A RADIO TEST REPORT

FOR

SIMOCO EMEA LTD

ON

Simoco Xd DMR Portable
Models SDP650AC and SDP660AC

DOCUMENT NO. TRA-012167-00-47-00-A

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TRaC Wireless Test Report	**:** TRA-012167-00-47-00-A
Applicant	**:** Simoco EMEA Ltd
Apparatus	**:** SDP650AC and SDP660AC
Specification(s)	**:** CFR47 Part 90 & RSS119
Purpose of Test	**:** Certification
FCCID	**:** STZSDP600AC
Certification number	**:** 7068A-SDP600AC
Authorised by	**:** 
	: Radio Product Manager
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Section 1: Introduction

1.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

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1.2 Tests Requested By

This testing in this report was requested by :

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1.3 Manufacturer

As Above

1.4 Apparatus Assessed

The following apparatus was assessed between 4th and 27th September 2013

DMR Handsets – AC Band; Models SDP650AC and SDP660AC

The SDP650 and SDP660 are multi-mode PMR/ DMR Portable Handset Radios operating with 12.5 kHz channel spacing with the following emissions:

11k0F3E – Analogue speech
7k60FXE – DMR 4FSK 9600 bps TDMA digital speech and data
7k60FXD – DMR 4FSK 9600 bps TDMA digital data

The SDP650AC and SDP660AC are DMR Portable Handset Radios capable of operating with 12.5 kHz channel spacing in analogue mode and 12.5 kHz in Digital Mode.

The SDP660 model offers full keypad functionality for telephony, complex groups, advanced data messaging and a total of 12 programmable function keys. The SDP650 model offers seven function keys but no keypad.

1.5 Test Result Summary

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

Test Type	FCC Part	RSS Part	Appendix in Report	Pass/ Fail
RF Power Output	90.205	RSS-119 5.4	A1	Pass
Emission Mask	90.210	RSS-119 5.5	A2	Pass
Occupied Bandwidth	90.210	RSS-119 5.5	A3	Pass
Spurious Emissions at Antenna Terminals	90.210	RSS-119 5.8	A4	Pass
Field Strength of Spurious Emissions	90.210	RSS-119 5.8	A5	Pass
Frequency Stability	90.213	RSS-119 5.3	A6	Pass
Transient behaviour	90.214	RSS-119 5.9	A7	Pass
AC Powerline Conducted Emissions	15.107	RSS-GEN 5.5	A8	Pass
Field Strength of Un-Intentional Spurious Emissions	15.109	RSS-GEN 6.0	A9	Pass
Audio Frequency Response	2.1047	RSS-119 5.5	A10	Pass
Modulation Limiting	2.1047	RSS-119 5.5	A10	Pass

Abbreviations used in the above table:

FCC : Federal Communications Commission
CFR : Code of Federal Regulations
RSS : Radio Standards Specification

1.6 Standard References

47 CFR 2	Code of Federal Regulations, Title 47, Part 2, “Frequency allocations and Radio Telemetry Matters; General Rules and Regulations”
47 CFR 90	Code of Federal Regulations, Title 47, Part 90, “Land Mobile Radio Service”
47 CFR 15	Code of Federal Regulations, Title 47, Part 15, “Radio Frequency Devices” Subpart B, “Unintentional Radiators”
C63.4	American National Standards Institute (ANSI), “Methods of Measurement of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range 9 kHz to 40 GHz”
RSS-GEN	Radio Standards Specification “General Requirements and Information for the Certification of Radio Apparatus”
RSS-119	Radio Standards Specification “Radio transmitters and receivers operating in the land mobile and fixed services in the frequency range 27.41-960MHz”

1.6 Notes Relating To Assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, “Pass” indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

Temperature	: 17 to 23 °C
Humidity	: 45 to 75 %
Barometric Pressure	: 86 to 106 kPa

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of 47 CFR Part 2.

1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

Section 2: Measurement Uncertainty

2.1 Measurement Uncertainty Values

For the test data recorded the following measurement uncertainty was calculated:

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Power Meter) = **1.08dB**
Uncertainty in test result (Spectrum Analyser) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Power Meter) = **0.113ppm**
Uncertainty in test result (Spectrum Analyser) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**,
Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,
Uncertainty in test result (1GHz – 18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result – Up to 8.1GHz = **3.31dB**
Uncertainty in test result – 8.1GHz – 15.3GHz = **4.43dB**
Uncertainty in test result – 15.3GHz – 21GHz = **5.34dB**
Uncertainty in test result – Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**,
Uncertainty in time measurement = **0.59%,**
Uncertainty in Amplitude measurement = **0.82%**

[12] Power Line Conduction

Uncertainty in test result = **3.4dB**

[13] Spectrum Mask Measurements

Uncertainty in test result = **2.59% (frequency)**
Uncertainty in test result = **1.32dB (amplitude)**

[14] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[15] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[16] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[17] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[18] Receiver Threshold

Uncertainty in test result = **3.23dB**

[19] Transmission Time Measurement

Uncertainty in test result = **7.98%**

Section 3: Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

Appendix A: Formal Emission Test Results

Abbreviations used in the tables in this appendix, in addition to those listed in section 1.5

Spec	: Specification
Mod	: Modification
EUT	: Equipment Under Test
SE	: Support Equipment
L	: Live Power Line
N	: Neutral Power Line
E	: Earth Power Line
Pk	: Peak Detector
QP	: Quasi-Peak Detector
Av	: Average Detector
CDN	: Coupling & decoupling network

ALSR	: Absorber Lined Screened Room
OATS	: Open Area Test Site
ATS	: Alternative Test Site
Ref	: Reference
Freq	: Frequency
MD	: Measurement Distance
SD	: Spec Distance
Pol	: Polarisation
H	: Horizontal Polarisation
V	: Vertical Polarisation

A1 RF Output Power

Test Details:	
FCC Regulation	Title 47 of the CFR: Part 90.205, RSS-119 Section 5.4
Measurement standard	Title 47 of the CFR: Part 2.1046, RSS-GEN Section 4.8
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
Temperature	21
Humidity	50
EUT set up	Refer to Appendix C

SDP650AC					
Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Variation (dB)	Limit	Verdict
138.0125	36.6	37	-0.4	±1dB	Pass
143.9875	36.5	37	-0.5	±1dB	Pass
148.0125	36.5	37	-0.5	±1dB	Pass
149.8875	36.6	37	-0.4	±1dB	Pass
150.0125	36.6	37	-0.4	±1dB	Pass
150.0625	36.6	37	-0.4	±1dB	Pass
162.0000	36.7	37	-0.3	±1dB	Pass
173.9875	36.9	37	-0.1	±1dB	Pass

SDP660AC					
Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Variation (dB)	Limit	Verdict
138.0125	36.4	37	-0.6	±1dB	Pass
143.9875	36.3	37	-0.7	±1dB	Pass
148.0125	36.4	37	-0.6	±1dB	Pass
149.8875	36.5	37	-0.5	±1dB	Pass
150.0125	36.5	37	-0.5	±1dB	Pass
150.0625	36.6	37	-0.4	±1dB	Pass
162.0000	37.1	37	0.1	±1dB	Pass
173.9875	36.7	37	-0.3	±1dB	Pass

Both variants utilise the same RF paths therefore conducted testing was performed on the highest power unit

Limit

The output power shall be within ±1dB of the manufacturers rated output power

Result

The SDP650AC and SDP660AC were found to comply with the limits

A2 Emissions Mask

Test Details:	
Regulation	Title 47 of the CFR: Part 90.210, RSS-119 Section 5.5
Measurement standard	Title 47 of the CFR: Part 2.1051
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Both variants utilise the same RF paths, testing was performed on the highest power unit, the SDP660AC.

Limit

Mask D – 12.5 kHz channels with audio filter

On any frequency removed from the centre of the authorised bandwidth (f_o) by the following frequency displacements (f_d)

±0 kHz	-	5.625 kHz	0	dB
±5.625 kHz	-	12.5 kHz	7.27 (f_d -2.88 kHz)	dB
> ±12.5 kHz	-		50 + 10 Log P or 70[‡]	dB
> ±50 kHz			43 + 10 Log P	dB[#]

Notes:
(10 log P_{watts}) – (43 + 10 Log (P_{watts} * 1000)) = LIMIT = -13 dBm
(10 log P_{watts}) – (50 + 10 Log (P_{watts} * 1000)) = LIMIT = -20 dBm
[‡] Whichever is the lesser attenuation.

[#] Not applicable for RSS-119

Results

The SDP660AC was found to comply with the limits

See plots in Appendix B.

A3 Occupied Bandwidth

Test Details:	
Regulation	Title 47 of the CFR: Part 90.210, RSS-119 Section 5.5
Measurement standard	Title 47 of the CFR: Part 2.1049, RSS-GEN Section 4.6
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Both variants utilise the same RF paths, testing was performed on the highest power unit, the SDP660AC.

Frequency Of Operation (MHz)	Occupied Bandwidth	
	12.5 kHz Channel Spacing Analogue	12.5 kHz Channel Spacing Digital
138.0125	5.1923 kHz	7.3717 kHz
143.9875	5.1923 kHz	7.8205 kHz
148.0125	5.1923 kHz	7.6282 kHz
149.8875	5.1923 kHz	7.6923 kHz
150.0125	5.1923 kHz	7.8846 kHz
150.0625	5.1923 kHz	7.6923 kHz
162.0000	5.1602 kHz	7.7564 kHz
173.9875	5.1602 kHz	7.6923 kHz

Note 1 Measurements on 12.5 kHz channels made with 100Hz RBW
Figures may be rounded up/down.

Limit

Channel Spacing	Bandwidth Limitation
12.5 kHz	11.25 kHz

Result

The SDP660AC was found to comply with the limits

A4 Spurious Emissions at Antenna Terminals

Test Details:	
Regulation	Title 47 of the CFR: Part 90.210
Measurement standard	Title 47 of the CFR: Part 2.1051
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Operating Frequency – 138.0125 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	276.00	-82.20	45.70	-36.50	-20.00
	414.00	-84.68	45.60	-39.08	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 143.9875 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	288.00	-83.12	45.50	-37.62	-20.00
	431.95	-83.72	45.50	-38.22	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 148.0125 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	296.00	-83.48	43.30	-40.18	-20.00
	444.05	-82.68	45.60	-37.08	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 149.8875 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	299.80	-83.76	43.20	-40.56	-20.00
	449.65	-83.42	45.40	-38.02	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 150.0125 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	300.00	-84.10	45.50	-38.60	-20.00
	450.05	-83.18	45.60	-37.58	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 150.0625 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	300.15	-83.46	45.60	-37.86	-20.00
	450.20	-83.12	45.60	-37.52	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 162.0000 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	324.00	-83.52	43.60	-39.92	-20.00
	486.00	-81.34	45.50	-35.84	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Operating Frequency – 173.9875 MHz					
Frequency Range (MHz)	Freq. of Emission (MHz)	Measured Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
9 kHz - 16GHz	348.00	-84.04	45.50	-38.54	-20.00
	521.95	-83.46	45.60	-37.86	-20.00

Note Emissions checked up to 16GHz, 10 x the GPS operating frequency.

Limit

Limit is determined by the outermost step of the emissions mask and is calculated as follows:

At least 43 + 10 log P dB

$(10\log P_{watts}) - (43+10\log (P_{watts} * 1000)) = \text{LIMIT} = -13$ dBm

Limit reduces to $(10 \log P_{watts}) - (50 + 10 \text{ Log } (P_{watts} * 1000)) = \text{LIMIT} = -20$ dBm for RSS-119 Mask D

Result

The SDP660AC was found to comply with the limits

A5 Radiated Electric Field Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions.
The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : [ ] 3m alternative test site : [X]

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details: SDP 650	
Regulation	Title 47 of the CFR: Part 90.210, RSS-119 Section 5.8
Measurement standard	Title 47 of the CFR: Part 2.1053, RSS-GEN Section 4.9
Frequency range	30 MHz – 16 GHz
EUT sample number	S33 & S32
Modification state	0
SE in test environment	S01, S08, S12, Mic/Speaker Handset
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	1 & 2

Operating Frequency – 138.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 143.9875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 148.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 149.8875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 150.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 150.0625 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 162.0000 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 173.9875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Result

The SDP650AC was found to comply with the limits

Test Details: SDP 660	
Regulation	Title 47 of the CFR: Part 90.210, RSS-119 Section 5.8
Measurement standard	Title 47 of the CFR: Part 2.1053, RSS-GEN Section 4.9
Frequency range	30 MHz – 16 GHz
EUT sample number	S33 & S32
Modification state	0
SE in test environment	S01, S08, S12, Mic/Speaker Handset
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	1 & 2

Operating Frequency – 138.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 143.9875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 148.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 149.8875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 150.0125 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 150.0625 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 162.0000 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Operating Frequency – 173.9875 MHz			
FREQUENCY RANGE	**FREQ. (MHz)**	**ERP/EIRP (dBm)**	**LIMIT (dBm)**
30 MHz – 16 GHz	No significant Emissions Within 20 dB of the limit		-20

Result

The SDP660AC was found to comply with the limits

Notes:

1. Emissions Checked up to a minimum of 10 times Fc, this is extended if significant emissions are detected. Emissions Checked up to 10 times the highest frequency used within the EUT, in the case of the SDP650AC and SDP660AC this is the GPS receiver.

2. The unit was mounted on a turntable and rotated through 360^0 and in 3 orthogonal planes to find the worst case emission.

3. For Frequencies below 1 GHz, RBW = 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

   Peak Detector RBW = 1MHz; VBW = ≥RBW

4. Limit is determined as the outermost step of the emissions mask and is calculated as follows.

   At least 43 + 10 log P dB

   $(10\log P_{watts}) - (43+10\log (P_{watts} * 1000)) =$ LIMIT =-13 dBm

Limit reduces to $(10 \log P_{watts}) - (50 + 10 \text{ Log } (P_{watts} * 1000))$ = LIMIT = -20 dBm for RSS-119 Mask D

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 2.1057.

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation}\,(\text{dB}) = 20\log_{10}\left(\frac{\text{measurement distance}}{\text{specification distance}}\right)$$

(b) The levels may have been rounded for display purposes.

(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels	✓			
Effect of Position of EUT cables & samples on emission levels			✓	

(i) Parameter defined by standard and / or single possible, refer to Appendix D
(ii) Parameter defined by client and / or single possible, refer to Appendix D
(iii) Parameter had a negligible effect on emission levels, refer to Appendix D
(iv) Worst case determined by initial measurement, refer to Appendix D

A6 Frequency Stability

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	138.01240	-0.10	-0.72	Pass*
+20	85%	138.01239	-0.01	-0.07	Pass
+20	115%	138.01237	-0.03	-0.22	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	138.01230	-0.10	-0.72	Pass
-20	7.2	138.01229	-0.11	-0.80	Pass
-10	7.2	138.01238	-0.02	-0.14	Pass
0	7.2	138.01242	0.02	0.14	Pass
10	7.2	138.01242	0.02	0.14	Pass
20	7.2	138.01240	-0.10	-0.72	Pass*
30	7.2	138.01241	0.01	0.07	Pass
40	7.2	138.01236	-0.04	-0.29	Pass
50	7.2	138.01237	-0.03	-0.22	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	143.98741	-0.09	-0.63	Pass*
+20	85% of Vnom	143.98739	-0.02	-0.14	Pass
+20	115% of Vnom	143.98736	-0.05	-0.35	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	143.98730	-0.11	-0.76	Pass
-20	7.2	143.98728	-0.13	-0.90	Pass
-10	7.2	143.98737	-0.04	-0.28	Pass
0	7.2	143.98741	0.00	0.00	Pass
10	7.2	143.98741	0.00	0.00	Pass
20	7.2	143.98741	-0.09	-0.63	Pass*
30	7.2	143.98741	0.00	0.00	Pass
40	7.2	143.98736	-0.05	-0.35	Pass
50	7.2	143.98737	-0.04	-0.28	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.

* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	148.01240	-0.10	-0.68	Pass*
+20	85% of Vnom	148.01239	-0.01	-0.07	Pass
+20	115% of Vnom	148.01236	-0.04	-0.27	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	148.01229	-0.11	-0.74	Pass
-20	7.2	148.01228	-0.12	-0.81	Pass
-10	7.2	148.01237	-0.03	-0.20	Pass
0	7.2	148.01242	0.02	0.14	Pass
10	7.2	148.01242	0.02	0.14	Pass
20	7.2	148.01240	-0.10	-0.68	Pass*
30	7.2	148.01240	0.00	0.00	Pass
40	7.2	148.01235	-0.05	-0.34	Pass
50	7.2	148.01237	-0.03	-0.20	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.

* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	149.88740	-0.10	-0.67	Pass*
+20	85% of Vnom	149.88738	-0.02	-0.13	Pass
+20	115% of Vnom	149.88736	-0.04	-0.27	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	149.88729	-0.11	-0.73	Pass
-20	7.2	149.88728	-0.12	-0.80	Pass
-10	7.2	149.88738	-0.02	-0.13	Pass
0	7.2	149.88741	0.01	0.07	Pass
10	7.2	149.88742	0.02	0.13	Pass
20	7.2	149.88740	-0.10	-0.67	Pass*
30	7.2	149.88740	0.00	0.00	Pass
40	7.2	149.88736	-0.04	-0.27	Pass
50	7.2	149.88736	-0.04	-0.27	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	150.01240	-0.10	-0.67	Pass*
+20	85% of Vnom	150.01238	-0.02	-0.13	Pass
+20	115% of Vnom	150.01236	-0.04	-0.27	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	150.01230	-0.10	-0.67	Pass
-20	7.2	150.01228	-0.12	-0.80	Pass
-10	7.2	150.01237	-0.03	-0.20	Pass
0	7.2	150.01241	0.01	0.07	Pass
10	7.2	150.01240	0.00	0.00	Pass
20	7.2	150.01240	-0.10	-0.67	Pass*
30	7.2	150.01241	0.01	0.07	Pass
40	7.2	150.01235	-0.05	-0.33	Pass
50	7.2	150.01237	-0.03	-0.20	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	150.06240	-0.10	-0.67	Pass*
+20	85% of Vnom	150.06238	-0.02	-0.13	Pass
+20	115% of Vnom	150.06236	-0.04	-0.27	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	150.06230	-0.10	-0.67	Pass
-20	7.2	150.06229	-0.11	-0.73	Pass
-10	7.2	150.06237	-0.03	-0.20	Pass
0	7.2	150.06241	0.01	0.07	Pass
10	7.2	150.06241	0.01	0.07	Pass
20	7.2	150.06240	-0.10	-0.67	Pass*
30	7.2	150.06240	0.00	0.00	Pass
40	7.2	150.06236	-0.04	-0.27	Pass
50	7.2	150.06236	-0.04	-0.27	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	161.99989	-0.11	-0.68	Pass*
+20	85% of Vnom	161.99986	-0.03	-0.19	Pass
+20	115% of Vnom	161.99984	-0.05	-0.31	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	161.99978	-0.11	-0.68	Pass
-20	7.2	161.99976	-0.13	-0.80	Pass
-10	7.2	161.99986	-0.03	-0.19	Pass
0	7.2	161.99989	0.00	0.00	Pass
10	7.2	161.99988	-0.01	-0.06	Pass
20	7.2	161.99989	-0.11	-0.68	Pass*
30	7.2	161.99988	-0.01	-0.06	Pass
40	7.2	161.99983	-0.06	-0.37	Pass
50	7.2	161.99984	-0.05	-0.31	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

Test Details:	
Regulation	Title 47 of the CFR: Part 90.213, RSS-119 Section 5.3
Measurement standard	Title 47 of the CFR: Part 2.1055, RSS-GEN Section 4.7
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Voltage Variation					
Temperature °C	Vdc	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
+20	7.2	173.98739	-0.11	-0.63	Pass*
+20	85% of Vnom	173.98735	-0.04	-0.23	Pass
+20	115% of Vnom	173.98734	-0.05	-0.29	Pass
Temperature Variation					
Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Pass/Fail
-30	7.2	173.98728	-0.11	-0.63	Pass
-20	7.2	173.98725	-0.14	-0.80	Pass
-10	7.2	173.98735	-0.04	-0.23	Pass
0	7.2	173.98739	0.00	0.00	Pass
10	7.2	173.98738	-0.01	-0.06	Pass
20	7.2	173.98739	-0.11	-0.63	Pass*
30	7.2	173.98738	-0.01	-0.06	Pass
40	7.2	173.98733	-0.06	-0.34	Pass
50	7.2	173.98733	-0.06	-0.34	Pass

* Measured f_c (at Tnom Vnom) was compared to the declared operating frequency for drift.
* Measured f_c (at Tnom Vnom) was used as the reference frequency for drift calculations of measured f_c at extreme voltage / temperature.

Limit

±1.5 ppm (tightest applicable limit)

Result

The SDP660AC was found to comply with the limits

A7 Transient Behaviour

Test Details:	
Regulation	Title 47 of the CFR: Part 90.214, RSS-119 Section 5.9
Measurement standard	Title 47 of the CFR: Part 2.1055,
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Channel	Time, t1	Time, t2	Time, t3
138.0125	Compliant	Compliant	Compliant
143.9875	Compliant	Compliant	Compliant
148.0125	Compliant	Compliant	Compliant
149.8875	Compliant	Compliant	Compliant
150.0125	Compliant	Compliant	Compliant
150.0625	Compliant	Compliant	Compliant
162.0000	Compliant	Compliant	Compliant
173.9875	Compliant	Compliant	Compliant

Limit

Time interval	Maximum Frequency Difference	All Equipment	
		150 – 174 MHz	421 – 512 MHz
12.5 kHz channels			
t1	±12.5 kHz	5.0 ms	10.0 ms
t2	±6.25 kHz	20.0 ms	25.0 ms
t3	±12.5 kHz	5.0 ms	10.0 ms

Result

The SDP660AC was found to comply with the limits

A8 Power Line Conducted Emissions

Preview power line conducted emission measurements were performed with a peak & average detector in a screened room. The effect of the EUT set-up on the measurements is summarised in note (b).Where applicable formal measurements of the emissions were performed with an average and/or quasi peak detector.

Test Details:	
Regulation	Title 47 of the CFR: Part 15.107, RSS-GEN Section 5.5
Measurement standard	ANSI C63.10:2003, RSS-GEN
Frequency range	150kHz to 30MHz
EUT sample number	S33 & S32
Modification state	0
SE in test environment	S01, S08, S12, Mic/Speaker Handset
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	3

The EUT was operated in standby mode. The worst-case power line conducted emission measurements are listed below:

Results measured using the average detector compared to the average limit

SDP650AC						
Ref No.	Freq (MHz)	Result (dBuV)	Conductor	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.40	30.33	Live	47.96	17.63	Pass
2	0.53	28.75	Live	46.00	17.25	Pass
3	0.60	30.76	Live	46.00	15.24	Pass
4	0.66	27.40	Neutral	46.00	18.60	Pass
5	0.73	26.67	Neutral	46.00	19.33	Pass
6	0.80	29.38	Live	46.00	16.62	Pass
7	0.93	28.07	Neutral	46.00	17.93	Pass
8	0.99	27.72	Live	46.00	18.28	Pass
9	1.13	27.88	Neutral	46.00	18.12	Pass
10	2.05	26.17	Live	46.00	19.83	Pass
11	4.43	29.28	Live	46.00	16.72	Pass
12	4.96	34.41	Live	46.00	11.59	Pass
13	5.56	32.54	Live	50.00	17.46	Pass
14	15.88	31.16	Neutral	50.00	18.84	Pass
15	16.74	38.81	Neutral	50.00	11.19	Pass
16	17.00	33.98	Live	50.00	16.02	Pass

Results measured using the quasi-peak detector compared to the quasi–peak limit

SDP650AC						
Ref No.	Freq (MHz)	Result (dBuV)	Conductor	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	4.96	37.62	Live	56.00	18.38	Pass
2	16.74	44.08	Neutral	60.00	15.90	Pass
3	17.20	41.62	Live	60.00	18.38	Pass

Results measured using the average detector compared to the average limit

SDP660AC						
Ref No.	Freq (MHz)	Result (dBuV)	Conductor	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.40	30.70	Live	47.96	17.26	Pass
2	0.53	29.15	Live	46.00	16.85	Pass
3	0.60	30.81	Live	46.00	15.19	Pass
4	0.66	27.31	Neutral	46.00	18.69	Pass
5	0.73	26.57	Neutral	46.00	19.43	Pass
6	0.80	29.83	Live	46.00	16.17	Pass
7	0.86	27.74	Neutral	46.00	18.26	Pass
8	1.00	26.58	Live	46.00	19.42	Pass
9	1.06	26.70	Live	46.00	19.30	Pass
10	1.13	27.55	Neutral	46.00	18.45	Pass
11	2.25	26.66	Live	46.00	19.34	Pass
12	4.44	28.15	Live	46.00	17.85	Pass
13	4.97	32.19	Live	46.00	13.81	Pass
14	16.61	36.50	Neutral	50.00	13.50	Pass

Results measured using the quasi-peak detector compared to the quasi–peak limit

SDP660AC						
Ref No.	Freq (MHz)	Result (dBuV)	Conductor	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.20	44.08	Live	63.61	19.53	Pass
2	4.97	37.52	Live	56.00	18.48	Pass
3	16.48	43.98	Neutral	60.00	16.02	Pass

Specification limits:

Conducted disturbance at the mains port Limits.

Frequency range MHz	Limits dBμV	
	Quasi-peak	Average
0.15 to 0.5	66 to 56[2]	56 to 46[2]
0.5 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequency. 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

Notes:

(a) The levels may have been rounded for display purposes.

