dB Technology
(Cambridge Ltd.)
EMC Testing | EMC Consultancy | EMC Training

23, Headington Drive,
Cambridge.
CB1 9HE
Tel : 01954 251974 (test site)
or : 01223 241140 (accounts)
Fax : 01954 251907
web : www.dbtechnology.co.uk
email: mail@dbtechnology.co.uk

REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

Twenty Pence Road,
Cottenham,
Cambridge
U.K.
CB24 8PS

on

Sepura PLC

STP9040/STP9240

dated

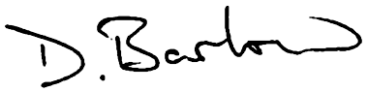
15th December 2013

Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	15/12/13		Initial release		
2	01/07/14		See notes added to last page of report	DS	DB

Based on report template:
v090319

Equipment Under Test (EUT):	STP9040/STP9240
Test Commissioned by:	Sepura PLC Radio House St Andrews Road Cambridge Cambridgeshire CB4 1GR
Representative:	Steve Wood
Test Started:	19th August 2013
Test Completed:	23rd October 2013
Test Engineer:	Dave Smith
Date of Report:	15th December 2013

Written by:	Dave Smith	Checked by:	Derek Barlow
Signature:		Signature:	
Date:	15th December 2013	Date:	19th December 2013

dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.

Test Standards Applied

Part 90 of CFR47	*Private Land Mobile Radio Services*

CFR 47 Class B	*Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - Unintentional Radiators*

Emissions Test Results Summary

Part 90 **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Output Power Radiated		90.205	90.205(h)	No Limit	#1
Output Power Conducted	antenna	90.205 2.1046	90.205(h)	No Limit	#1
Types of Emissions	antenna	90.207 2.1047	Specified by manufacturer		
Bandwidth	antenna	90.209 2.1049	90.209(b)(5)	PASS	#2
Emissions Masks Radiated		90.210 2.1051	90.221(d)	PASS	#3
Emissions Masks Conducted	antenna	90.210 2.1051	90.221(d)	PASS	#3
Frequency Stability	antenna	90.213 2.1055	90.213	PASS	
Frequency Transient Behaviour	antenna	90.214	90.214	PASS	
Adjacent Channel Power		90.221	90.221(b)	PASS	

specs_canadav111211

CFR 47 **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:2003	FCC(B)	N/A	#4
Radiated Emissions		ANSI C63.4:2003	FCC(B)	PASS	

specs_fccv100412

#1 There is no specific limit on output power.
#2 The additional note 6 was applied which allows a bandwidth of up to 22kHz providing the additional Adjacent Channel Power requirements are met.
#3 The additional note 5 was applied which only stipulates limits 75kHz from the carrier providing the additional Adjacent Channel Power requirements are met.
#4 Not applicable as the EUT is not mains powered.

This Report shows that the EUT met all of the requirements for the tests performed - as shown above.

Contents

1 EUT Details 6
1.1 General 6
1.2 Modifications to EUT and Peripherals 7
1.3 EUT Operating Modes 7
Figure 1 Car Kit Configuration 8
Photograph 1 Connected to Spectrum Analyser 9
Photograph 2 Connected to Tetra Test Set 9
Photograph 3 Radiated Emissions - Standalone 10
Photograph 4 Radiated Emissions - Standalone 10
Photograph 5 Radiated Emissions - Standalone 11
Photograph 6 Radiated Emissions - Standalone 11
Photograph 7 Radiated Emissions - STP9240 12
Photograph 8 Radiated Emissions - STP9240 12
Photograph 9 Radiated Emissions - STP9240 13
Photograph 10 Radiated Emissions - STP9240 13
Photograph 11 Radiated Emissions - RSM 14
Photograph 12 Radiated Emissions - RSM 14
Photograph 13 Radiated Emissions - RSM 15
Photograph 14 Radiated Emissions - Car Kit 16
Photograph 15 Radiated Emissions - Car Kit 16
Photograph 16 Radiated Emissions - Car Kit 17
Photograph 17 Radiated Emissions - Car Kit 17
2 Test Equipment 18
3 Test Methods 19
3.1 Antenna Conducted Carrier Power 19
3.2 Antenna Conducted Transmitter Unwanted Emissions 19
3.3 Antenna Conducted Occupied Bandwidth 19
3.4 Antenna Conducted Adjacent Channel Power 19
3.5 Frequency Stability 19
3.6 Transient Frequency Behaviour 20
3.7 Radiated Transmitter Emissions (Substitution Method) 21
3.8 Receiver Radiated Emissions 21
4 Test Results 22
4.1 Conducted Antenna Output Power 23
4.2 Conducted Antenna Occupied Bandwidth 24
4.3 Frequency Stability - DMO Mode - Absolute Frequency Measurements 25
4.4 Frequency Stability - DMO Mode - Deviations from Nominal Volt/Temp - ppm 26
4.5 Frequency Stability - TMO Mode - Frequency Error Hz 27
4.6 Frequency Stability - TMO Mode - Deviation from nominal volt/temp - ppm 28
4.7 Conducted Emission Antenna Adjacent Channel Power 29
4.8 Transmitter Transient Frequency Behaviour - Results 30
4.9 Conducted Emission Antenna Spurious Emissions 31
4.10 Radiated Emissions - Transmit Carrier ERP 32
4.11 Radiated Emissions - Transmit Spurious Below 1GHz 33
4.12 Radiated Emissions - Transmit Spur - Above 1GHz - Standalone 34
4.13 Radiated Emissions - Transmit Spur - Above 1GHz - RSM 35
4.14 Radiated Emissions - Transmit Spur - Above 1GHz - Car Kit 36
4.15 Radiated Emissions - Receive Mode - Below 1GHz 37
4.16 Radiated Emissions - Receive Mode - Above 1GHz 38
PLOT 1 Conducted Antenna Power - 450MHz 39
PLOT 2 Conducted Antenna Power - 460MHz 40
PLOT 3 Conducted Antenna Power - 470MHz 41
PLOT 4 Occupied Bandwidth - 450MHz 42
PLOT 5 Occupied Bandwidth - 460MHz 43
PLOT 6 Occupied Bandwidth - 470MHz 44
PLOT 7 Adjacent Channel Power 450MHz - as an alternative to Masks of 90.210 45

PLOT 8 Adjacent Channel Power - 460MHz - as an alternative to Masks of 90.210 46
PLOT 9 Adjacent Channel Power - 470MHz - as an alternative to Masks of 90.210 47
PLOT 10 Transient Frequency - 450MHz - On 48
PLOT 11 Transient Frequency - 460MHz - On 48
PLOT 12 Transient Frequency - 470MHz - On 49
PLOT 13 Transient Frequency - 450MHz - Off 49
PLOT 14 Transient Frequency - 460MHz - Off 50
PLOT 15 Transient Frequency - 470MHz - Off 50
PLOT 16 Antenna Conducted Spurious Emissions - 9kHz to 1GHz - Mask of 90.221(d) 51
PLOT 17 Antenna Conducted Spurious Emissions - 1GHz to 2GHz - Mask of 90.221(d) 52
PLOT 18 Antenna Conducted Spurious Emissions - 2GHz to 6GHz - Mask of 90.221(d) 53
PLOT 19 Radiated Emissions - Standalone - Tx - 25MHz to 200MHz - Mask of 90.221(d) 54
PLOT 20 Radiated Emissions - Standalone - Tx - 200MHz to 500MHz - Mask of 90.221(d) 55
PLOT 21 Radiated Emissions - Standalone - Tx - 500MHz to 1GHz - Mask of 90.221(d) 56
PLOT 22 Radiated Emissions - Standalone - Tx - 1GHz to 2GHz - Mask of 90.221(d) 57
PLOT 23 Radiated Emissions - Standalone - Tx - 2GHz to 5GHz - Mask of 90.221(d) 58
PLOT 24 Radiated Emissions - RSM - Tx - 25MHz to 200MHz - Mask of 90.221(d) 59
PLOT 25 Radiated Emissions - RSM - Tx - 200MHz to 500MHz - Mask of 90.221(d) 60
PLOT 26 Radiated Emissions - RSM - Tx - 500MHz to 1GHz - Mask of 90.221(d) 61
PLOT 27 Radiated Emissions - RSM - Tx - 1GHz to 2GHz - Mask of 90.221(d) 62
PLOT 28 Radiated Emissions - RSM - Tx - 2GHz to 5GHz - Mask of 90.221(d) 63
PLOT 29 Radiated Emissions - Car Kit - Tx - 25MHz to 200MHz - Mask of 90.221(d) 64
PLOT 30 Radiated Emissions - Car Kit - Tx - 200MHz to 500MHz - Mask of 90.221(d) 65
PLOT 31 Radiated Emissions - Car Kit - Tx - 500MHz to 1GHz - Mask of 90.221(d) 66
PLOT 32 Radiated Emissions - Car Kit - Tx - 1GHz to 2GHz - Mask of 90.221(d) 67
PLOT 33 Radiated Emissions - Car Kit - Tx - 2GHz to 5GHz - Mask of 90.221(d) 68
PLOT 34 Radiated Emissions - Standalone - Rx - 25MHz to 275MHz 69
PLOT 35 Radiated Emissions - Standalone - Rx - 250MHz to 1GHz 70
PLOT 36 Radiated Emissions - Standalone - Rx - 1GHz to 2GHz 71
PLOT 37 Radiated Emissions - Standalone - Rx - 2GHz to 5GHz 72
PLOT 38 Radiated Emissions - RSM - Rx - 25MHz to 275MHz 73
PLOT 39 Radiated Emissions - RSM - Rx - 250MHz to 1GHz 74
PLOT 40 Radiated Emissions - RSM - Rx - 1GHz to 2GHz 75
PLOT 41 Radiated Emissions - RSM - Rx - 2GHz to 5GHz 76
PLOT 42 Radiated Emissions - Car Kit - Rx - 25MHz to 275MHz 77
PLOT 43 Radiated Emissions - Car Kit - Rx - 250MHz to 1GHz 78
PLOT 44 Radiated Emissions - Car Kit - Rx - 1GHz to 2GHz 79
PLOT 45 Radiated Emissions - Car Kit - Rx - 2GHz to 5GHz 80
PLOT 46 Radiated Emissions - STP9240 - Rx - 25MHz to 275MHz 81
PLOT 47 Radiated Emissions - STP9240 - Rx - 250MHz to 1GHz 82
PLOT 48 Radiated Emissions - STP9240 - Rx - 1GHz to 2GHz 83
PLOT 49 Radiated Emissions - STP9240 - Rx - 2GHz to 5GHz 84

1 EUT Details

1.1 General

The EUT was a TETRA Voice + Data Hand Portable .

The device can transmit and receive over the following frequency band:

450MHz to 470MHz.

The device can transmit in Trunked Mode Operation (TMO mode) or Direct Mode Operation (DMO mode)

Measurements were made at the top, near middle and bottom of the appropriate frequency range:

Bottom: 450 MHz
Middle: 460 MHz
Top: 470 MHz

The nominal output power is 32.5dBm (1.8W).

The product can be used on a standalone basis in which case it is powered from an internal battery. It can also be used in conjunction with a Car Kit in which case it is powered from a lead acid vehicle battery with nominal voltage of 13.2V.

This report additionally includes radiated emissions measurements:

- o with a Remote Speaker Microphone (RSM) connected;
- o in a Car Kit configuration.

All tests were performed on the STP9040 which is the fully featured unit. For the STP9240 variant it was only considered necessary to perform receiver mode radiated emissions measurements.

Unless otherwise stated, tests were performed with nominal power supply voltage.

The product is intended to comply with the FCC part 90 requirements using the “Tetra Waiver” as described in FCC 11-63.

Radiated field strength tests were performed at the dB Technology Test Site Registered with the FCC: Registration number: 90528.

Output Stage Settings:

With reference to the requirements of **2.1046(a)** and **2.1033(c)(8),** the DC voltages and currents in the elements of the final radio are regulated within the product and not user variable.

Modulation Characteristics:

With reference to the requirements of **2.1047,** the device uses digital modulation which is not proportional in any way to the level or frequency of the audio signal. We consider that compliance with the relevant Mask of Part 90 using pseudo random digital data is sufficient to adequately demonstrate the Modulation Characteristics as per Section 2.1047.

1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

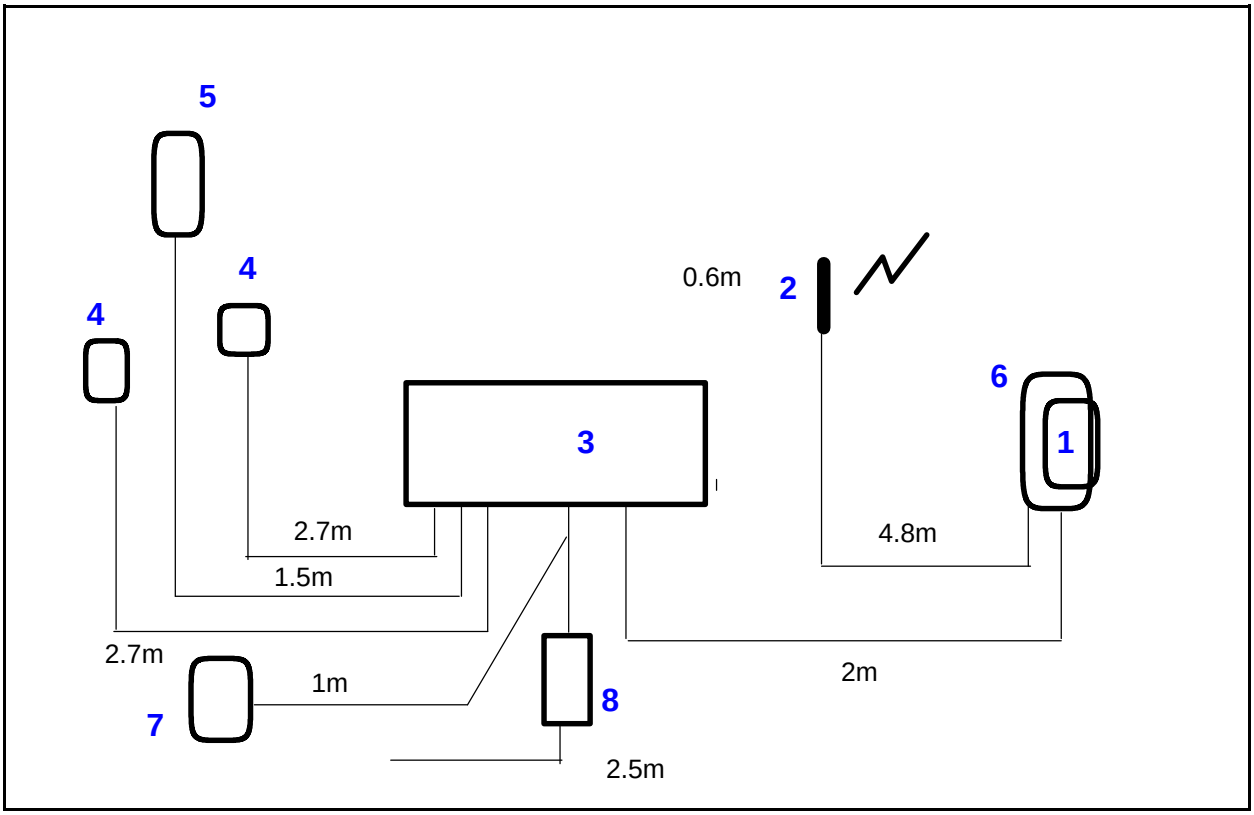
Mod No:	Details	Implemented for
0	Original sample as supplied.	
1	Screening can properly fitted.	

1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	Transmitting on selected channel.
2	Receiving on selected channel.

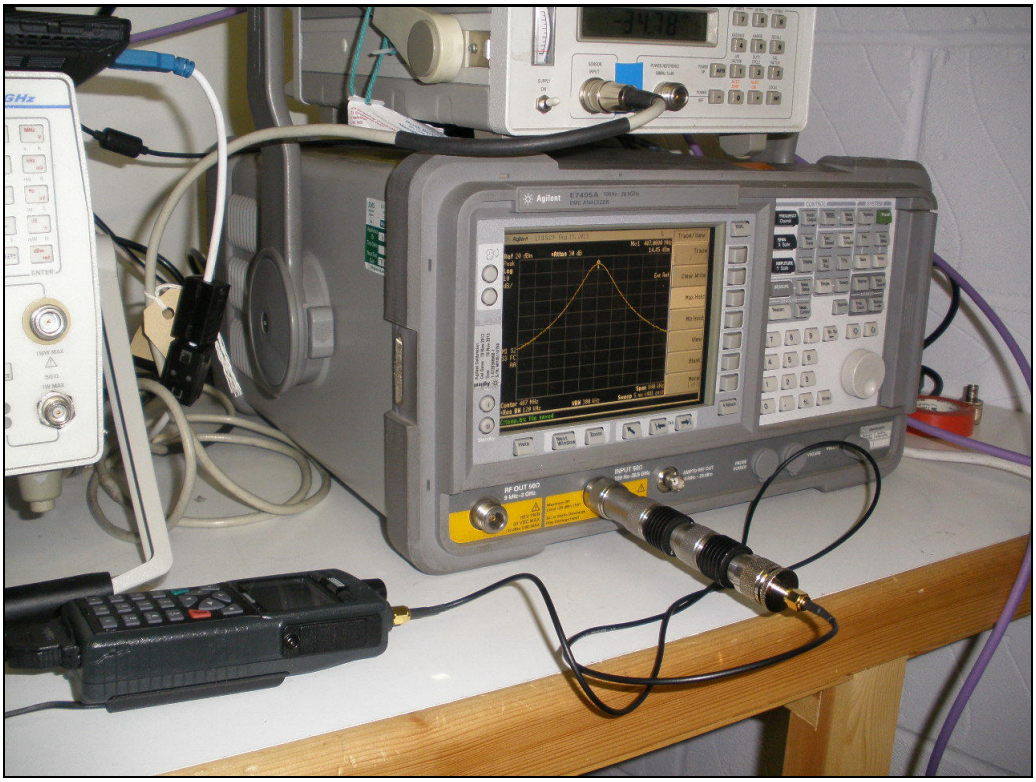
Figure 1 Car Kit Configuration



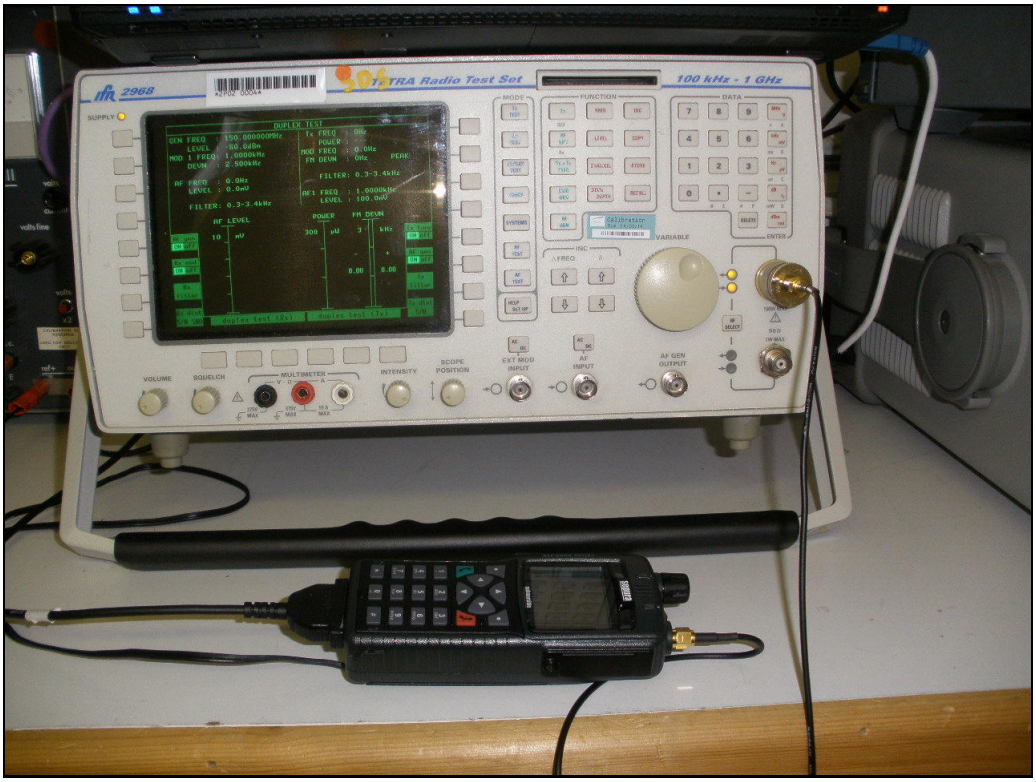
Item	Manufacturer	Model	Description	Serial No:	Notes
1	Sepura	STP9040	TETRA Hand Portable	1PR201327G8099S	
2	Sepura	300 00663	Antenna		
3	Sepura	300 00797	CarKit		
4	Sepura	300 00657	Hands Free Kit		
5	Sepura	300 00492	Handset		
6	Sepura	300 00796	Cradle		
7	Sepura	300 00719	Speaker		
8	Kingshill	18V10CA	Bench Power Supply	566	

The same sample of Tetra Hand Portable was used for the conducted antenna tests.

The serial number of the STP9240 was 1PR101322G8021L.



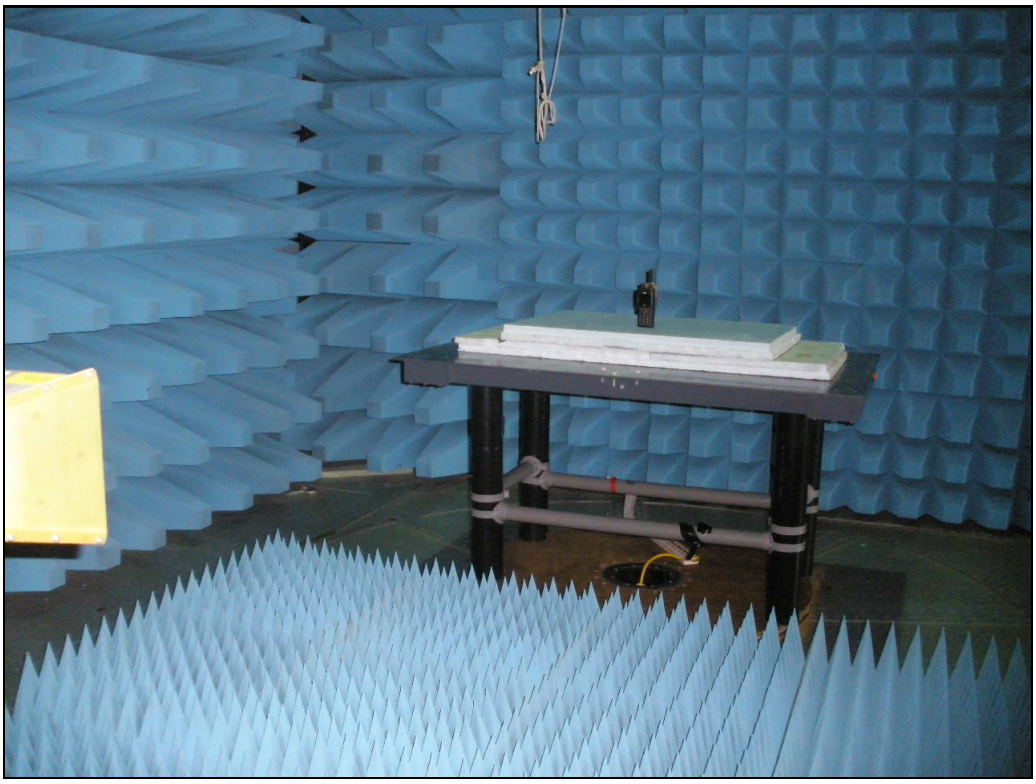
Photograph 1 Connected to Spectrum Analyser



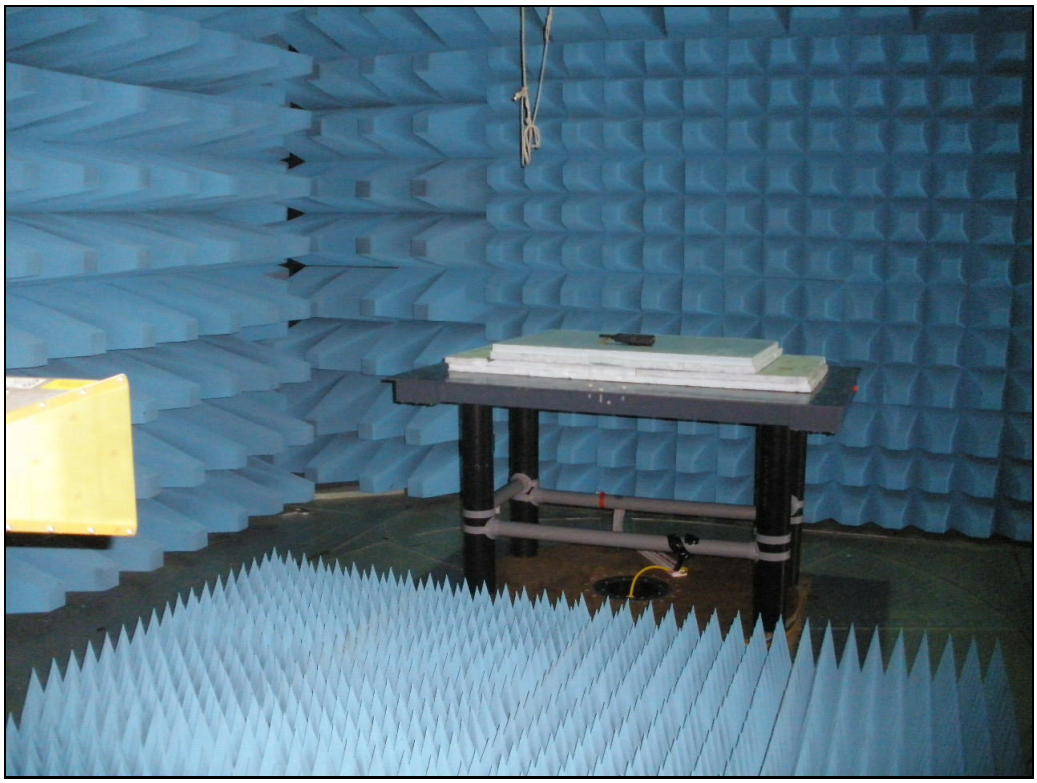
Photograph 2 Connected to Tetra Test Set

Photograph 3 Radiated Emissions - Standalone

Photograph 4 Radiated Emissions - Standalone



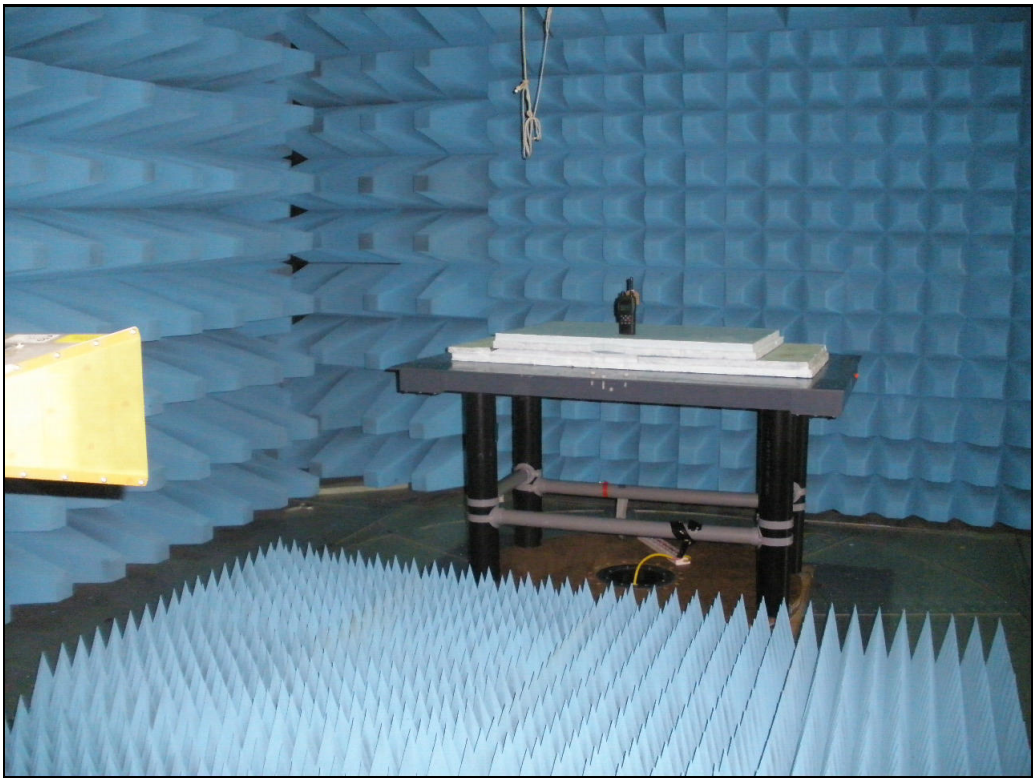
Photograph 5 Radiated Emissions - Standalone



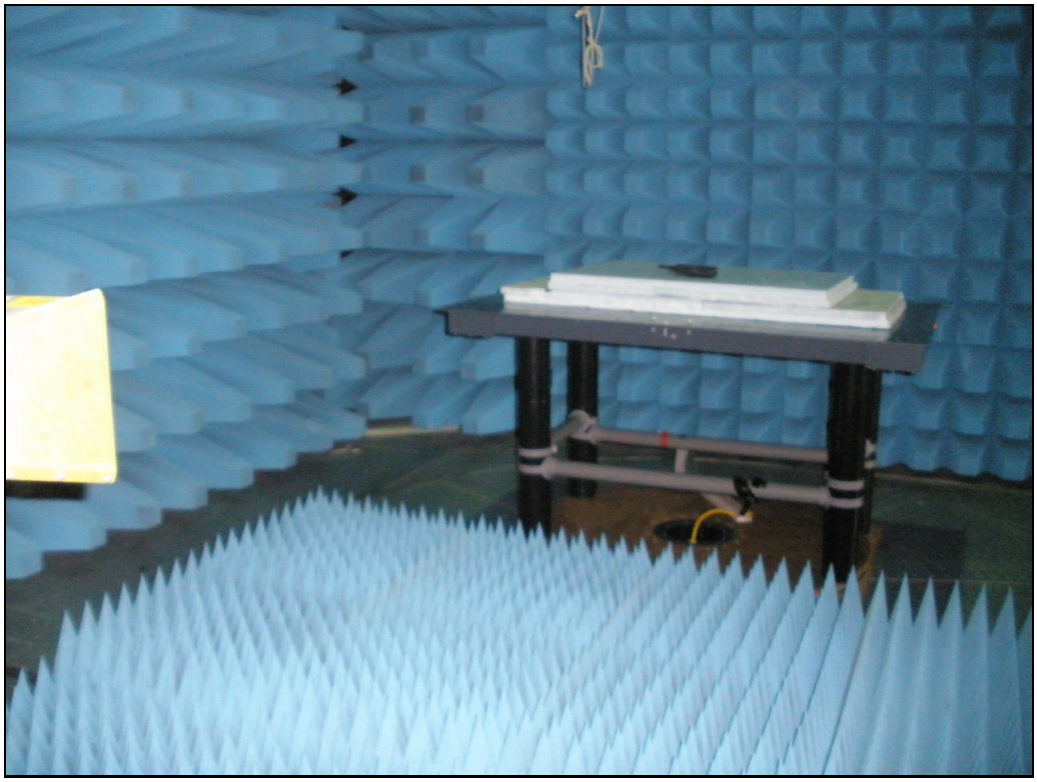
Photograph 6 Radiated Emissions - Standalone

