REPORT ON THE CERTIFICATION TESTING OF A
SCOPE COMMUNICATIONS UK Ltd
SYTX MK1
UHF SYNTHESIZED TRANSMITTER
WITH RESPECT TO
FCC RULES CFR 47, PART 90 Subpart K

TRL Compliance
part of TRAC global

TEST REPORT NO: RU1530/8962

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FCC ID: JRNUSASYNLINK

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SCOPE COMMUNICATIONS UK Ltd
SYTX MK1
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TEST DATE: 27th October – 11th December 2008

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = <n Reason: I am the author of this document Date: 2009.01.15 16:22:09 Z — D WINSTANLEY

APPROVED BY: John Charters — Digitally signed by John Charters DN: CN = John Charters, C = GB, O = TRL Compliance Ltd Reason: I am approving this document Date: 2009.01.16 09:23:47 Z — J CHARTERS RADIO SECTION LEADER

DATE: 15th January 2009

Distribution:

Copy Nos: 1. Scope Communications UK Ltd
2. FCC EVALUATION LABORATORIES
3. TRL Compliance Ltd

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UKAS TESTING 0728
Moss View, Nipe Lane, Up Holland, West Lancashire, WN8 9PY, UK.
T +44 (0)1695 556666
F +44 (0)1695 557077
E test@trlcompliance.com

TRAC testing regulatory and compliance

CONTENTS

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.
4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	JRNUSASYNLINK					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 90 Subpart K					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	SYTX MK1 UHF Synthesized Transmitter					
ITU: EMISSION CODE:	12k5F1D					
EQUIPMENT TYPE:	Pager System					
PRODUCT USE:	Paging					
CARRIER EMISSION:	4.35 Watts Conducted					
ANTENNA TYPE:	Not Applicable, BNC Connector					
BAND OF OPERATION:	446.0 MHz – 464.0 MHz					
CHANNEL SPACING:	12.5 kHz					
NUMBER OF CHANNELS:	1440					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[ ]	Synthesiser	[X]
MODULATION METHOD:	Amplitude	[ ]	Digital	[X]	Angle	[ ]
POWER SOURCE(s):	+110Vac					
TEST DATE(s):	27th October – 11th October 2008					
ORDER No(s):	20576					
APPLICANT:	Scope Communications UK Ltd					
ADDRESS:	Quantum House Steamer Quay Totnes Devon TQ9 5AL					

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = <n Reason: I am the author of this document Date: 2009.01.15 16:21:56 Z — D WINSTANLEY

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TRAC testing regulatory and compliance

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	SYTX MK1 UHF Synthesized Transmitter
EQUIPMENT TYPE:	Pager System
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 90 Subpart K
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	20576
APPLICANT'S CONTACT PERSON(s):	Mr S Fidler
E-mail address:	simon@scope-uk.com
APPLICANT:	Scope Communications UK Ltd
ADDRESS:	Quantum House Steamer Quay Totnes Devon TQ9 5AL
TEL:	+44 (0) 1803 860700
FAX:	+44 (0) 1803 863716
MANUFACTURER:	Scope Communications UK Ltd
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRaC – TRL
UKAS ACCREDITATION No:	0728
TEST DATE(s)	27th October – 11th December 2008
TEST REPORT No:	RU1530/8962

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	APPLICABILITY	RESULT
RF Power Output	90.267	Yes	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A
Occupied Bandwidth	90.210	Yes	Complies
Spurious Emissions at Antenna Terminals	90.210 (d)	Yes	Complies
Field Strength of Spurious Emissions	90.210 (d)	Yes	Complies
Frequency Stability	90.213	Yes	Complies
Transient behaviour	90.214	Yes	Complies

2. Product Use: Paging

3. Emission Designator: 12k5F1D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 1200 bps

6. Temperatures: Ambient (Tnom) 14°C

7. Supply Voltages: Vnom +110Vac

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

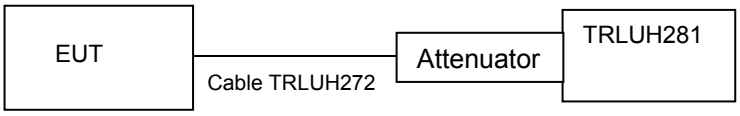
8. Equipment Category:
   Single channel [ ]
   Two channel [ ]
   Multi-channel [X]

9. Channel spacing:
   Narrowband [X]
   Wideband [ ]
   12.5 kHz

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – CONDUCTED – Part 2.1046

Ambient temperature = 18 °C(<1GHz), Conducted Measurement
Relative humidity = 47%(<1GHz),
Conditions = Radio Laboratory
Supply voltage = +110Vac



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

FREQ. (MHz)	MEASUREMENT Rx. READING (dBm)	CABLE LOSS (dB)	OUTPUT POWER (dBm)	OUTPUT POWER (Watts)
446.0 MHz	-0.46	36.4	35.94	3.92
454.0 MHz	-0.21	36.4	36.19	4.16
464.0 MHz	-0.10	36.4	36.39	4.35

Limit value @ fc		**6 Watts**	
Band occupancy @ -20dBc	Operating Frequency	**f lower**	**f higher**
	446.0 MHz	445.996314 MHz	446.003493 MHz
	454.0 MHz	453.996538 MHz	454.003429 MHz
	464.0 MHz	463.996506 MHz	464.003237 MHz

See spectrum analyser plot – Annex C

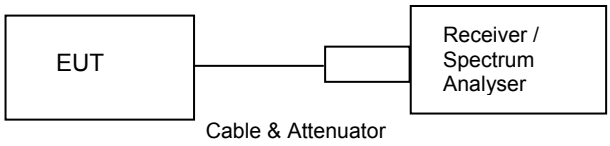
Notes:
1 Receiver detector @ fc = Peak.
2 EUT transmitting permanent carrier for output power measurement.
3 EUT transmitting modulated carrier for band occupancy measurement.