(b) The following table summarises the effect of the EUT operating mode and internal configuration on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels	✓			
(i) Parameter defined by standard and / or single possible, refer to Appendix C (ii) Parameter defined by client and / or single possible, refer to Appendix C (iii) Parameter had a negligible effect on emission levels, refer to Appendix C (iv) Worst case determined by initial measurement, refer to Appendix C				

A9 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions on directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109. The EUT was set to operate in a transmit standby / receive mode.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : [ ] 3m alternative test site : [X]

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details:	
Regulation	Title 47 of the CFR, Part 15.109, RSS-GEN 6.0
Measurement standard	ANSI C63.10:2003
Frequency range	30 MHz – 16.3GHz
EUT sample number	S33, S32
Modification state	0
SE in test environment	S01, S08, S12, Mic/Speaker Handset
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs	See Appendix F

The worst case radiated emission measurements for spurious emissions are listed overleaf:

Emissions Regardless of Unit									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	36.75	7.05	0.60	15.75	-	23.4	-	14.79	100
Qp	39.65	9.17	0.58	14.15	-	23.9	-	15.67	100
Qp	40.65	11.97	0.65	13.58	-	26.2	-	20.42	100
Qp	41.15	12.6	0.69	13.31	-	26.6	-	21.38	100
Qp	41.80	11.45	0.73	12.92	-	25.1	-	17.99	100
Qp	42.35	13.13	0.74	12.63	-	26.5	-	21.13	100
Qp	43.20	12.37	0.73	12.20	-	25.3	-	18.41	100
Qp	58.70	25.17	0.77	6.16	-	32.1	-	40.27	100
Qp	59.45	28.16	0.78	6.06	-	35.0	-	56.23	100
Qp	60.45	29.64	0.80	5.96	-	36.4	-	66.07	100
Qp	60.95	29.58	0.81	5.91	-	36.3	-	65.31	100
Qp	61.30	30.05	0.82	5.93	-	36.8	-	69.18	100
Qp	62.45	30.26	0.84	6.00	-	37.1	-	71.61	100
Qp	62.95	30.05	0.85	6.00	-	36.9	-	69.98	100
Qp	63.65	29.12	0.84	5.94	-	35.9	-	62.37	100
Qp	64.90	25.58	0.83	5.99	-	32.4	-	41.69	100
Qp	109.25	8.19	1.18	11.53	-	20.9	-	11.09	150
Qp	112.85	8.69	1.32	11.89	-	21.9	-	12.45	150
Qp	113.25	9.13	1.34	11.93	-	22.4	-	13.18	150
Qp	117.80	8.73	1.37	12.40	-	22.5	-	13.34	150
Qp	118.85	8.41	1.39	12.40	-	22.2	-	12.88	150
Qp	219.00	20.04	1.86	9.50	-	31.4	-	37.15	200
Qp	230.40	14.96	1.84	9.80	-	26.6	-	21.38	200

SDP650AC									
Operating Frequency – 138.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	183.0125	18.80	1.7	9.5	N/A	30.00	-	31.62	150

Operating Frequency – 143.9875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	188.9875	20.00	1.7	8.8	N/A	30.50	-	33.50	150
Pk	2267.845	50.33	3.0	28.1	36.0	45.43	-	186.85	5000
Av	2267.845	41.83	3.0	28.1	36.0	36.93	-	70.23	500
Pk	2456.840	49.87	3.2	28.4	36.0	45.47	-	187.72	5000
Av	2456.840	39.11	3.2	28.4	36.0	34.71	-	54.39	500
Pk	2078.854	48.64	2.6	27.7	36.0	42.94	-	140.28	5000
Av	2078.854	34.47	2.6	27.7	36.0	28.77	-	27.45	500

Operating Frequency – 148.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	193.0125	20.6	1.7	8.5	N/A	30.80	-	34.67	150
Pk	2123.134	49.22	2.6	27.8	36.0	43.62	-	151.71	5000
Av	2123.134	37.24	2.6	27.8	36.0	31.64	-	38.19	500
Pk	2316.147	51.50	3.1	28.2	36.0	46.80	-	218.78	5000
Av	2316.147	45.65	3.1	28.2	36.0	40.95	-	111.56	500
Pk	2509.167	52.03	3.2	28.5	36.0	47.73	-	243.50	5000
Av	2509.167	44.29	3.2	28.5	36.0	39.99	-	99.88	500
Pk	2702.175	51.11	3.4	29.1	36.0	47.61	-	240.16	5000
Av	2702.175	42.63	3.4	29.1	36.0	39.13	-	90.47	500
Pk	2895.188	49.99	3.5	29.3	36.0	46.79	-	218.52	5000
Av	2895.188	40.72	3.5	29.3	36.0	37.52	-	75.16	500
Pk	3088.195	48.83	3.0	30.3	35.9	46.23	-	204.88	5000
Av	3088.195	36.80	3.0	30.3	35.9	34.20	-	51.29	500

Operating Frequency – 149.8875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	194.8875	20.70	1.8	8.6	N/A	31.1	-	35.89	150
Pk	2143.763	49.45	2.7	27.8	36.0	43.95	-	157.58	5000
Av	2143.763	38.02	2.7	27.8	36.0	32.52	-	42.27	500
Pk	2338.649	52.24	3.1	28.2	36.0	47.54	-	238.23	5000
Av	2338.649	46.06	3.1	28.2	36.0	41.36	-	116.95	500
Pk	2533.535	53.05	3.2	28.6	36.0	48.85	-	277.01	5000
Av	2533.535	46.50	3.2	28.6	36.0	42.30	-	130.32	500
Pk	2728.424	50.40	3.3	29.1	36.0	46.80	-	218.78	5000
Av	2728.424	43.00	3.3	29.1	36.0	39.40	-	93.33	500
Pk	2923.312	49.99	3.5	29.5	36.0	46.99	-	223.61	5000
Av	2923.312	41.43	3.5	29.5	36.0	38.43	-	83.46	500

Operating Frequency – 150.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	195.0125	20.70	1.8	8.6	N/A	31.10	-	35.89	150
Pk	2145.137	50.40	2.6	27.8	36.0	44.80	-	173.78	5000
Av	2145.137	38.44	2.6	27.8	36.0	32.84	-	43.85	500
Pk	2340.149	51.72	3.1	28.2	36.0	47.02	-	224.39	5000
Av	2340.149	44.73	3.1	28.2	36.0	40.03	-	100.35	500
Pk	2535.160	53.79	3.2	28.6	36.0	49.59	-	301.65	5000
Av	2535.160	47.05	3.2	28.6	36.0	42.85	-	138.84	500
Pk	2730.179	50.72	3.3	29.1	36.0	47.12	-	226.99	5000
Av	2730.179	43.76	3.3	29.1	36.0	40.16	-	101.86	500
Pk	2925.183	50.60	3.5	29.5	36.0	47.60	-	239.88	5000
Av	2925.183	41.35	3.5	29.5	36.0	38.35	-	82.70	500

Operating Frequency – 150.0625 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	195.0625	20.70	1.8	8.6	N/A	31.10	-	35.89	150
Pk	2145.683	49.66	2.6	27.8	36.0	44.06	-	159.59	5000
Av	2145.683	38.37	2.6	27.8	36.0	32.77	-	43.50	500
Pk	2340.751	52.20	3.1	28.2	36.0	47.50	-	237.14	5000
Av	2340.751	45.32	3.1	28.2	36.0	40.62	-	107.40	500
Pk	2535.808	52.98	3.2	28.6	36.0	48.78	-	274.79	5000
Av	2535.808	47.07	3.2	28.6	36.0	42.87	-	139.16	500
Pk	2730.874	51.03	3.3	29.1	36.0	47.43	-	235.23	5000
Av	2730.874	43.61	3.3	29.1	36.0	40.01	-	100.12	500
Pk	2925.936	50.35	3.6	29.5	36.0	47.45	-	235.78	5000
Av	2925.936	41.32	3.6	29.5	36.0	38.42	-	83.37	500

Operating Frequency – 162.0000 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	207.000	20.20	1.7	8.9	N/A	30.80	-	34.67	150
Pk	2276.999	52.70	2.9	28.1	36.0	47.70	-	242.66	5000
Av	2276.999	47.32	2.9	28.1	36.0	42.32	-	130.62	500
Pk	2484.001	53.14	3.1	28.5	36.0	48.74		273.53	5000
Av	2484.001	46.24	3.1	28.5	36.0	41.84	-	123.59	500
Pk	2691.000	52.05	3.3	29.1	36.0	48.45	-	264.55	5000
Av	2691.000	44.78	3.3	29.1	36.0	41.18	-	114.55	500
Pk	2898.000	50.52	3.5	29.4	36.0	47.42	-	234.96	5000
Av	2898.000	42.11	3.5	29.4	36.0	39.01	-	89.23	500
Pk	3105.002	49.60	3.0	30.4	35.9	47.10	-	226.46	5000
Av	3105.002	38.96	3.0	30.4	35.9	36.46	-	66.53	500

Operating Frequency – 173.9875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	218.9875	19.40	1.9	9.5	N/A	30.80	-	34.67	200
Pk	2189.875	50.99	2.7	27.8	36.0	45.49	-	188.15	5000
Av	2189.875	41.22	2.7	27.8	36.0	35.72	-	61.09	500
Pk	2408.858	50.62	3.2	28.3	36.0	46.12	-	202.30	5000
Av	2408.858	40.72	3.2	28.3	36.0	36.22	-	64.71	500
Pk	2627.849	52.82	3.2	28.9	36.0	48.92	-	279.25	5000
Av	2627.849	45.62	3.2	28.9	36.0	41.72	-	121.90	500
Pk	2846.836	50.12	3.4	29.2	36.0	46.72	-	216.77	5000
Av	2846.836	40.87	3.4	29.2	36.0	37.47	-	74.73	500
Pk	3065.828	50.89	3.0	30.3	35.9	48.29	-	259.72	5000
Av	3065.828	40.04	3.0	30.3	35.9	37.44	-	74.47	500

SDP660AC									
Operating Frequency – 138.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	183.0125	18.6	1.7	9.5	N/A	29.8	-	30.90	150

Operating Frequency – 143.9875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	188.9875	20.2	1.7	8.8	N/A	30.70	-	34.28	150
Pk	2267.845	49.44	3.0	28.1	36.0	44.54	-	168.66	5000
Av	2267.845	39.77	3.0	28.1	36.0	34.87	-	55.40	500
Pk	2456.836	49.51	3.2	28.4	36.0	45.11	-	180.09	5000
Av	2456.836	39.29	3.2	28.4	36.0	34.89	-	55.53	500
Pk	2645.825	51.47	3.3	28.9	36.0	47.67	-	241.82	5000
Av	2645.825	41.36	3.3	28.9	36.0	37.56	-	75.51	500
Pk	2834.815	50.89	3.4	29.1	36.0	47.39	-	234.15	5000
Av	2834.815	43.42	3.4	29.1	36.0	39.92	-	99.08	500

Operating Frequency – 148.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	193.0125	20.80	1.7	8.5	N/A	31.00	-	35.48	150
Pk	2123.138	50.41	2.6	27.8	36.0	44.81	-	173.98	5000
Av	2123.138	39.37	2.6	27.8	36.0	33.77	-	48.81	500
Pk	2316.156	50.57	3.1	28.2	36.0	45.87	-	196.56	5000
Av	2316.156	43.07	3.1	28.2	36.0	38.37	-	82.89	500
Pk	2509.158	51.12	3.2	28.5	36.0	46.82	-	219.28	5000
Av	2509.158	42.83	3.2	28.5	36.0	38.53	-	84.43	500
Pk	2702.179	52.91	3.4	29.1	36.0	49.41	-	295.46	5000
Av	2702.179	46.85	3.4	29.1	36.0	43.35	-	147.06	500
Pk	2895.182	51.62	3.5	29.3	36.0	48.42	-	263.63	5000
Av	2895.182	45.84	3.5	29.3	36.0	42.64	-	135.52	500

Operating Frequency – 149.8875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	194.8875	20.80	1.8	8.6	N/A	31.20	-	36.31	150
Pk	2143.761	49.01	2.7	27.8	36.0	43.51	-	149.80	5000
Av	2143.761	38.44	2.7	27.8	36.0	32.94	-	44.36	500
Pk	2338.651	51.59	3.1	28.2	36.0	46.89	-	221.05	5000
Av	2338.651	44.98	3.1	28.2	36.0	40.28	-	103.28	500
Pk	2533.545	51.98	3.2	28.6	36.0	47.78	-	244.91	5000
Av	2533.545	44.33	3.2	28.6	36.0	40.13	-	101.51	500
Pk	2728.420	53.33	3.3	29.1	36.0	49.73	-	306.55	5000
Av	2728.420	47.86	3.3	29.1	36.0	44.26	-	163.31	500
Pk	2923.315	51.15	3.5	29.5	36.0	48.15	-	255.56	5000
Av	2923.315	44.69	3.5	29.5	36.0	41.69	-	121.48	500

Operating Frequency – 150.0125 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	195.0125	20.90	1.8	8.6	N/A	31.30	-	36.73	150
Pk	2145.133	48.48	2.6	27.8	36.0	42.88	-	139.32	5000
Av	2145.133	37.05	2.6	27.8	36.0	31.45	-	37.37	500
Pk	2340.153	51.80	3.1	28.2	36.0	47.10	-	226.46	5000
Av	2340.153	45.65	3.1	28.2	36.0	40.95	-	111.56	500
Pk	2535.162	51.87	3.2	28.6	36.0	47.67	-	241.82	5000
Av	2535.162	44.37	3.2	28.6	36.0	40.17	-	101.98	500
Pk	2730.178	53.53	3.3	29.1	36.0	49.93	-	313.69	5000
Av	2730.178	47.99	3.3	29.1	36.0	44.39	-	165.77	500
Pk	2925.189	50.98	3.5	29.5	36.0	47.98	-	250.61	5000
Av	2925.189	44.57	3.5	29.5	36.0	41.57	-	119.81	500

Operating Frequency – 150.0625 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	195.0625	20.50	1.8	8.6	N/A	30.90	-	35.08	150
Pk	2145.681	50.58	2.6	27.8	36.0	44.98	-	177.42	5000
Av	2145.681	41.87	2.6	27.8	36.0	36.27	-	65.09	500
Pk	2340.750	51.87	3.1	28.2	36.0	47.17	-	228.30	5000
Av	2340.750	45.70	3.1	28.2	36.0	41.00	-	112.20	500
Pk	2535.811	51.96	3.2	28.6	36.0	47.76	-	244.34	5000
Av	2535.811	44.32	3.2	28.6	36.0	40.12	-	101.39	500
Pk	2730.874	53.34	3.3	29.1	36.0	49.74	-	306.90	5000
Av	2730.874	47.86	3.3	29.1	36.0	44.26	-	163.31	500
Pk	2925.935	51.18	3.6	29.5	36.0	48.28	-	259.42	5000
Av	2925.935	44.54	3.6	29.5	36.0	41.64	-	120.78	500

Operating Frequency – 162.0000 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	207.000	19.50	1.7	8.9	N/A	30.10	-	31.99	150
Pk	2070.000	49.16	2.6	27.7	36.0	43.46	-	148.94	5000
Av	2070.000	37.58	2.6	27.7	36.0	31.88	-	39.26	500
Pk	2277.000	51.71	2.9	28.1	36.0	46.71	-	216.52	5000
Av	2277.000	44.24	2.9	28.1	36.0	39.24	-	91.62	500
Pk	2484.000	52.43	3.1	28.5	36.0	48.03	-	252.06	5000
Av	2484.000	46.86	3.1	28.5	36.0	42.46	-	132.74	500
Pk	2690.998	54.97	3.3	29.1	36.0	51.37	-	370.25	5000
Av	2690.998	50.23	3.3	29.1	36.0	46.63	-	214.54	500
Pk	2897.998	53.06	3.5	29.4	36.0	49.96	-	314.77	5000
Av	2897.998	48.29	3.5	29.4	36.0	45.19	-	181.76	500

Operating Frequency – 173.9875 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	218.9875	19.50	1.9	9.5	N/A	30.90	-	35.08	200
Pk	2189.898	51.47	2.7	27.8	36.0	45.97	-	198.84	5000
Av	2189.898	43.03	2.7	27.8	36.0	37.53	-	75.25	500
Pk	2408.862	51.63	3.2	28.3	36.0	47.13	-	227.25	5000
Av	2408.862	45.05	3.2	28.3	36.0	40.55	-	106.54	500
Pk	2627.852	54.04	3.2	28.9	36.0	50.14	-	321.37	5000
Av	2627.852	48.78	3.2	28.9	36.0	44.88	-	175.39	500
Pk	2846.839	53.48	3.4	29.2	36.0	50.08	-	319.15	5000
Av	2846.839	48.97	3.4	29.2	36.0	45.57	-	189.89	500
Pk	3065.823	50.47	3.0	30.3	35.9	47.87	-	247.46	5000
Av	3065.823	39.07	3.0	30.3	35.9	36.47	-	66.60	500

Notes:

1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1. For emissions below 30MHz the cable losses are assumed to be negligible.
2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
4 For Frequencies below 1 GHz, RBW = 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak	RBW=VBW= 1MHz
Average	RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15: Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits for all emissions:

Frequency of emission (MHz)	Field strength μV/m	Measurement Distance m	Field strength dBμV/m
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

(a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation}\,(\text{dB}) = 20\log_{10}\left(\frac{\text{measurement distance}}{\text{specification distance}}\right)$$

(b) The levels may have been rounded for display purposes.

(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels	✓			
Effect of Position of EUT cables & samples on emission levels			✓	

(i) Parameter defined by standard and / or single possible, refer to Appendix D
(ii) Parameter defined by client and / or single possible, refer to Appendix D
(iii) Parameter had a negligible effect on emission levels, refer to Appendix D
(iv) Worst case determined by initial measurement, refer to Appendix D

A10 Modulation Characteristics

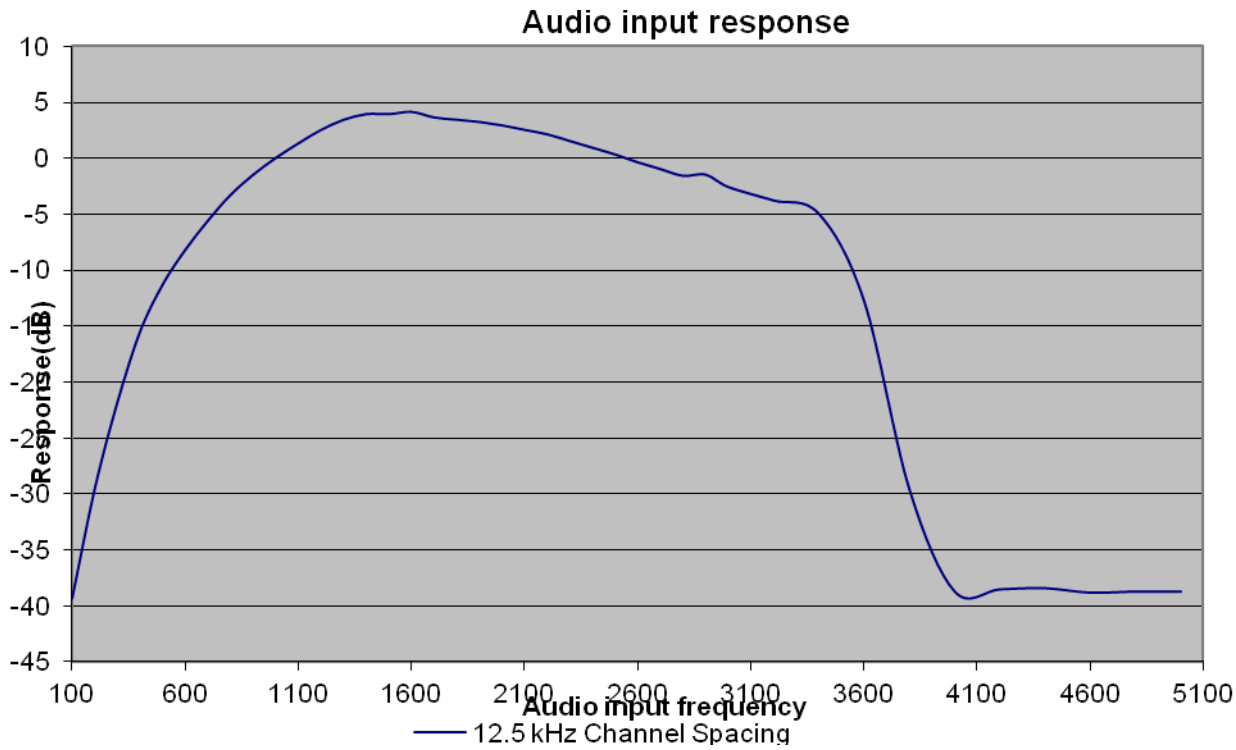
Test Details:	
Measurement standard	Title 47 of the CFR: Part 2.1047, RSS-119 Section 5.5
EUT sample number	S33 & S32
Modification state	0
SE in test environment	Interface / Control PCB
SE isolated from EUT	None
EUT set up	Refer to Appendix C

The transmitter was tested whilst operating under the following conditions:

1) A signal generator was connected into the AF input and the audio frequency was then varied between 100Hz and 5kHz.

2) A 1kHz audio signal was applied which was used as a 0dB response reference.

The following plot shows the audio response of the transmitter.



Appendix B: Supporting Graphical Data

This appendix contains graphical data obtained during testing.

Notes:

(a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.

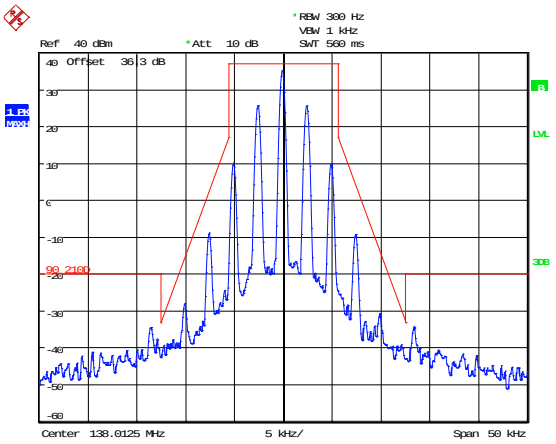
(b) The time and date on the plots do not necessarily equate to the time of the test.

(c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.

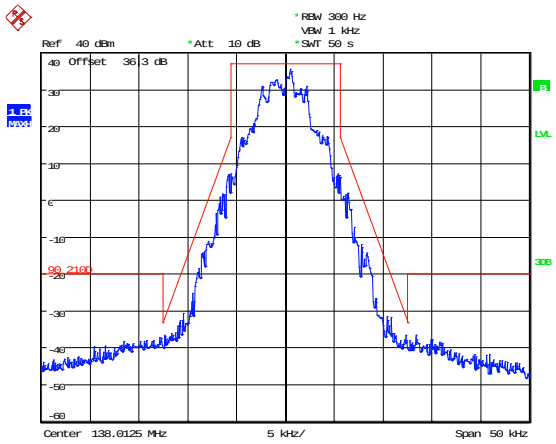
(d) Appendix C details the numbering system used to identify the sample and its modification state.

(e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.

