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Report On

FCC Testing of the
Sepura plc STP8040 Portable Tetra Radio
In accordance with FCC CFR 47 Part 90

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FCC ID: XX6STP8040

Document 75908190 Report 01 Issue 2

March 2010



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
Sepura plc STP8040 Portable Tetra Radio
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Document 75908190 Report 01 Issue 2

March 2010

PREPARED FOR

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PREPARED BY

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Senior Administrator

APPROVED BY

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Authorised Signatory

C Gould
Authorised Signatory

DATED

02 March 2010

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 CFR 47 Part 90. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

R A Blagg

G Lawler

This report has been up-issued to remove references to Issue 2 to Industry Canada.





Product Service

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sepura plc STP8040 Portable Tetra Radio
In accordance with FCC CFR 47 Part 90



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sepura plc, STP8040 Portable Tetra Radio to the requirements of FCC CFR 47 Part 90.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sepura plc
Model Number(s)	STP8040 Portable Tetra Radio
Serial Number(s)	2PN40092294Y10S
Number of Samples Tested	One
Test Specification/Issue/Date	FCC CFR 47 Part 90: 2008
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	315350/T0201
Date	19 November 2009
Start of Test	08 December 2009
Finish of Test	12 January 2010
Name of Engineer(s)	R A Blagg G Lawler
Related Document(s)	ANSI 63.4 : 2003



Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 90 is shown below.

Section	Spec Clause	Test Description	Mode	Result	Comments
2.1	90.210(c)(3)	Emission Limitations for Cellular Equipment	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.2	90.205 (h)	Effective Radiated Power	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.3	90.205, 2.1046	Power and Antenna Height Limits / Transmitter Output Power	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.4	90.207, 2.1047	Types of Emission / Types of Modulation	Transmit Bottom	Pass	Customer to Declare
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.5	90.209, 2.1049	Bandwidth Limitations	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.6	90.210, 2.1051	Emission Mask	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.7	90.213, 2.1055	Frequency Stability	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	
2.8	90.214	Transient Frequency Behaviour	Transmit Bottom	Pass	
			Transmit Middle	Pass	
			Transmit Top	Pass	



Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Tetra Handheld terminal		
MANUFACTURER	Sepura		
TYPE	STP8040 (STP8140)		
PART NUMBER	n/a		
SERIAL NUMBER	2PN400922G4Y10S and 2PN400922G4Y1P5		
HARDWARE VERSION	Production		
SOFTWARE VERSION	-		
TRANSMITTER OPERATING RANGE	407MHz to 473MHz and 2402MHz-2480MHz		
RECEIVER OPERATING RANGE	407MHz to 473MHz and 2402MHz-2480MHz		
COUNTRY OF ORIGIN	UK		
INTERMEDIATE FREQUENCIES	69.25MHz		
ITU DESIGNATION OF EMISSION	25K0Q1D		
HIGHEST INTERNALLY GENERATED FREQUENCY	Fc (TX)x4/3 MHz or Fc (RX)+69.25MHz, GPS Module clock on chip 3.145GHZ		
OUTPUT POWER (W or dBm)	1.8 Watts		
FCC ID	XX6STP8040		
INDUSTRY CANADA ID	8739-STP8040		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Tetra Handheld terminal		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Lithium Polymer		
MANUFACTURER	Varta		
TYPE	Standard	Hi Cap	
PART NUMBER	300 00634,	300 00635	
VOLTAGE	7.4Vdc		
COUNTRY OF ORIGIN	Indonesia		
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	Advanced RSM	Ear Hanger	
MANUFACTURER	JDI	Lowe	
TYPE			
PART NUMBER	300-00388		
SERIAL NUMBER			
COUNTRY OF ORIGIN	Taiwan	UK	

Signature

Date

10 December 2009

D of B S Serial No

75908190

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sepura plc, STP8040 Portable Tetra Radio as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test



Product Service

1.4.2 Test Configuration

Configuration 1: Stand Alone Powered

The EUT was configured as a standalone item and powered via a 7.4 V battery.

1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
Signal	1.0m	Fist Microphone	Multicore	No

1.4.4 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 – 450.025 MHz Transmit Bottom

Mode 2 – 460.025 MHz Transmit Middle

Mode 3 – 469.975 MHz Transmit Top

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



Product Service

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, test laboratories or an open test area as appropriate.

The EUT was powered via a 7.4 V battery.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Sepura plc STP8040 Portable Tetra Radio
In accordance with FCC CFR 47 Part 90



Product Service

2.1 EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT

2.1.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.210 (c) (3)

2.1.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.1.3 Date of Test and Modification State

12 January 2010 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

2.1.6 Environmental Conditions

12 January 2010

Ambient Temperature 21.5°C

Relative Humidity 24%

Atmospheric Pressure 996mbar

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 90 for Emission limitations for Cellular Equipment.

