Flight Test Land: 200 W

Industry Canada RSS-141, Limit Clause 5.1

Ground Equipment:
300 W for fixed equipment with A3E emissions



Product Service

2.3 FREQUENCY STABILITY

2.3.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.133
FCC 47 CFR Part 2, Clause 2.1055
Industry Canada RSS-141, Clause 5.1
Industry Canada RSS-GEN, Clause 6.11

2.3.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.3.3 Date of Test

7 June 2016

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02 r02, clause 9 and FCC 47 CFR Part 2, clause 2.1055

Remarks

The measurement equipment was connected to an external frequency standard to improve measurement accuracy.

2.3.6 Environmental Conditions

Ambient Temperature	22.4°C
Relative Humidity	49.9%



Product Service

2.3.7 Test Results

Temperature	118.000 MHz	127.500 MHz	136.975 MHz
	ppm	ppm	ppm
-30°C	0.051	0.055	0.058
-20°C	0.034	0.024	0.015
-10°C	0.025	0.016	0.007
0°C	0.009	0.008	0.015
+10°C	0.017	0.016	0.029
+20°C	0.017	0.031	0.037
+30°C	0.025	0.031	0.044
+40°C	0.025	0.031	0.051
+50°C	0.025	0.031	0.058

Transmit, Frequency Stability Under Voltage Variations Results

Voltage	118.000 MHz	127.500 MHz	136.975 MHz
	ppm	ppm	ppm
110 V AC	0.017	0.031	0.037
93.50 V AC	0.025	0.031	0.037
126.5 V AC	0.025	0.024	0.044

FCC 47 CFR Part 87, Limit Clause 87.133(a)

The frequency error shall not exceed 20 ppm

Industry Canada RSS-141, Limit Clause 5.1

Ground Equipment:
 ± 20 ppm for A3E and A9W emissions



Product Service

2.4 BANDWIDTH OF EMISSION**2.4.1 Specification Reference**

FCC 47 CFR Part 87, Clause 87.135
Industry Canada RSS-141, Clause 5.1
Industry Canada RSS-GEN, Clause 6.6

2.4.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.4.3 Date of Test

1 June 2016

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02 r02, Clause 4.2.

Remarks

Maximum rated modulation condition:

2500 Hz sinewave sufficient to produce 50 % modulation. Input level of modulation then increased by 16 dB.

AC power supply 110 V @ 60 Hz

2.4.6 Environmental Conditions

Ambient Temperature	22.7°C
Relative Humidity	51.7%



Product Service

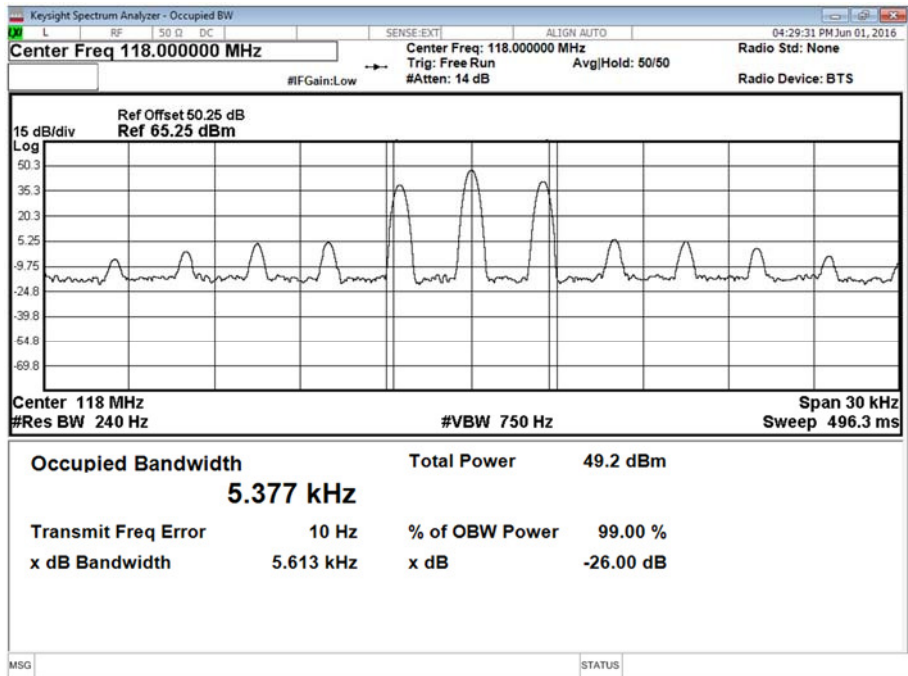
2.4.7 Test Results

110 V AC Supply

Transmit, Bandwidth of Emission Results

118.000 MHz	127.500 MHz	136.975 MHz
kHz	kHz	kHz
5.377	5.376	5.375

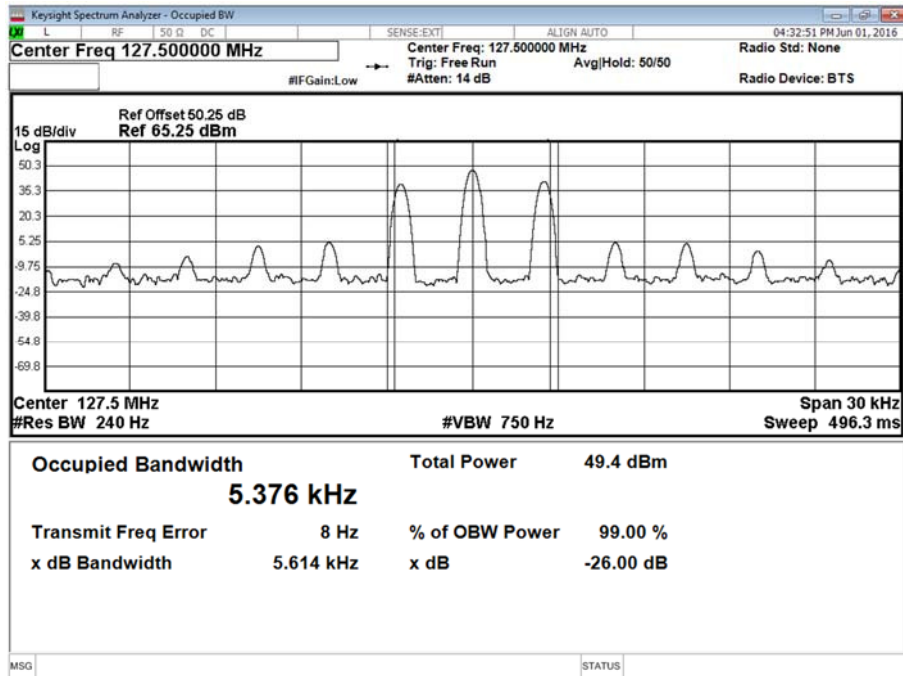
Transmit, 118.000 MHz, Bandwidth of Emission Plot



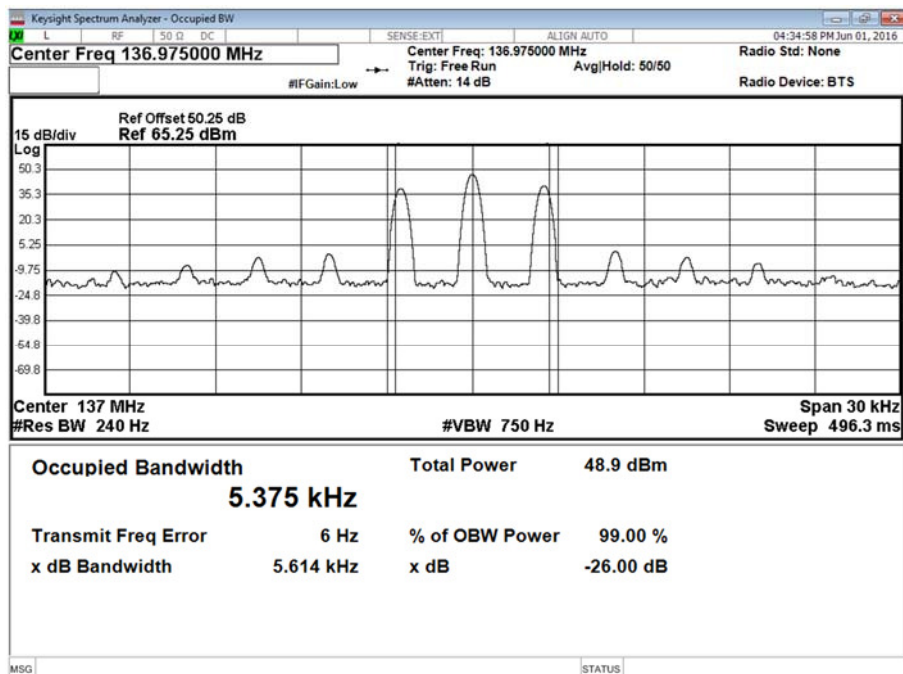


Product Service

Transmit, 127.500 MHz, Bandwidth of Emission Plot



Transmit, 136.975 MHz, Bandwidth of Emission Plot



FCC 47 CFR Part 87, Limit Clause 87.135(a)

Occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5 percent of the total mean power of a given emission.