138.0125 MHz Mask D

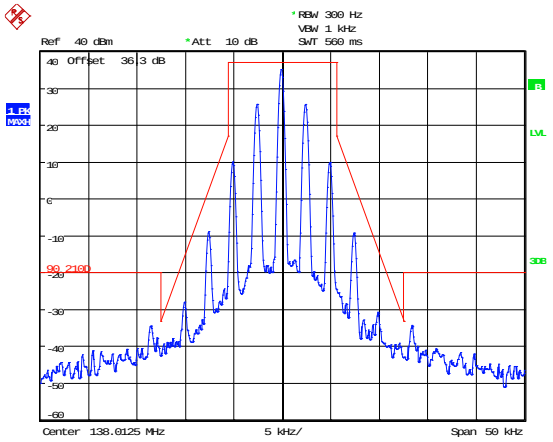


Analogue Modulation

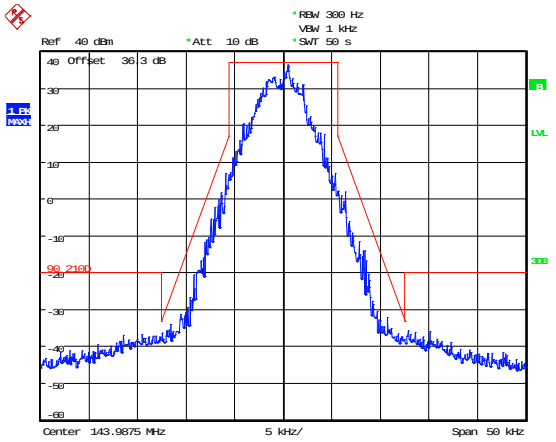


Digital Modulation

143.9875MHz Mask D

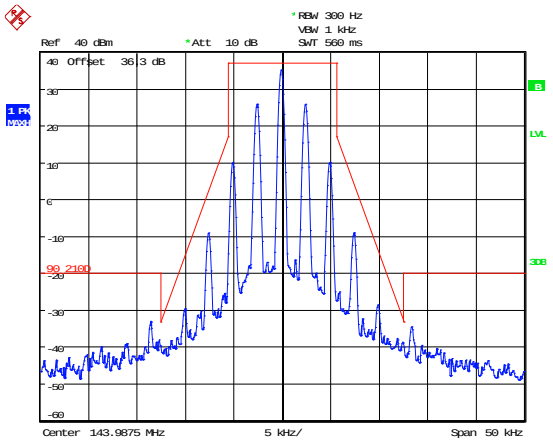


Analogue Modulation

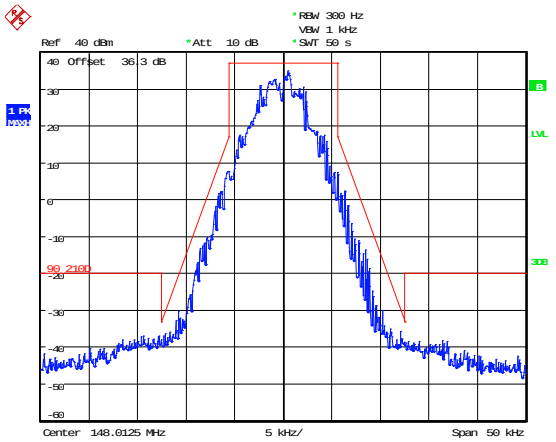


Digital Modulation

148.0125 MHz Mask D

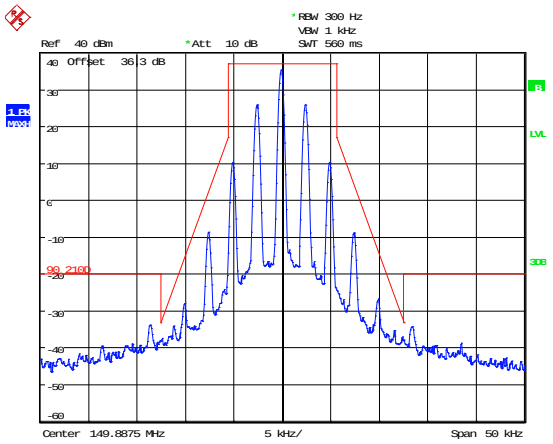


Analogue Modulation

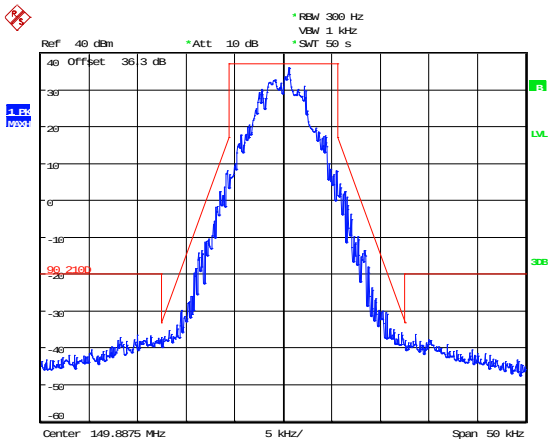


Digital Modulation

149.8875 MHz Mask D

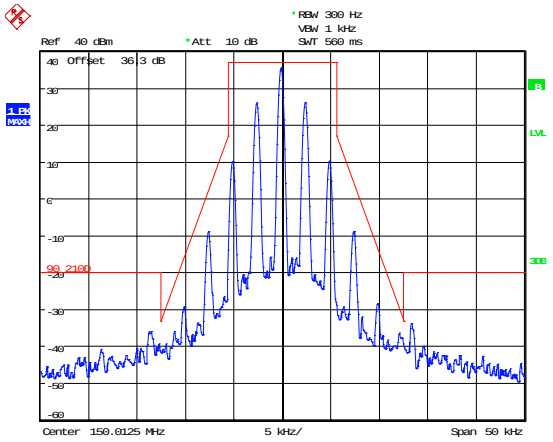


Analogue Modulation

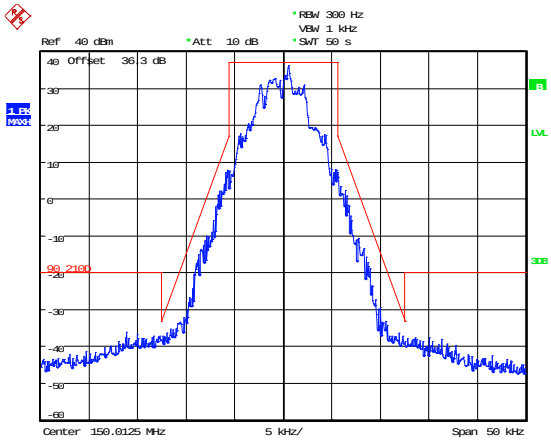


Digital Modulation

150.0125 MHz Mask D

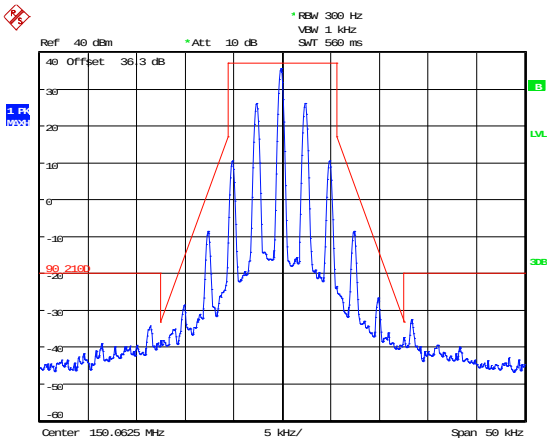


Analogue Modulation

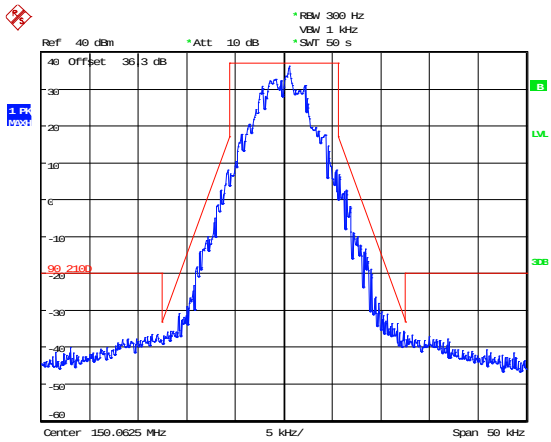


Digital Modulation

150.0625 MHz Mask D

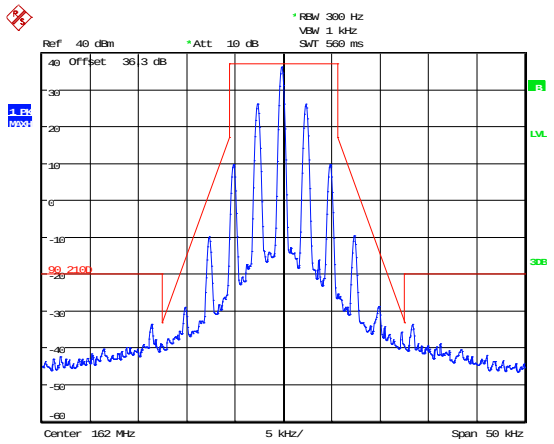


Analogue Modulation

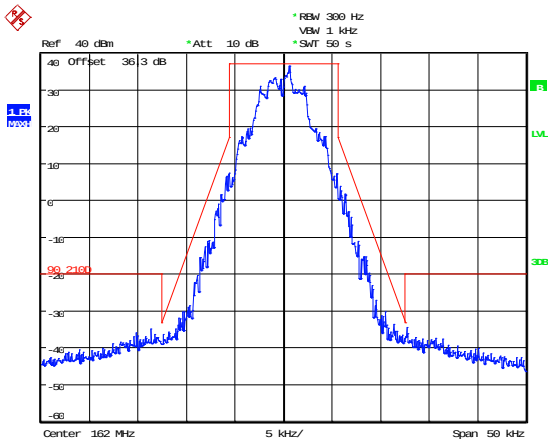


Digital Modulation

162.0000 MHz Mask D

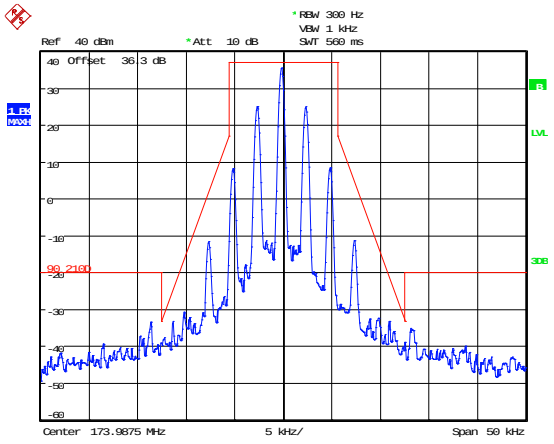


Analogue Modulation

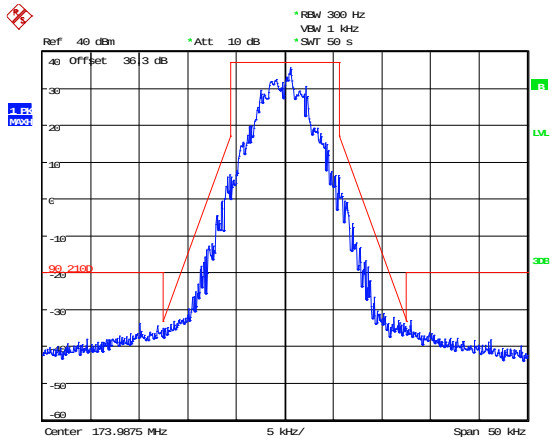


Digital Modulation

173.9875 MHz Mask D

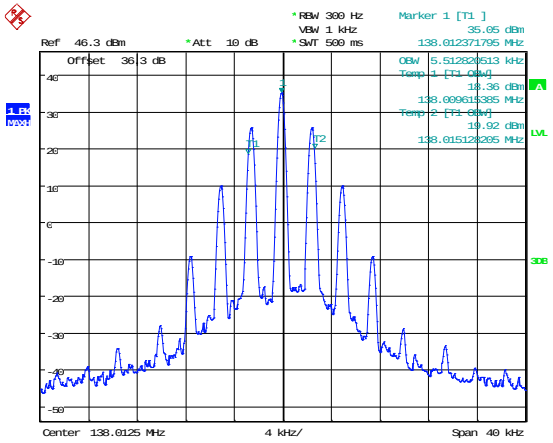


Analogue Modulation



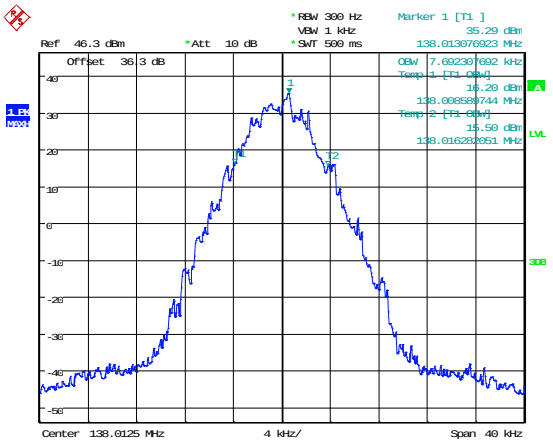
Digital Modulation

138.0125 MHz 99% Bandwidth



Date: 20.SEP.2013 14:29:49

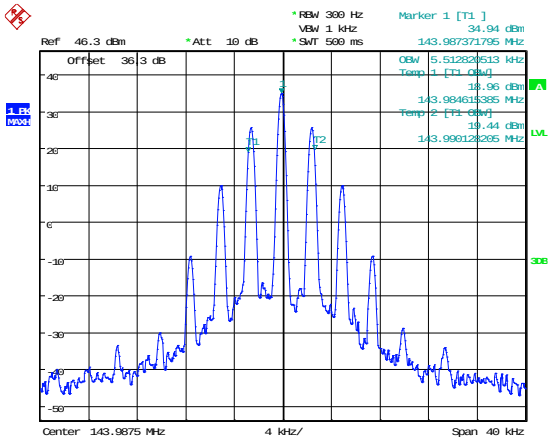
Analogue Modulation



Date: 20.SEP.2013 15:17:24

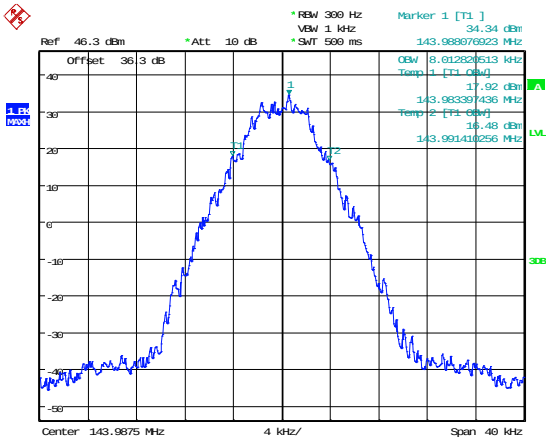
Digital Modulation

143.9875 MHz 99% Bandwidth



Date: 20.SEP.2013 14:33:38

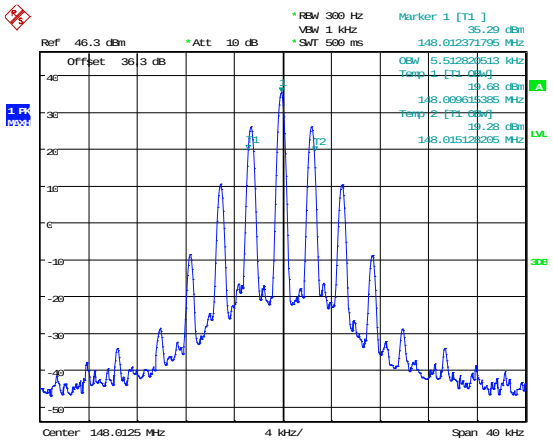
Analogue Modulation



Date: 20.SEP.2013 15:22:33

Digital Modulation

148.0125 MHz 99% Bandwidth



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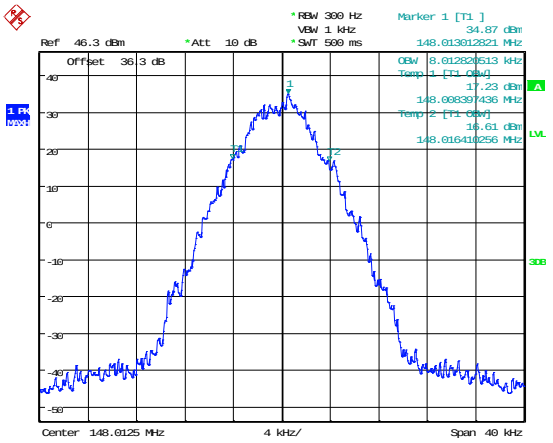
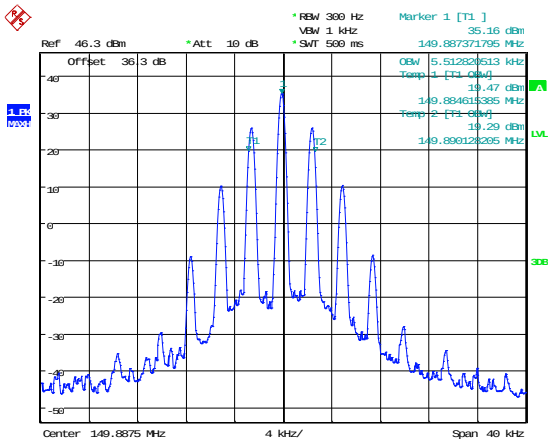
Analogue Modulation



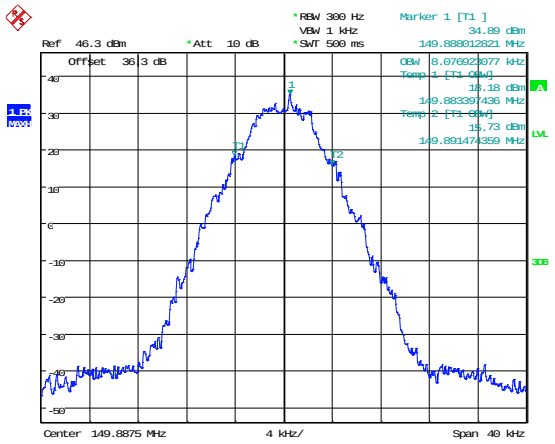
Date: 20.SEP.2013 15:23:29

Digital Modulation

149.8875 MHz 99% Bandwidth

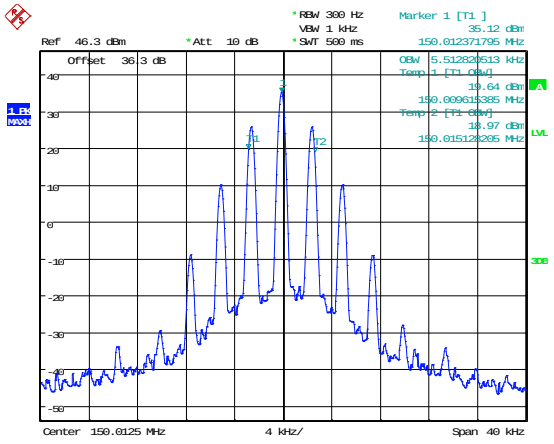


Analogue Modulation

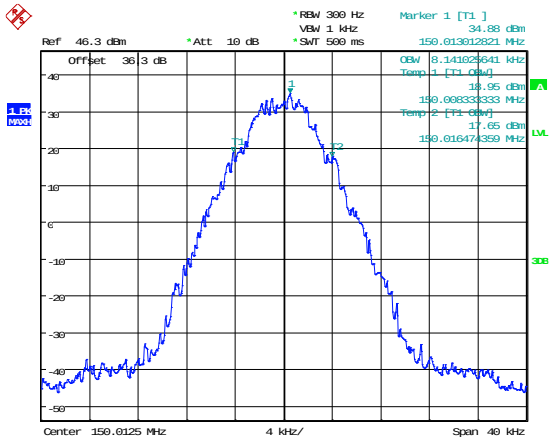


Digital Modulation

150.0125 MHz 99% Bandwidth

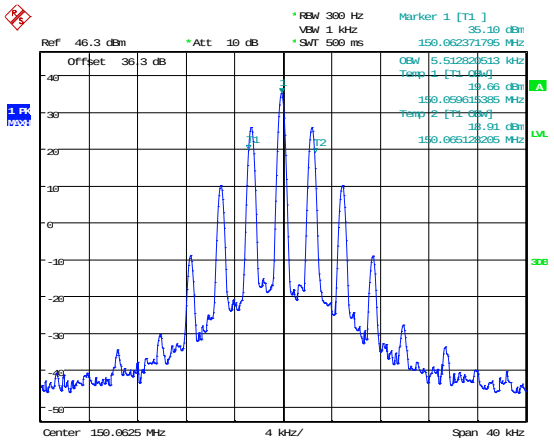


Analogue Modulation

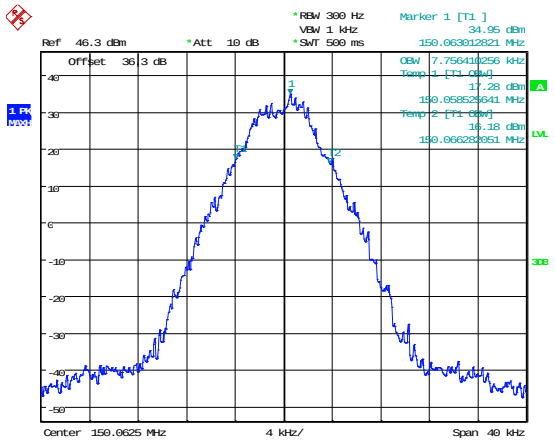


Digital Modulation

150.0625 MHz 99% Bandwidth

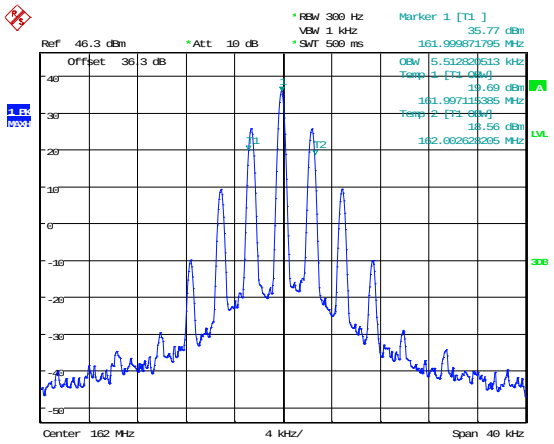


Analogue Modulation



Digital Modulation

162.0000 MHz 99% Bandwidth



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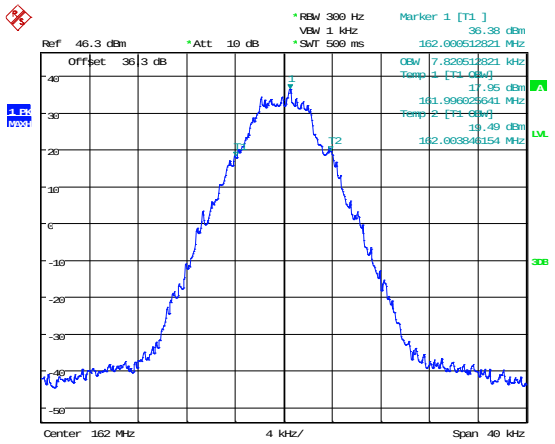
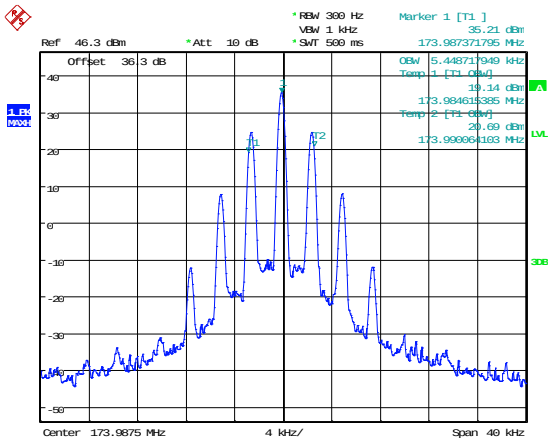
Analogue Modulation



Date: 20.SEP.2013 15:35:20

Digital Modulation

173.9875 MHz 99% Bandwidth



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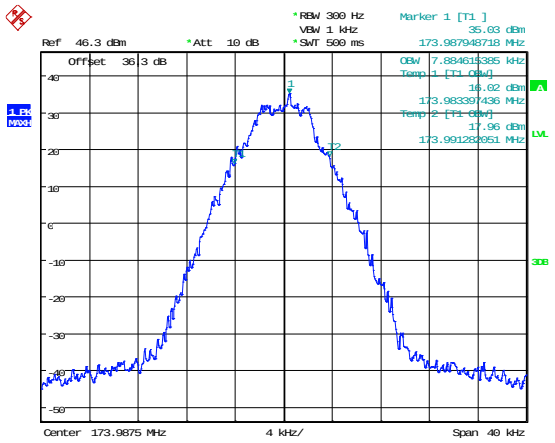
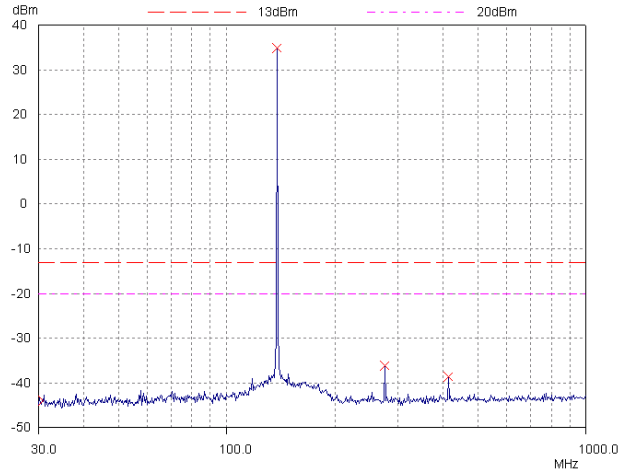
Analogue Modulation



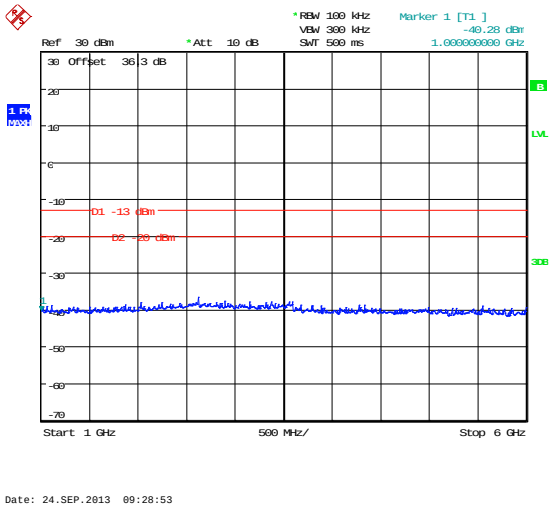
Date: 20.SEP.2013 15:40:13

Digital Modulation

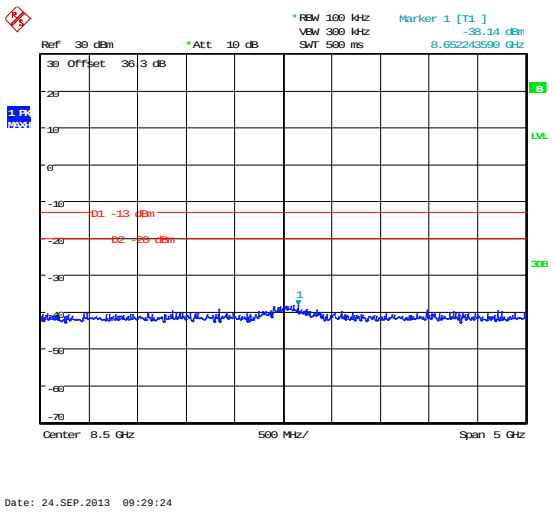
SDP660 - Spurious Emissions at antenna Terminals 138.0125 MHz