The test results are shown on the following pages

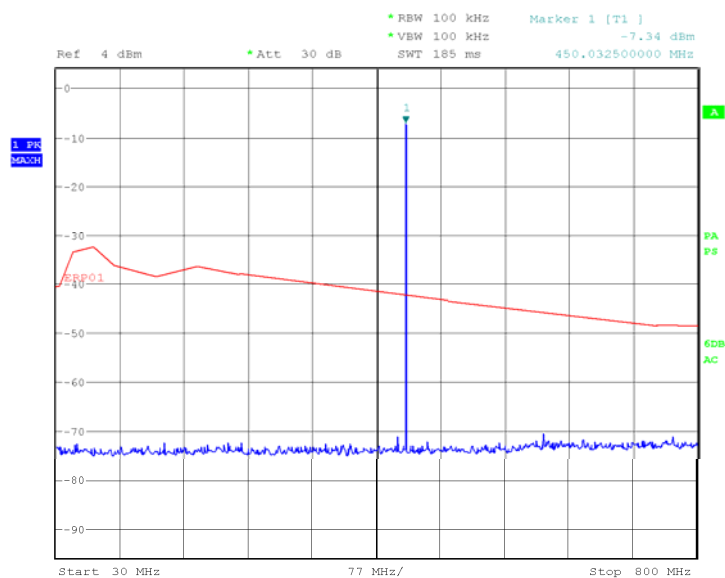


Product Service

Configuration 1 - Mode 1

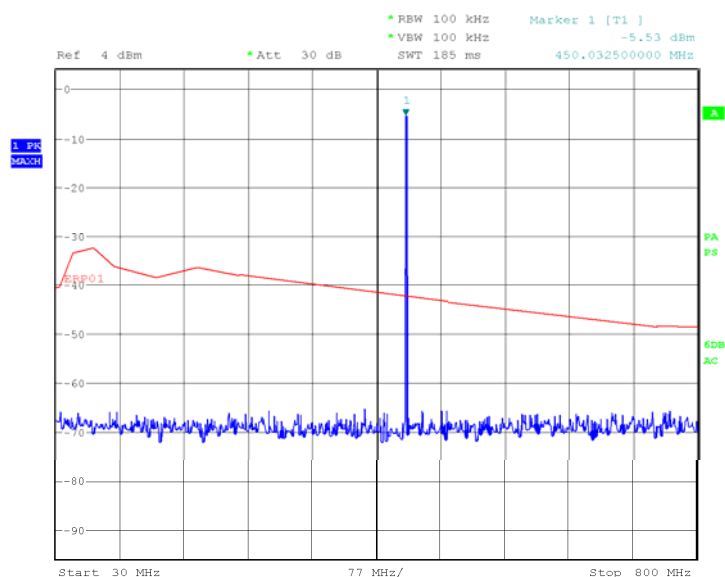
30 MHz to 800MHz

Vertical



Date: 12.JAN.2010 20:47:08

Horizontal



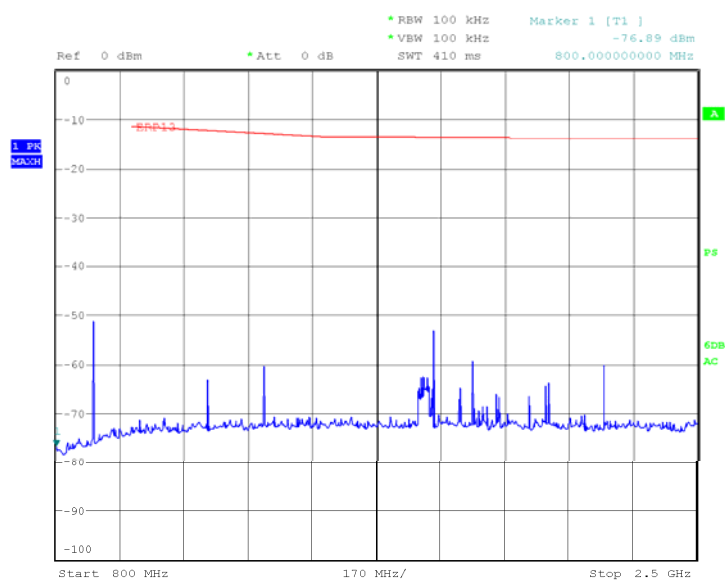
Date: 12.JAN.2010 20:46:04



Product Service

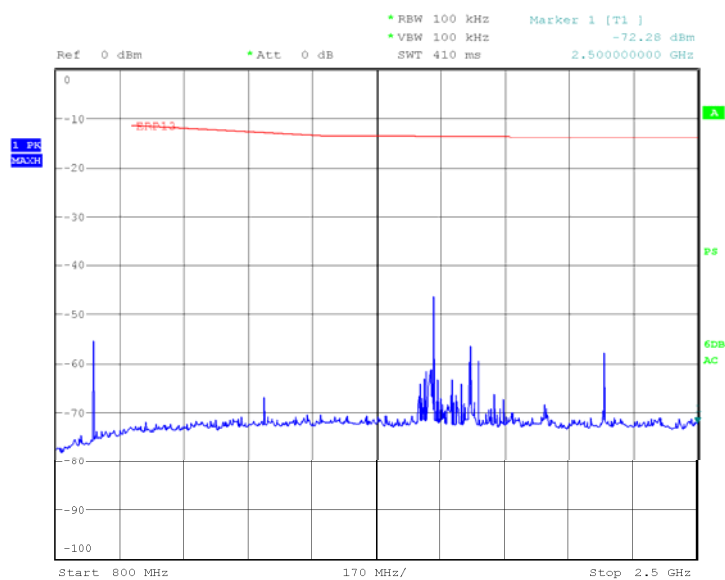
800 MHz to 2.5 GHz

Vertical



Date: 12.JAN.2010 22:39:28

Horizontal



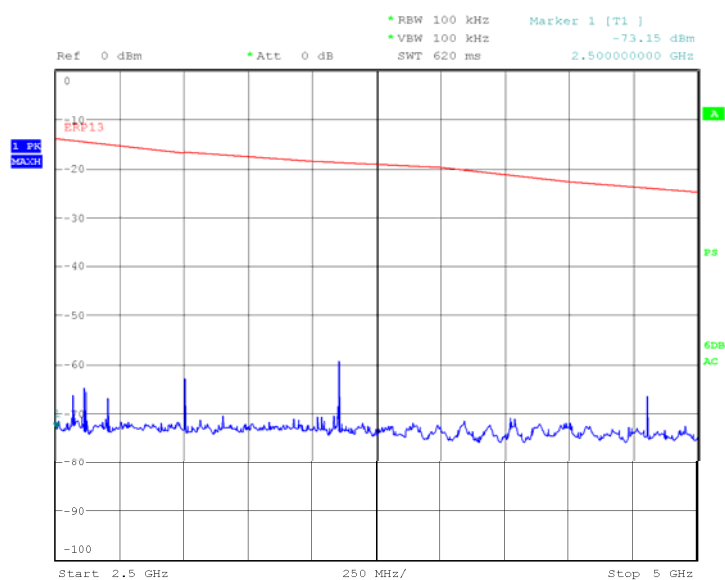
Date: 12.JAN.2010 22:52:37



Product Service

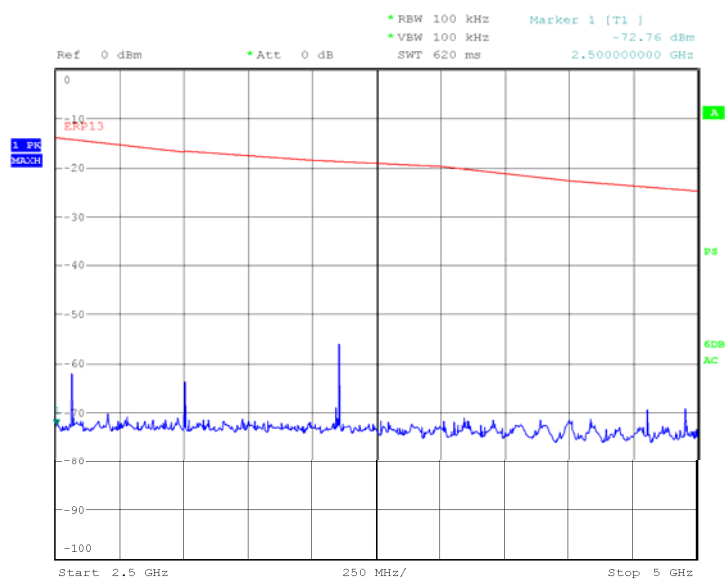
2.5 GHz to 5 GHz

Vertical



Date: 12.JAN.2010 22:49:26

Horizontal



Date: 12.JAN.2010 22:51:03

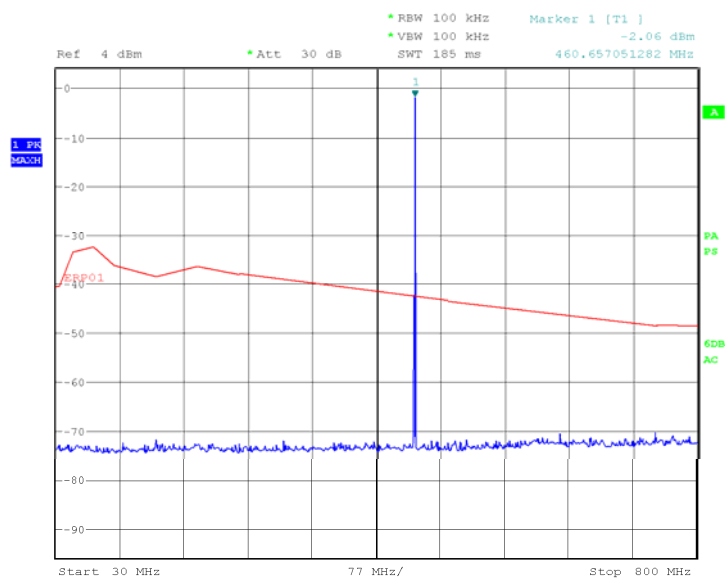


Product Service

Configuration 1 - Mode 2

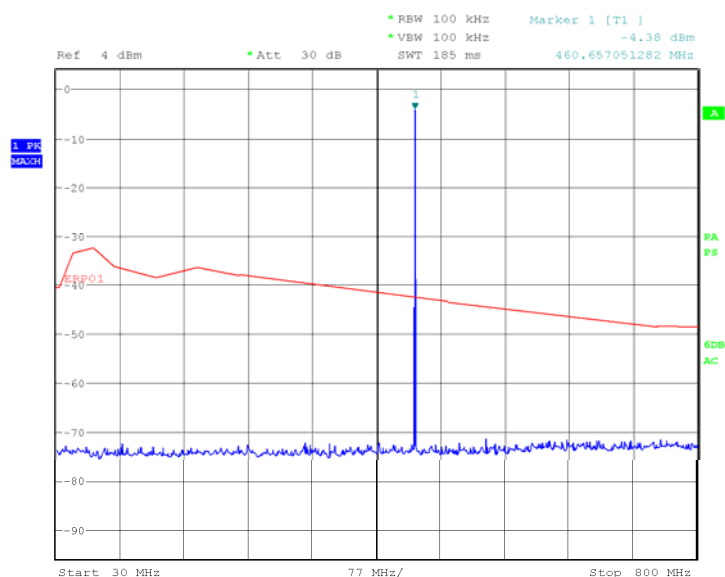
30 MHz to 800MHz

Vertical



Date: 12.JAN.2010 21:06:41

Horizontal



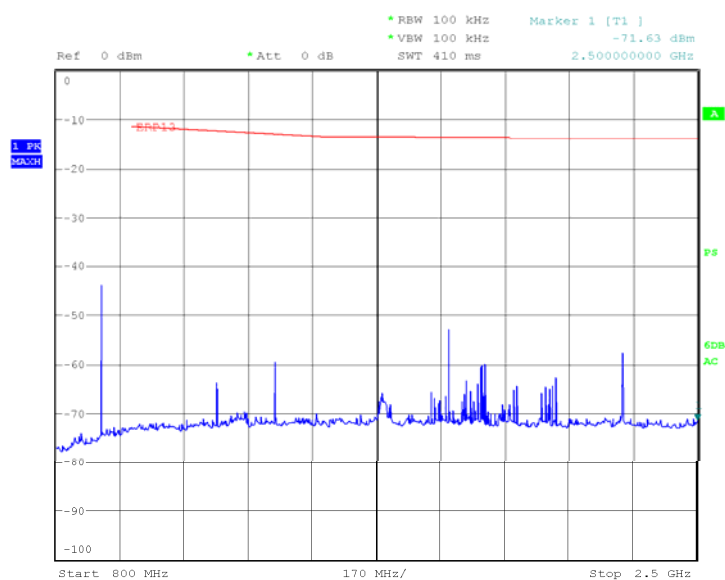
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Product Service

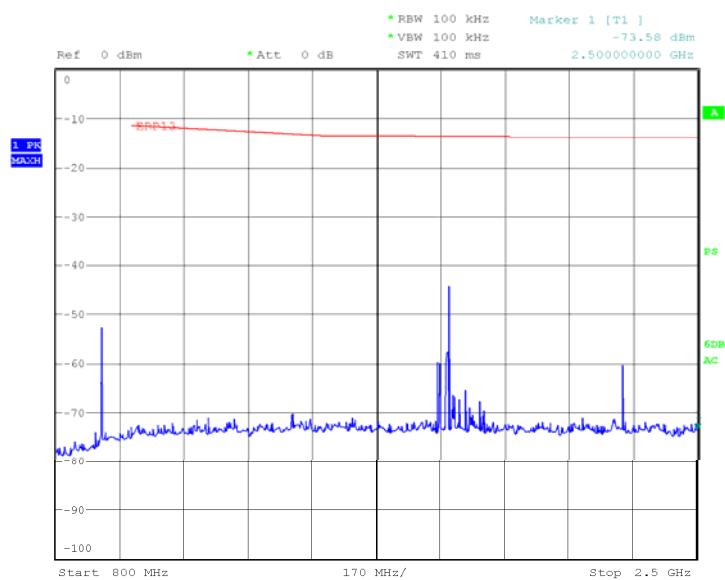
800 MHz to 2.5 GHz

Vertical



Date: 12.JAN.2010 23:00:53

Horizontal



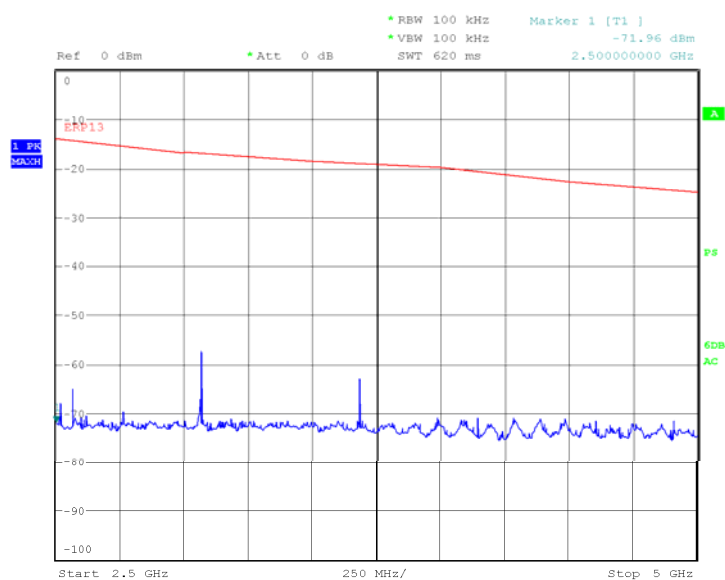
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Product Service