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003.
2 Conducted Measurement.
3 Maximum results recorded.

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – CONDUCTED – Part 2.1049 & 2.1051

Ambient temperature	=	19°C	Radio Laboratory
Relative humidity	=	46%	
Supply voltage	=	+110Vac	



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

The Spurious limit is as follows:

On any frequency removed from the assigned frequency by the following offsets any emissions must be attenuated below the power P of the highest emission contained within the authorised bandwidth as follows:

±0 kHz	-	±5.625 kHz	0 dB
±5.625 kHz	-	±12.5 kHz	7.27(f_d – 2.88kHz) dB
> ±12.5 kHz	-	±50kHz	At least 50 + 10 log P (dB) or 70 dB (Whichever is lesser)
>±50kHz			At least 43 + 10 log P (dB)

RESULTS

See Annex D for emissions mask showing compliance.

FREQUENCY RANGE	FREQ. (MHz)	MEASURED LEVEL (dBm)	ATTENUATOR & CABLE LOSSES (dB)	EMISSION LEVEL (dBm)	LIMIT (dBm)
< fc – ±50kHz	No Significant Emissions within 20dB of the Limit				-13
> fc + ±50kHz	No Significant Emissions within 20dB of the Limit				-13

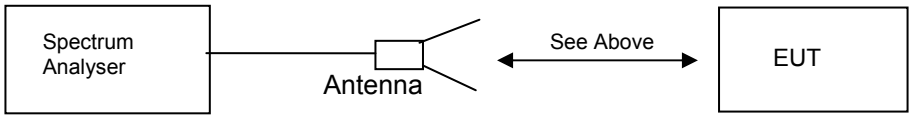
Notes:
1 Emissions were searched to: (**x**) 1000MHz inclusive.
2 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth.
3 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth.
4 EUT transmitting permanent carrier.

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003.

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 2.1053

Ambient temperature	=	20°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	46% (<1GHz),	1m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)		
Supply voltage	=	+110Vac		



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

The Spurious limit is as follows:

On any frequency removed from the assigned frequency by the following offsets any emissions must be attenuated below the power P of the highest emission contained within the authorised bandwidth as follows:

±0 kHz	-	±5.625 kHz	0 dB
±5.625 kHz	-	±12.5 kHz	7.27(f_d – 2.88kHz) dB
> ±12.5 kHz	-	±50kHz	At least 50 + 10 log P (dB) or 70 dB (Whichever is lesser)
>±50kHz			At least 43 + 10 log P (dB)

RESULTS

FREQUENCY RANGE	OPERATING FREQUENCY (MHz)	EMISSION FREQ. (MHz)	EIRP (dBm)	LIMIT (dB)
±0 kHz - ±5.625 kHz	No Significant Emissions within 20 dBs of the Limit			0 (dBc)
±5.625 kHz - ±12.5 kHz	No Significant Emissions within 20 dBs of the Limit			7.27(f_d -2.88kHz) (dBc)
> ±12.5 kHz - 50kHz	No Significant Emissions within 20 dBs of the Limit			50 + 10 log P (dBc)
>±50kHz	446.0 446.0 446.0 454.0 464.0 464.0 464.0 464.0 464.0 464.0 464.0	1338.03 4014.01 4459.60 1361.89 1392.04 1856.02 2319.96 3248.07 3711.96 4175.87 4646.00	-30.84 -31.21 -32.70 -31.24 -31.08 -31.67 -30.91 -31.20 -30.73 -30.08 -28.99	43 + 10 log P (dBc)

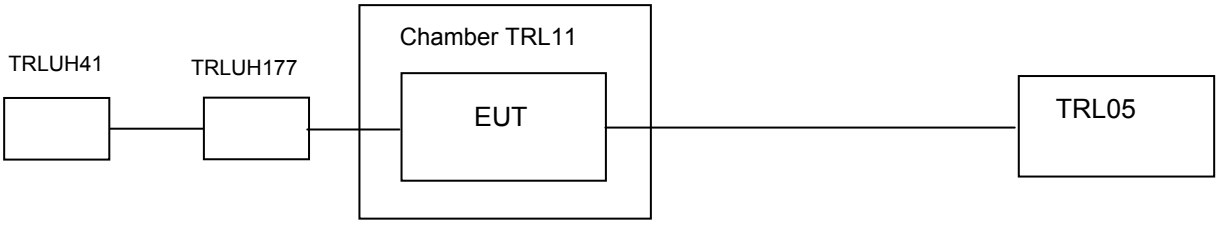
Notes:
1 Emissions were searched to: (**x**) 1000MHz inclusive.
2 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth.
3 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth.
4 See Annex F for radiated spurious emissions.
5 P = power in Watts

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003.
2 Measuring distances as Notes 1 to 4 above.
3 EUT 0.8 metre above ground plane.
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded.

TRANSMITTER TESTS

TRANSMITTER FREQUENCY STABILITY – CONDUCTED – TEMPERATURE – PART 2.1055

Ambient temperature = 20°C Radio Laboratory
Relative humidity = 48%
Supply voltage = +110Vac



The test setup was as per the above diagram. The test equipment TRL05 was set to count the frequency of the transmission. The EUT was set transmit a permanent carrier.