Product Service

Industry Canada RSS-141, Limit Clause 5.1

6 kHz for A3E emissions



Product Service

2.5 TYPES OF EMISSION

2.5.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.137
Industry Canada RSS-141, Clause 5.1

2.5.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.5.3 Date of Test

2 June 2016

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

A spectrum analyser was used to show a plot of the fundamental frequency.

Remarks

The first plot shows 50 % modulation and the second with 85 % modulation.

2.5.6 Environmental Conditions

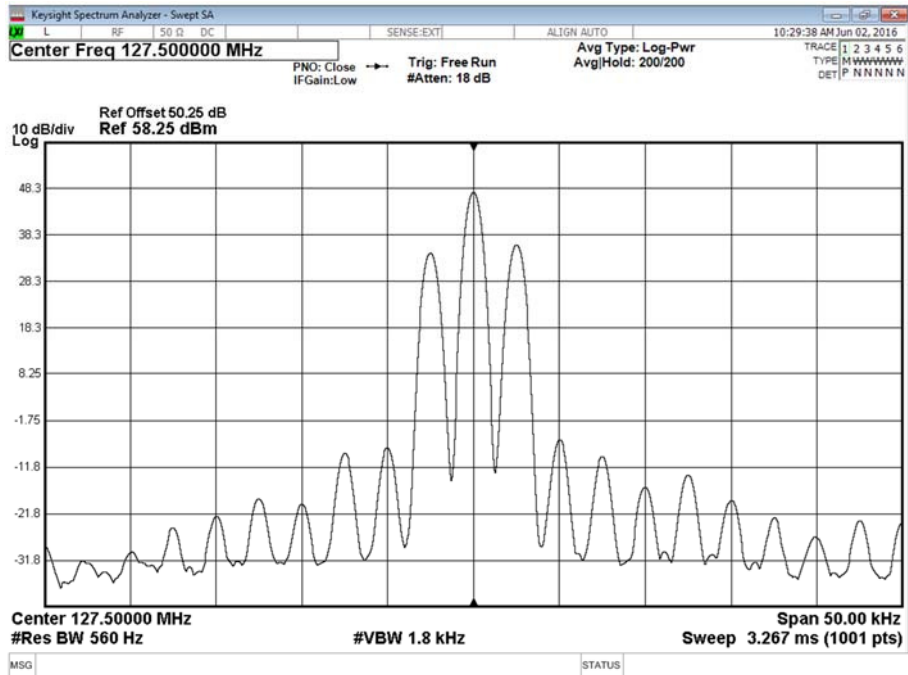
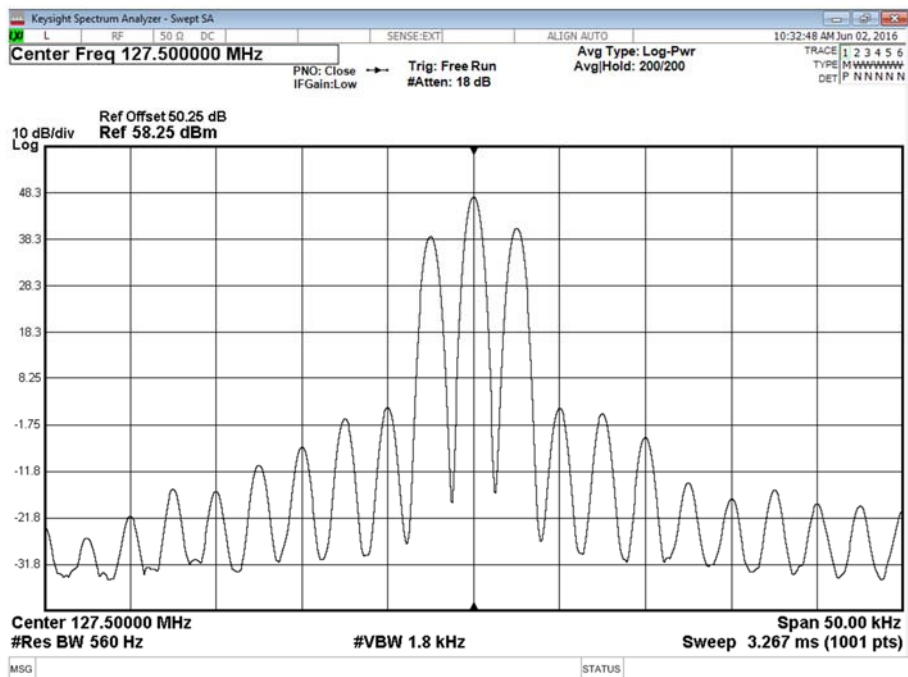
Ambient Temperature	21.1°C
Relative Humidity	46.5%



Product Service

2.5.7 Test Results

110 V AC

Transmit, 50 % Modulation. Types of Emission PlotTransmit, 85 % Modulation. Types of Emission Plot



Product Service

FCC 47 CFR Part 87, Limit Clause 87.137

The Emission Designator shall be specified.

Industry Canada RSS-141, Limit Clause 5.1

The Emission Designator shall be either A3E, A9W, G1D or G7D.



Product Service

2.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

2.6.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.139 (a)
FCC 47 CFR Part 2, Clause 2.1051
Industry Canada RSS-141, Clause 5.2

2.6.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.6.3 Date of Test

3 June 2016

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

The EUT was set to transmit at maximum power at 85% modulation depth. The EUT was connected to a Spectrum Analyser via 50dB of external attenuation. Measurements were performed to cover at least $\pm 250\%$ of the emission bandwidth and also outside $\pm 250\%$ of the emission bandwidth. The 0 dB reference point shown on the plot was determined with an unmodulated carrier. The test was performed at both 8.33 kHz and 25 kHz channel spacing options.

The Path Loss was recorded and the worst case loss was entered as a Reference Level Offset.

The EUT was powered with 110 V AC and 60 Hz frequency.