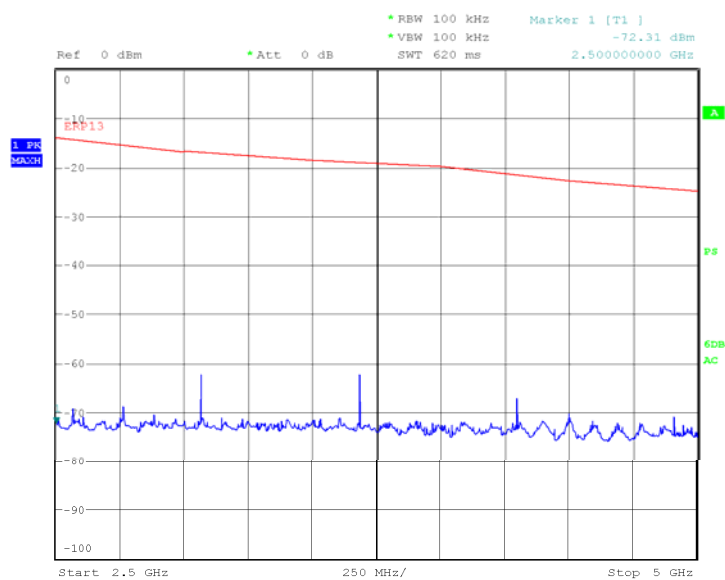
2.5 GHz to 5 GHz

Vertical



Date: 12.JAN.2010 23:04:04

Horizontal



Date: 12.JAN.2010 23:06:33

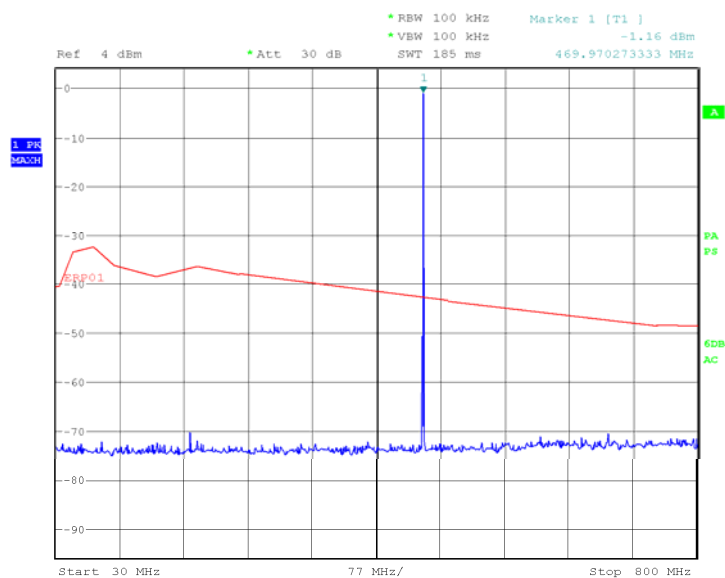


Product Service

Configuration 1 - Mode 3

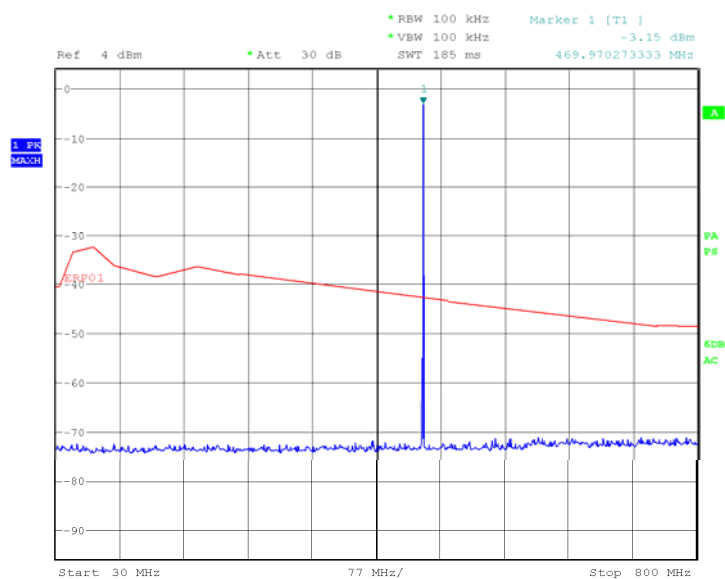
30 MHz to 800MHz

Vertical



Date: 12.JAN.2010 21:28:16

Horizontal



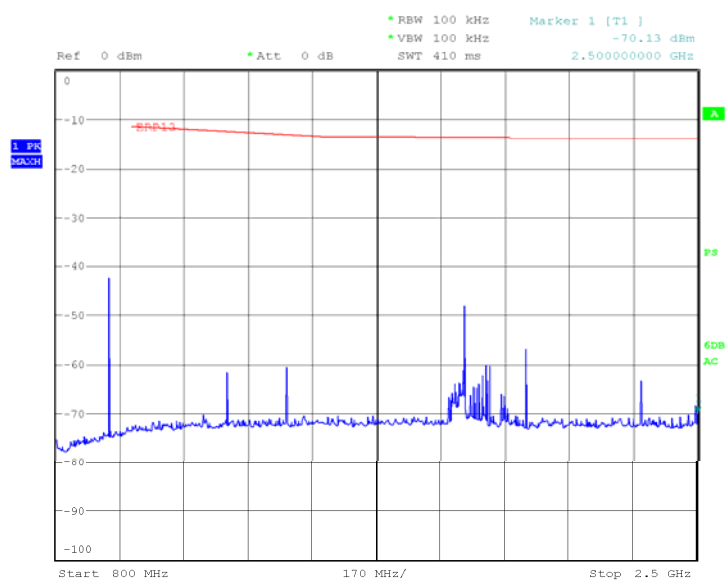
Date: 12.JAN.2010 21:26:45



Product Service

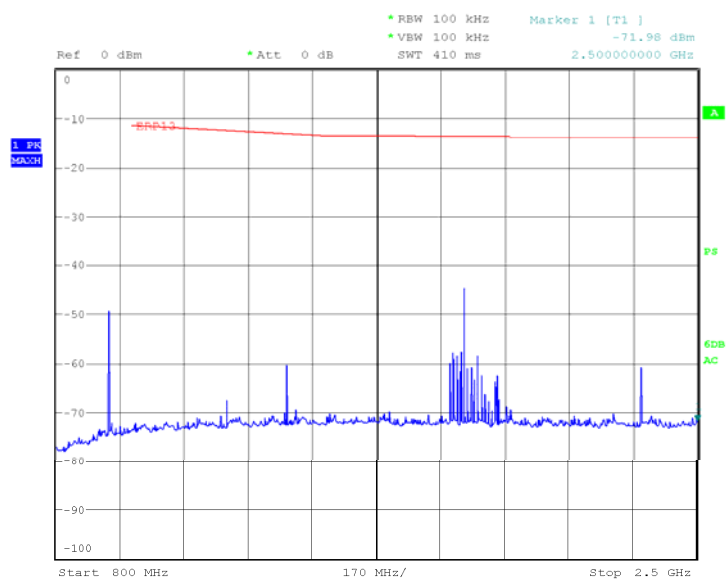
800 MHz to 2.5 GHz

Vertical



Date: 12.JAN.2010 23:26:36

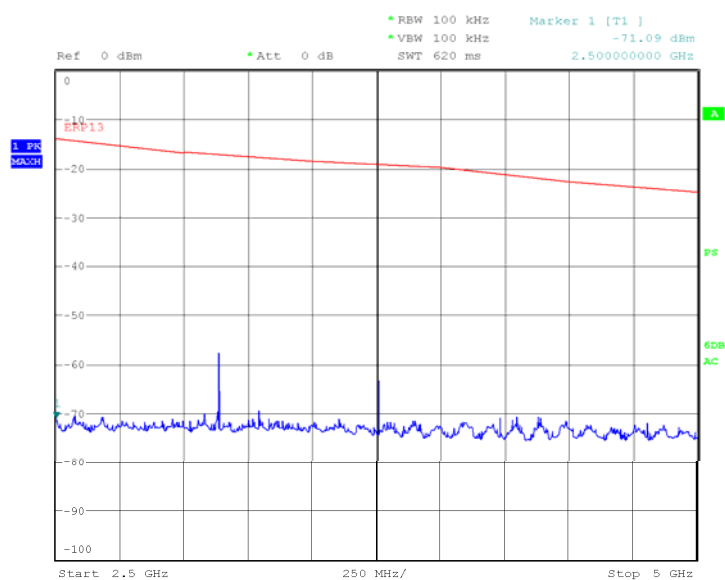
Horizontal



Date: 12.JAN.2010 23:30:39

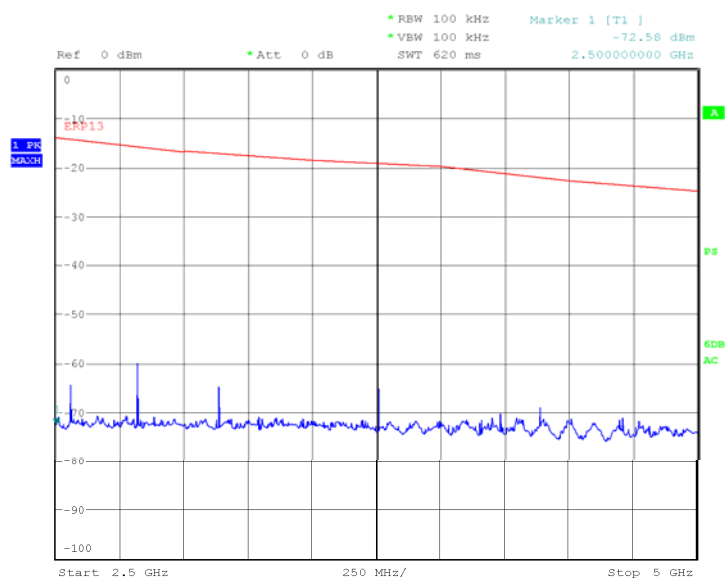
2.5 GHz to 5 GHz

Vertical



Date: 12.JAN.2010 23:28:27

Horizontal



Date: 12.JAN.2010 23:33:53



Product Service

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.205 (h)