RESULTS

TEMP	Frequency (MHz)		
^{0}C	446.0	454.0	464.0
+60	445.99989	453.99994	464.00014
+50	445.99980	453.99978	464.99975
+40	445.99985	453.99983	463.99981
+30	445.99996	453.99997	464.00000
+20	446.00018	454.00016	464.00016
+10	446.00025	454.00027	464.00028
0	446.00025	454.00018	464.00019
-10	446.00012	454.00015	464.00018
-20	446.00012	454.00026	464.00006
-30	445.99990	453.99998	464.00008

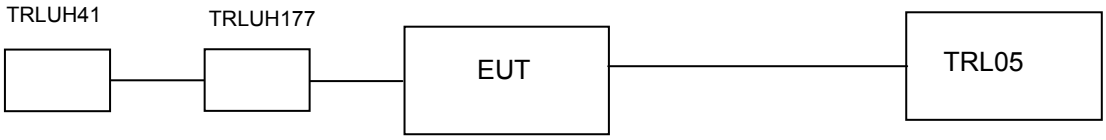
Notes: See Annex G for frequency stability plots verses limit.

The ECTX Mk1 was found to comply with the ± 1.5ppm limits.

TRANSMITTER TESTS

TRANSMITTER FREQUENCY STABILITY – CONDUCTED – VOLTAGE – PART 2.1055

Ambient temperature	=	17°C	Radio Laboratory
Relative humidity	=	48%	
Supply voltage	=	+12 Vdc	



See Annex C for full list of test equipment

The test setup was as per the above diagram. The test equipment TRL05 was set to count the frequency of the transmission. The EUT was set transmit a permanent carrier.

RESULTS

VOLTAGE	Frequency (MHz)		
%	446.0	454.0	464.0
85	446.00009	453.99991	463.99991
90	446.00007	453.99990	463.99991
95	446.00006	453.99992	463.99992
100	446.00004	453.99992	463.99995
105	446.00002	453.99993	464.00002
110	446.00001	453.99995	464.00003
115	446.00000	453.99996	463.99995

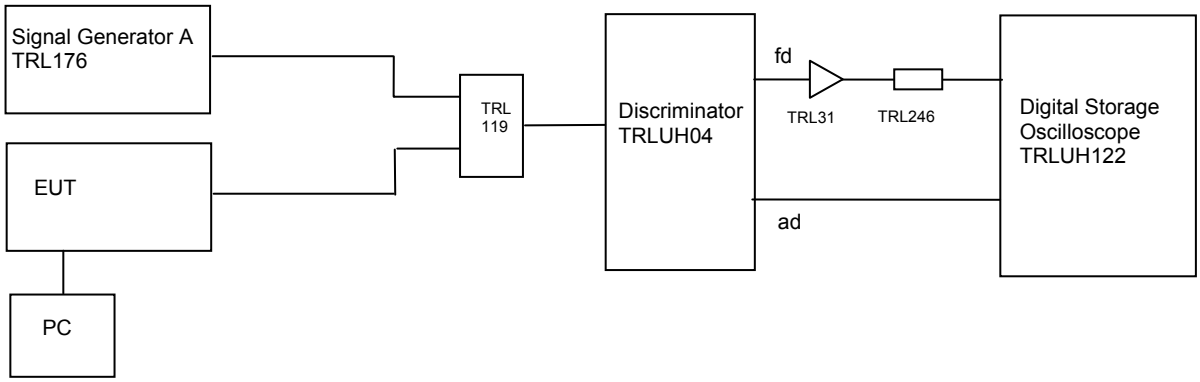
Notes: See Annex H for frequency stability plots verses limit.

The ECTX Mk1 was found to comply with the ± 1.5ppm limits limits.

TRANSMITTER TESTS

TRANSMITTER TRANSIENT FREQUENCY BEHAVIOUR – Part 90.214

Ambient temperature = 21°C Radio Laboratory
Relative humidity = 36%
Supply voltage = +110Vac



The test equipment was connected as above. Signal generator A was tuned to the centre frequency of the channel selected on the EUT. The signal was modulated with a 1 kHz tone with an FM deviation that corresponds to the EUT operational channel spacing. The power level of the signal is adjusted to 0.1% of the power of the transmitter under test. The EUT was set to transmit a permanent carrier.

Both signals were fed into the input of an RF discriminator via a combiner. The discriminator was connected to two channels of the digital storage oscilloscope (DSO) One channel monitored the frequency difference (fd) and the second monitored the audio difference (ad). The DSO is set to display the channel corresponding to the fd input up to ±1 channel frequency difference. The DSO is set to 10ms/div and to trigger at 1 div from the left edge of the display.

The display will show the 1 kHz test signal continuously. The DSO is then set to trigger on the ad input. The transmitter is then turned on without modulation. Due to the ratio between the 1 kHz test signal and the wanted signal the test signal will be suppressed. The transmitter is then turned off. Due to the wanted signal being removed the test signal will be displayed. The resulting plots were recorded and compared to the limit.

RESULTS

The ECTX Mk1 was found to comply with the limits. See annex I for plots.

Time intervals[1,2]	Maximum Frequency Difference[3]	All Equipment
Transient Frequency Behaviour for Equipment Designed to operate on 12.5 kHz Channels		
t_1[4] t_2 t_3[4]	±12.5 kHz ±6.25 kHz ±12.5 kHz	10.0 ms 25.0 ms 10.0 ms
Notes	1 $_{on}$ is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing. t_1 is the time period immediately following t_{on} t_2 is the time period immediately following t_1 t_3 is the time period from when the transmitter is turned off until t_{off} t_{off} is the instant when the 1 kHz test signal starts to rise 2:During the time from the end of t_2 to the beginning of t_3 the frequency difference must not exceed the limits specified in 90.213 3: Difference between the actual transmitter frequency and the assigned transmitter frequency. 4:If the transmitter carrier output power rating is 6watt or less the frequency difference during this time period may exceed the maximum frequency difference for this time period.	

