A TEST REPORT

FOR

TEAM SIMOCO Ltd

ON

SB2025NT100W

Private Land Mobile Radio

DOCUMENT NO. TRA-008201-W-US-1

TEST REPORT NO: TRA-008201-W-US-01

COPY NO: 1

ISSUE NO: 1

FCC ID: U89SB2K5354D3D3V

REPORT ON THE CERTIFICATION TESTING OF A
TEAM SIMOCO
SB2025NT100W
WITH RESPECT TO
THE FCC RULES CFR 47,
PART 90

PRIVATE LAND MOBILE RADIO.

TEST DATE: 6th -12th January 2012

APPROVED BY: _____ J CHARTERS
RADIO
PRODUCT
MANAGER

DATE: 6th March 2012

Distribution:

Copy Nos: 1. Team Simoco

2. TRaC Global

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CONTENTS

	PAGE
CERTIFICATE OF CONFORMITY & COMPLIANCE	4
APPLICANT'S SUMMARY	5
EQUIPMENT TEST CONDITIONS	6
TESTS REQUIRED	6
TEST RESULTS	7 – 47

	ANNEX
PHOTOGRAPHS	A
PHOTOGRAPH No. 1&2: Test setup	
PHOTOGRAPH No. 3&4: Equipment overview	
PHOTOGRAPH No. 5&6: Top/Underside View Main Audio PC	
PHOTOGRAPH No. 7&8: Top/Underside View SBC Support PCB	
PHOTOGRAPH No. 9&10: Top/Underside View Aux PCB	
PHOTOGRAPH No. 11&12:Top/Underside View SBC	
PHOTOGRAPH No. 13&14: Top /Underside View T36 Option PCB	
PHOTOGRAPH No. 15&16: Top /Underside View Tx'er exciter PCB	
PHOTOGRAPH No. 17&18: Top /Underside View Rx'er PCB	
PHOTOGRAPH No. 19&20: Top /Underside View Controller PCB	
PHOTOGRAPH No. 21&22: Top /Underside View Digital I/O PCB	
PHOTOGRAPH No. 23: Top View 100W P. A. PCB	
APLICANTS DECLATION	B
EQUIPMENT CALIBRATION	C
MEASUREMENT UNCERTAINTY	D

Notes:

1. Component failure during test

YES	[ ]
NO	[X]

2. If Yes, details of failure:

3. The facilities used for the testing of the product contain in this report are FCC Listed.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	U89SB2K5354D3D3V
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	SB2025NT100W
EQUIPMENT TYPE:	Private Land Mobile Radio
FREQUENCY OF OPERATION:	148MHz – 174MHz
MAXIMUM OUTPUT CONDUCTED:	49.94dBm 98.62W
MODULATION TYPE:	F3E, F1E
POWER SOURCE(s):	+13.8Vdc
TEST DATE(s):	6th -12th January 2012
APPLICANT:	Team Simoco
ADDRESS:	Team Simoco Ltd Field House Uttoxeter Old Road Derby DE1 1NH

APPROVED BY: _____

RADIO
PRODUCT
MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	SB2025NT100W
EQUIPMENT TYPE:	Private Land Mobile Radio
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 90
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S CONTACT PERSON(s):	Mr Richard Stimson
EMAIL ADDRESS	Richard.stimson@teamsimoco.com
APPLICANT:	Team Simoco Ltd
ADDRESS:	Team Simoco Ltd Field House Uttoxeter Old Road Derby DE1 1NH
TEL:	01332 375414
MANUFACTURER:	Team Simoco Ltd
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRaC Global
TEST DATE(s):	6th -12th January 2012
TEST REPORT No:	TRA-008201-W-US-01

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	APPLICABILITY	RESULT
RF Power Output	90.205	Yes	Complies
Audio Frequency Response (a)	2.1047	Yes	Complies
Modulation Limiting	2.1047	No	N/A
Occupied Bandwidth	90.210	Yes	Complies
Spurious Emissions at Antenna Terminals	90.210	Yes	Complies
Field Strength of Spurious Emissions	90.210	Yes	Complies
Field Strength of Un- Intentional Spurious Emissions	15.109	Yes	Complies
Frequency Stability	90.213	Yes	Complies
Transient behaviour	90.214	Yes	Complies
Emission Mask	90.210(d)	Yes	Complies

2. Product class: Class A [X] Class B [ ]

3. Product Use: Private Land Mobile Radio

4. Emission Designator: F3E, F1E

5. Temperatures: Ambient (Tnom) 22°C

6. Supply Voltages: Vnom +13.8Vdc

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

7. Equipment Category:
   - Single channel [ ]
   - Two channel [ ]
   - Multi-channel [X]

8. Channel spacing:
   - Narrowband [X]
   - Wideband

9. Test Location TRaC Global
   - Skelmersdale [X]

10. Modifications made during test program No modifications were performed.

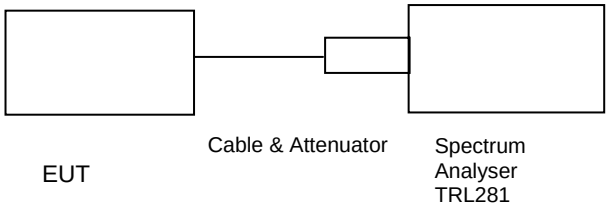
System description:

The SB2025NT100W is a radio base station capable of operating in analogue FM and digital P25 modes as a stand-alone repeater or as part of a simulcast/voted system. Inputs are provided for connection to external frequency and 1PPS timing signals to ensure the accurate frequency and modulation synchronisation necessary for simulcast operation. Dispatcher connection is via Ethernet using the TIA DFSI protocol."

COMPLIANCE TESTS

RF OUTPUT POWER – CONDUCTED – PART 2.1046

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	47%	
Supply voltage	=	+13.8Vdc	
Channel number	=	See test results	



Frequency MHz	Level on Analyser (dBm)	Output Cable & Attenuator loss (dB)	Conducted Output Power (dBm)	Conducted Output Power (W)	Rated output Power (dBm)	Rated output Power (W)
148.0500MHz	-0.4	50.30	49.90	97.72	50.0	100
161.0250MHz	-0.41	50.35	49.94	98.62	50.0	100
173.9875MHz	-0.4	50.34	49.94	98.62	50.0	100

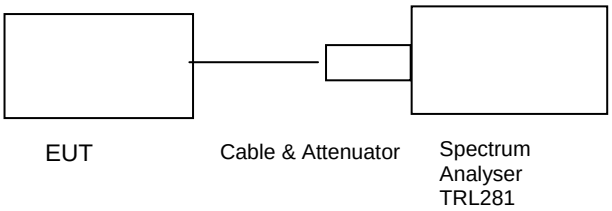
Notes: Power and antenna height clause 90.205(d) specifies that in the band 150MHz – 174MHz the maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and the required service area.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	R&S	FSU46	200034	TRL281	**X**
CABLE	TRAC	N/A	N/A	UH271	**X**
CABLE	TRAC	N/A	N/A	UH272	**X**
ATTENUATOR	SPINNER	745357	N/A	TRLUH225	**X**
ATTENUATOR	-	-	-	20dB	**X**
ATTENUATOR	BIRD	8304-100-N	N/A	222	**X**

TRANSMITTER TESTS

99% Bandwidth – CONDUCTED – Part 90.209

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	47%	
Supply voltage	=	+13.8Vdc	
Channel number	=	See test results	



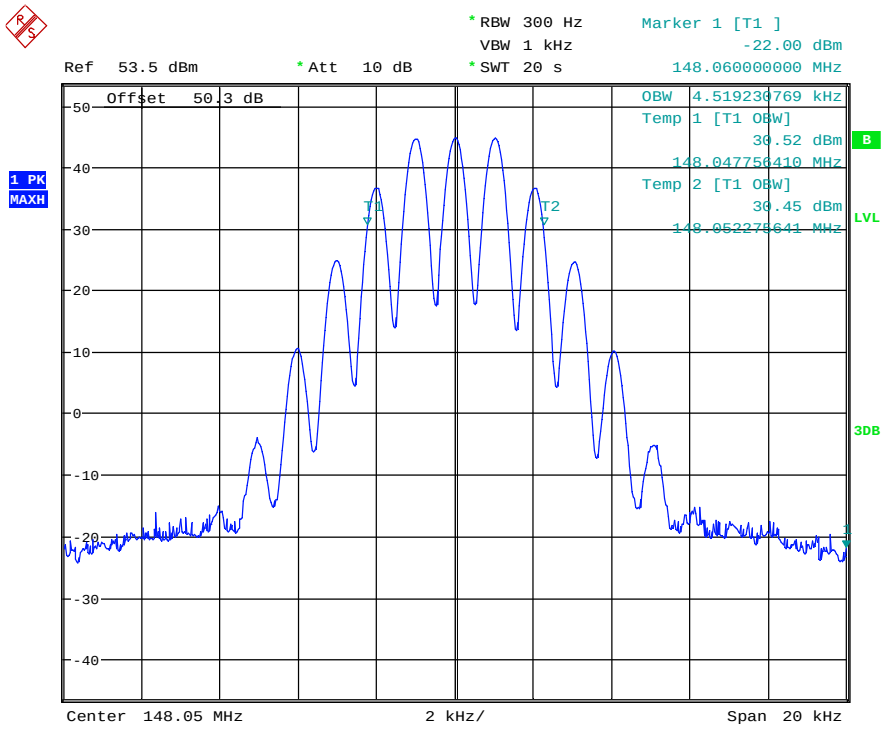
Note:

1. Cable and attenuator between EUT and spectrum analyser 50dB
2. See Table below for 99% Power Occupied Bandwidth
3. Internally generated test tone analogue speech
4. P25 Internally generated test tone C4FM

Frequency Of Operation Channel	Modulation Type
FM 2.5kHz Deviation	
148.0500MHz	99% Bandwidth =4.51kHz
161.0250MHz	99% Bandwidth =4.51kHz
173.9875MHz	99% Bandwidth =4.51kHz
P25 Modulation	
148.0500MHz	99% Bandwidth =8.25kHz
161.0250MHz	99% Bandwidth =8.33kHz
173.9875MHz	99% Bandwidth =8.25kHz

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRAC No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
CABLE	TRAC	N/A	N/A	UH271	**X**
CABLE	TRAC	N/A	N/A	UH272	**X**
ATTENUATOR	SPINNER	745357	N/A	TRLUH225	**X**
ATTENUATOR	-	-	-	20dB	**X**
ATTENUATOR	BIRD	8304-100-N	N/A	222	**X**

148.0500MHz analogue speech



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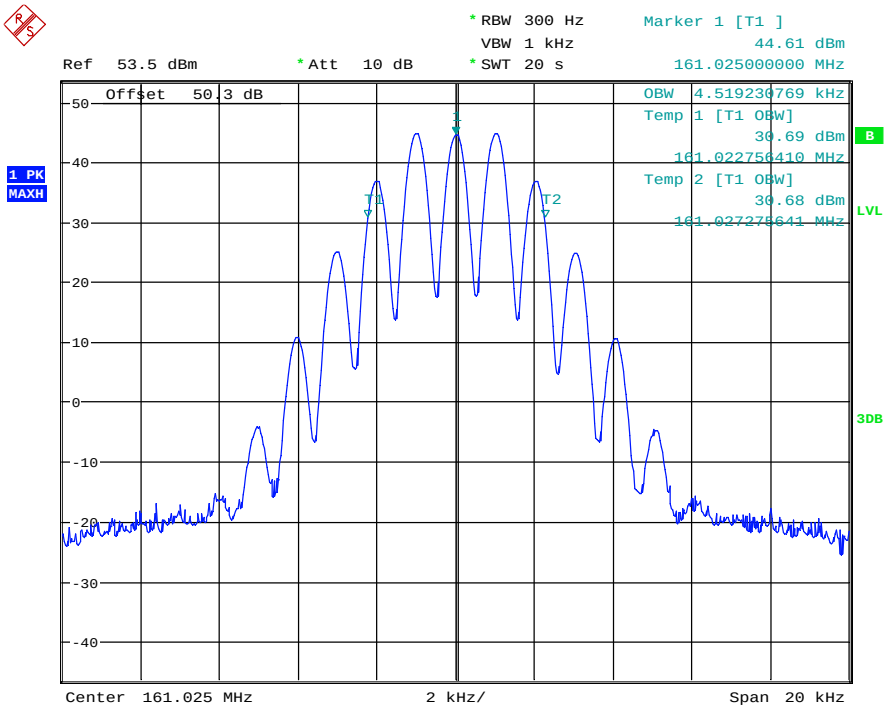
161.0250MHz analogue speech



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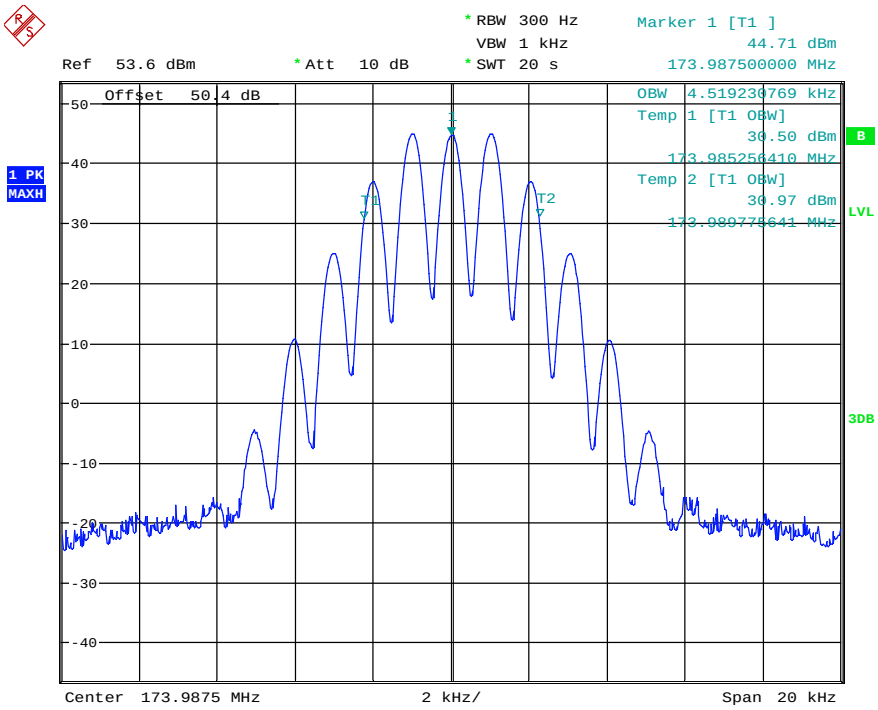
173.9875MHz analogue speech



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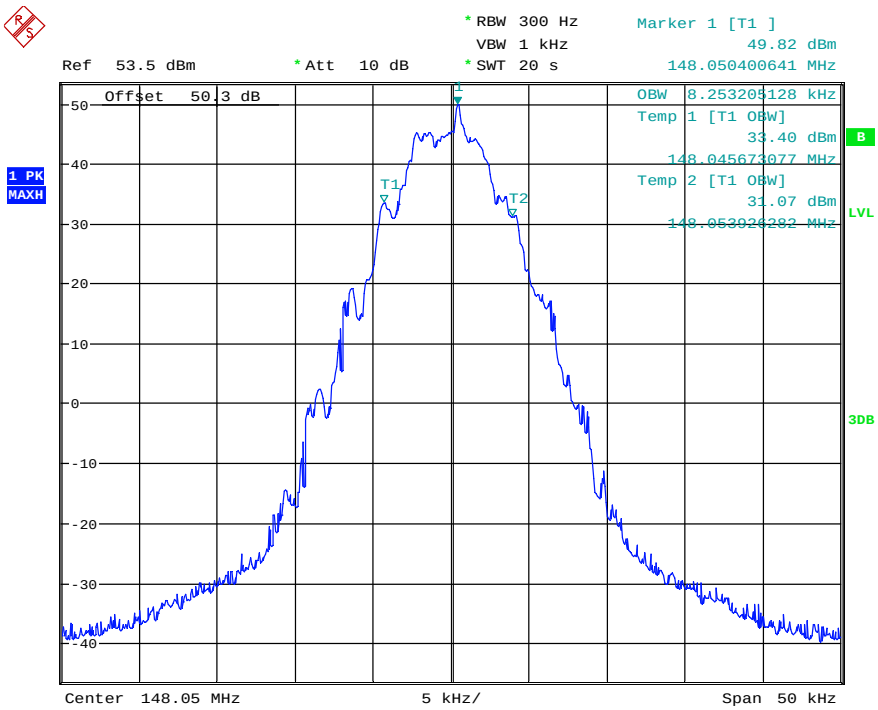
148.0500MHz P25 Modulation



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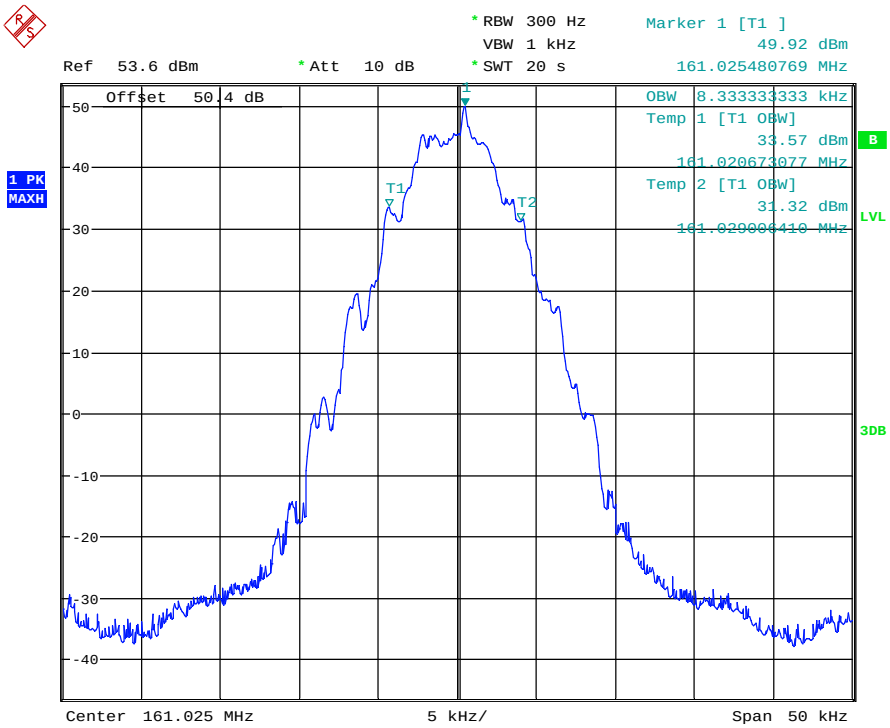
161.0250MHz P25 Modulation



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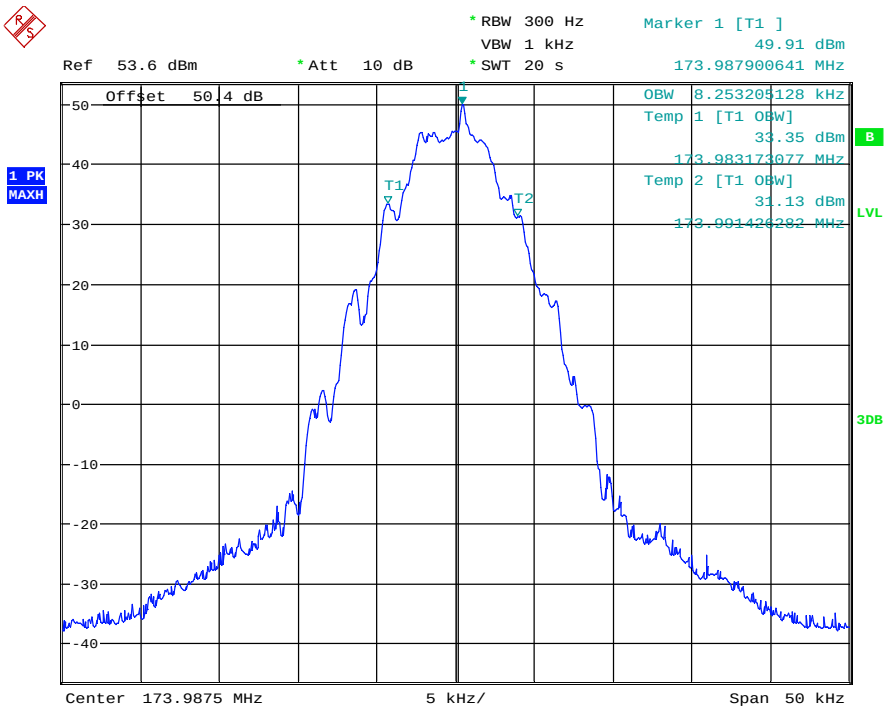
173.9875MHz P25 Modulation



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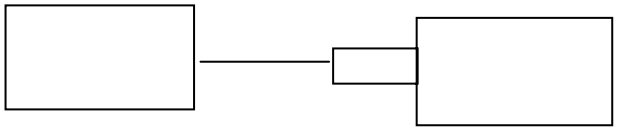
TRANSMITTER TESTS

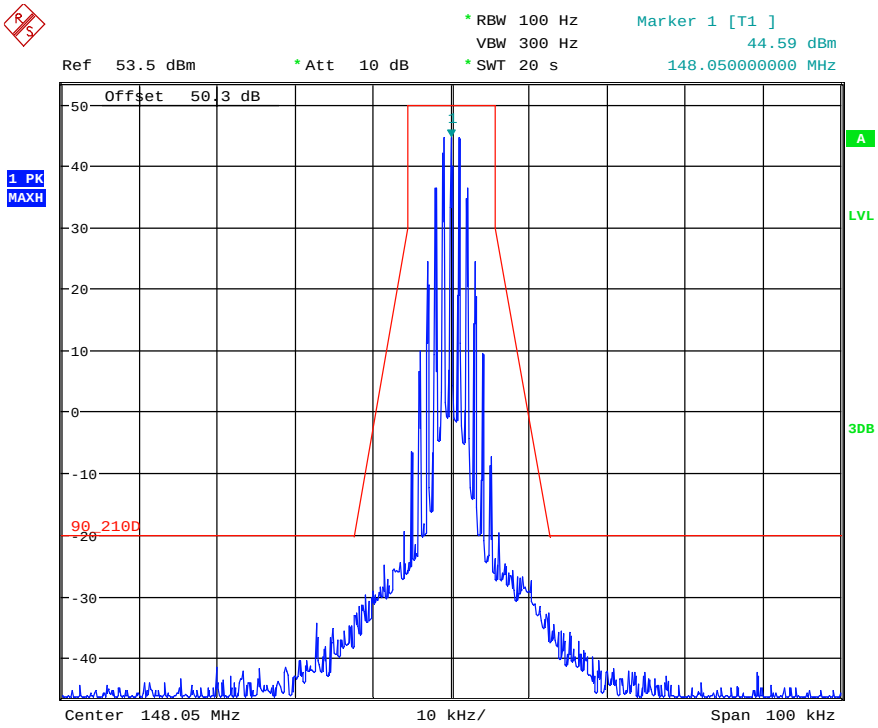
Occupied Bandwidth
Emission Masks. Part 90.210(d)

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	47%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