2.2.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.2.3 Date of Test and Modification State

12 January 2010 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 90.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
- Mode 2
- Mode 3

2.2.6 Environmental Conditions

12 January 2010

Ambient Temperature 21.5°C

Relative Humidity 24%

Atmospheric Pressure 996mbar

2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 90 for Effective Radiated Power.

The test results are shown on the following pages



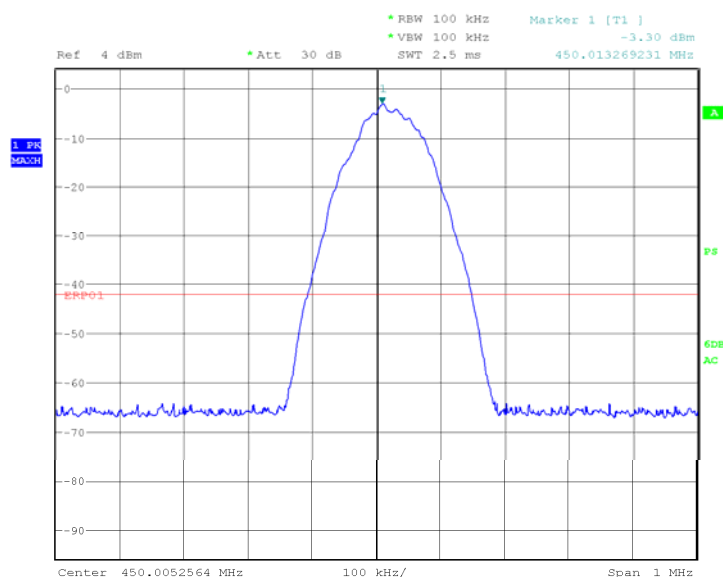
Product Service

Configuration 1 - Mode 1

Frequency	Result (dBm)	Result (W)
450.025	+23.7	0.23

Limit Clause

There is not an RF power limit for portable devices under Part 90 in the 450-470 MHz band. The limit will be based on compliance with SAR requirements. This could range from 200 mW up to 5 watts depending upon the design used to meet SAR limits. But this is not an RF power limit by rule, but it is a limit by circumstance



Date: 12.JAN.2010 20:43:45



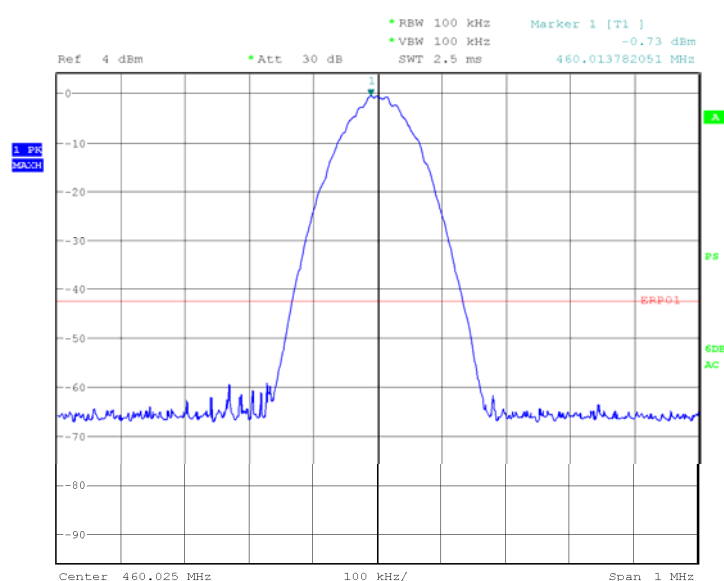
Product Service

Configuration 1 - Mode 2

Frequency	Result (dBm)	Result (W)
460.025	+26.4	0.44

Limit Clause

There is not an RF power limit for portable devices under Part 90 in the 450-470 MHz band. The limit will be based on compliance with SAR requirements. This could range from 200 mW up to 5 watts depending upon the design used to meet SAR limits. But this is not an RF power limit by rule, but it is a limit by circumstance



Date: 12.JAN.2010 21:02:47



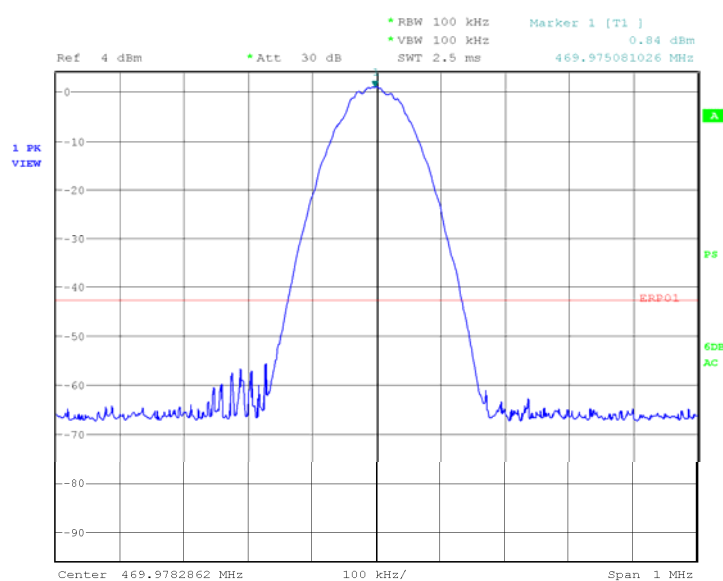
Product Service

Configuration 1 - Mode 3

Frequency	Result (dBm)	Result (W)
469.025	+28.5	0.71

Limit Clause

There is not an RF power limit for portable devices under Part 90 in the 450-470 MHz band. The limit will be based on compliance with SAR requirements. This could range from 200 mW up to 5 watts depending upon the design used to meet SAR limits. But this is not an RF power limit by rule, but it is a limit by circumstance



Date: 12.JAN.2010 21:11:55



Product Service

2.3 POWER AND ANTENNA HEIGHT LIMITS / TRANSMITTER OUTPUT POWER

2.3.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.205, 2.1046

2.3.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.3.3 Date of Test and Modification State

17 December 2009 – Modification State 0

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

Test Performed in accordance with FCC CFR 47 Part 90.

The EUT was connected to a spectrum analyser via a 30dB attenuator and cable. The path loss between the EUT and power sensor was measured and used as an offset in the measuring equipment. The average power was measured with an RMS detector and average trace over 200 sweeps. The EUT was set to a TETRA continuous burst on maximum power.

2.3.6 Environmental Conditions

	17 December 2009
Ambient Temperature	23.6°C
Relative Humidity	23.2%



Product Service

2.3.7 Test Results

Frequency (MHz)	Average Power	
	dBm	W
450.025	31.74	1.493
460.025	31.99	1.581
469.975	32.20	1.660

Limit Clause

	Service Area Radius (km)									
	3	8	13	16	24	32	40	48	64	80
Maximum ERP (W) ¹	2	100	² 500	² 500	² 500	² 500	² 500	² 500	² 500	² 500
Up to reference HAAT (m) ³	15	15	15	27	63	125	250	410	950	2700

¹ Maximum ERP indicated provides for a 39 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig.29 (see §73.699, Fig 10b).

² Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 39 dBu.

³ When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation: $ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})^2$.

⁴ Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 39 dBu.



Product Service

2.4 TYPES OF EMISSION / TYPES OF MODULATION

2.4.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.207, 2.1047

2.4.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.4.3 Date of Test and Modification State

16 December 2009 – Modification State 0

2.4.4 Test Procedure

Test Performed in accordance with FCC CFR 47 Part 90.