UN-INTENTIONAL EMISSIONS

UN-INTENTIONAL SPURIOUS EMISSIONS – RADIATED – PART 15.109

Ambient temperature	=	5°C(<1GHz)	3m measurements <1GHz	[X]	
Relative humidity	=	62% (<1GHz),	3m measurements >1GHz	[X]	
Conditions	=	Open Area Test Site (OATS)	Supply voltage	=	+110Vac

	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)
0.009MHz - 0.49MHz									**Note 5**
0.49MHz - 1.705MHz									**Note 5**
1.705MHz - 30MHz									**Note 5**
30MHz - 88MHz									**Note 5**
88MHz - 216MHz	192.30 216.00	18.50 19.00	1.90 2.00	8.0 8.8	- -	28.4 29.8	- -	26.30 30.90	**100** **100**
216MHz - 960MHz	240.35 272.10 368.70 386.60 408.20 443.90 458.20 472.50 541.35 601.35 630.00	29.50 23.90 12.22 18.70 16.66 16.70 13.48 14.82 7.97 8.41 6.87	2.10 2.20 2.58 2.60 2.74 2.80 2.92 2.88 3.13 3.29 3.43	10.3 12.7 14.7 15.5 16.6 16.7 17.2 17.5 19.4 19.9 20.5	- - - - - - - - - - -	32.9 38.8 29.5 36.8 36.0 36.2 33.6 35.2 30.5 31.6 30.8	- - - - - - - - - - -	44.15 87.09 29.85 69.18 36.00 64.56 47.86 57.54 33.49 38.02 34.67	**150** **150** **150** **150** **150** **150** **150** **150** **150** **150** **150**
960MHz - 1GHz									**Note 5**
1GHz - 5GHz									**Note 5**

Limits	0.009 MHz to 0.49 MHz	2400/f(kHz) µV/m @ 300m
	0.49 MHz to 1.705 MHz	24000/f(kHz) µV/m @ 30m
	1.705MHz to 30MHz	30µV/m @ 30m
	30MHz to 88MHz	100µV/m @ 3m
	88MHz to 216MHz	150µV/m @ 3m
	216MHz to 960MHz	200µV/m @ 3m
	960MHz to 1GHz	500µV/m @ 3m
	1GHz to 5GHz	500µV/m @ 3m

Notes:
1 Emissions were searched to: (**x**) 1000MHz inclusive, as per Part 15.33a
2 Measurements >1GHz @ 3m as per Part 15.31f(1)
3 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
4 Receiver detector >1GHz = Average, 1MHz resolution bandwidth
5 Only emissions within 20 dB of the limit are recoded.

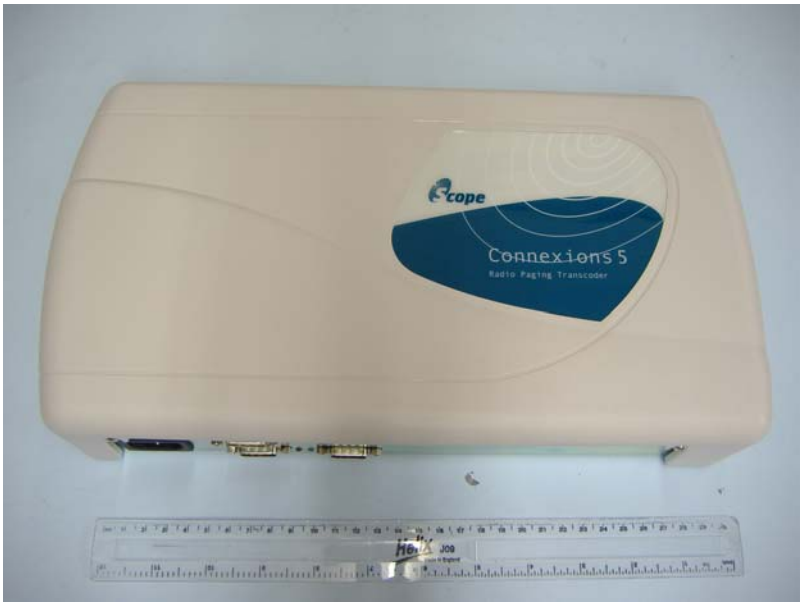
Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003
2 Measuring distances as Notes 1 to 4 above
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded.