EUT Cable & Attenuator Spectrum Analyser TRL281

Part 90 Bottom channel: F3E 12.5kHz channel spacing



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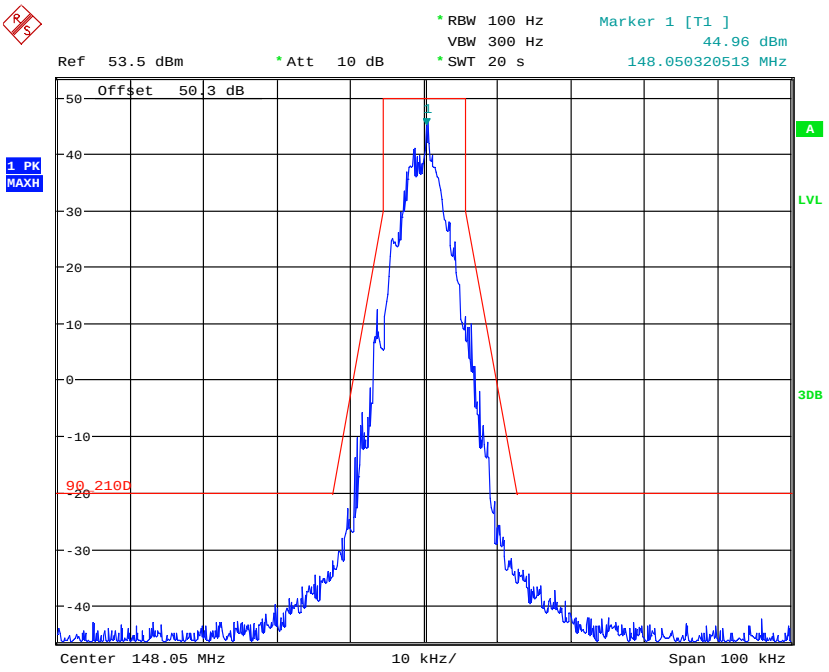
Part 90 Bottom channel: F1E 12.5kHz channel spacing



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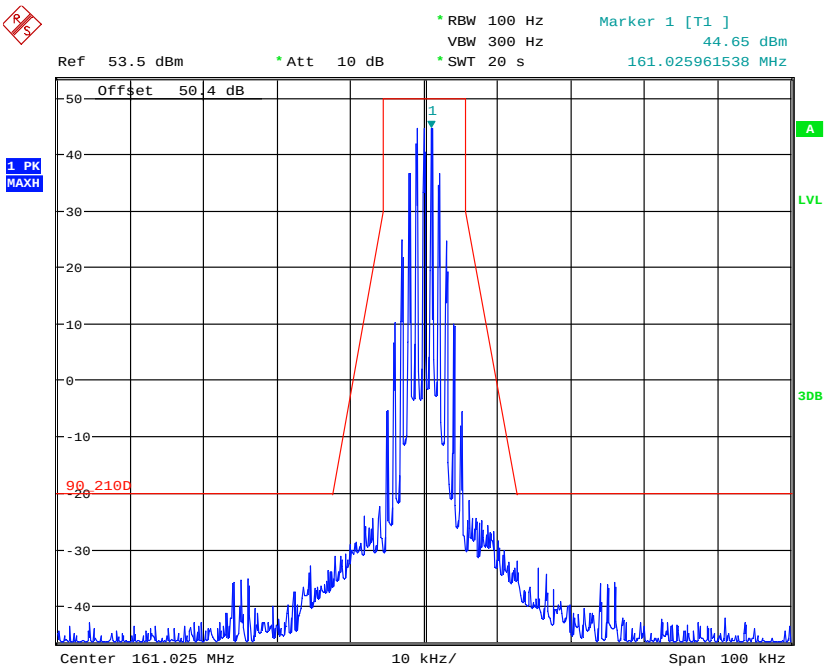
Part 90 Middle channel: F3E 12.5kHz channel spacing



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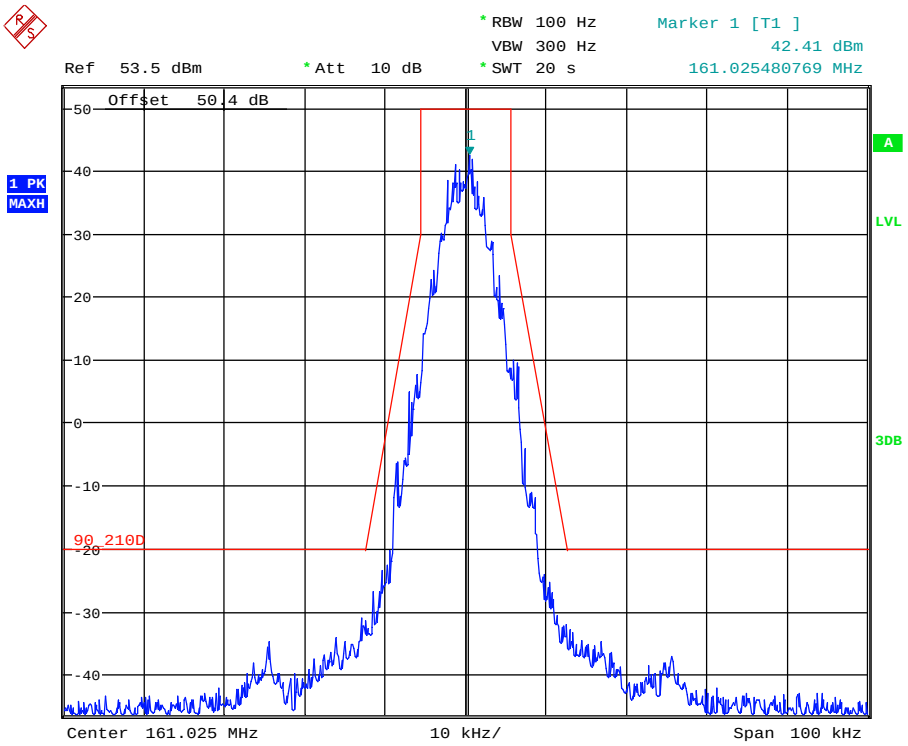
Part 90 Middle channel: F1E 12.5kHz channel spacing



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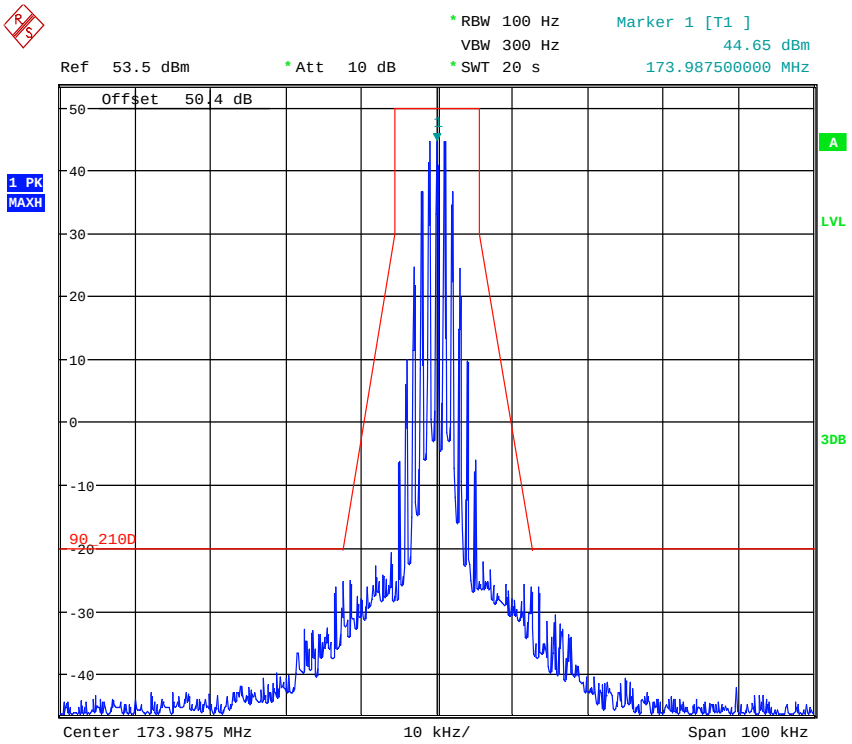
Part 90 Top channel: F3E 12.5kHz channel spacing



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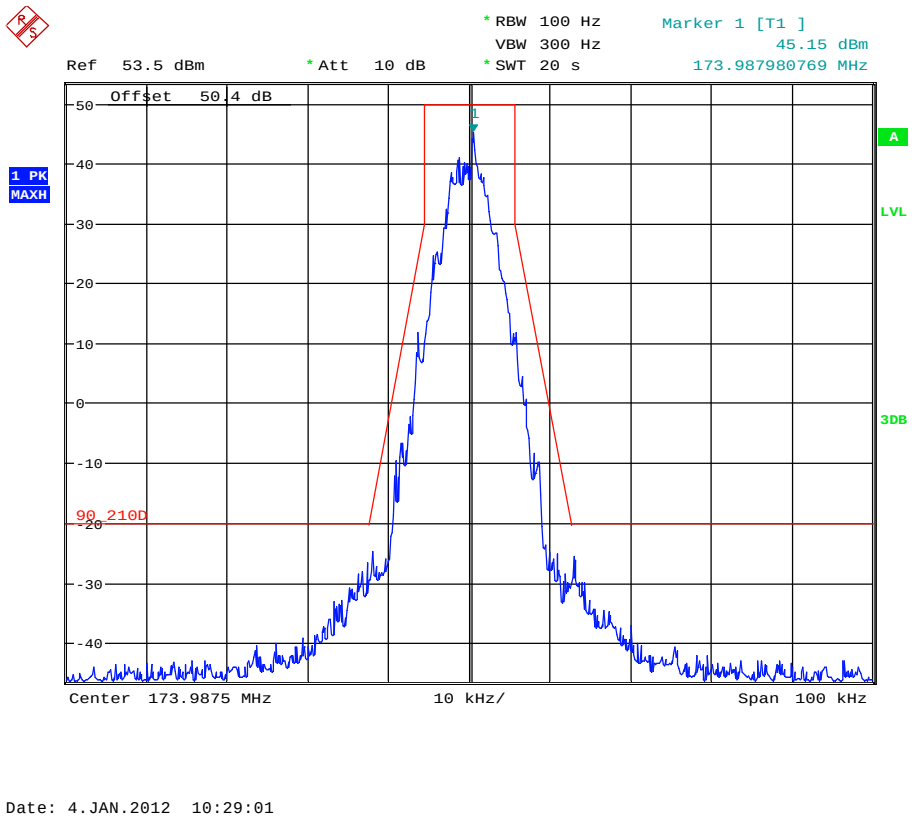
Part 90 Top channel: F1E 12.5kHz channel spacing

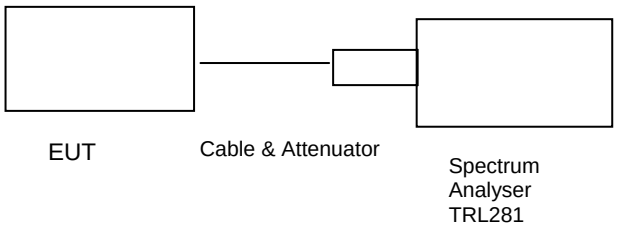


Note: the spectrum masks are defined in: Part 90.210(d) as the transmitter operates in the band 146MHz- 174MHz using an authorized bandwidth of 11.25kHz as per section 90.209(6).

TRANSMITTER TESTS

SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053
Bottom Channel

Ambient temperature	=	22°C	Radio Laboratory		
Relative humidity	=	42%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



The test was set up as per the diagram. The unit was tested operating at maximum power.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

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

RESULTS

Bottom Channel

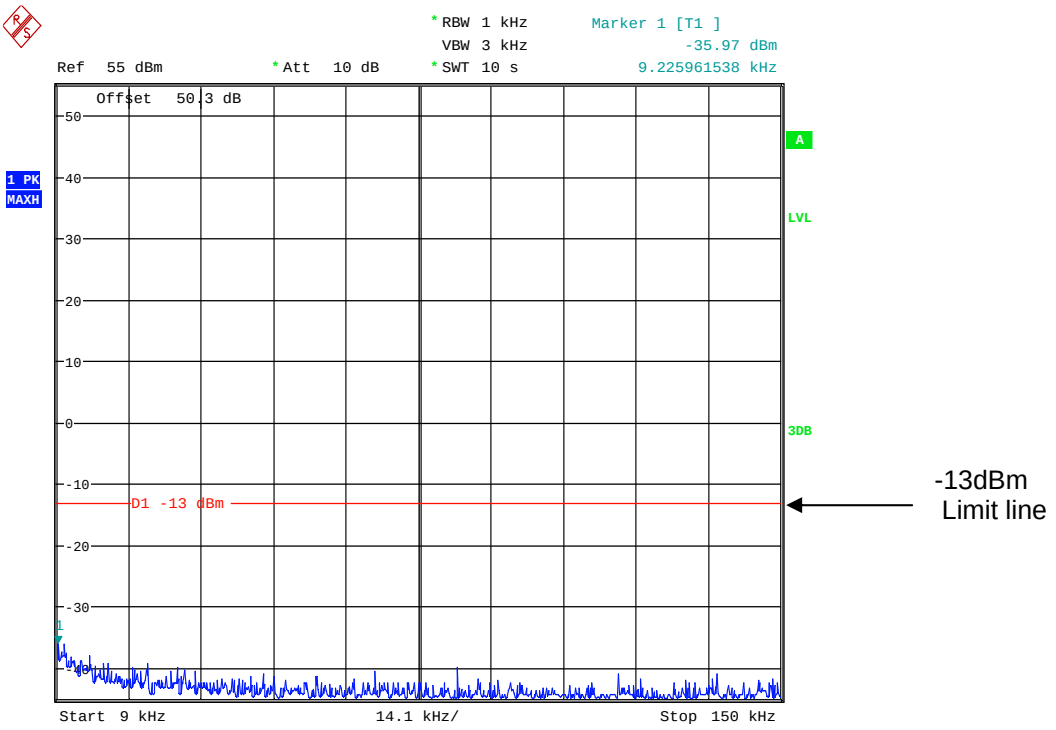
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	LIMIT (dBm)
9kHz – 10GHz	296.10	-17.86	-13

The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRAC No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
CABLE	TRAC	N/A	N/A	UH271	**X**
CABLE	TRAC	N/A	N/A	UH272	**X**
ATTENUATOR	SPINNER	745357	N/A	TRLUH225	**X**
ATTENUATOR	-	-	-	20dB	**X**
ATTENUATOR	BIRD	8304-100-N	N/A	222	**X**

Conducted emissions Bottom Channel

148.0500MHz 9kHz – 150kHz



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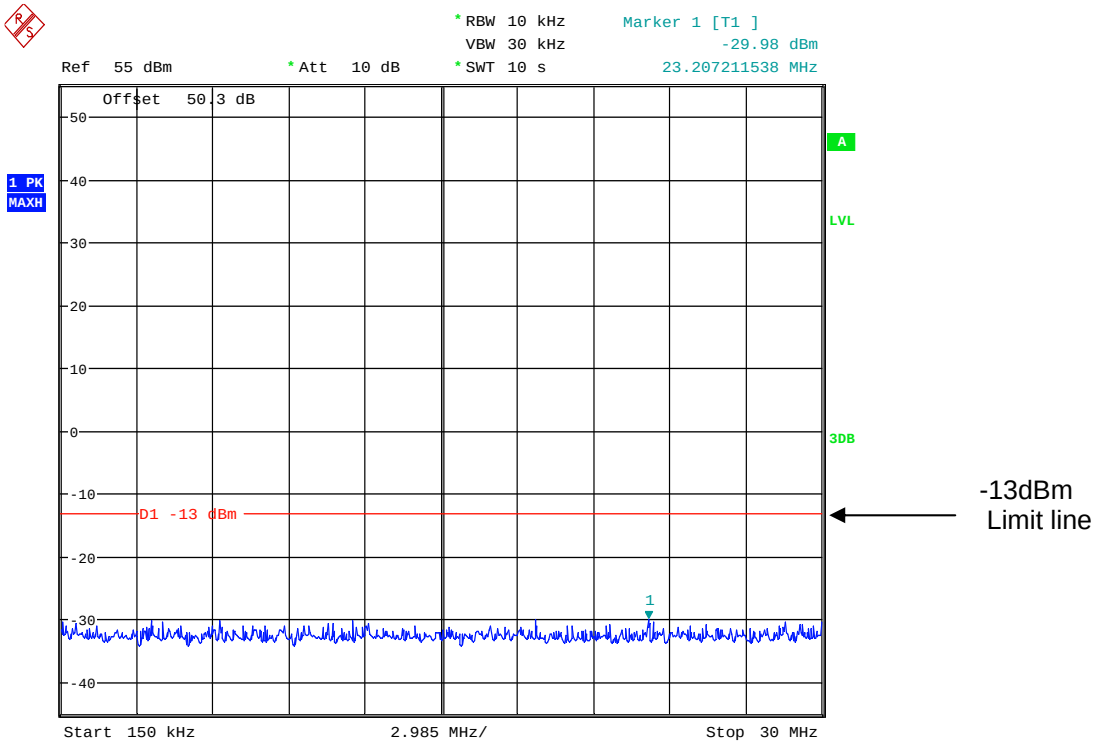
148.0500MHz 150kHz-30MHz



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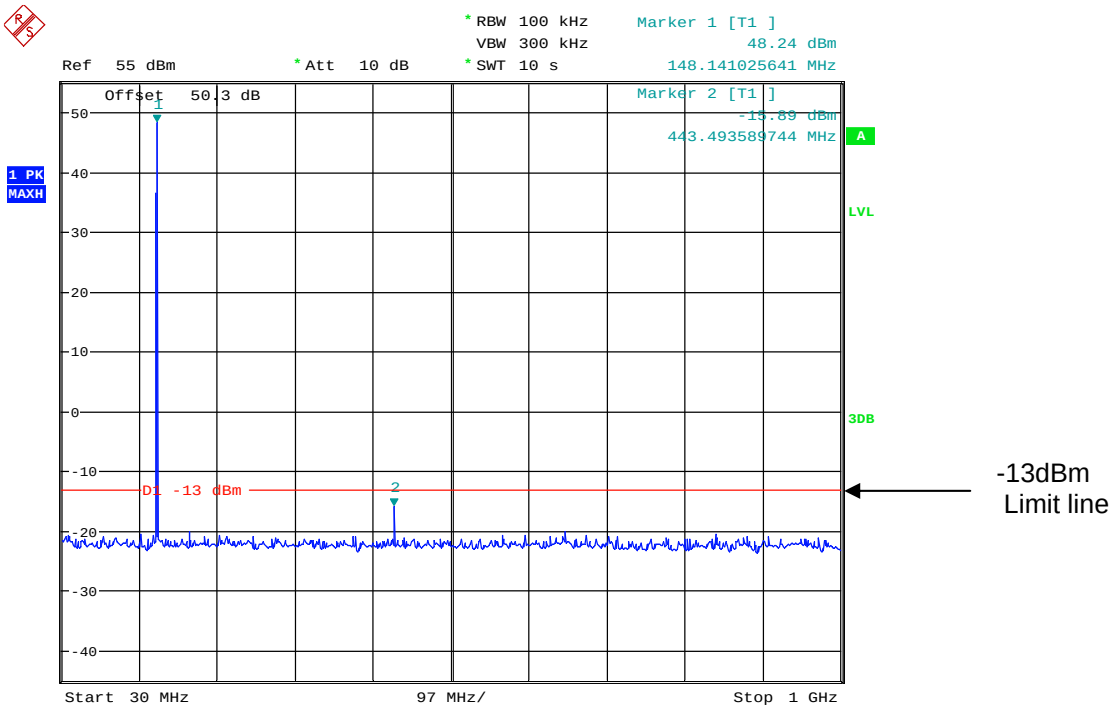
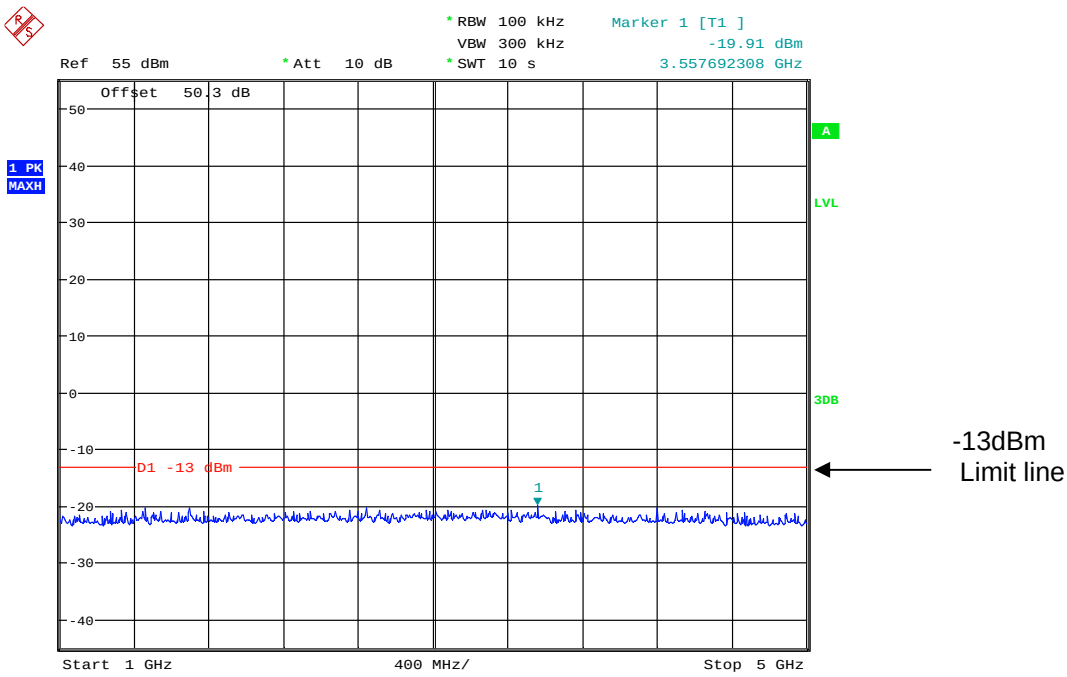
148.0500MHz 30MHz-1GHz