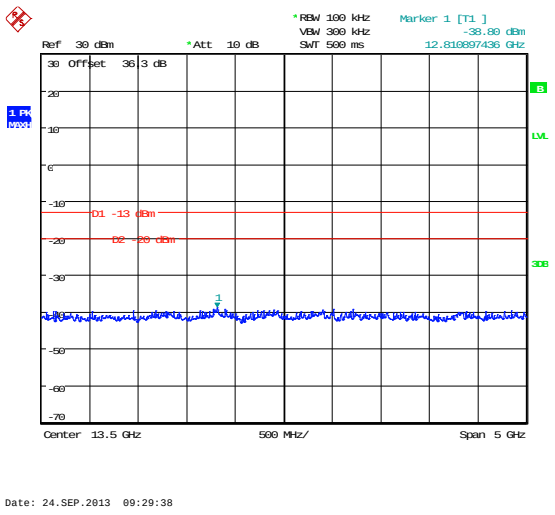
30MHz – 1GHz



1GHz – 6GHz

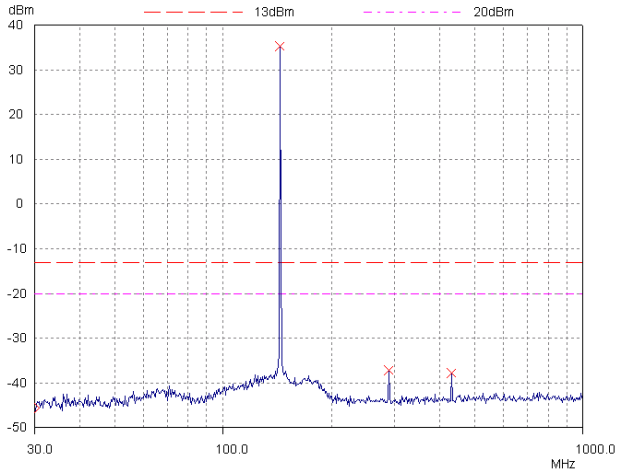


6GHz – 11GHz

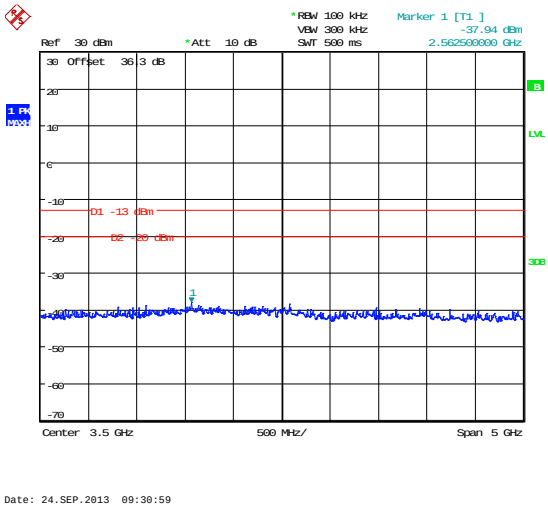


11GHz – 16GHz

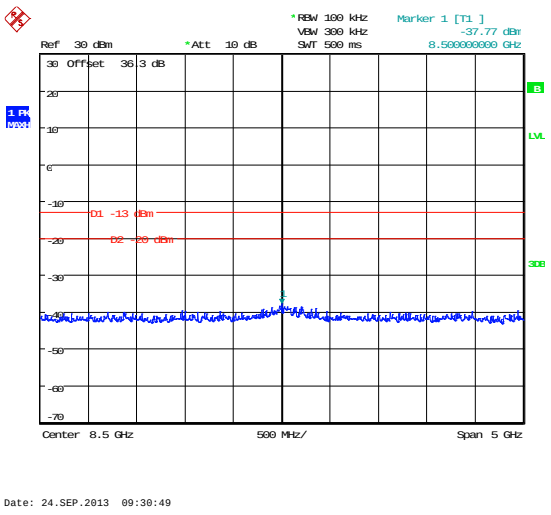
SDP660 - Spurious Emissions at antenna Terminals 143.9875MHz



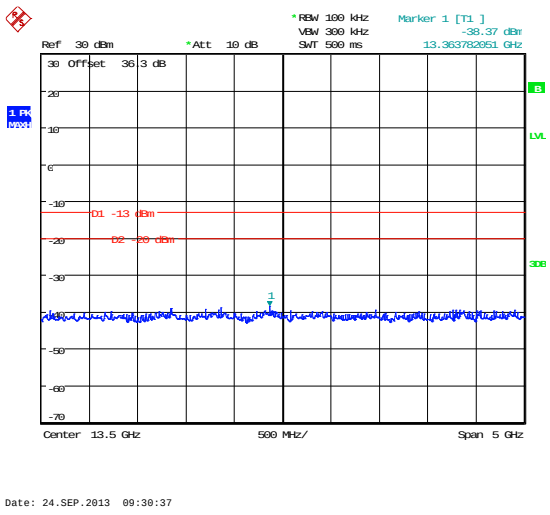
30MHz – 1GHz



1GHz – 6GHz

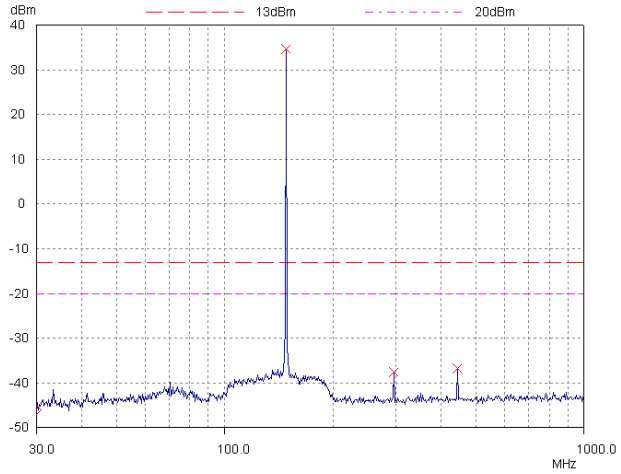


6GHz – 11GHz

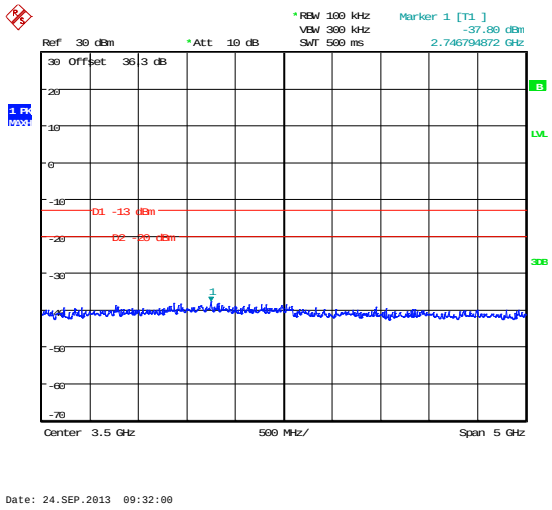


11GHz – 16GHz

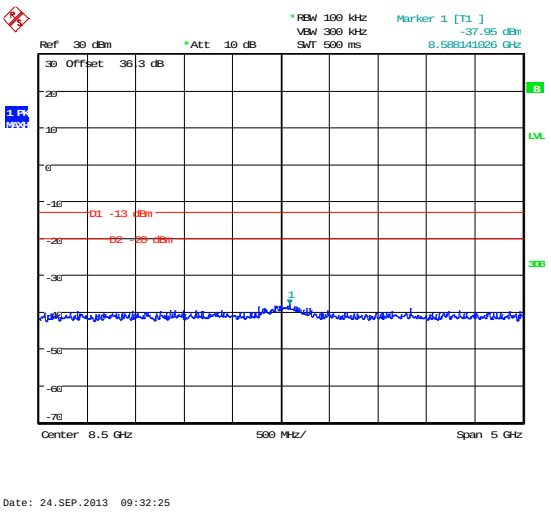
SDP660 - Spurious Emissions at antenna Terminals 148.0125 MHz



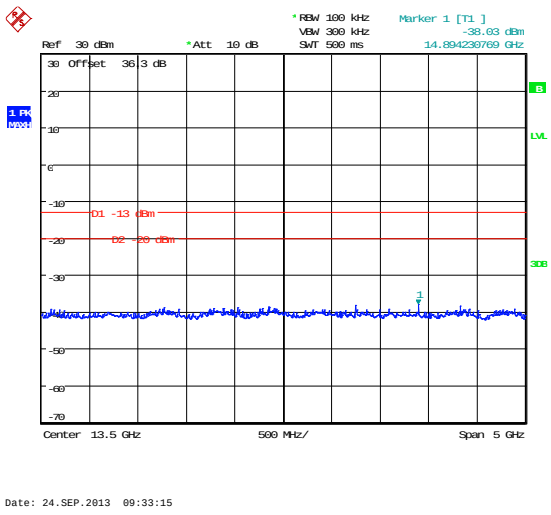
30MHz – 1GHz



1GHz – 6GHz

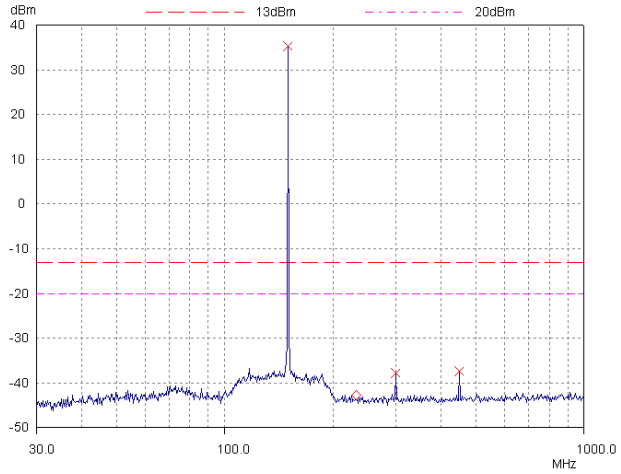


6GHz – 11GHz

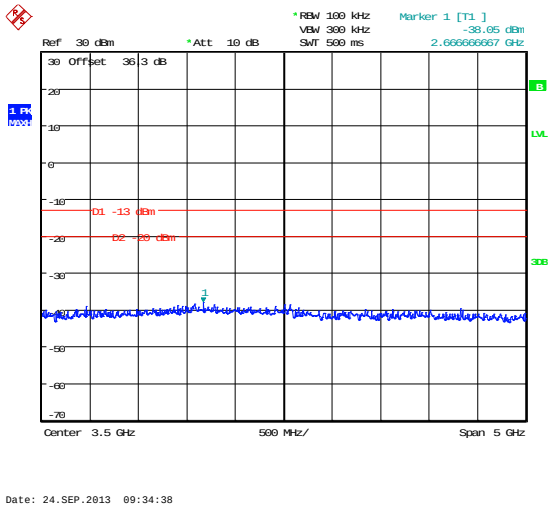


11GHz – 16GHz

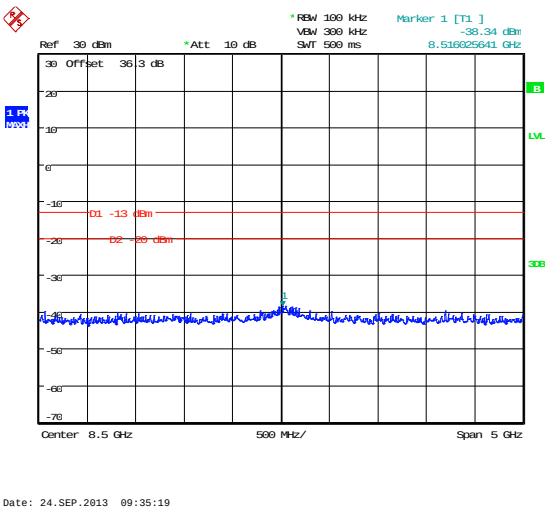
SDP660 - Spurious Emissions at antenna Terminals 149.8875 MHz



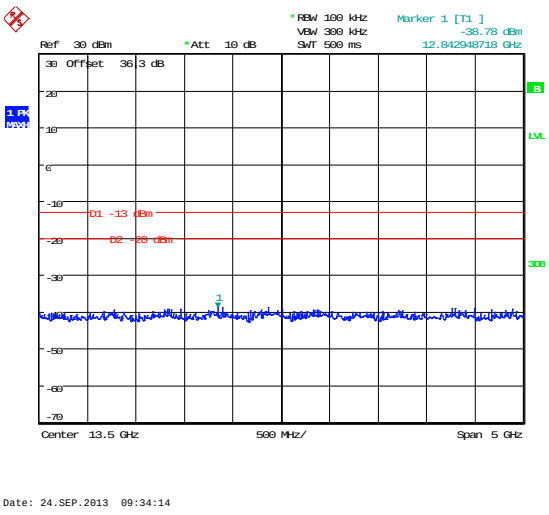
30MHz – 1GHz



1GHz – 6GHz

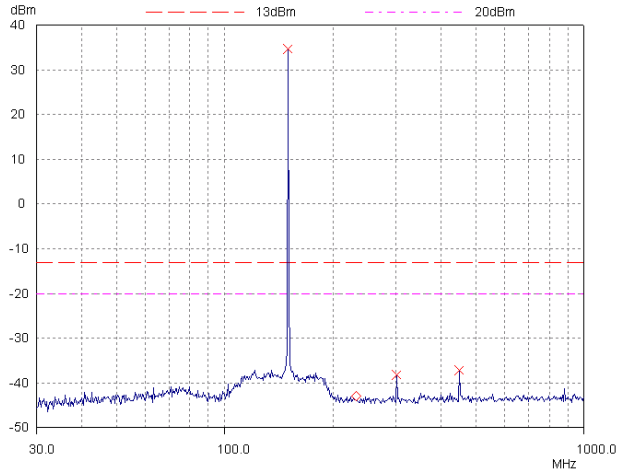


6GHz – 11GHz

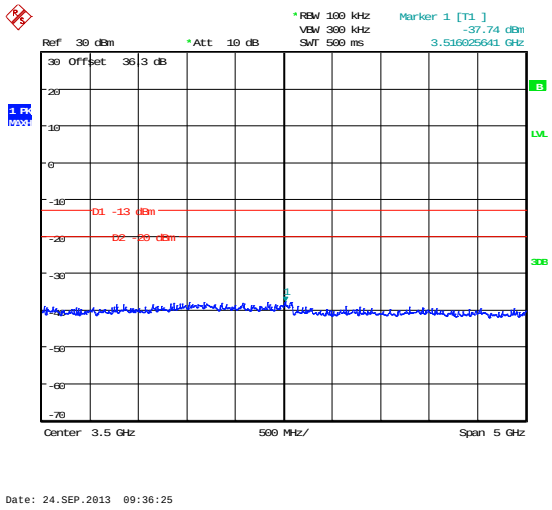


11GHz – 16GHz

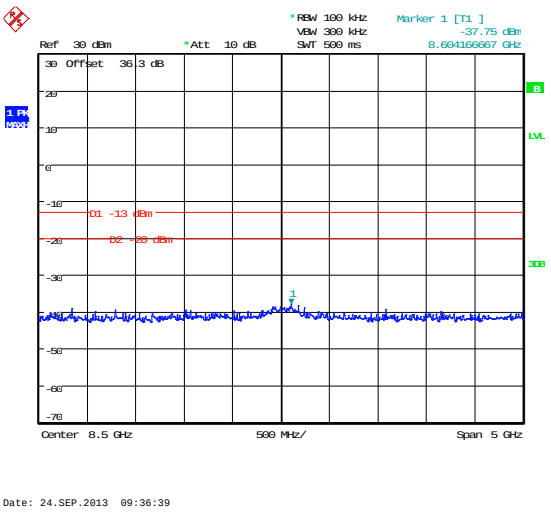
SDP660 - Spurious Emissions at antenna Terminals 150.0125 MHz



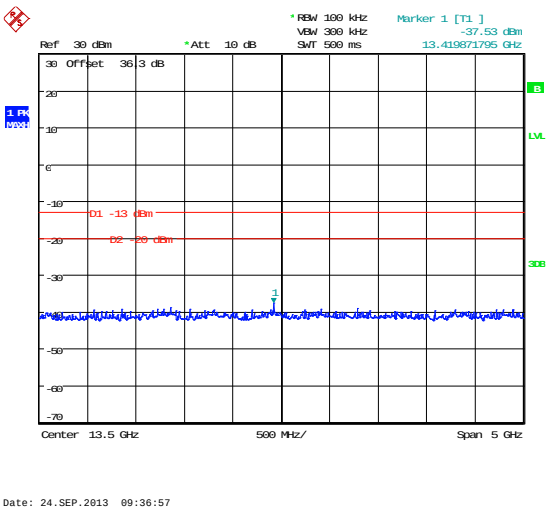
30MHz – 1GHz



1GHz – 6GHz

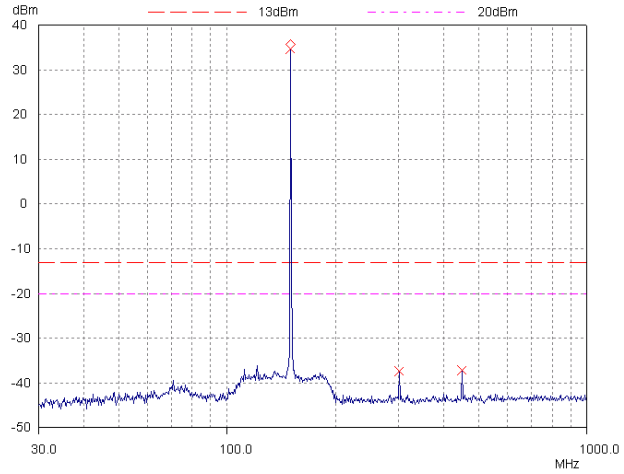


6GHz – 11GHz

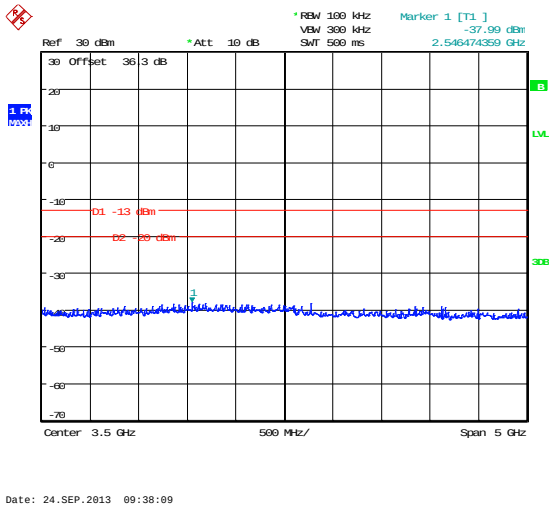


11GHz – 16GHz

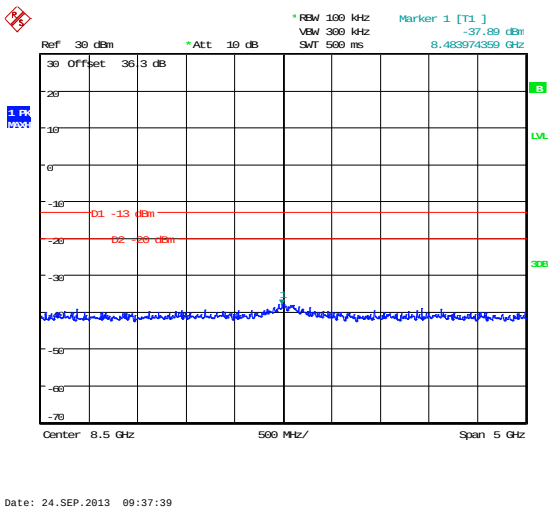
SDP660 - Spurious Emissions at antenna Terminals 150.0625 MHz



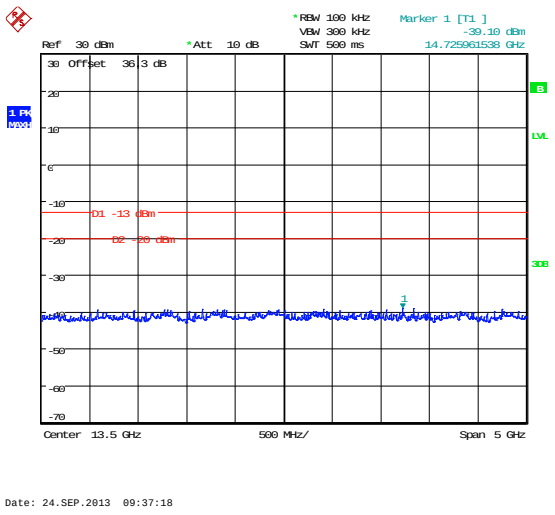
30MHz – 1GHz



1GHz – 6GHz

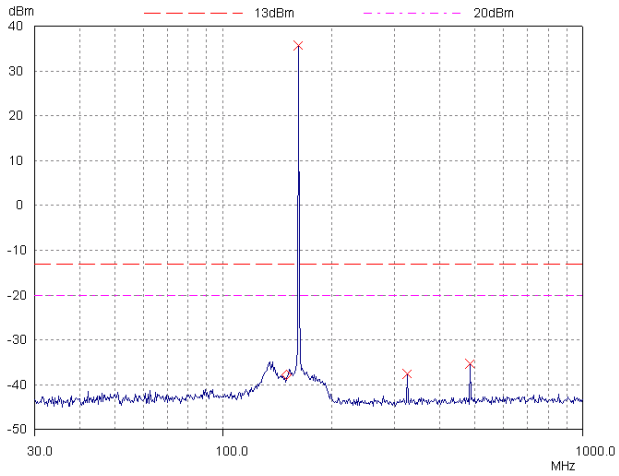


6GHz – 11GHz

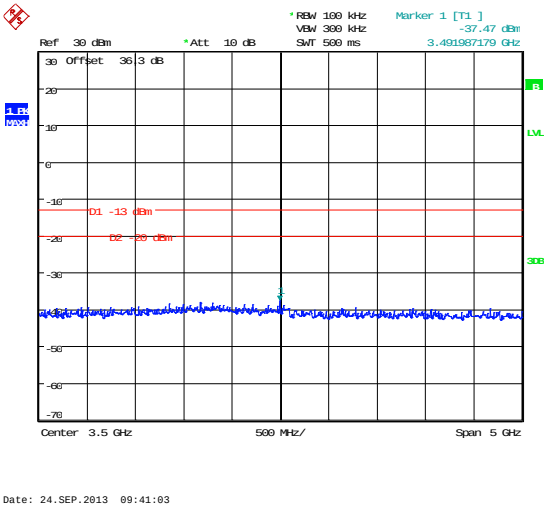


11GHz – 16GHz

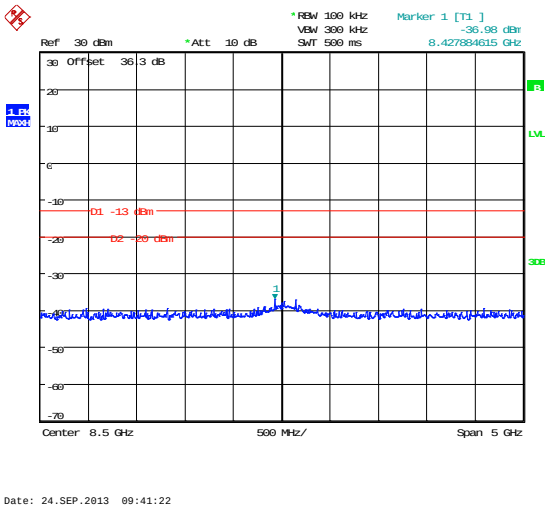
SDP660 - Spurious Emissions at antenna Terminals 162.0000 MHz



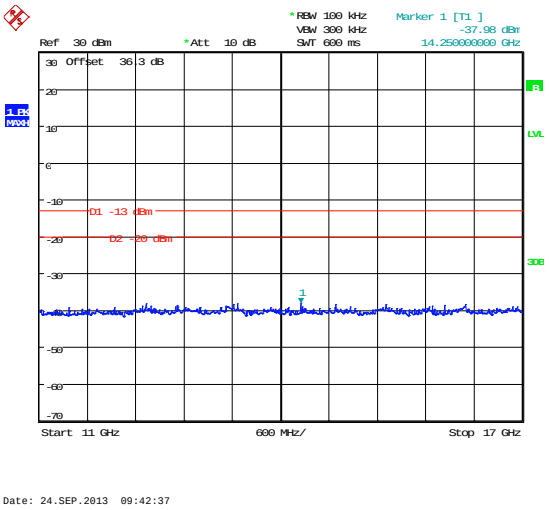
30MHz – 1GHz



1GHz – 6GHz

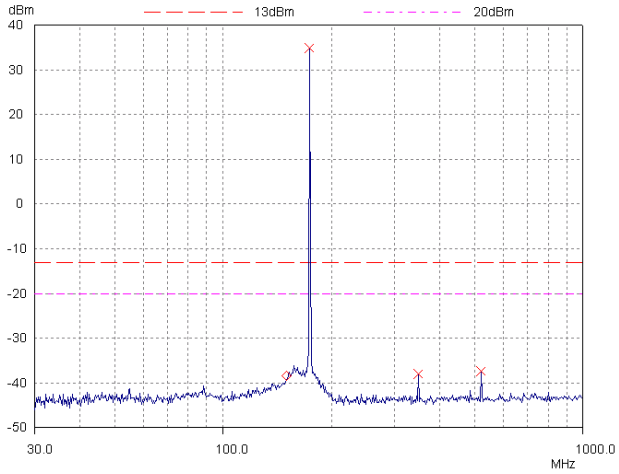


6GHz – 11GHz

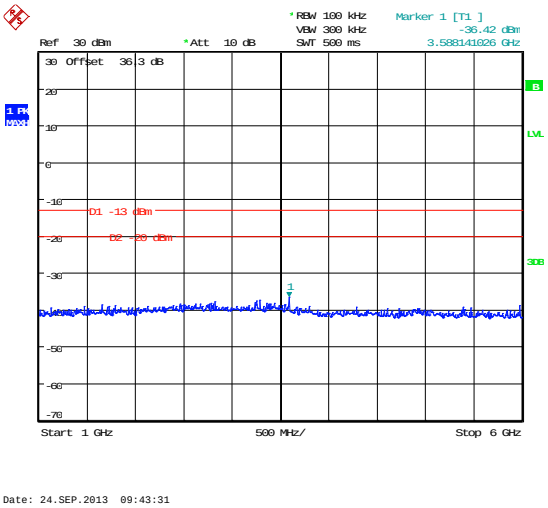


11GHz – 16GHz

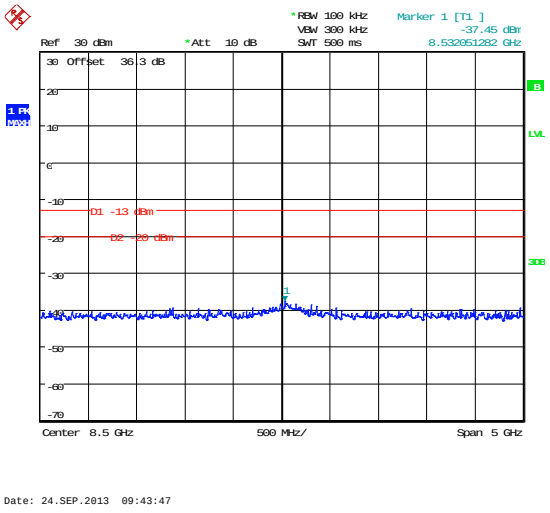
SDP660 - Spurious Emissions at antenna Terminals 173.9875 MHz