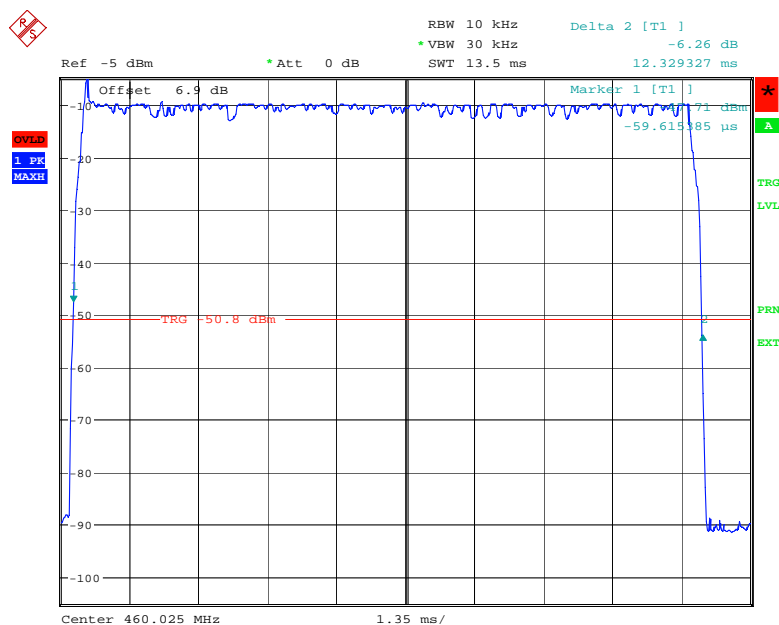
Modulation Type: pi/4DQPSK

Emission Designator: 25K0Q1D

2.4.5 Environmental Conditions

	16 December 2009
Ambient Temperature	20.5°C
Relative Humidity	21.3%

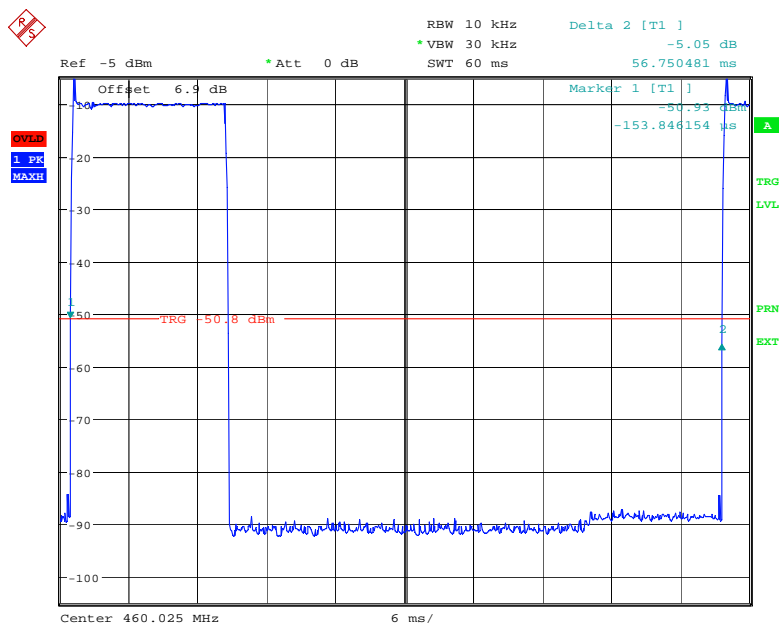
2.4.6 Test Results



Date: 16.DEC.2009 10:26:00



Product Service



Date: 16.DEC.2009 10:28:52



Product Service

2.5 BANDWIDTH LIMITATIONS

2.5.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.209, 2.1049

2.5.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.5.3 Date of Test and Modification State

08 December 2009 – Modification State 0

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

Test Performed in accordance with FCC CFR 47 Part 90.

The EUT was connected to a spectrum analyser using a 30dB attenuator and cable. The resolution and video bandwidths were set to 300Hz and 1kHz respectively. The EUT was set to transmit on maximum power and the 99% bandwidth was measured using the function of the spectrum analyser.

2.5.6 Environmental Conditions

	08 December 2009
Ambient Temperature	25.5°C
Relative Humidity	31.9%

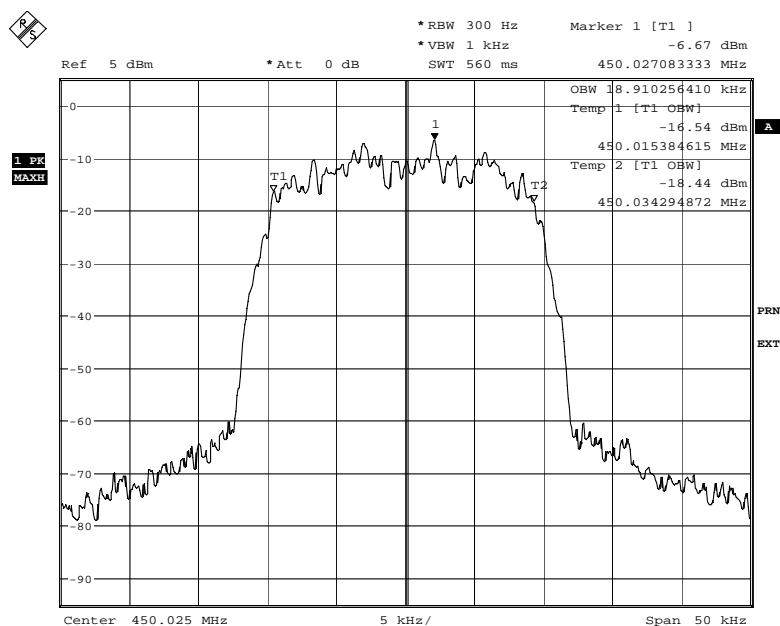
2.5.7 Test Results

Frequency (MHz)	Occupied Bandwidth (99%)
450.025	18.910kHz
460.025	18.910kHz
469.975	18.990kHz



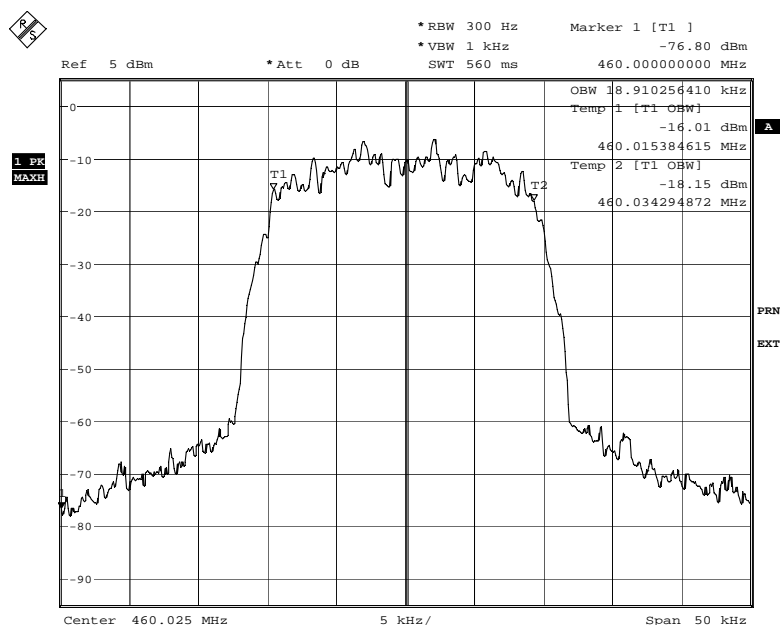
Product Service

450.025 MHz



Date: 8.DEC.2009 15:25:31

460.025 MHz

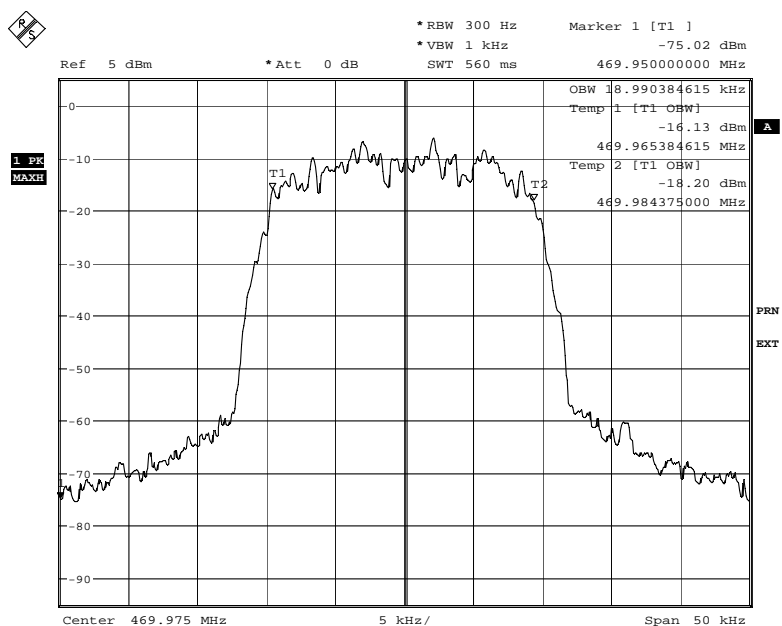


Date: 8.DEC.2009 15:28:29



Product Service

469.975 MHz



Date: 8.DEC.2009 15:41:24



Product Service

2.6 EMISSION MASK

2.6.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.210, 2.1051

2.6.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.6.3 Date of Test and Modification State

09 December 2009 – Modification State 0

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

Test Performed in accordance with FCC CFR 47 Part 90.

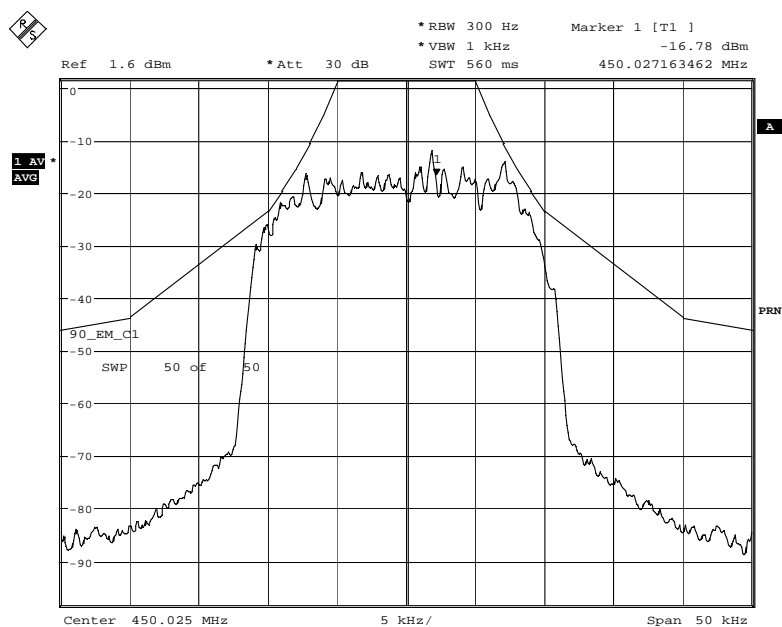
The EUT was connected to the spectrum analyser via a 30dB attenuator and a cable. In accordance with the specification, the emission mask C was used and a resolution and video bandwidth of 300Hz and 1kHz respectively were used. For out of band emissions a resolution bandwidth of 100kHz and video bandwidth of 300kHz was used below 1GHz. Above 1GHz the resolution and video bandwidth was set to 1MHz and 3MHz respectively. The EUT was set to transmit on maximum power.