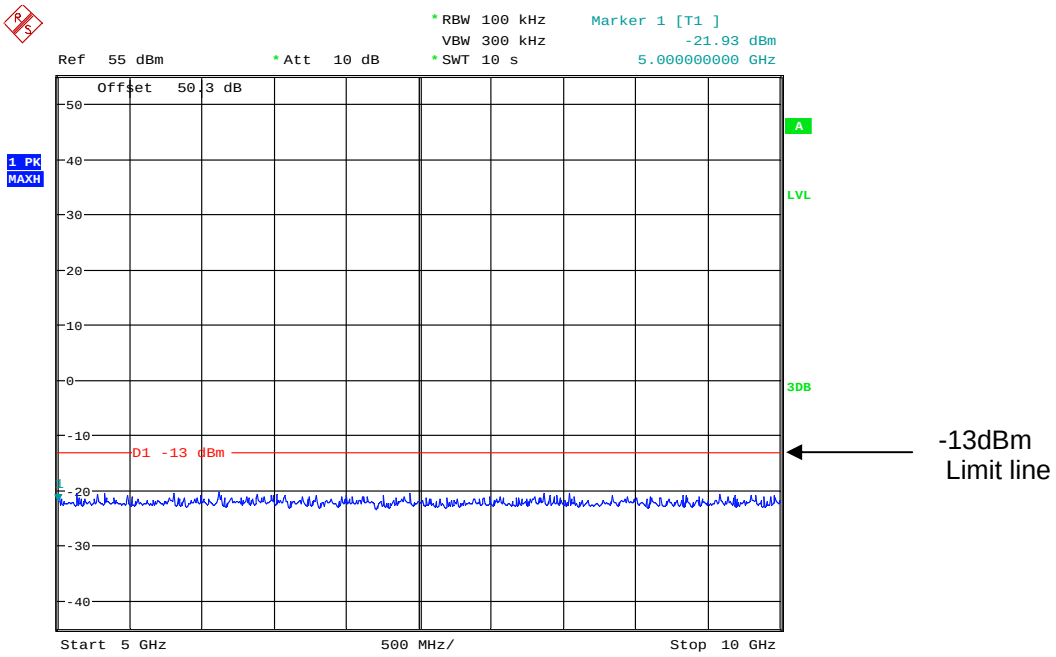
Date: 3.JAN.2012 17:45:00

148.0500MHz 1GHz – 5GHz



Date: 3.JAN.2012 17:45:30

148.0500MHz 5GHz-10GHz



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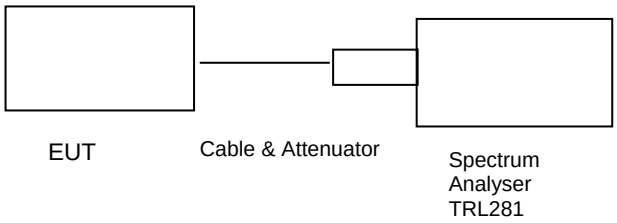
SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053
Middle Channel

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	47%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



The test was set up as per the diagram. The unit was tested operating at maximum power.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

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

RESULTS

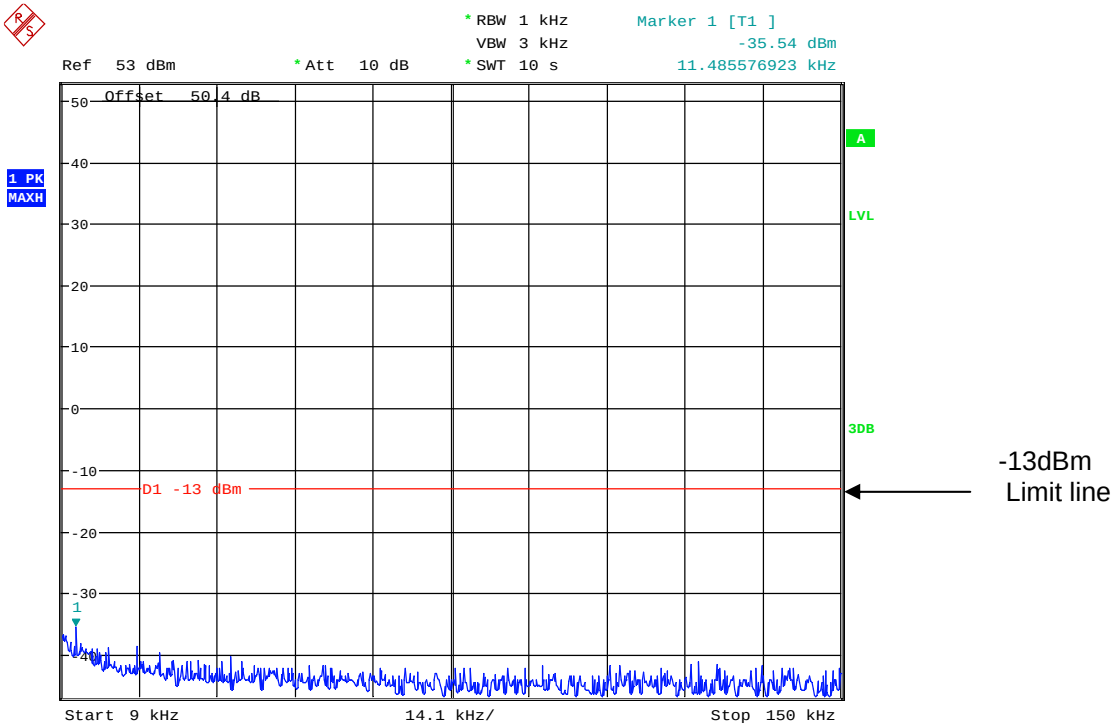
Middle Channel

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	LIMIT (dBm)
9kHz – 10GHz	322.05	-15.17	-13

The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRAC No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
CABLE	TRAC	N/A	N/A	UH271	**X**
CABLE	TRAC	N/A	N/A	UH272	**X**
ATTENUATOR	SPINNER	745357	N/A	TRLUH225	**X**
ATTENUATOR	-	-	-	20dB	**X**
ATTENUATOR	BIRD	8304-100-N	N/A	222	**X**

161.0250MHz 9kHz – 150kHz



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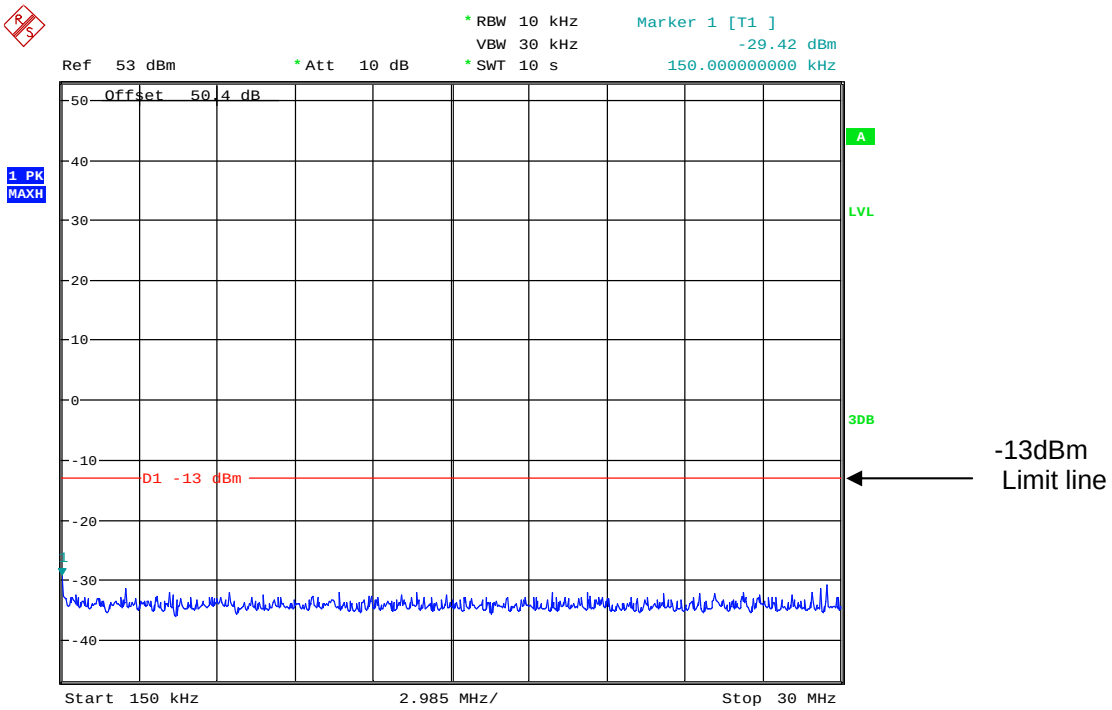
161.0250MHz 150kHz – 30MHz



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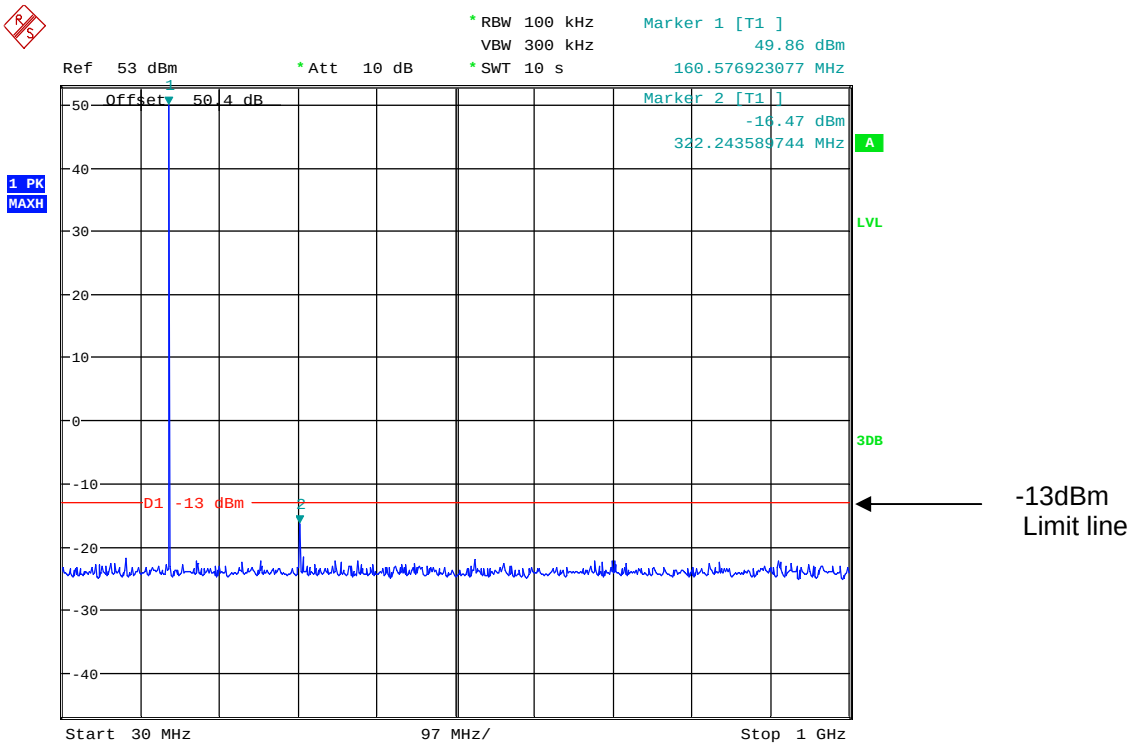
161.0250MHz 30MHz- 1GHz



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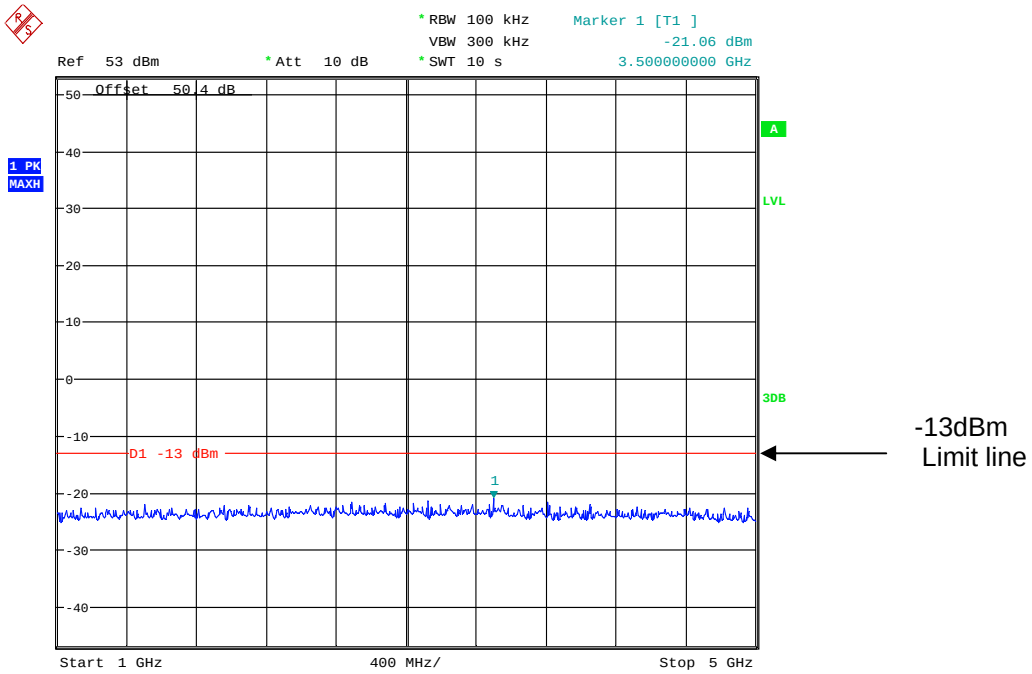
161.0250MHz 1GHz - 5GHz



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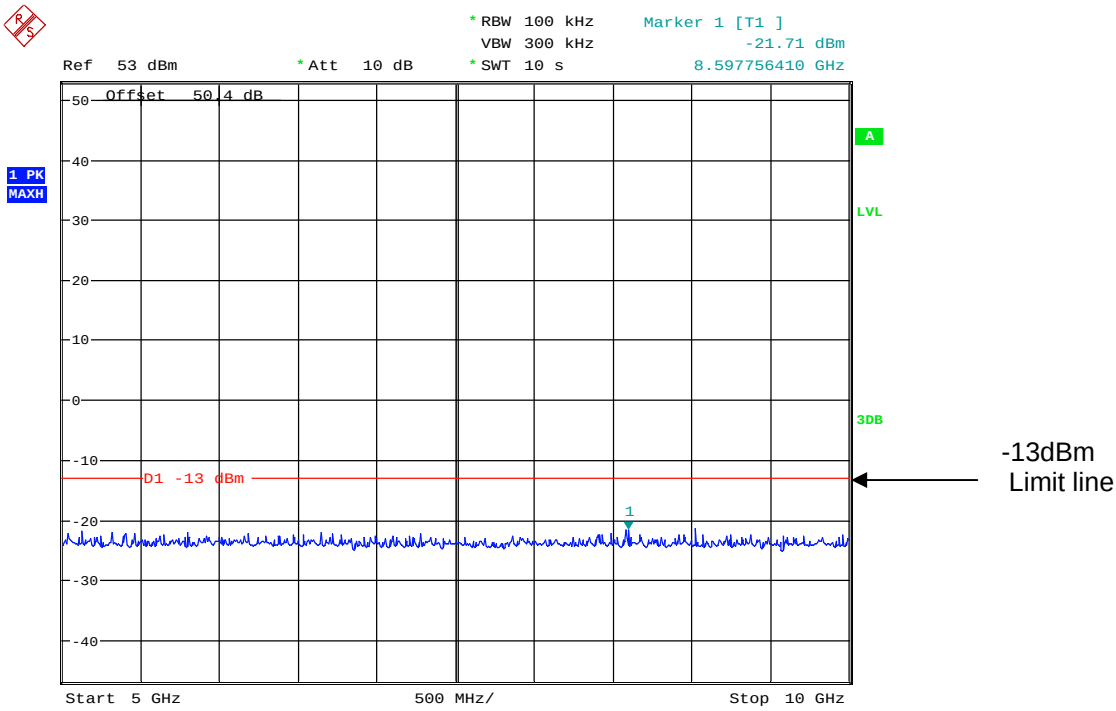
161.0250MHz 5GHz - 10GHz



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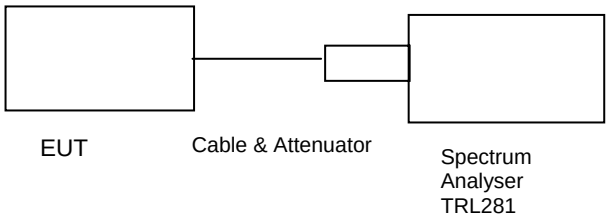
SPURIOUS EMISSIONS – CONDUCTED – Part 2.1053
Top Channel

Ambient temperature	=	20°C	Radio Laboratory		
Relative humidity	=	47%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



The test was set up as per the diagram. The unit was tested operating at maximum power .

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

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

RESULTS

Top Channel

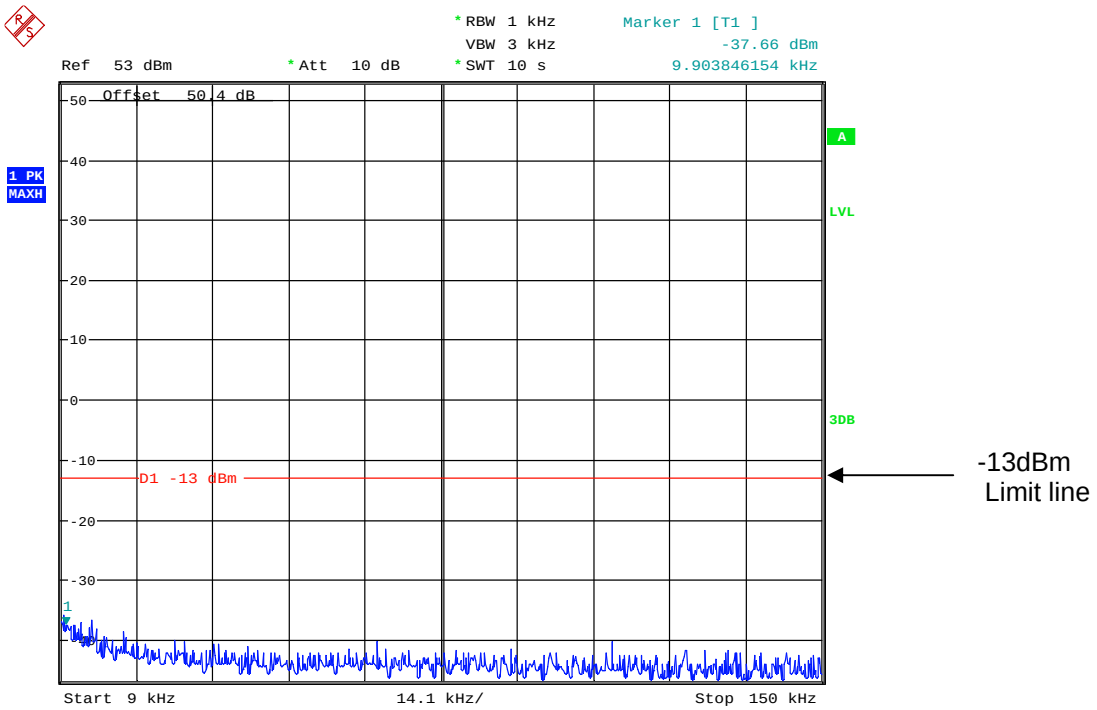
FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	LIMIT (dBm)
9kHz – 10GHz	357.97	-13.76	-13

The test equipment used for the Transmitter Conducted Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRAC No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
CABLE	TRAC	N/A	N/A	UH271	**X**
CABLE	TRAC	N/A	N/A	UH272	**X**
ATTENUATOR	SPINNER	745357	N/A	TRLUH225	**X**
ATTENUATOR	-	-	-	20dB	**X**
ATTENUATOR	BIRD	8304-100-N	N/A	222	**X**