ANNEX A

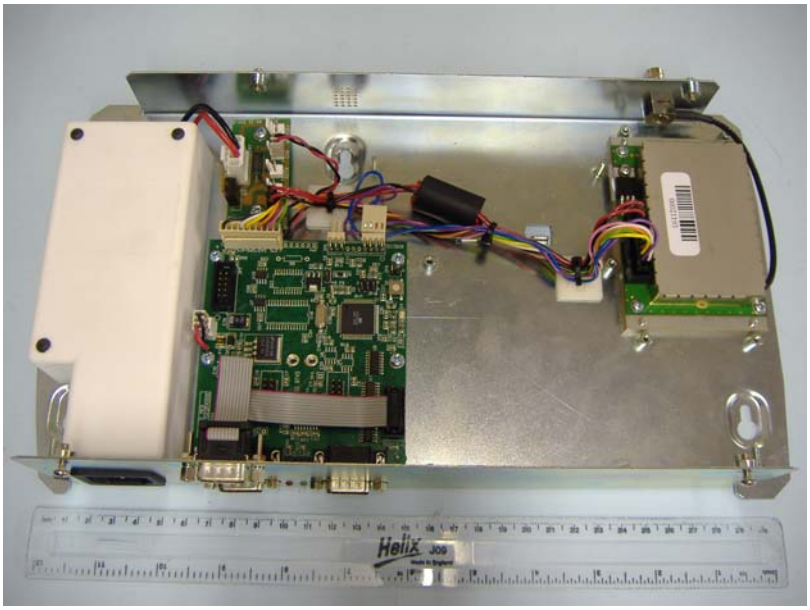
PHOTOGRAPHS

PHOTOGRAPH No. 1 **RADIATED TEST SETUP**

PHOTOGRAPH No. 2 **TRANSMITTER OVERVIEW**

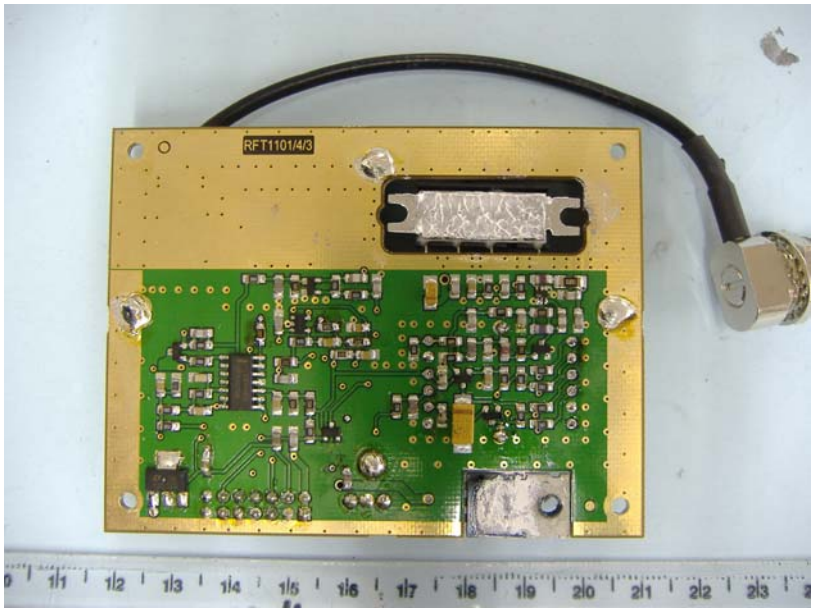


PHOTOGRAPH No. 3 **TRANSMITTER TOP VIEW COVER REMOVED**

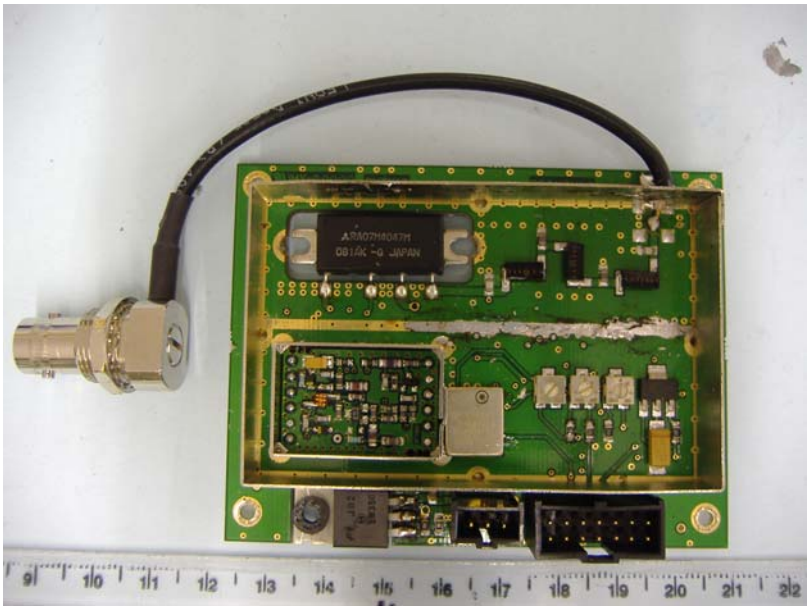


PHOTOGRAPH No. 4 **RF MODULE OVERVIEW**

PHOTOGRAPH No. 5 **RF MODULE BOTTOM VIEW**



PHOTOGRAPH No. 6 **RF MODULE TOP VIEW, CAN REMOVED**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