2.6.6 Environmental Conditions

Ambient Temperature	21.2°C
Relative Humidity	42.0%

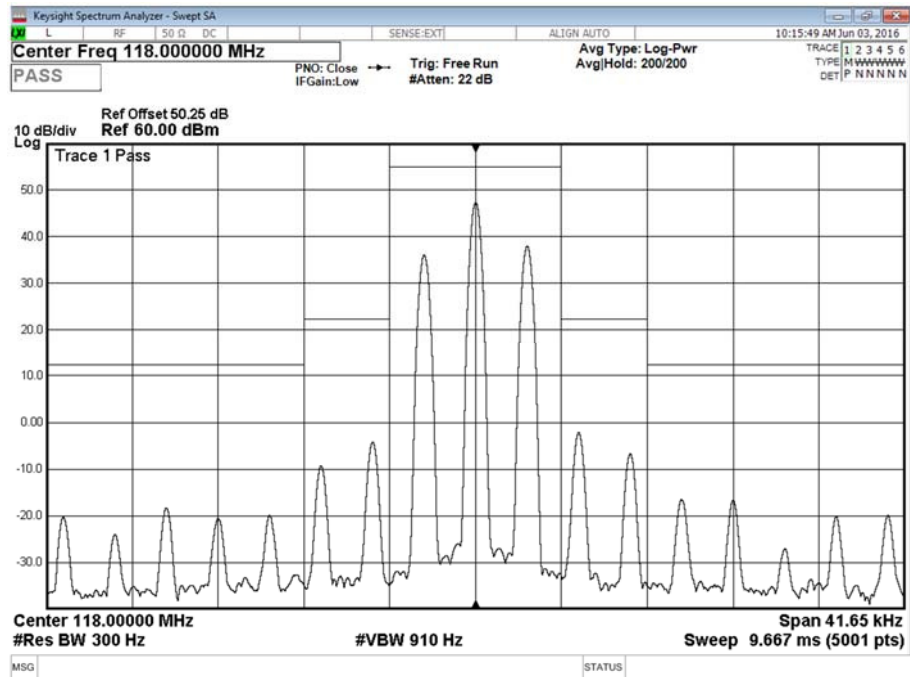


Product Service

2.6.7 Test Results

110 V AC Supply

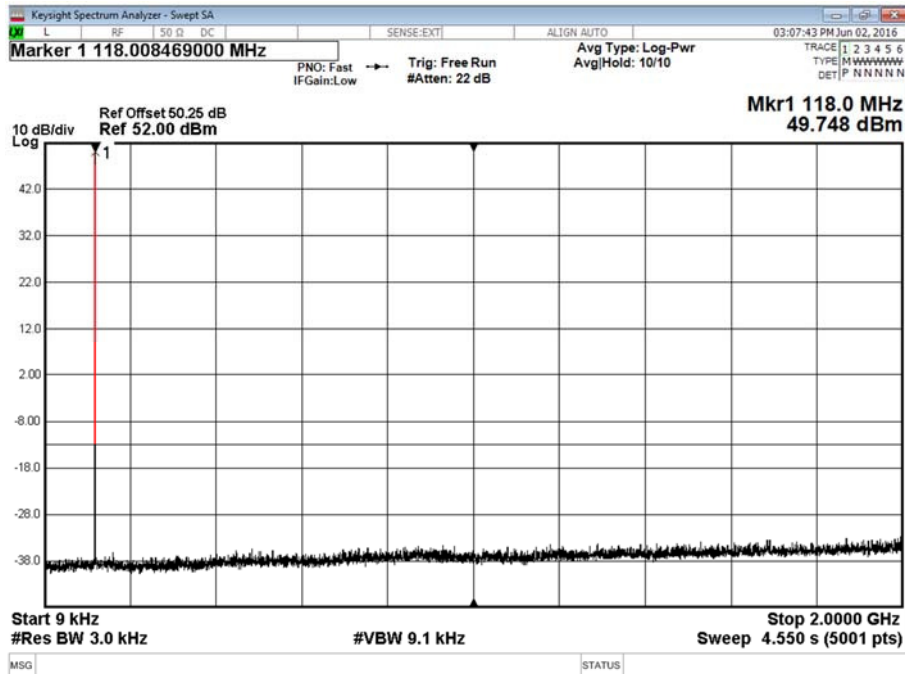
Transmit, 118.000 MHz, 8.33 kHz Channel Spacing, Emission Mask, Spurious Emissions at Antenna Terminals Plot



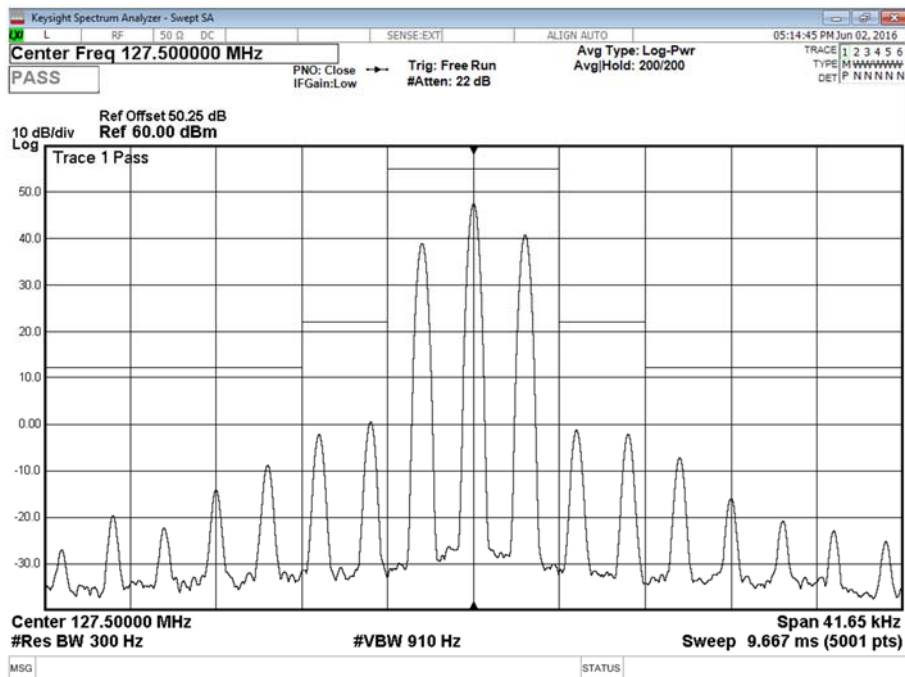


Product Service

Transmit, 118.000 MHz, 8.33 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



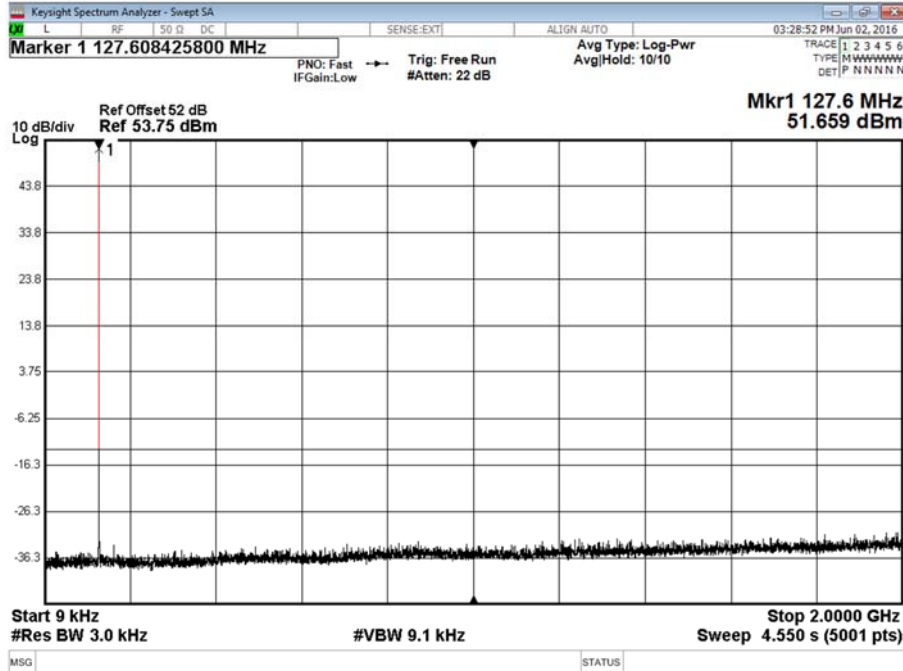
Transmit, 127.500 MHz, 8.33 kHz Channel Spacing, Emission Mask, Spurious Emissions at Antenna Terminals Plot



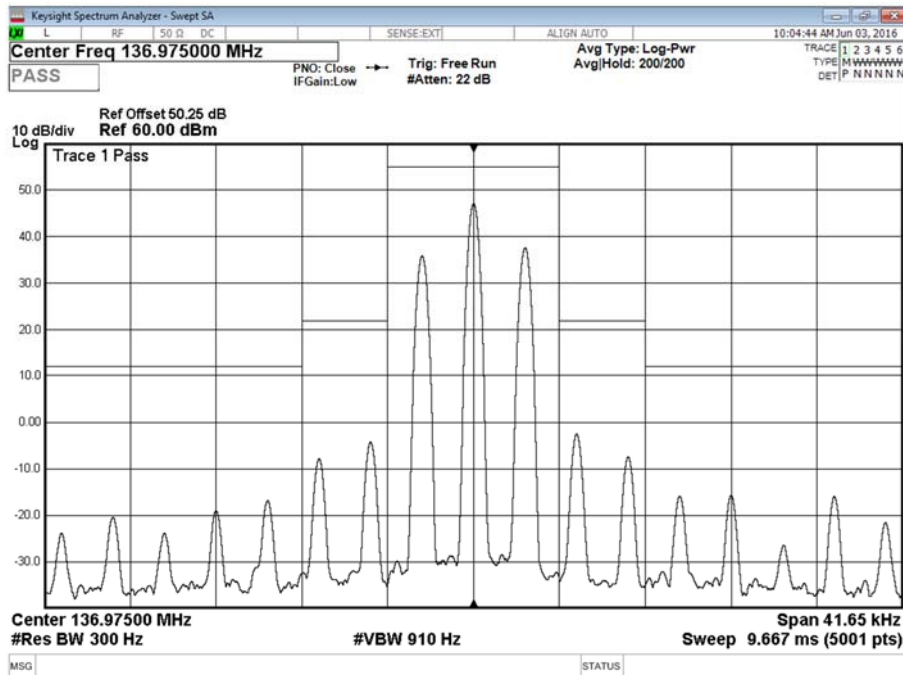


Product Service

Transmit, 127.500 MHz, 8.33 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