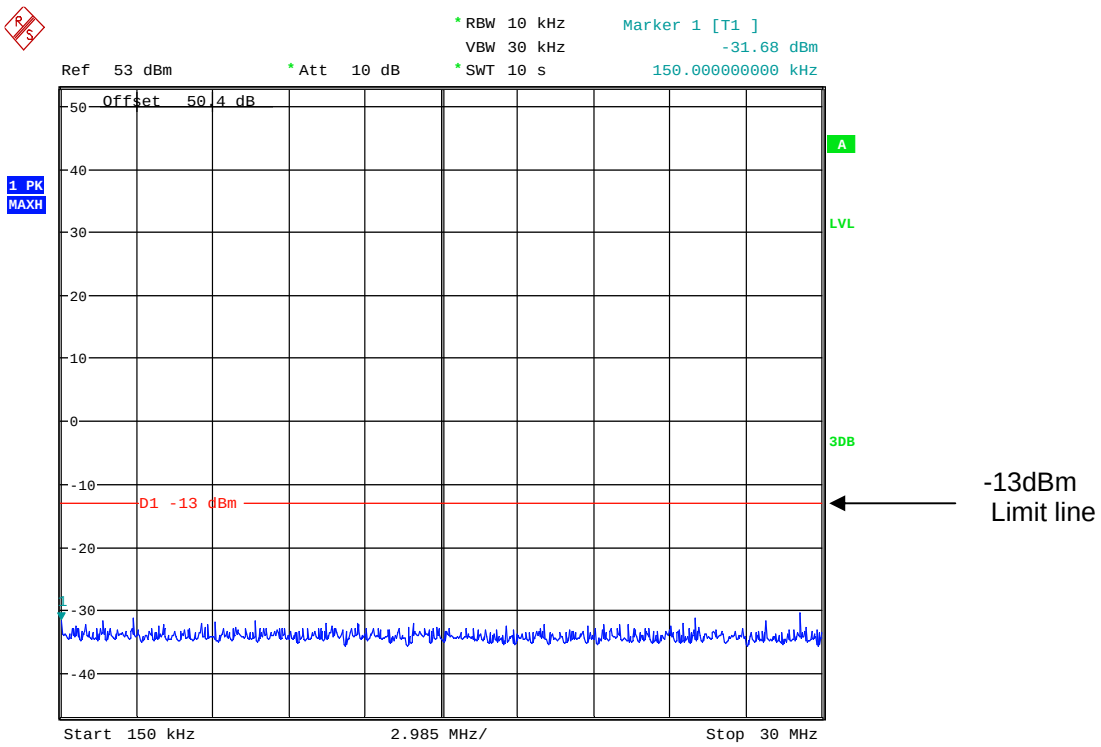
Conducted emissions Top Channel

173.9875MHz 9kHz – 150kHz



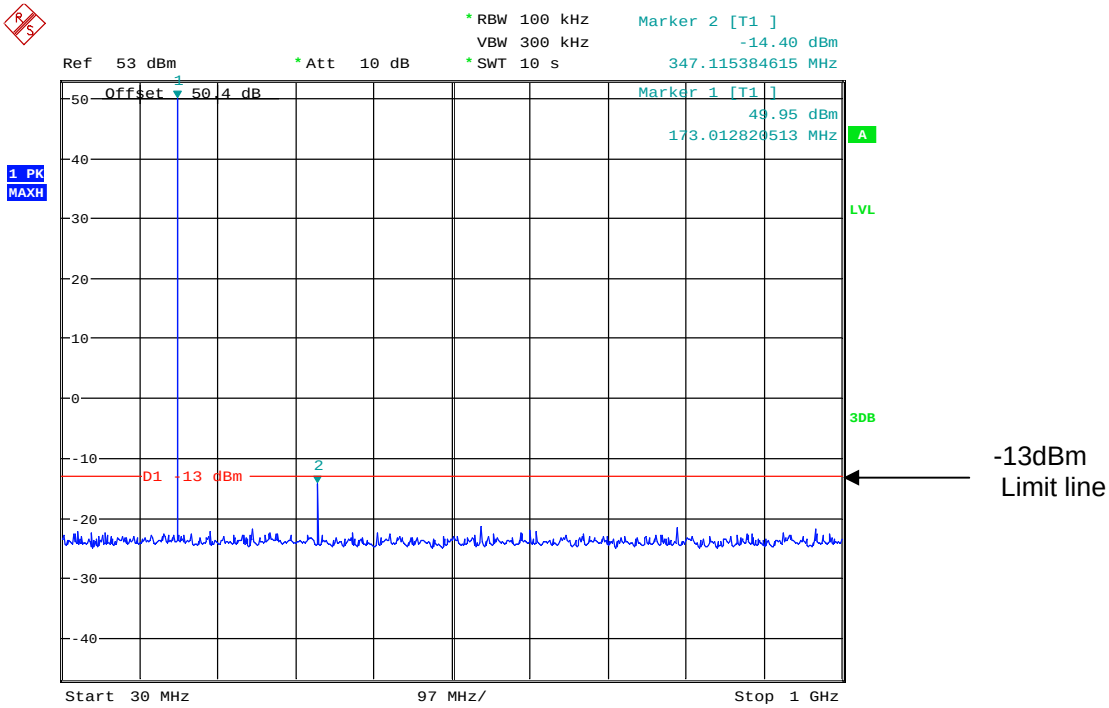
Date: 3.JAN.2012 18:00:42

173.9875MHz 150kHz -30MHz



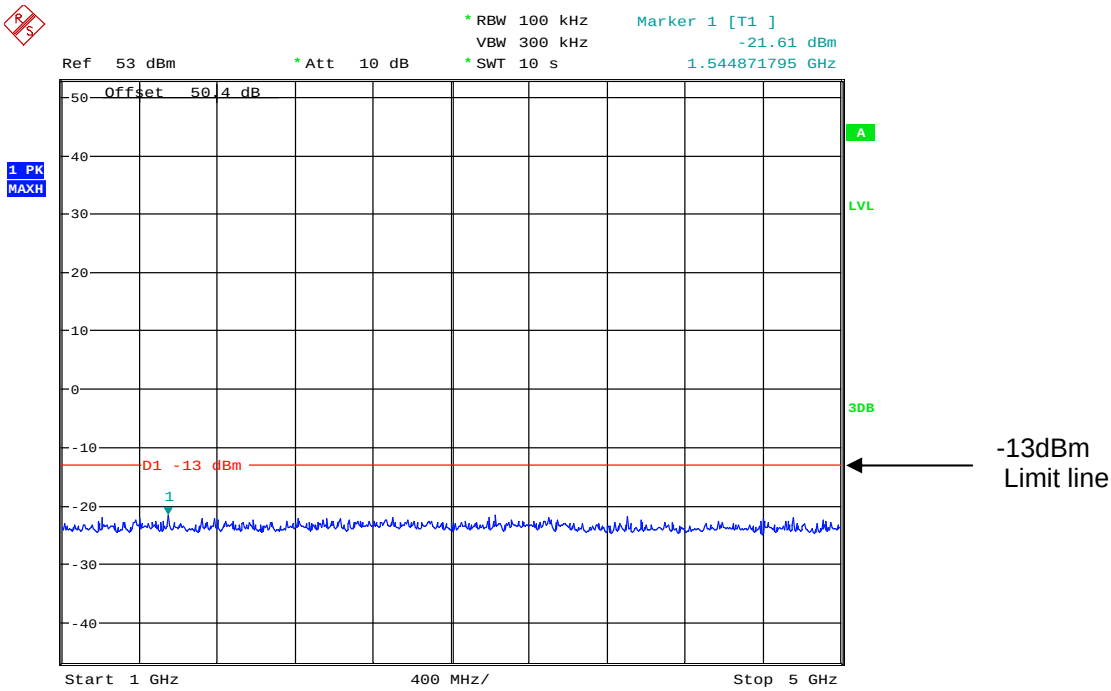
Date: 3.JAN.2012 18:01:16

173.9875MHz 30MHz-1GHz



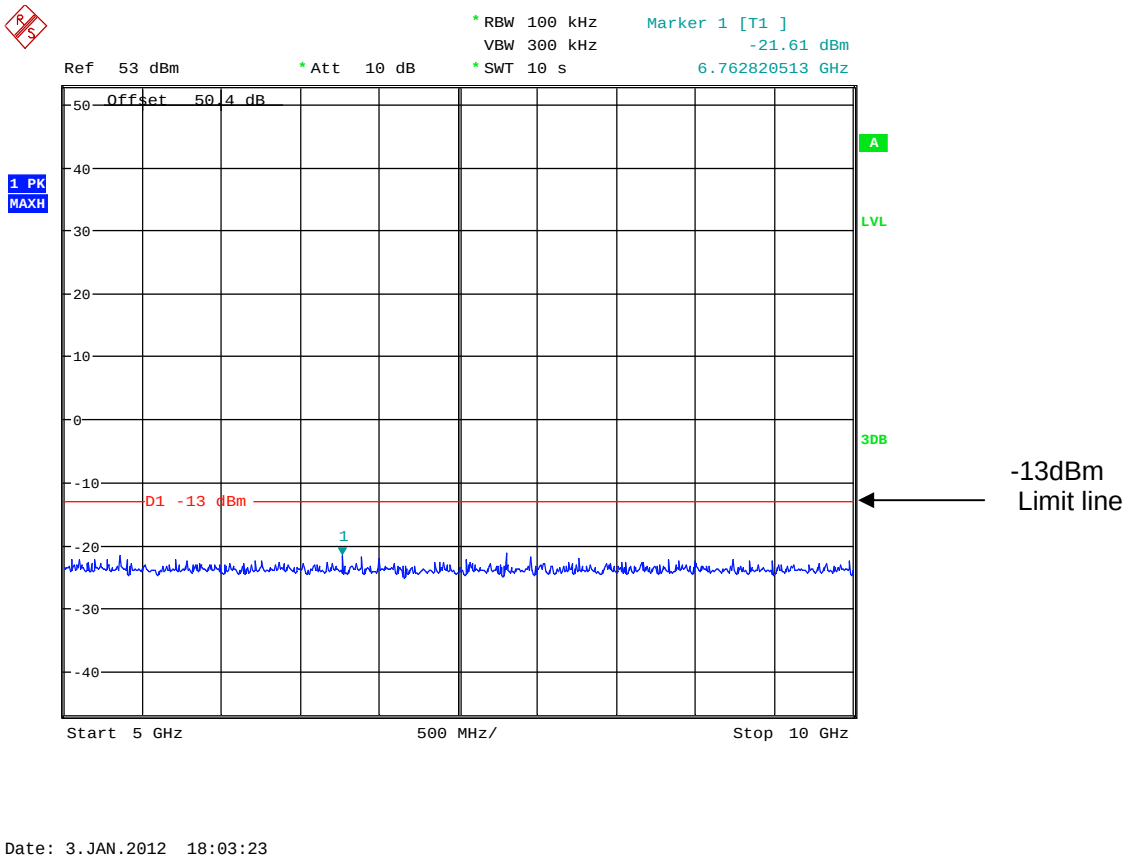
Date: 3.JAN.2012 18:01:54

173.9875MHz 1GHz – 5GHz



Date: 3.JAN.2012 18:02:30

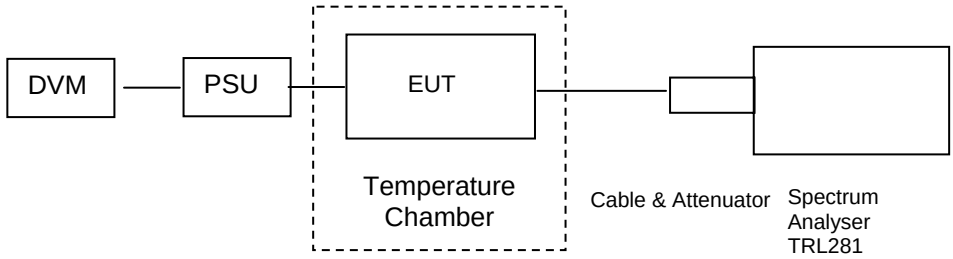
174.0MHz 5GHz – 10GHz



Date: 3.JAN.2012 18:03:23

FREQUENCY STABILITY – CONDUCTED – Part 90.213

Ambient temperature	=	24°C	Radio Laboratory		
Relative humidity	=	42%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



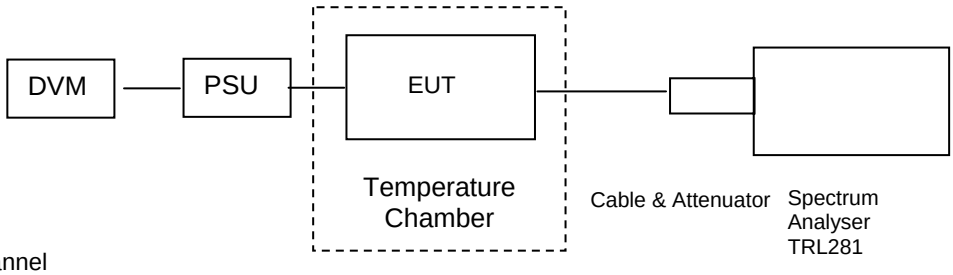
Bottom Channel

Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Limit ± 2.5 ppm Pass/Fail
+50	13.8	148.05001	0	0	Pass
+40	13.8	148.05001	0	0	Pass
+30	13.8	148.05001	0	0	Pass
+20	13.8	148.05001	0	0	Pass
+10	13.8	148.05001	0	0	Pass
0	13.8	148.05001	0	0	Pass
-10	13.8	148.05001	0	0	Pass
-20	13.8	148.05001	0	0	Pass
-30	13.8	148.05001	0	0	Pass

Tnom 24 °C	85%= 11.7Vdc	115%= 15.9Vdc
Frequency (MHz)	148.05001	148.05000
Frequency Difference (Hz)	0	-10
ppm	0	0.07
Limit ± 2.5 ppm Pass/Fail	Pass	Pass

FREQUENCY STABILITY – CONDUCTED – Part 90.213 cont

Ambient temperature	=	24°C	Radio Laboratory		
Relative humidity	=	47%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



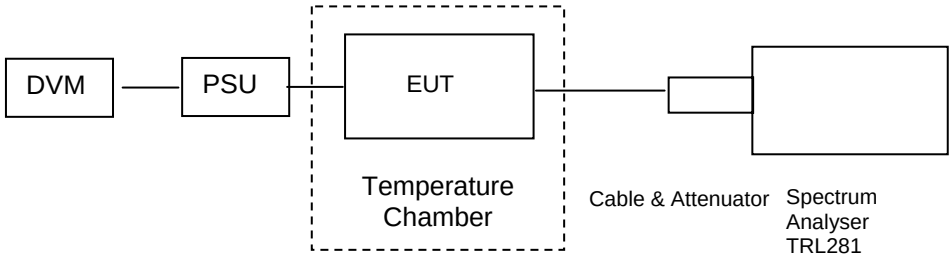
Middle Channel

Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Limit ± 2.5 ppm Pass/Fail
+50	13.8	161.02500	0	0	Pass
+40	13.8	161.02500	0	0	Pass
+30	13.8	161.02500	0	0	Pass
+20	13.8	161.02500	0	0	Pass
+10	13.8	161.02500	0	0	Pass
0	13.8	161.02498	20	0.12	Pass
-10	13.8	161.02500	0	0	Pass
-20	13.8	161.02500	0	0	Pass
-30	13.8	161.02500	0	0	Pass

Tnom 21.5°C	85%= 11.7Vdc	115%= 15.9Vdc
Frequency (MHz)	161.02500	161.02500
Frequency Difference (Hz)	0	0
ppm	0	0
Limit ± 2.5 ppm Pass/Fail	Pass	Pass

Ambient temperature = 24°C
Relative humidity = 47%
Supply voltage = +13.8Vdc

Radio Laboratory
Test Signal = F3E



Top Channel

Temperature °C	Vnom (Vdc)	Measured Frequency (MHz)	Frequency Difference (Hz)	ppm	Limit ± 2.5 ppm Pass/Fail
+50	13.8	173.98750	0	0	Pass
+40	13.8	173.98750	0	0	Pass
+30	13.8	173.98750	0	0	Pass
+20	13.8	173.98750	0	0	Pass
+10	13.8	173.98750	0	0	Pass
0	13.8	173.98750	0	0	Pass
-10	13.8	173.98750	0	0	Pass
-20	13.8	173.98750	0	0	Pass
-30	13.8	173.98750	0	0	Pass

Tnom 21.5°C	85%= 11.7Vdc	115%= 15.9Vdc
Frequency (MHz)	173.9875	173.9875
Frequency Difference (Hz)	0	0
ppm	0	0
Limit ± 2.5 ppm Pass/Fail	Pass	Pass

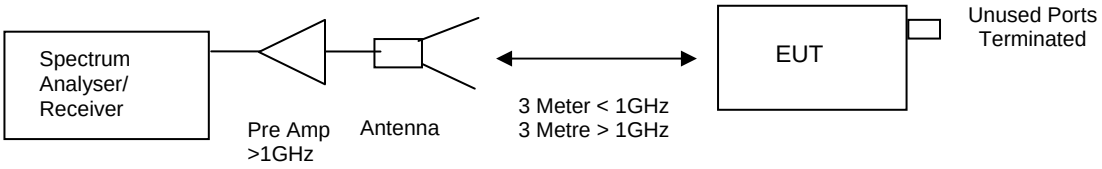
Frequency stability measurements were between -30°C and +50°C in 10°C increments.

At each temperature the transmitter was given a period of 60 minutes to stabilise. The transmitter was then turned on and the frequency error measured after a period of 1 minute.

Measurements were also made with the supply voltage varied between 115% and 85% of the nominal supply voltage(13.8Vdc).

INTENTIONAL RADIATOR SPURIOUS EMISSIONS – RADIATED – Part 2.1053

Ambient temperature	=	22°C	Test Signal	=	F3E
Relative humidity	=	46%			
Conditions	=	OATS			
Supply voltage	=	+13.8Vdc			
Supply Frequency	=	N/A			



The test was set up as per the diagram. The unit was tested operating maximum power on three test frequencies with a 50 ohm load on the output.

The Spurious limit was calculated as follows:

On any frequency removed from the assigned frequency by more that 250% of the authorised bandwidth

At least 43 + 10 log PdB

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

RESULTS

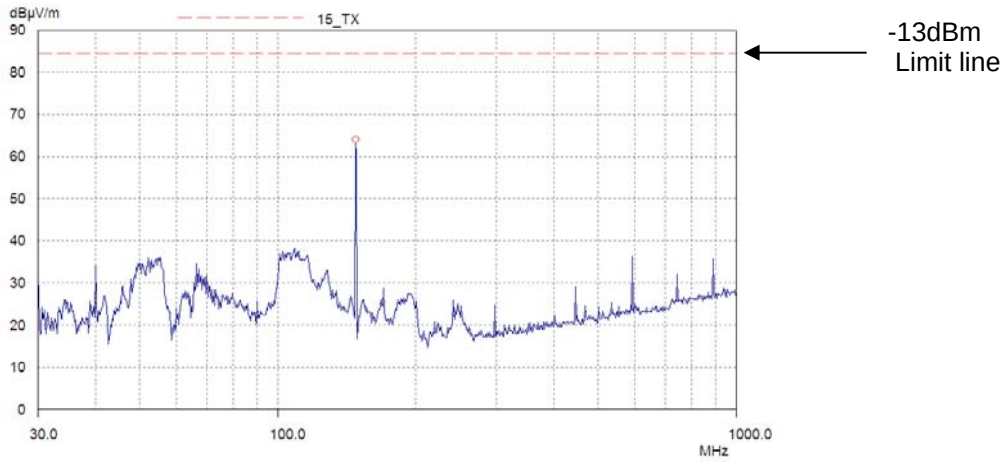
FREQUENCY RANGE	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED EIRP (dBm)	LIMIT (dBm)
30MHz – 10GHz	No Significant Emissions Within 20dB of Limit.						-13

The test equipment used for the Transmitter Spurious Emissions:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRAC No	ACTUAL EQUIPMENT USED
HORN	EMCO	3115	9010-3580	138	**X**
SPECTRUM ANALYSER	R&S	FSU46	200034	TRL281	**X**
PRE AMPLIFIER	HP	8449B	3008A016	572	**X**
ANTENNA	YORK	CBL611/A	1618	UH191	**X**
RECEIVER	R&S	ESVS10	825892/006	UH04	**X**

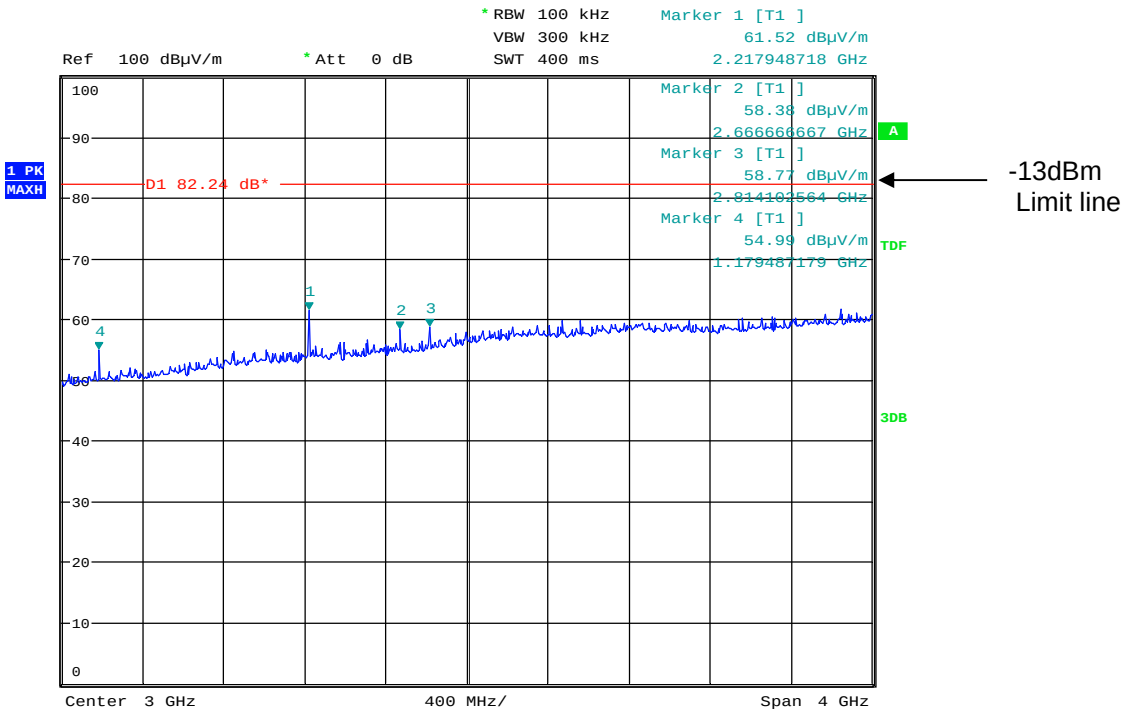
Radiated emissions Bottom Channel

148.05MHz 30MHz – 1GHz



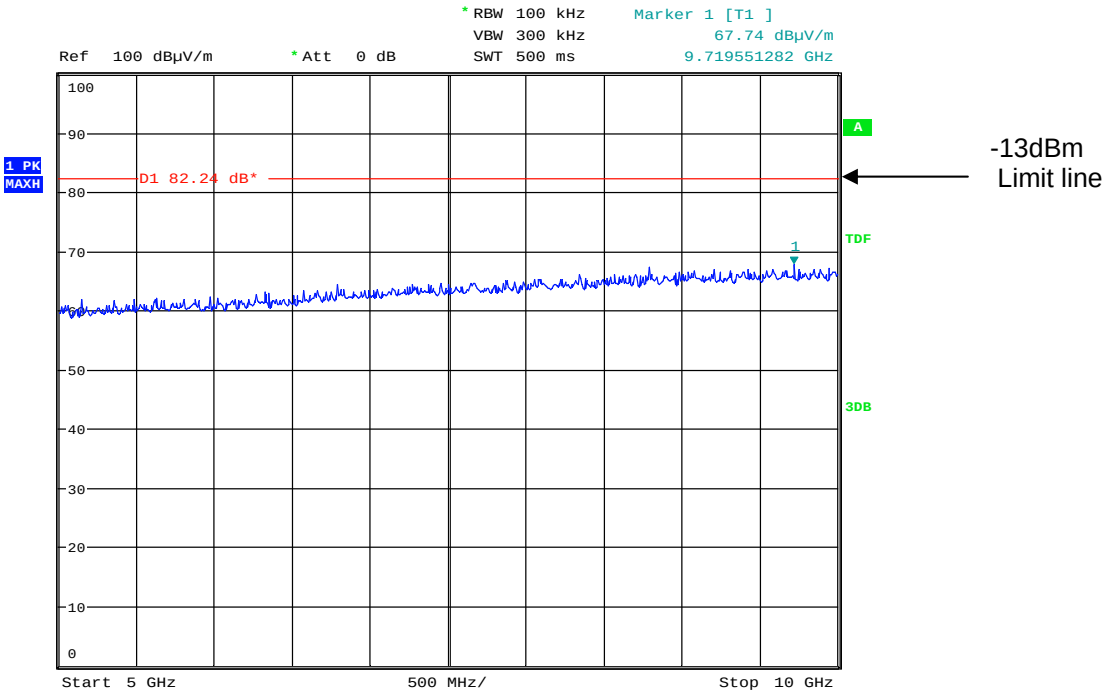
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

148.05MHz 1GHz – 5GHz



Date: 10.JAN.2012 12:29:30

148.05MHz 5GHz – 10GHz

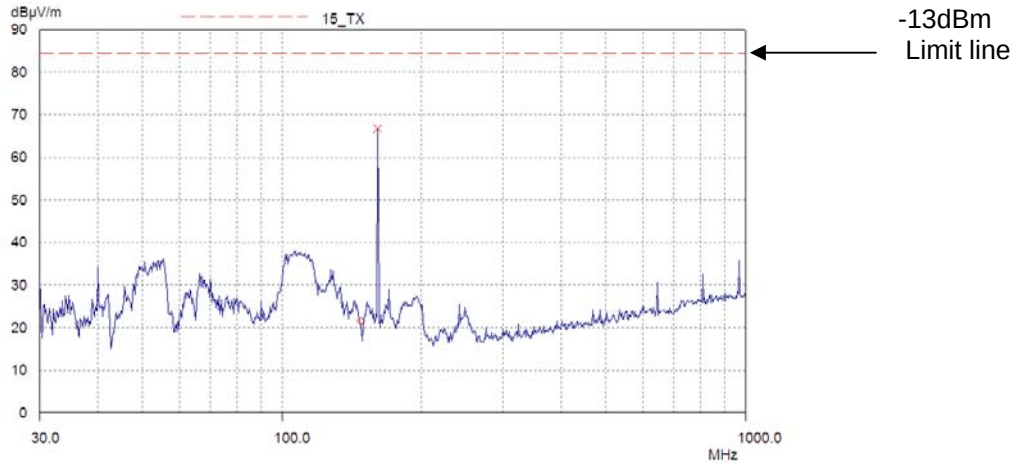


Date: 10.JAN.2012 12:32:49

The above test results show that there were no emissions within 20dBs of the –13dBm limit.