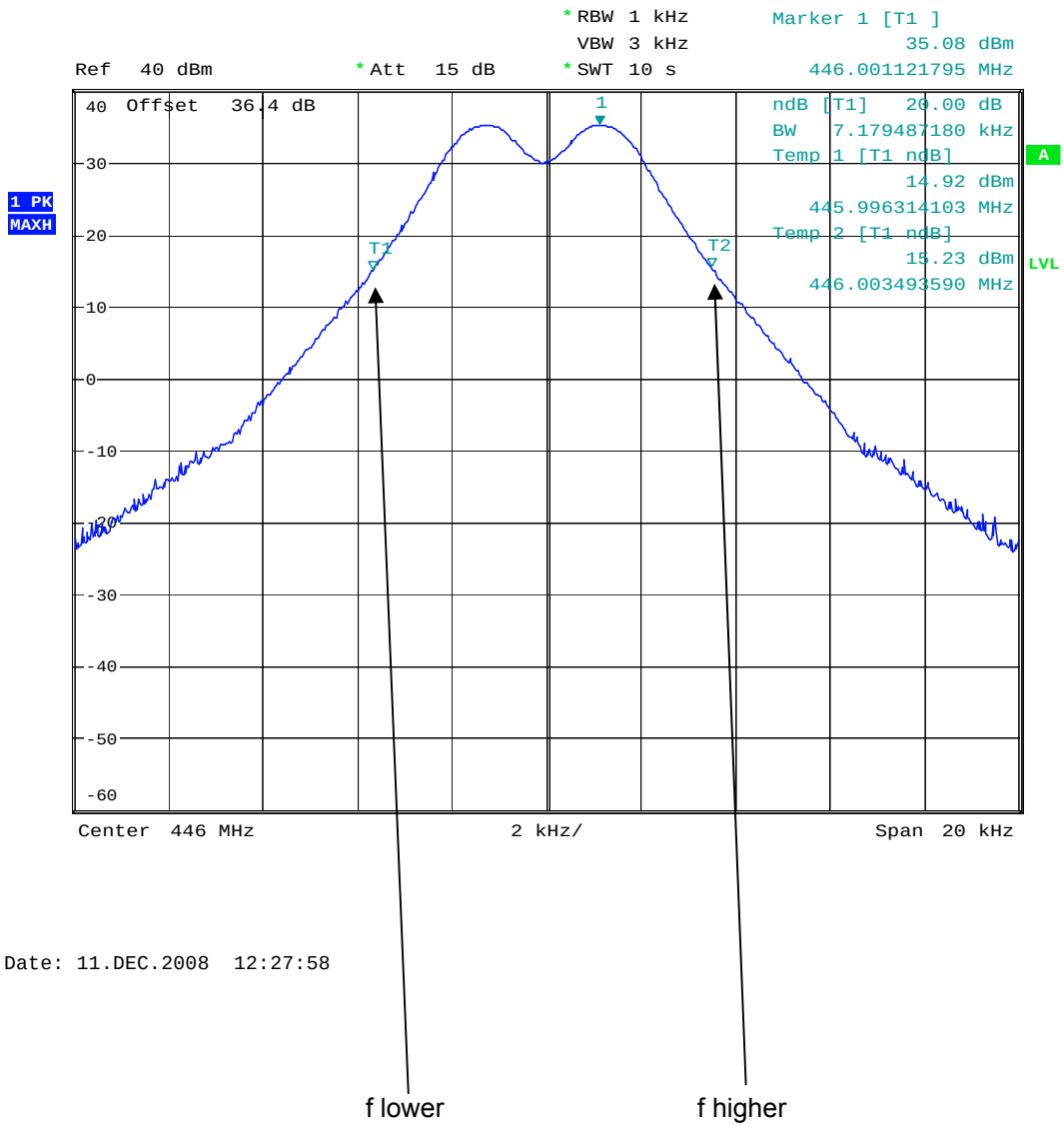
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[ ]
		-	DECLARATION	[ ]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C