Photograph 7 Radiated Emissions - STP9240

Photograph 8 Radiated Emissions - STP9240

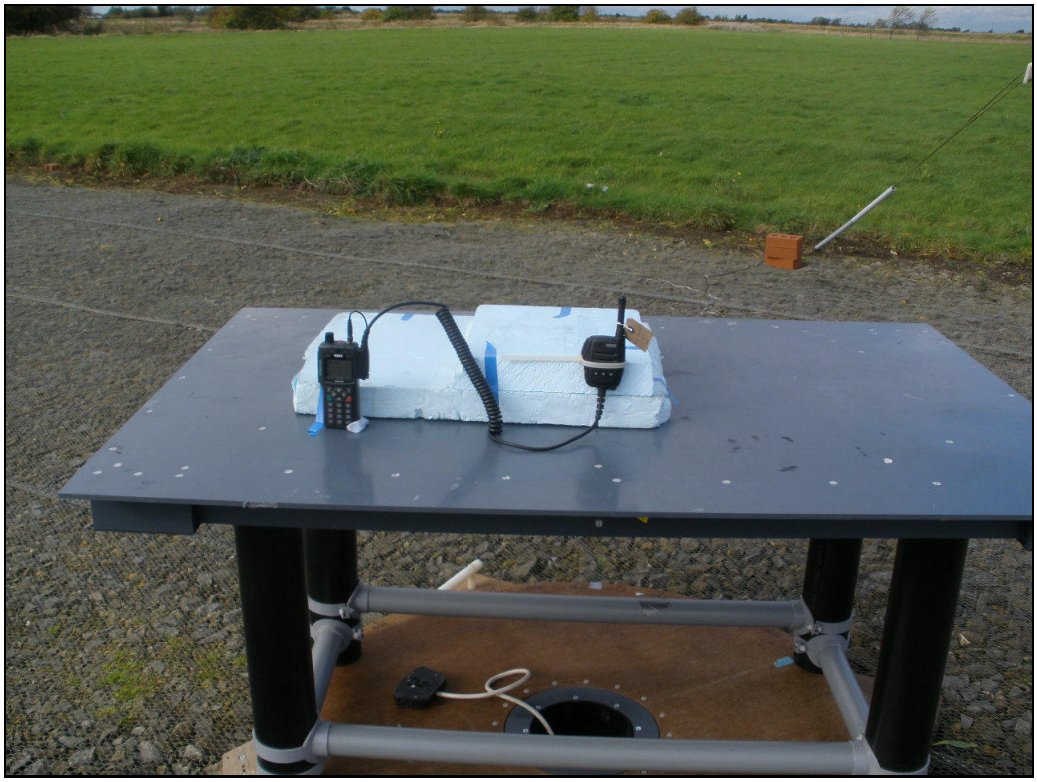


Photograph 9 Radiated Emissions - STP9240

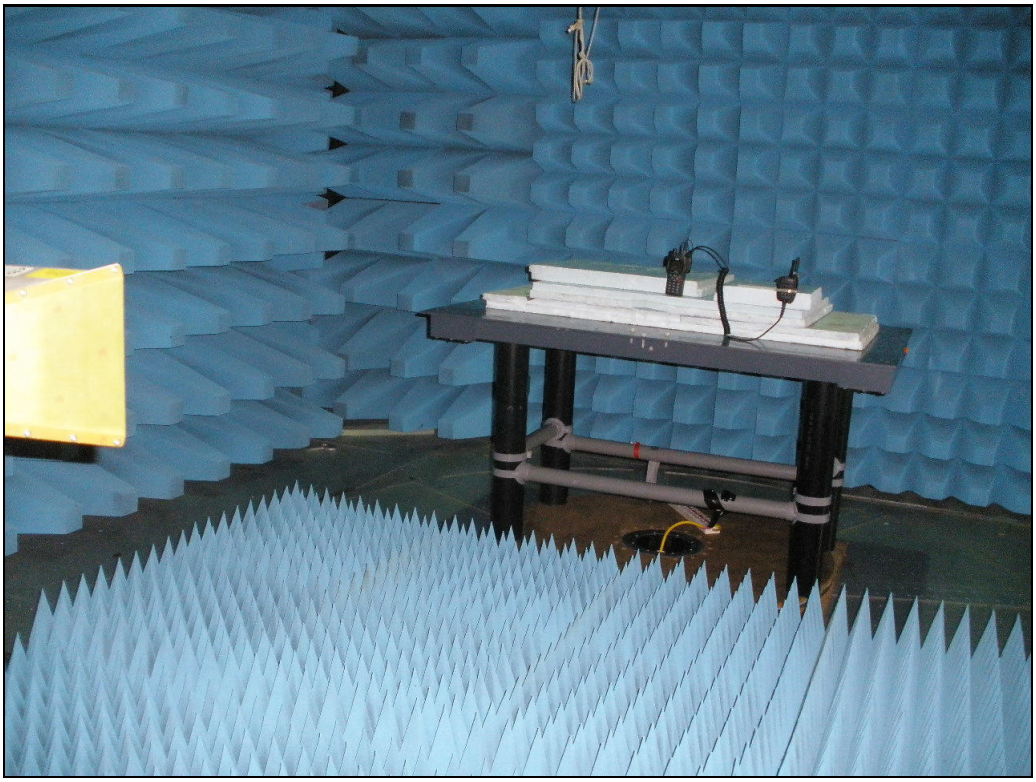


Photograph 10 Radiated Emissions - STP9240

Photograph 11 Radiated Emissions - RSM

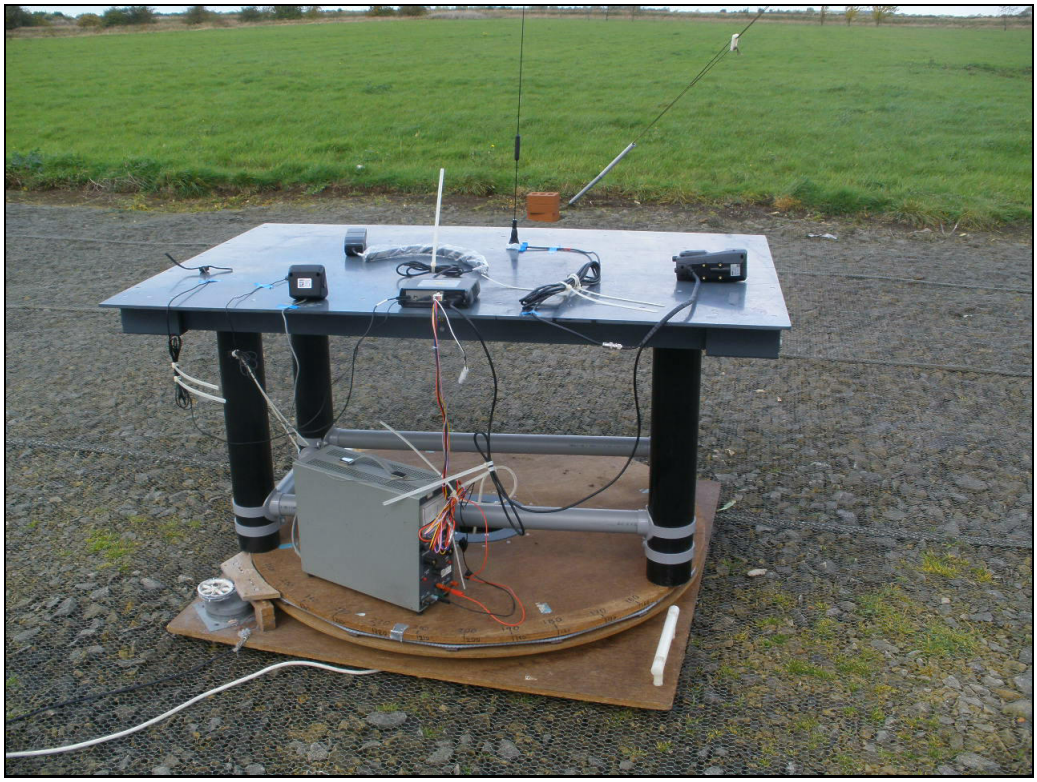


Photograph 12 Radiated Emissions - RSM

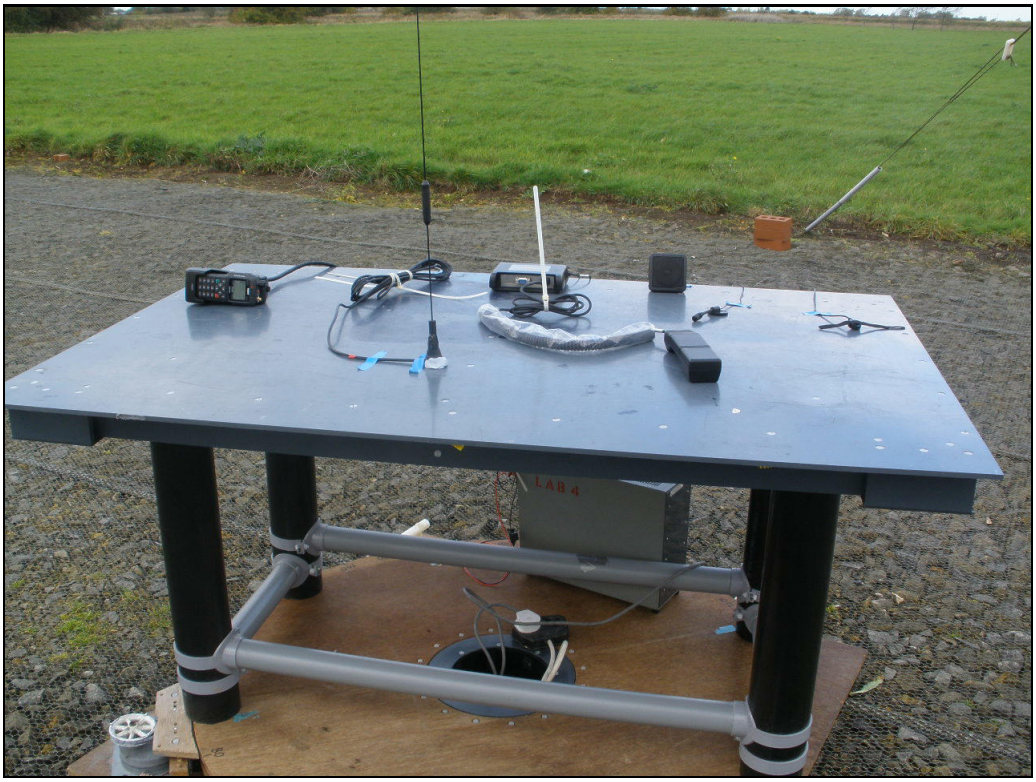


Photograph 13 Radiated Emissions - RSM

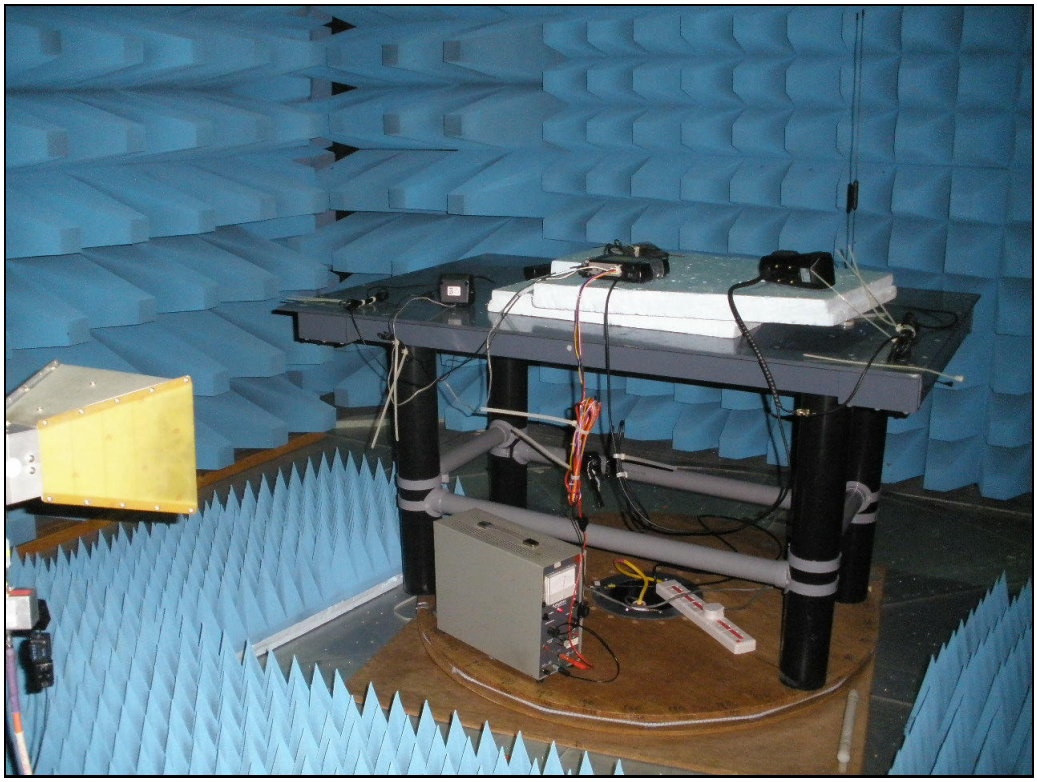
Photograph 14 Radiated Emissions - Car Kit



Photograph 15 Radiated Emissions - Car Kit



Photograph 16 Radiated Emissions - Car Kit



Photograph 17 Radiated Emissions - Car Kit

2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Details	Serial Number	Cal Date	Cal Interval
A12	Chase Bilog CBL6111A	1012	30/01/2013	1 year
A23	EMCO 3115 DR Guide (1-18GHz)	9507-4525	28/10/2013	1 year
A24	Chase X-wing Bilog CBL6144 26MHz-3GHz	27590	28/10/2013	1 year
A30	Schwarzbeck MiniBicon (30MHz to 1GHz)	9115-180	21/01/2013	3 years
A8	EMCO 3115 DR Guide	6070	30/01/2013	1 year
PM6	Marconi 6960B RF Power Meter	236923/003	18/12/2012	1 year
PRE10	LUCIX 100M-20G pre-amp	10	20/08/2013	1 year
PS10	Marconi 6910 RF Power Sensor (-30dBm / +20dBm) 10MHz to 20GHz	5009	18/12/2012	1 year
R4	R&S ESVS10	843744/002	17/12/2012	1 year
R8	Agilent E7405A Spectrum Analyser	MY44212494	24/09/2013	1 year
R9	Agilent E7405A Spectrum Analyser	MY45110758	19/11/2013	1 year
RFF02	Low Pass RF Filter 0MHz to 190MHz	02	20/08/2013	1 year
RFF09	Band Pass Filter 500MHz to 2GHz	F653-9	20/08/2013	1 year
RFF15	Band Pass Filter 1GHz to 2GHz	15	20/08/2013	1 year
RFF22	High Pass Filter - 1.35GHz (10GHz) MicroTronics HPM13017	033	20/08/2013	1 year
SG16	Marconi 6203 Microwave Test Set (10MHz - 26.5GHz)	236252/025	01/08/2013	1 year
SG9	HP 8648C 9kHz-3.2GHz Signal Generator	3847A05254	17/05/2013	1 year
TTS	IFR 2968 Tetra Test Set	296501/321	14/03/2013	1 year

The Tetra Test Set is owned by Sepura.

3 Test Methods

3.1 Antenna Conducted Carrier Power

The antenna output is connected to a spectrum analyser via a suitable PAD. The bandwidth on the spectrum analyser is set to greater than the EUT occupied bandwidth. A peak measurement is recorded. Additional measurements are made with antenna output connected to a power meter providing average measurements.

3.2 Antenna Conducted Transmitter Unwanted Emissions

Measurements are made with the antenna output connected to a spectrum analyser via a suitable PAD. Sweeps are made over the specified frequency ranges . The limit is set relative to the measured carrier power. A peak detector is used.

3.3 Antenna Conducted Occupied Bandwidth

Measurements are made with the antenna output connected to a spectrum analyser via a suitable PAD. Sweeps are made with a 300Hz Resolution Bandwidth and a 1kHz Video Bandwidth. A peak detector is used. Markers are used to determine the 99% power bandwidth.

3.4 Antenna Conducted Adjacent Channel Power

Measurements are made with the antenna output connected to an Tetra Test Set via a suitable PAD. The Analyser is set to make adjacent channel power measurements using the pre-configured settings for Tetra with 25 kHz channel spacing.

3.5 Frequency Stability

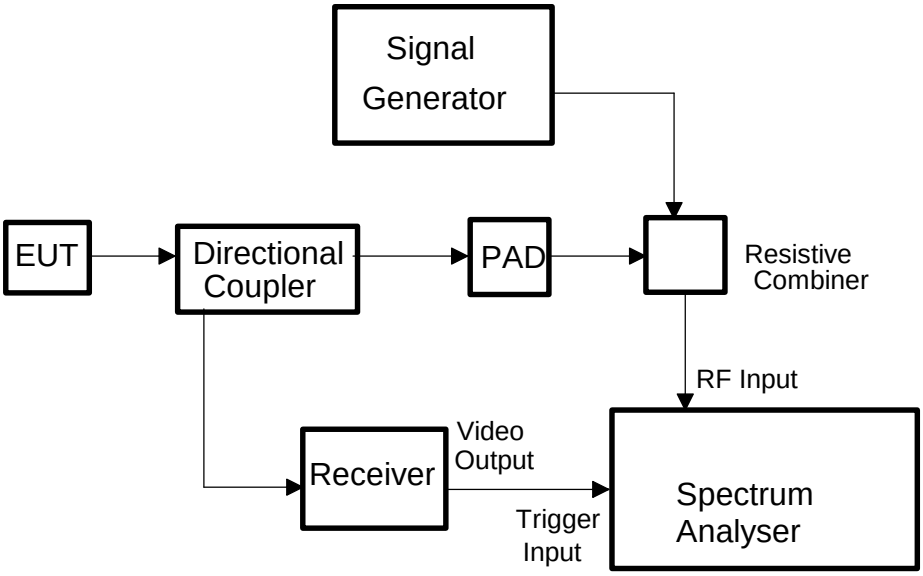
The EUT is placed in an environmental chamber. The temperature inside the chamber is set to the required level and allowed to stabilise.

For DMO mode the antenna output is connected to a spectrum analyser via a suitable PAD. The EUT is set to transmit with constant carrier (at a frequency 2.25kHz above channel centre frequency). The frequency is measured using the frequency counter function of the spectrum analyser.

For TMO mode the antenna output is connected to a Tetra Test Set. The EUT is set to transmit using normal burst operation. the frequency error, as indicated by the Tetra Test Set, is recorded.

Measurements are made at the specified temperature and over the required voltage supply range of the EUT.

3.6 Transient Frequency Behaviour



The test equipment was set up as shown above.

The spectrum analyser was set to Hz span with its inbuilt FM demodulation function activated.

Initially only the EUT was set to transmit an unmodulated signal and the centre frequency of the analyser adjusted to give 0Hz FM deviation.

The EUT transmitter was then switched off and the signal generator set to provide a carrier only output. The frequency of the signal generator was adjusted to again give 0Hz FM deviation on the spectrum analyser.

The signal generator FM modulation was then switched on and adjusted to give 25kHz FM deviation on the spectrum analyser.

The spectrum analyser was then set to trigger only on video output from the receiver. The directional coupler was used to feed an attenuated portion of the EUT transmitter into the receiver. The receiver was tuned to the transmit frequency and so produced a change on its video output when the transmitter was switched on and off. This signal was used to trigger the spectrum analyser.

FM deviation data was recorded from the spectrum analyser for both carrier switch on and switch off and at all three test frequencies.

3.7 Radiated Transmitter Emissions (Substitution Method)

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The EUT cables were manipulated in an attempt to produce maximum emissions. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured using a substitution method. Maximised emission readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

The EUT is then replaced with a calibrated reference antenna fed from a signal generator. The level fed into the reference antenna is measured with a power meter. Measurements are made to determine the power output of the signal generator required to give the same emission levels as were observed from the EUT.

The radiated power from the EUT is calculated as:

Signal Level fed into Reference Antenna	+ Gain of Reference Antenna	+ Radiated Level From EUT	- Radiated Level From Reference Antenna

For example, assuming following measurements:

Signal Level fed into Reference Antenna	= -14.3dBm
Gain of Reference Antenna	= 7.1 dBi
Radiated Level from EUT (i.e. Level at Measuring Receiver)	= 37 dBuV
Radiated Level from Reference Antenna (i.e. Level at Measuring Receiver)	= 61.5 dBuV

Then the Radiated Power from the EUT = -14.3 + 7.1 +37 - 61.5 dBm (isotropic)
= - 31.7 dBm (isotropic)

3.8 Receiver Radiated Emissions

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The EUT cables were manipulated in an attempt to produce maximum emissions. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

Tabulated results show levels based on the following calculation:

Field Strength (dBuV) = receiver reading (dBuV) + CF (dB/m)

CF is the correction factor for the antenna and cable.

For example:

at 114MHz receiver reading was 17.9 dBuV, combined correction factor = 13.1 (dB/m).

Total field strength = 17.9 + 13.1 = 31.0 dBuV/m.

4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

4.1 Conducted Antenna Output Power

Factor Set 1:
Factor Set 2:
Factor Set 3:
Test Equipment: R9 PS10 PM6

Conducted Emissions (Signal)

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	19/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.205	using limits of	90.205(h)
Ports:			
Test:		using limits of	

Notes	Comments and Observations

Spectrum anlayser results using a peak detector are shown in plots 1 to 3.

Measurements were also made using a power meter with an average detector.

Measurements were made with continuous modulation.

Taking into account the loss of the cable and attenuators the following measurements were made:

Channel	Peak dBm	Average dBm
450 MHz	35.5	32.71
460 MHz	35.4	32.90
470 MHz	35.4	33.00

4.2 Conducted Antenna Occupied Bandwidth

Factor Set 1:
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R9

Conducted Emissions (Signal)

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	19/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.209	using limits of	90.209(b)(5)
Ports:			
Test:		using limits of	

Notes	Comments and Observations

Measurements were made with continuous modulation applied.
Spectrum analyser results are shown in plots 4 to 6.

Using the "Bandwidth Power" function of the spectrum analyser, the following measurements were recorded:

450MHz 20.83 kHz

460MHz 20.87 kHz

470MHz 20.93 kHz

Limit:

Using note 6 in the "Tetra Waiver" (FCC11-63) the limit is 22kHz (providing Adjacent Channel Power requirements are met).

PASS

4.3 Frequency Stability - DMO Mode - Absolute Frequency Measurements

Factor Set 1:
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R9

FrequencyStability

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	20/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.213	using limits of	90.213
Ports:			
Test:		using limits of	

Notes	Comments and Observations

DMO Frequency (as recorded from Spectrum Analyser Frequency Counter)

		450MHz Channel	460MHz Channel	470MHz Channel
-30.0°C	6.4V	450.002270	460.002260	470.002320
	7.4V	450.002270	460.002270	470.002300
-20.0°C	6.4V	450.002140	460.002150	470.002150
	7.4V	450.002150	460.002160	470.002140
-10.0°C	6.4V	450.002120	460.002110	470.002110
	7.4V	450.002110	460.002110	470.002110
0.0°C	6.4V	450.002120	460.002140	470.002149
	7.4V	450.002140	460.002130	470.002140
10.0°C	6.4V	450.002203	460.002209	470.002149
	7.4V	450.002221	460.002220	470.002097
20.0°C	6.4V	450.002124	460.002171	470.002260
	7.4V	450.002119	460.002110	470.002161
30.0°C	6.4V	450.002164	460.002077	470.002110
	7.4V	450.002156	460.002096	470.002093
40.0°C	6.4V	450.002222	460.002227	470.002232
	7.4V	450.002209	460.002237	470.002239
50.0°C	6.4V	450.002203	460.002207	470.002283
	7.4V	450.002232	460.002212	470.002223
55.0°C	6.4V	450.002238	460.002246	470.002174
	7.4V	450.002240	460.002180	470.002252

See next page for deviation from nominal voltage/temperature.

4.4 Frequency Stability - DMO Mode - Deviations from Nominal Volt/Temp - ppm

Factor Set 1:
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R9

FrequencyStability

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	20/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.213	using limits of	90.213
Ports:			
Test:		using limits of	

Notes	Comments and Observations

DMO Frequency deviation from nominal voltage/temperature - ppm

		450MHz Channel	460MHz Channel	470MHz Channel
-30.0°C	6.4V	0.336	0.326	0.338
	7.4V	0.336	0.348	0.296
-20.0°C	6.4V	0.047	0.087	-0.023
	7.4V	0.069	0.109	-0.045
-10.0°C	6.4V	0.002	0.000	-0.109
	7.4V	-0.020	0.000	-0.109
0.0°C	6.4V	0.002	0.065	-0.026
	7.4V	0.047	0.043	-0.045
10.0°C	6.4V	0.187	0.215	-0.026
	7.4V	0.227	0.239	-0.136
20.0°C	6.4V	0.011	0.133	0.211
	7.4V	0.000	0.000	0.000
30.0°C	6.4V	0.100	-0.072	-0.109
	7.4V	0.082	-0.030	-0.145
40.0°C	6.4V	0.229	0.254	0.151
	7.4V	0.200	0.276	0.166
50.0°C	6.4V	0.187	0.211	0.260
	7.4V	0.251	0.222	0.132
55.0°C	6.4V	0.264	0.296	0.028
	7.4V	0.269	0.152	0.194

The part 90 Limit for the 421MHz to 512MHz band mobiles is 5ppm **PASS**

4.5 Frequency Stability - TMO Mode - Frequency Error Hz

Factor Set 1:
Factor Set 2:
Factor Set 3:
Test Equipment: TTS

FrequencyStability

Company: Sepura PLC		*Product:*	STP9040/STP9240
Date: 20/08/2013		*Test Eng:*	Dave Smith
Ports: antenna			
Test: 90.213	using limits of	90.213	
Ports:			
Test:	using limits of		

Notes	Comments and Observations

TMO Frequency Error (as recorded from Tetra Test Set) (Hz)

		450MHz Channel	460MHz Channel	470MHz Channel
-30.0°C	6.4V	-20.500000	-20.700000	-20.200000
	7.4V	-20.800000	-14.800000	-16.100000
-20.0°C	6.4V	-21.100000	-18.600000	-11.500000
	7.4V	-18.500000	-14.500000	-25.400000
-10.0°C	6.4V	-22.100000	-12.700000	-19.200000
	7.4V	-21.000000	-22.600000	-16.900000
0.0°C	6.4V	-24.500000	-21.400000	-18.300000
	7.4V	-13.600000	-13.800000	-20.000000
10.0°C	6.4V	-19.800000	-27.200000	-18.000000
	7.4V	-21.600000	-21.000000	-18.300000
20.0°C	6.4V	-27.000000	-29.600000	-16.100000
	7.4V	-27.500000	-16.700000	-22.700000
30.0°C	6.4V	-12.600000	-26.200000	-24.900000
	7.4V	-21.500000	-28.200000	-18.900000
40.0°C	6.4V	-28.000000	-20.400000	-20.200000
	7.4V	-15.500000	-20.700000	-19.500000
50.0°C	6.4V	-21.100000	-21.400000	-23.300000
	7.4V	-13.300000	-22.200000	-21.400000
55.0°C	6.4V	-23.900000	-28.100000	-16.700000
	7.4V	-22.200000	-23.300000	-29.700000

See next page for deviation in ppm.

4.6 Frequency Stability - TMO Mode - Deviation from nominal volt/temp - ppm

Factor Set 1:
Factor Set 2:
Factor Set 3:
Test Equipment: TTS

FrequencyStability

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	20/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.213	using limits of	90.213
Ports:			
Test:		using limits of	

Notes	Comments and Observations

TMO Frequency deviation - ppm

		450MHz Channel	460MHz Channel	470MHz Channel
-30.0°C	6.4V	0.016	-0.009	0.005
	7.4V	0.015	0.004	0.014
-20.0°C	6.4V	0.014	-0.004	0.024
	7.4V	0.020	0.005	-0.006
-10.0°C	6.4V	0.012	0.009	0.007
	7.4V	0.014	-0.013	0.012
0.0°C	6.4V	0.007	-0.010	0.009
	7.4V	0.031	0.006	0.006
10.0°C	6.4V	0.017	-0.023	0.010
	7.4V	0.013	-0.009	0.009
20.0°C	6.4V	0.001	-0.028	0.014
	7.4V	0.000	0.000	0.000
30.0°C	6.4V	0.033	-0.021	-0.005
	7.4V	0.013	-0.025	0.008
40.0°C	6.4V	-0.001	-0.008	0.005
	7.4V	0.027	-0.009	0.007
50.0°C	6.4V	0.014	-0.010	-0.001
	7.4V	0.032	-0.012	0.003
55.0°C	6.4V	0.008	-0.025	0.013
	7.4V	0.012	-0.014	-0.015

The part 90 Limit for the 421MHz to 512MHz band mobiles is 5ppm **PASS**

4.7 Conducted Emission Antenna Adjacent Channel Power

Factor Set 1:
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: SEP1

Conducted Emissions (Signal)

Company: Sepura PLC		*Product:*	STP9040/STP9240
Date: 18/08/2013		*Test Eng:*	Dave Smith
Ports:			
Test: 90.221	using limits of	90.221(b)	
Ports:			
Test:	using limits of		

Notes	Comments and Observations

Using the Tetra Test Set analyser with the appropriate Tetra adjacent channel power settings. Captured results are shown in plots 7 to 9.

Readings in dBc

Channel

	-75kHz	-50kHz	-25kHz	+25kHz	+50kHz	+75kHz
450MHz	-80.64	-77.29	-64.88	-65.30	-76.82	-80.37
460MHz	-80.54	-76.63	-63.90	-64.20	-76.09	-80.24
470MHz	-80.16	-76.11	-64.02	-63.97	-75.53	-80.01
Limit (dBc)	-70	-70	-60	-60	-70	-70
	PASS	PASS	PASS	PASS	PASS	PASS

Limit shown is the maximum allowed level (dBc) for a product with output power above 1 W and operating in the 450MHz to 470MHz band (Part 90.221(b)

PASS

4.8 Transmitter Transient Frequency Behaviour - Results

Factor Set 1:
Factor Set 2:
Factor Set 3:
Test Equipment: R9 R4 SG9

Conducted Emissions (Signal)

Company: Sepura PLC		*Product:*	STP9040/STP9240
Date: 20/08/2013		*Test Eng:*	Dave Smith
Ports: antenna			
Test: 90.214	using limits of	90.214	
Ports:			
Test:	using limits of		

Notes	Comments and Observations

The output of the antenna port of the EUT was fed through a Directional Coupler and then combined with the output of a signal generator.

The spectrum analyser has an FM demodulation function.

The EUT was initially set to produce a constant carrier output and the tuning of the spectrum analyser adjusted to give 0Hz FM deviation.

The output of the EUT was turned off and a carrier only signal output from the signal generator set at approximately the same frequency as the EUT. This frequency was adjusted to again give 0Hz FM deviation on the spectrum analyser.

The signal generator was then set to give 25kHz FM deviation (with 1kHz signal).

The forward power output of the directional coupler was fed into a receiver tuned to the carrier frequency. The video output of this receiver was used to trigger the spectrum analyser when the EUT RF is turned on or off.

The results of sweeps captured from the spectrum analyser are shown in plots 10 to 15.

All of the plots show the EUT comfortably meets the Transient Frequency Behaviour limits for a 25kHz channel spacing transmitter as shown below:

	Frequency	Duration
t1	±25 kHz	10 msec
t2	±12.5 kHz	25 msec
t3	±25 kHz	10 msec

4.9 Conducted Emission Antenna Spurious Emissions

Factor Set 1:
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R9

Conducted Emissions (Signal)

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	19/08/2013	*Test Eng:*	Dave Smith
Ports:	antenna		
Test:	90.210	using limits of	90.221(d)
Ports:			
Test:		using limits of	

Notes	Comments and Observations

Results of scans shown in plots 16 to 18.

The limit line shown on the plots is at -13dBm.

All spurious emissions were below this limit.

The limit of -13dBm was derived as follows:

The applicable Mask is taken from part 90.221(d) which specifies an attenuation of:

43 + 10 log (P)

If the output is P Watts, the absolute limit is given by:

10 log (P) - (43 + 10 log (P)) = -43dBW

converting to dBm:

-43dBW = -13 dBm

This absolute limit is therefore the same (-13dBm) regardless of the actual measured output power P.