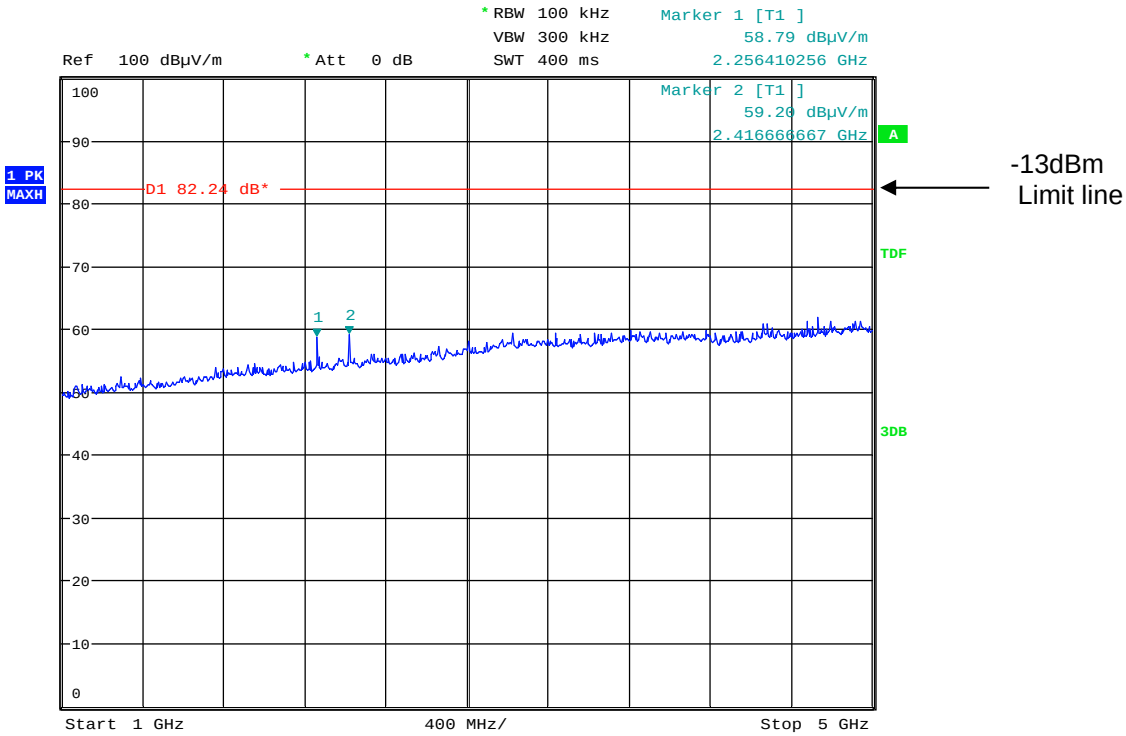
Radiated emissions Middle Channel

161.025MHz 30MHz – 1GHz



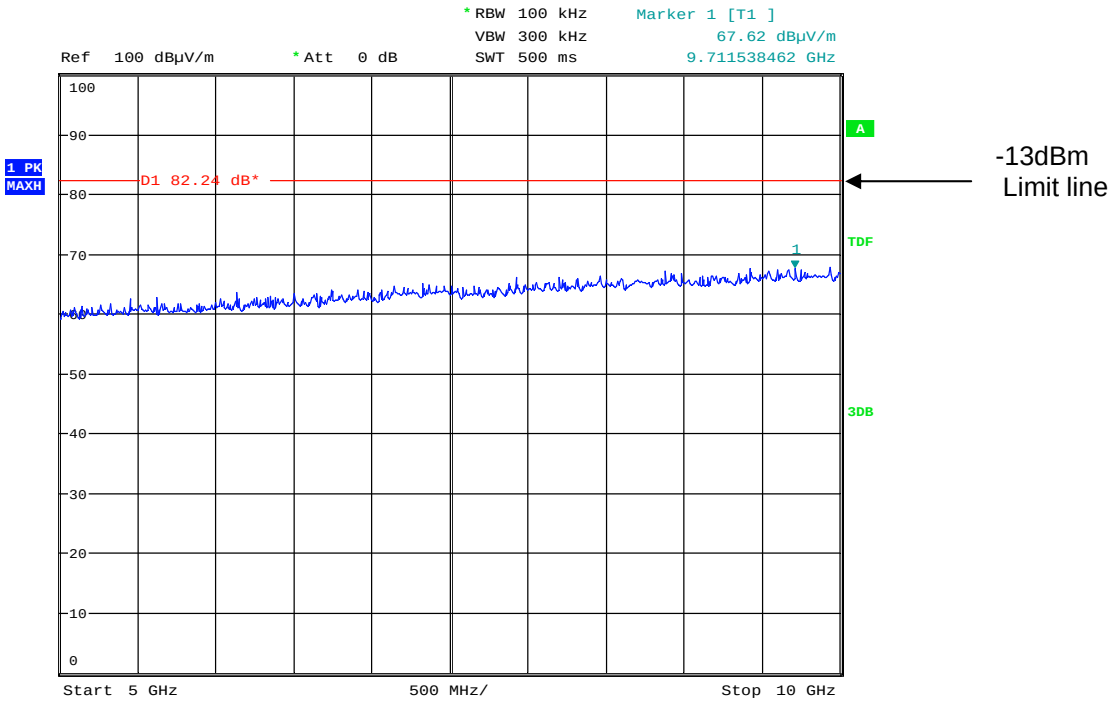
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

161.025MHz 1GHz – 5GHz



Date: 10.JAN.2012 12:37:27

158.5MHz 5GHz – 10GHz

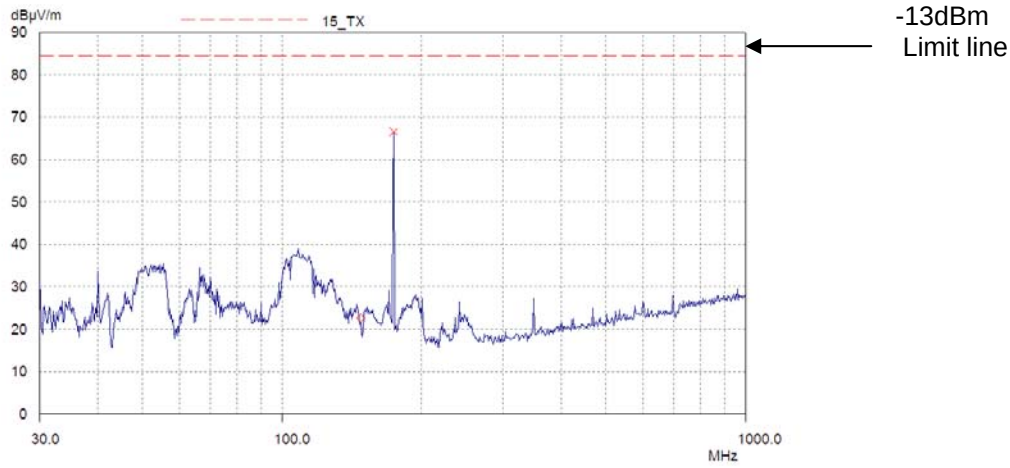


Date: 10.JAN.2012 12:41:38

The above test results show that there were no emissions within 20dBs of the –13dBm limit.

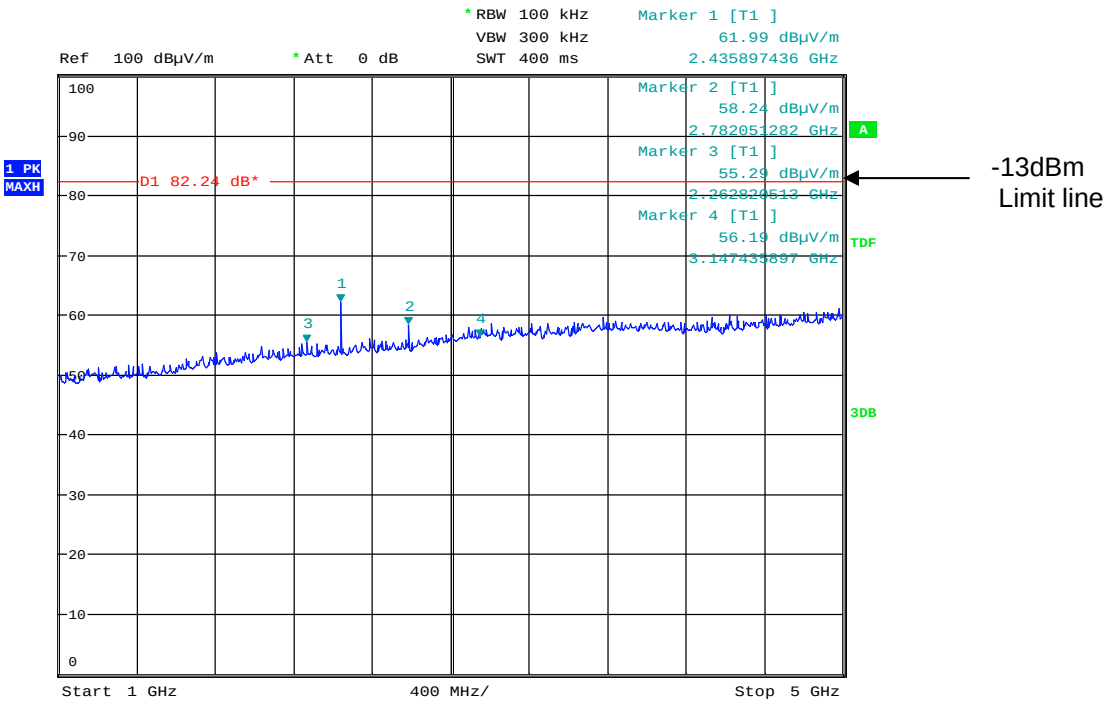
Radiated emissions Top Channel

173.9875MHz - 30MHz – 1GHz



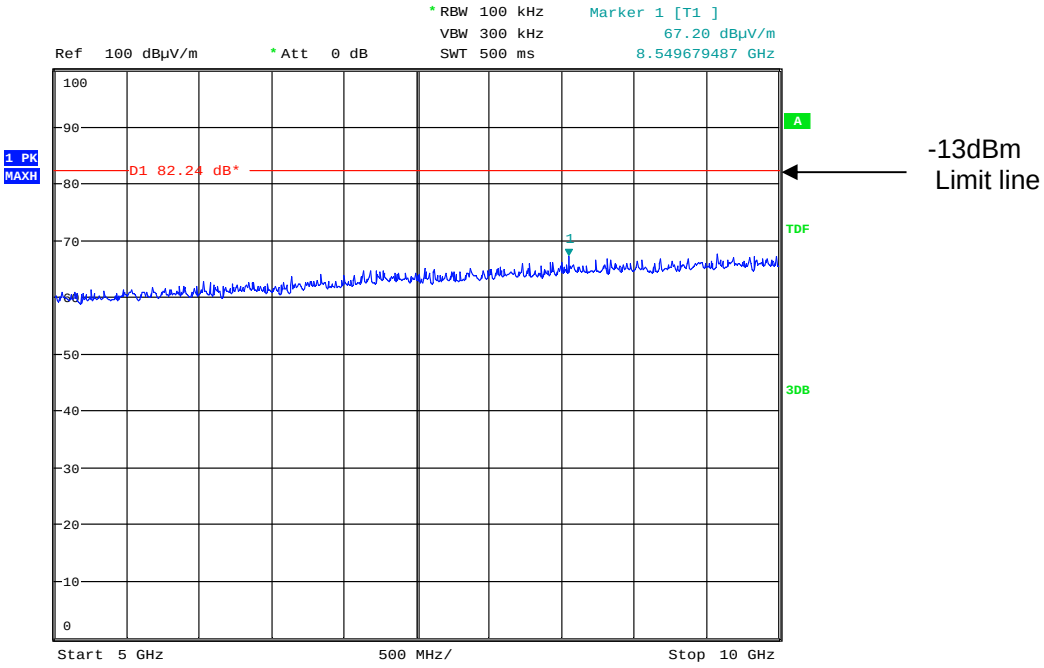
The above test results show that there were no emissions within 20dBs of the –13dBm limit.

173.9875MHz 1GHz – 5GHz



Date: 10.JAN.2012 12:49:07

173.9875MHz 5GHz – 10GHz

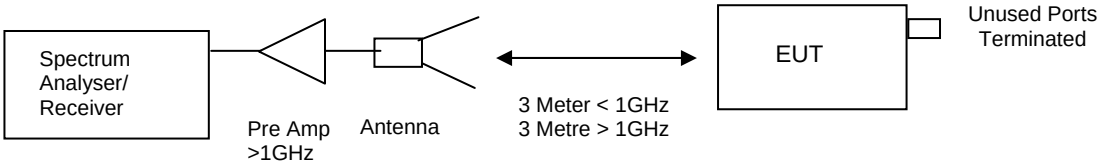


Date: 10.JAN.2012 12:52:22

The above test results show that there were no emissions within 20dBs of the –13dBm limit.

UN-INTENTIONAL RADIATOR SPURIOUS EMISSIONS – RADIATED – Part 15:109

Ambient temperature	=	22°C	Test Signal	=	F3E
Relative humidity	=	46%			
Conditions	=	OATS			
Supply voltage	=	+13.8Vdc			
Supply Frequency	=	N/A			



The test was set up as per the diagram, The receiver was tested while in receive mode while attached to a dummy load.

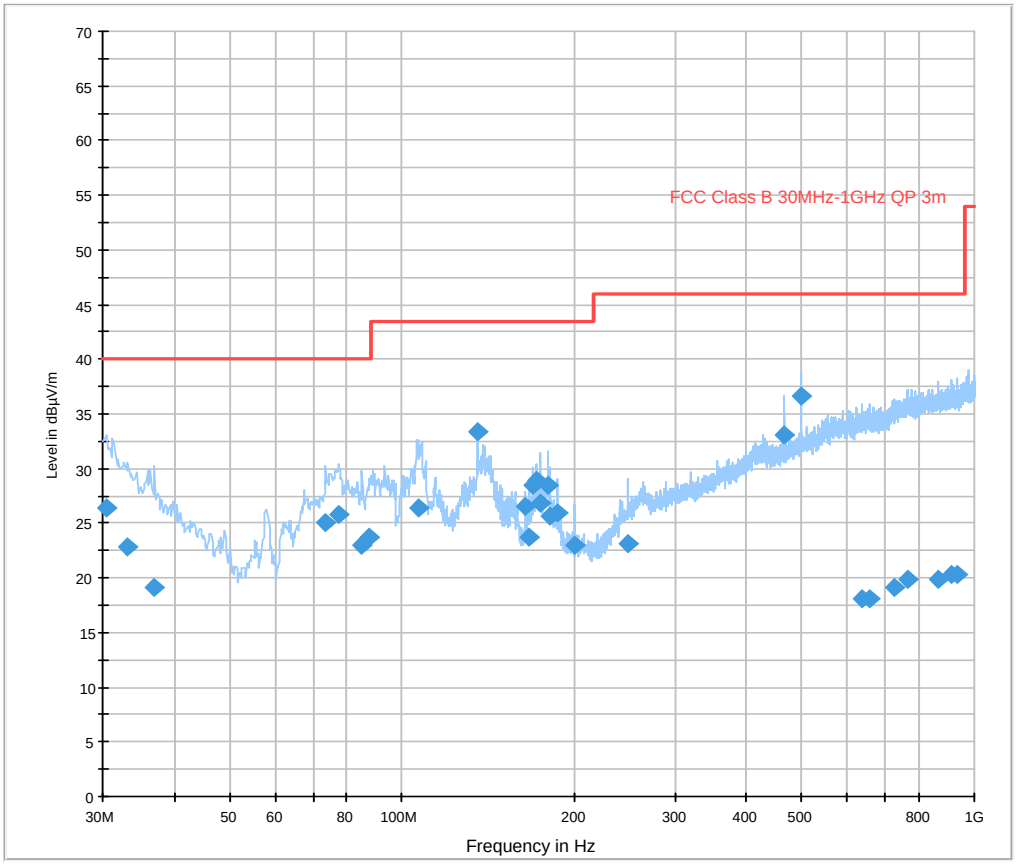
30MHz -1GHz worse case Rx mode

FREQ. (MHz)	MEAS. Rx. (dBµV)	Cable Loss (dB)	Ant Factor	Pre Amp (dB)	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	Limit (dBµV/m)	Limit (µV/m)
30.00	13.90	0.4	18.6	-	32.90	44.15	40.00	100
30.60	13.40	0.4	18.3	-	32.10	40.27	40.00	100
30.65	11.80	0.4	18.3	-	30.50	33.49	40.00	100
31.45	15.70	0.4	17.8	-	33.90	49.54	40.00	100
32.05	9.30	0.4	17.4	-	27.10	22.64	40.00	100
32.30	3.20	0.4	17.3	-	20.90	11.09	40.00	100
32.40	4.10	0.4	17.2	-	21.70	12.16	40.00	100
32.55	6.10	0.4	17.1	-	23.60	15.13	40.00	100
32.70	3.10	0.4	17.1	-	20.60	10.71	40.00	100
33.70	4.70	0.4	16.5	-	21.60	12.02	40.00	100
40.00	20.70	0.4	13.0	-	34.10	50.69	40.00	100
44.05	11.70	0.4	10.8	-	22.90	13.96	40.00	100
45.75	14.20	0.4	9.9	-	24.50	16.78	40.00	100
47.05	11.50	0.4	9.2	-	21.10	11.35	40.00	100
52.40	23.20	0.4	6.7	-	30.30	32.73	40.00	100
54.15	24.70	0.4	6.2	-	31.30	36.72	40.00	100
60.00	31.80	0.4	5.0	-	37.20	72.44	40.00	100
69.00	25.00	0.6	5.3	-	30.90	35.07	40.00	100
70.00	25.10	0.6	5.4	-	33.30	46.23	40.00	100
120.00	17.60	0.7	11.6	-	29.90	31.26	43.50	150
129.60	19.50	0.7	11.5	-	31.70	38.45	43.50	150
130.05	20.40	0.7	11.5	-	32.60	42.65	43.50	150
130.40	21.80	0.7	11.5	-	34.00	50.11	43.50	150
130.75	19.40	0.7	11.5	-	31.60	38.01	43.50	150

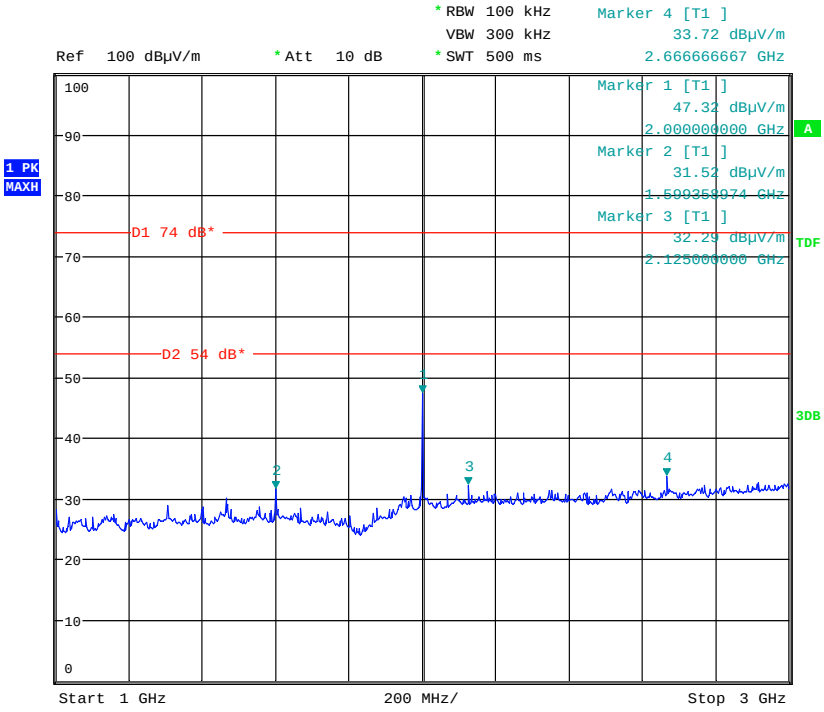
FREQ. (MHz)	MEAS. Rx. (dBµV)	Cable Loss (dB)	Ant Factor	Pre Amp (dB)	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	Limit (dBµV/m)	Limit (µV/m)
131.15	19.70	0.7	11.5	-	31.90	39.35	43.50	150
170.00	23.00	0.9	9.1	-	33.00	44.00	43.50	150
170.50	21.40	0.9	9.1	-	31.40	37.15	43.50	150
1866.02	57.14	2.1	27.4	35.90	50.74	344.35	74.0pk	5011pk
1866.02	41.52	2.1	27.4	35.90	35.12	57.01	54.0Av	500Av
2000.00	53.01	2.1	27.5	35.60	47.01	224.13	74.0pk	5011pk
2000.00	47.88	2.1	27.5	35.60	41.88	124.16	54.0Av	500Av
2133.18	61.11	2.1	27.8	35.60	55.41	589.52	74.0pk	5011pk
2133.18	42.86	2.1	27.8	35.60	37.16	72.11	54.0Av	500Av

Rx 30MHz – 1GHz

FCC pt15.109 RE Class B 30MHz-1GHz ESVS10 + UH93 - 10thFeb2011

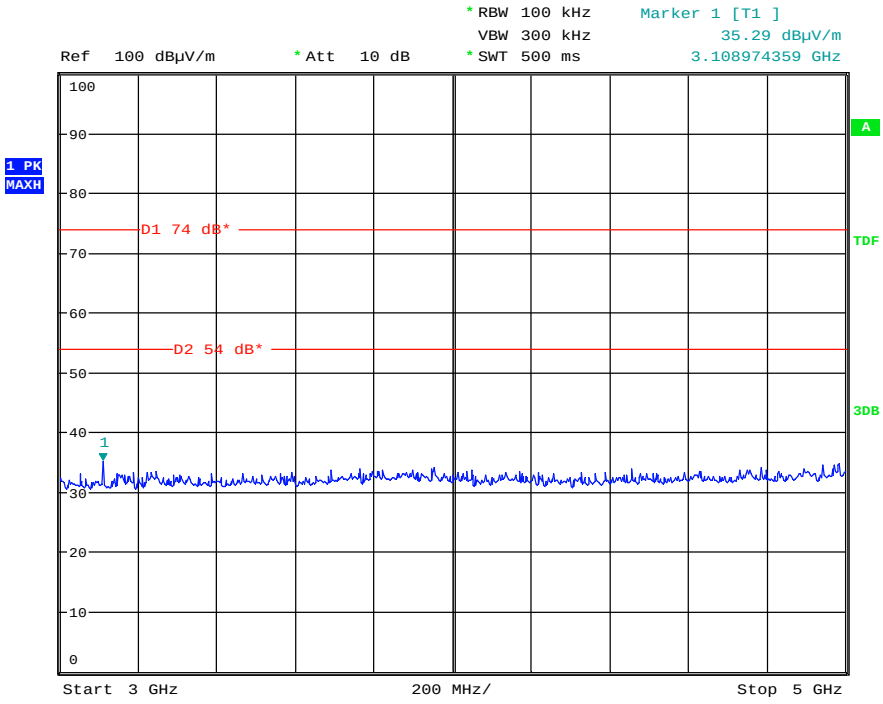


1GHz – 3GHz



Date: 10.OCT.2011 10:32:08

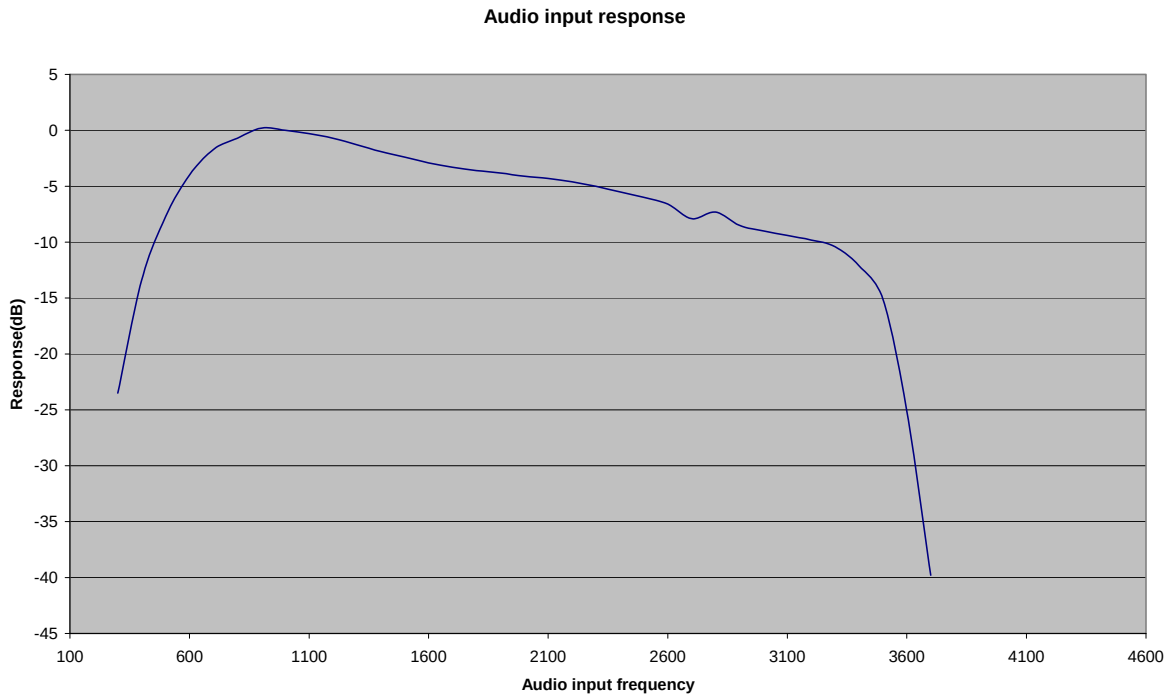
Rx 3GHz – 5GHz



Date: 10.OCT.2011 10:32:48

Modulation Characteristics: 2.1047 (a)

Ambient temperature	=	21°C	Radio Laboratory		
Relative humidity	=	42%	Test Signal	=	F3E
Supply voltage	=	+13.8Vdc			



Note: The SB2025NT100W is capable of transmitting analogue speech and P25 digital audio modulation.