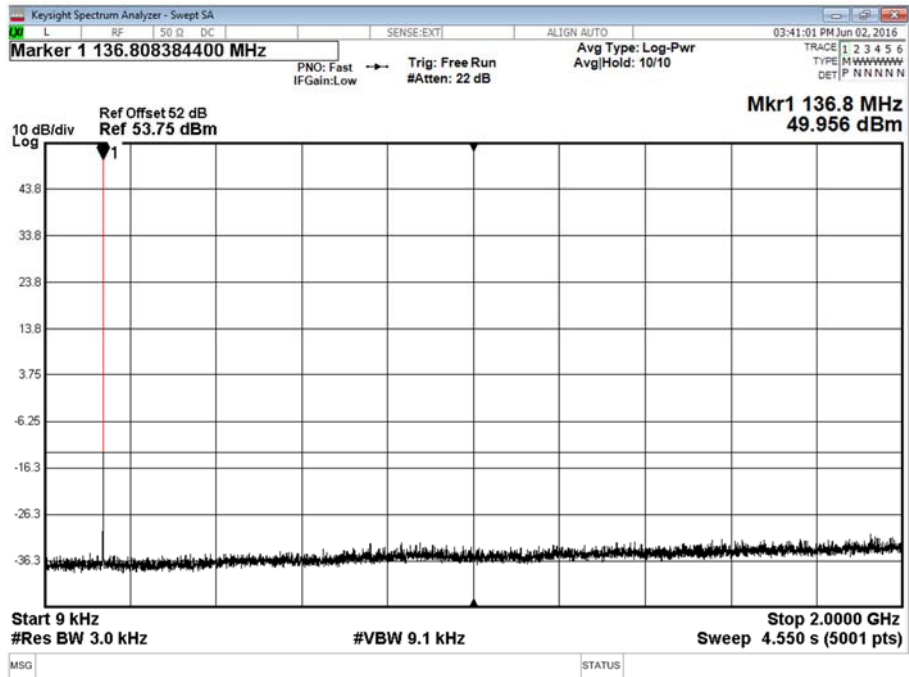
Transmit, 136.975 MHz, 8.33 kHz Channel Spacing, Emission Mask, Emission Mask, Spurious Emissions at Antenna Terminals Plot





Product Service

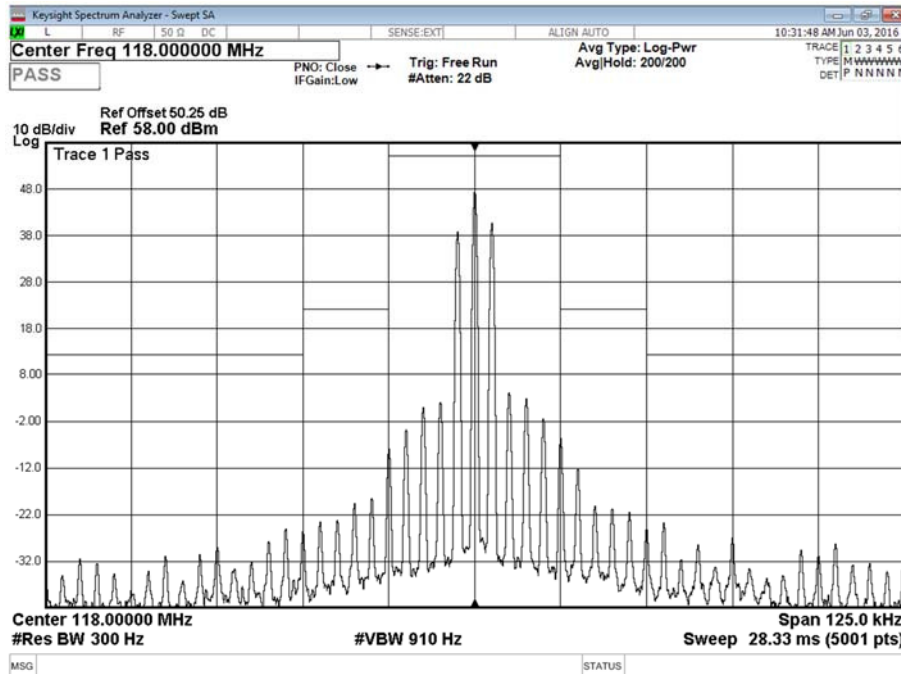
Transmit, 136.975 MHz, 8.33 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



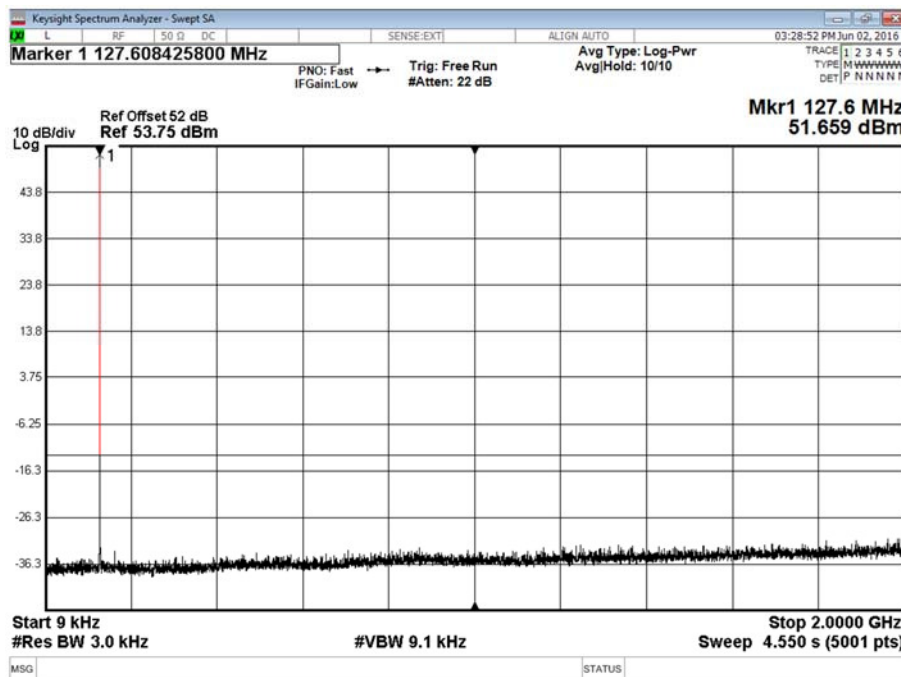


Product Service

Transmit, 118.000 MHz, 25 kHz Channel Spacing, Emission Mask, Spurious Emissions at Antenna Terminals Plot