PASS

4.10 Radiated Emissions - Transmit Carrier ERP

Factor Set 1: A30_dBi_10A - - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R8 A24 A30 SG9 PM6 PS10

Substitution Emissions

Company: Sepura PLC *Product:* STP9040/STP9240
Date: 04/09/2013 *Test Eng:* Dave Smith
Ports:
Test: 90.205 using limits of 90.205(h)
Ports:
Test: using limits of

Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss Sig Gen Level Cable dBm	Cable Loss Rec'vr Level Cable dBm	Ant Pol	Rec'vr Level EUT dBuV	Sig Gen Level Sub'n Ant dBm	Rec'vr Level Sub'n Ant dBuV	Sub'n Ant Gain dBd	**ERP dBm**	Limit dBm	Margin dB	Note
			Standalone											
1	1	1	450.000	110.0	110.0	V	113.4	-11.8	66.9	-2.4	**32.3**			Upr
1	1	1	460.000	110.0	110.0	V	113.9	-11.8	65.2	-2.4	**34.5**			Upr
1	1	1	470.000	110.0	110.0	V	113.2	-12.0	65.3	-2.5	**33.5**			Upr
1	1	1	450.000	0.0	0.0	H	115.8	-11.8	68.1	-2.4	**33.5**			Flat
1	1	1	460.000	0.0	0.0	H	116.4	-11.8	67.7	-2.4	**34.4**			Flat
1	1	1	470.000	0.0	0.0	H	117.0	-12.0	66.9	-2.5	**35.7**			Flat
			RSM											
1	1	1	450.000	110.0	110.0	V	102.2	-11.8	66.9	-2.4	**21.1**			Upr
1	1	1	460.000	110.0	110.0	V	103.3	-11.8	65.2	-2.4	**23.9**			Upr
1	1	1	470.000	110.0	110.0	V	104.6	-12.0	65.3	-2.5	**24.9**			Upr
1	1	1	450.000	0.0	0.0	H	100.9	-11.8	68.1	-2.4	**18.6**			Flat
1	1	1	460.000	0.0	0.0	H	104.3	-11.8	67.7	-2.4	**22.3**			Flat
1	1	1	470.000	0.0	0.0	H	105.2	-12.0	66.9	-2.5	**23.9**			Flat
			Car Kit											
1	1	1	450.000	110.0	110.0	V	108.7	-11.8	66.9	-2.4	**27.6**			Upr
1	1	1	460.000	110.0	110.0	V	107.9	-11.8	65.2	-2.4	**28.5**			Upr
1	1	1	470.000	110.0	110.0	V	109.6	-12.0	65.3	-2.5	**29.9**			Upr
1	1	1	450.000	0.0	0.0	H	107.7	-11.8	68.1	-2.4	**25.4**			Flat
1	1	1	460.000	0.0	0.0	H	109.5	-11.8	67.7	-2.4	**27.5**			Flat
1	1	1	470.000	0.0	0.0	H	111.1	-12.0	66.9	-2.5	**29.8**			Flat
Results				Minimum Margin PASS/FAIL										

Notes

The results above are radiated measurements using the substitution method.

There are no specific limits in the standard for this test.

4.11 Radiated Emissions - Transmit Spurious Below 1GHz

Factor Set 1: A30_dBi_10A - - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R8 A24 A30 SG9 PM6 PS10 RFF09 RFF02

Substitution Emissions

Company: Sepura PLC *Product:* STP9040/STP9240
Date: 04/09/2013 *Test Eng:* Dave Smith
Ports:
Test: 90.210 using limits of 90.221(d)
Ports:
Test: using limits of

Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss Sig Gen Level Cable dBm	Cable Loss Rec'vr Level Cable dBm	Ant Pol	Rec'vr Level EUT dBuV	Sig Gen Level Sub'n Ant dBm	Rec'vr Level Sub'n Ant dBuV	Sub'n Ant Gain dBd	**ERP dBm**	Limit dBm	Margin dB	Note
			Standalone											
1	1	1	600.000	110.0	110.0	V	31.6	-12.8	60.1	-4.3	**-45.6**	-13.0	32.6	Upr
1	1	1	900.000	110.0	110.0	V	43.1	-14.2	51.1	-8.9	**-31.2**	-13.0	18.2	Upr
1	1	1	920.000	110.0	110.0	V	37.4	-14.3	49.4	-8.9	**-35.1**	-13.0	22.1	Upr
1	1	1	940.000	110.0	110.0	V	37.5	-14.4	50.4	-8.7	**-36.1**	-13.0	23.1	Upr
1	1	1	900.000	110.0	110.0	H	42.8	-14.2	53.1	-8.9	**-33.4**	-13.0	20.4	Flat
1	1	1	920.000	110.0	110.0	H	38.8	-14.3	55.0	-8.9	**-39.3**	-13.0	26.3	Flat
1	1	1	940.000	110.0	110.0	H	42.1	-14.4	54.9	-8.7	**-35.9**	-13.0	22.9	Flat
			RSM											
1	1	1	900.000	110.0	110.0	V	40.7	-14.2	51.1	-8.9	**-33.5**	-13.0	20.5	Upr
1	1	1	920.000	110.0	110.0	V	36.9	-14.3	49.4	-8.9	**-35.6**	-13.0	22.6	Upr
1	1	1	940.000	110.0	110.0	V	41.2	-14.4	50.4	-8.7	**-32.3**	-13.0	19.3	Upr
1	1	1	900.000	110.0	110.0	H	42.6	-14.2	53.1	-8.9	**-33.6**	-13.0	20.6	Flat
1	1	1	920.000	110.0	110.0	H	38.1	-14.3	55.0	-8.9	**-40.1**	-13.0	27.1	Flat
1	1	1	940.000	110.0	110.0	H	38.6	-14.4	54.9	-8.7	**-39.4**	-13.0	26.4	Flat

Results	Minimum Margin PASS/FAIL	**18.2** dB **PASS**

Notes

Results of prescans shown in plots 19-21, 24-26 and 29-31.
Measurements made with 120kHz RBW peak detector.

3m test distance.

4.12 Radiated Emissions - Transmit Spur - Above 1GHz - Standalone

Factor Set 1: A8_dbi_12B - - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R8 A23 A8 PRE10 SG16 PM6 PS10 RFF015 RFF022

Substitution Emissions

Company: Sepura PLC *Product:* STP9040/STP9240
Date: 30/09/2013 *Test Eng:* Dave Smith
Ports:
Test: 90.210 using limits of 90.221(d)
Ports:
Test: using limits of

Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss Sig Gen Level Cable dBm	Cable Loss Rec'vr Level Cable dBm	Ant Pol	Rec'vr Level EUT dBuV	Sig Gen Level Sub'n Ant dBm	Rec'vr Level Sub'n Ant dBuV	Sub'n Ant Gain dBd	**ERP dBm**	Limit dBm	Margin dB	Note
1	1	1	2250.000	0.0	0.0	V	78.6	-22.0	97.1	7.4	**-33.1**	-13.0	20.1	Lo
1	1	1	2300.000	0.0	0.0	V	78.8	-21.9	96.9	7.5	**-32.5**	-13.0	19.5	Mid
1	1	1	2350.000	0.0	0.0	V	77.8	-21.9	96.8	7.6	**-33.3**	-13.0	20.3	Hi
1	1	1	2700.000	0.0	0.0	V	75.1	-22.3	96.3	7.9	**-35.5**	-13.0	22.5	Lo
1	1	1	2250.000	0.0	0.0	H	83.9	-22.0	99.6	7.4	**-30.2**	-13.0	17.2	Lo
1	1	1	2300.000	0.0	0.0	H	81.7	-21.9	99.1	7.5	**-31.8**	-13.0	18.8	Mid
1	1	1	2350.000	0.0	0.0	H	80.8	-21.9	98.8	7.6	**-32.3**	-13.0	19.3	Hi
1	1	1	2700.000	0.0	0.0	H	78.2	-22.3	97.7	7.9	**-33.9**	-13.0	20.9	Lo

Results	Minimum Margin PASS/FAIL	**17.2** dB **PASS**

Notes

Standalone. 1.5m. Maximum of flat and upright. Max rotation and height.
Measured with 1MHz RBW peak detector.
Results of prescans shown in plots 22 and 23.

4.13 Radiated Emissions - Transmit Spur - Above 1GHz - RSM

Factor Set 1: A8_dbi_12B - - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R8 A23 A8 PRE10 SG16 PM6 PS10 RFF015 RFF022

Substitution Emissions

Company: Sepura PLC *Product:* STP9040/STP9240
Date: 30/09/2013 *Test Eng:* Dave Smith
Ports:
Test: 90.210 using limits of 90.221(d)
Ports:
Test: using limits of

Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss Sig Gen Level Cable dBm	Cable Loss Rec'vr Level Cable dBm	Ant Pol	Rec'vr Level EUT dBuV	Sig Gen Level Sub'n Ant dBm	Rec'vr Level Sub'n Ant dBuV	Sub'n Ant Gain dBd	**ERP dBm**	Limit dBm	Margin dB	Note
1	1	1	2250.000	0.0	0.0	V	76.9	-22.0	97.1	7.4	**-34.8**	-13.0	21.8	Lo
1	1	1	2300.000	0.0	0.0	V	74.8	-21.9	96.9	7.5	**-36.6**	-13.0	23.6	Mid
1	1	1	2350.000	0.0	0.0	V	75.8	-21.9	96.8	7.6	**-35.2**	-13.0	22.2	Hi
1	1	1	2250.000	0.0	0.0	H	79.9	-22.0	99.6	7.4	**-34.2**	-13.0	21.2	Lo
1	1	1	2300.000	0.0	0.0	H	79.1	-21.9	99.1	7.5	**-34.4**	-13.0	21.4	Mid
1	1	1	2350.000	0.0	0.0	H	78.3	-21.9	98.8	7.6	**-34.8**	-13.0	21.8	Hi

Results	Minimum Margin PASS/FAIL	**21.2** dB **PASS**

Notes

RSM. 1.5m. Maximum of flat and upright. Max rotation and height.
Measured with 1MHz RBW peak detector.
Results of prescans shown in plots 27 and 28.

4.14 Radiated Emissions - Transmit Spur - Above 1GHz - Car Kit

Factor Set 1: A8_dbi_12B - - -
Factor Set 2: - - - -
Factor Set 3: - - - -
Test Equipment: R8 A23 A8 PRE10 SG16 PM6 PS10 RFF015 RFF022

Substitution Emissions

Company: Sepura PLC *Product:* STP9040/STP9240
Date: 30/09/2013 *Test Eng:* Dave Smith
Ports:
Test: 90.210 using limits of 90.221(d)
Ports:
Test: using limits of

Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss Sig Gen Level Cable dBm	Cable Loss Rec'vr Level Cable dBm	Ant Pol	Rec'vr Level EUT dBuV	Sig Gen Level Sub'n Ant dBm	Rec'vr Level Sub'n Ant dBuV	Sub'n Ant Gain dBd	**ERP dBm**	Limit dBm	Margin dB	Note
1	1	1	2250.000	0.0	0.0	V	78.4	-22.0	97.1	7.4	**-33.3**	-13.0	20.3	Lo
1	1	1	2300.000	0.0	0.0	V	79.9	-21.9	96.9	7.5	**-31.5**	-13.0	18.5	Mid
1	1	1	2350.000	0.0	0.0	V	78.9	-21.9	96.8	7.6	**-32.2**	-13.0	19.2	Hi
1	1	1	2250.000	0.0	0.0	H	73.6	-22.0	99.6	7.4	**-40.5**	-13.0	27.5	Lo
1	1	1	2300.000	0.0	0.0	H	74.3	-21.9	99.1	7.5	**-39.2**	-13.0	26.2	Mid
1	1	1	2350.000	0.0	0.0	H	75.6	-21.9	98.8	7.6	**-37.5**	-13.0	24.5	Hi

Results	Minimum Margin PASS/FAIL	**18.5** dB **PASS**

Notes

Car kit. 1.5m. Max rotation and height.
Measured with 1MHz RBW peak detector.
Results of prescans shown in plots 32 and 33.

4.15 Radiated Emissions - Receive Mode - Below 1GHz

Factor Set 1:	A12_FS_13B - - CBL015_11A	1 m cable
Factor Set 2:	- - - -	
Factor Set 3:	- - - -	
Test Equipment:	R4 A12 R8 A24 PRE10	

Radiated Emissions

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	23/10/2013	*Test Eng:*	Dave Smith
Ports:			
Test:	ANSI C63.4:2003 using limits of		FCC(B)
Ports:			
Test:	using limits of		

Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit FCC_B dBuV/m	Margin FCC_B dB	Notes
	Standalone												
35	2	1	3	1	529.280	V	0.4	22.7		23.1	46.0	22.9	Mid
35	2	1	3	1	529.280	H	1.0	22.7		23.7	46.0	22.3	Mid
	STP9240												
47	2	1	3	1	529.280	V	-1.9	22.7		20.8	46.0	25.2	Mid
47	2	1	3	1	529.280	H	1.6	22.7		24.3	46.0	21.7	Mid
	RSM												
39	2	1	3	1	452.000	V	-2.2	20.7		18.5	46.0	27.5	Hi
39	2	1	3	1	452.000	H	-2.0	20.7		18.7	46.0	27.3	Hi
	Car Kit												
42	2	1	3	1	160.029	V	8.1	12.1		20.2	43.5	23.3	Mid
42	2	1	3	1	160.029	H	6.3	12.1		18.4	43.5	25.1	Mid
42	2	1	3	1	231.900	V	8.3	13.1		21.4	46.0	24.6	Mid
42	2	1	3	1	231.900	H	9.9	13.1		23.0	46.0	23.0	Mid
43	2	1	3	1	384.003	V	-0.6	18.9		18.3	46.0	27.7	Mid
43	2	1	3	1	384.003	H	6.2	18.9		25.1	46.0	20.9	Mid
43	2	1	3	1	544.004	V	0.4	23.9		24.3	46.0	21.7	Mid
43	2	1	3	1	544.004	H	1.1	23.9		25.0	46.0	21.0	Mid
43	2	1	3	1	672.005	V	-0.2	25.3		25.1	46.0	20.9	Mid
43	2	1	3	1	672.005	H	0.2	25.3		25.5	46.0	20.5	Mid
43	2	1	3	1	928.007	V	0.2	29.7		29.9	46.0	16.1	Mid
43	2	1	3	1	928.007	H	-0.2	29.7		29.5	46.0	16.5	Mid

Results	**Minimum Margin**	**16.1**	**dB**
	PASS/FAIL	**PASS**	

Notes	Comments and Observations
	Results of scans shown in plots 34-35, 38-39, 42-43 and 46-47. Measurements made with 120kHz QP detector.

4.16 Radiated Emissions - Receive Mode - Above 1GHz

Factor Set 1:	A8_3m_12B CBL050_11A RFF22_12A PRE10_12A	1 m cable
Factor Set 2:	- - - -	
Factor Set 3:	- - - -	
Test Equipment:	R8 A8 RFF22 PRE10 RFF15	

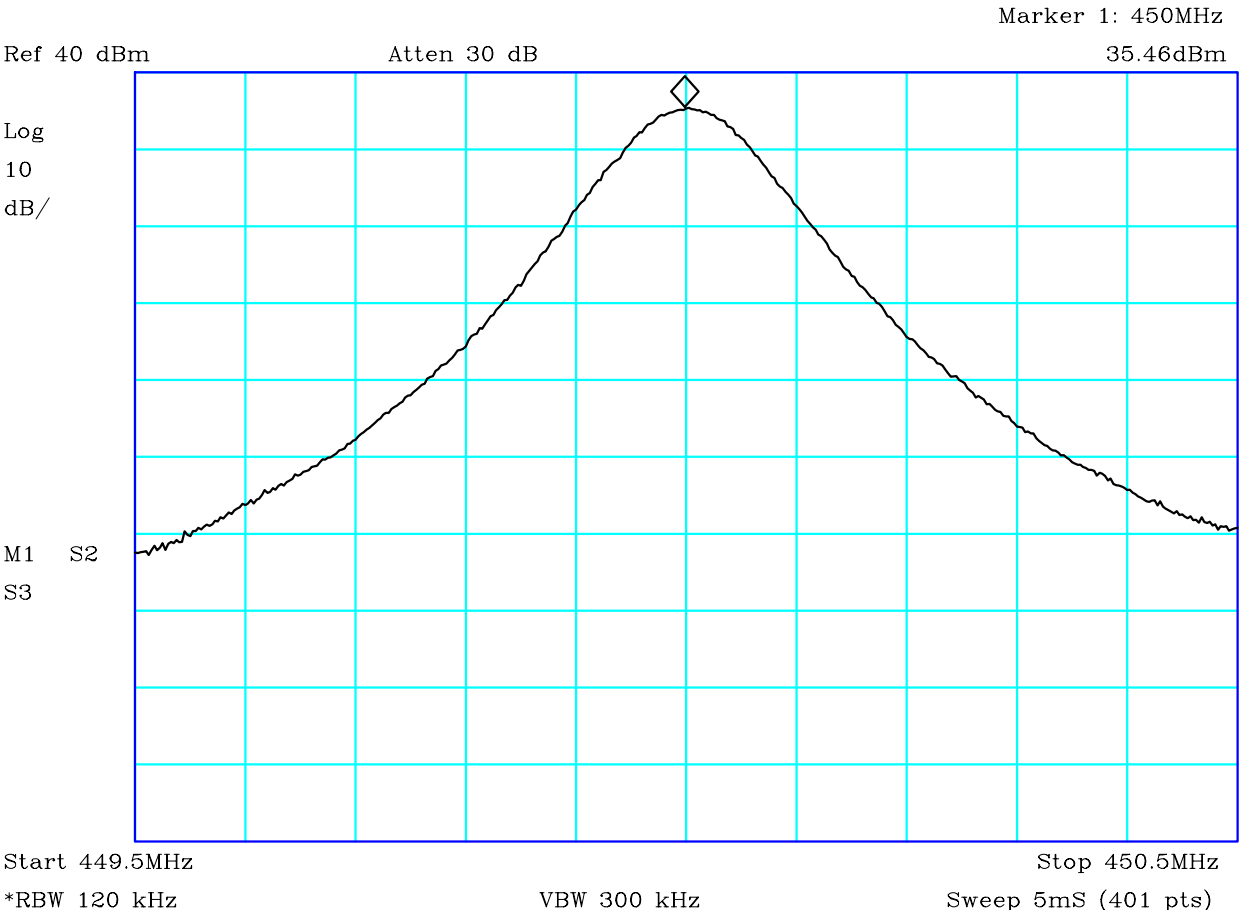
Radiated Emissions

Company:	Sepura PLC	*Product:*	STP9040/STP9240
Date:	06/09/2013	*Test Eng:*	Dave Smith
Ports:			
Test:	ANSI C63.4:2003 using limits of		FCC(B)
Ports:			
Test:	using limits of		

Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit FCC_B dBuV/m	Margin FCC_B dB	Notes
	RSM Lower Chann												
41	2	1	1.5	1	4673.000	V	47.3	-2.3		45.0	80.0	35.0	pk
41	2	1	1.5	1	4673.000	V	36.5	-2.3		34.2	60.0	25.8	avg
41	2	1	1.5	1	4673.000	H	49.2	-2.3		46.9	80.0	33.1	pk
41	2	1	1.5	1	4673.000	H	38.6	-2.3		36.3	60.0	23.7	avg
	RSM Mid Channel												
41	2	1	1.5	1	4763.000	V	46.7	-2.0		44.7	80.0	35.3	pk
41	2	1	1.5	1	4763.000	V	35.9	-2.0		33.9	60.0	26.1	avg
41	2	1	1.5	1	4763.000	H	48.0	-2.0		46.0	80.0	34.0	pk
41	2	1	1.5	1	4763.000	H	41.7	-2.0		39.7	60.0	20.3	avg
	RSM Upper Channel												
41	1	1	1.5	1	4853.000	V	45.5	-1.8		43.7	80.0	36.3	pk
41	1	1	1.5	1	4853.000	V	34.3	-1.8		32.5	60.0	27.5	avg
41	1	1	1.5	1	4853.000	H	45.8	-1.8		44.0	80.0	36.0	pk
41	1	1	1.5	1	4853.000	H	34.5	-1.8		32.7	60.0	27.3	avg
	STP9240 Mid Channel												
41	2	1	1.5	1	4763.000	V	46.5	-2.0		44.5	80.0	35.5	pk
41	2	1	1.5	1	4763.000	V	34.8	-2.0		32.8	60.0	27.2	avg
41	2	1	1.5	1	4763.000	H	47.4	-2.0		45.3	80.0	34.7	pk
41	2	1	1.5	1	4763.000	H	35.7	-2.0		33.7	60.0	26.3	avg

Results	**Minimum Margin**	**20.3**	**dB**
	PASS/FAIL	**PASS**	

Notes	Comments and Observations
	Results of scans shown in plots 36-37, 40-41, 44-45 and 48 - 49. Tabulated maximised results are for the RSM and STP9240 which gave the highest emissions. Measured with 1MHz RBW detector.



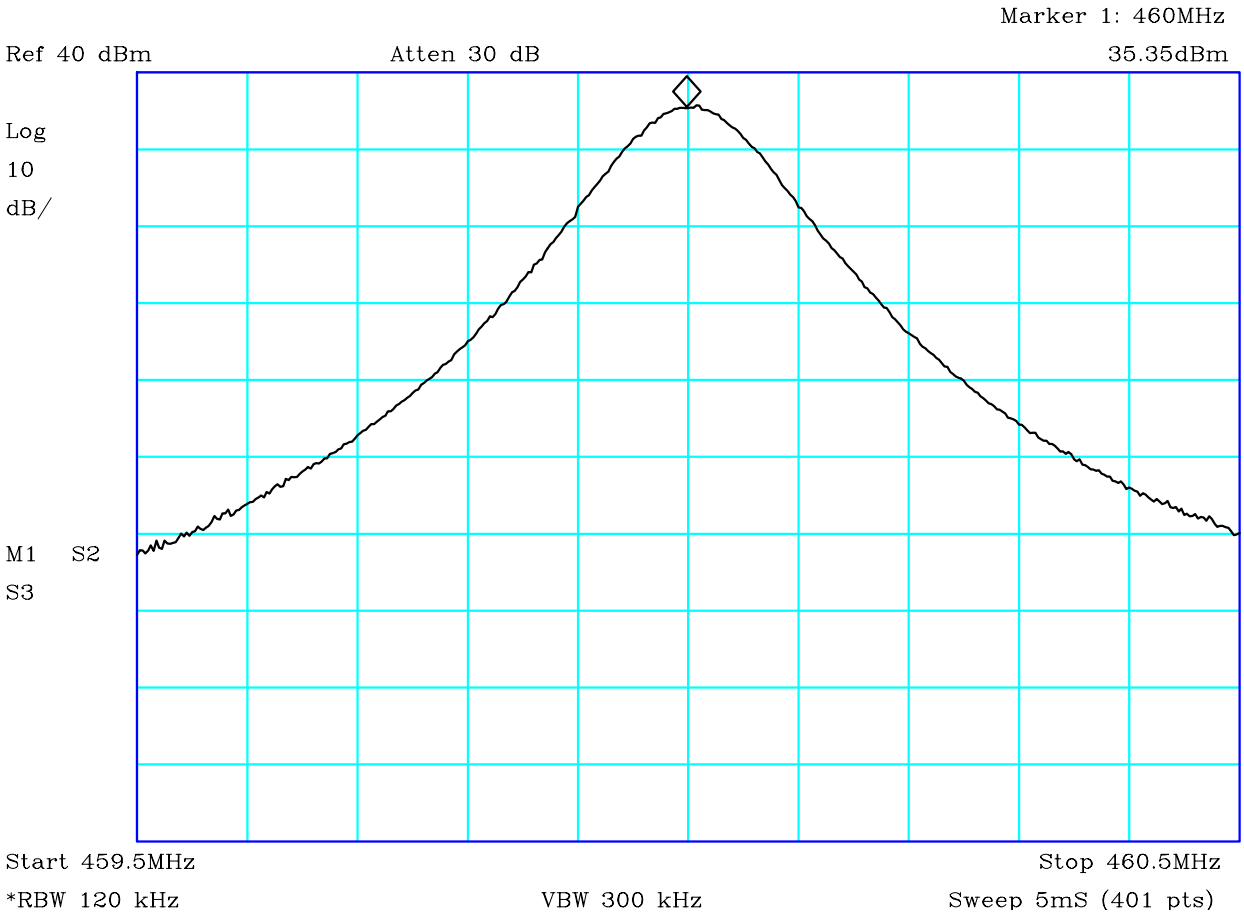
CF1:Cable_PAD

PLOT 1 Conducted Antenna Power - 450MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

450MHz max hold

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37195D8	Analyser:	R9



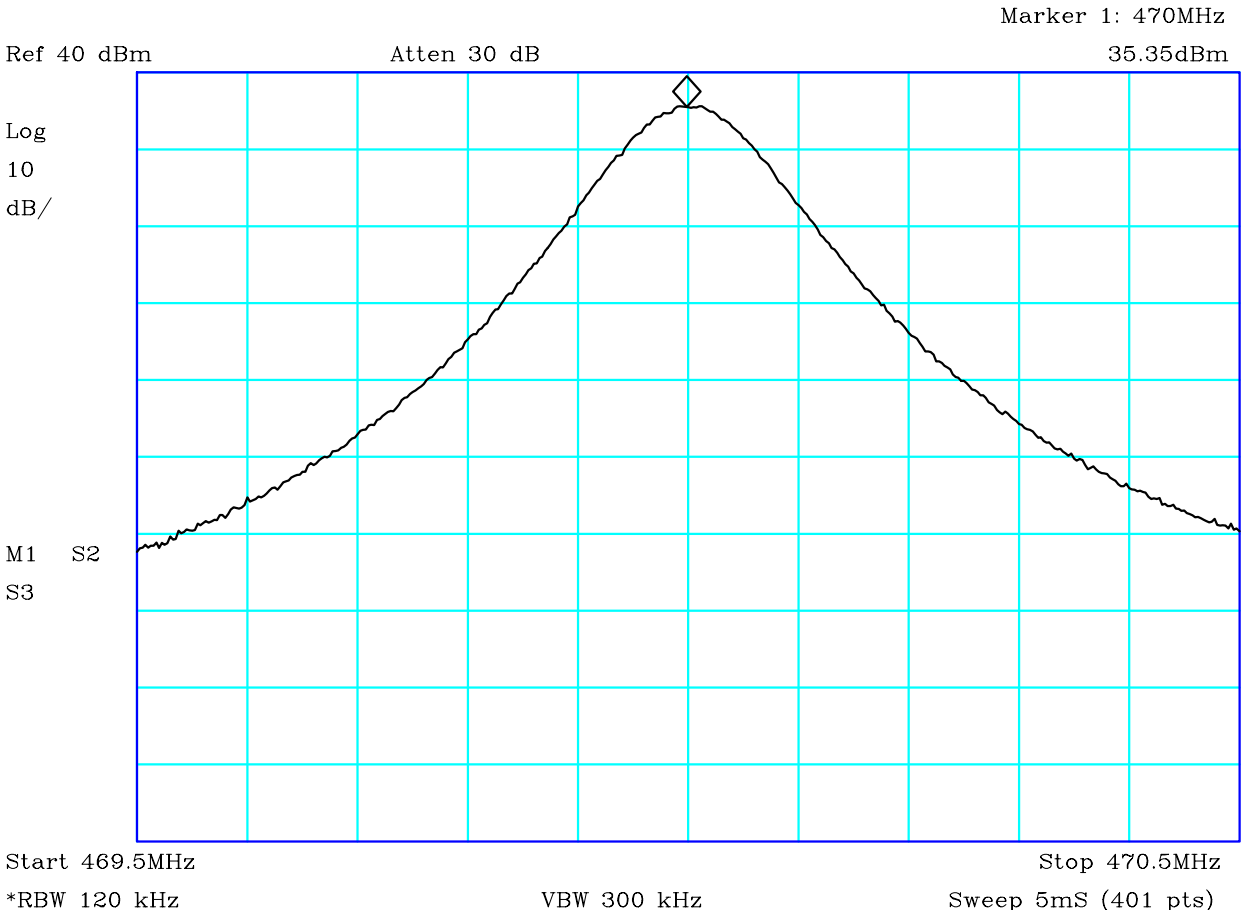
CF1:Cable_PAD

PLOT 2 Conducted Antenna Power - 460MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

460MHz max hold

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37195DA	Analyser:	R9



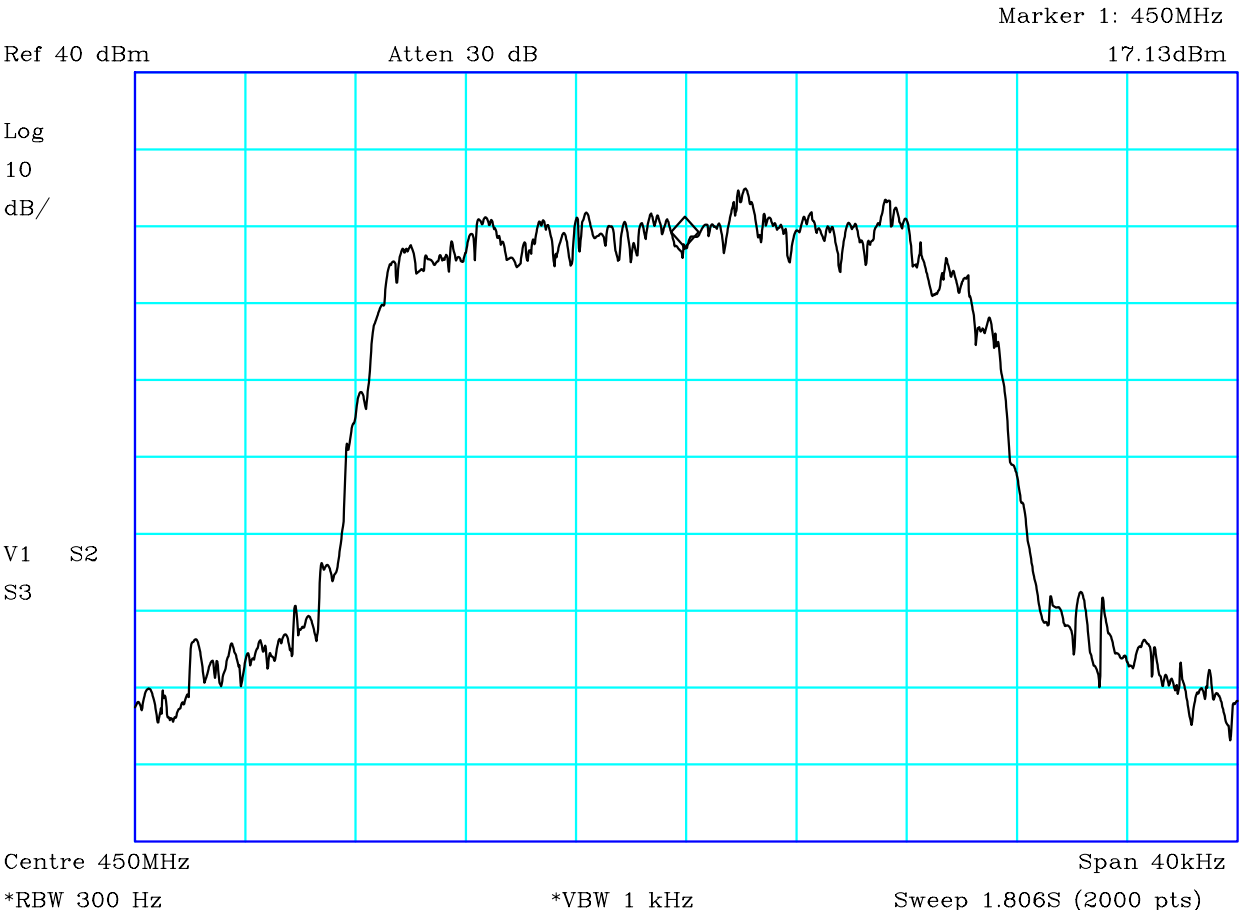
CF1:Cable_PAD

PLOT 3 Conducted Antenna Power - 470MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