There are no transmitter audio frequency inputs available via a microphone socket or any other audio frequency input.

The transmitter was tested whilst operating under the following conditions:

1) A signal generator was connected into the receiver RF input, tuned to the receiver frequency, and the deviation level set to 2.5kHz, the audio frequency was then varied between 100Hz and 5kHz.

2) testing was carried out with the talk through feature enabled.
(therefore the audio response will take into account the pre emphasis and de emphasis of the receiver and transmitter).

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

The above plot shows the audio response of the transmitter.

Modulation Characteristics: 2.1047 (b)

Note: The SB2025NT100W is capable of transmitting analogue speech and P25 digital audio modulation.

There are no transmitter external audio inputs available via a microphone socket etc, and therefore the test was not performed. The external audio is via the receiver RF input or the digital audio input.

Transient frequency Behaviour: Part 90.214

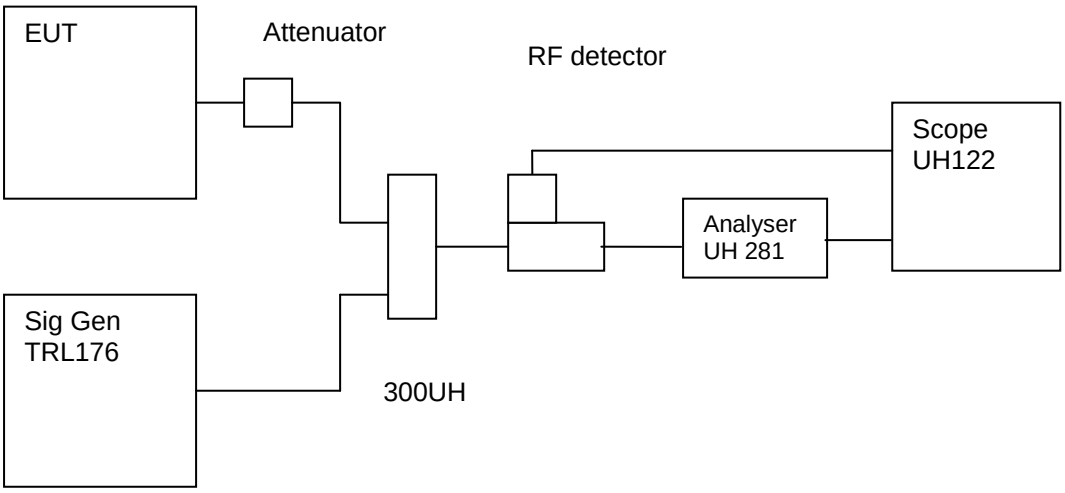
Tnom = 22°C

RHnom = 45%

Tx Pnom = 50W

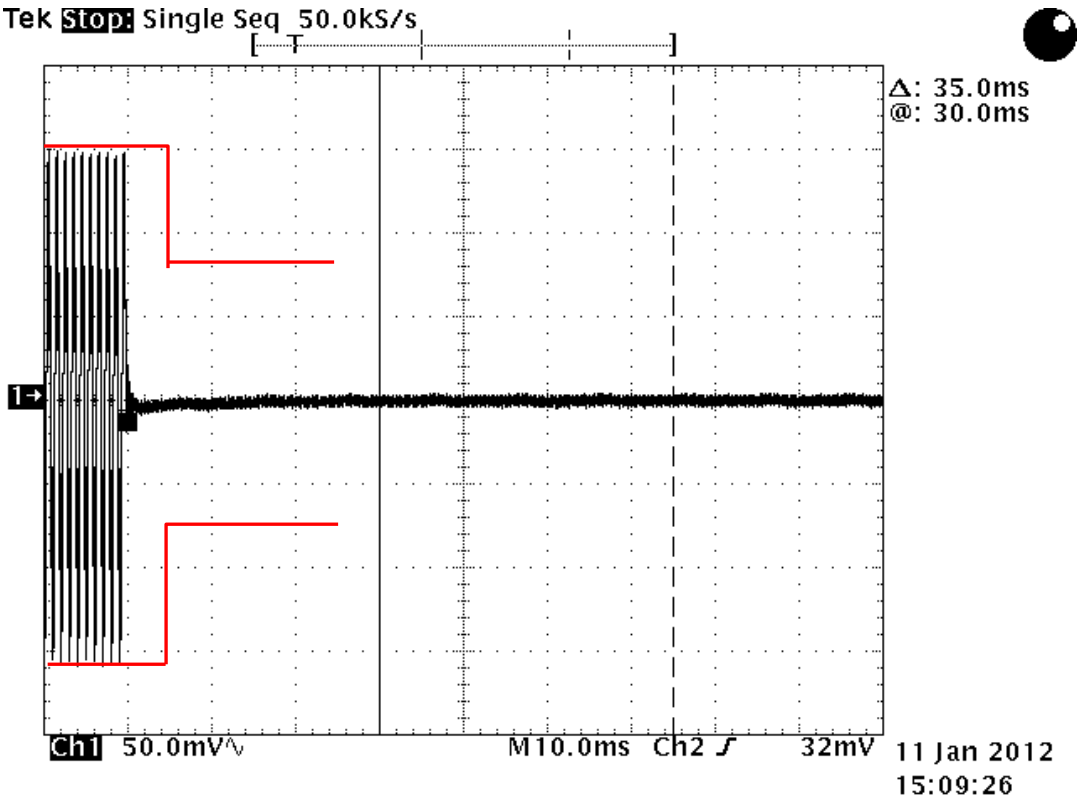
Method

Channel Spacing = 12.5kHz

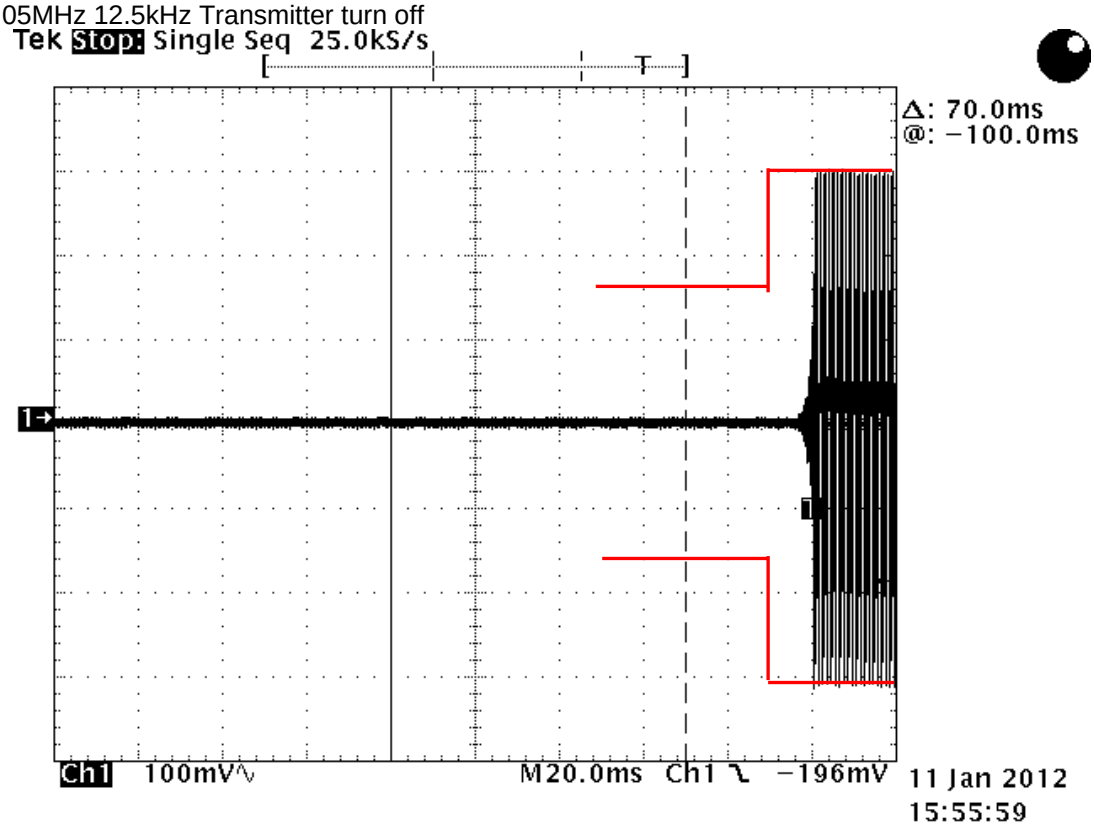


Channel		148.05MHz	161.025MHz	173.98750MHz
Time, t1 Transient Frequency		Compliant	Compliant	Compliant
Time, t2 Transient Frequency		Compliant	Compliant	Compliant
Time, t3 Transient Frequency		Compliant	Compliant	Compliant
Limits Clause	t1	5ms @ 12.5kHz		
	t2	20ms @ 6.25kHz		
	t3	5ms @ 12.5kHz		