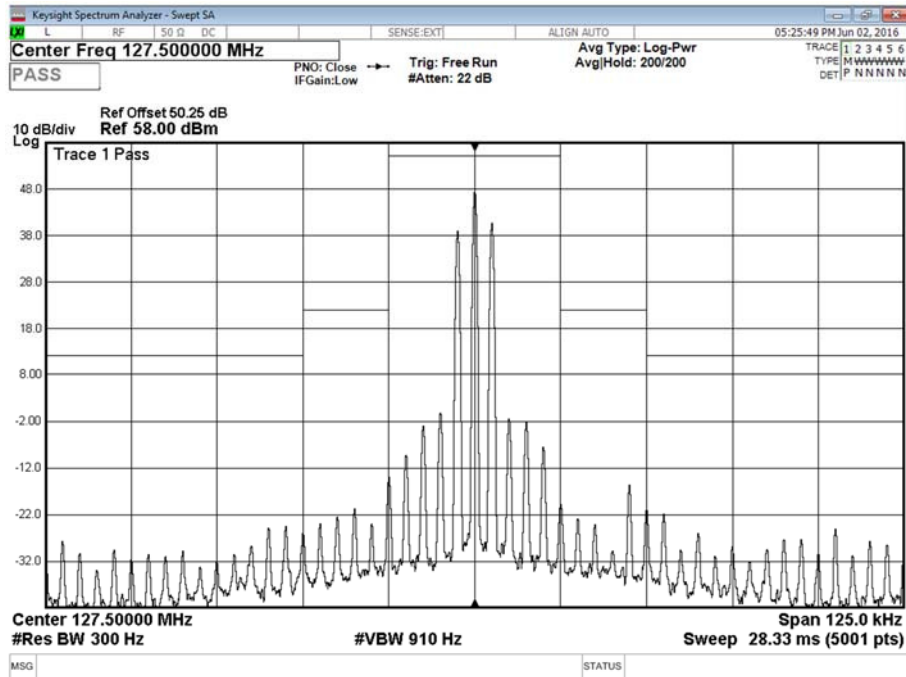
Transmit, 118.000 MHz, 25 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



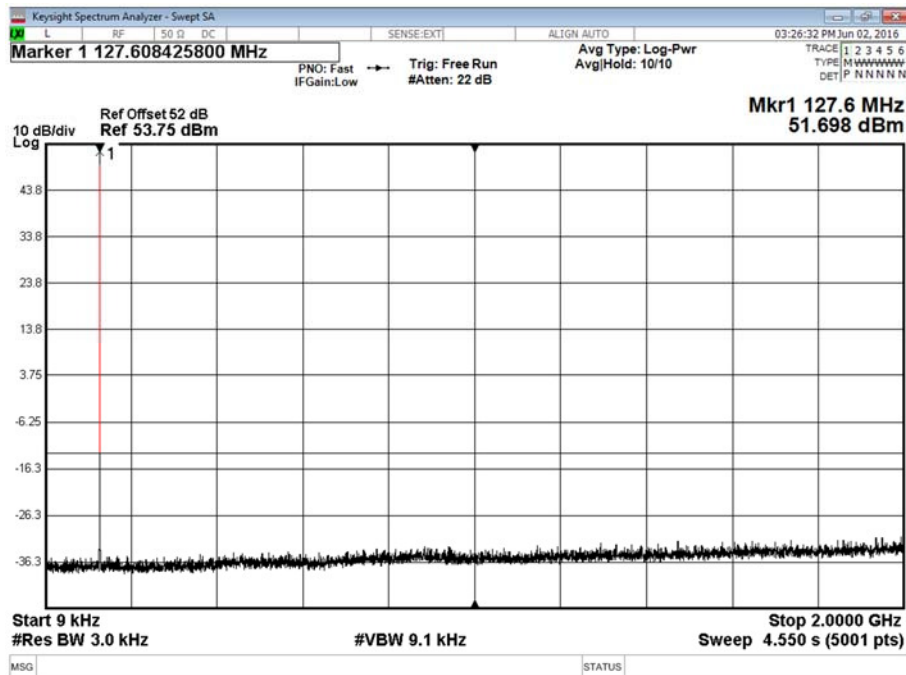


Product Service

Transmit, 127.500 MHz, 25 kHz Channel Spacing, Emission Mask, Spurious Emissions at Antenna Terminals Plot



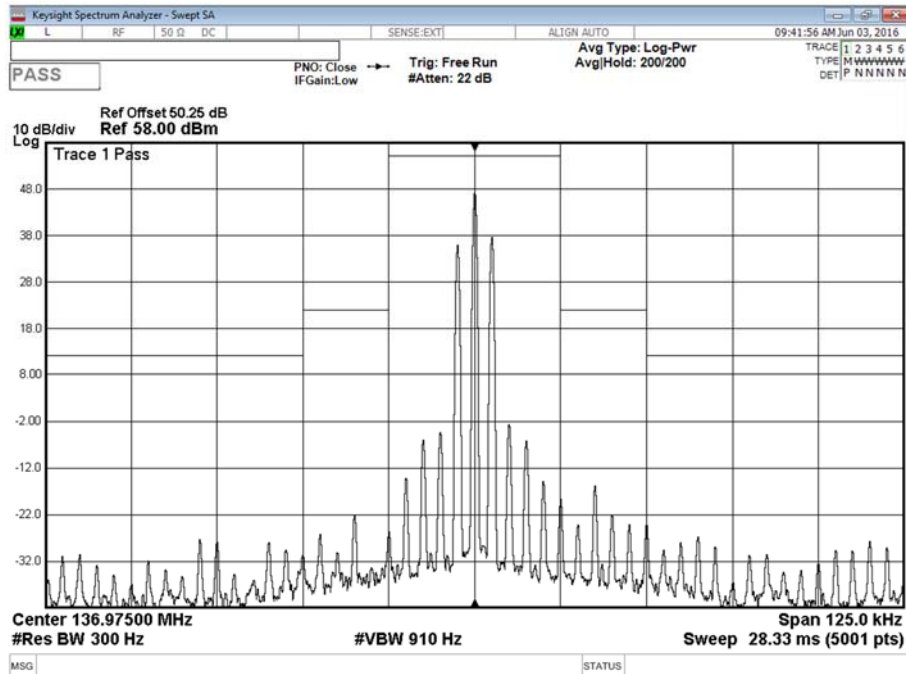
Transmit, 127.500 MHz, 25 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



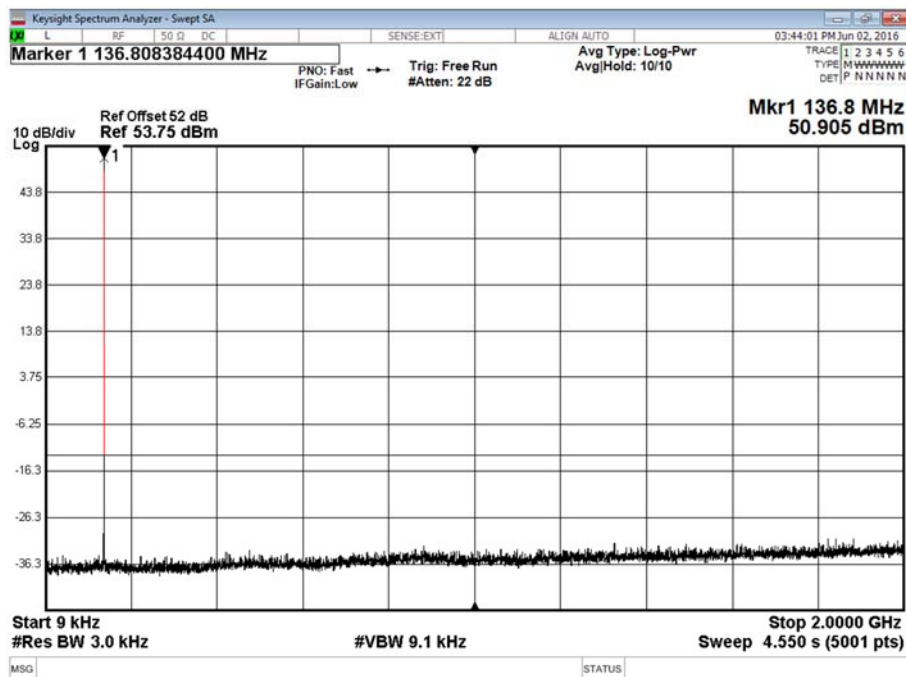


Product Service

Transmit, 136.975 MHz, 25 kHz Channel Spacing, Emission Mask, Emission Mask, Spurious Emissions at Antenna Terminals Plot



Transmit, 136.975 MHz, 25 kHz Channel Spacing, 9 kHz to 2 GHz, Spurious Emissions at Antenna Terminals Plot



FCC 47 CFR Part 87, Limit Clause 87.139(a)

- (1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB.
- (2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.
- (3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB, and the attenuation for aeronautical station transmitters must be at least $43 + 10 \log_{10} P$ dB.