470MHz max hold

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37195DB	Analyser:	R9



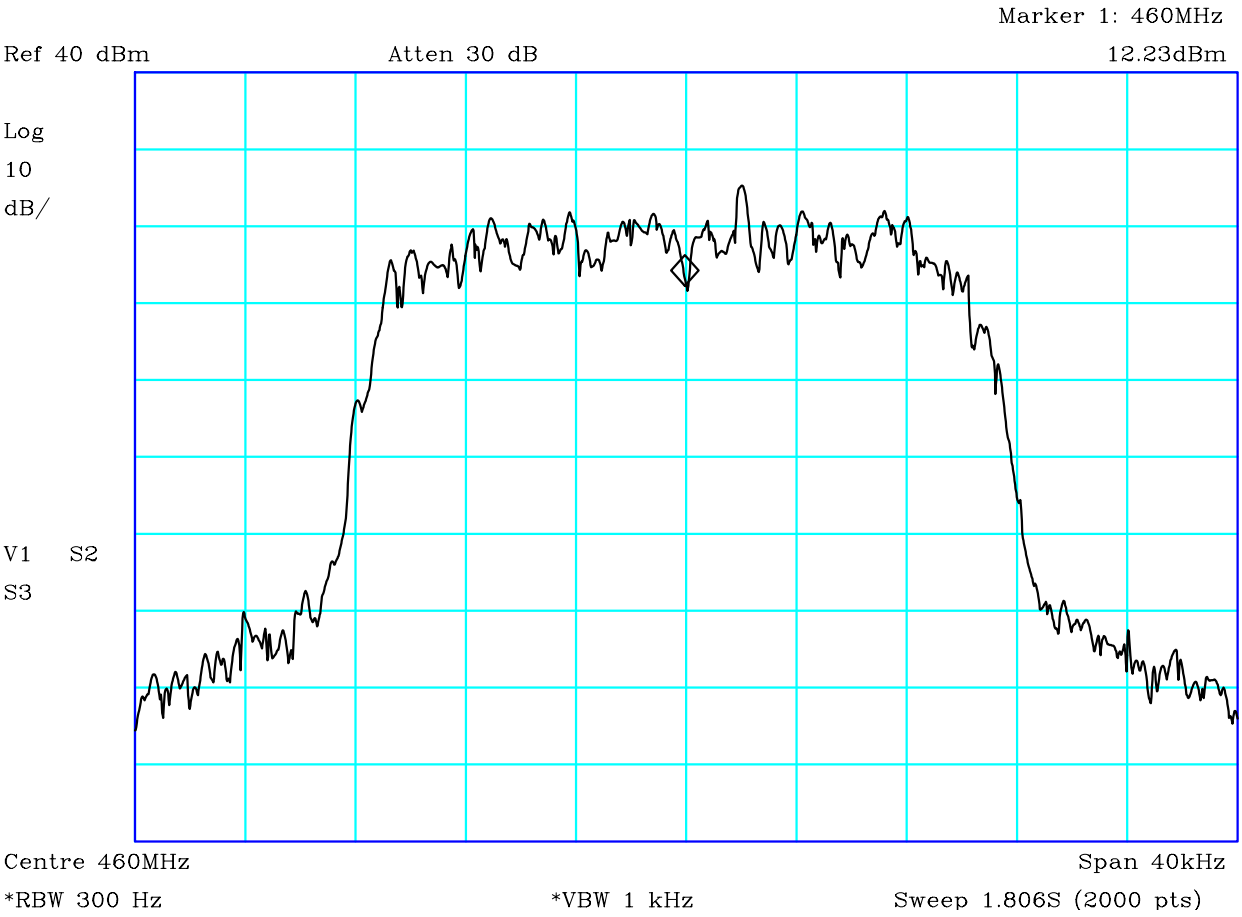
CF1:Cable_PAD

PLOT 4 Occupied Bandwidth - 450MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

450MHz
99% occupied bandwidth = 20.83kHz

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H371967A	Analyser:	R9



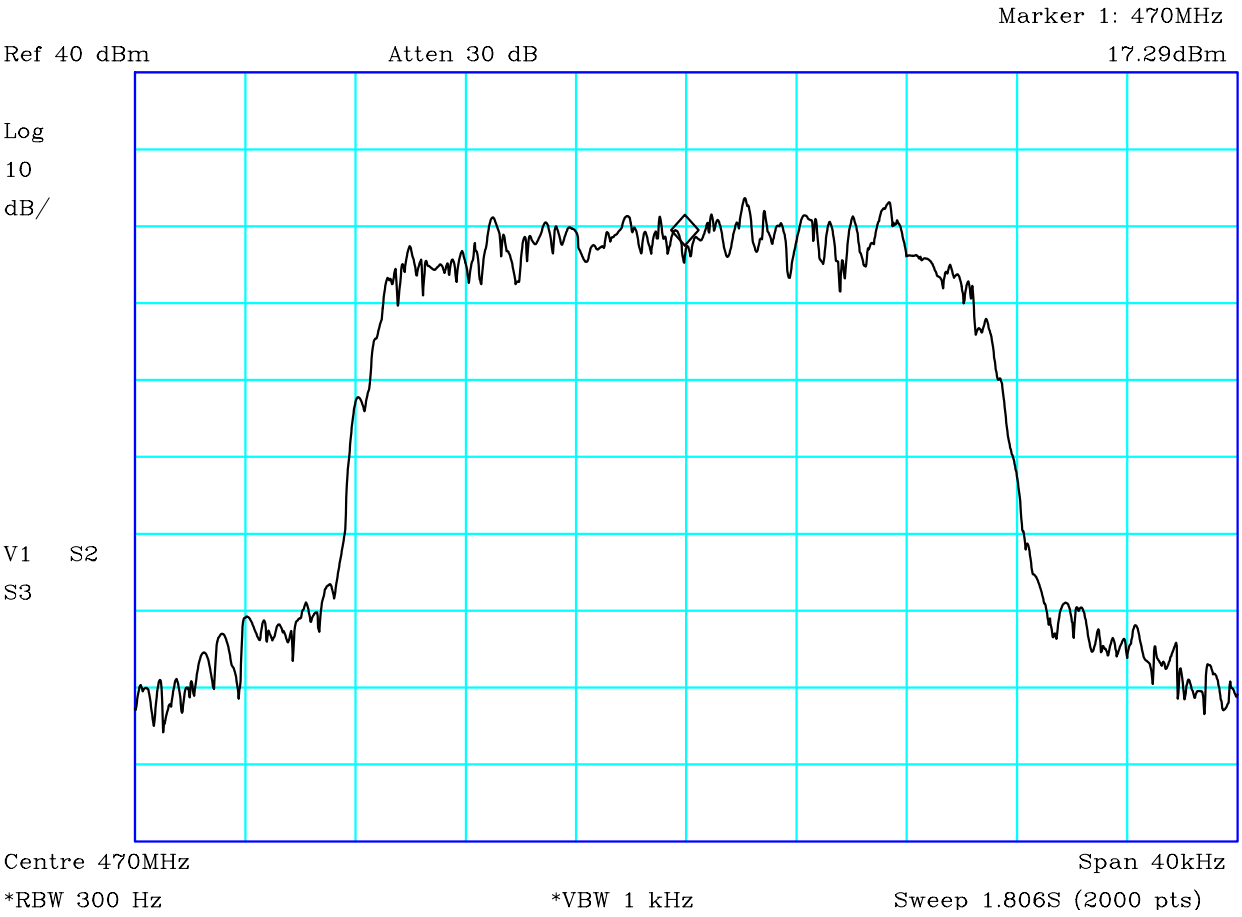
CF1:Cable_PAD

PLOT 5 Occupied Bandwidth - 460MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

460MHz
99% occupied bandwidth = 20.87kHz

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H3719681	Analyser:	R9



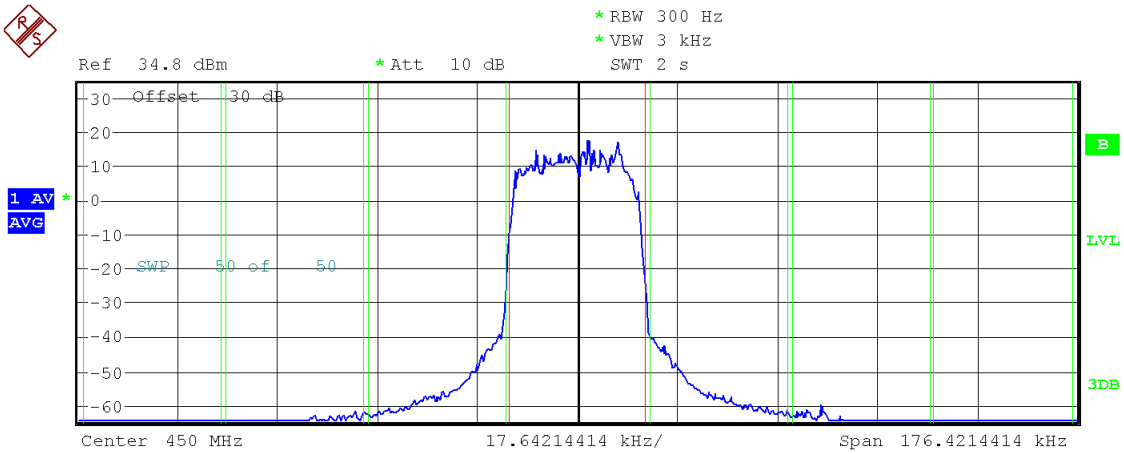
CF1:Cable_PAD

PLOT 6 Occupied Bandwidth - 470MHz

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

470MHz
99% occupied bandwidth = 20.932kHz

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37195FA	Analyser:	R9



Tx Channel
Bandwidth 24.3 kHz

Adjacent Channel
Bandwidth 24.3 kHz
Spacing 25 kHz

Alternate Channel
Bandwidth 24.3 kHz
Spacing 50 kHz

2nd Alternate Channel
Bandwidth 24.3 kHz
Spacing 75 kHz

TETRA
Power 29.19 dBm

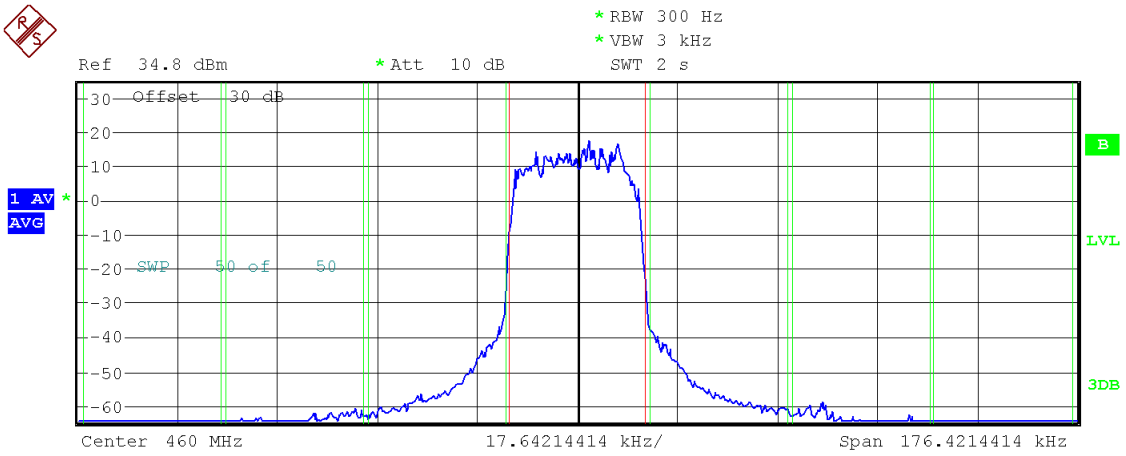
Lower -64.88 dB
Upper -65.30 dB

Lower -77.29 dB
Upper -76.82 dB

Lower -80.64 dB
Upper -80.37 dB

Date: 18.AUG.2013 00:37:42

PLOT 7 Adjacent Channel Power 450MHz - as an alternative to Masks of 90.210



Tx Channel
Bandwidth 24.3 kHz

Adjacent Channel
Bandwidth 24.3 kHz
Spacing 25 kHz

Alternate Channel
Bandwidth 24.3 kHz
Spacing 50 kHz

2nd Alternate Channel
Bandwidth 24.3 kHz
Spacing 75 kHz

TETRA
Power 29.35 dBm

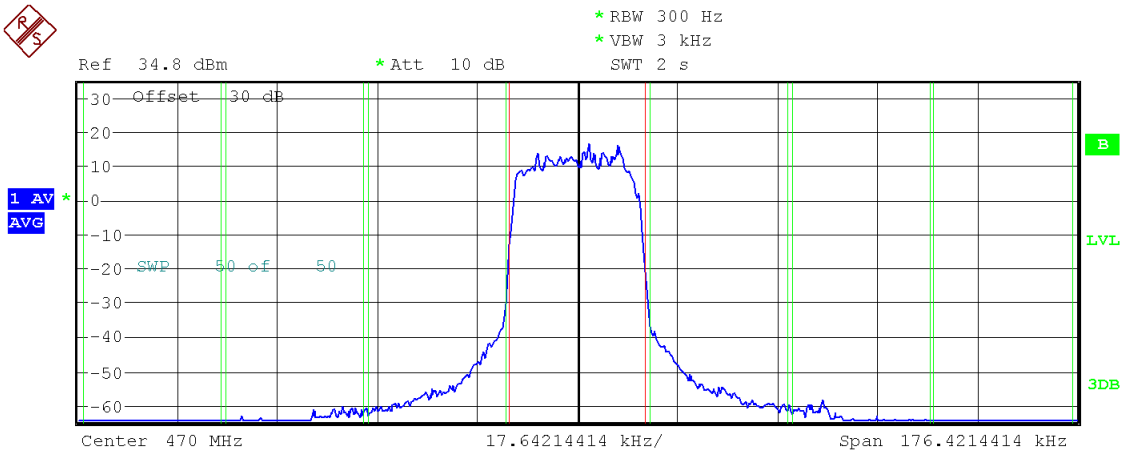
Lower -63.90 dB
Upper -64.20 dB

Lower -76.63 dB
Upper -76.09 dB

Lower -80.54 dB
Upper -80.24 dB

Date: 18.AUG.2013 00:40:52

PLOT 8 Adjacent Channel Power - 460MHz - as an alternative to Masks of 90.210



Tx Channel
Bandwidth 24.3 kHz

Adjacent Channel
Bandwidth 24.3 kHz
Spacing 25 kHz

Alternate Channel
Bandwidth 24.3 kHz
Spacing 50 kHz

2nd Alternate Channel
Bandwidth 24.3 kHz
Spacing 75 kHz

TETRA
Power 29.18 dBm

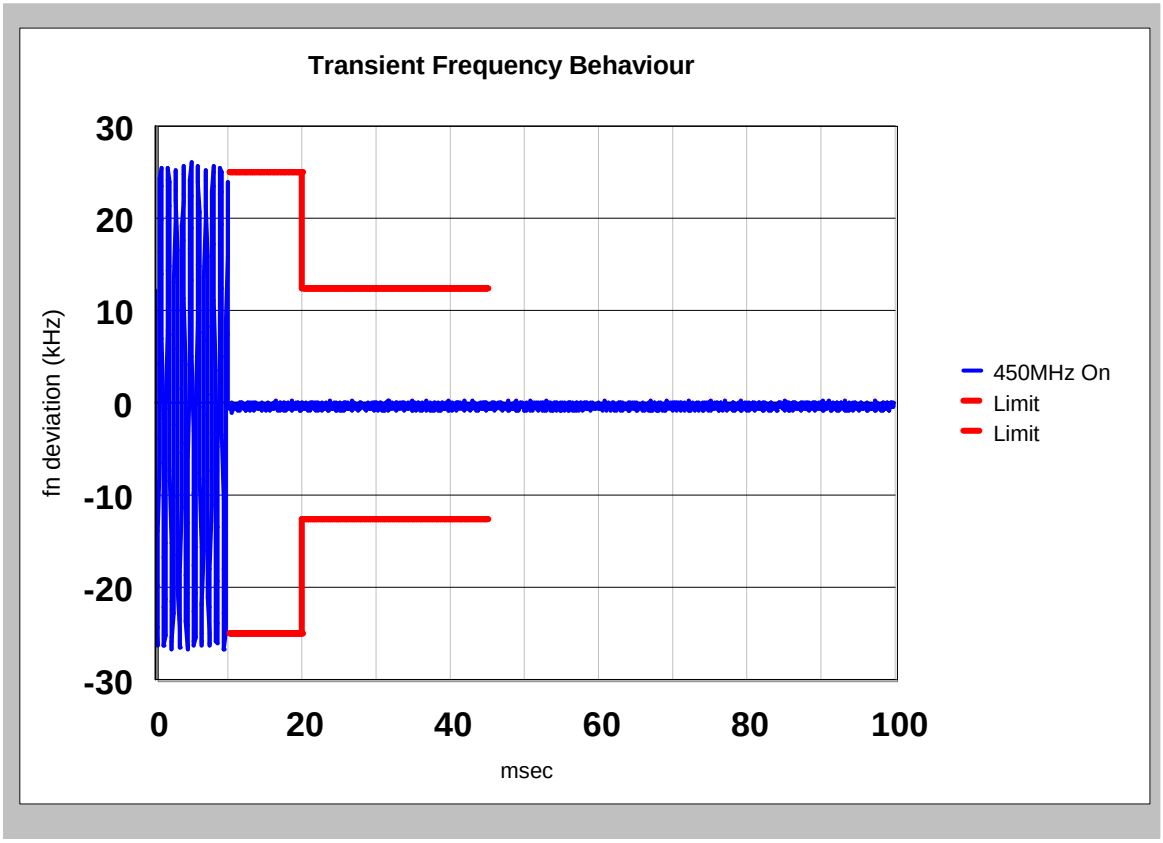
Lower -64.02 dB
Upper -63.97 dB

Lower -76.11 dB
Upper -75.53 dB

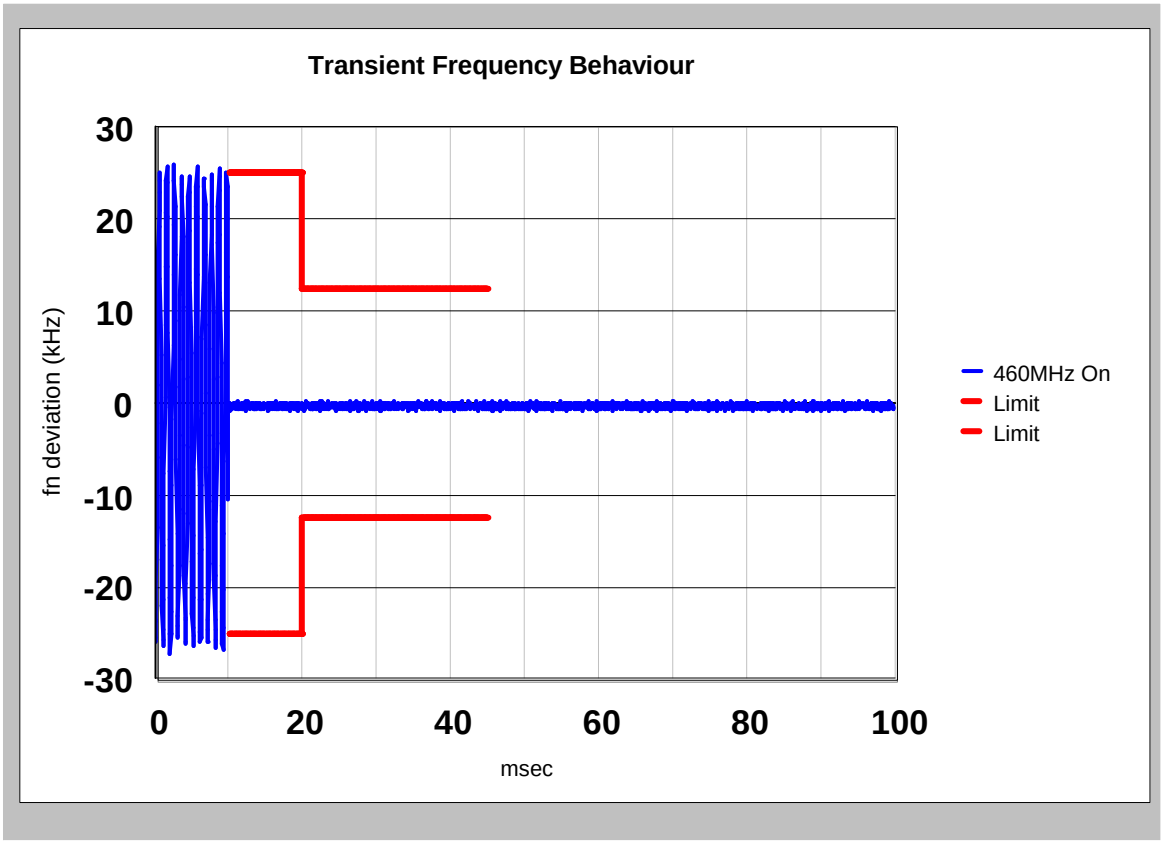
Lower -80.16 dB
Upper -80.01 dB

Date: 18.AUG.2013 00:43:32

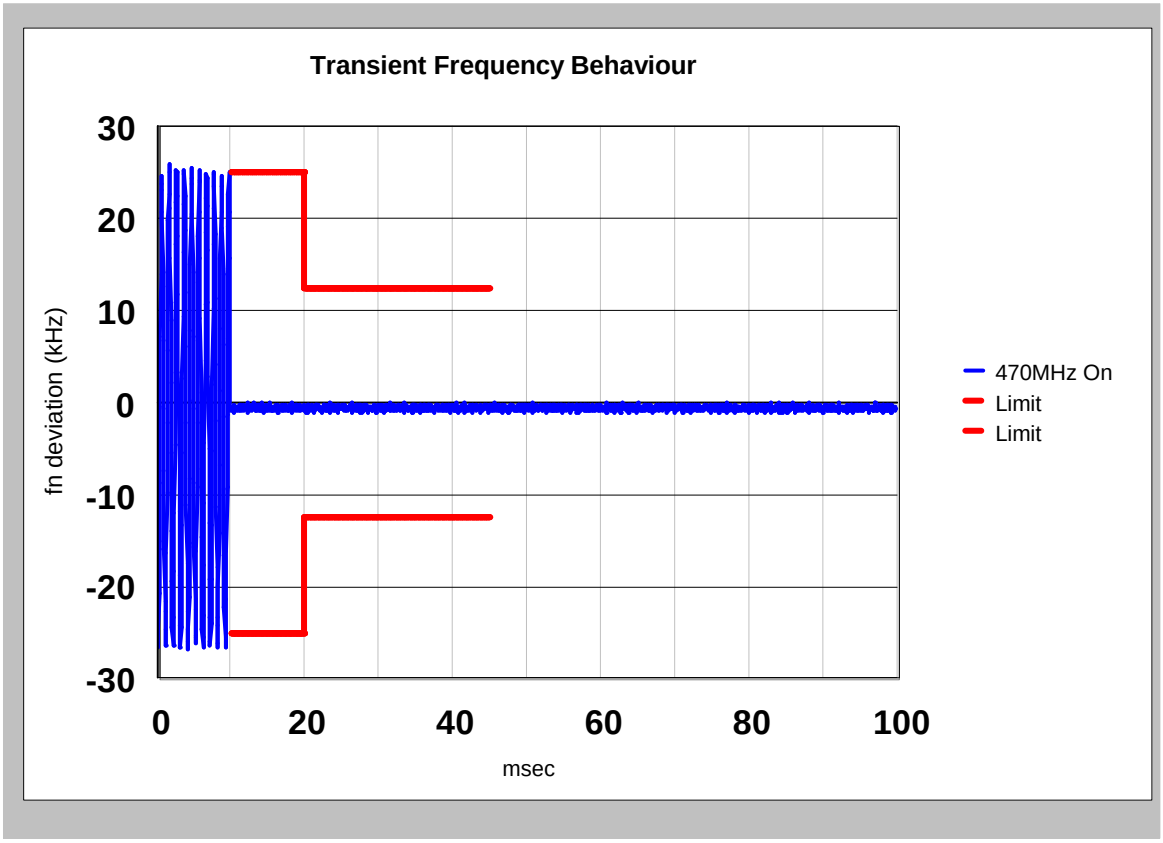
PLOT 9 Adjacent Channel Power - 470MHz - as an alternative to Masks of 90.210



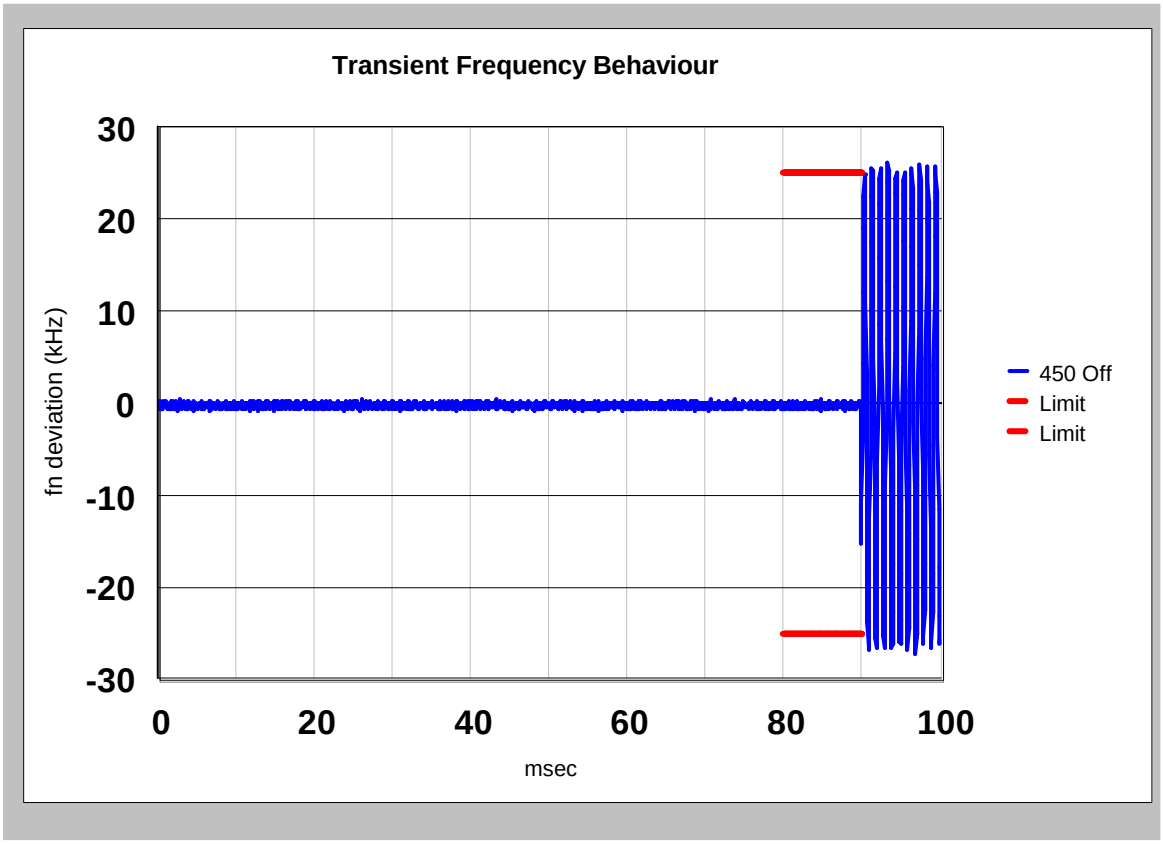
PLOT 10 Transient Frequency - 450MHz - On



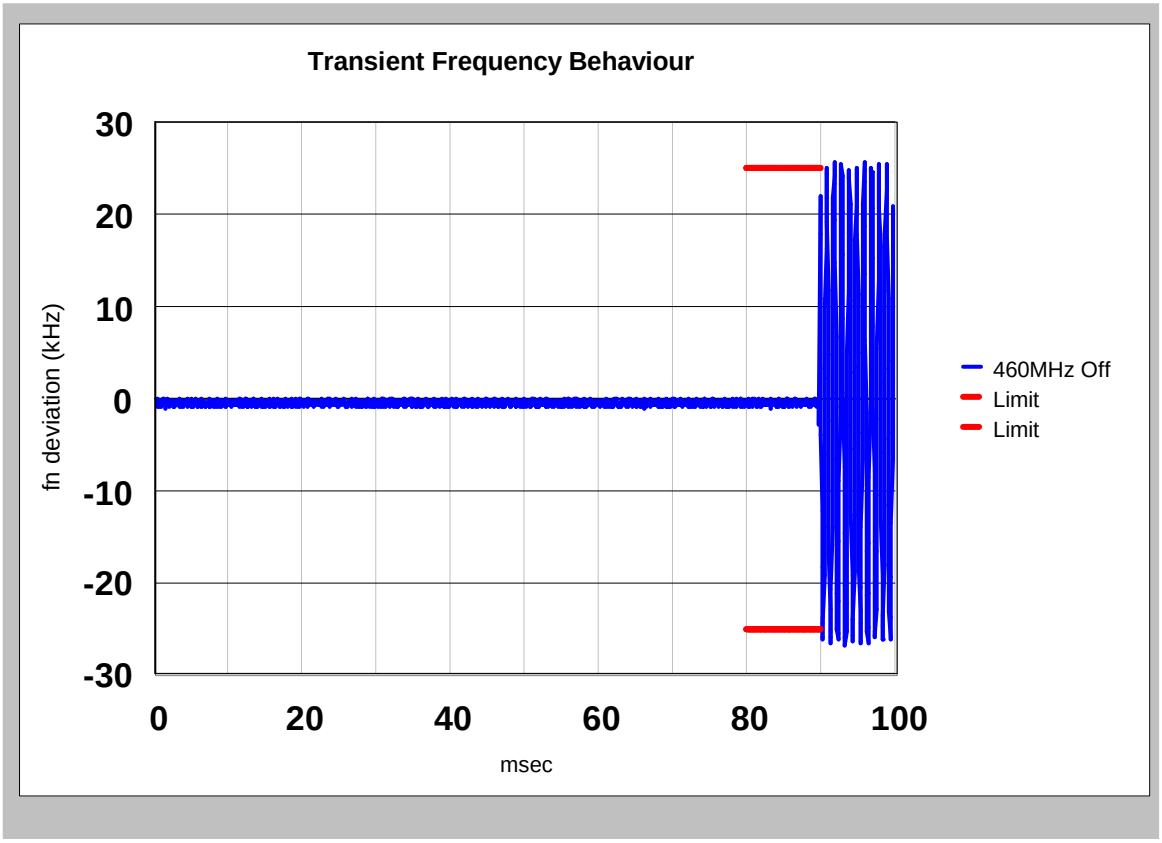
PLOT 11 Transient Frequency - 460MHz - On



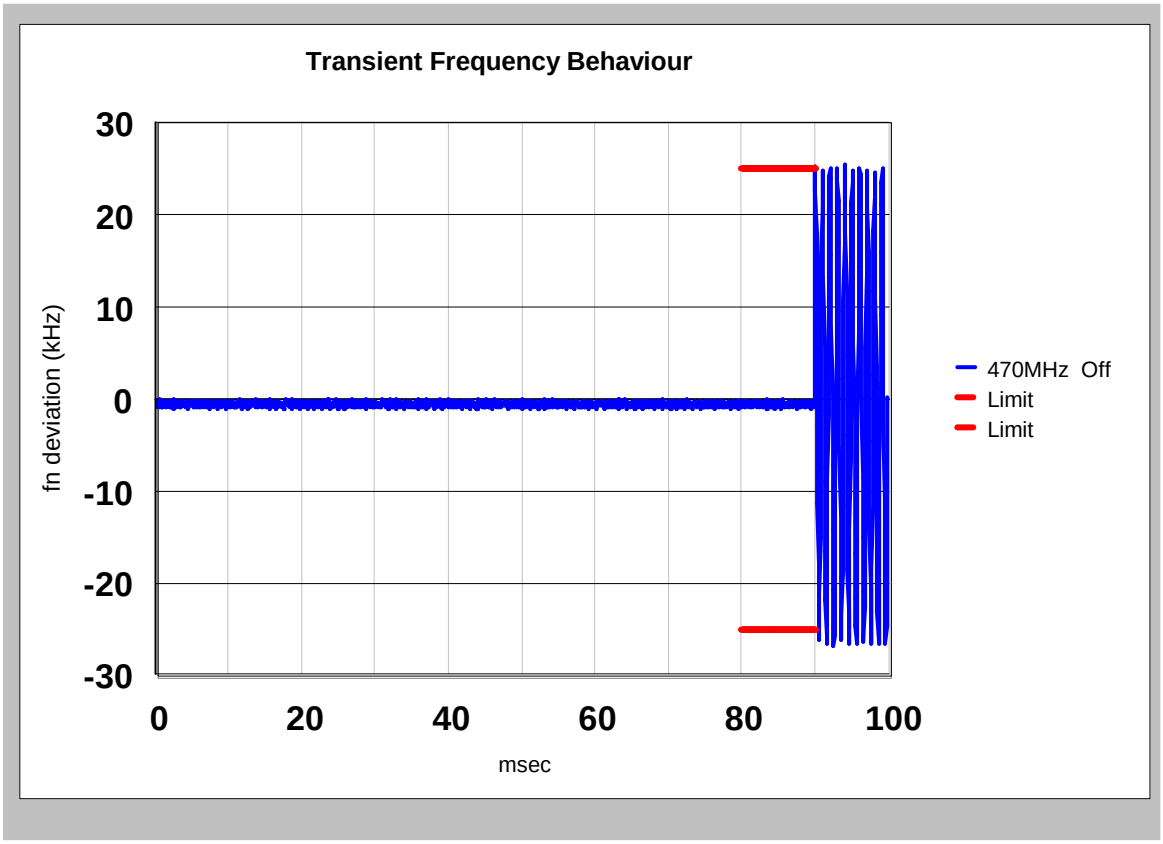
PLOT 12 Transient Frequency - 470MHz - On