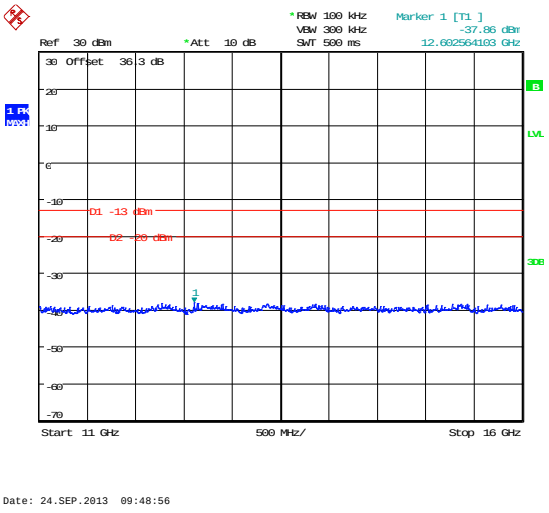
30MHz – 1GHz



1GHz – 6GHz

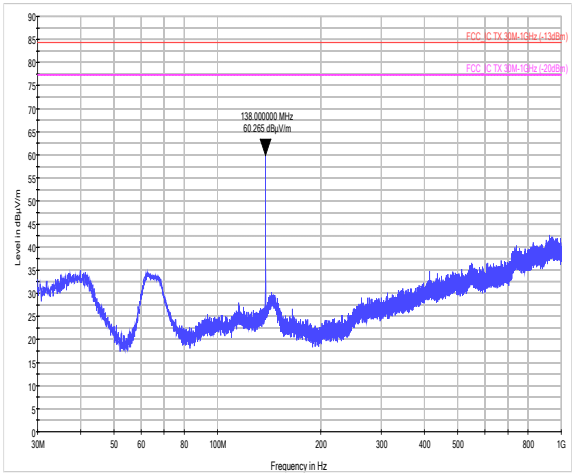


6GHz – 11GHz

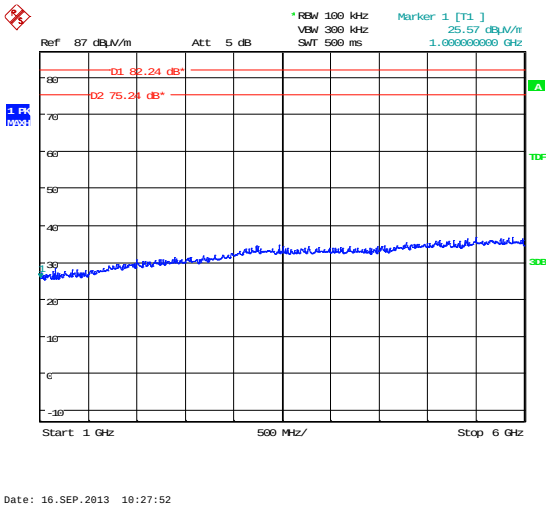


11GHz – 16GHz

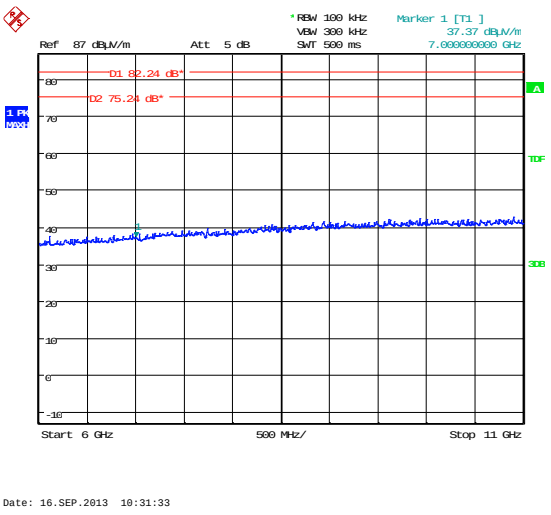
SDP650 - Field Strength of Spurious Emissions 138.0125 MHz



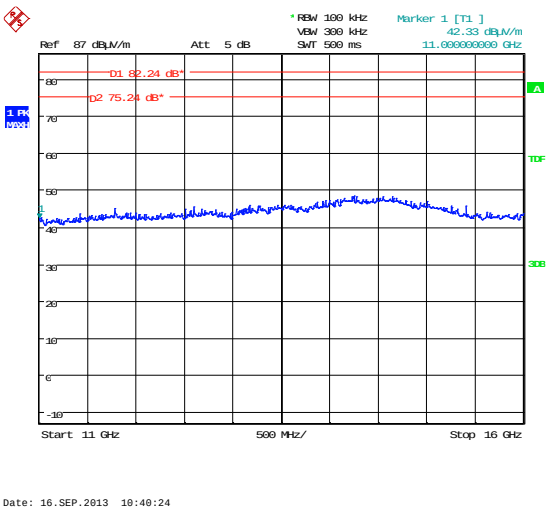
30MHz – 1GHz



1GHz – 6GHz

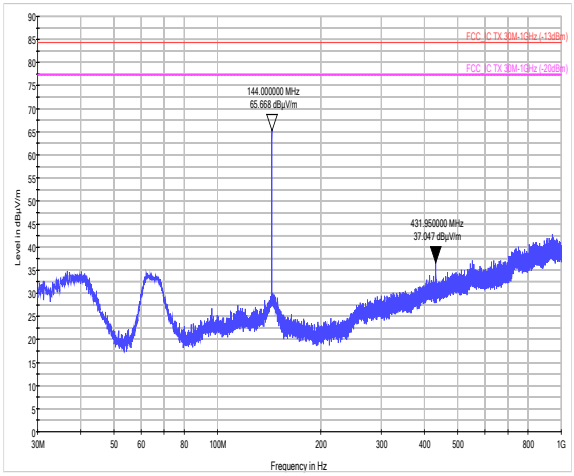


6GHz – 11GHz

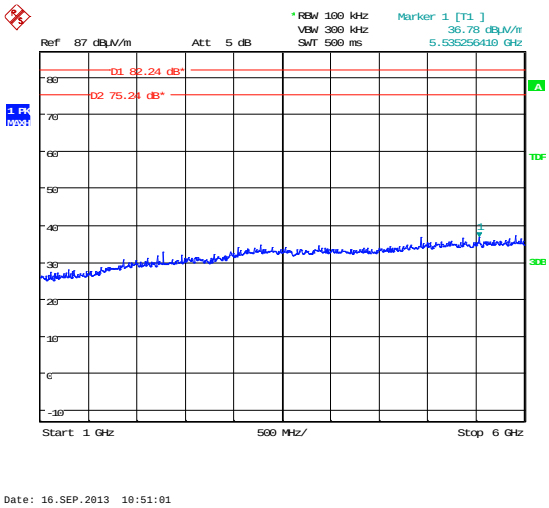


11GHz – 16GHz

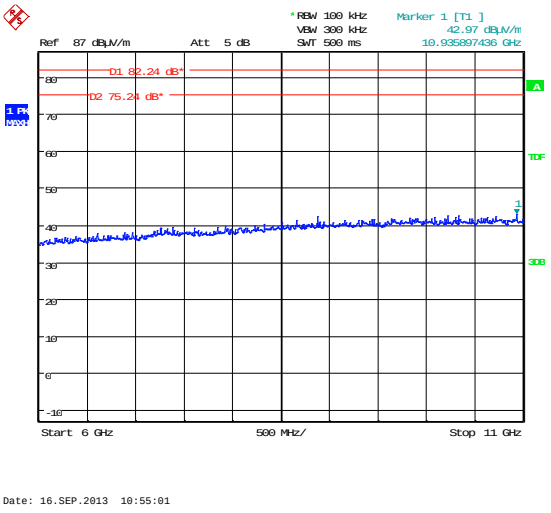
SDP650 - Field Strength of Spurious Emissions 143.9875MHz



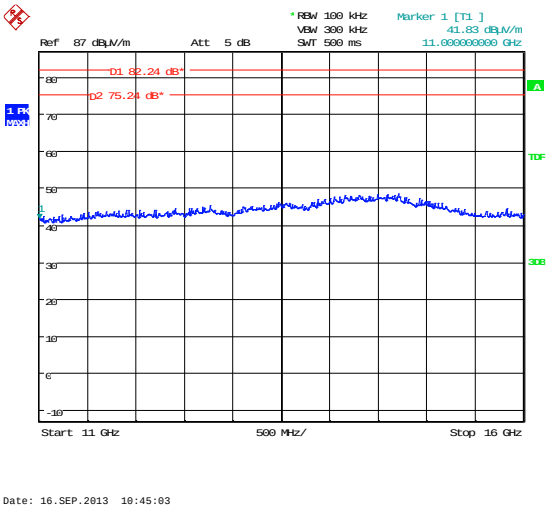
30MHz – 1GHz



1GHz – 6GHz

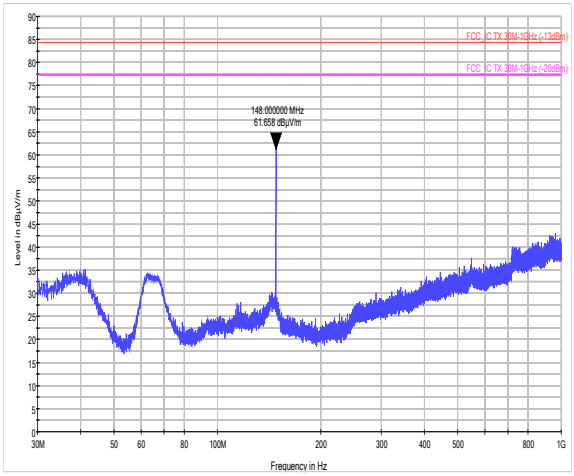


6GHz – 11GHz

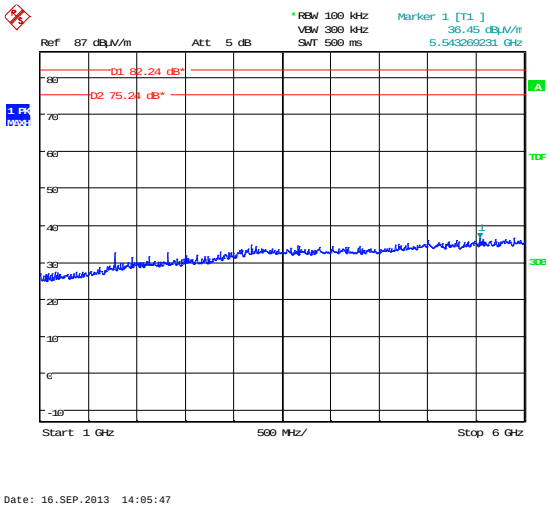


11GHz – 16GHz

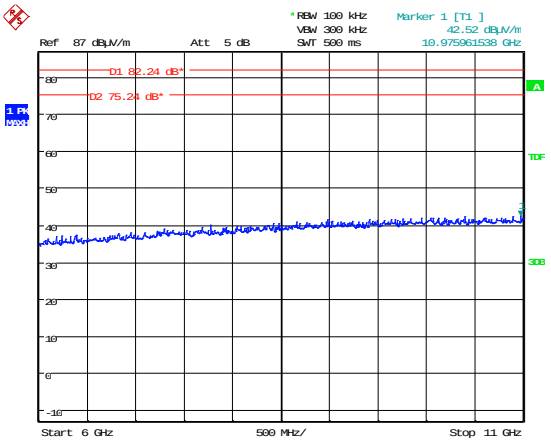
SDP650 - Field Strength of Spurious Emissions 148.0125 MHz



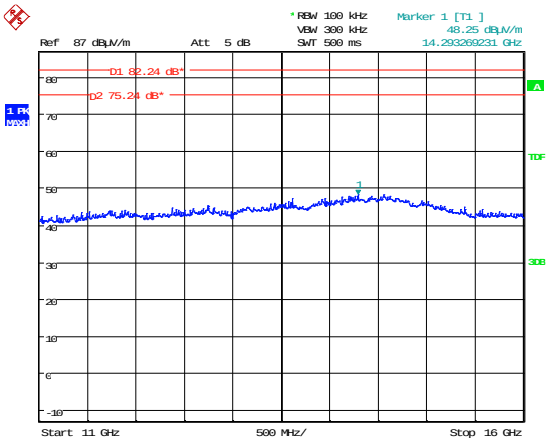
30MHz – 1GHz



1GHz – 6GHz

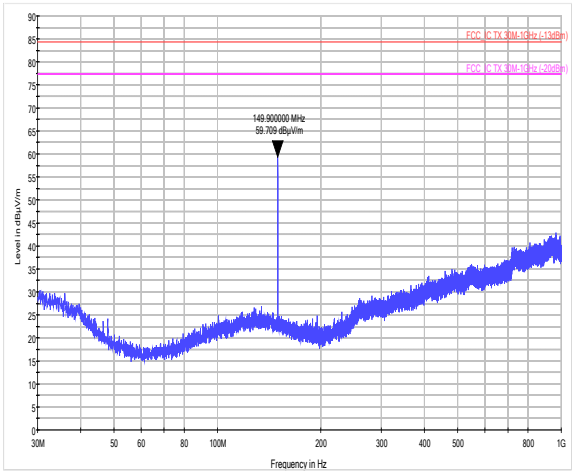


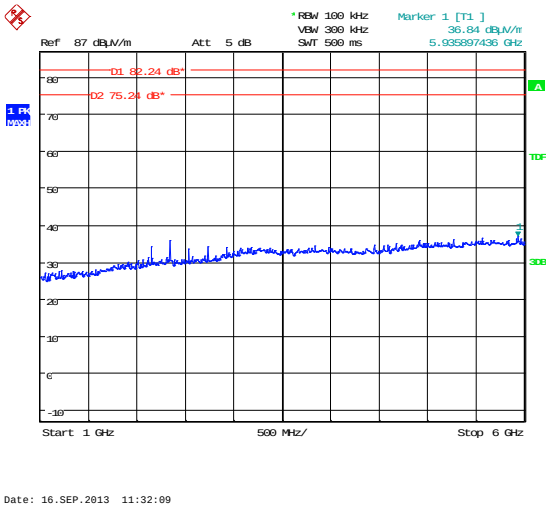
6GHz – 11GHz



11GHz – 16GHz

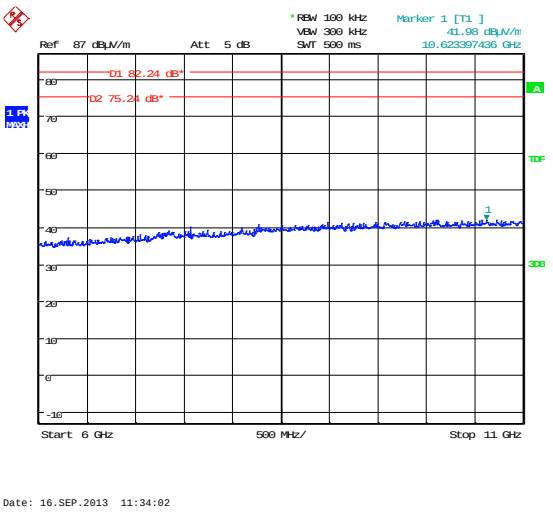
SDP650 - Field Strength of Spurious Emissions 149.8875 MHz

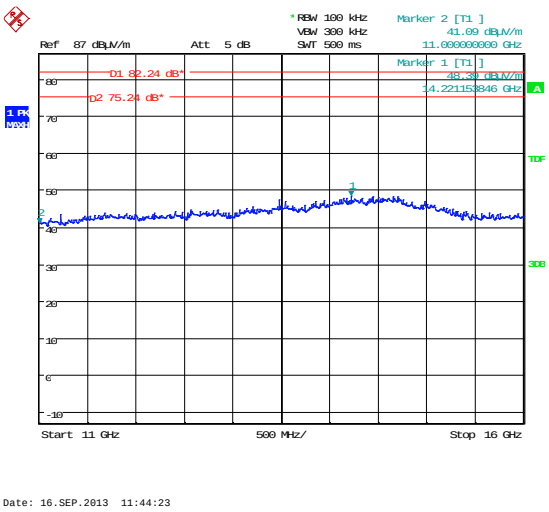




30MHz – 1GHz

1GHz – 6GHz

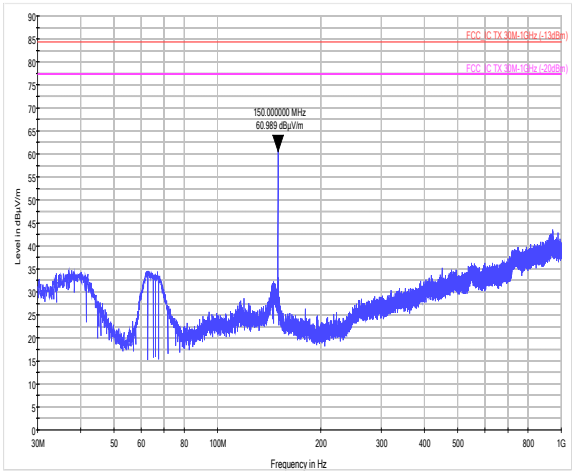




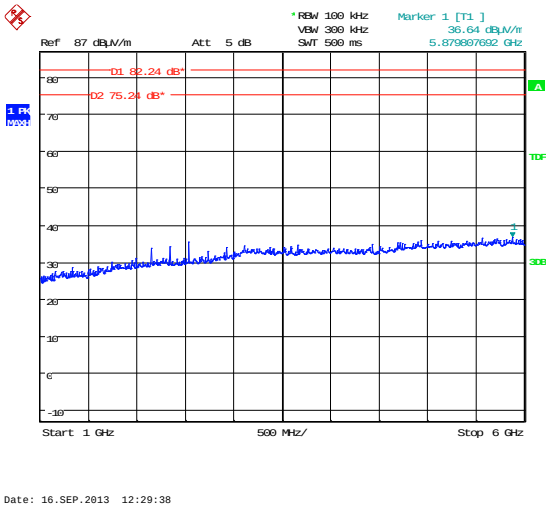
6GHz – 11GHz

11GHz – 16GHz

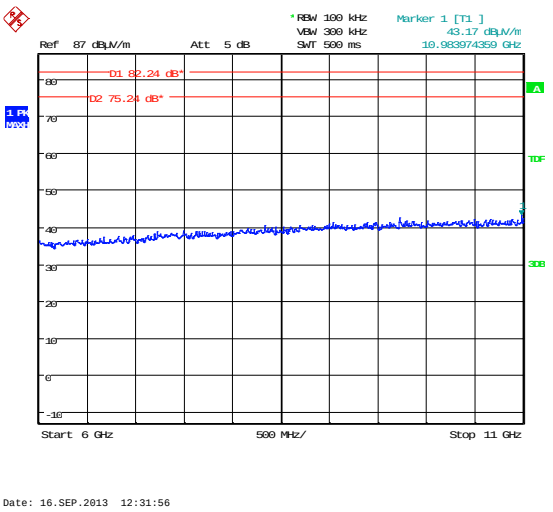
SDP650 - Field Strength of Spurious Emissions 150.0125 MHz



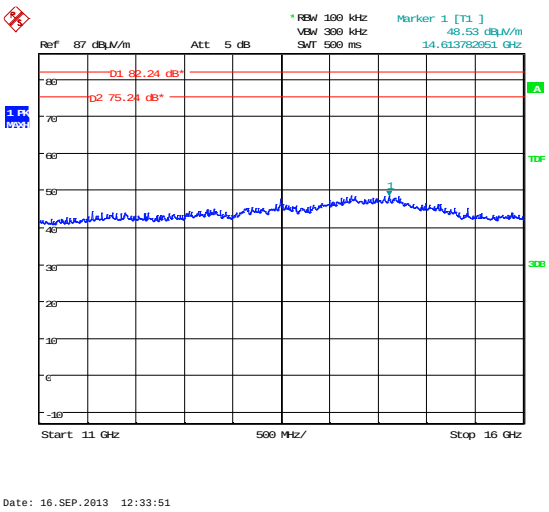
30MHz – 1GHz



1GHz – 6GHz

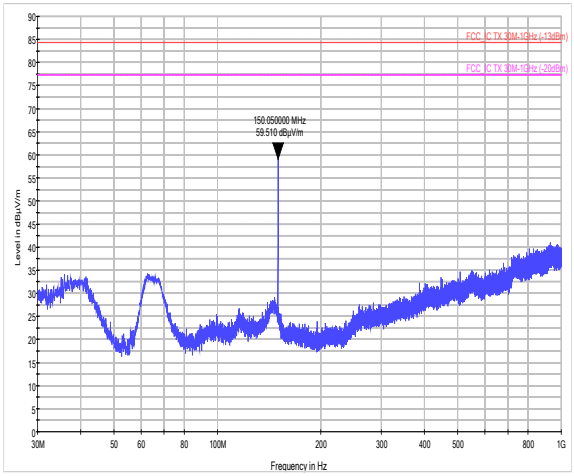


6GHz – 11GHz

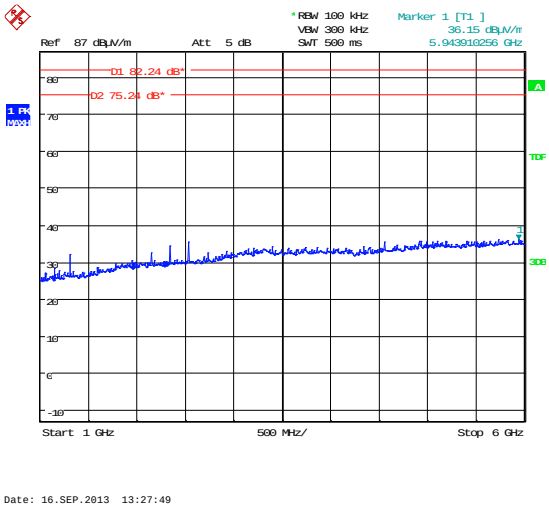


11GHz – 16GHz

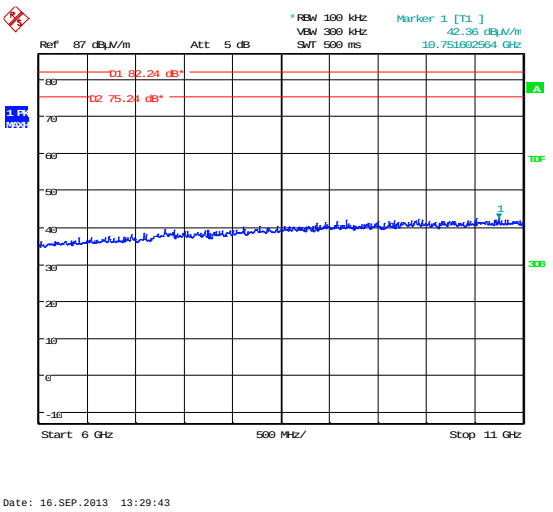
SDP650 - Field Strength of Spurious Emissions 150.0625 MHz



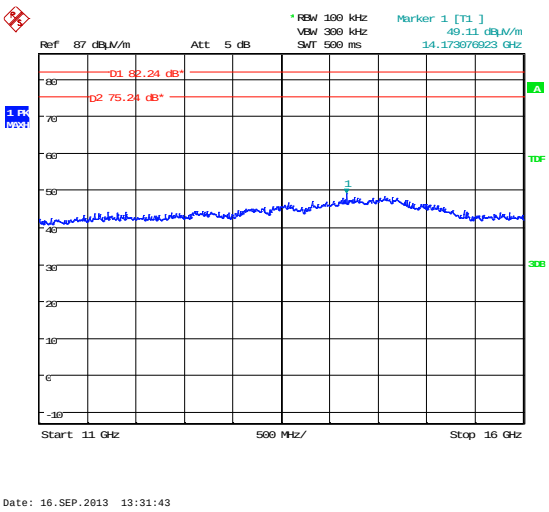
30MHz – 1GHz



1GHz – 6GHz

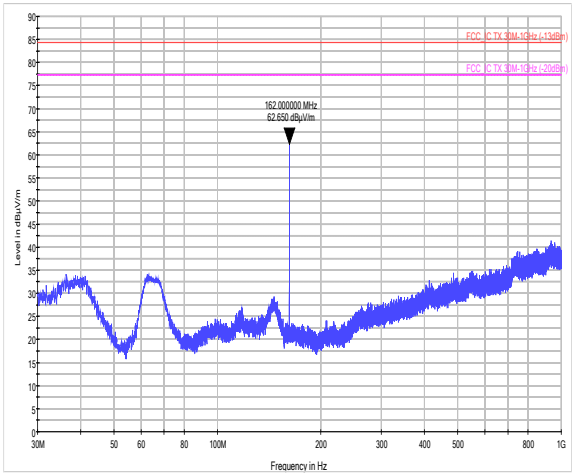


6GHz – 11GHz

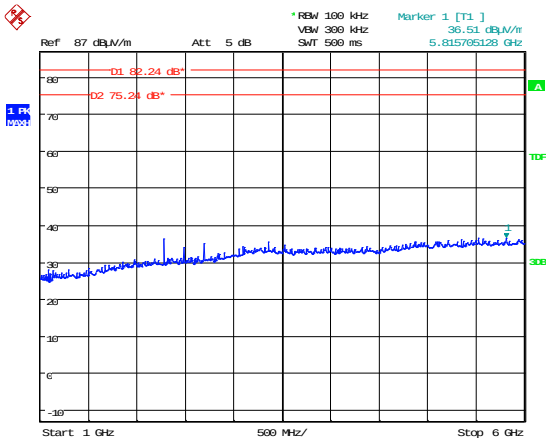


11GHz – 16GHz

SDP650 - Field Strength of Spurious Emissions 162.0000 MHz



30MHz – 1GHz



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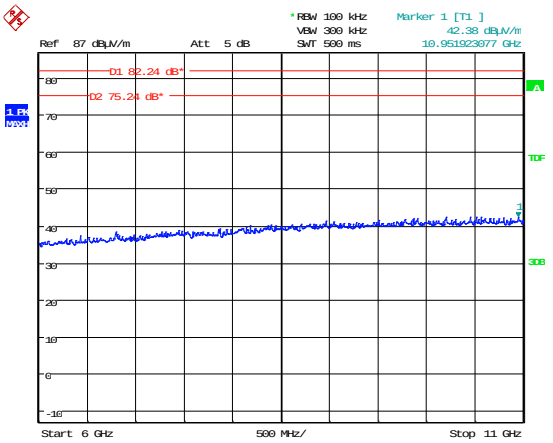
1GHz – 6GHz