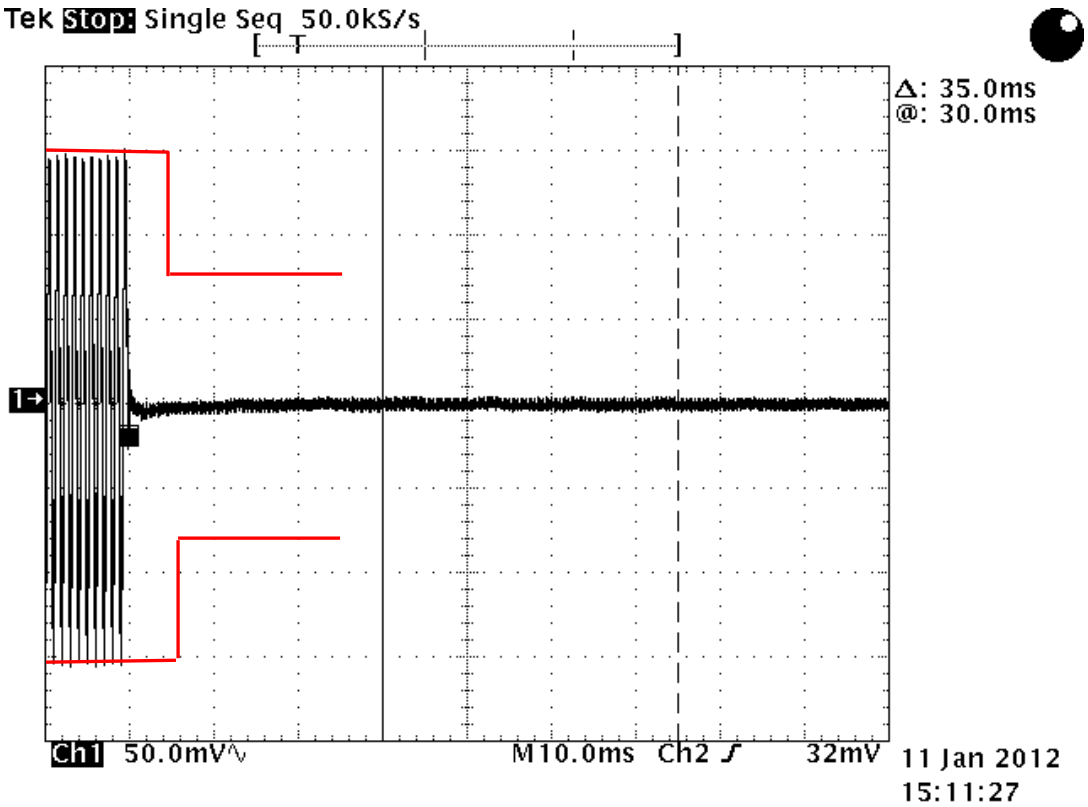
148.05MHz 12.5kHz Transmitter turn on



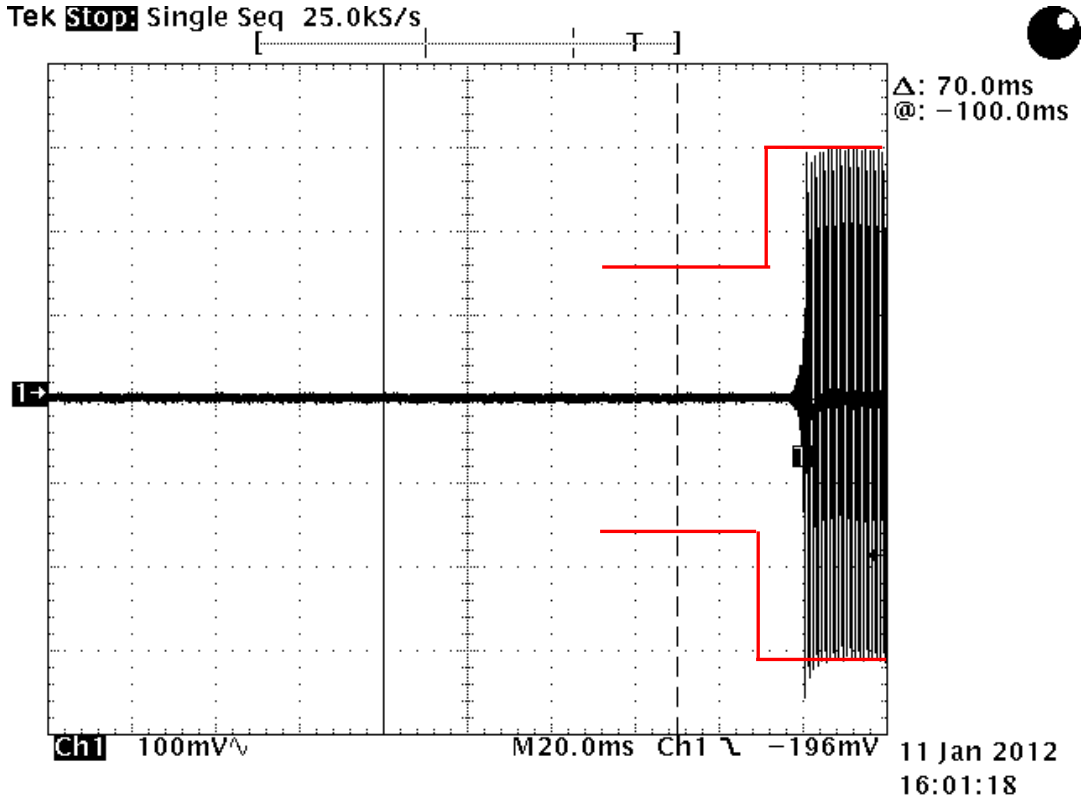
148.05MHz 12.5kHz Transmitter turn off



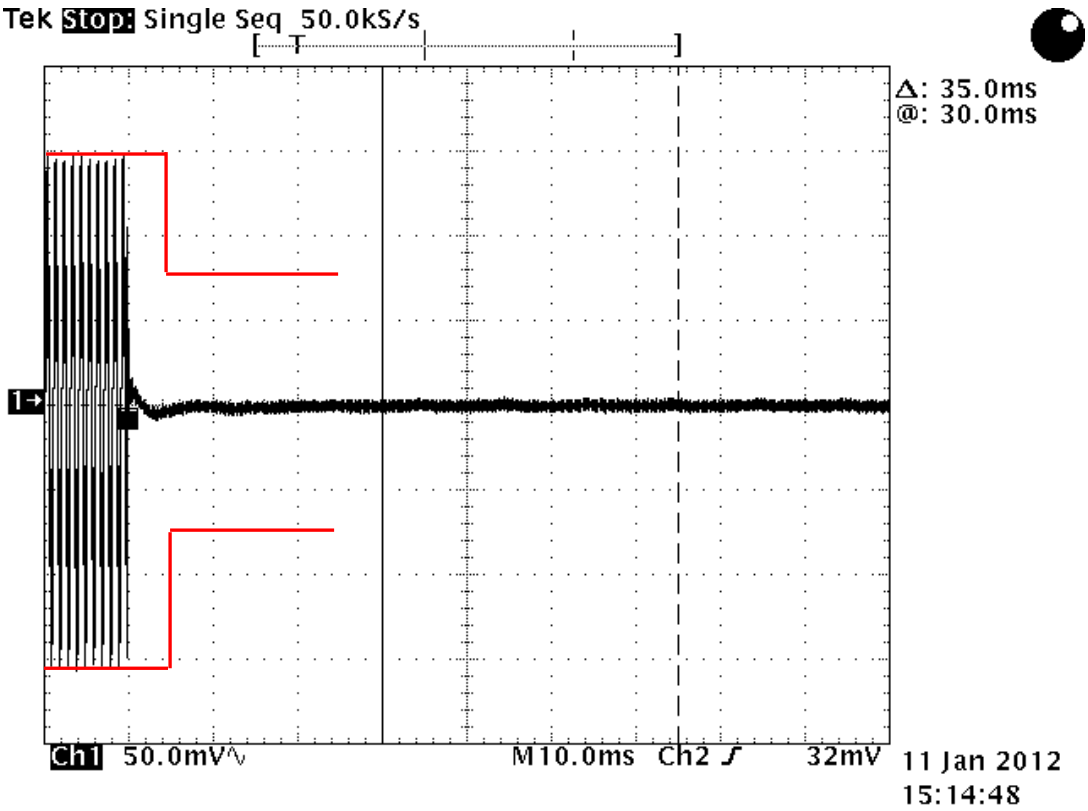
161.025MHz 12.5kHz Transmitter turn on



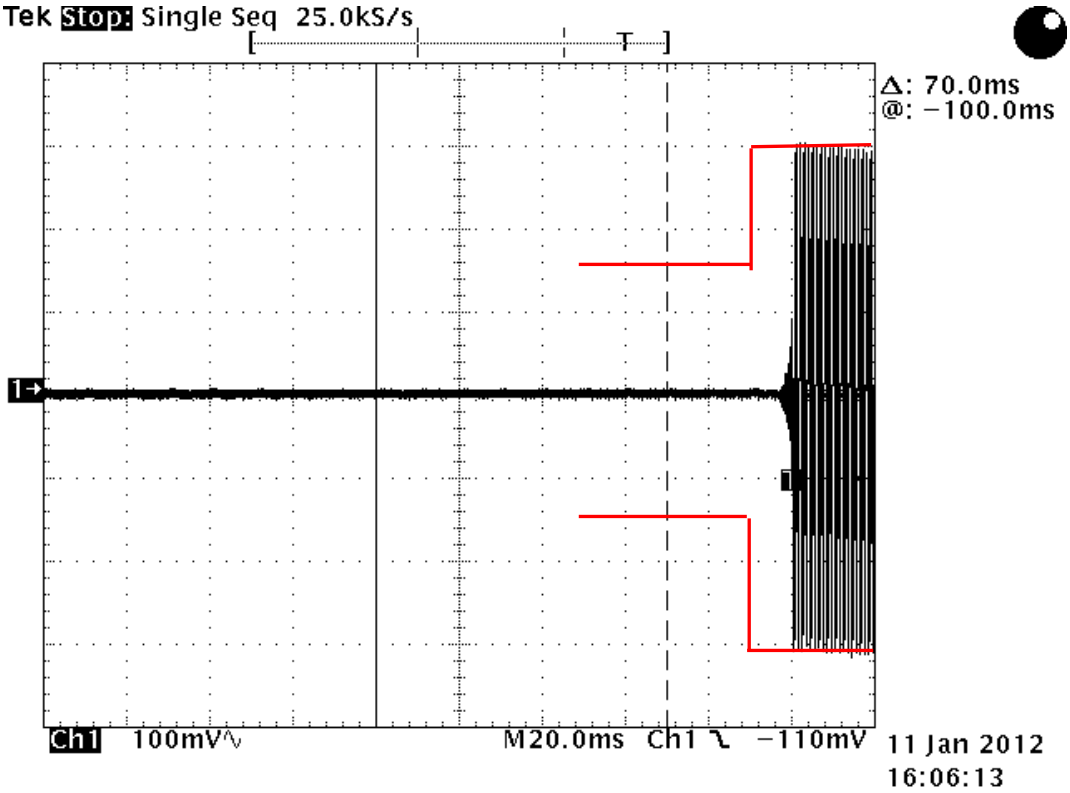
161.025MHz 12.5kHz Transmitter turn off



173.98750MHz 12.5kHz Transmitter turn on



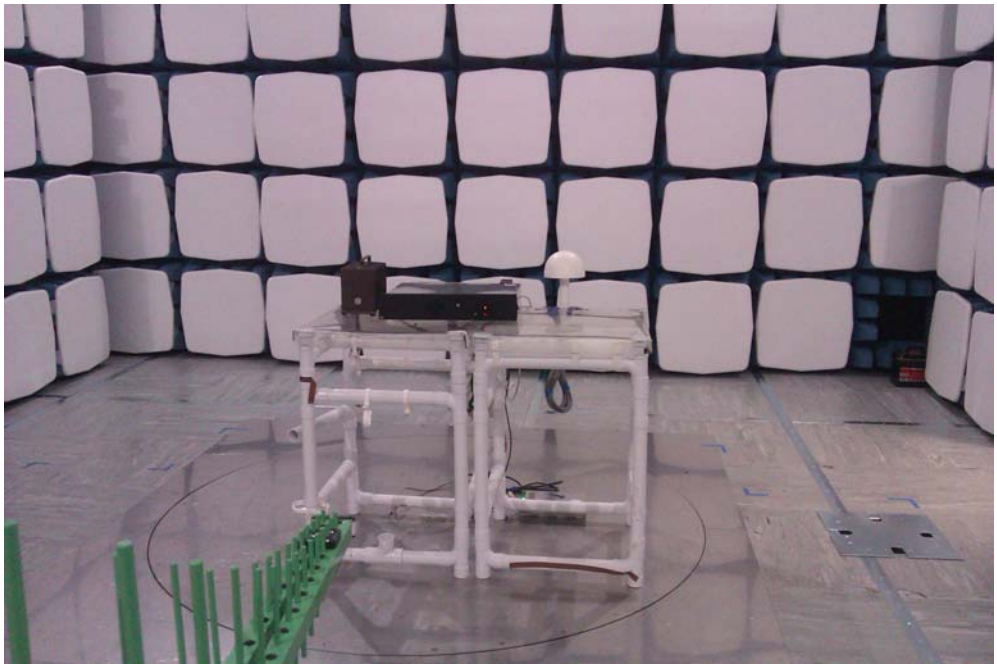
174.0MHz 12.5kHz Transmitter turn off

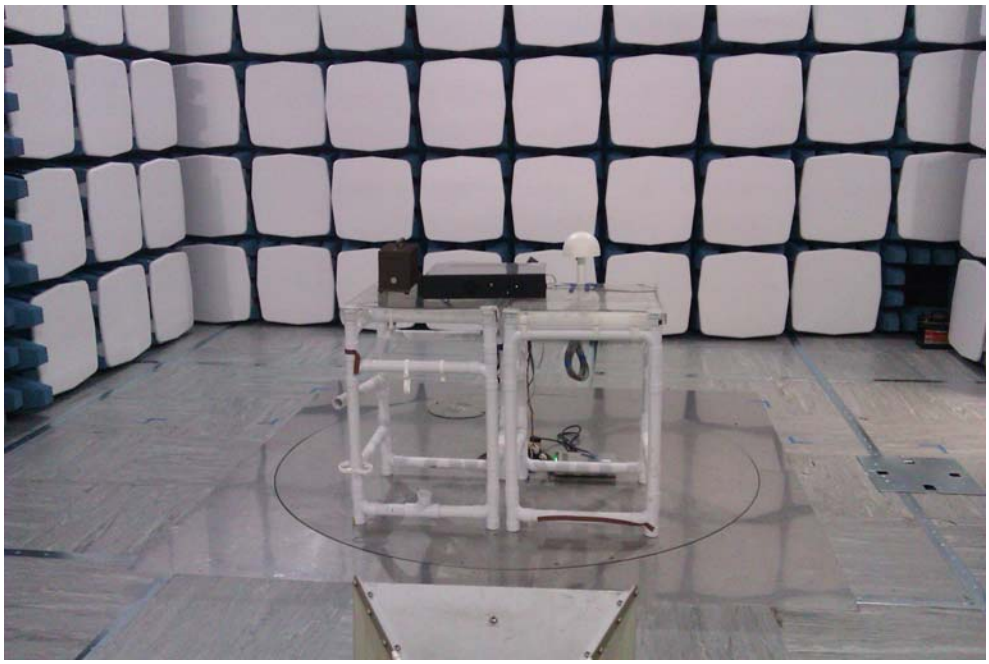


ANNEX A

PHOTOGRAPHS

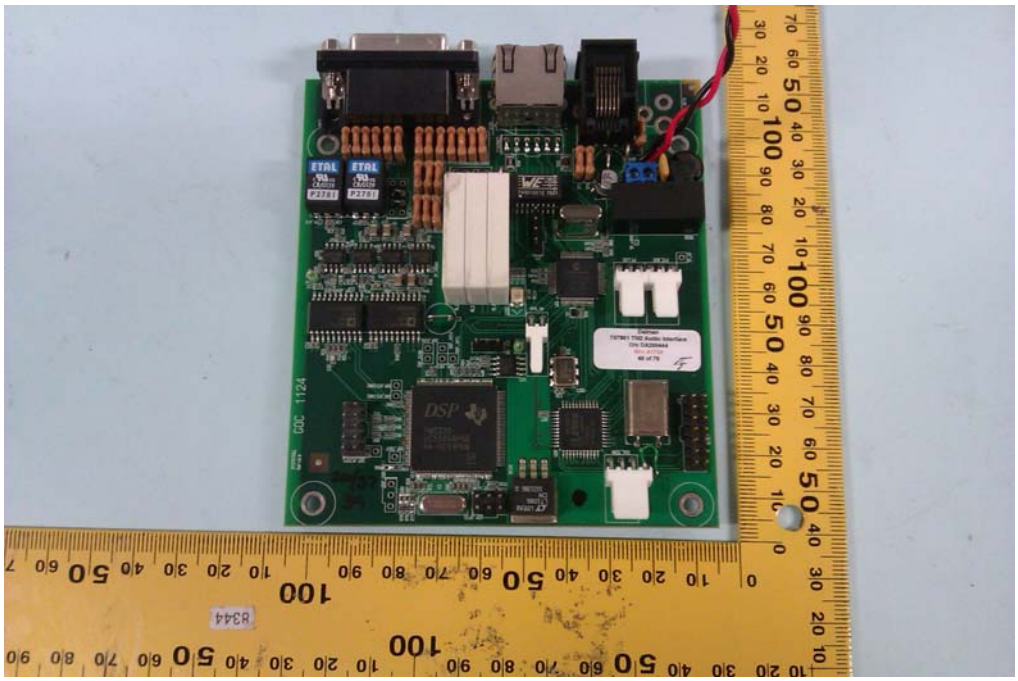
Photograph 1&2: Test Setup



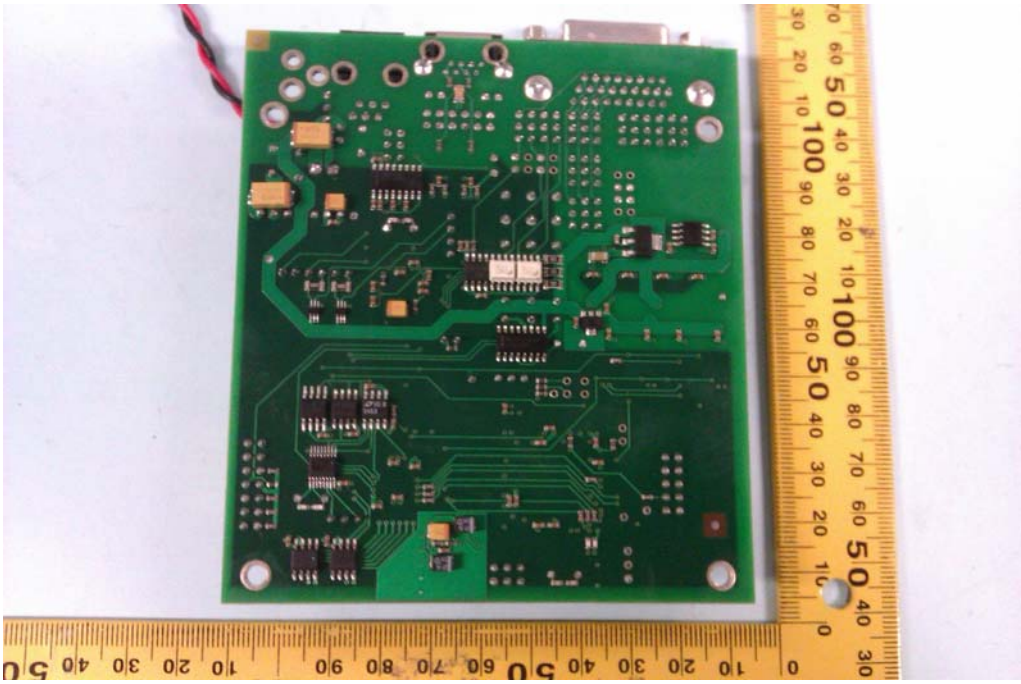


Photograph 3&4: Equipment overview

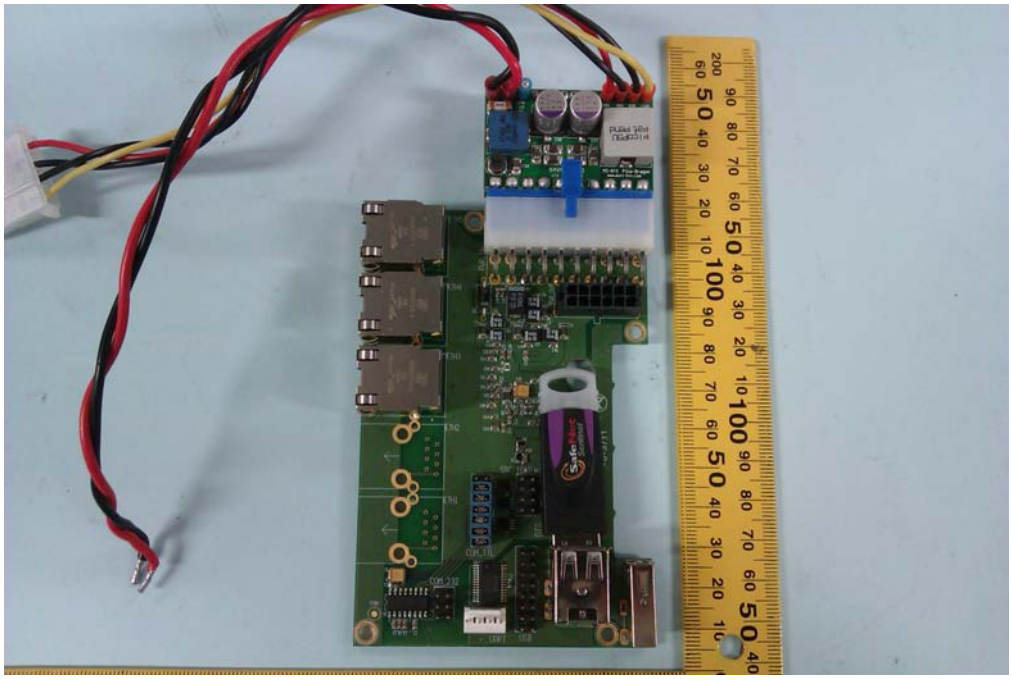
Photograph 5&6: Top View Main Audio PC



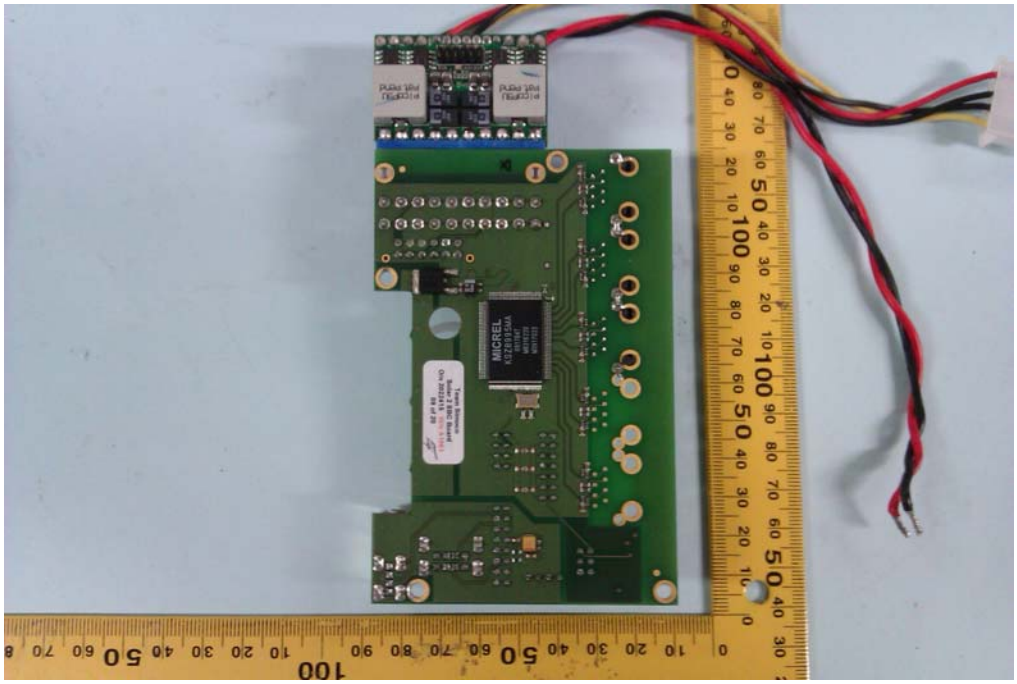
Underside view Main Audio PC



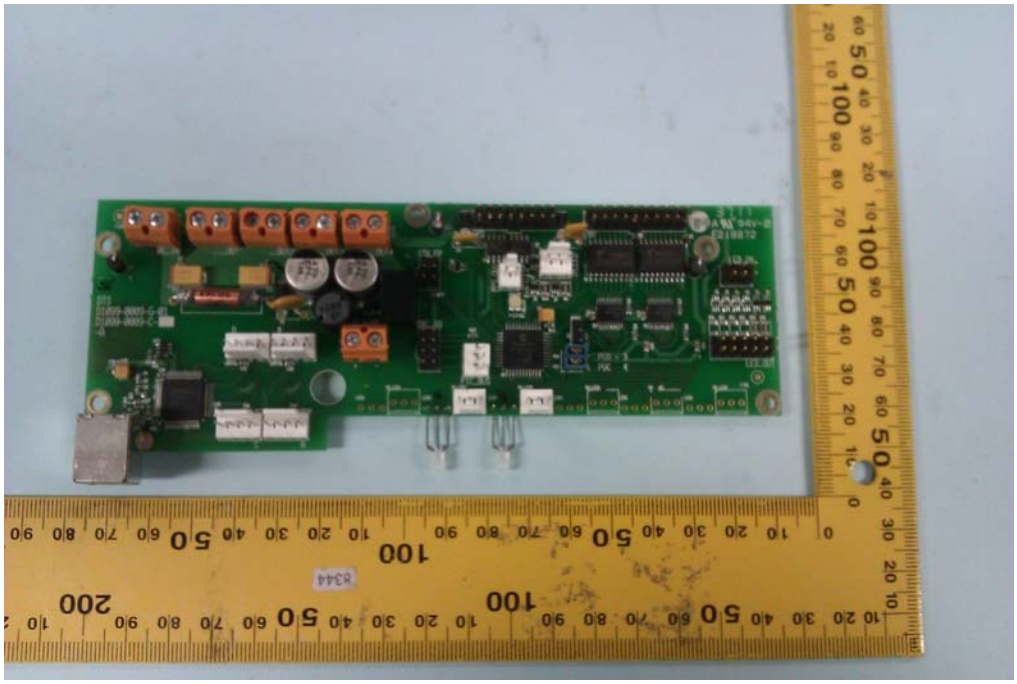
Photograph 7&8: Top View SBC Support PCB