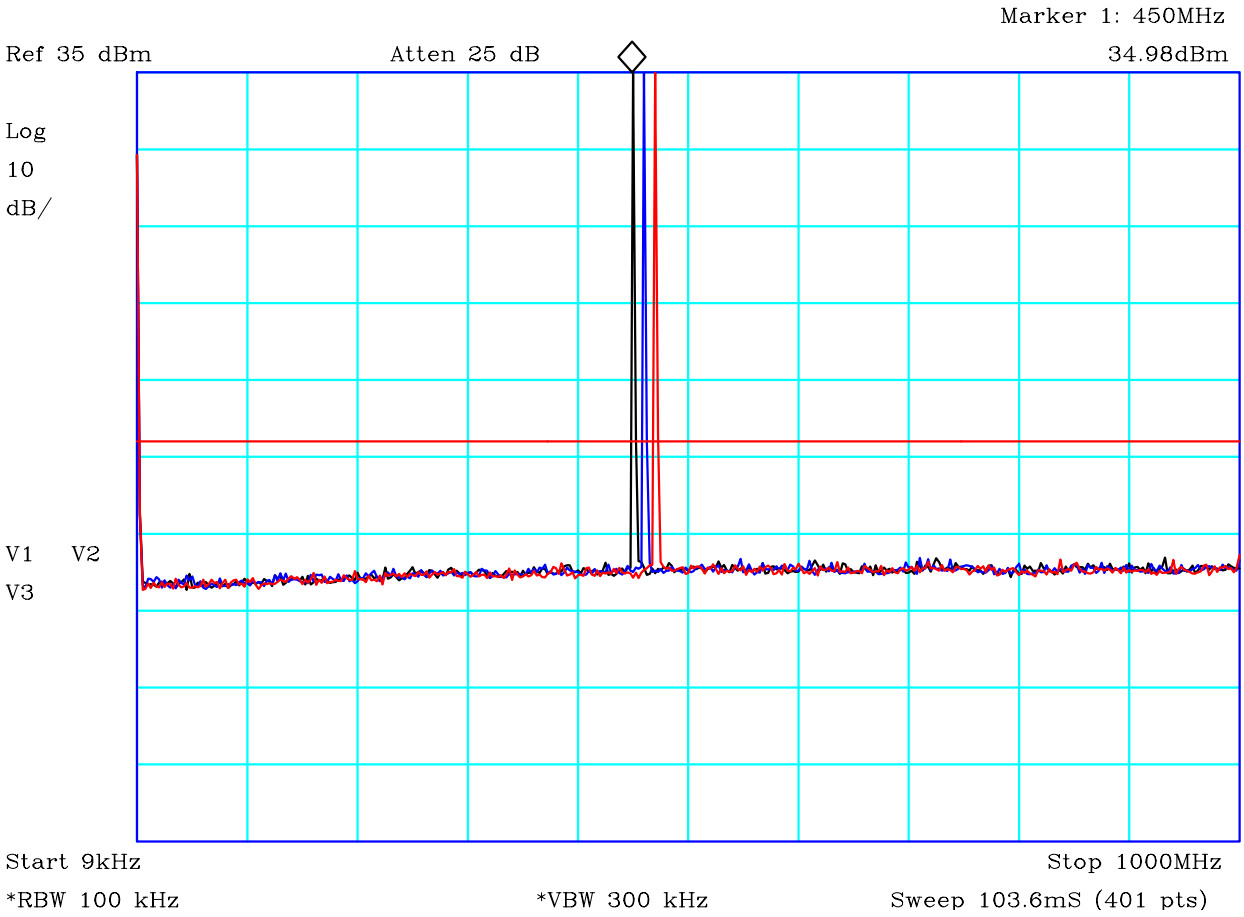
PLOT 13 Transient Frequency - 450MHz - Off



PLOT 14 Transient Frequency - 460MHz - Off



PLOT 15 Transient Frequency - 470MHz - Off



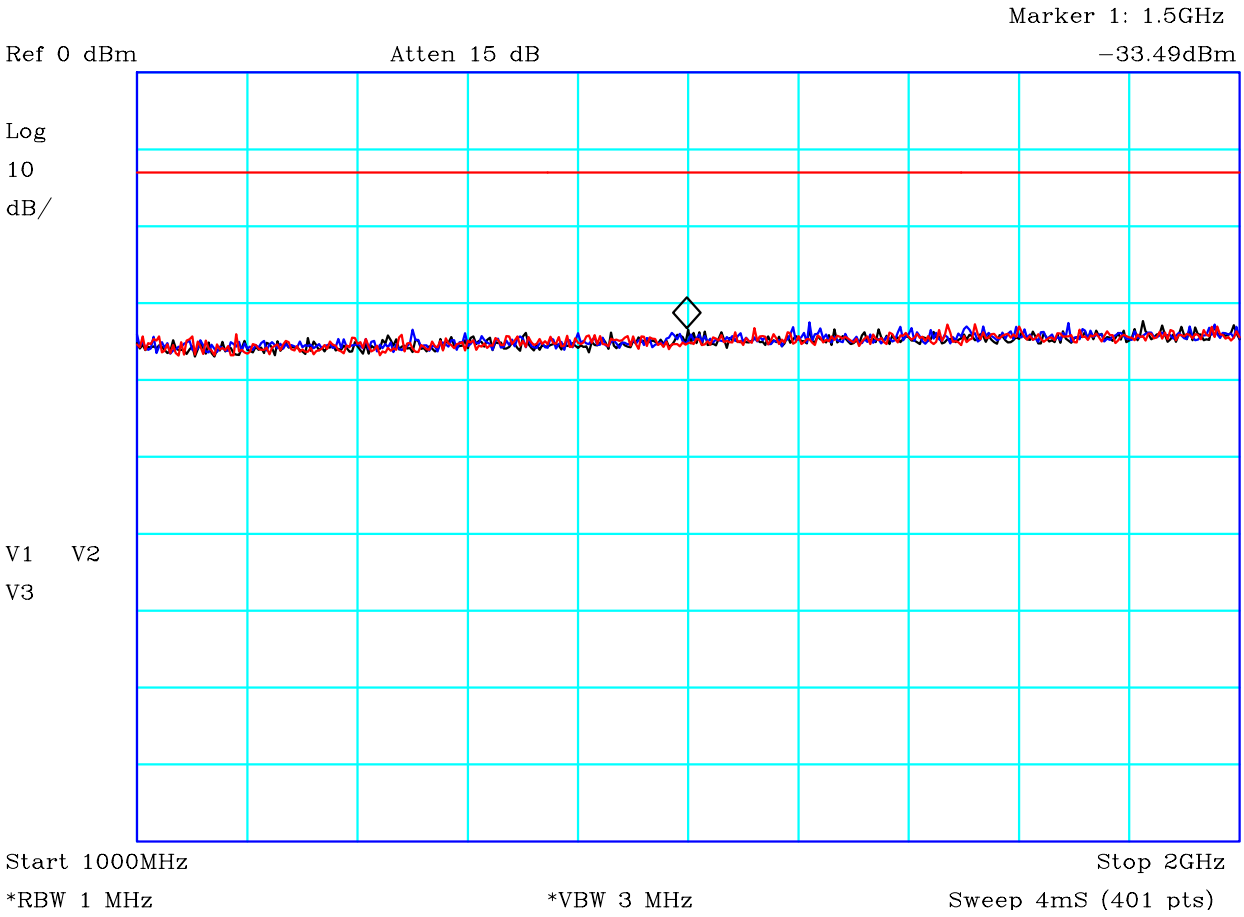
CF1:Cable_PAD

PLOT 16 Antenna Conducted Spurious Emissions - 9kHz to 1GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(RED)	-13dBm	Limit2:	
Limit3:		Limit4:	

Black: 450MHz, Blue: 460MHz Red: 470MHz
Limit set at -13 dBm.
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37197BF	Analyser:	R9



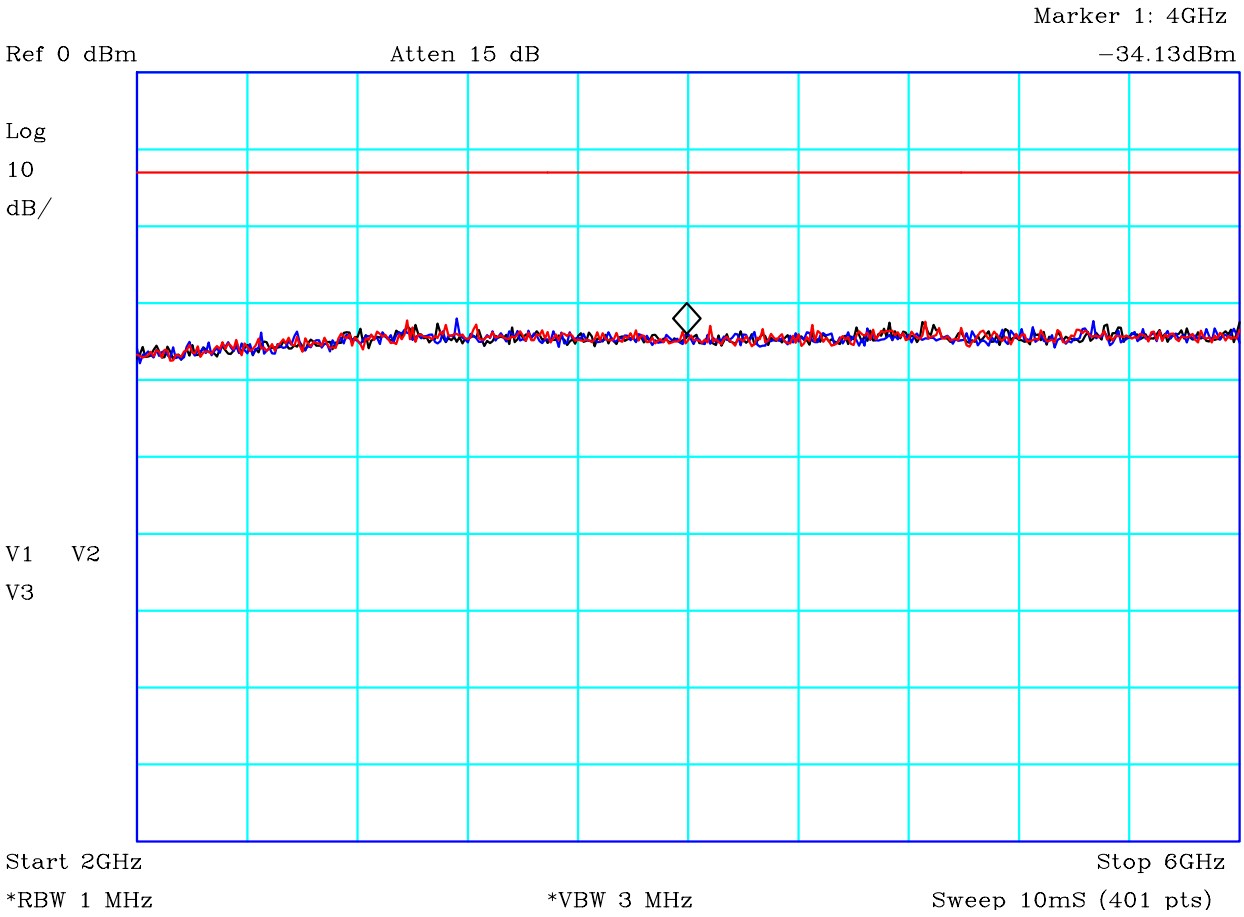
CF1:Cable_PAD CF2:RFF15_120716

PLOT 17 Antenna Conducted Spurious Emissions - 1GHz to 2GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(RED)	-13dBm	Limit2:	
Limit3:		Limit4:	

Black: 450MHz, Blue: 460MHz Red: 470MHz
Limit set at -13 dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37197B6	Analyser:	R9



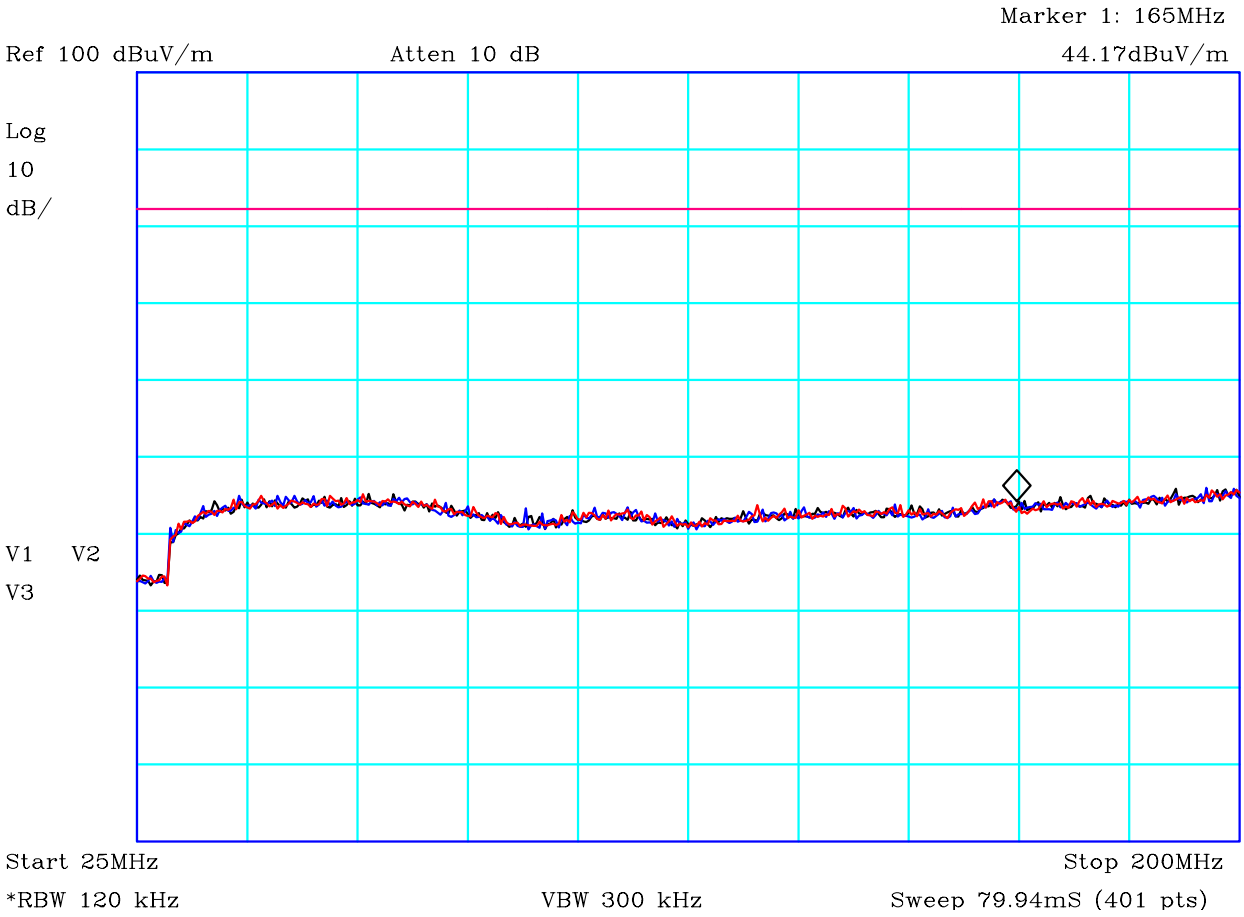
CF1:Cable_PAD CF2:RFF22_120716

PLOT 18 Antenna Conducted Spurious Emissions - 2GHz to 6GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	19/08/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(RED)	-13dBm	Limit2:	
Limit3:		Limit4:	

Black: 450MHz, Blue: 460MHz Red: 470MHz
Limit set at -13 dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Environ			Mode:	Tx
				Modification State:	0
		File:	H37197AF	Analyser:	R9



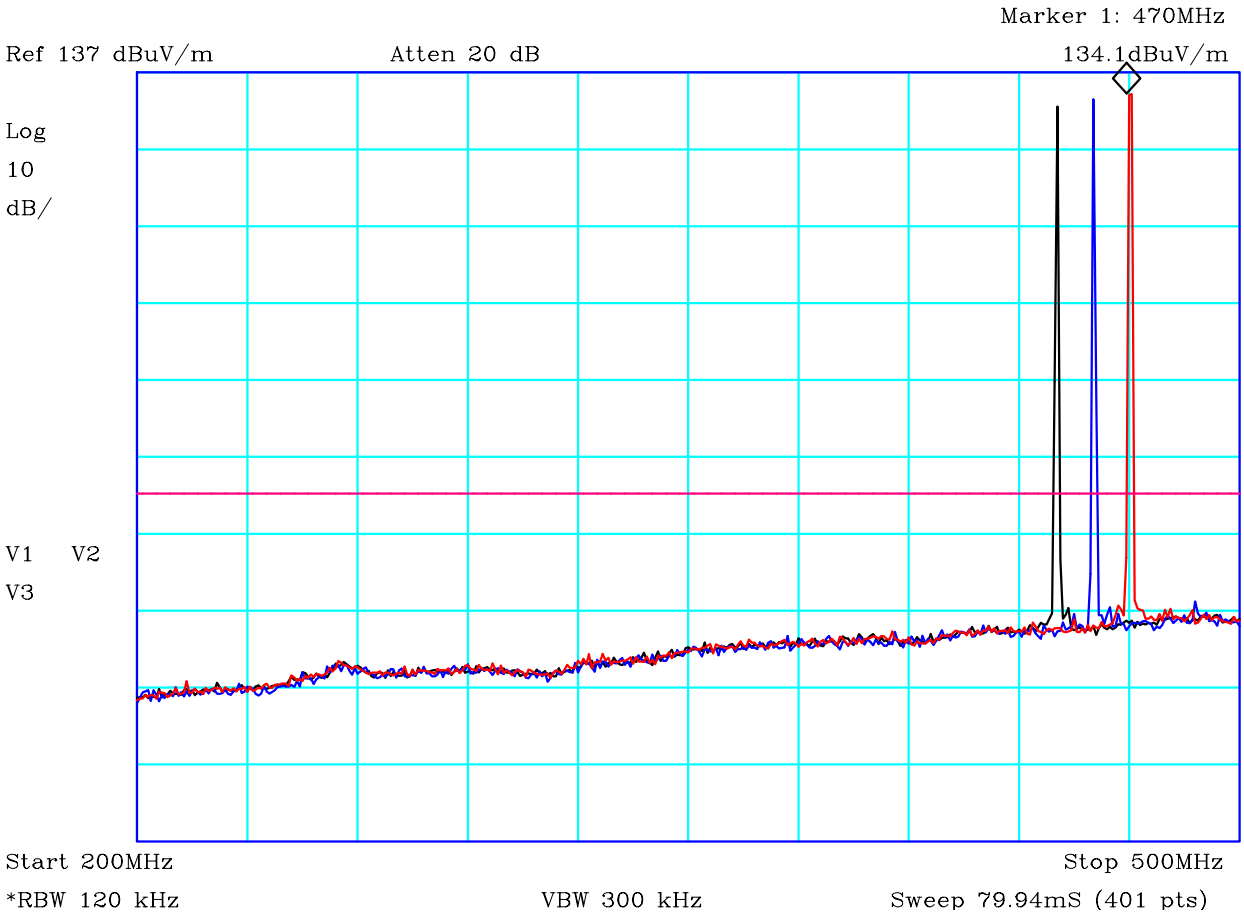
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF02_120716

PLOT 19 Radiated Emissions - Standalone - Tx - 25MHz to 200MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Standalone.
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H380545A	Analyser:	R8



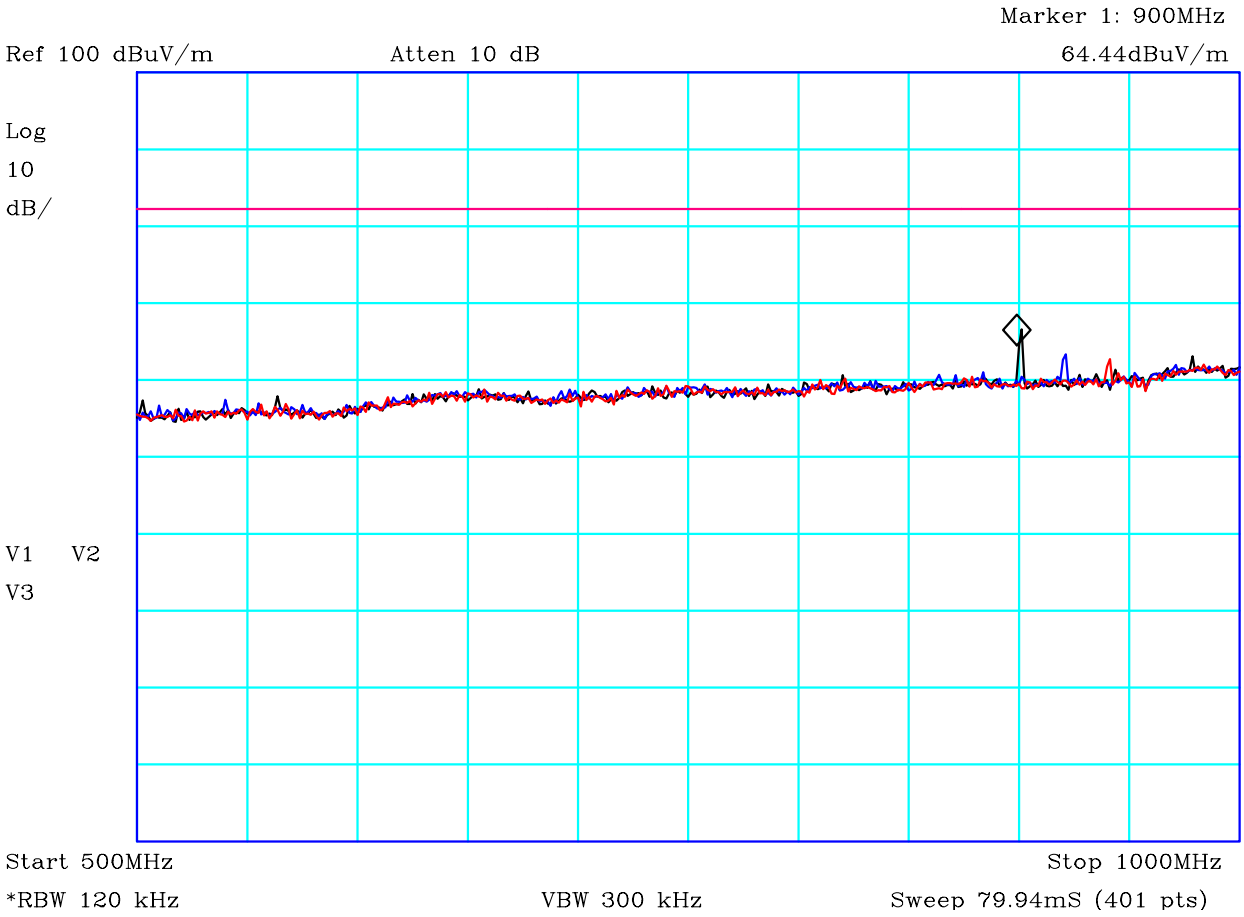
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 20 Radiated Emissions - Standalone - Tx - 200MHz to 500MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Standalone
Transmit mode. Maximum of horizontal and vertical, upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H380471F	Analyser:	R8



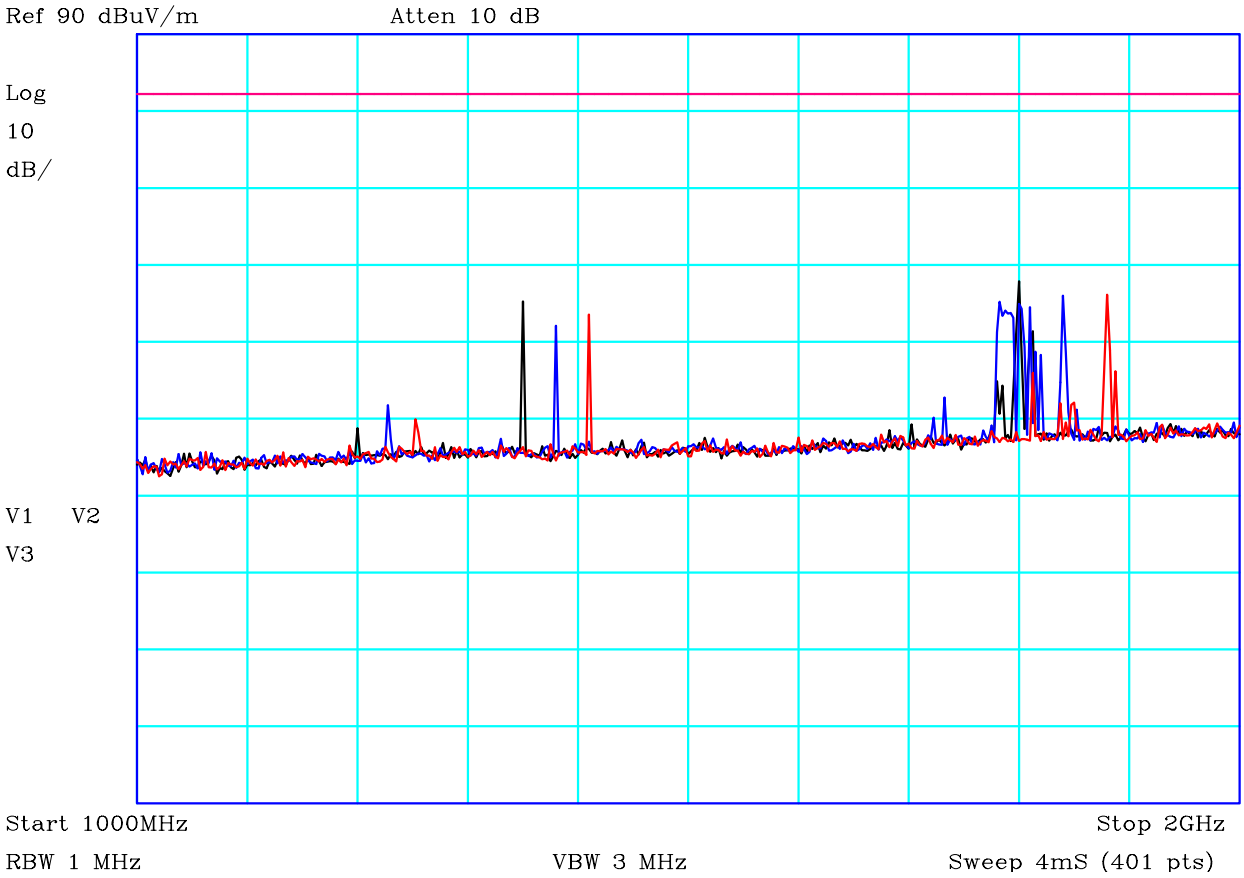
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF09_120716

PLOT 21 Radiated Emissions - Standalone - Tx - 500MHz to 1GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Standalone.
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3804478	Analyser:	R8



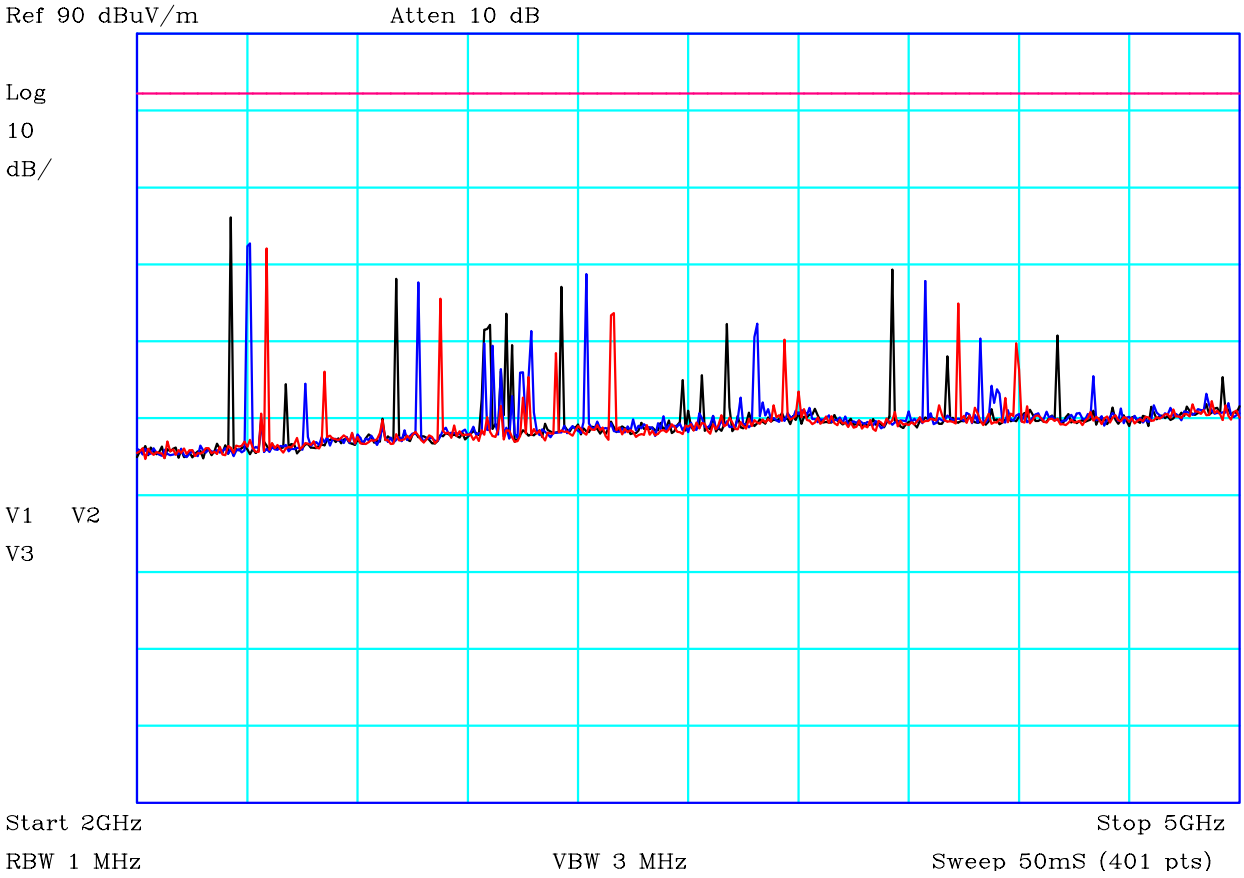
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF15_120716 CF4:PRE10_120627

PLOT 22 Radiated Emissions - Standalone - Tx - 1GHz to 2GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Standalone.
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38057D9	Analyser:	R8



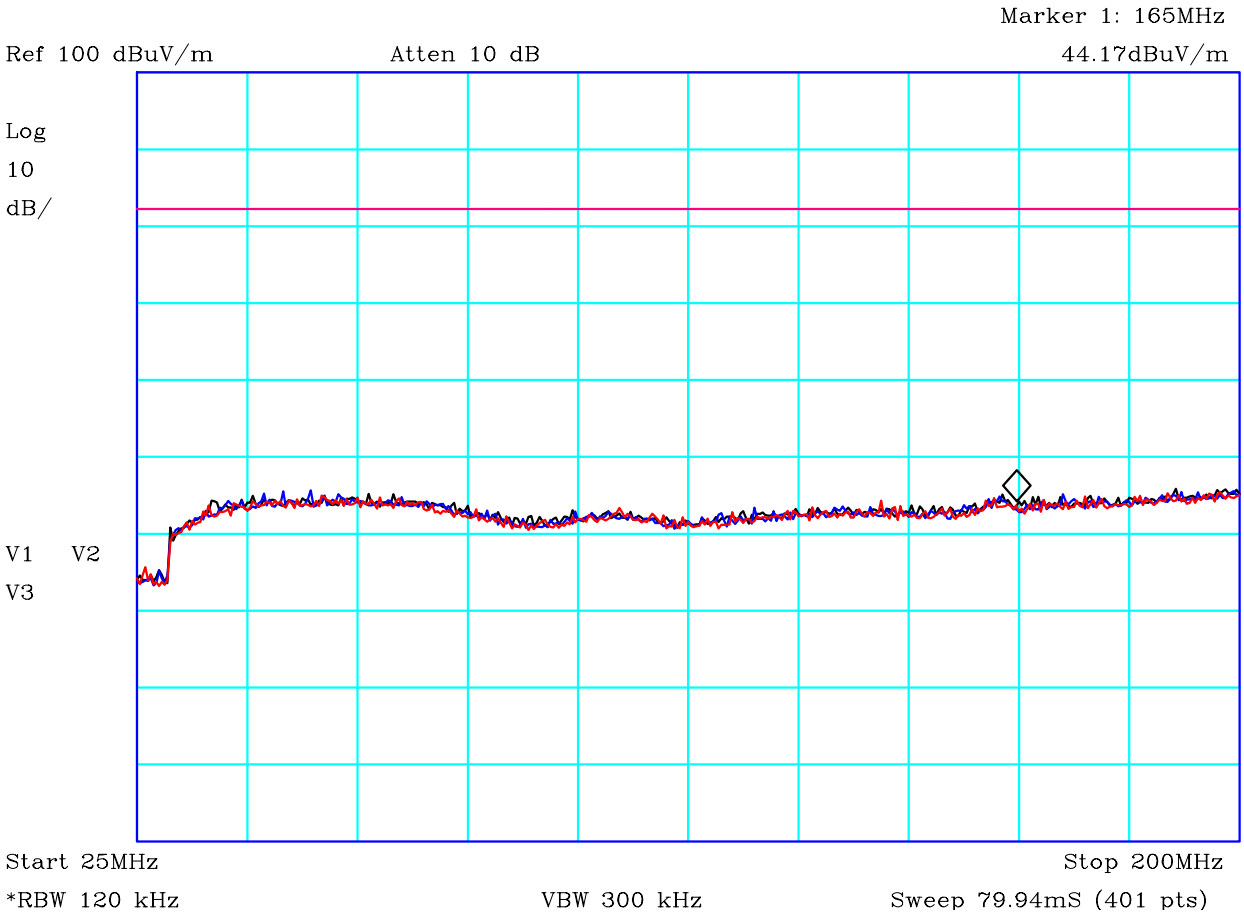
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 23 Radiated Emissions - Standalone - Tx - 2GHz to 5GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	26/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Standalone
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3826509	Analyser:	R9