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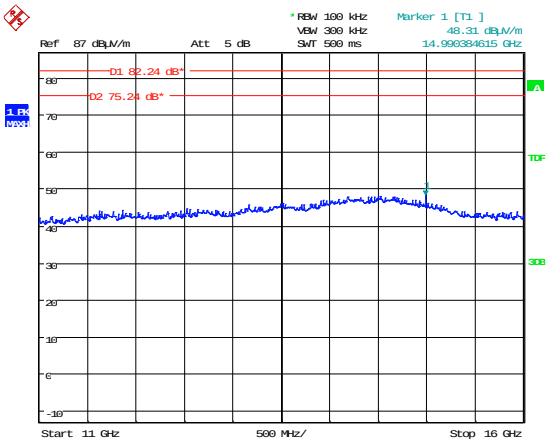
6GHz – 11GHz



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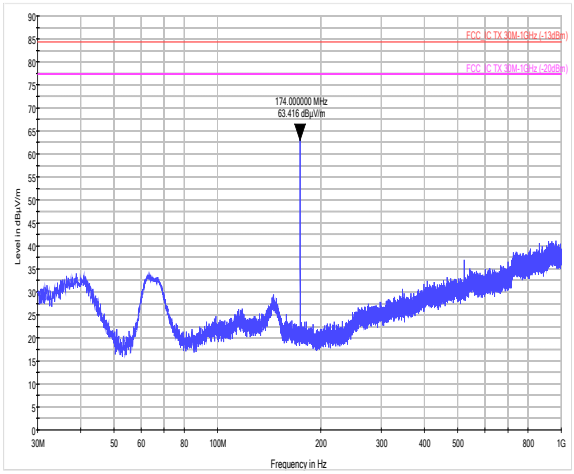
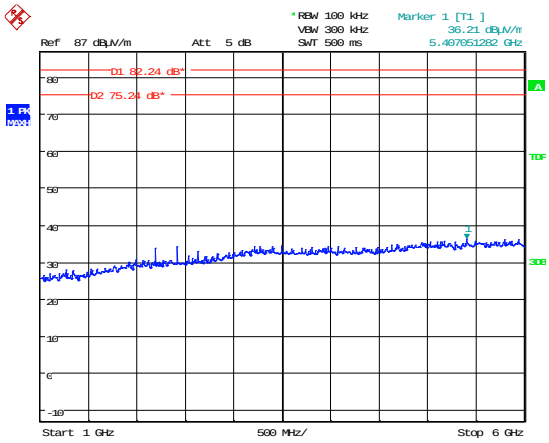
11GHz – 16GHz

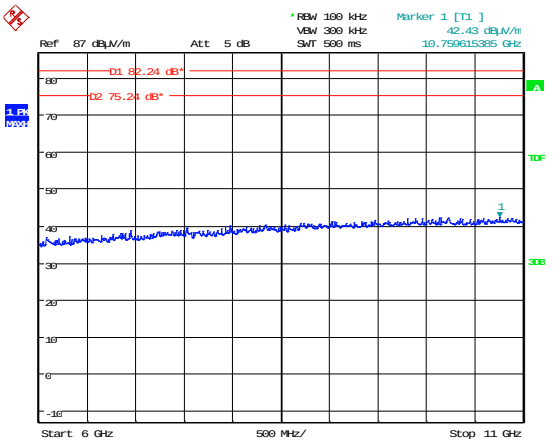
SDP650 - Field Strength of Spurious Emissions 173.9875 MHz



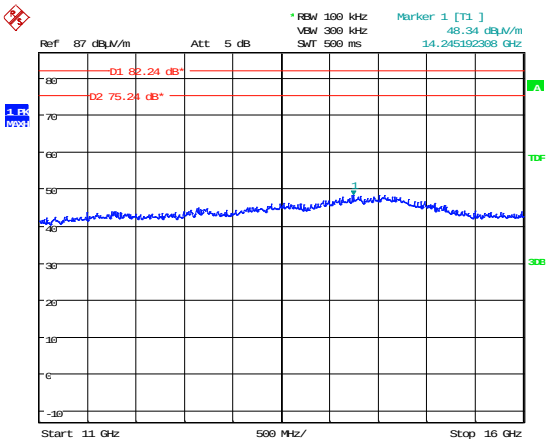
30MHz – 1GHz



1GHz – 6GHz

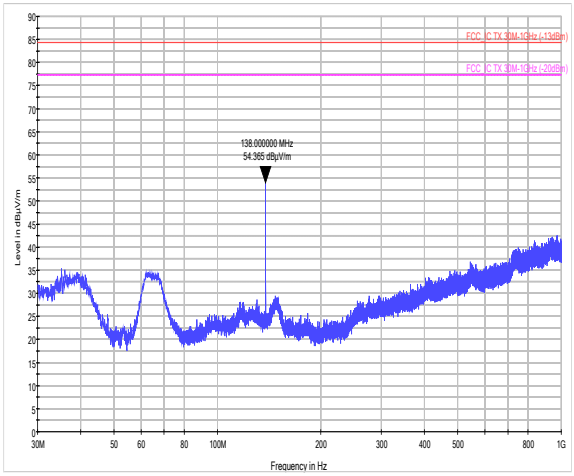


6GHz – 11GHz

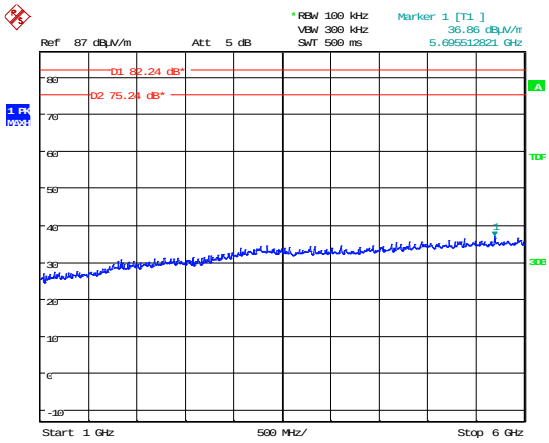


11GHz – 16GHz

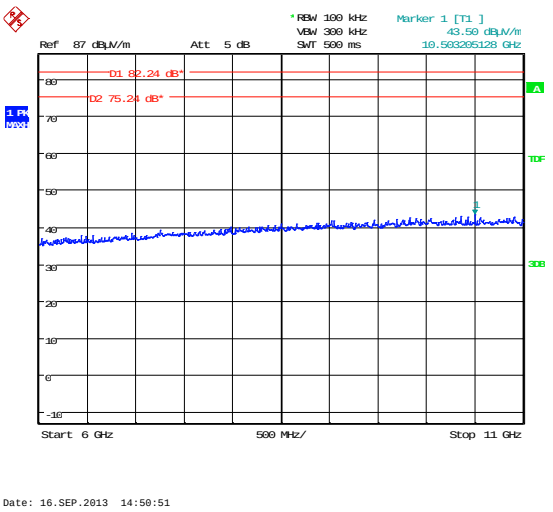
SDP660 - Field Strength of Spurious Emissions 138.0125 MHz



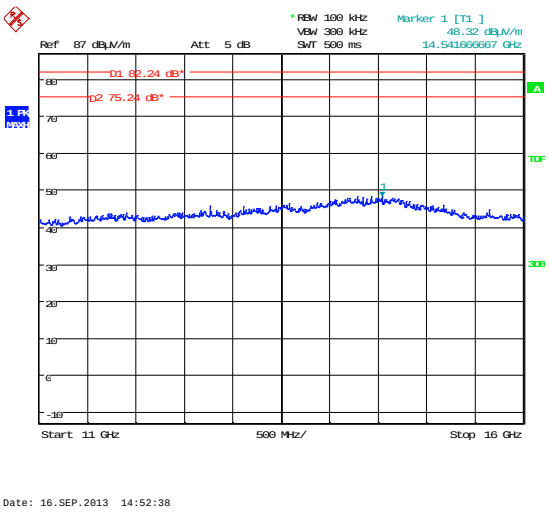
30MHz – 1GHz



1GHz – 6GHz

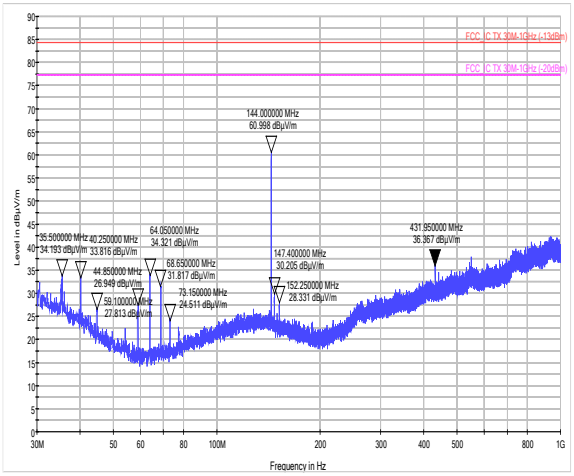


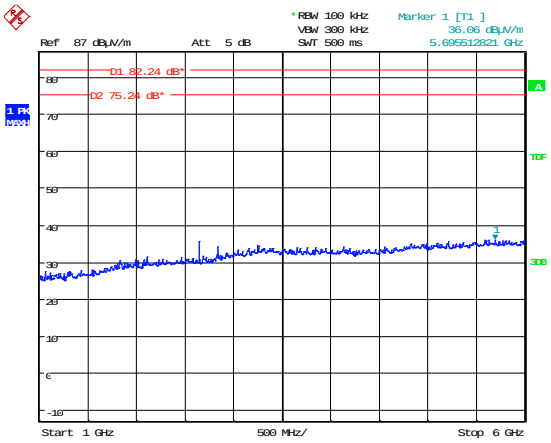
6GHz – 11GHz



11GHz – 16GHz

SDP660 - Field Strength of Spurious Emissions 143.9875MHz





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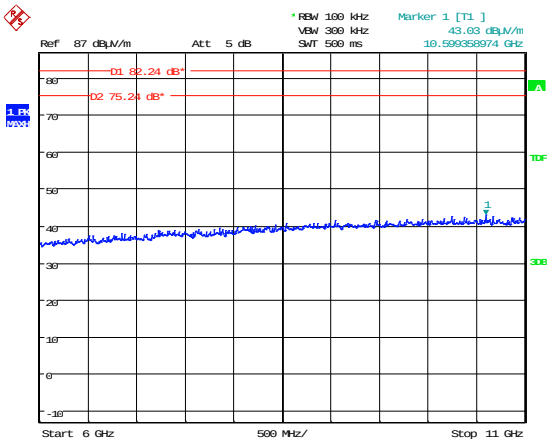
30MHz – 1GHz

1GHz – 6GHz



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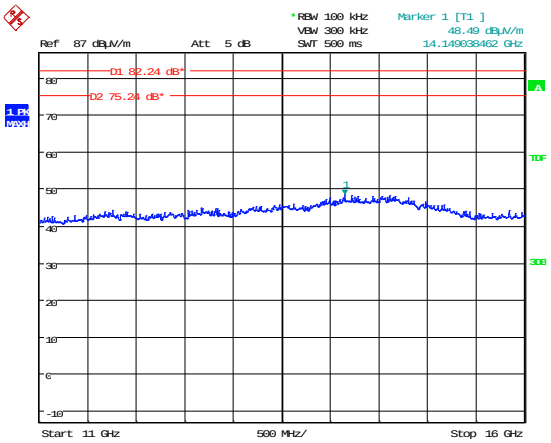

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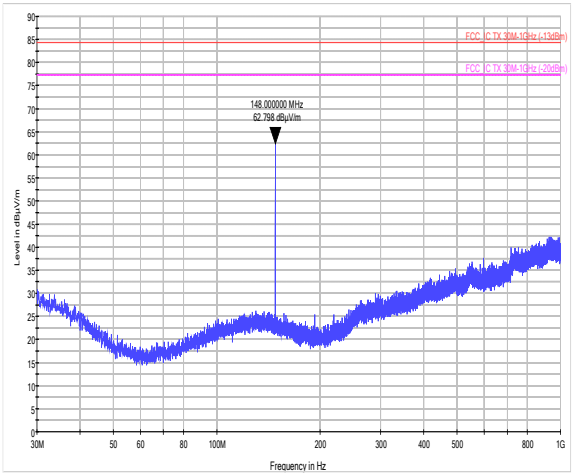
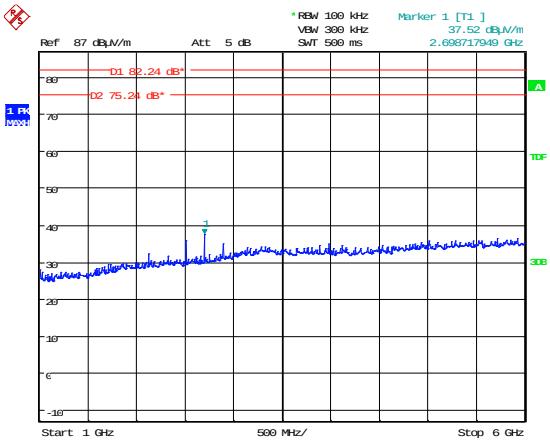
6GHz – 11GHz

11GHz – 16GHz

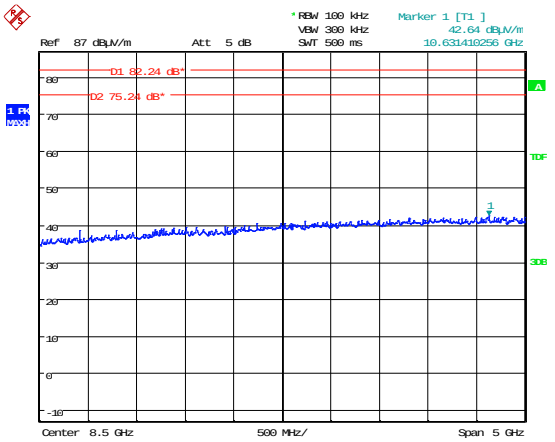
SDP660 - Field Strength of Spurious Emissions 148.0125 MHz



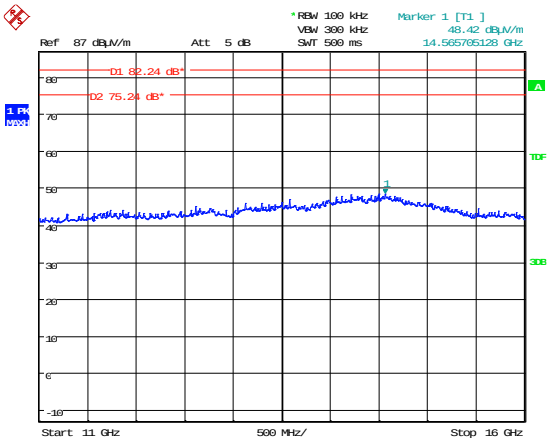
30MHz – 1GHz



1GHz – 6GHz

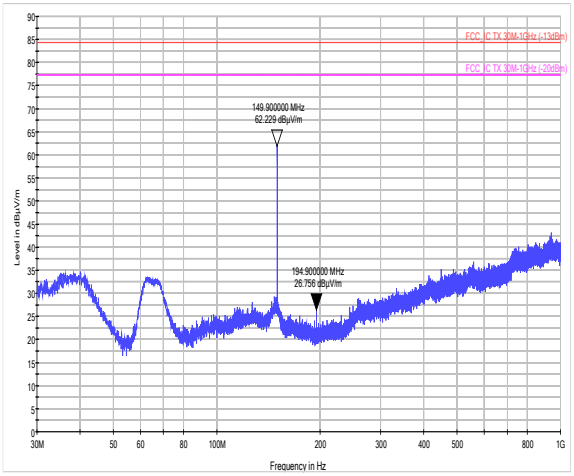


6GHz – 11GHz

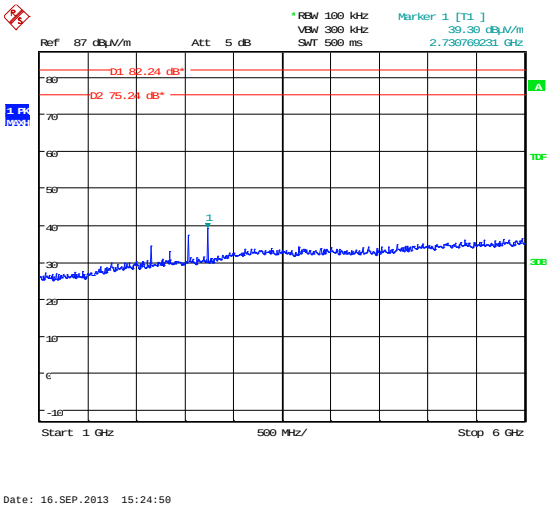


11GHz – 16GHz

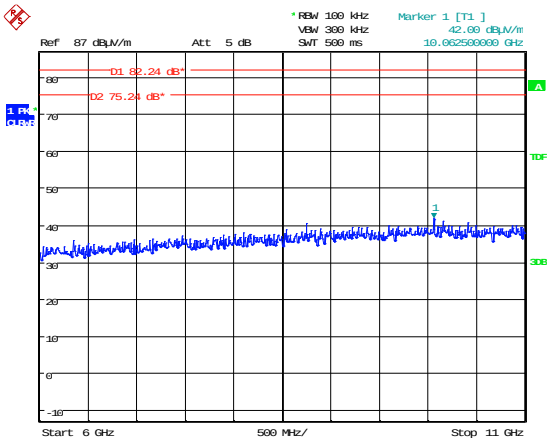
SDP660 - Field Strength of Spurious Emissions 149.8875 MHz



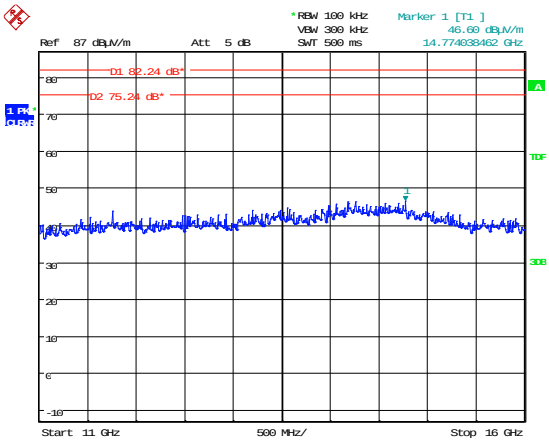
30MHz – 1GHz



1GHz – 6GHz

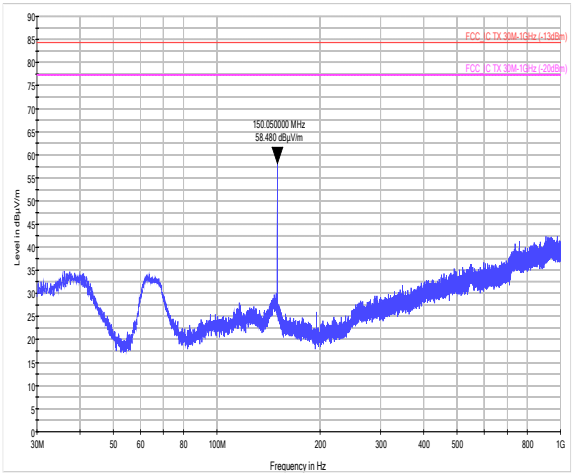


6GHz – 11GHz

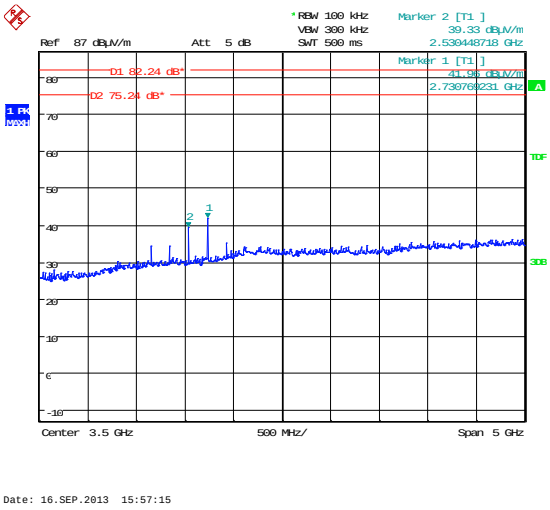


11GHz – 16GHz

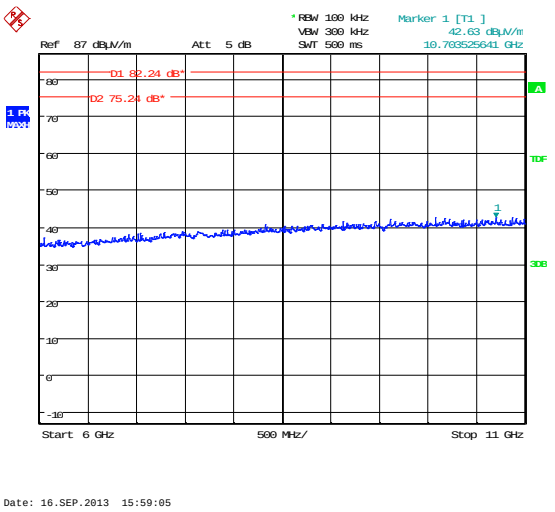
SDP660 - Field Strength of Spurious Emissions 150.0125 MHz



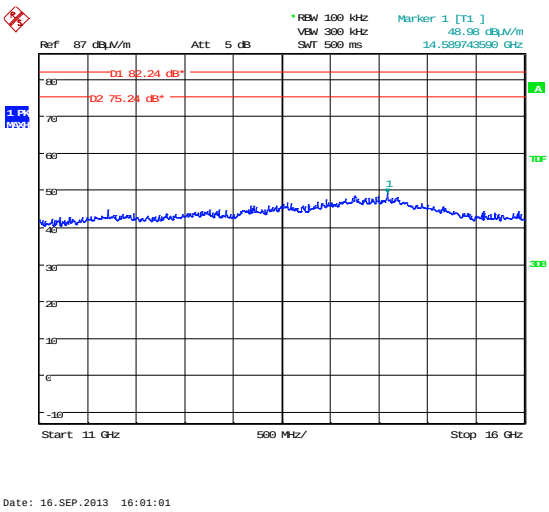
30MHz – 1GHz



1GHz – 6GHz

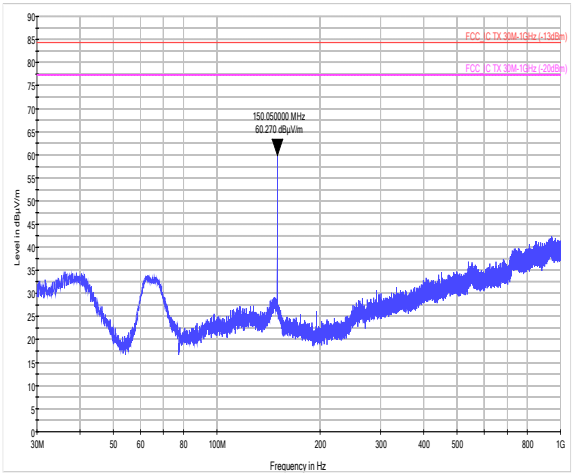


6GHz – 11GHz

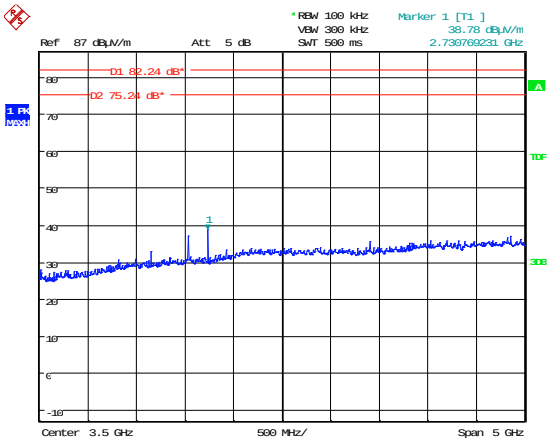


11GHz – 16GHz

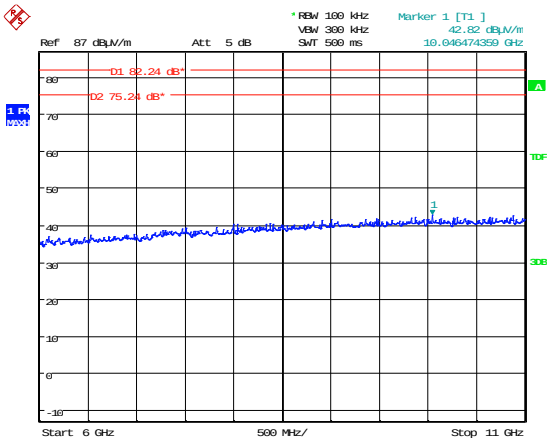
SDP660 - Field Strength of Spurious Emissions 150.0625 MHz