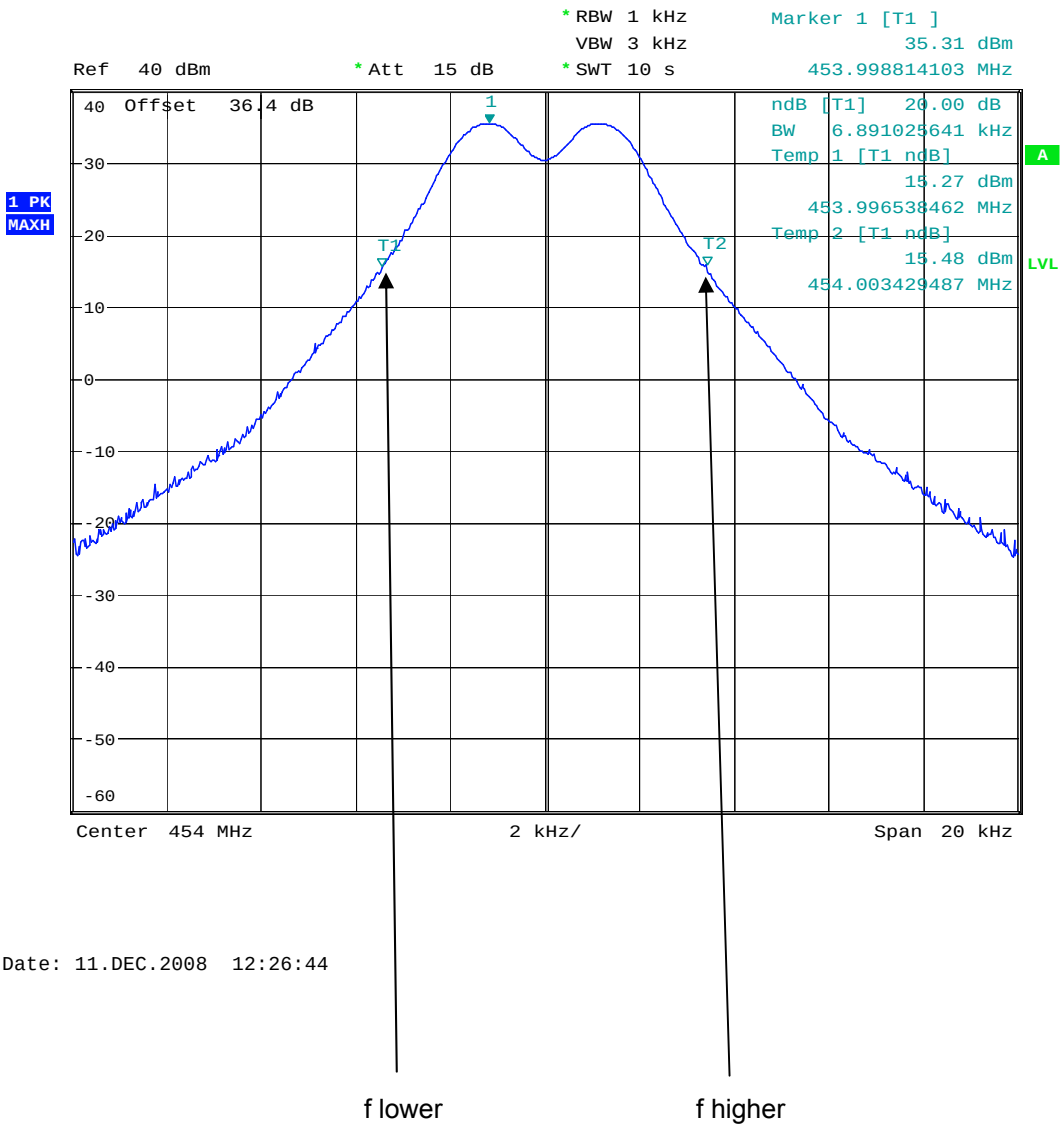
BANDWIDTH PLOT

BANDWIDTH PLOT – BOTTOM CHANNEL



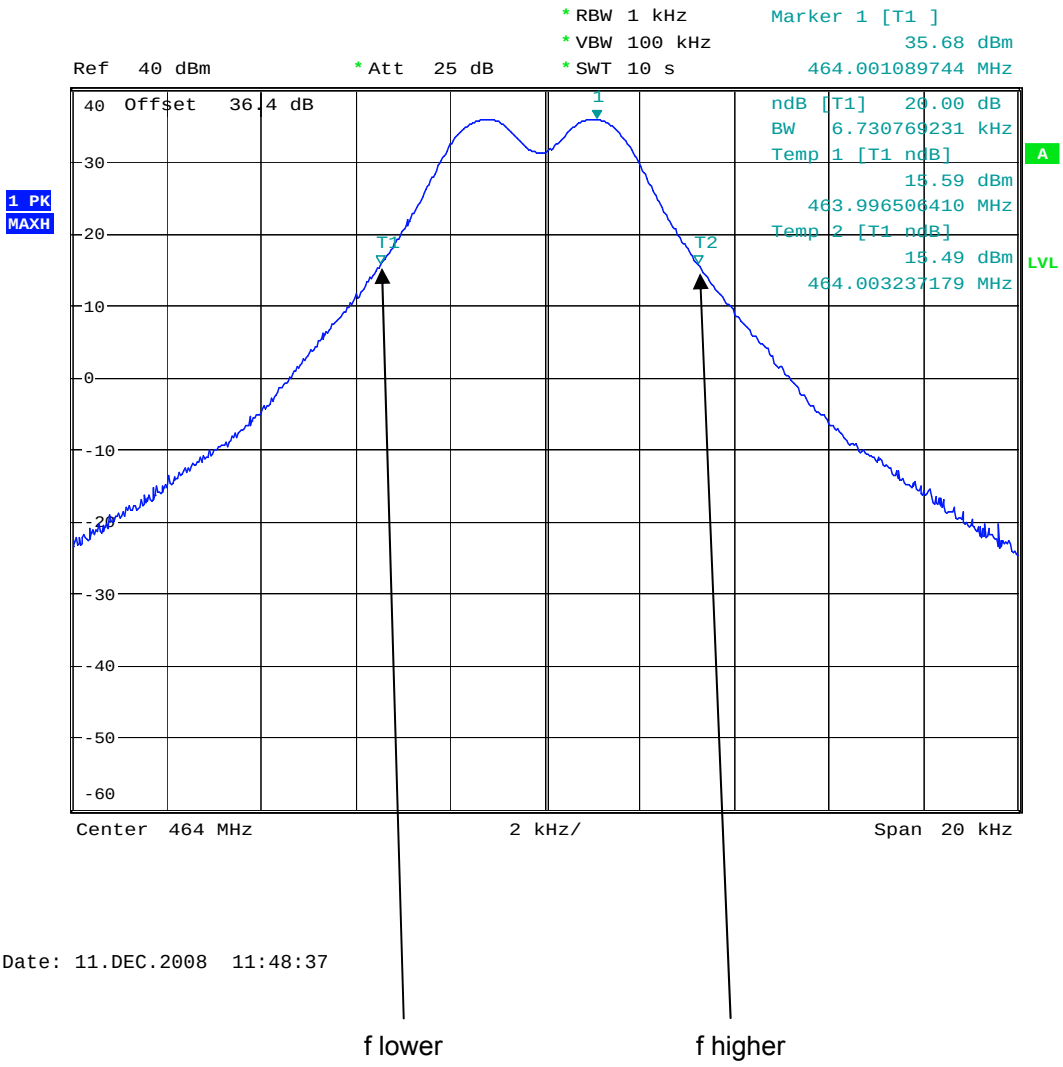
f lower = 445.996314 MHz
f higher = 446.003493 MHz
Occupied Bandwidth = 7.18 kHz