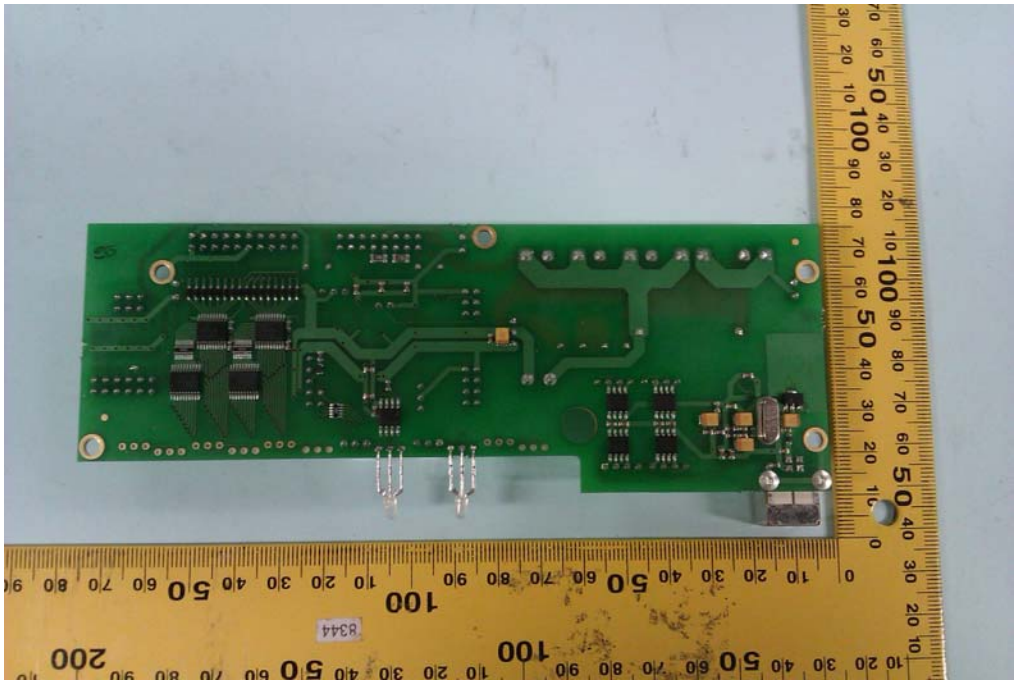
Underside view SBC Support PCB



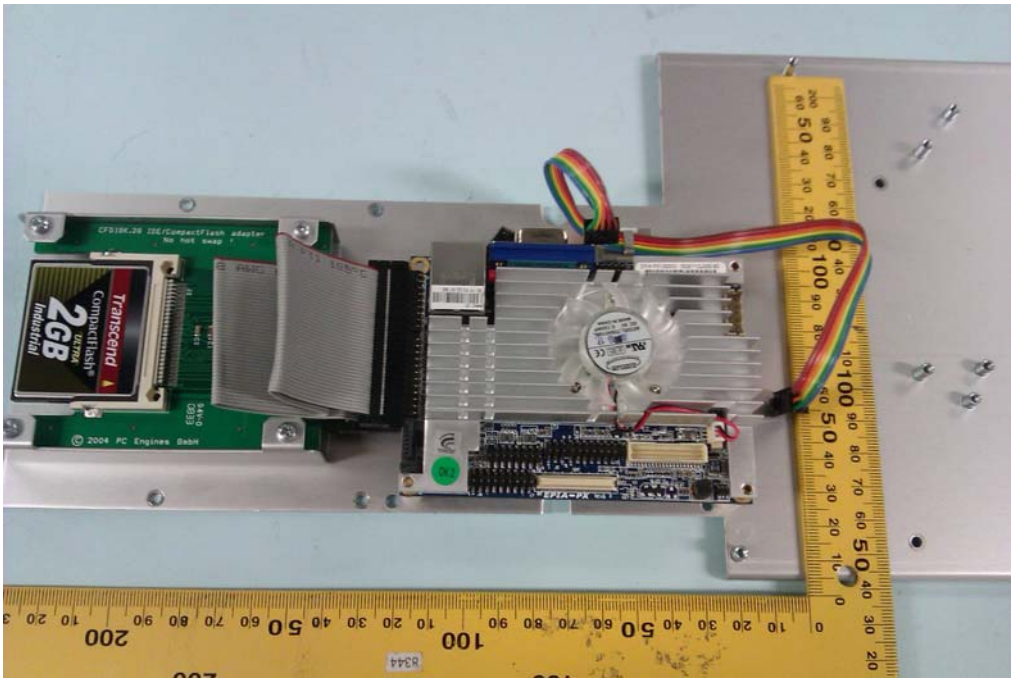
Photograph 9&10: Top View Aux PCB



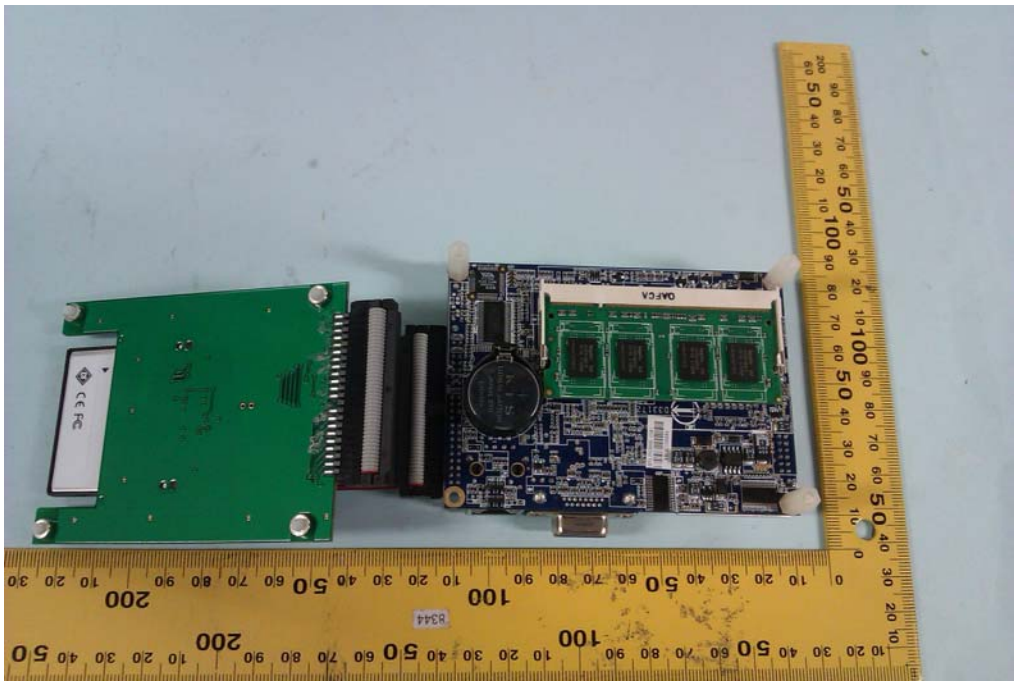
Underside view Aux PCB



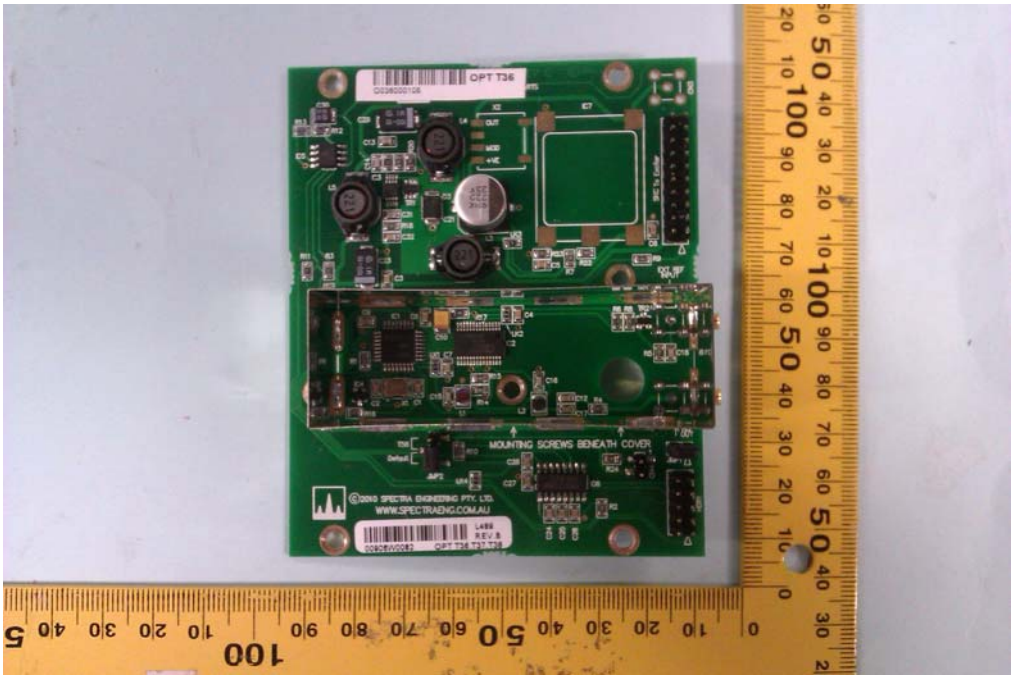
Photograph 11&12: Top View SBC



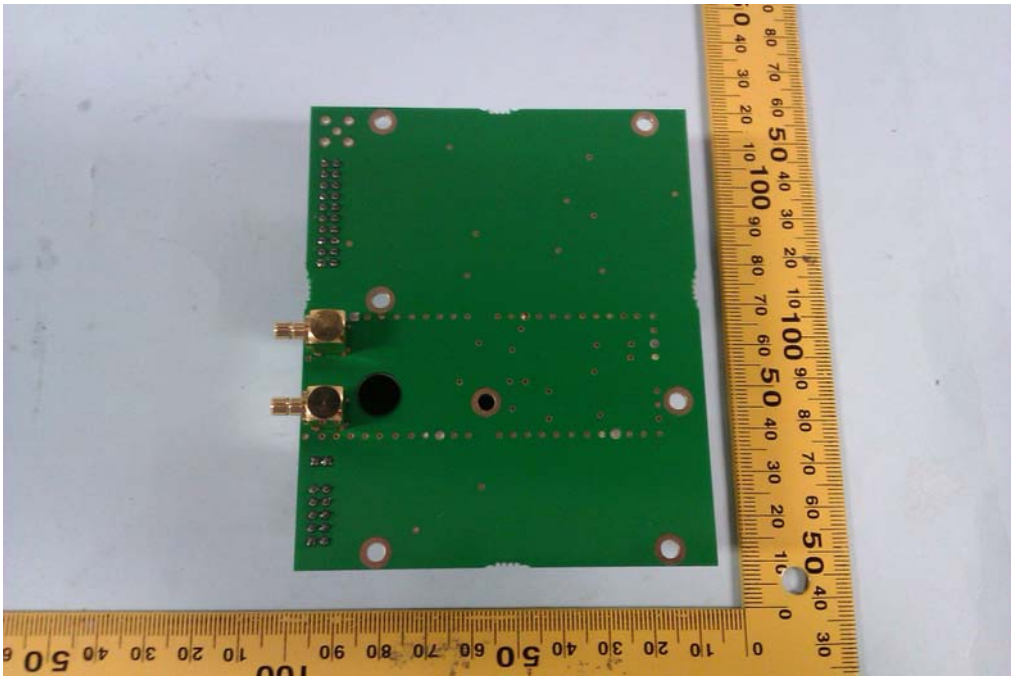
Underside view SBC



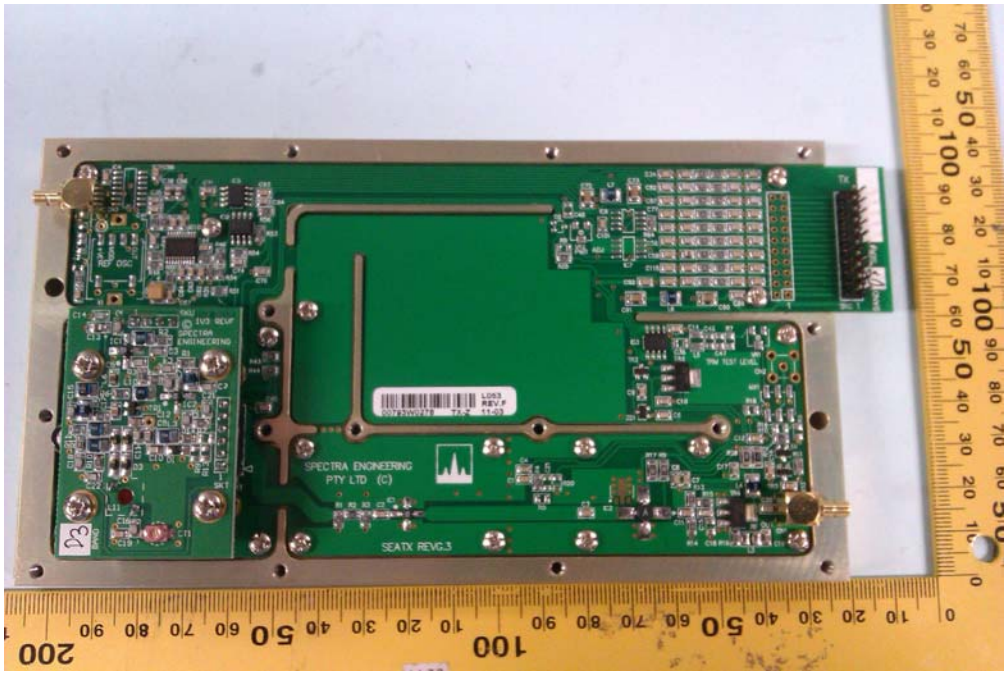
Photograph 13&14: Top View T36 Option PCB



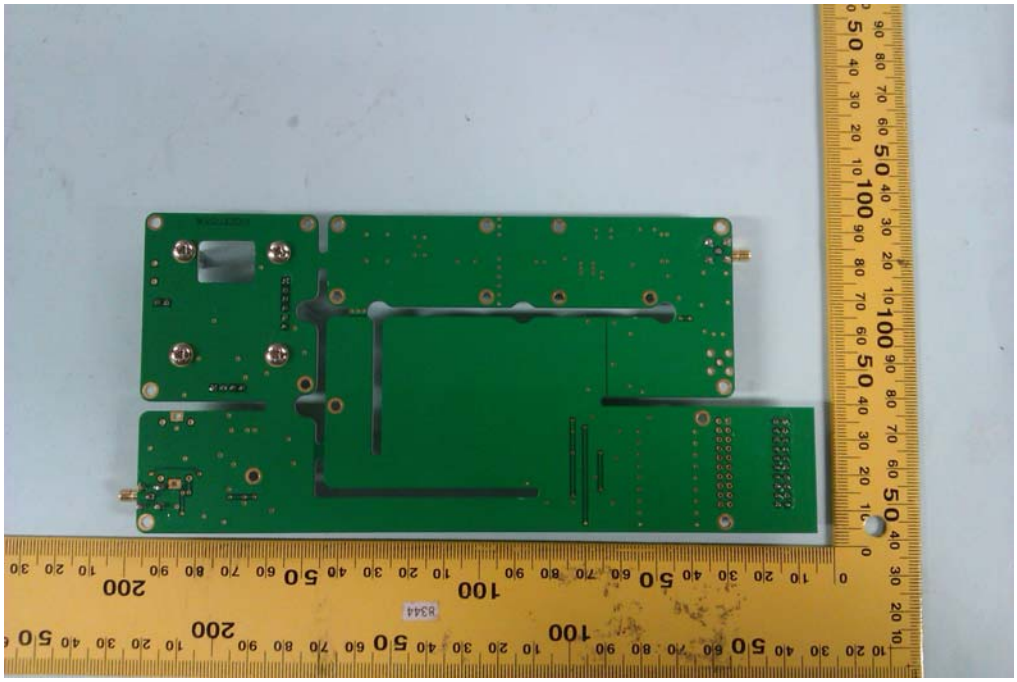
Underside view T36 Option PCB



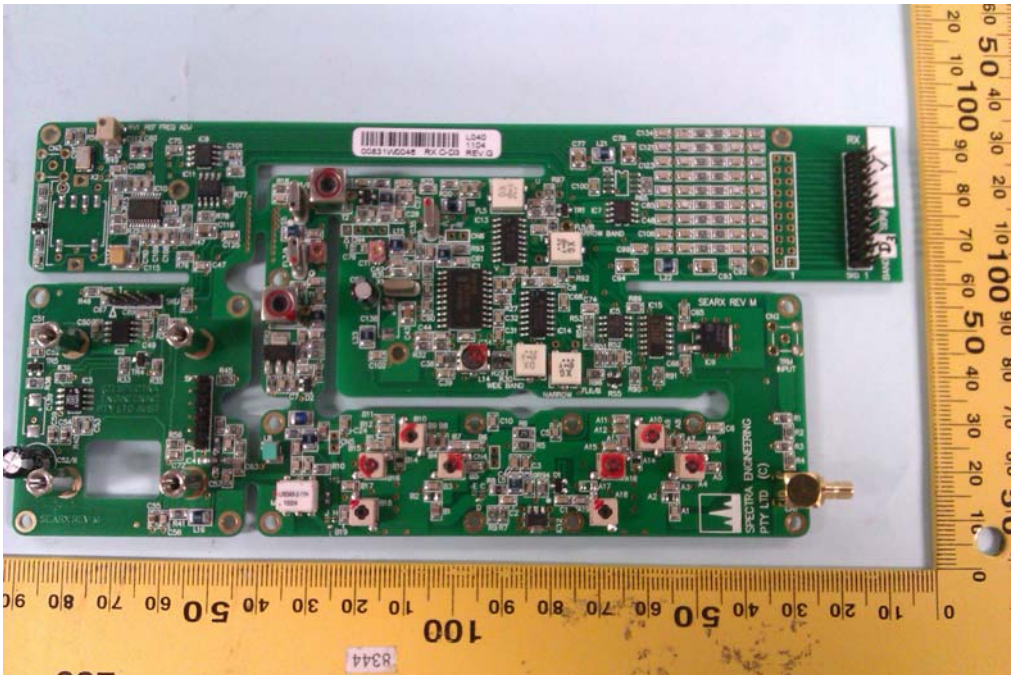
Photograph 15&16: Top View Tx'er exciter PCB



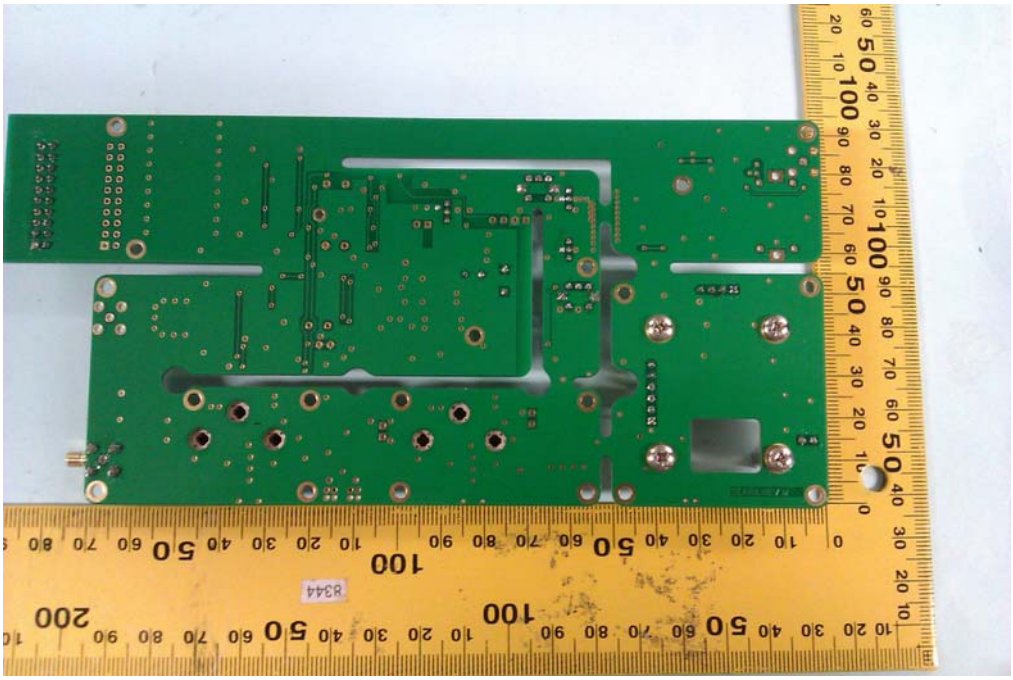
Underside view Tx'er exciter PCB



Photograph 17&18: Top View Rx'er PCB

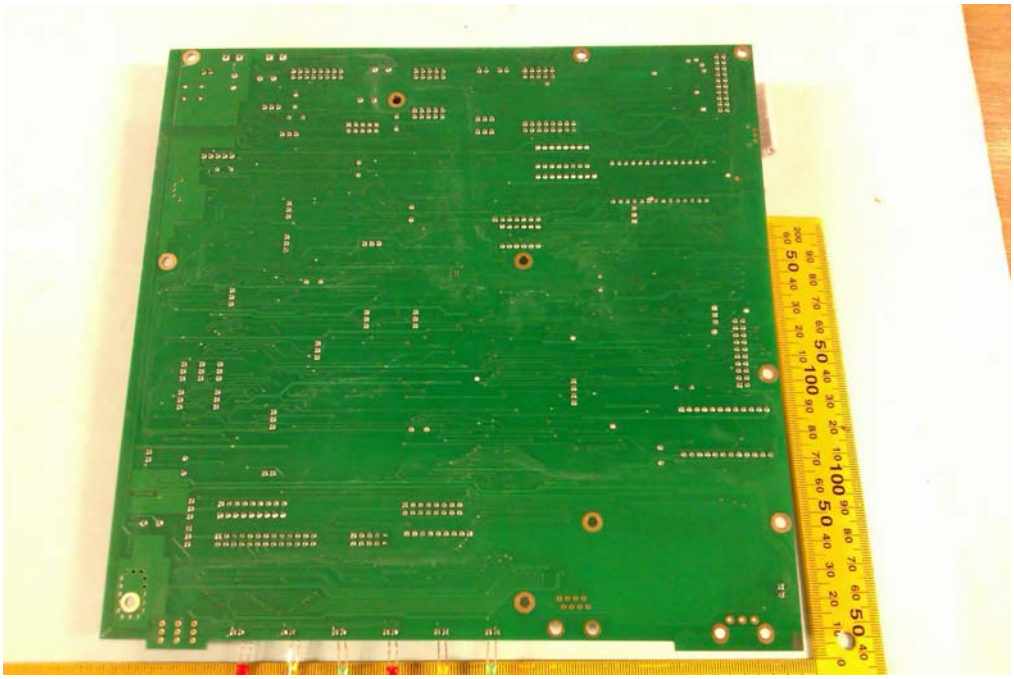


Underside view Rx'er PCB

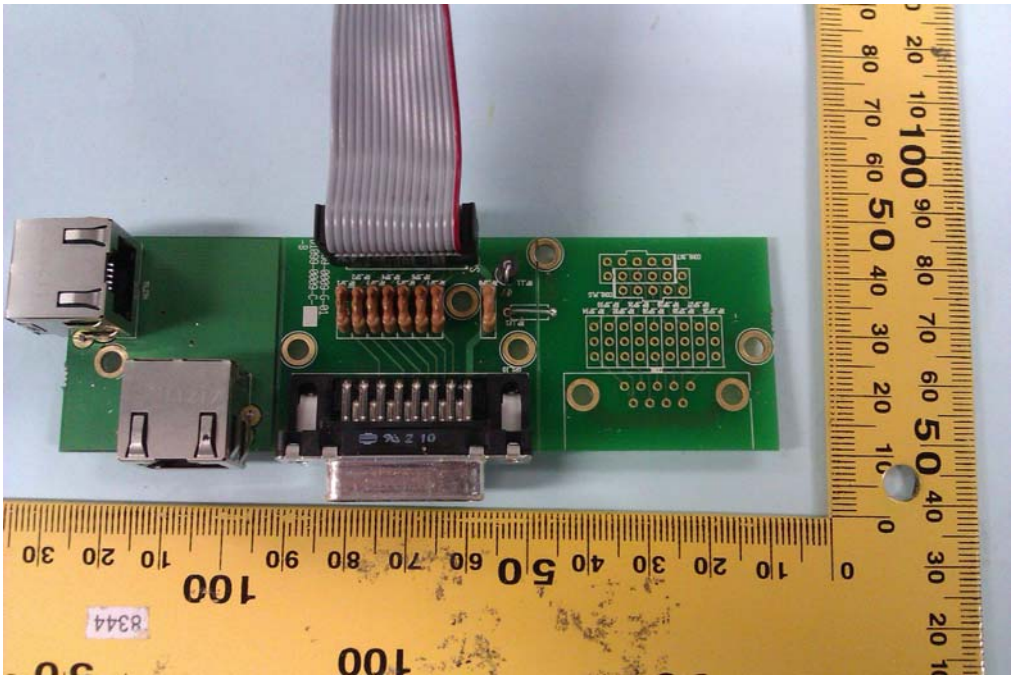


Photograph 19&20: Top View Controller PCB

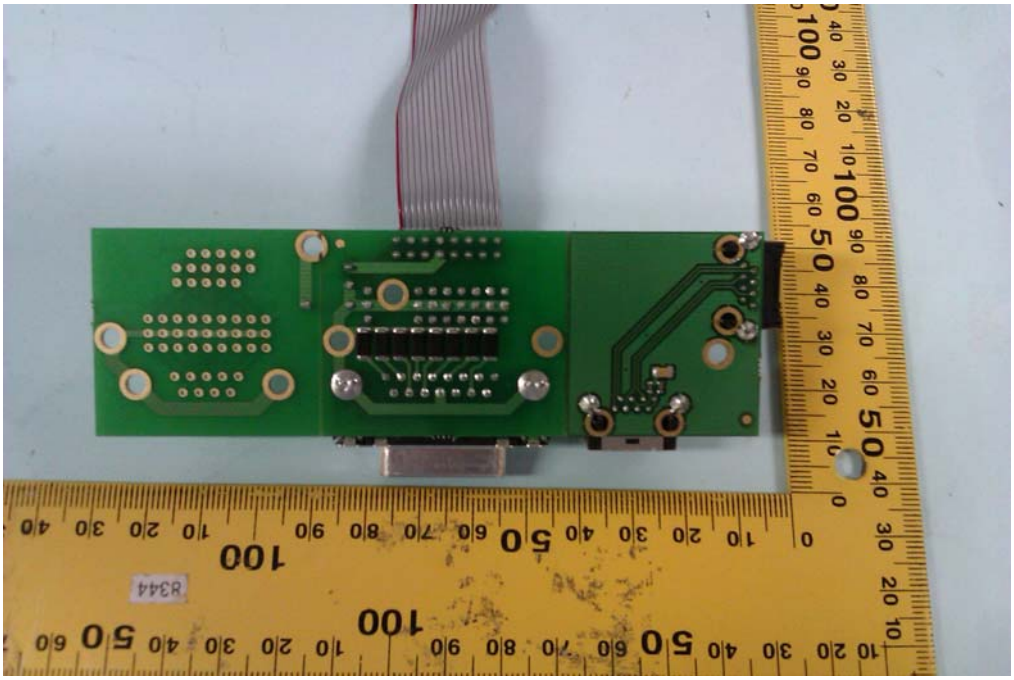
Underside view Controller PCB



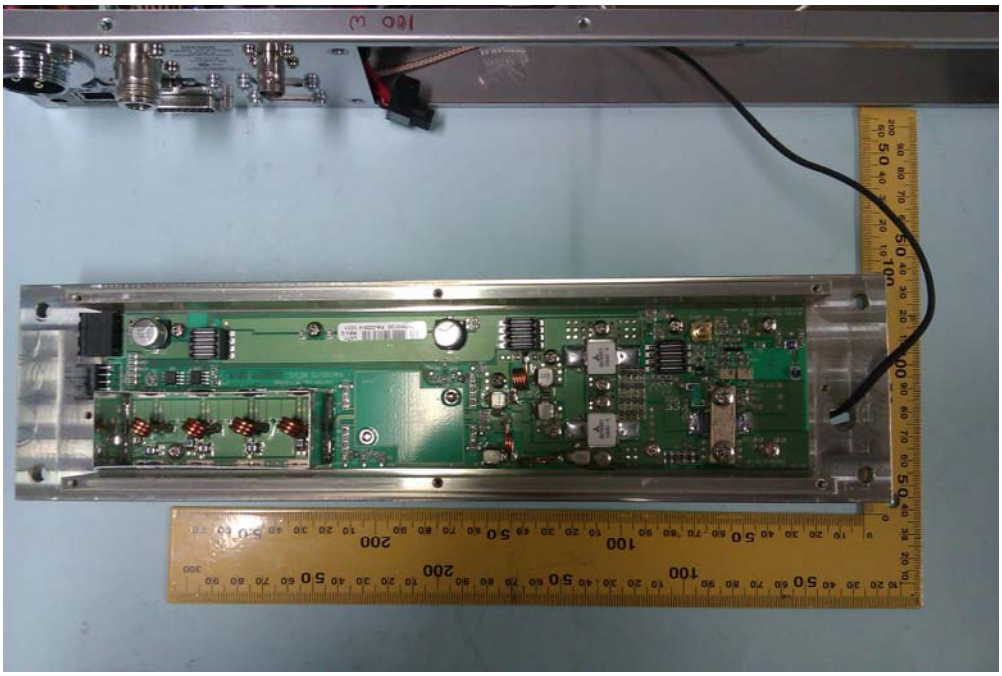
Photograph 21&22 Top View Digital I/O PCB



Underside view Digital I/O PCB



Photograph 23: Top View 100W P. A. PCB



ANNEX B

APPLICANT'S DECLARATION

APPLICANT'S DECLARATION

TeamSimoco

Field House
Uttoxeter Old Road
Derby
DE1 1NH

24-Feb-2012

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Subject: FCC Part 90 Band Re-farming

Dear Sir/Madam

The SB2025NT conforms to the P25 standard of 9600bps within a 12.5KHz bandwidth which therefore meets the requirement of 4800bps per 6.25KHz of channel bandwidth.

Yours faithfully

Richard Stimson

ISOQAR QUALITY ASSURED UKAS Cert No 5467 QMS001
ISOQAR UKAS Cert No 5467 EMS001
ISOQAR HEALTH and SAFETY UKAS Cert No 5467 OHS001
Apprenticeships Good for our Business

Team Simoco Ltd
Field House
Uttoxeter Old Road
Derby DE1 1NH
Tel: +44 (0)1332 375500
Fax: +44 (0)1332 375501
Web: www.teamsimoco.com

Registered Office: Field House, Uttoxeter Old Road, Derby DE1 1NH England. Registered in England No. 04382515 VAT No. GB 974973750 Part of the Team Telecom Group of Companies

ANNEX C

EQUIPMENT CALIBRATION

TRAC Ref	Type	Description	Manufacturer	Date Calibrated.
TRL281	FSU46	Spectrum Analyser	Rhode & Schwarz	10/02/2011
TRL139	3115	Horn Antenna	EMCO	14/09/2011
TRL572	8449B	Pre amp	Agilent	24/11/2010
TRLUH04	ESVS10	Receiver	Rhode & Schwarz	14/12/2010
TRLUH372	6201-69	Pre amp	Watkins& Johnson	14/04/2010
TRLUH93	CBL6112B	Antenna	Chase	20/06/2011
UH122	TDS520B	Oscilloscope	Tektronix	12/11/2010
TRL222	8304-100-N	ATTENUATOR	BIRD	Cal In Use
TRLUH225	745357	ATTENUATOR	SPINNER	Cal In Use
REF916	SMBV100A	Signal Generator	Rhode & Schwarz	13/12/2010
TRL426	52 Series 11	Temperature Indicator	Fluke	04/03/2011
TRL11	-	Environmental Chamber	Sharetree	USE TRL426
TRLUH41	M3004	Multimeter	AVOmeter	04/03/2011
TRLUH194	AP60/50	Power Supply	Farnell	USE TRLUH41

ANNEX D

MEASUREMENT UNCERTAINTY

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%**