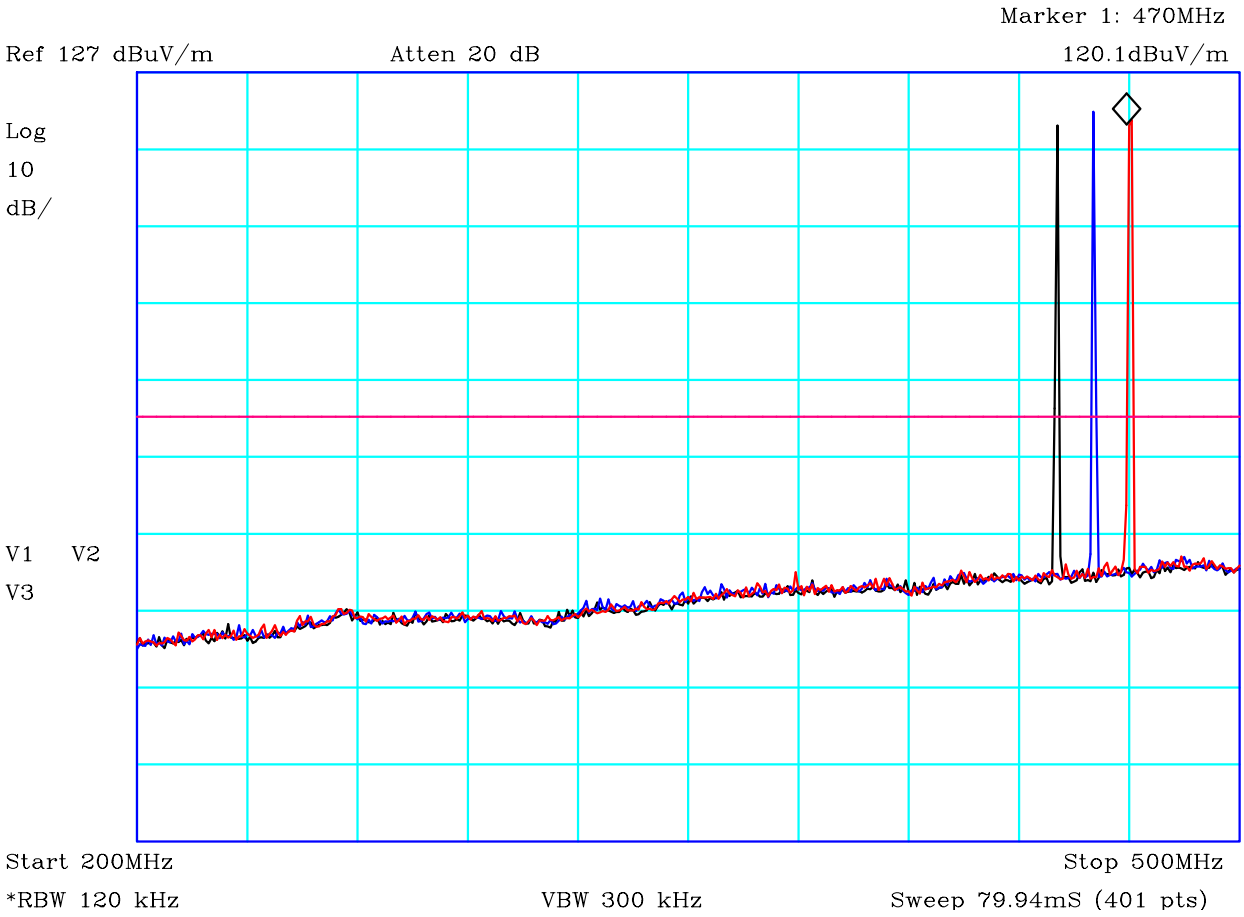
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF02_120716

PLOT 24 Radiated Emissions - RSM - Tx - 25MHz to 200MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H380546B	Analyser:	R8



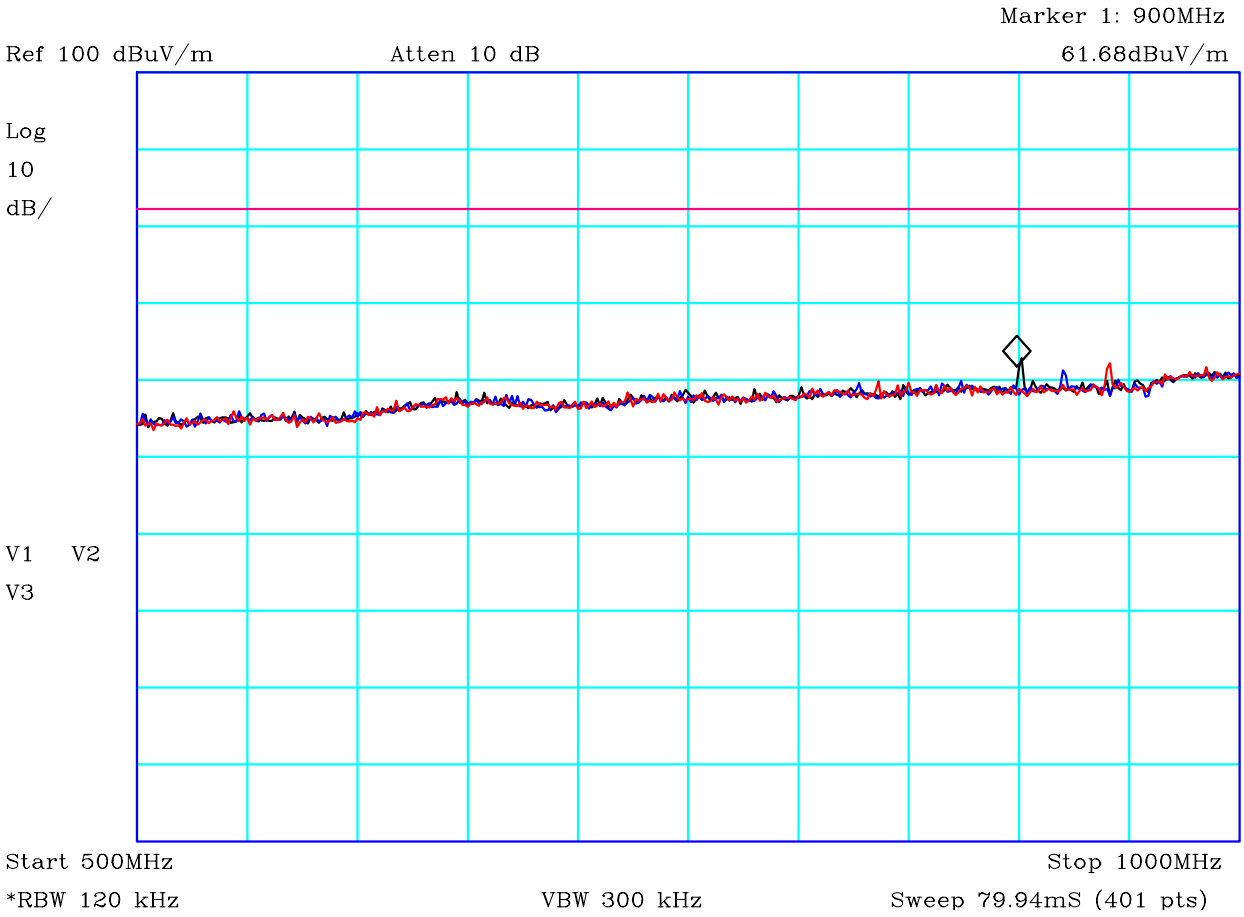
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 25 Radiated Emissions - RSM - Tx - 200MHz to 500MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Radio with RSM.
Transmit mode. Maximum of horizontal and vertical, upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H380470B	Analyser:	R8



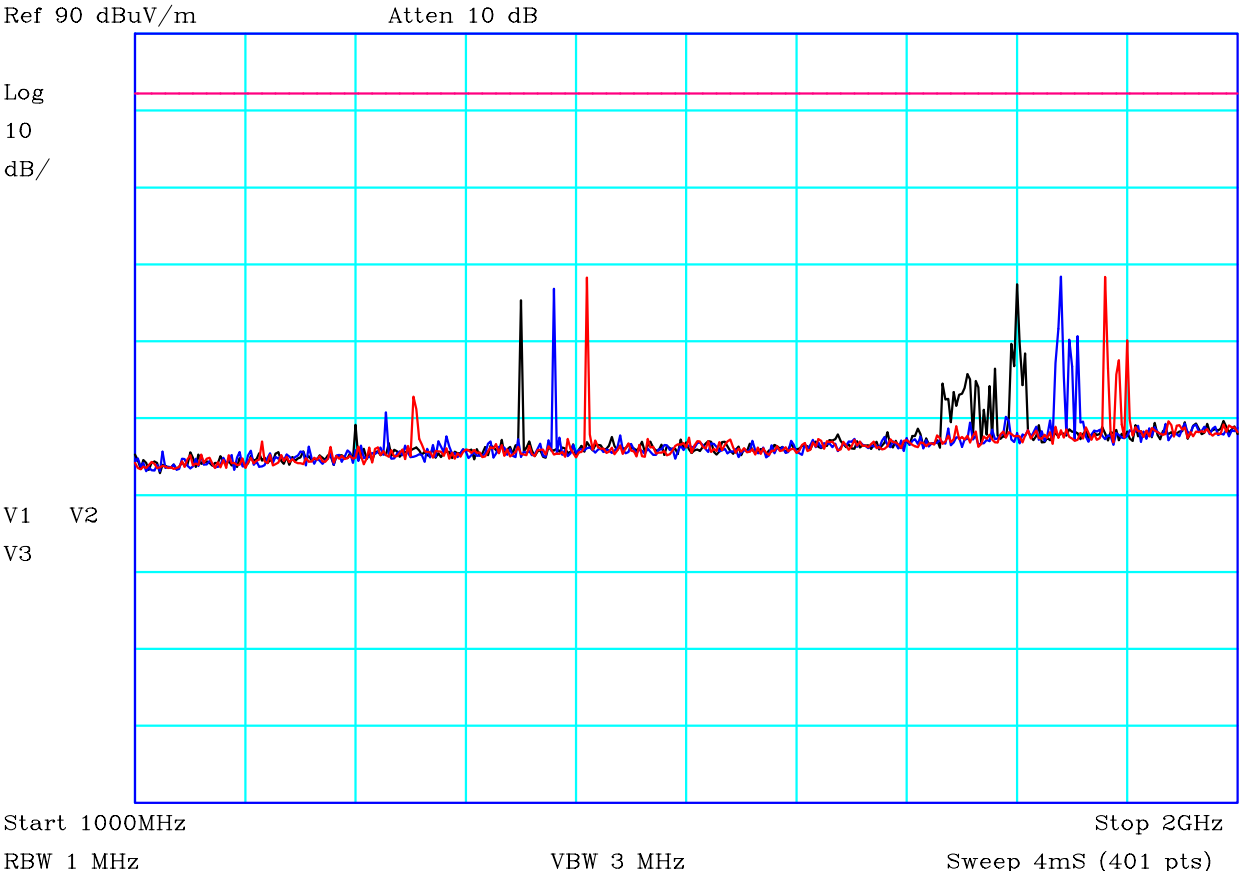
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF09_120716

PLOT 26 Radiated Emissions - RSM - Tx - 500MHz to 1GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3804529	Analyser:	R8



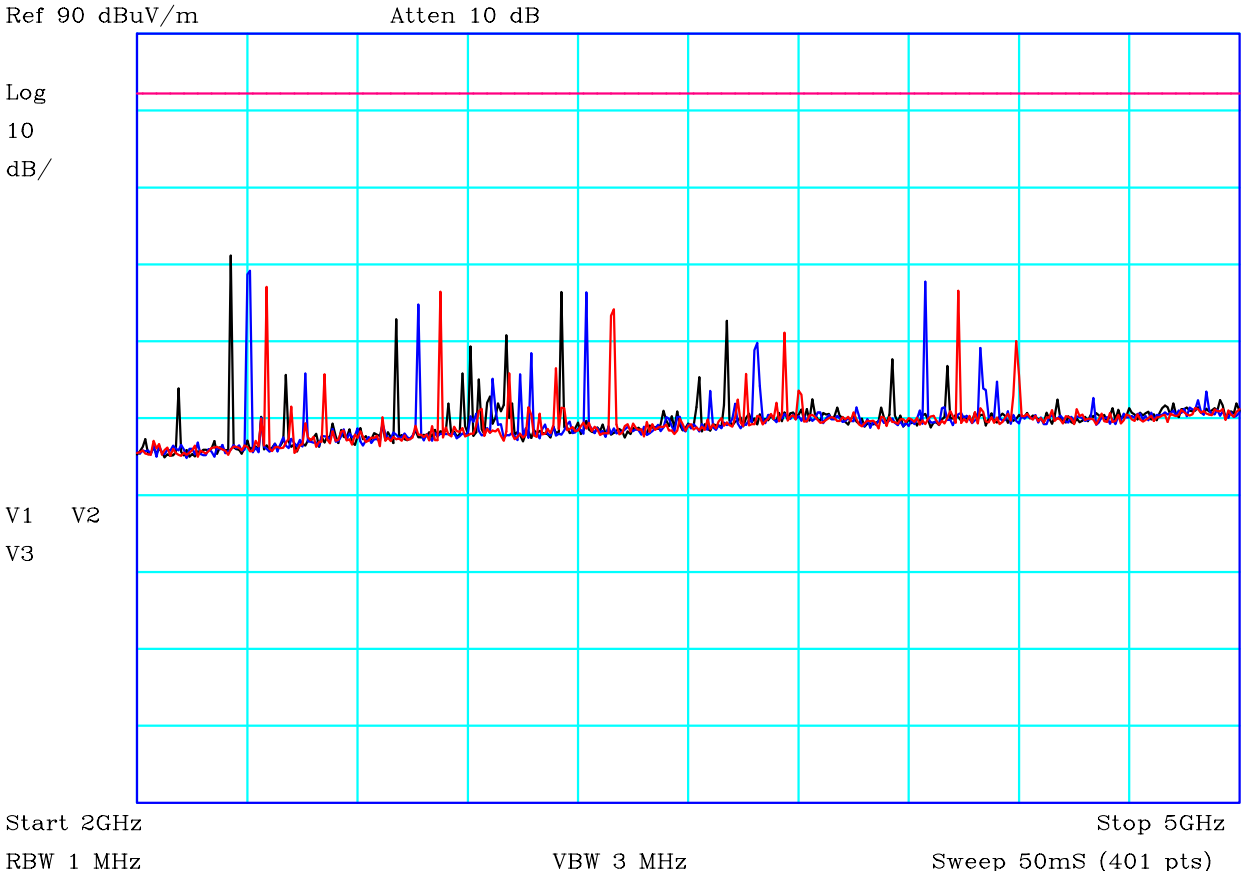
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF15_120716 CF4:PRE10_120627

PLOT 27 Radiated Emissions - RSM - Tx - 1GHz to 2GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38057DB	Analyser:	R8



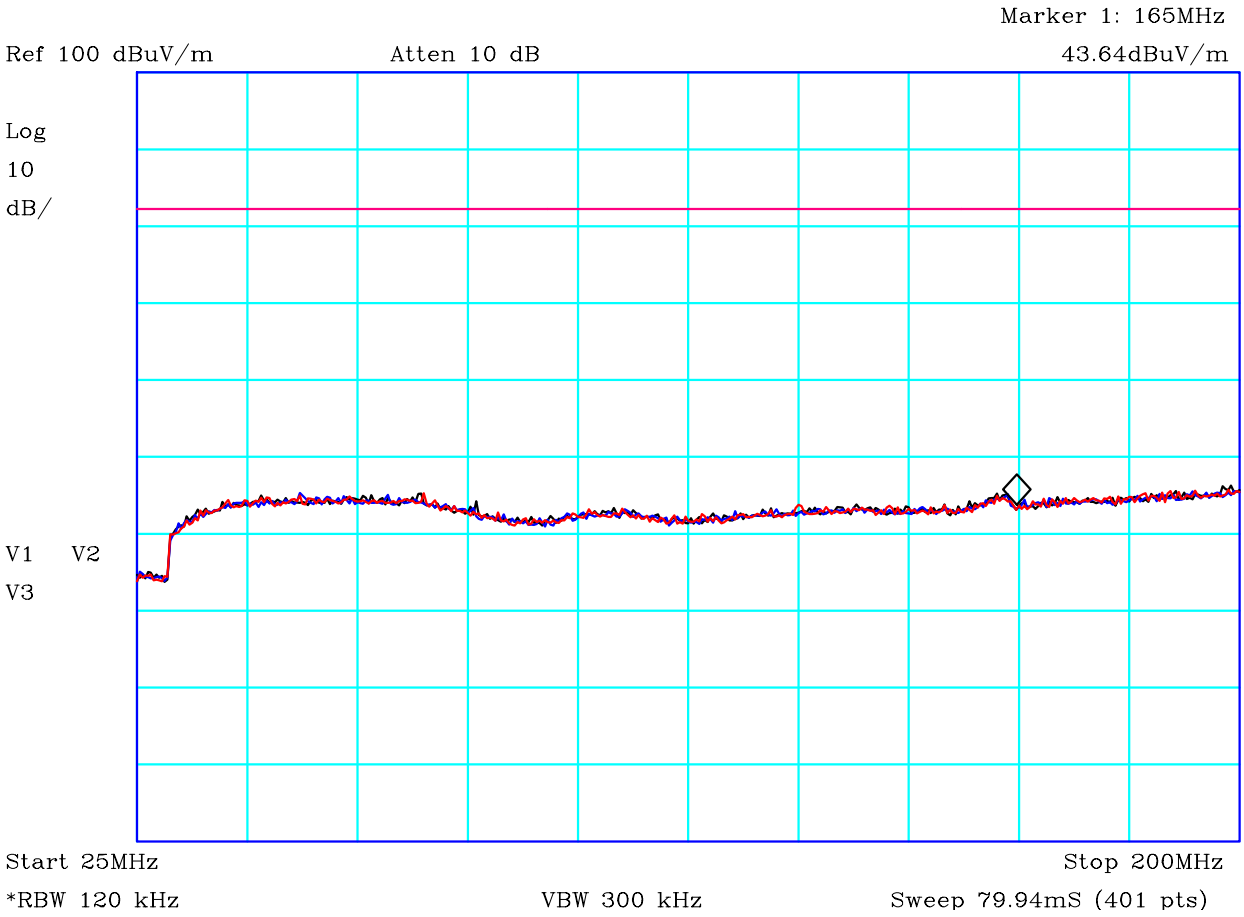
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 28 Radiated Emissions - RSM - Tx - 2GHz to 5GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	26/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Transmit mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38264D5	Analyser:	R9



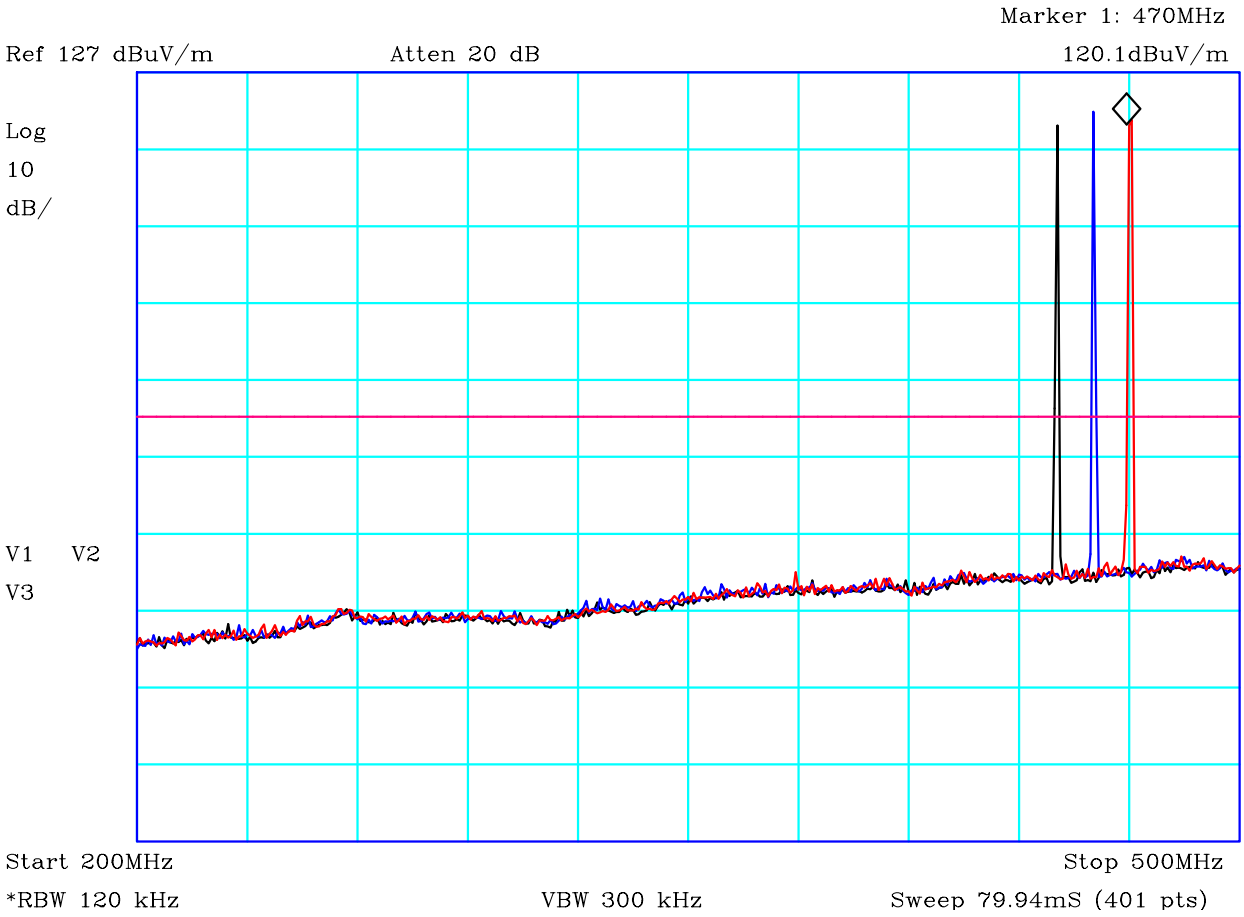
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF02_120716

PLOT 29 Radiated Emissions - Car Kit - Tx - 25MHz to 200MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Transmit mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3904808	Analyser:	R8



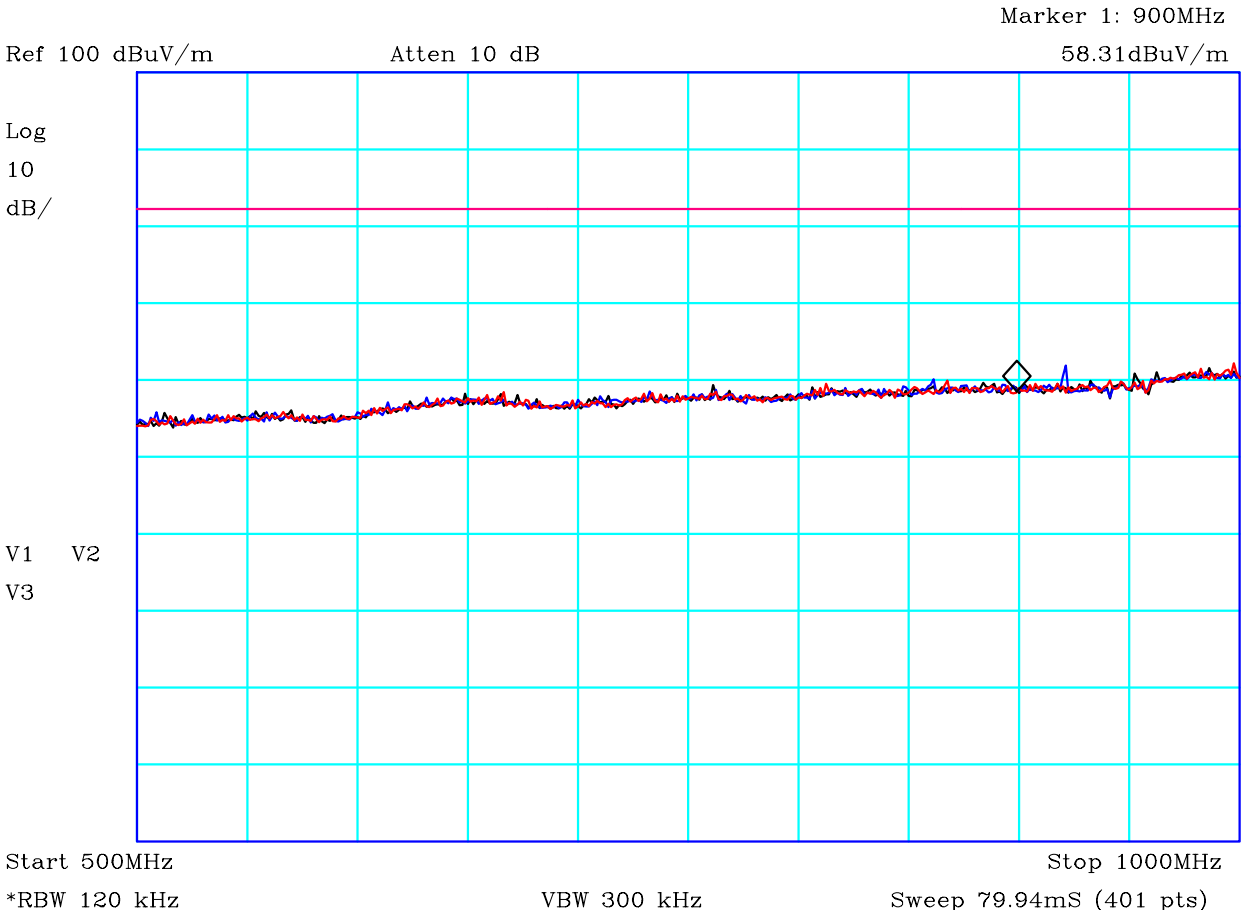
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 30 Radiated Emissions - Car Kit - Tx - 200MHz to 500MHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Transmit mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3904801	Analyser:	R8



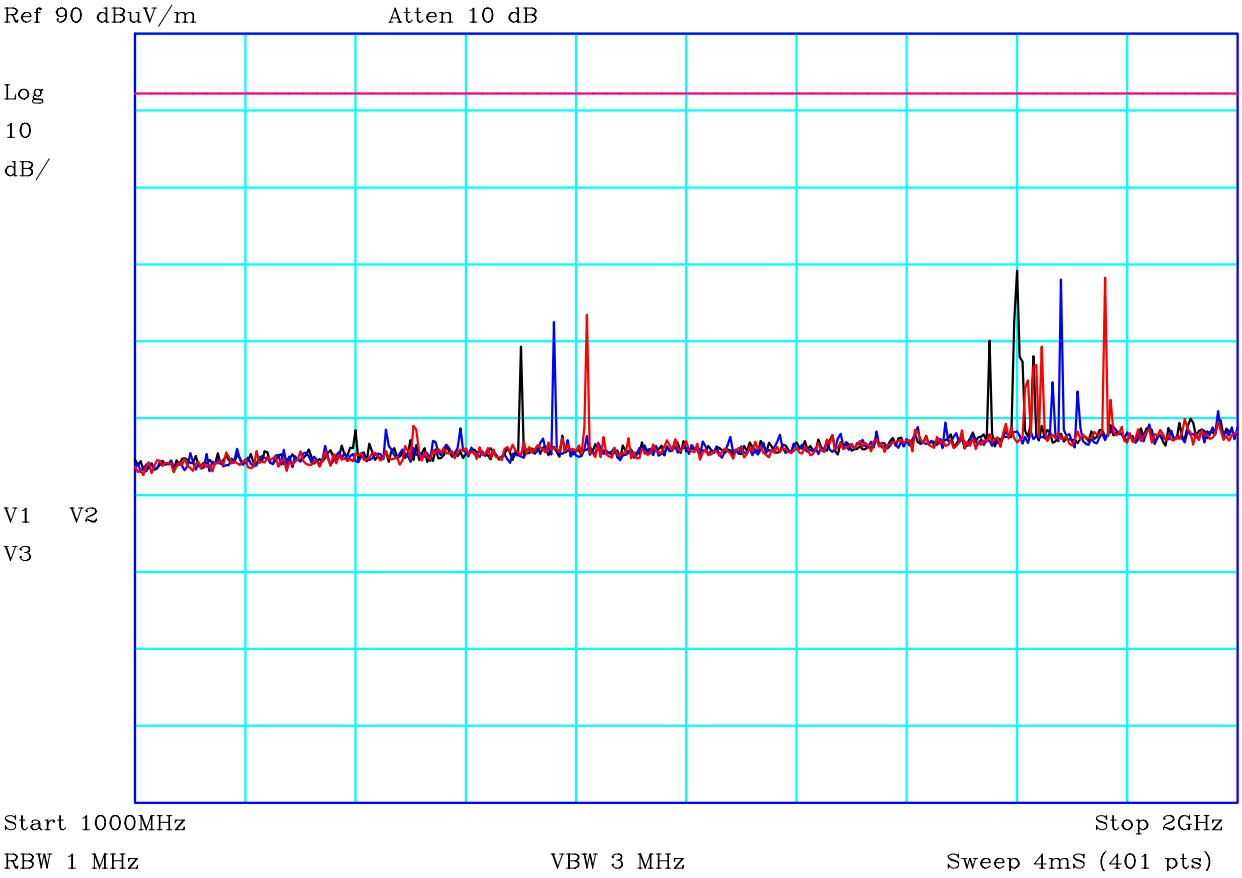
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF09_120716

PLOT 31 Radiated Emissions - Car Kit - Tx - 500MHz to 1GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Transmit mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3904810	Analyser:	R8