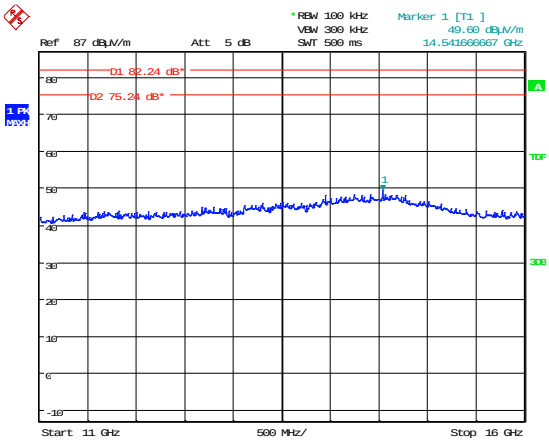
30MHz – 1GHz



1GHz – 6GHz

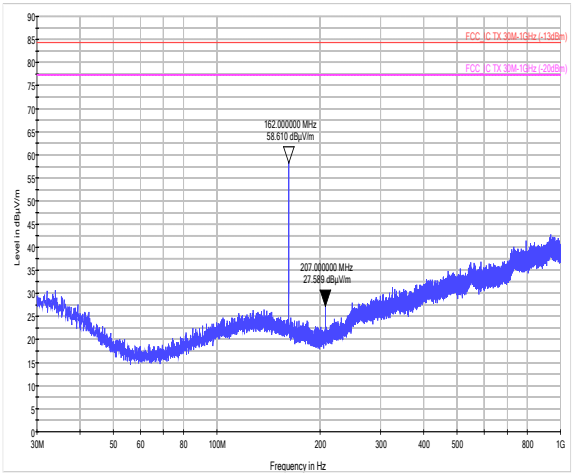


6GHz – 11GHz

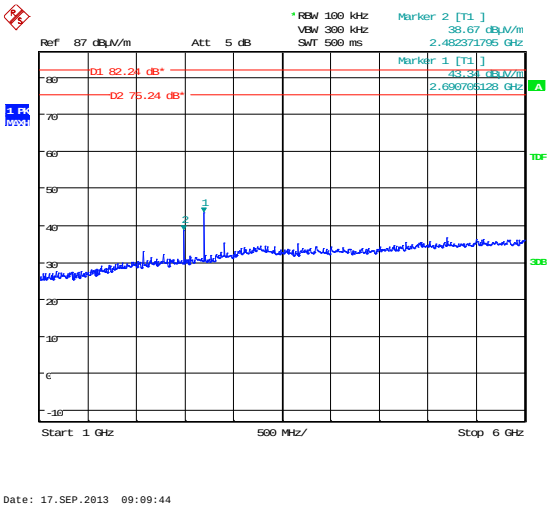


11GHz – 16GHz

SDP660 - Field Strength of Spurious Emissions 162.0000 MHz

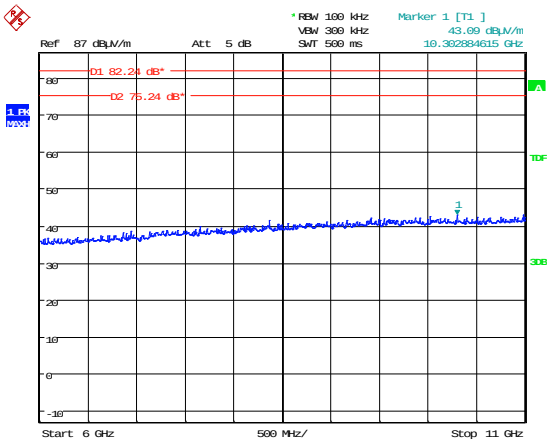


30MHz – 1GHz



Date: 17.SEP.2013 09:09:44

1GHz – 6GHz



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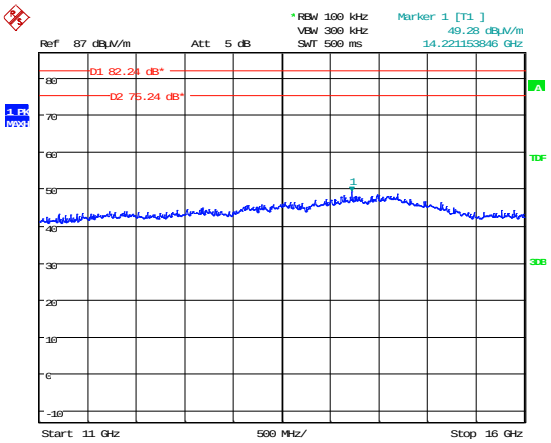
6GHz – 11GHz



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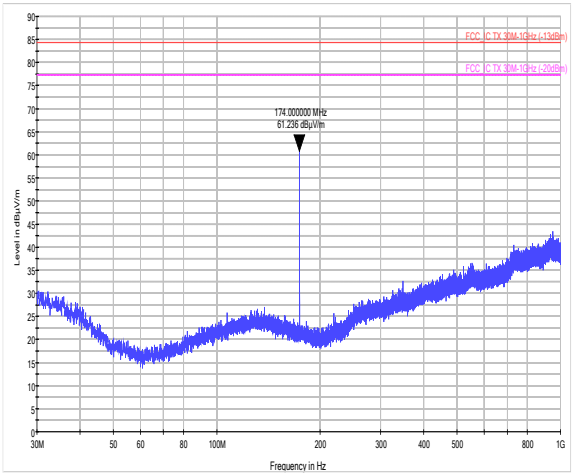
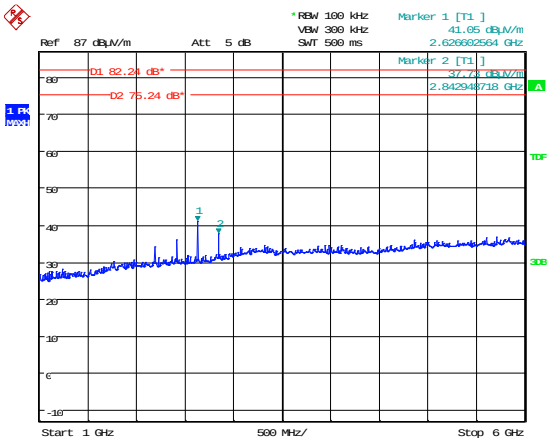
11GHz – 16GHz

SDP660 - Field Strength of Spurious Emissions 173.9875 MHz



30MHz – 1GHz



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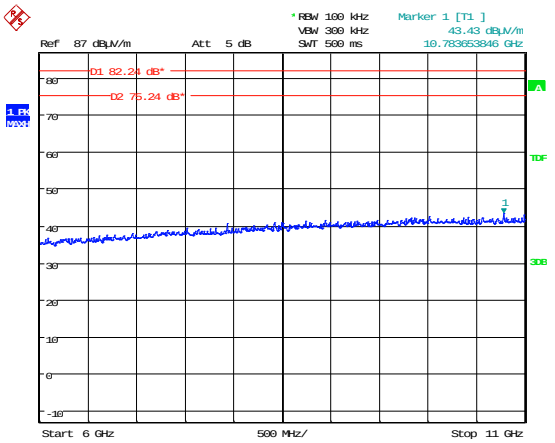
1GHz – 6GHz



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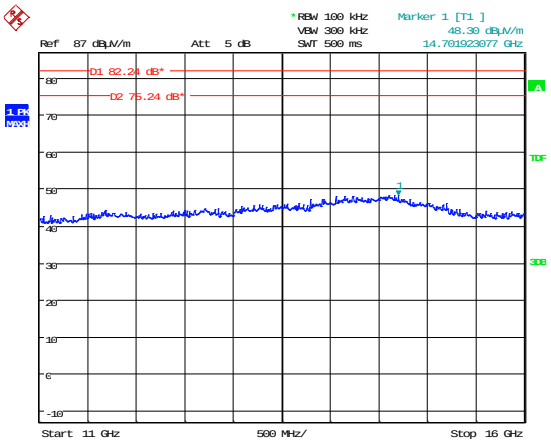
6GHz – 11GHz



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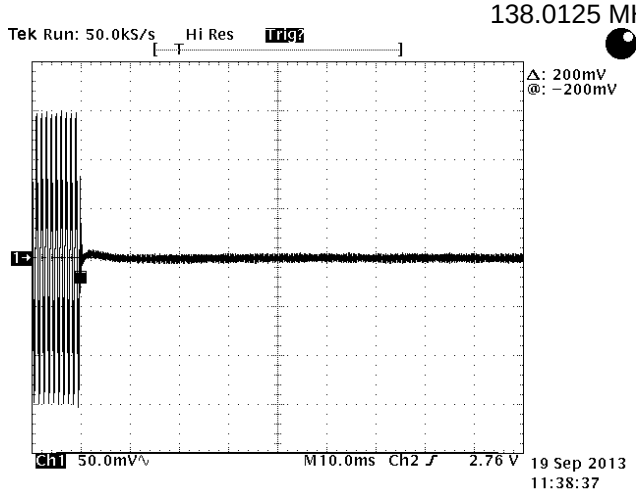
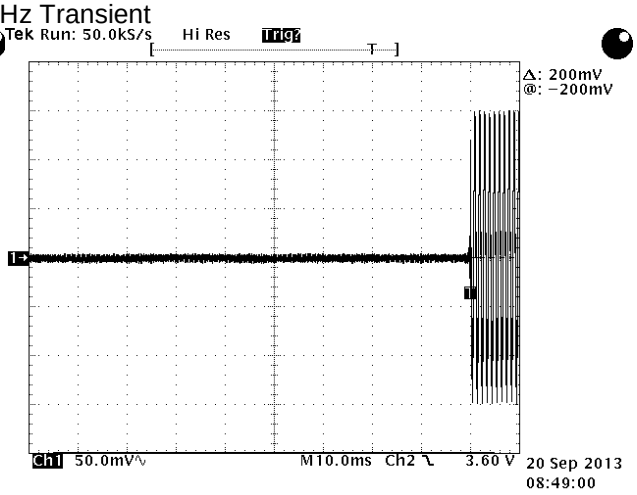
11GHz – 16GHz

138.0125 MHz Transient

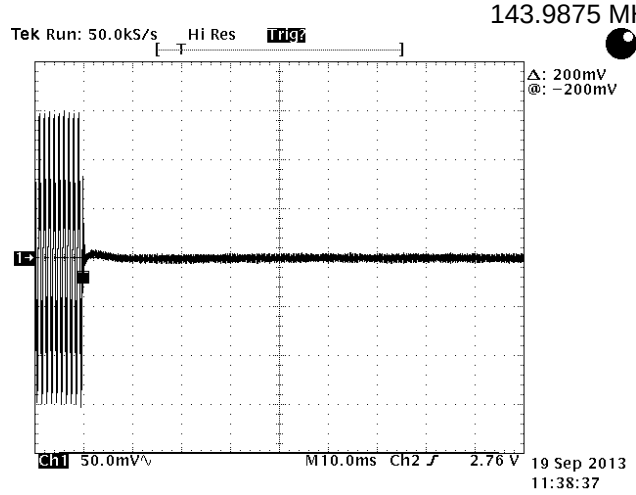


On Transient

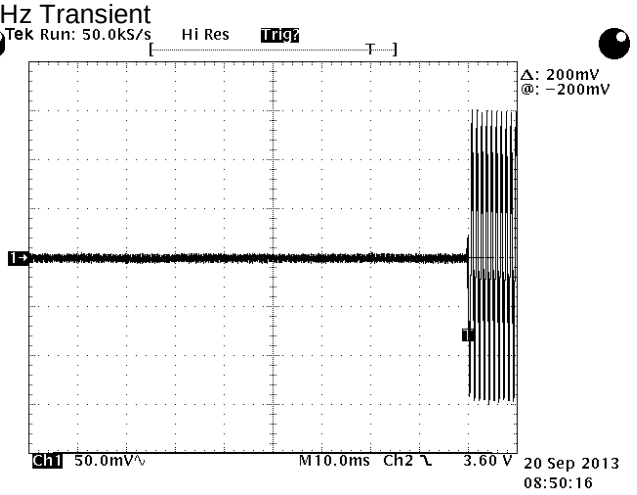


Off Transient

143.9875 MHz Transient

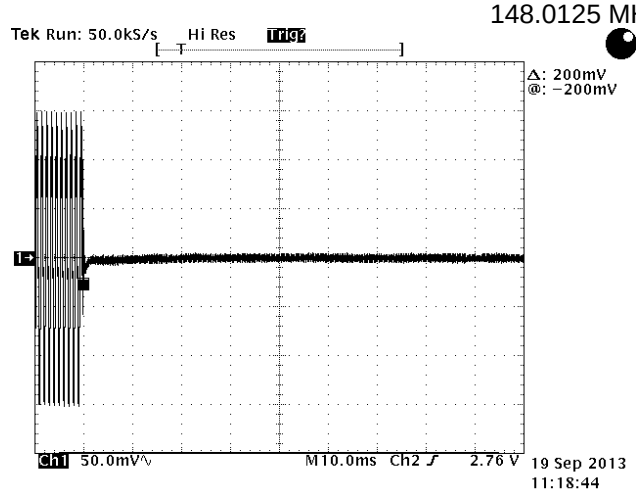


On Transient

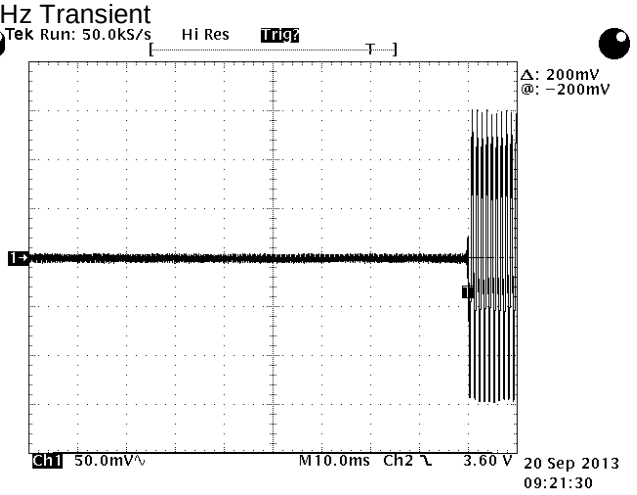


Off Transient

148.0125 MHz Transient

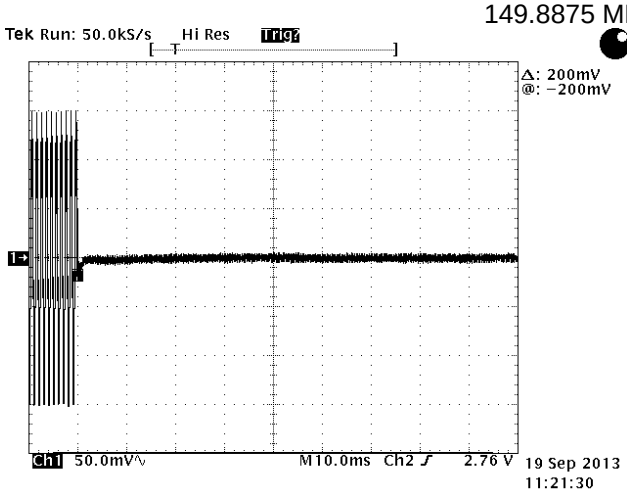


On Transient

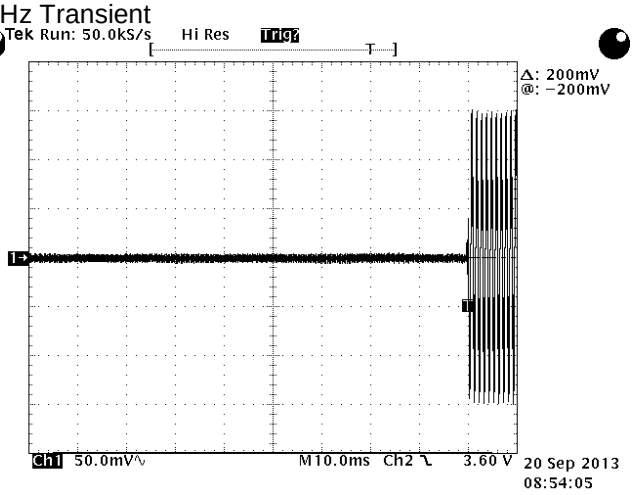


Off Transient

149.8875 MHz Transient

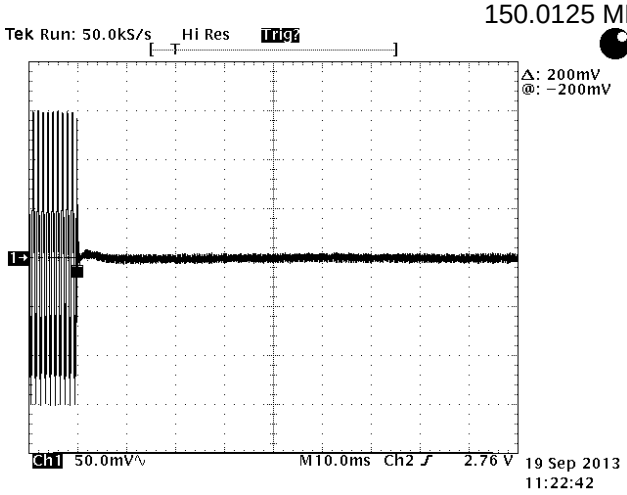


On Transient

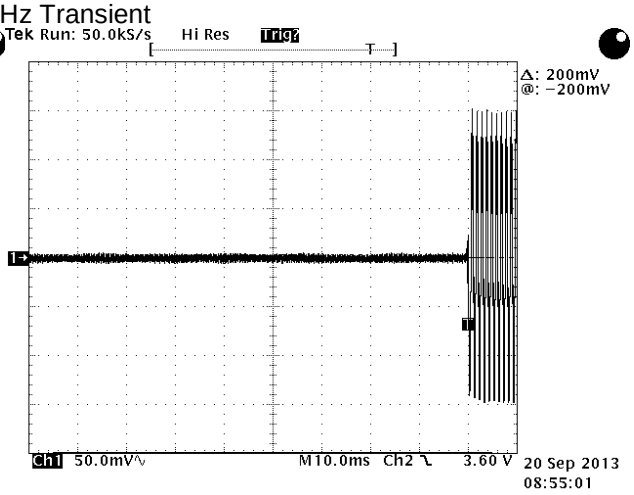


Off Transient

150.0125 MHz Transient

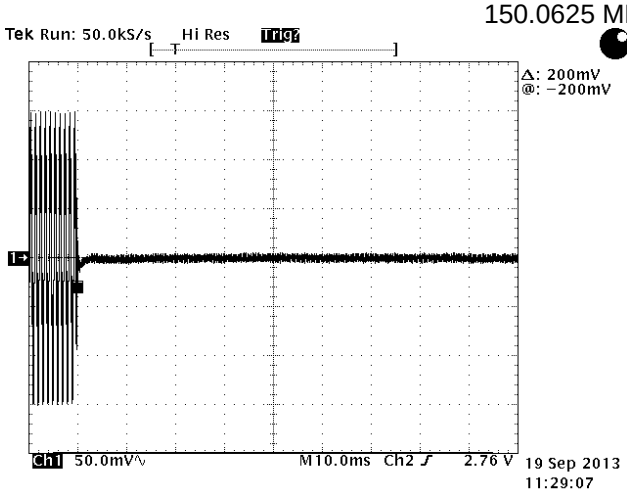


On Transient

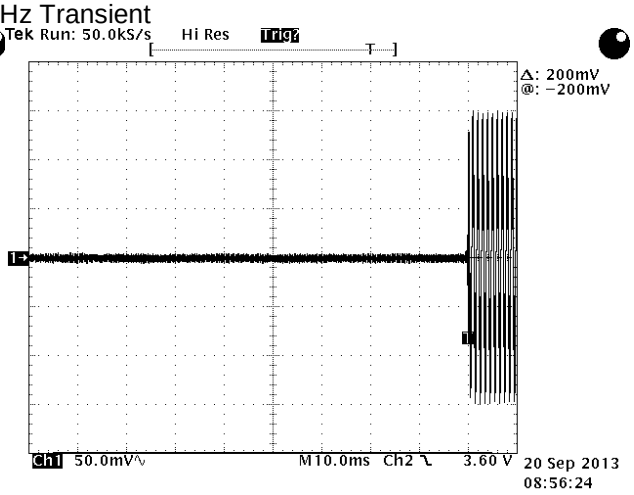


Off Transient

150.0625 MHz Transient

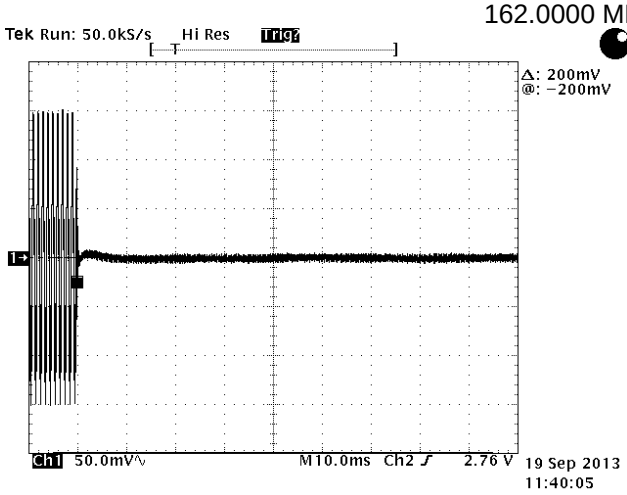


On Transient

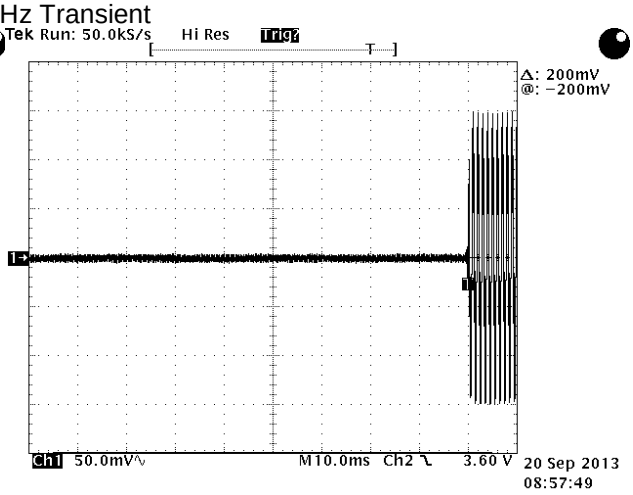


Off Transient

162.0000 MHz Transient

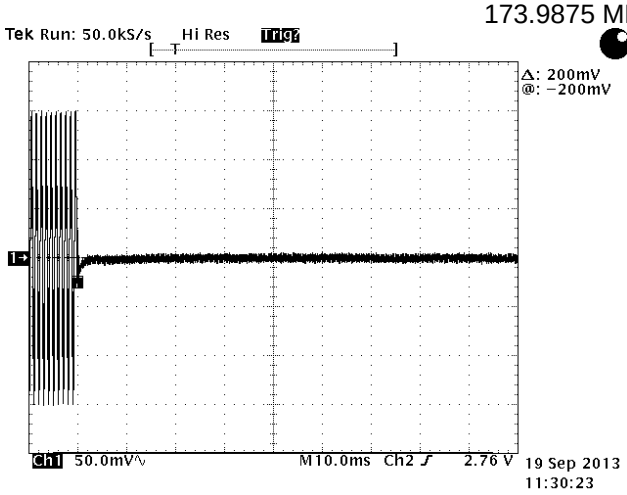


On Transient

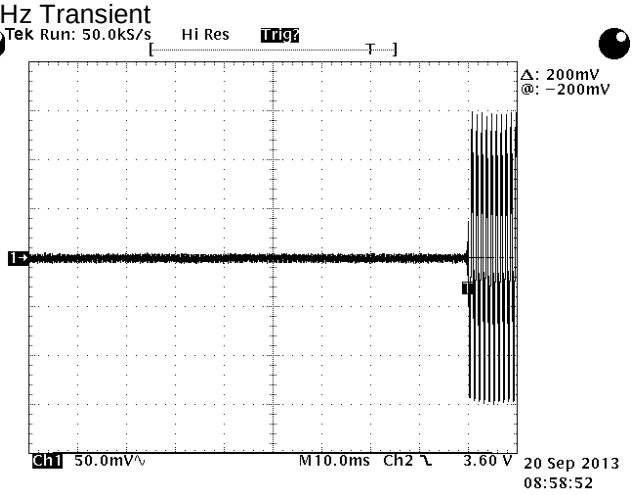


Off Transient

173.9875 MHz Transient

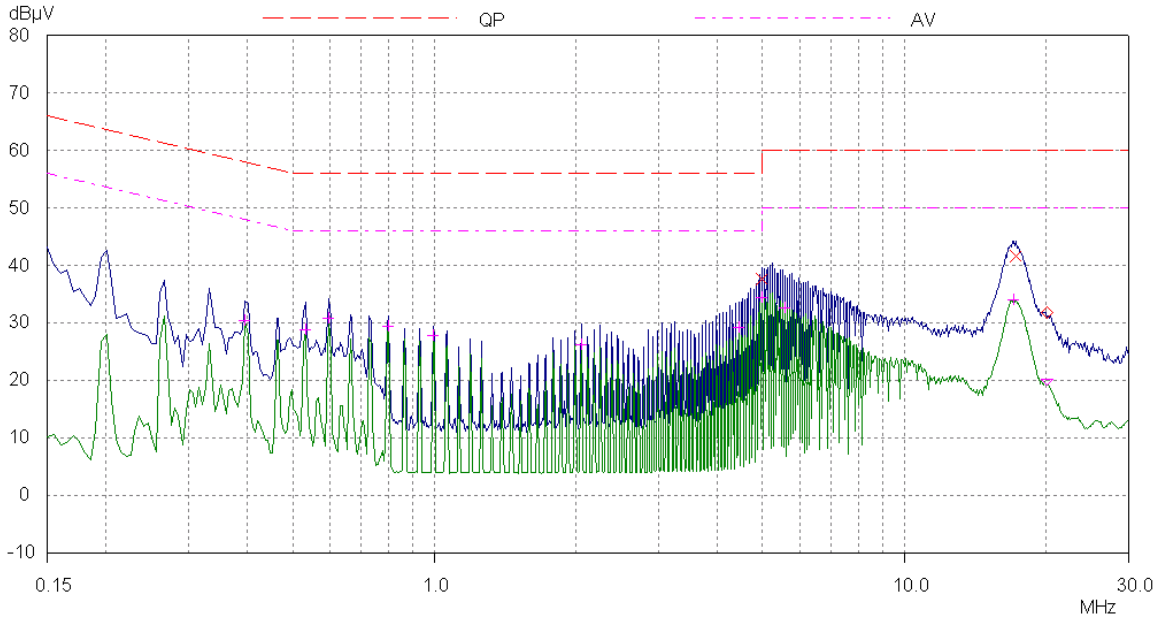


On Transient

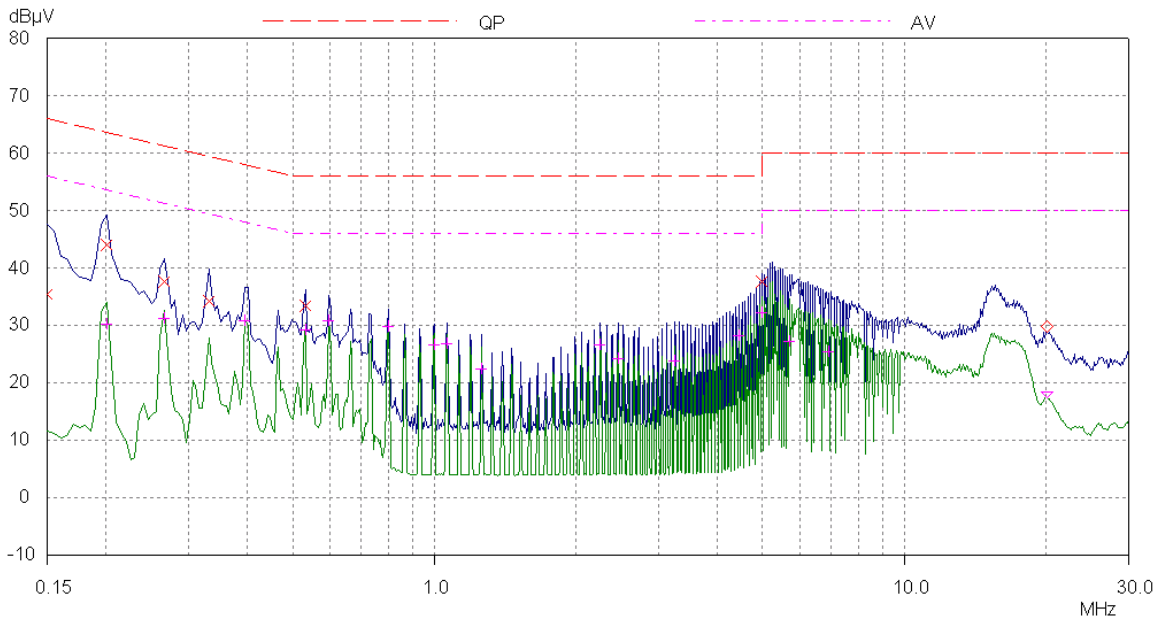


Off Transient

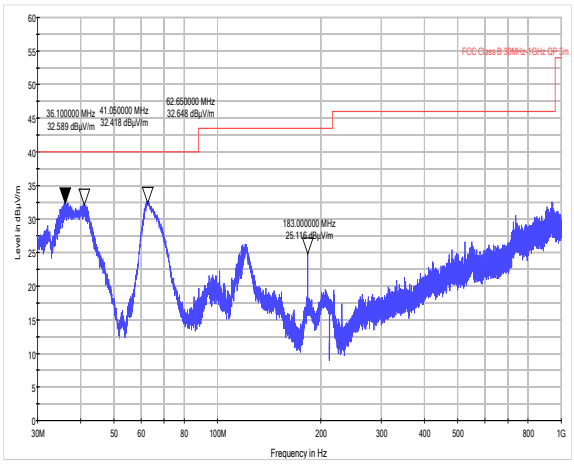
SDP 650 - AC powerline Conducted Emissions EUT in RX mode