2.6.6 Environmental Conditions

	09 December 2009
Ambient Temperature	23.0°C
Relative Humidity	42.7%

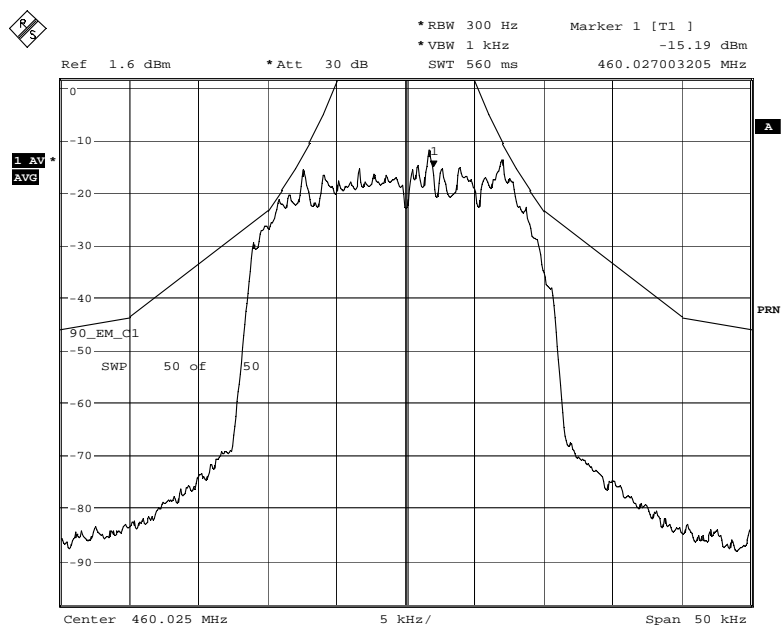
2.6.7 Test Results

450.025 MHz



Date: 3.DEC.2009 13:36:40

460.025 MHz

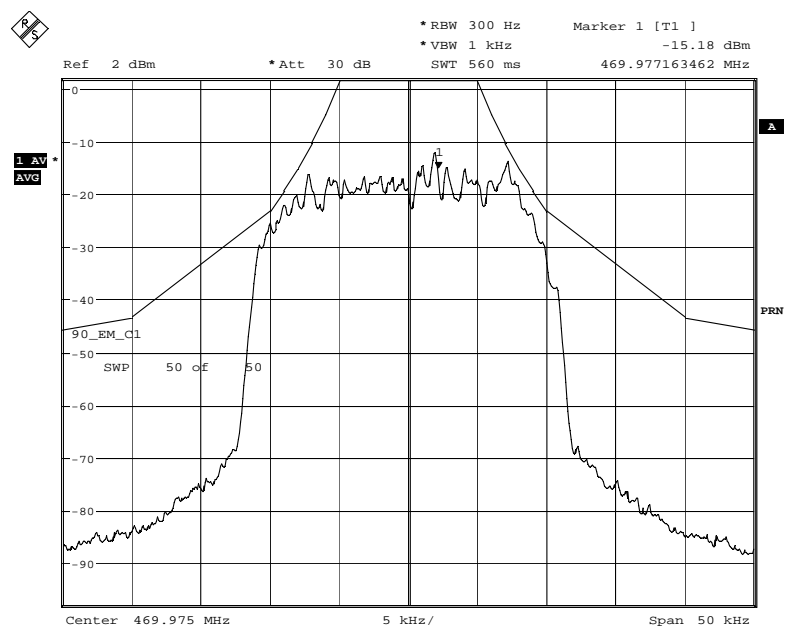


Date: 3.DEC.2009 13:38:50



Product Service

469.975 MHz

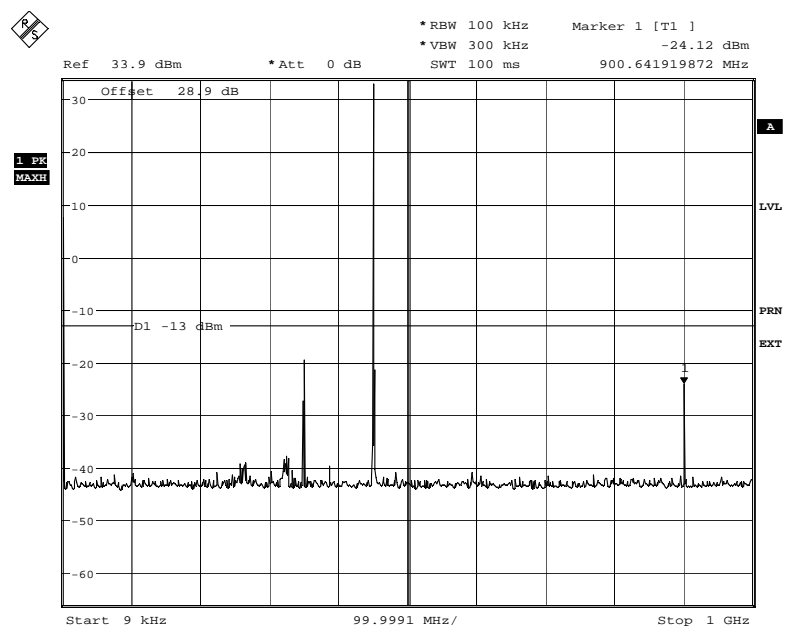


Date: 3.DEC.2009 13:48:55



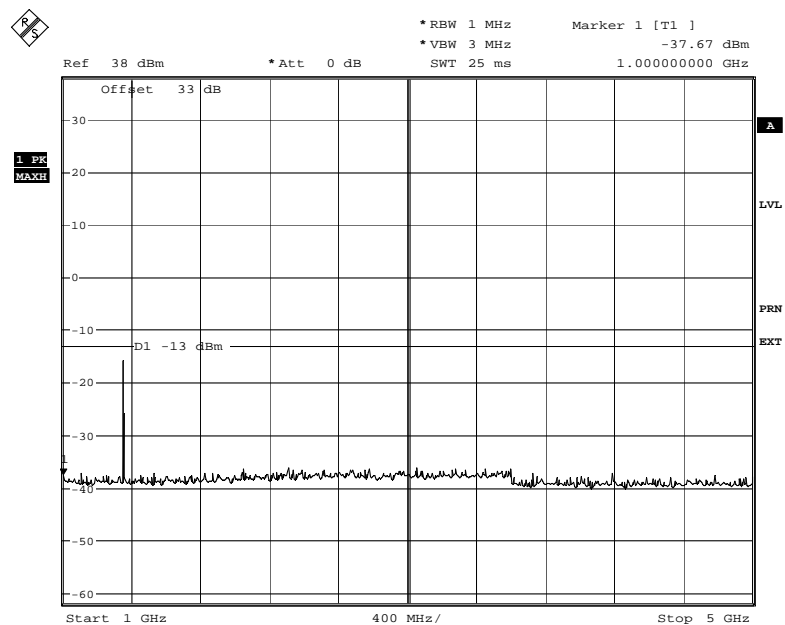
Product Service

450.025 MHz



Date: 9.DEC.2009 09:40:45

450.025 MHz

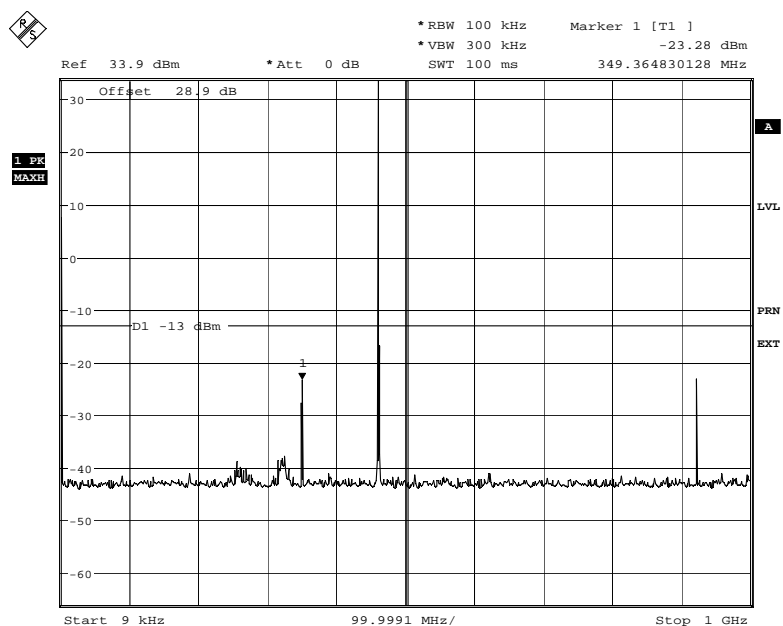


Date: 9.DEC.2009 10:22:43



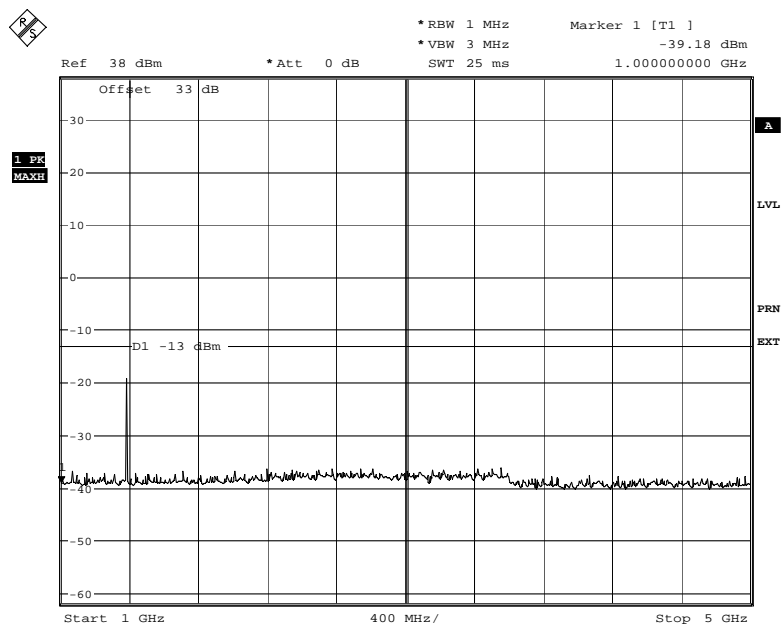
Product Service

460.025 MHz



Date: 9.DEC.2009 09:48:23

460.025 MHz

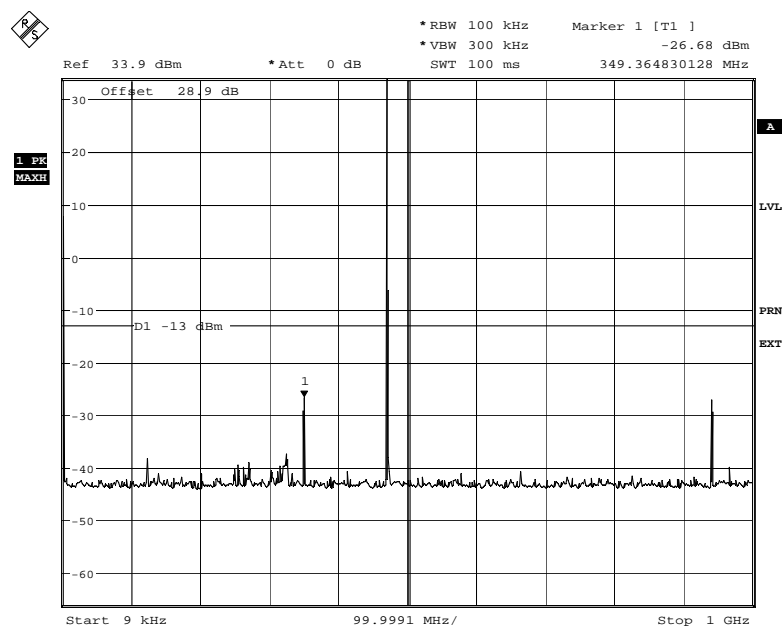


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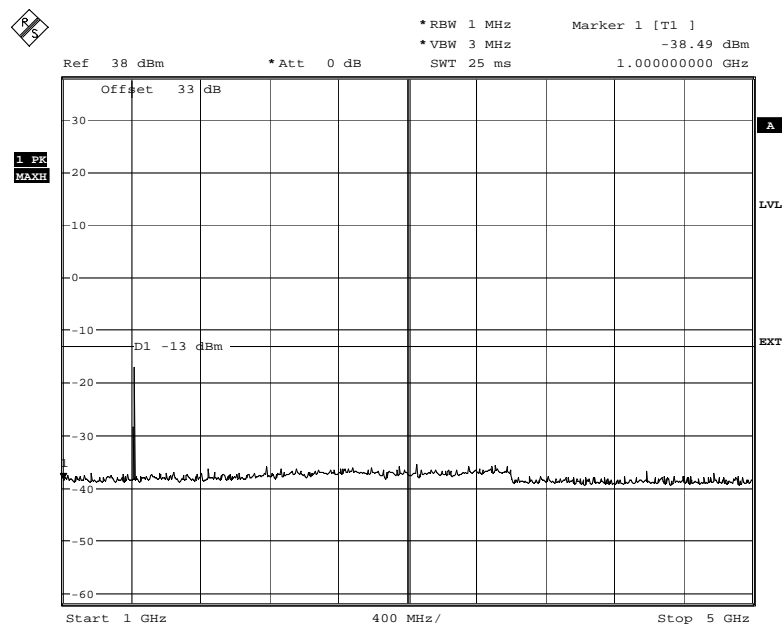
Product Service

469.975 MHz



Date: 9.DEC.2009 09:52:36

469.975 MHz



Date: 9.DEC.2009 10:27:14



Product Service

2.7 FREQUENCY STABILITY

2.7.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.213, 2.1055

2.7.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.7.3 Date of Test and Modification State

14 December 2009 – Modification State 0

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

Test Performed in accordance with FCC CFR 47 Part 90.

Supply voltage 7.4 V DC

Maximum rated output power as stated by the manufacturer: 1.8W

2.7.6 Environmental Conditions

	14 December 2009
Ambient Temperature	23.6°C
Relative Humidity	26.1%



Product Service

2.7.7 Test Results

Temperature Interval	Supply Voltage	Frequency (MHz)		
		450.025 MHz	460.025 MHz	469.975 MHz
-30°C	6.4 V DC	450.025216	460.025213	469.975208
	7.4 V DC	450.025209	460.025206	469.975212
-20°C	6.4 V DC	450.025226	460.025220	469.975200