Industry Canada RSS-141, Limit Clause 5.2.2

For transmitters with A3E or A9W emissions, the mean power of any emissions shall be attenuated below the mean power of the transmitter, P as follows:

- (a) When the frequency is removed from the equipment's channel centre frequency by more than 50% up to and including 100% of the channel bandwidth, the attenuation shall be at least 25 dB, measured with a bandwidth of 300 Hz.
- (b) When the frequency is removed from the equipment's channel centre frequency by more than 100% up to and including 250% of the channel bandwidth, the attenuation shall be at least 35 dB, measured with a bandwidth of 300 Hz.
- (c) When the frequency is removed from the equipment's channel centre frequency by more than 250% of the channel bandwidth, the attenuation for on-board aircraft transmitters shall be at least 40 dB; and the attenuation for ground transmitters shall be at least $43 + 10 \log_{10} P$ (in watts) dB, measured with a bandwidth of 3 kHz.



Product Service

2.7 RADIATED SPURIOUS EMISSIONS**2.7.1 Specification Reference**

FCC 47 CFR Part 87, Clause 87.139 (a)
FCC 47 CFR Part 2, Clause 2.1053
Industry Canada RSS-141, Clause 5.2

2.7.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.7.3 Date of Test

16 May 2016 & 26 May 2016

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

The test was performed in accordance with ANSI C63.4, clause 8 and ANSI TIA-603-D, clause 3.2.12.

2.7.6 Environmental Conditions

Ambient Temperature	19.7 - 21.6°C
Relative Humidity	32.0 - 37.0%



Product Service

2.7.7 Test Results

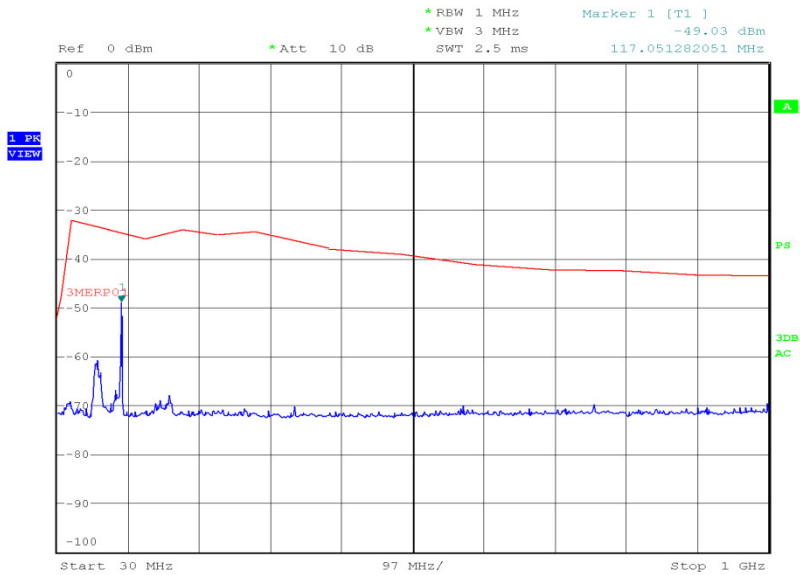
110 V AC Supply

Transmit, 118.000 MHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

*No emissions were detected within 20 dB of the limit.

Transmit, 118.000 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot

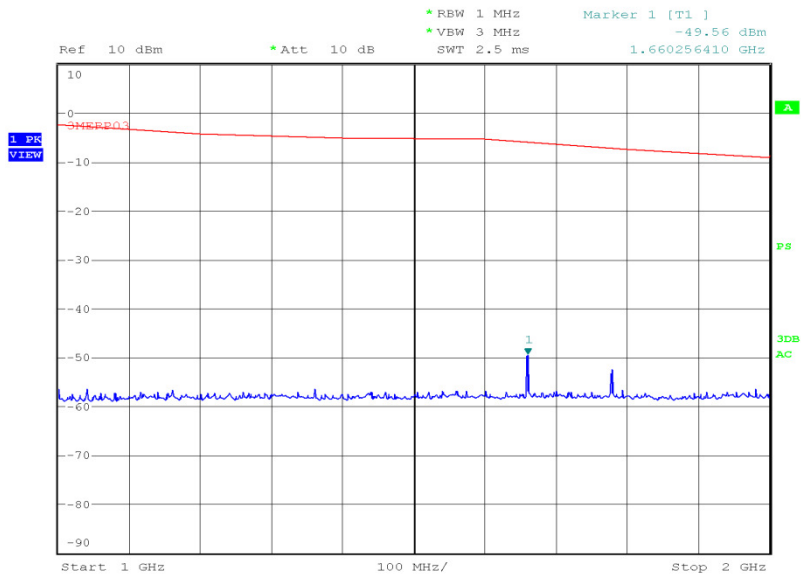


Date: 26.MAY.2016 17:11:11



Product Service

Transmit, 118.000 MHz, 1 GHz to 2 GHz, Radiated Spurious Emissions Plot



Date: 26.MAY.2016 14:49:20



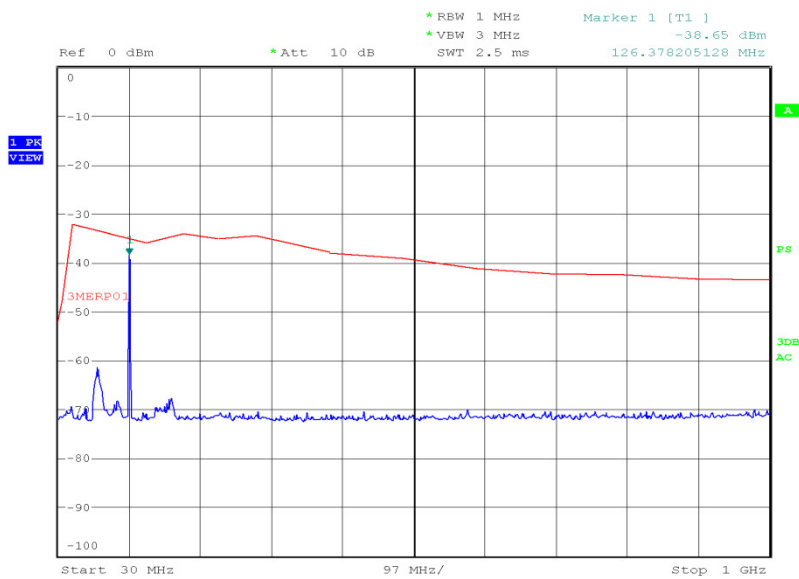
Product Service

Transmit, 127.500 MHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

*No emissions were detected within 20 dB of the limit.

Transmit, 127.500 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 26.MAY.2016 17:07:09



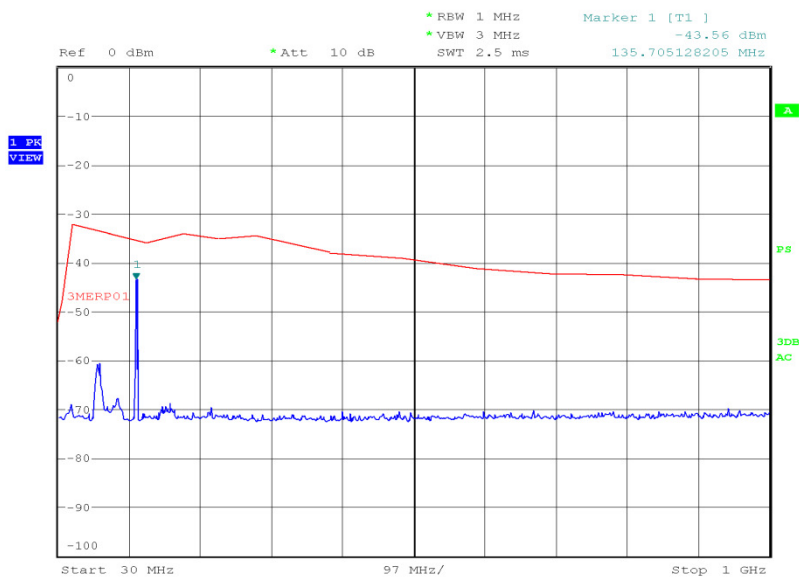
Product Service

Transmit, 136.975 MHz, Radiated Spurious Emissions Results

Frequency (MHz)	Emission Results (dBm)
*	

*No emissions were detected within 20 dB of the limit.