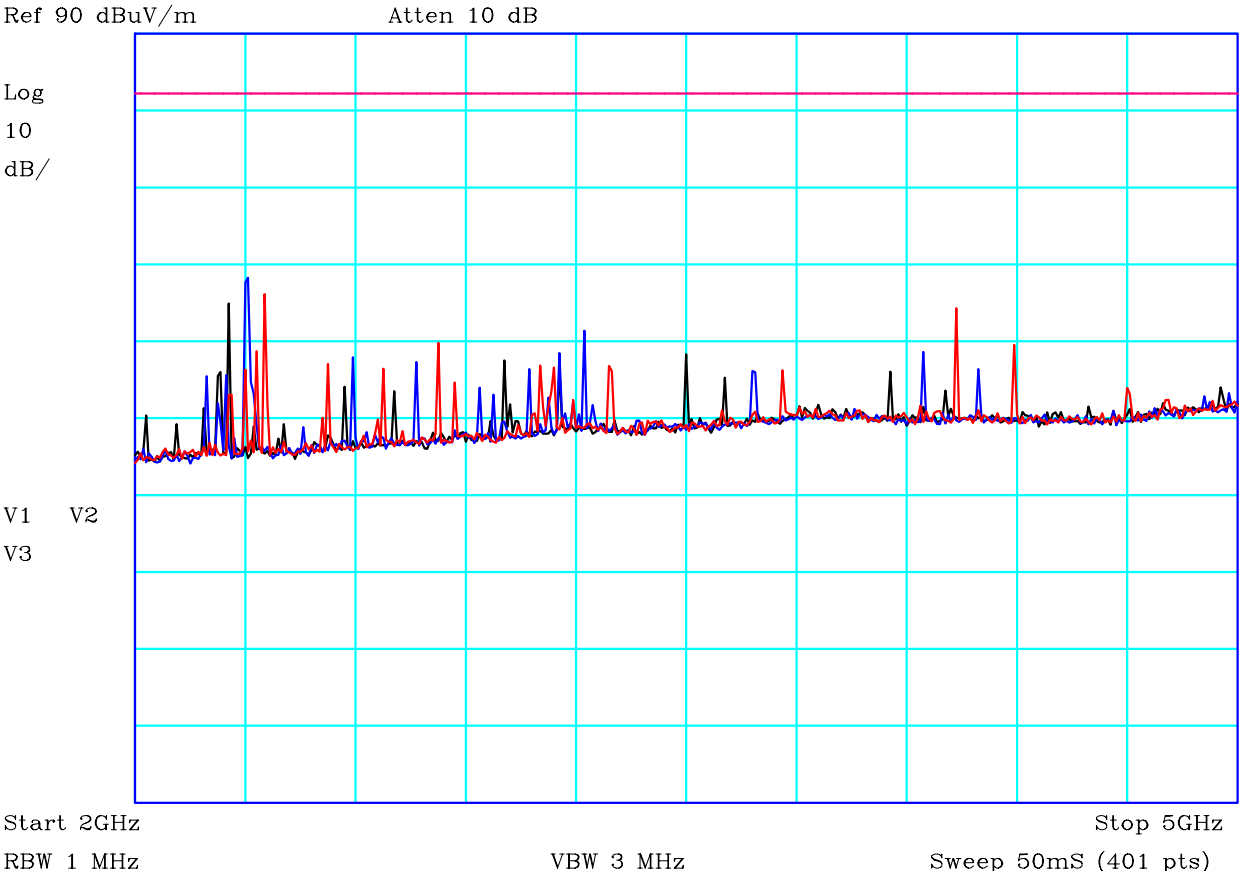
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:RFF15_120716 CF4:PRE10_120627

PLOT 32 Radiated Emissions - Car Kit - Tx - 1GHz to 2GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Car Kit
Transmit mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3904820	Analyser:	R8



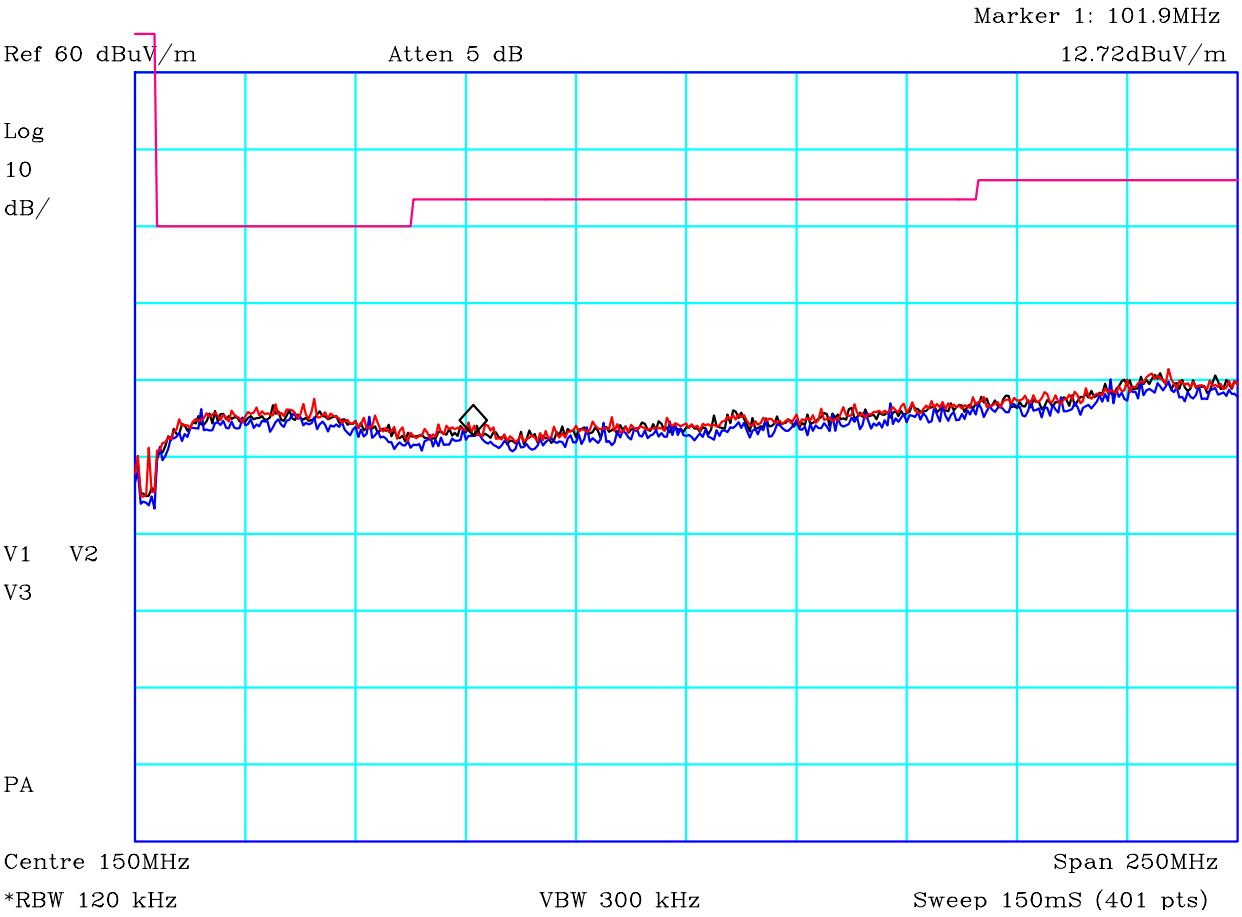
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 33 Radiated Emissions - Car Kit - Tx - 2GHz to 5GHz - Mask of 90.221(d)

Company:	Sepura	Product:	STP9040
Date:	30/09/2013	Test Eng:	Dave Smith
Method:	FCC Part 90	Method:	
Limit1:(VIO)	43+10 log(P)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Transmit mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Limit is approximate field strength correlation to -13dBm
Calculation of limit shown on page 31. Mask of 90.221(d) used as an alternative to 90.210 as permitted in note 5.

Facility:	Anech_2	Height	1.5m	Mode:	1
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38307E5	Analyser:	R9



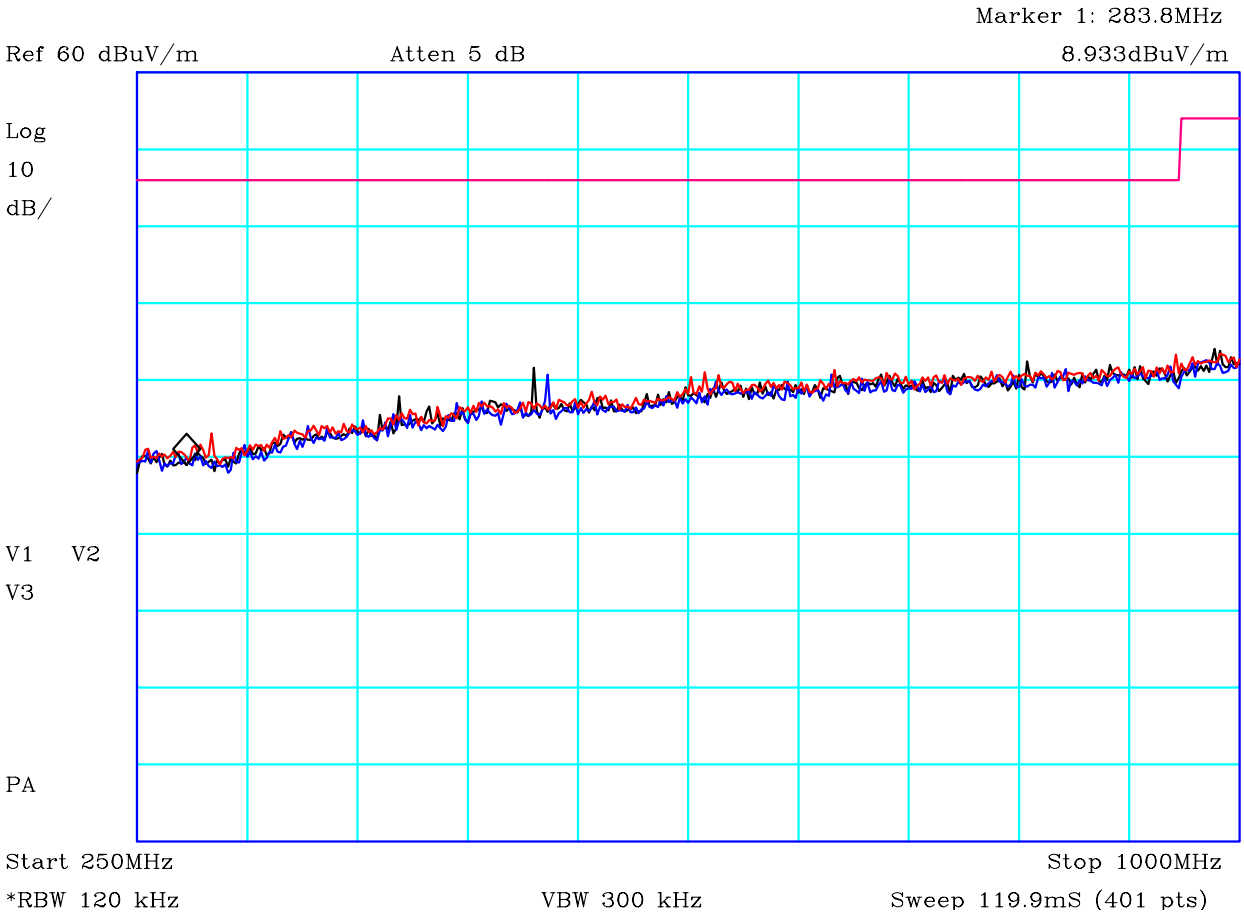
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 34 Radiated Emissions - Standalone - Rx - 25MHz to 275MHz

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Standalone
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38056CC	Analyser:	R8



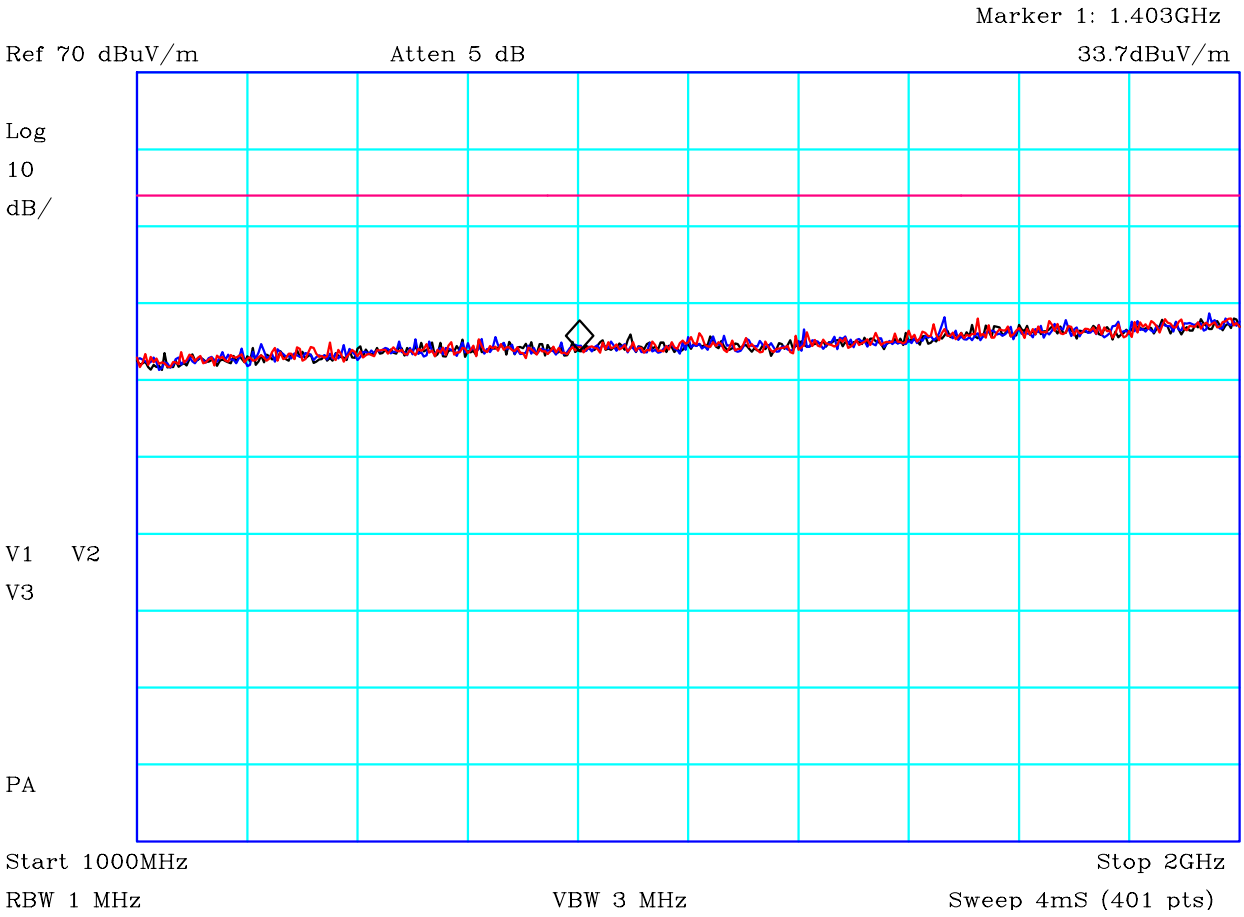
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627

PLOT 35 Radiated Emissions - Standalone - Rx - 250MHz to 1GHz

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Standalone
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Emissions at 519.3MHz, 529.3MHz and (probably) 539.3MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3805683	Analyser:	R8



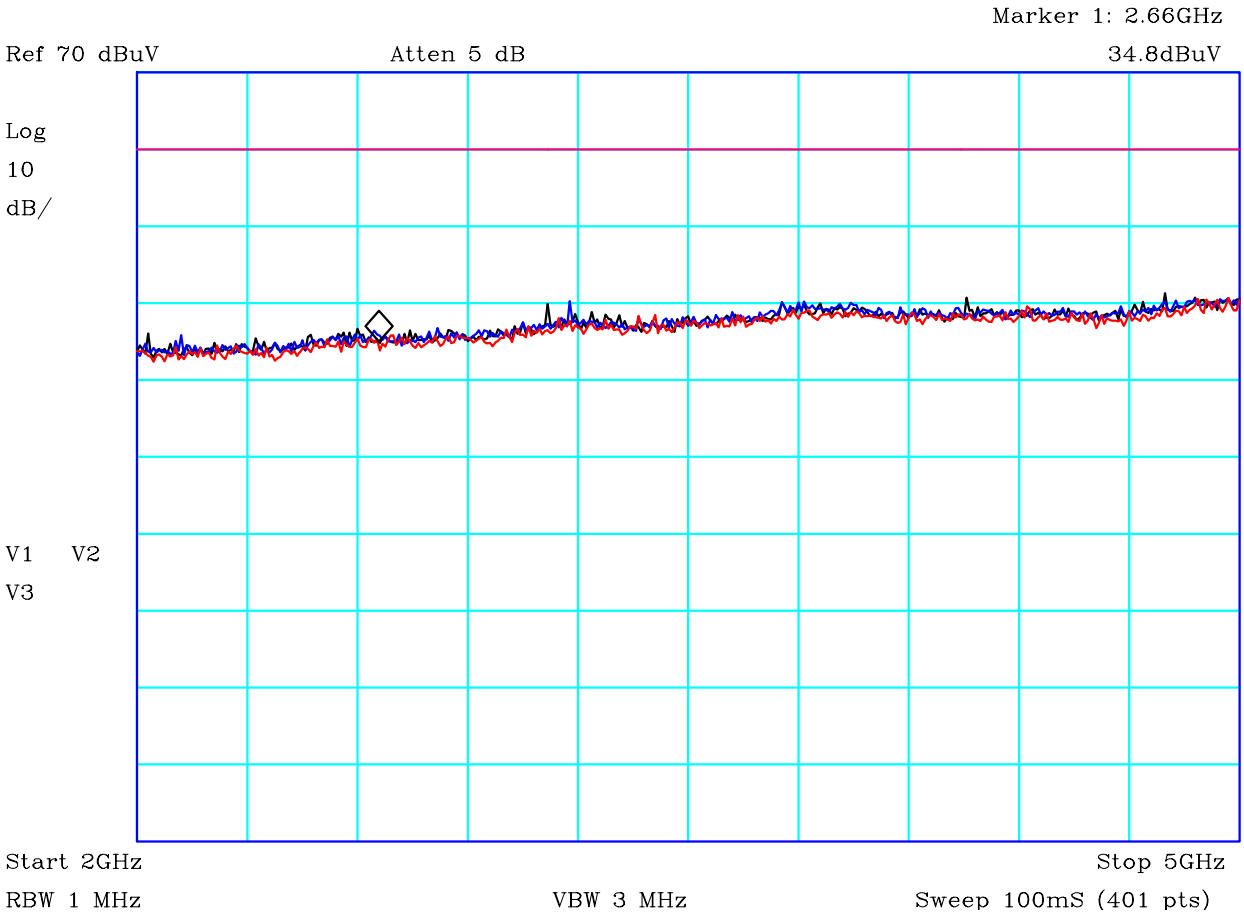
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627 CF4:RFF15_120716

PLOT 36 Radiated Emissions - Standalone - Rx - 1GHz to 2GHz

Company:	Sepura	Product:	STP9040
Date:	06/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Standalone
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H380644F	Analyser:	R8



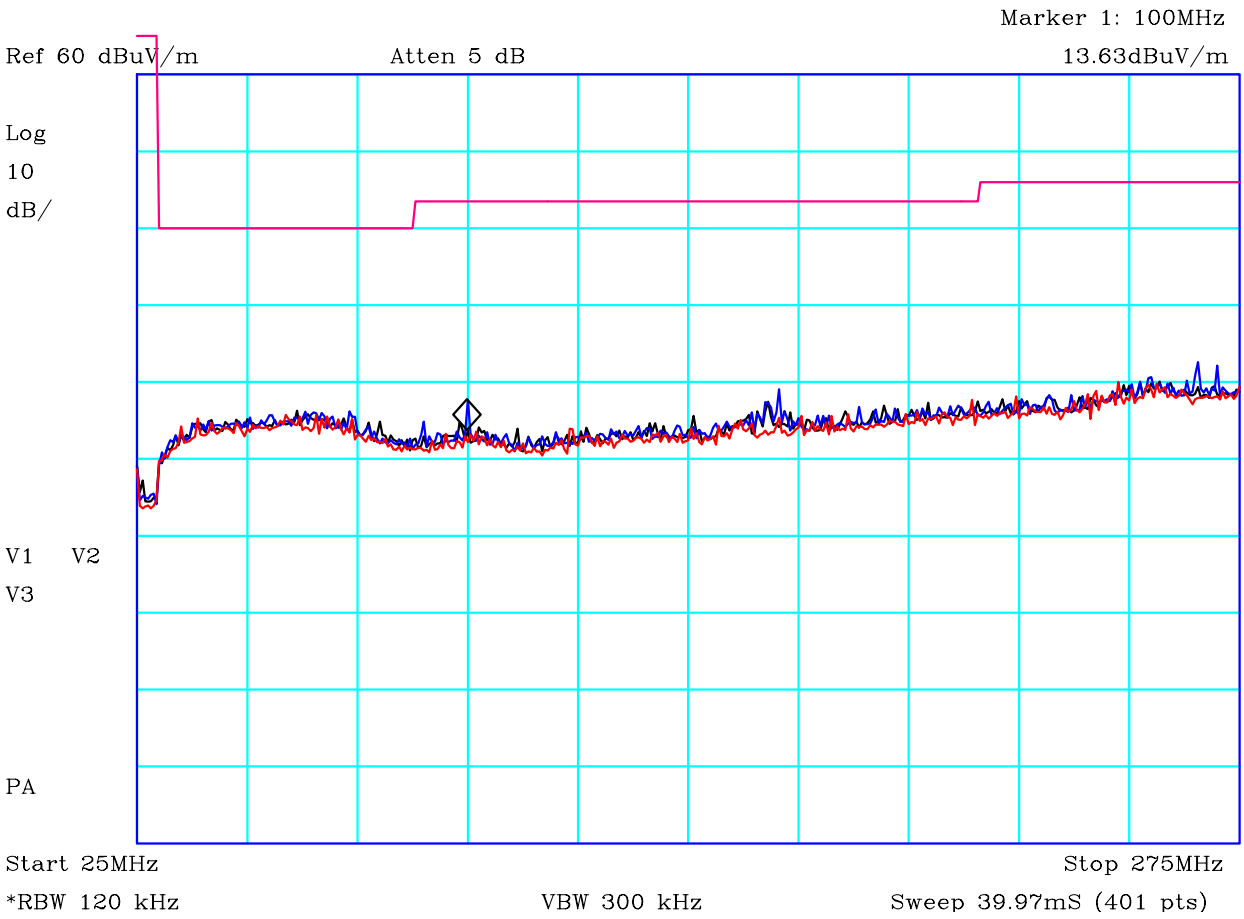
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 37 Radiated Emissions - Standalone - Rx - 2GHz to 5GHz

Company:	Sepura	Product:	STP9040
Date:	30/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	

Standalone
Receive Mode
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Maximum of horizontal and vertical. Maximum of upright and flat.

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	1.5m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H383081C	Analyser:	R9



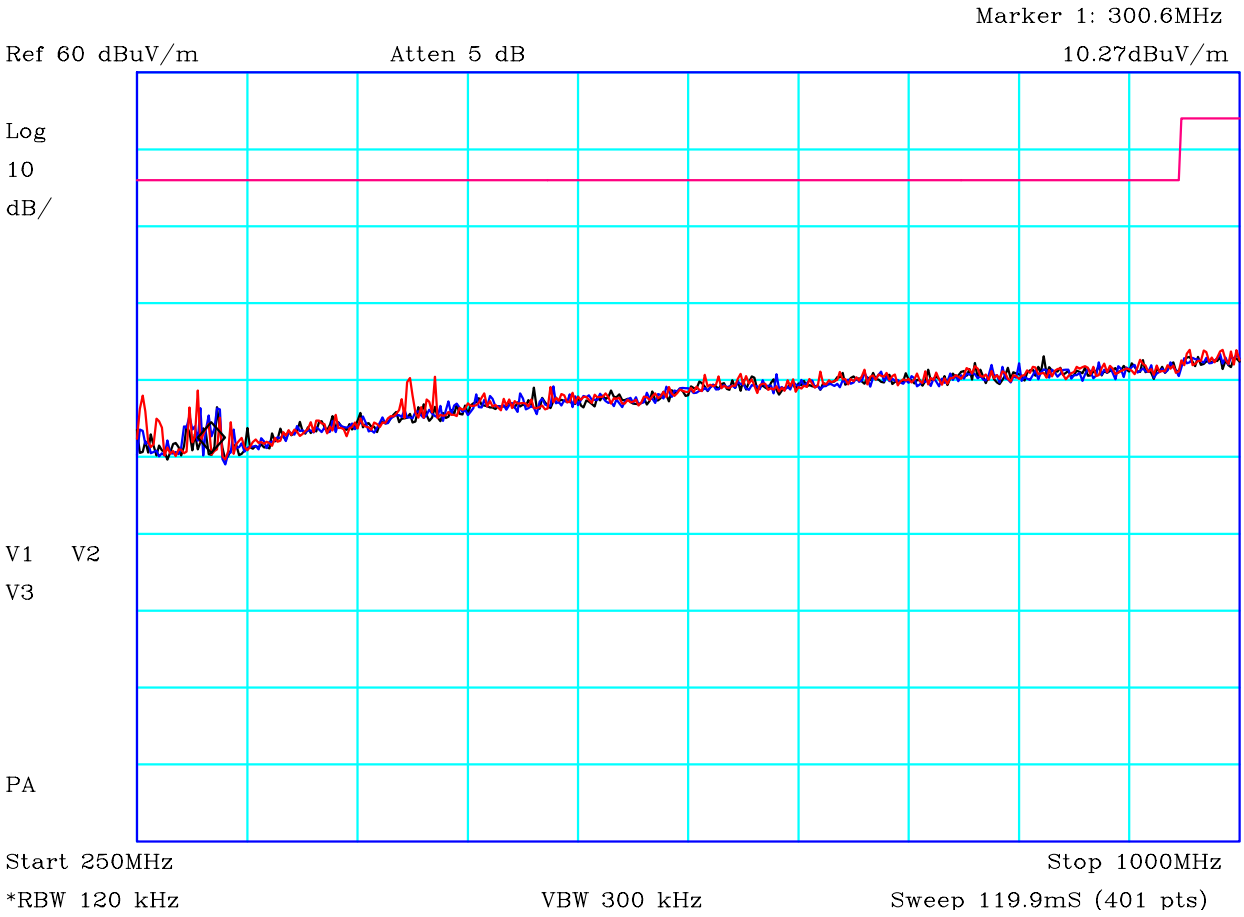
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 38 Radiated Emissions - RSM - Rx - 25MHz to 275MHz

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38055DC	Analyser:	R8



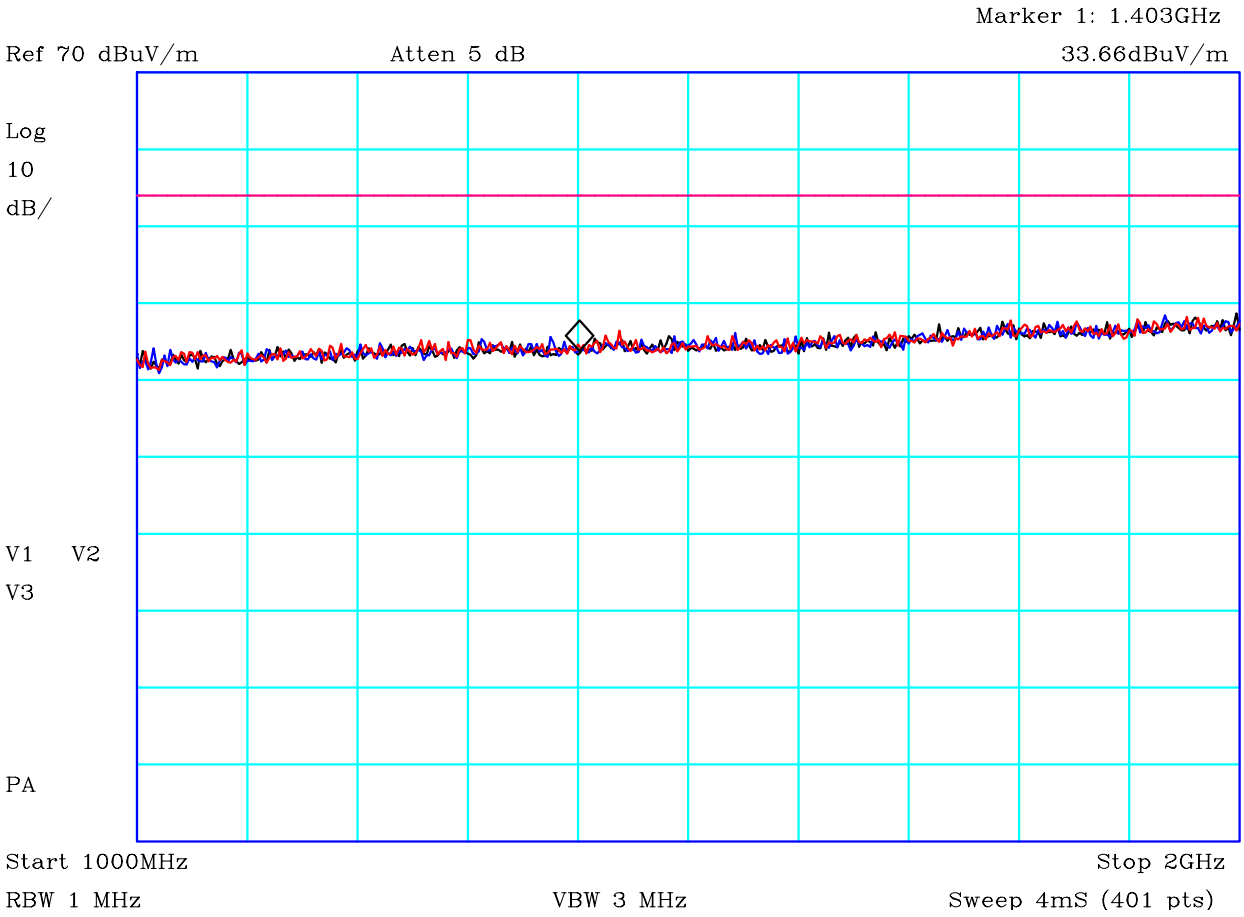
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627

PLOT 39 Radiated Emissions - RSM - Rx - 250MHz to 1GHz

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38054FA	Analyser:	R8



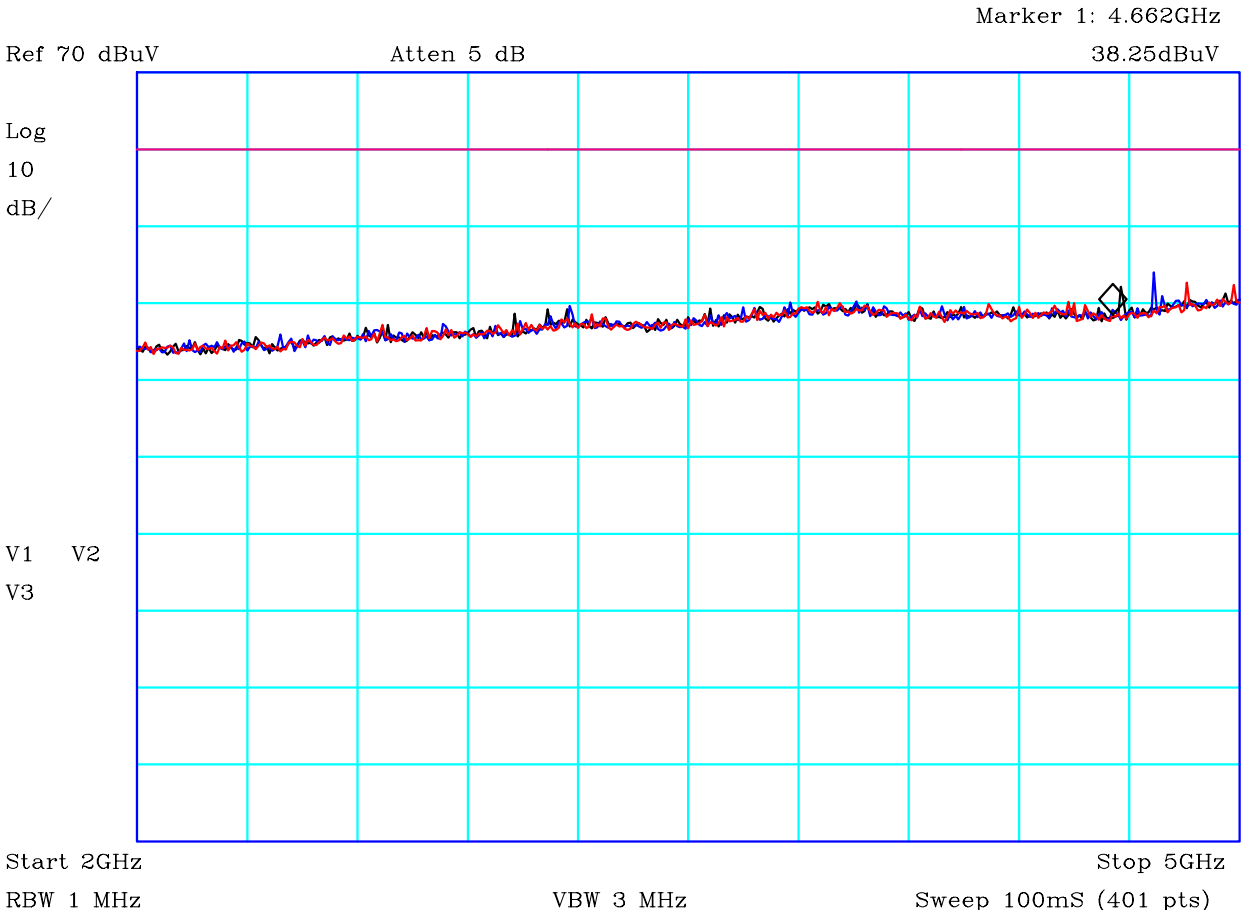
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627 CF4:RFF15_120716

PLOT 40 Radiated Emissions - RSM - Rx - 1GHz to 2GHz

Company:	Sepura	Product:	STP9040
Date:	06/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

RSM
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3806419	Analyser:	R8



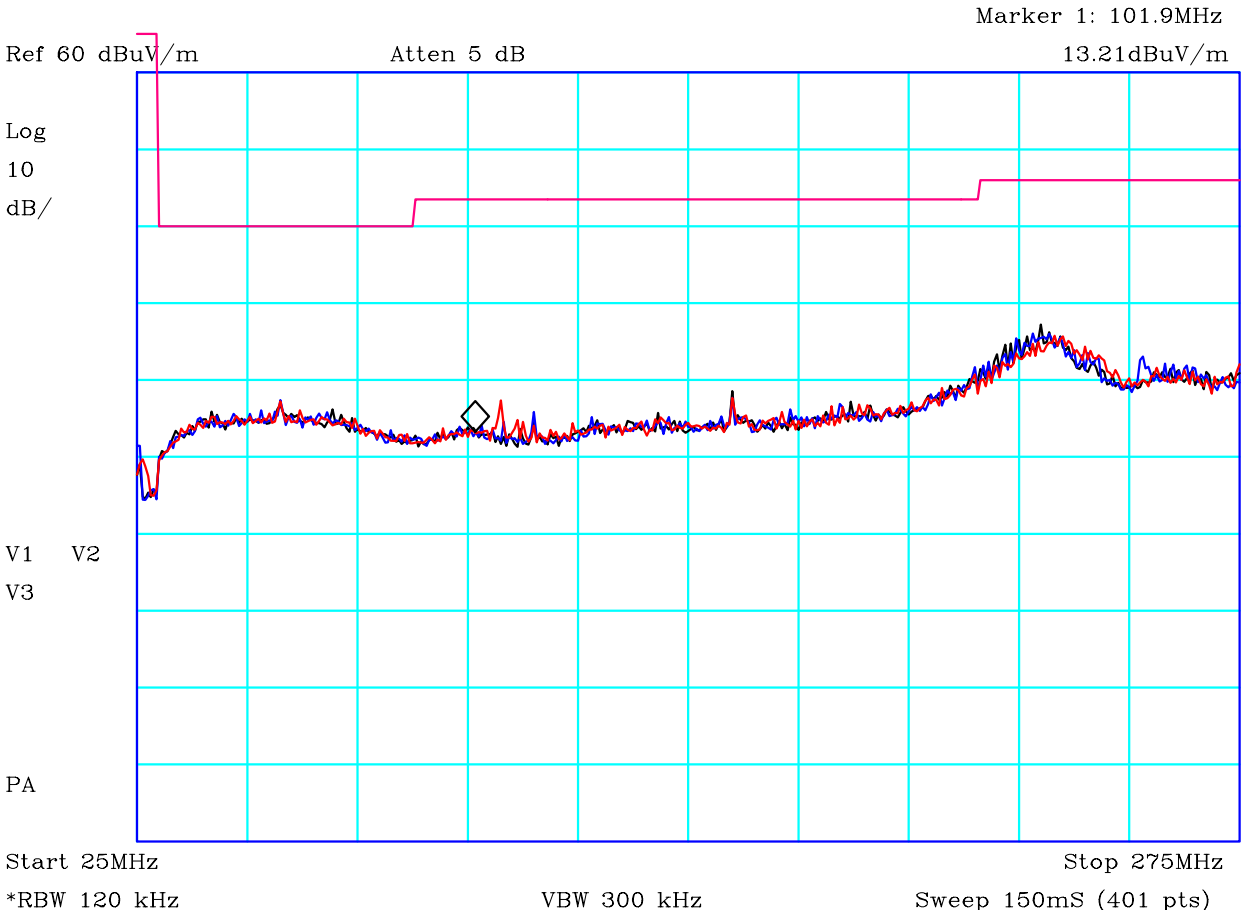
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 41 Radiated Emissions - RSM - Rx - 2GHz to 5GHz

Company:	Sepura	Product:	STP9040
Date:	01/10/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	

RSM
Receive Mode
Black = 450MHz
Blue = 460MHz
Red = 470MHz
Maximum of vertical plus horizontal, upright and flat.