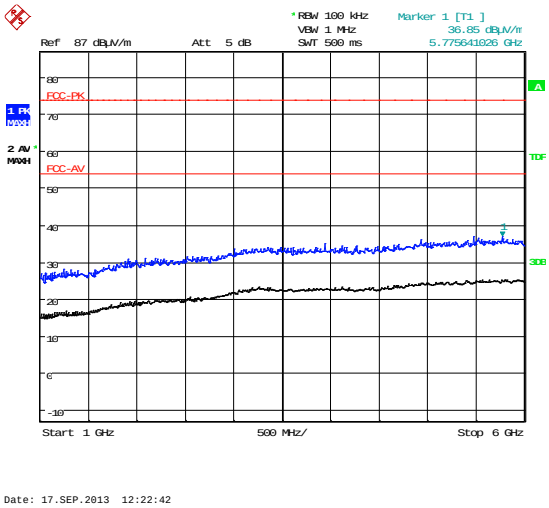
SDP 660 - AC powerline Conducted Emissions EUT in RX mode



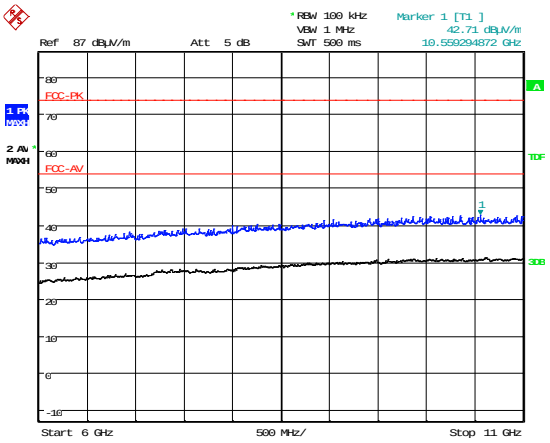
SDP650AC - Field Strength of Un-intentional Spurious Emissions 138.0125 MHz



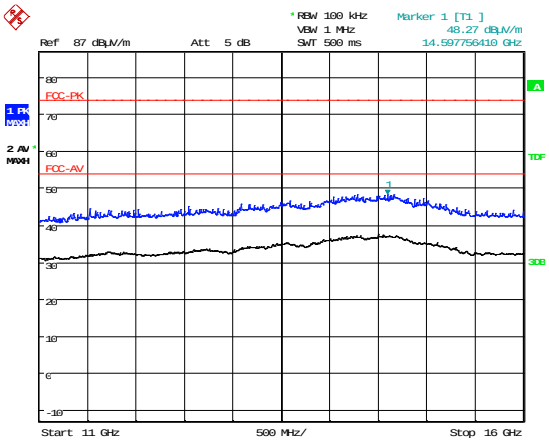
30M Hz – 1 GHz



1 GHz –6 GHz

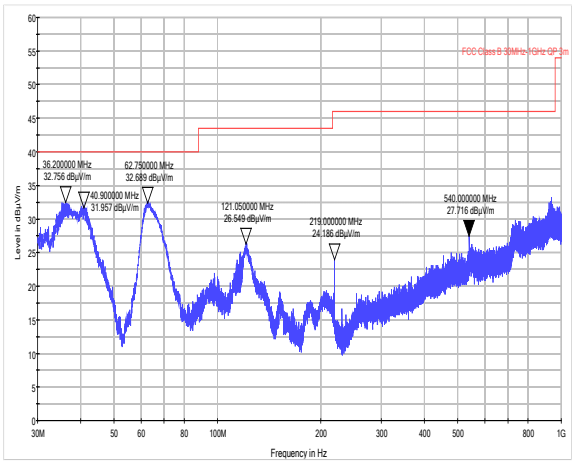


6 GHz – 11 GHz

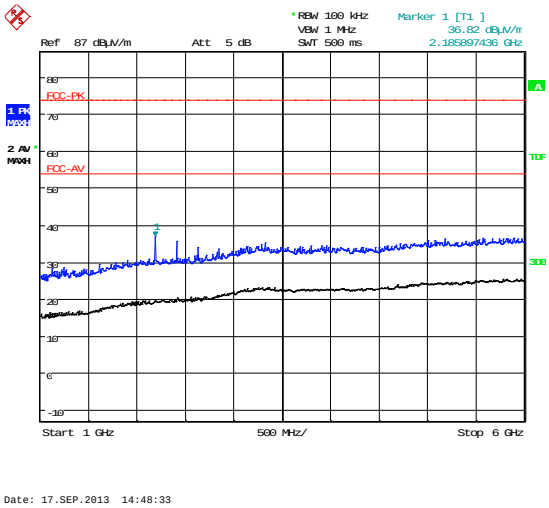


11 GHz –16 GHz

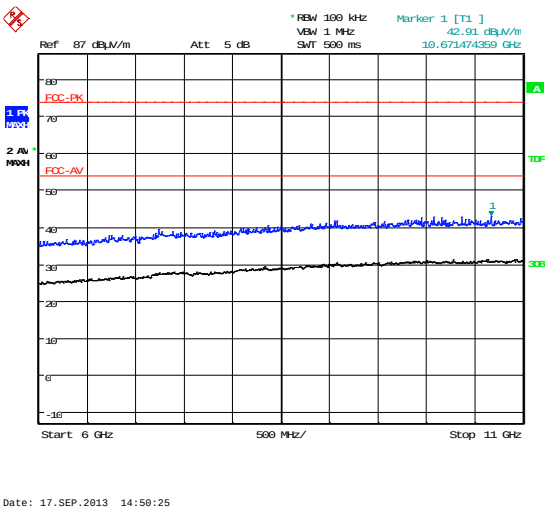
SDP650AC - Field Strength of Un-intentional Spurious Emissions 173.9875 MHz



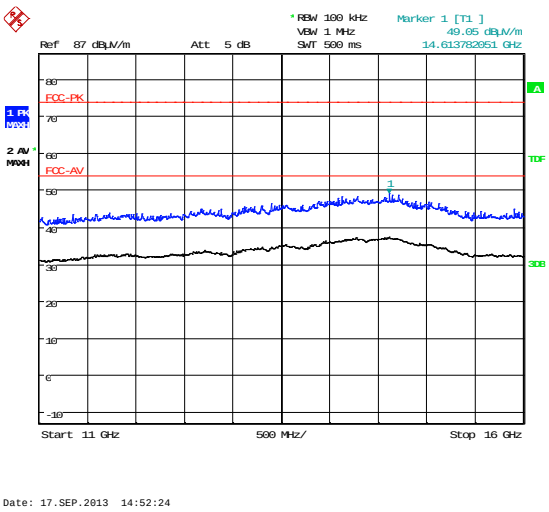
30M Hz – 1 GHz



1 GHz –6 GHz

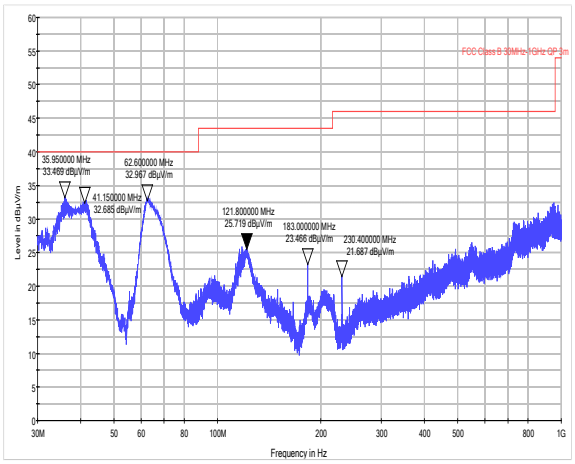


6 GHz – 11 GHz

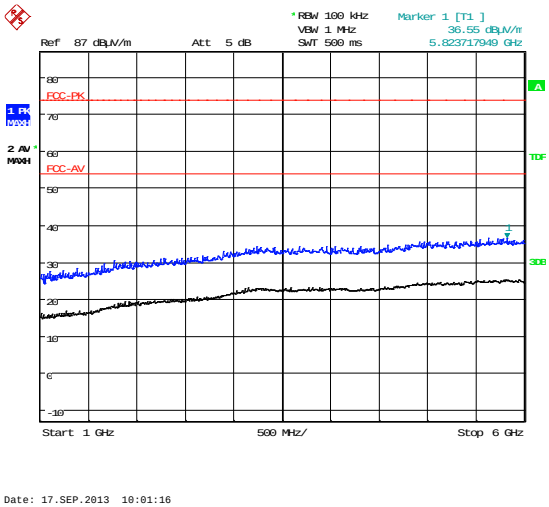


11 GHz –16 GHz

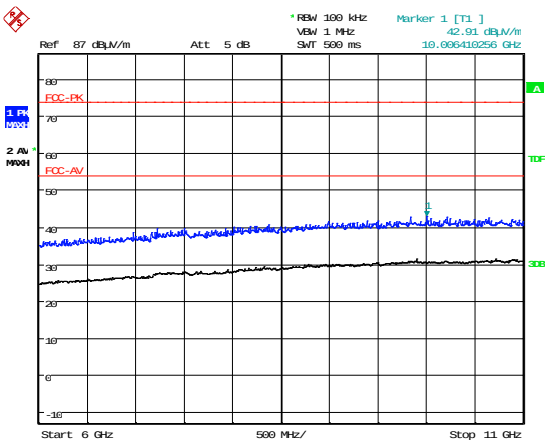
SDP660AC - Field Strength of Un-intentional Spurious Emissions 138.0125 MHz



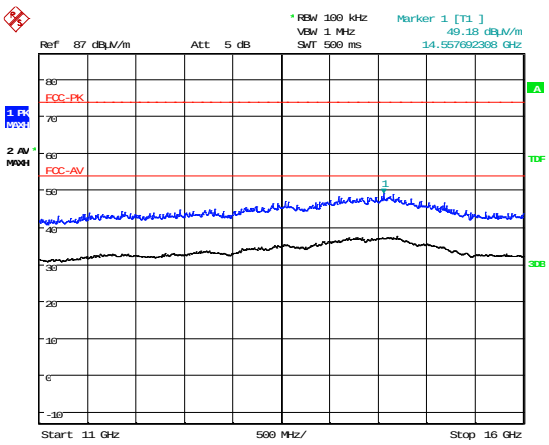
30M Hz – 1 GHz



1 GHz –6 GHz

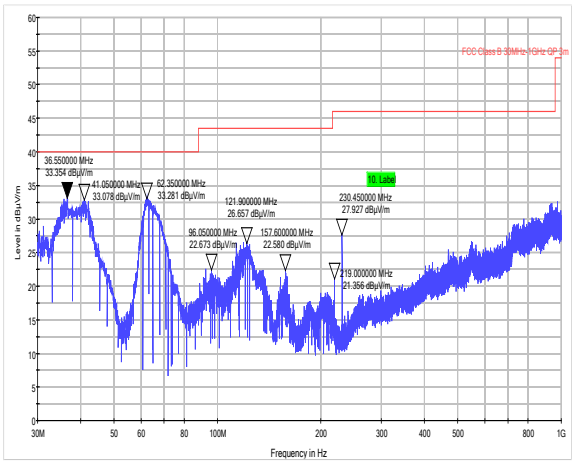


6 GHz – 11 GHz

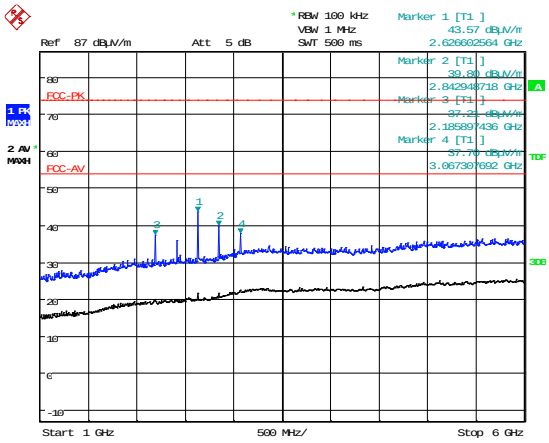


11 GHz –16 GHz

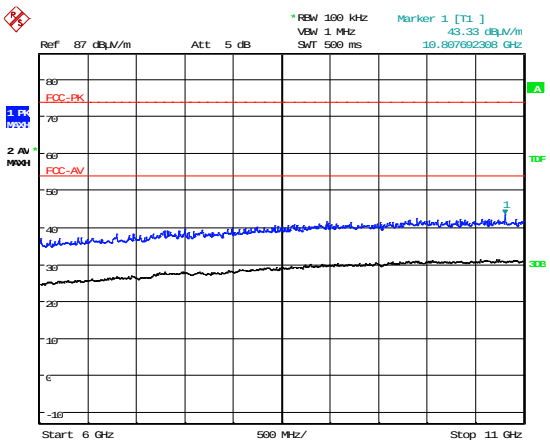
SDP660AC - Field Strength of Un-intentional Spurious Emissions 173.9875 MHz



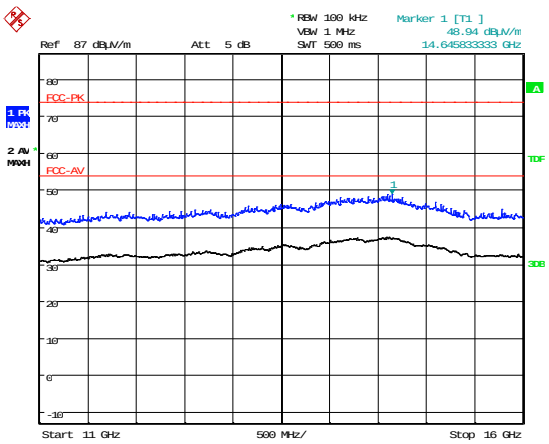
30M Hz – 1 GHz



1 GHz –6 GHz



6 GHz – 11 GHz



11 GHz –16 GHz

Appendix C: **Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

Sample No: Sxx Mod w

where:

xx = sample number eg. S01
w = modification number eg. Mod 2

The following terminology is used throughout the test report:

Support Equipment (SE) is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

EUT configuration refers to the internal set-up of the EUT. It may include for example:

Positioning of cards in a chassis.
Setting of any internal switches.
Circuit board jumper settings.
Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as “single possible configuration”.

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Global upon request.

C1) Test samples

The following samples of the apparatus were submitted by the client for testing :

Sample No.	Description	Identification
S33	SDP650AC	EA154
S32	SDP660AC	EA152

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

Sample No.	Description	Identification
S01	Charger	36NTU125100
S08	Antenna	None
S12	AC Adaptor	None
None	Interface / Control PCB	None
None	Mic / Speaker Handset	None

The following samples of apparatus were supplied by TRaC Global as support or drive equipment (auxiliary equipment):

Identification	Description
None	

C2) EUT Operating Mode During Testing.

During testing, the EUT was exercised as described in the following tables :

Test	Description of Operating Mode
All tests detailed in this report	EUT transmitting on the required frequency with / without modulation and set to 12.5 kHz as required. Analogue signal – 2.5 kHz tone with 2.5 kHz deviation Digital Signal - DMR 4FSK 9600 bps

Test	Description of Operating Mode:
Receiver conducted and radiated (ERP) spurious emissions	EUT active but non-transmitting.

Test	Description of Operating Mode:
PLCE	EUT Active but not transmitting

C3) EUT Configuration Information.

The EUT was submitted for testing in one single possible configuration.

C4) List of EUT Ports

The tables below describe the termination of EUT ports:

Sample : S33 & S32
Tests : Conducted

Port	Description of Cable Attached	Cable length	Equipment Connected
Antenna Port	Coaxial cable	1m	Measuring setup
Handset port	Multicore cable - Unscreened	1m	Interface / Control PCB

Sample : S33 & S32
Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
Antenna Port	None	N/A	50Ω Load (TX Mode)
Antenna Port	None	N/A	Antenna (RX Mode)
Charging port	None (Seated in charger)	N/A	S01

C5 Details of Equipment Used

TRaC No	Equipment Type	Equipment Description	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH004	ESVS10	Receiver	R&S	11/02/2013	12	11/02/2014
UH028	UHALP 9108	Log Periodic Ant	Schwarbeck	08/07/2013	24	08/07/2015
UH029	VHBA 9123	Bicone Antenna	Schwarbeck	19/08/2013	24	19/08/2015
UH093	CBL6112B	Bilog	Chase	08/07/2013	24	08/07/2015
UH096	6960B	Power meter	Marconi	04/11/2012	12	04/11/2013
UH122	TDS520B	Oscilloscope	Tektronix	11/04/2012	24	11/04/2014
UH129	6924	Power Sensor	Marconi	03/12/2012	12	03/12/2013
UH187	ESHS10	Receiver	R&S	11/02/2013	12	11/02/2014
UH191	CBL611/A	Bilog	Chase	13/12/2012	24	13/12/2014
UH195	ESH3-Z5.831.5	Lisn	R&S	03/07/2013	12	03/07/2014
UH228	6920	Power Sensor	Marconi	03/12/2012	12	03/12/2013
UH281	FSU46	Spectrum Analyser	R&S	06/03/2013	12	06/03/2014
UH385	HL 050	Log Periodic Antenna	R&S	16/07/2012	24	16/07/2014
UH387	ATS	Chamber 1	Rainford EMC	04/07/2013	12	04/07/2014
UH388	ATS	Chamber 2	Rainford EMC	04/07/2013	12	04/07/2014
UH396	ENV216	Lisn	R&S	30/04/2013	12	30/04/2014
UH403	ESCI 7	Recevier	R&S	12/08/2013	12	12/08/2014
UH405	FSU26	Spectrum Analyser	R&S	20/03/2013	12	20/03/2014
L005	CMTA52	Communications Analyser	R&S	27/03/2013	12	27/03/2014
L007	hfh2	Loop Antenna	R&S	17/10/2013	24	17/10/2015
L138	3115	1-18GHz Horn	EMCO	17/10/2013	24	17/10/2015
L139	3115	1-18GHz Horn	EMCO	20/09/2013	24	20/09/2015
L176	2042	Signal Generator	Marconi	20/11/2012	12	20/11/2013
L254	2042	Signal Generator	Marconi	19/12/2012	12	19/12/2013
L193	VHA 9103 balu	Bicone Antenna	Chase	19/06/2012	24	19/06/2014
L203	UPA6108	Log Periodic Ant	Chase	19/06/2012	24	19/06/2014
L263/A	20240-20	Horn 18-26GHz	Flann	17/11/2011	24	17/11/2013
L290	CBL611/A	Bilog	Chase	13/12/2012	24	13/12/2014
L300	20240-20	Horn 18-26GHz (&UH330)	Flann	17/11/2011	24	17/11/2013
L317	ESVS10	Receiver	R&S	09/01/2013	12	09/01/2014
L415	ESVS20	Receiver	R&S	27/08/2013	12	27/08/2014
L426	52 Series II	Temperature Indicator	Fluke	29/04/2013	12	29/04/2014
L572	8449B	Pre Amp	Agilent	12/12/2012	24	12/12/2014
REF909	FSU26	Spectrum Analyser	R&S	04/02/2013	12	04/02/2014
REF940	ATS	Radio Chamber - PP	Rainford EMC	09/07/2013	12	09/07/2014
REF976	34405a	Multimeter	Agilent	26/04/2013	12	26/04/2014
REF977	SH4141	High Pass Filter	BSC	25/02/2013	24	25/02/2015

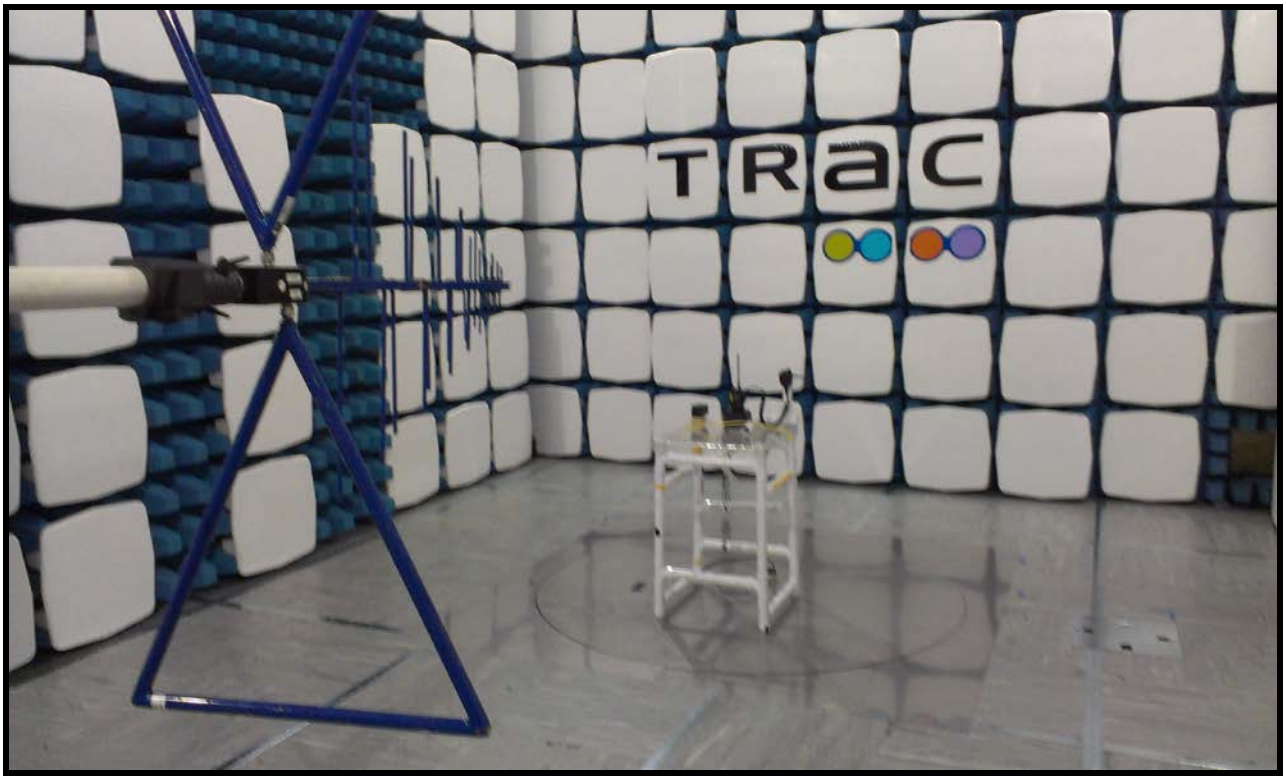
Appendix D: Additional Information

No additional information is included within this test report.

Appendix F: Photographs and Figures

The following photographs were taken of the test samples:

1. SDP650AC - Radiated electric field emissions arrangement: Overview.
2. SDP650AC - AC Powerline Conducted emissions arrangement: Overview.
3. SDP660AC - Radiated electric field emissions arrangement: Overview.
4. SDP660AC - AC Powerline Conducted emissions arrangement: Overview.



Photograph 1

Photograph 2

Photograph 3

Photograph 4

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