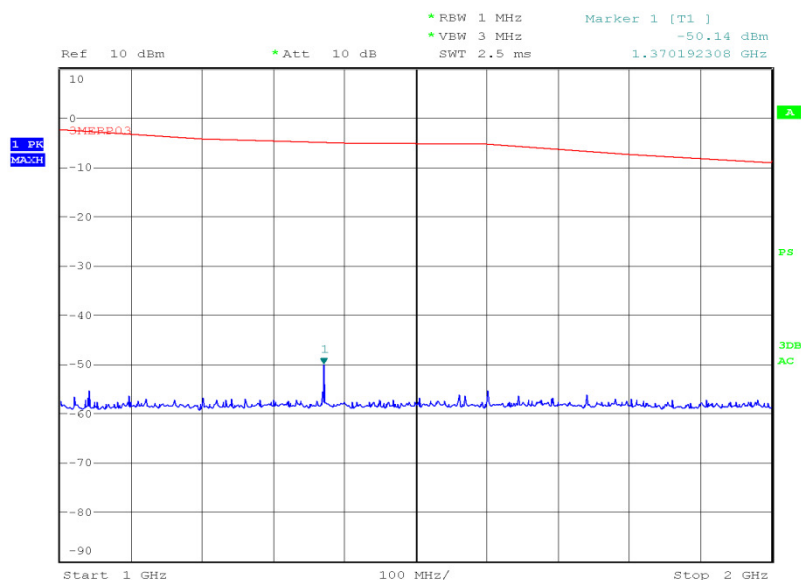
Transmit, 136.975 MHz, 30 MHz to 1 GHz, Radiated Spurious Emissions Plot



Date: 26.MAY.2016 16:57:05



Transmit, 136.975 MHz, 1 GHz to 2 GHz, Radiated Spurious Emissions Plot



Date: 26.MAY.2016 14:57:41

FCC 47 CFR Part 87, Limit Clause 87.139 (a)(3)

Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435–1525 MHz, 2345 – 2395 MHz, or 5091–5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least $43 + 10 \log_{10} pY$ dB.

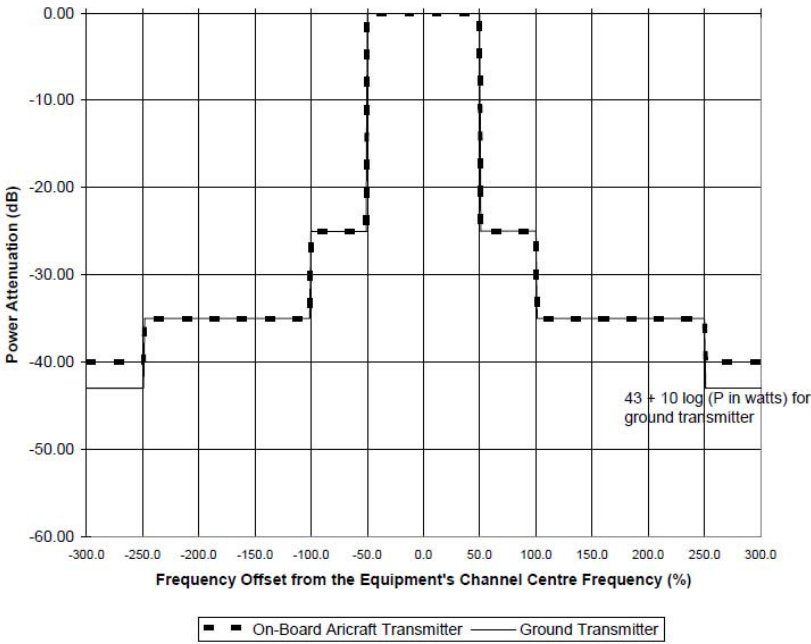
Industry Canada RSS-141, Limit Clause 5.2.2 (c)

For transmitters with A3E or A9W emissions, the mean power of any emissions shall be attenuated below the mean power of the transmitter, P as follows:

When the frequency is removed from the equipment's channel centre frequency by more than 250% of the channel bandwidth, the attenuation for on-board aircraft transmitters shall be at least 40 dB; and the attenuation for ground transmitters shall be at least $43 + 10 \log_{10} P$ (in watts) dB, measured with a bandwidth of 3 kHz



Product Service





Product Service

2.8 MODULATION REQUIREMENTS

2.8.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.141
FCC 47 CFR Part 2, Clause 2.1047 (d)
Industry Canada RSS-141, Clause 5.1

2.8.2 Equipment Under Test and Modification State

T6-TRV S/N: 140356 - Modification State 0

2.8.3 Date of Test

3 June 2016

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, Clause 3.

Remarks

The AM depth was measured in respect to the AF frequency and level to demonstrate compliance.

The EUT was AC powered with 110V and 60Hz frequency.

2.8.6 Environmental Conditions

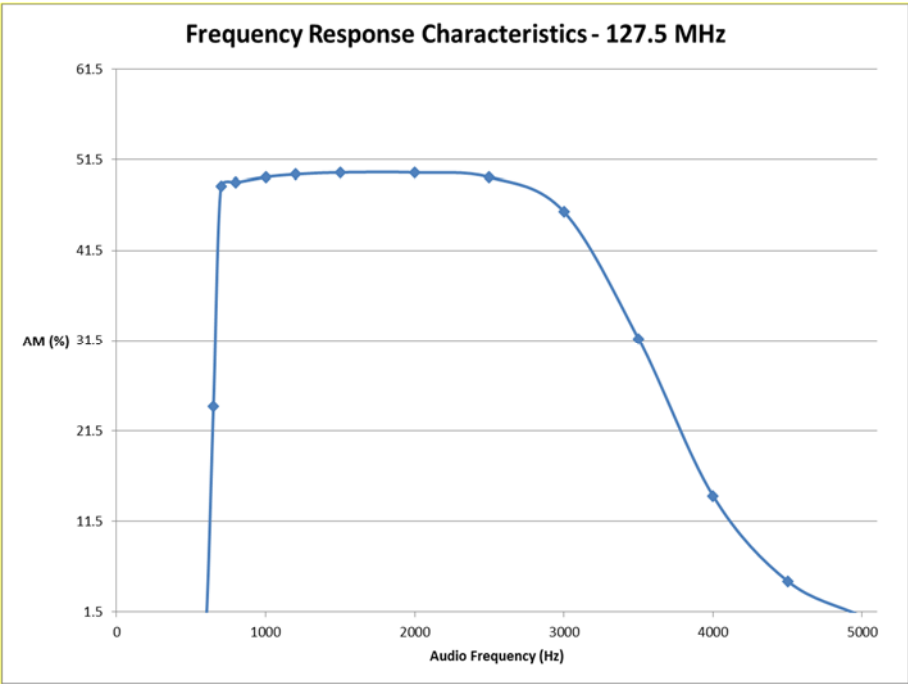
Ambient Temperature	22.8°C
Relative Humidity	42.5%



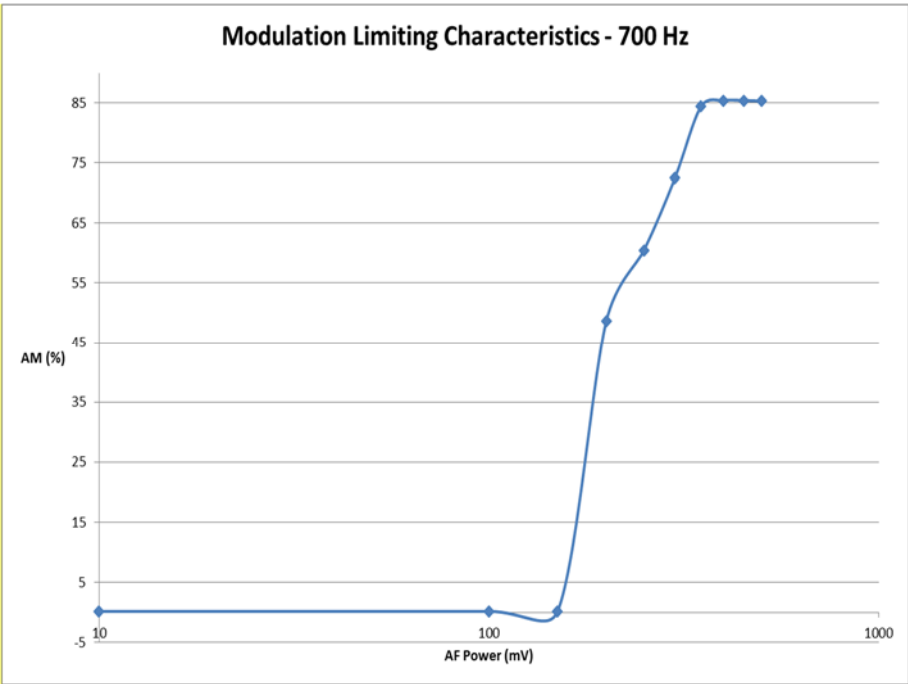
Product Service

2.8.7 Test Results

Transmit, Frequency Response Characteristic – 127.5 MHz, Modulation Requirements Plot