	7.4 V DC	450.025306	460.025199	469.975196
-10°C	6.4 V DC	450.025208	460.025214	469.975204
	7.4 V DC	450.025227	460.025217	469.975211
0°C	6.4 V DC	450.025228	460.025214	469.975212
	7.4 V DC	450.025233	460.025224	469.975211
+10°C	6.4 V DC	450.025270	460.025292	469.975300
	7.4 V DC	450.025292	460.025294	469.975316
+20°C	6.4 V DC	450.025471	460.025495	469.975498
	7.4 V DC	450.025490	460.025493	469.975503
-30°C	6.4 V DC	450.025566	460.025565	469.975571
	7.4 V DC	450.025574	460.025570	469.975573
+40°C	6.4 V DC	450.025505	460.025493	469.975482
	7.4 V DC	450.025510	460.025499	469.975488
+50°C	6.4 V DC	450.025237	460.025229	469.975224
	7.4 V DC	450.025269	460.025258	469.975233
+55°C	6.4 V DC	450.025136	460.025118	469.975098
	7.4 V DC	450.025081	460.025088	469.975090
Maximum Frequency Error (kHz)		+ 574 (+1.28 ppm)	+ 570 (+1.24 ppm)	+ 573 (+1.22 ppm)
Measurement Uncertainty (Hz)		± 11		

Limit Clause

The frequency error shall not exceed 5ppm



Product Service

2.8 TRANSIENT FREQUENCY BEHAVIOUR

2.8.1 Specification Reference

FCC CFR 47 Part 90, Clause 90.214

2.8.2 Equipment Under Test

STP8040 Portable Tetra Radio, S/N: 2PN40092294Y10S

2.8.3 Date of Test and Modification State

10 December 2009 – Modification State 0

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

Test Performed in accordance with FCC CFR 47 Part 90.

2.8.6 Environmental Conditions

	10 December 2009
Ambient Temperature	24.8°C
Relative Humidity	31.7%



Product Service

2.8.7 Test Results

Transient Period	Frequency Difference (kHz)		
	450.025 MHz	460.025 MHz	469.975 MHz
T ₁	0	0	0
T ₂	0	0	0
T ₃	0	0	0
Measurement Uncertainty (Hz)	± 0.2		

Limit Clause

Time Interval	Maximum Frequency Difference	421 to 512MHz, 25kHz Channels
T ₁	± 25.0KHz	10.0ms
T ₂	± 12.5kHz	25.0ms
T ₃	± 25.0kHz	10.0ms