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	1.5m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3901405	Analyser:	R9



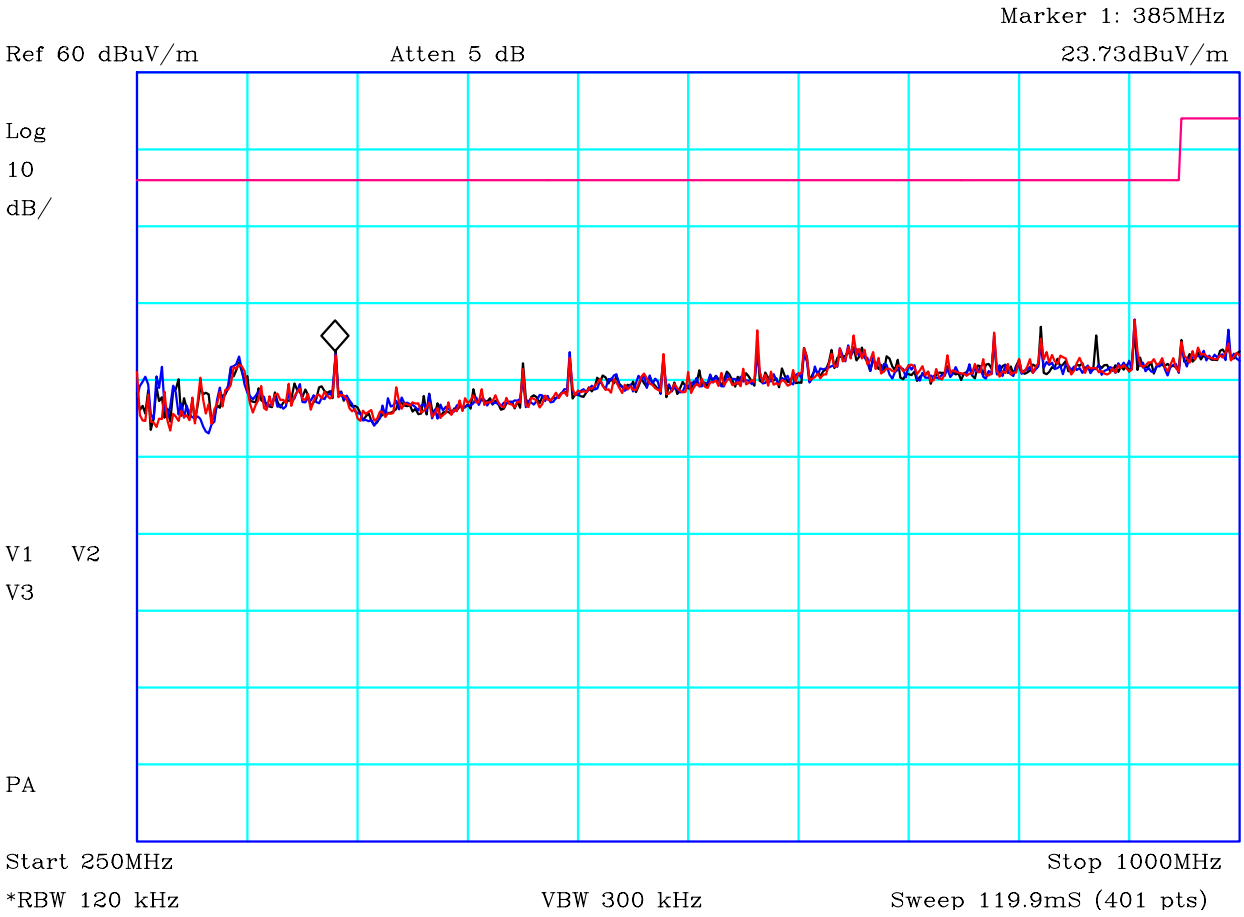
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 42 Radiated Emissions - Car Kit - Rx - 25MHz to 275MHz

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Receive Mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H39047C4	Analyser:	R8



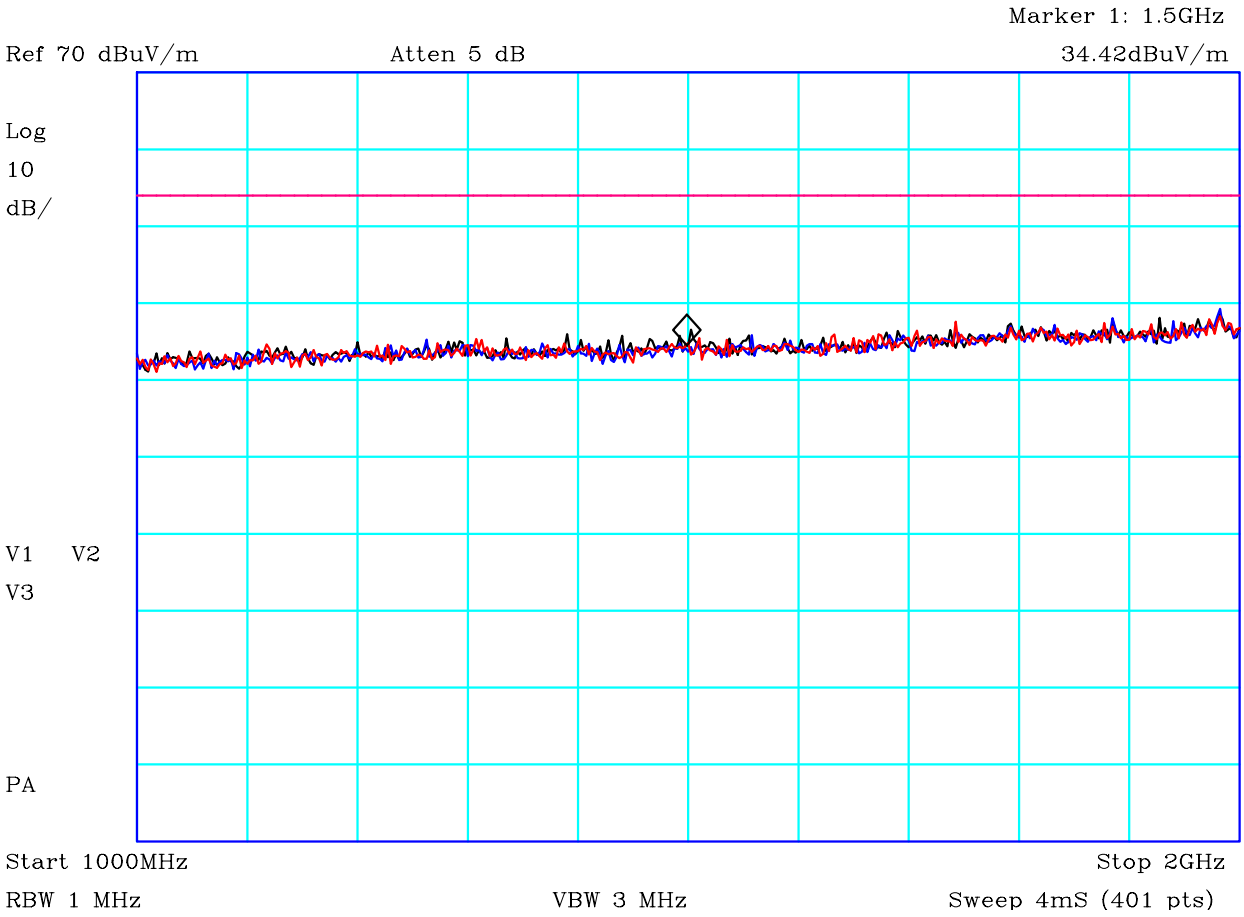
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627

PLOT 43 Radiated Emissions - Car Kit - Rx - 250MHz to 1GHz

Company:	Sepura	Product:	STP9040
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Receive Mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3A224F7	Analyser:	R8



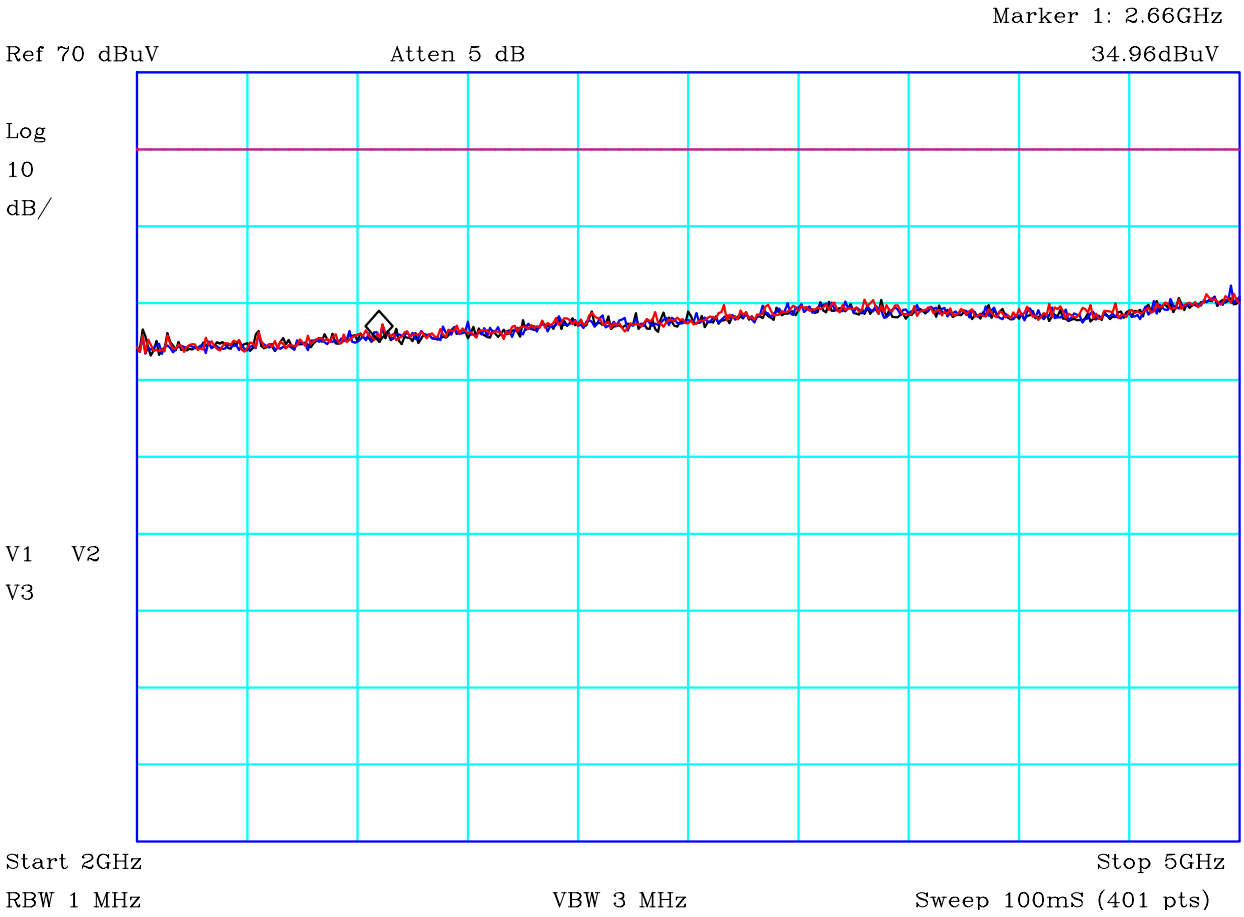
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627 CF4:RFF15_120716

PLOT 44 Radiated Emissions - Car Kit - Rx - 1GHz to 2GHz

Company:	Sepura	Product:	STP9040
Date:	04/10/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Car kit
Receive Mode. Maximum of horizontal and vertical.
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3904830	Analyser:	R8



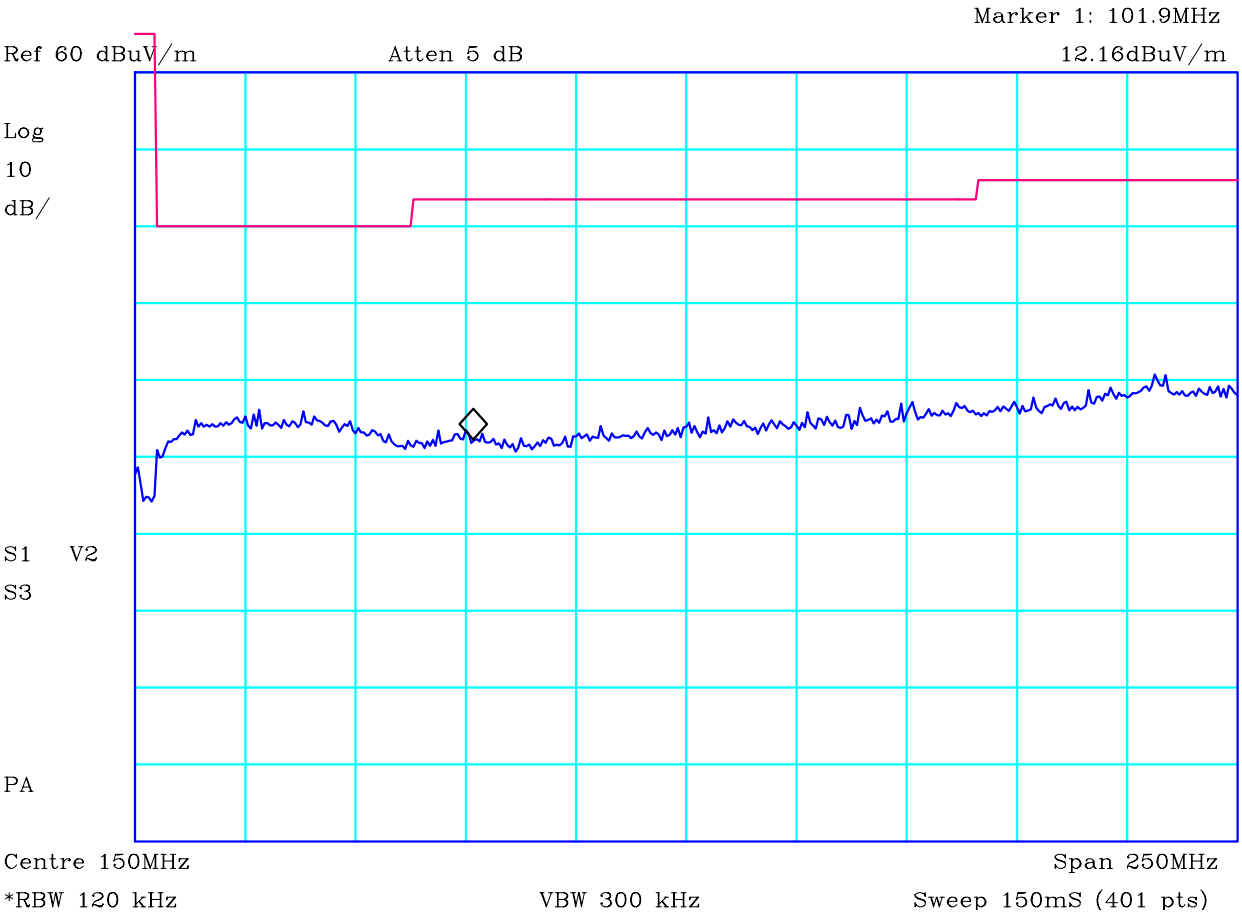
CF1:A8_3m_120807 CF2:CBL050_110107 CF3:RFF22_120716 CF4:PRE10_120627

PLOT 45 Radiated Emissions - Car Kit - Rx - 2GHz to 5GHz

Company:	Sepura	Product:	STP9040
Date:	09/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	

Carkit - Maxiumum of Vertical and Horizontal
Receive Mode
Black = 450MHz
Blue = 460MHz
Red = 470MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	1.5m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3809706	Analyser:	R8



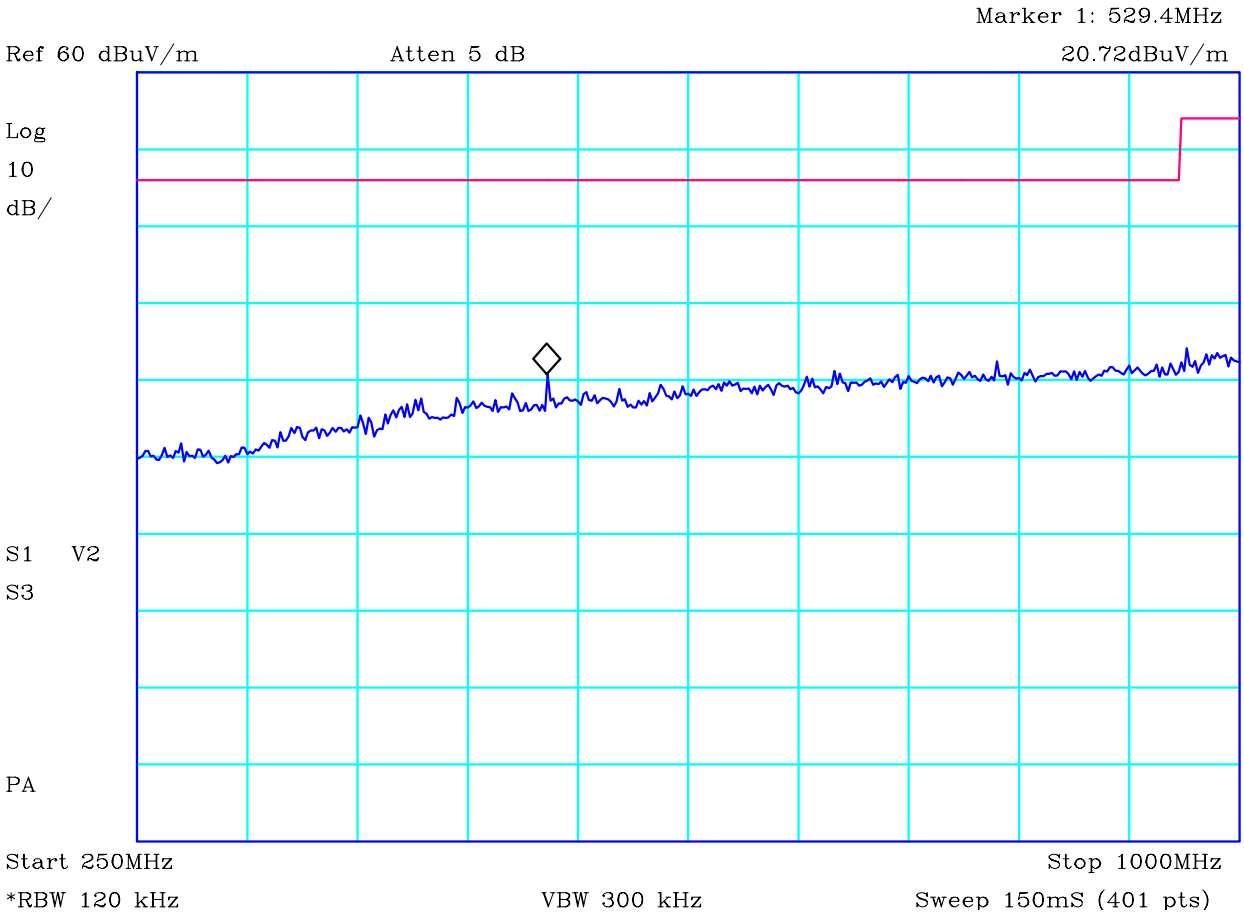
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806

PLOT 46 Radiated Emissions - STP9240 - Rx - 25MHz to 275MHz

Company:	Sepura	Product:	STP9240
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Mono display
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Blue = 460MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38056D3	Analyser:	R8



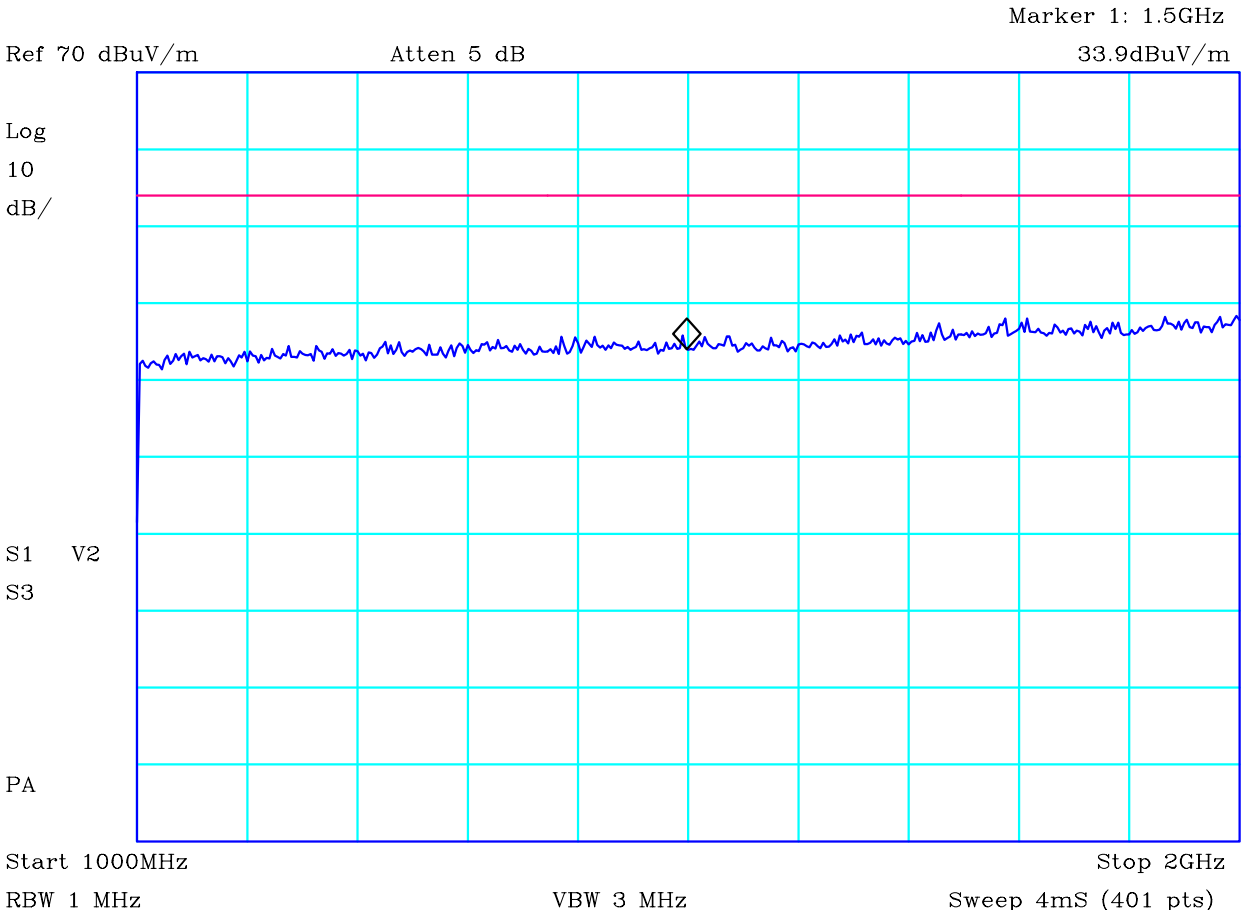
CF1:A24_3m_130215 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627

PLOT 47 Radiated Emissions - STP9240 - Rx - 250MHz to 1GHz

Company:	Sepura	Product:	STP9240
Date:	05/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Mono display
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Blue = 460MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38056E6	Analyser:	R8



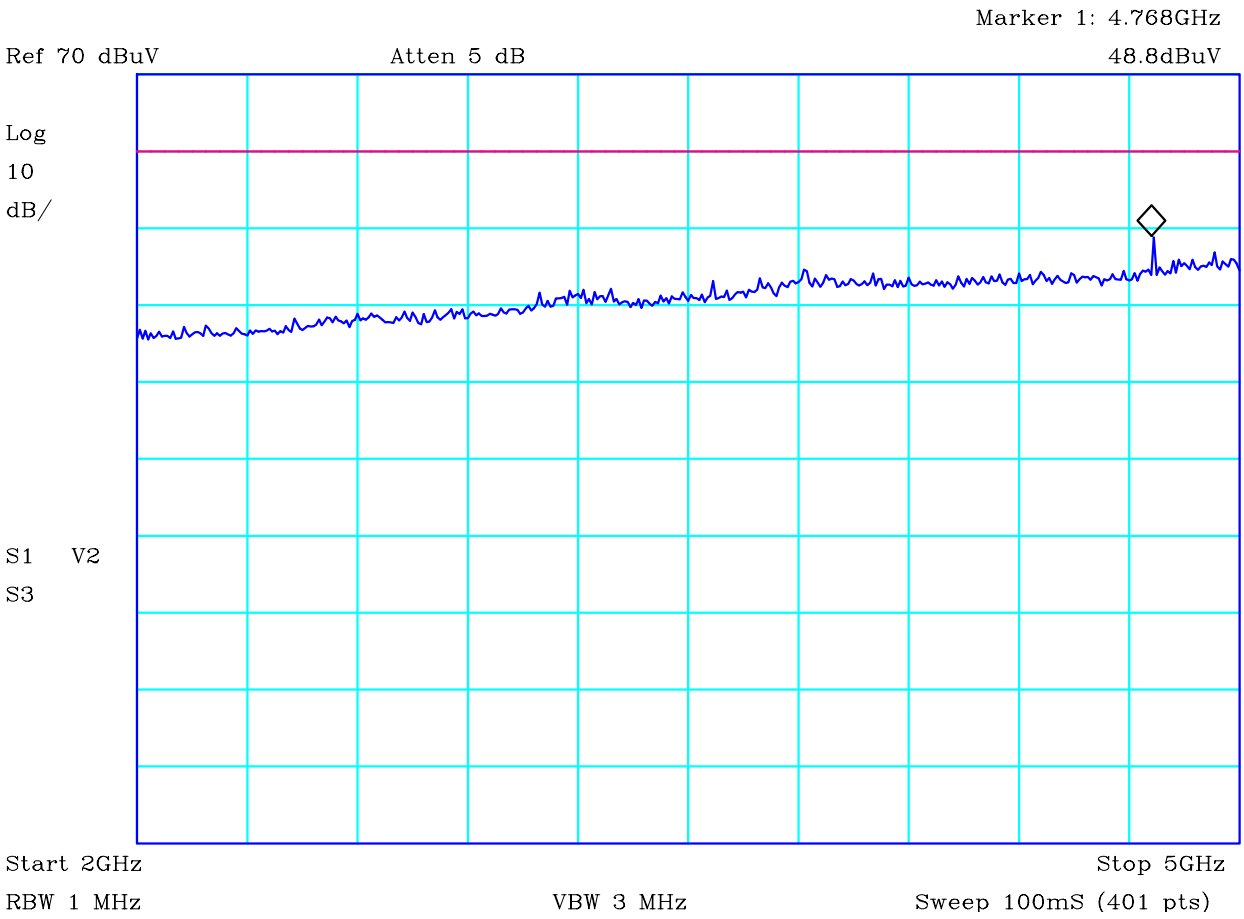
CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627 CF4:RFF15_120716

PLOT 48 Radiated Emissions - STP9240 - Rx - 1GHz to 2GHz

Company:	Sepura	Product:	STP9240
Date:	06/09/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	

Mono Display
Receive Mode. Maximum of horizontal and vertical. Maximum of upright and flat.
Blue = 460MHz

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H38064A8	Analyser:	R8



CF1:A8_3m_120807 CF2:CBL059_CBL018_CBL065_CBL060_100806 CF3:PRE10_120627 CF4:RFF22_120716

PLOT 49 Radiated Emissions - STP9240 - Rx - 2GHz to 5GHz

Company:	Sepura	Product:	STP9240
Date:	01/10/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(VIO)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	

Mono Display
Receive Mode
Blue = 460MHz
Maximum of vertical plus horizontal, upright and flat.

Facility:	Anech_2	Height	1.5m	Mode:	2
Distance	3m	Polarisation	V+H	Modification State:	1
Angle	0-360	File:	H3A224B7	Analyser:	R9

Changes notes for Version 2:

Page 3:

Remove references in notes to Tetra waiver documents.

Page 6:

Added statement regarding settings of output stage (**2.1046(a)** and **2.1033(c)(8**))

Added statement regarding modulation characteristics **(2.1047)**

Pages 23-29,31:

Headers changed to reference the correct section of Part 90.

Page 31:

Added calculation for -13dBm limit.

Pages 45 to 47

Note added to titles to explicitly state that this is an alternative to the Masks of 90.210.

Pages 51 to 68:

Note added to titles to explicitly state that Mask of 90.221(d) is applied.
Note added to comments that 90.221(d) is an alternative to the Masks of 90.210.