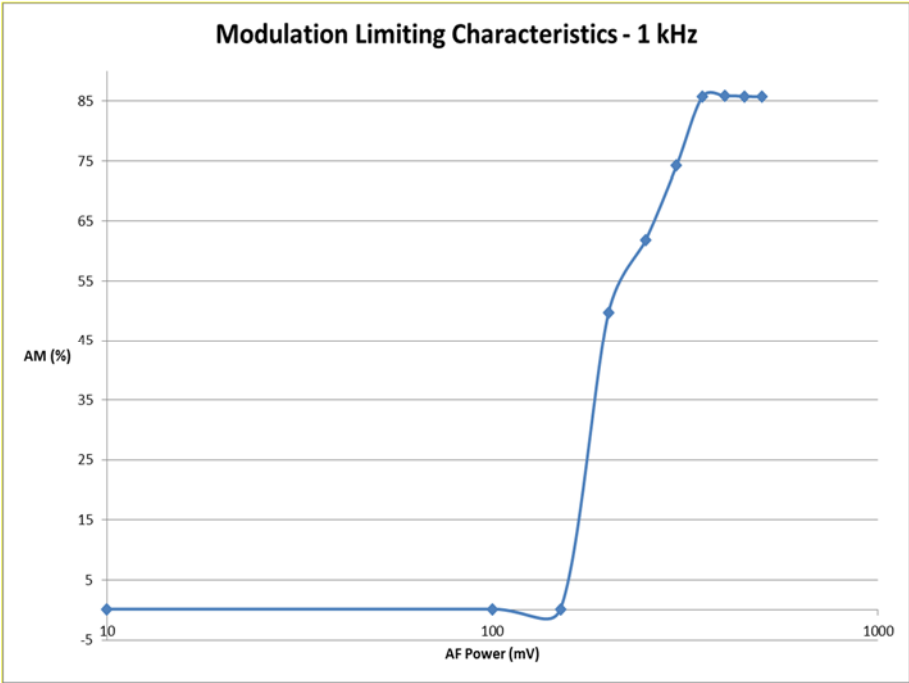
Transmit, Modulation Limiting Characteristics – 700 Hz, Modulation Requirements Plot



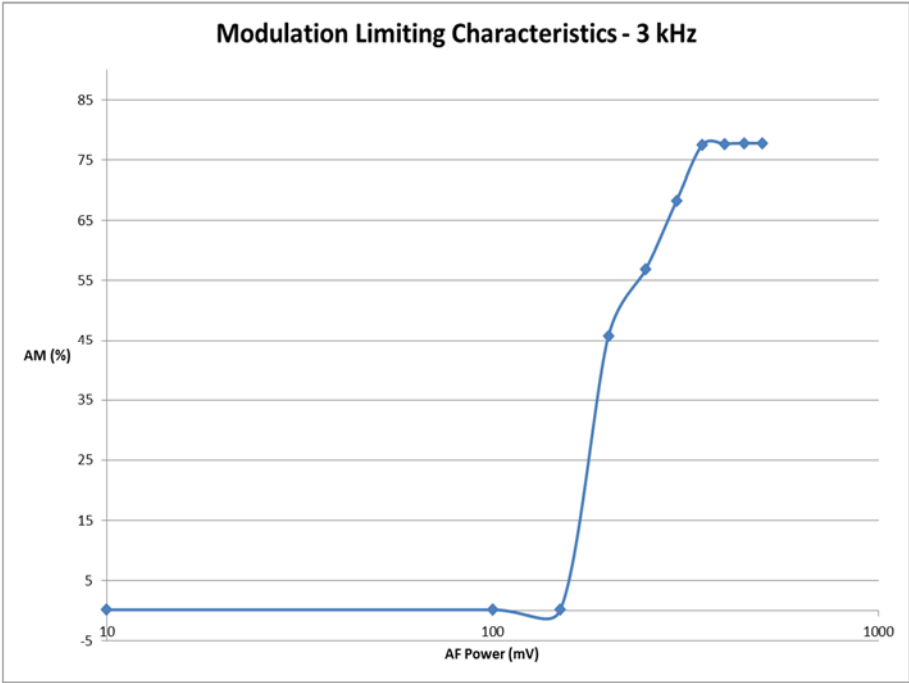


Product Service

Transmit, Modulation Limiting Characteristics – 1 kHz, Modulation Requirements Plot



Transmit, Modulation Limiting Characteristics – 3 kHz, Modulation Requirements Plot





Product Service

FCC 47 CFR Part 87, Limit Clause 87.141 (a)(b)(c)

- (a) When A3E emission is used, the modulation percentage must not exceed 100 percent. This requirement does not apply to emergency locator transmitters or survival craft transmitters.
- (b) A double sideband full carrier amplitude modulated radiotelephone transmitter with rated carrier power output exceeding 10 watts must be capable of automatically preventing modulation in excess of 100 percent.
- (c) If any licensed radiotelephone transmitter causes harmful interference to any authorized radio service because of excessive modulation, the Commission will require the use of the transmitter to be discontinued until it is rendered capable of automatically preventing modulation in excess of 100 percent.

Industry Canada RSS-141, Limit Clause 5.1

Shall not exceed 100%



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - AC Line Conducted Emissions					
LISN	Rohde & Schwarz	ESH2-Z5	17	12	11-Feb-2017
3 phase LISN	Rohde & Schwarz	ESH2-Z5	323	12	7-Apr-2017
Transient Limiter	Hewlett Packard	11947A	2377	12	16-Feb-2017
Multimeter	Iso-tech	IDM101	2417	12	29-Sep-2016
Compliance 5 Emissions	Schaffner	C5e Software V.5.00.00	3275	-	N/A - Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
Section 2.2 - Power and Emissions					
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.3 - Frequency Stability					
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Sensor Module	Hewlett Packard	11722A	1333	12	2-Sep-2016
Mains Voltage Monitor	TUV SUD Product Service	MVM1	1378	12	3-Sep-2016
Programmable Power Supply	California Inst	2001RP	1898	-	TU
Digital Temperature Indicator	Fluke	51	2267	12	9-Dec-2016
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Modulation Analyser	Hewlett Packard	8901B	3292	12	5-Nov-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Section 2.4 - Bandwidth of Emission					
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Sensor Module	Hewlett Packard	11722A	1333	12	2-Sep-2016
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Modulation Analyser	Hewlett Packard	8901B	3292	12	5-Nov-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Type of Emissions					
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.6 - Spurious Emissions at Antenna Terminals					
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.7 - Emission Limitations					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2017
Modulation Analyser	Hewlett Packard	8901B	555	12	1-Dec-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Audio Analyser	Hewlett Packard	8903B	1881	12	16-Nov-2016
Multimeter	Iso-tech	IDM101	2417	12	29-Sep-2016
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
Section 2.8 - Modulation Requirements					
Audio Analyser	Hewlett Packard	8903B	576	12	8-Jun-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Sensor Module	Hewlett Packard	11722A	1333	12	2-Sep-2016
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Multimeter	Fluke	79 Series II	3057	12	7-Oct-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Modulation Analyser	Hewlett Packard	8901B	3292	12	5-Nov-2016
Attenuator (20dB, 150W)	Narda	769-20	3367	12	31-May-2017
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	29-Jun-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Spurious Emissions at Antenna Terminals	± 3.454 dB
Bandwidth of Emission	± 100 Hz
Frequency Stability	± 8.03 Hz
Modulation Requirements	-
Power and Emissions	± 0.70 dB
Types of Emission	-
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
AC Line Conducted Emissions	± 3.2 dB



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

This report must not be reproduced, except in its entirety, without the written permission of
TÜV SÜD Product Service

© 2016 TÜV SÜD Product Service