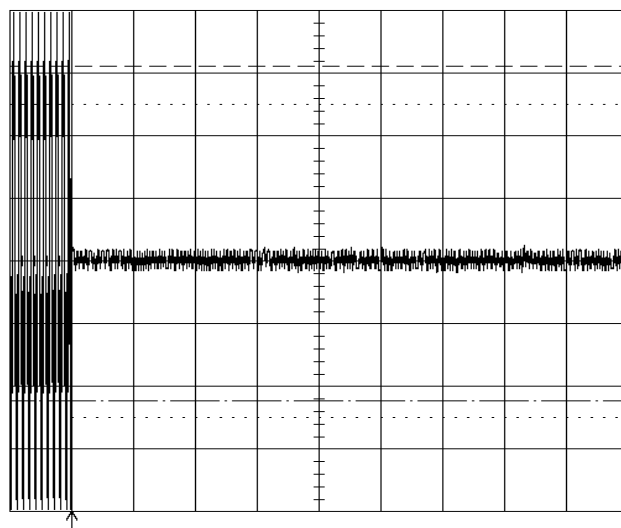
Product Service

450.025 MHz

T_1 and T_2

10-Dec-09
12:16:04

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff

OFF Time Evts

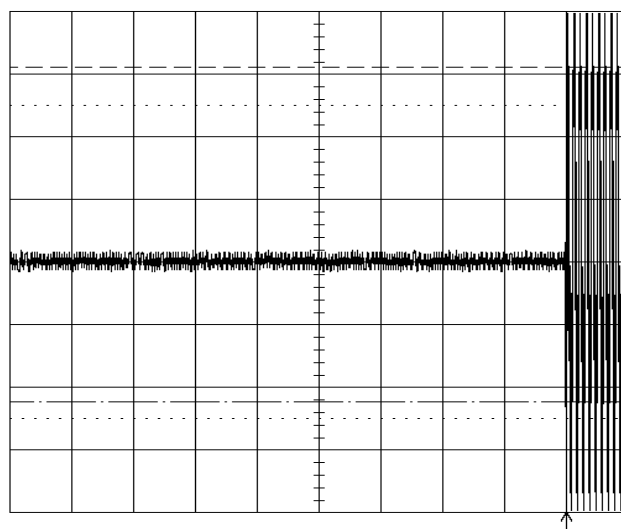
500 kS/s

☐ STOPPED

T_3

10-Dec-09
12:00:35

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff

OFF Time Evts

500 kS/s

☐ STOPPED



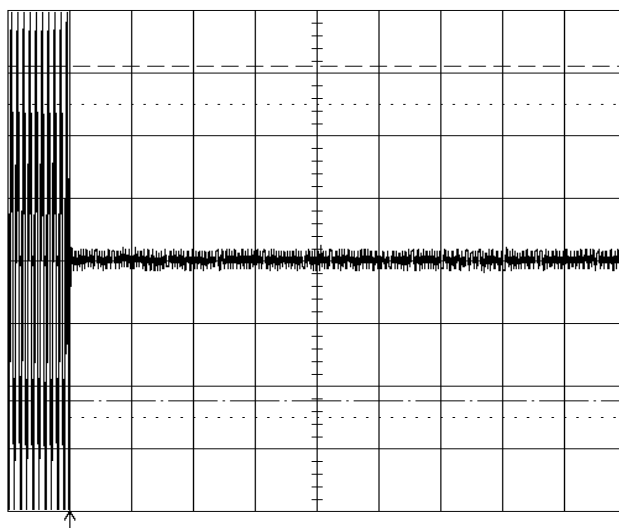
Product Service

460.025 MHz

T_1 and T_2

10-Dec-09
11:57:11

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff
OFF Time Evts

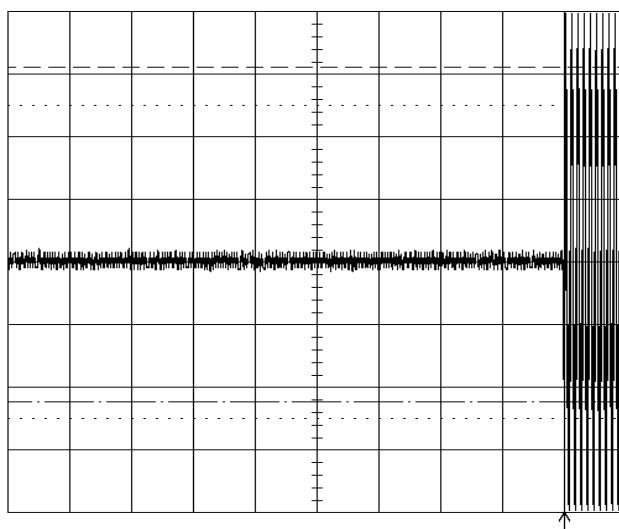
500 kS/s

STOPPED

T_3

10-Dec-09
12:01:56

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff
OFF Time Evts

500 kS/s

STOPPED



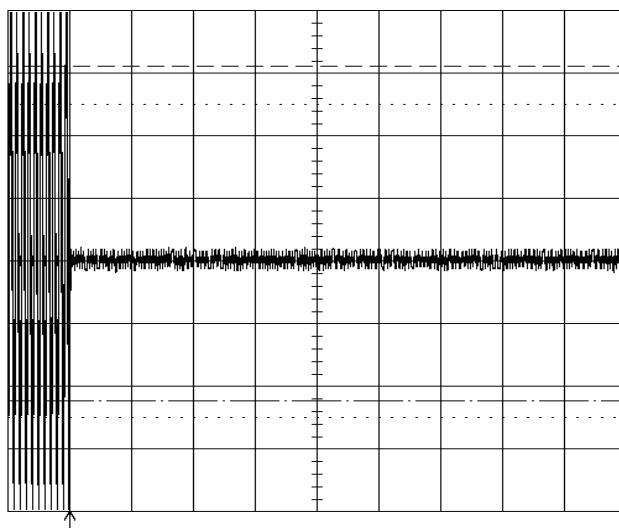
Product Service

469.975 MHz

T_1 and T_2

10-Dec-09
11:58:10

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff
OFF Time Evts

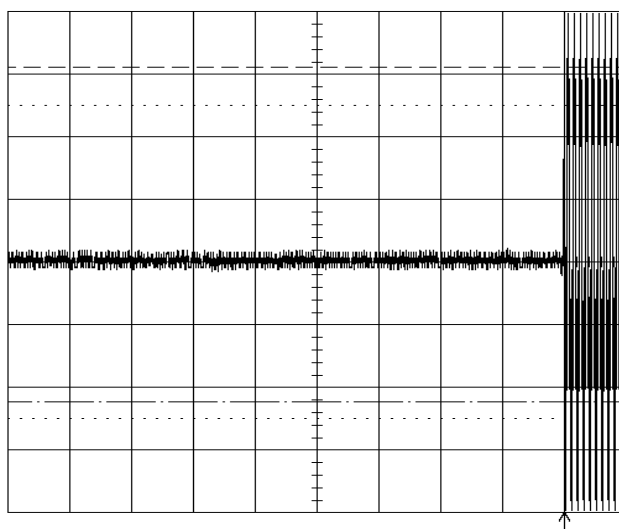
500 kS/s

STOPPED

T_3

10-Dec-09
12:03:10

1
10 ms
335 mV
1.790 V



10 ms
1 335 mV DC
2 50 mV DC



2 DC -41 mV

TRIGGER SETUP

Edge SMART

trigger on
1 2 Ext Ext10
Line

coupling 2
DC AC LFREJ
HFREJ HF

slope 2
Pos Neg

holdoff
OFF Time Evts

500 kS/s

STOPPED



Product Service

SECTION 3

TEST EQUIPMENT USED



Product Service

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 & 2.2 EMC - Effective Radiated Power & Radiated Emissions					
Load	Diamond Antenna	DL-30N	218	12	22-Jun-2010
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Oct-2010
Antenna (Bilog)	Schaffner	CBL6143	287	24	21-Jan-2010
Pre-Amplifier	Phase One	PS04-0085	1532	12	16-Sep-2010
Pre-Amplifier	Phase One	PS04-0086	1533	12	17-Sep-2010
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Turntable/Mast Controller	EMCO	2090	1610	-	TU
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Cable (2m, SMA(m) - SMA(m))	Reynolds	262-0248-2000	2401	12	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	4-Dec-2011
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	4-Apr-2010
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	4-Aug-2010
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	1-Sep-2010
Turntable	EMCO	1060-04	3693	-	TU
Section 2.3 Power and Antenna Height Limit / Transmitter Output Power					
Signal Generator	Hewlett Packard	ESG4000A	38	12	11-May-2010
Peak Power Analyser	Hewlett Packard	8990A	107	12	2-Feb-2010
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Power Divider	Weinschel	1506A	603	12	19-Mar-2010
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	2-Nov-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Attenuator (30dB, 150W)	Narda	769-30	3369	12	19-May-2010
5 metre Tape Measure	Stanley	33-719	3549	-	TU
Section 2.4 - Types of Emission / Types of Modulation					
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	24-Jun-2010
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	2-Nov-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Attenuator (30dB, 150W)	Narda	769-30	3369	12	19-May-2010



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Bandwidth Limitations					
Power Meter	Hewlett Packard	436A	94	12	12-Oct-2010
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	24-Jun-2010
Attenuator (10dB, 10W)	Bird	8343-100	478	12	28-Nov-2010
Attenuator (10dB/100W)	Bird	8343-100	495	12	8-Sep-2010
Signal Generator	Rohde & Schwarz	SMY 01	1109	12	16-Dec-2009
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Power Sensor	Hewlett Packard	8481A	1338	12	16-Dec-2009
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	2-Nov-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Section 2.6 - Emission Mask					
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	24-Jun-2010
Attenuator (10dB, 10W)	Bird	8343-100	478	12	28-Nov-2010
Attenuator (10dB/100W)	Bird	8343-100	495	12	8-Sep-2010
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	2-Nov-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	4-Aug-2010
Section 2.7- Frequency Stability					
Counter	Hewlett Packard	53181A	159	12	26-May-2010
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	24-Jun-2010
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Digital Temperature Indicator	Fluke	51	1385	12	7-Sep-2010
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Climatic Chamber	TAS	Micro 225	2892	-	O/P Mon



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.8 Transient Frequency Behaviour					
Modulation Analyser	Rohde & Schwarz	FAM	119	-	TU
True RMS Multimeter	Fluke	79 Series III	411	12	24-Jul-2010
Crystal Detector	Hewlett Packard	8470B	484	-	O/P Mon
Power Splitter	Weinschel	1506A	607	-	TU
Signal Generator	Rohde & Schwarz	SMY 01	1109	12	16-Dec-2009
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Cable (1m, sma(m) - sma(m))	Reynolds	262-0248-1000	2406	12	15-Oct-2010
Programmable Power Supply	Iso-tech	IPS 2010	2437	-	O/P Mon
Oscilloscope	Lecroy	9370	2832	12	20-Oct-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010
Attenuator (20dB, 150W)	Narda	769-20	3367	12	19-May-2010

TU – Traceability Unscheduled

OP/Mon – Output monitored using calibrated equipment

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
DC Input Ripple Immunity	Current Voltage	0.45% 0.91%
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°

Worst case error for both Time and Frequency measurement 12 parts in 10⁶.

* In accordance with CISPR 16-4

† In accordance with UKAS Lab 34



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
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