BANDWIDTH PLOT – MIDDLE CHANNEL



f lower = 453.996536 MHz
f higher = 454.003429 MHz
Occupied Bandwidth = 6.89 kHz

BANDWIDTH PLOT – TOP CHANNEL

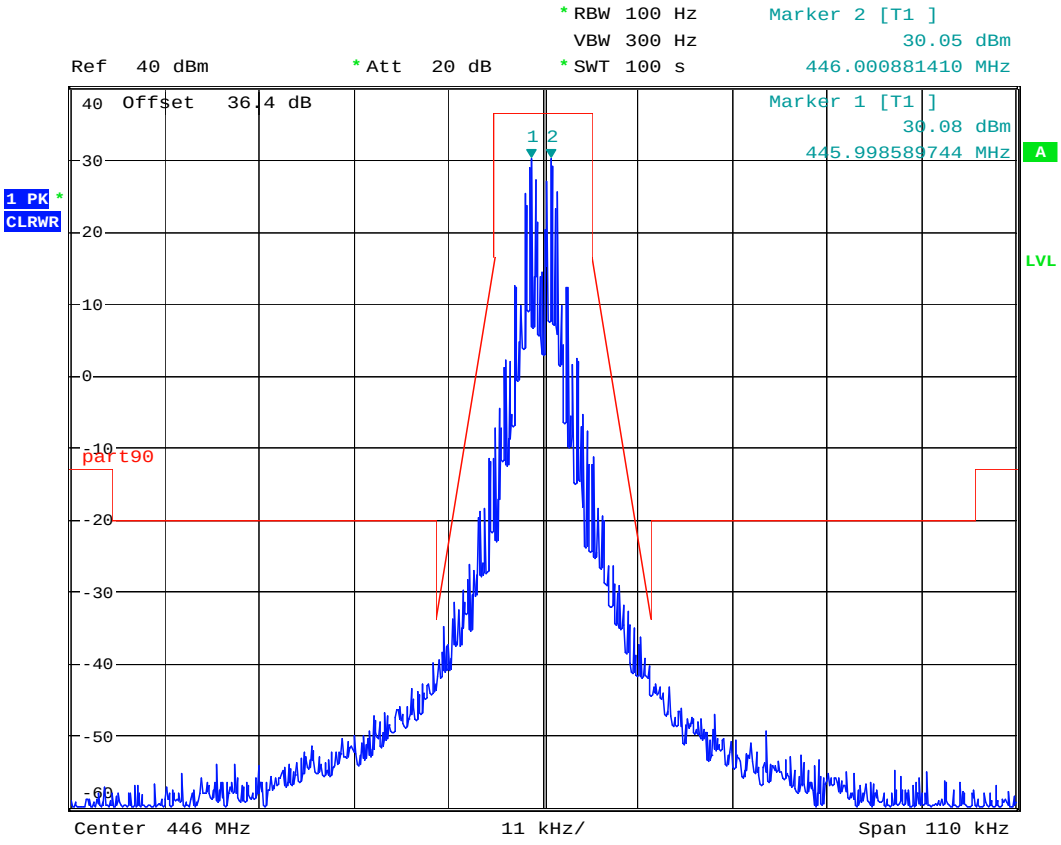


f lower = 463.996506 MHz
f higher = 464.003237 MHz
Occupied Bandwidth = 6.73 kHz

ANNEX D

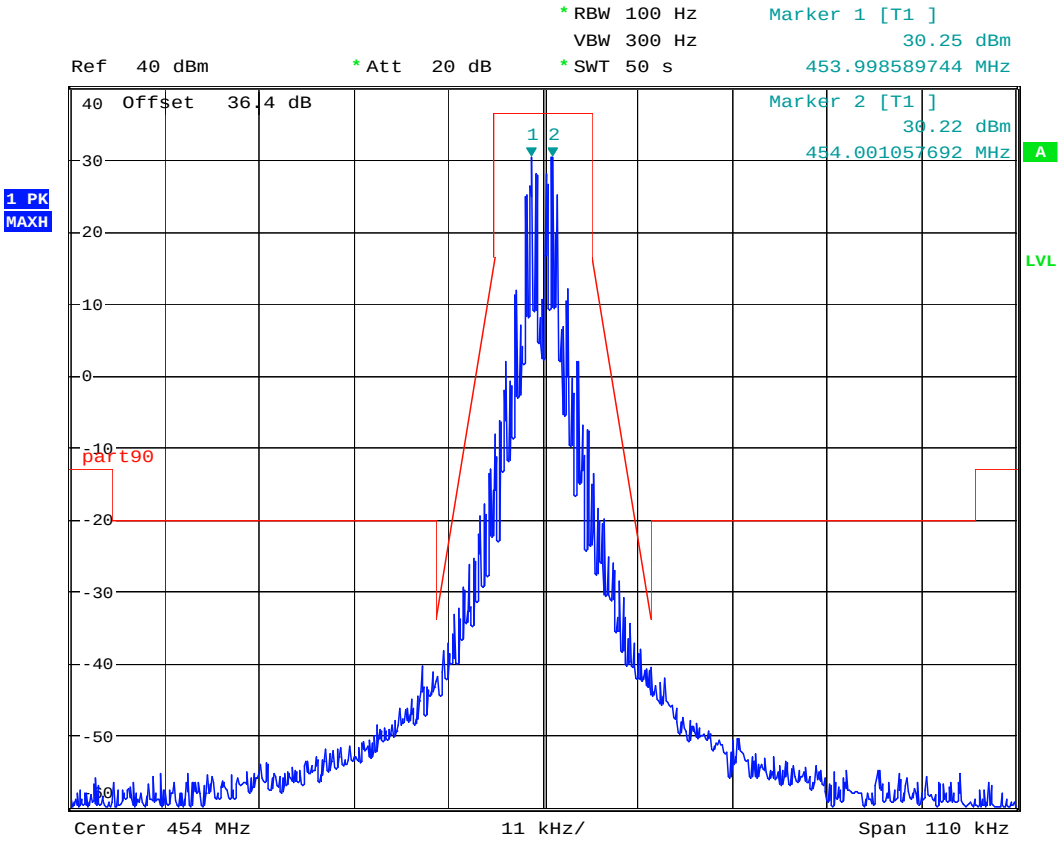
EMISSIONS MASK

EMISSIONS MASK – BOTTOM CHANNEL



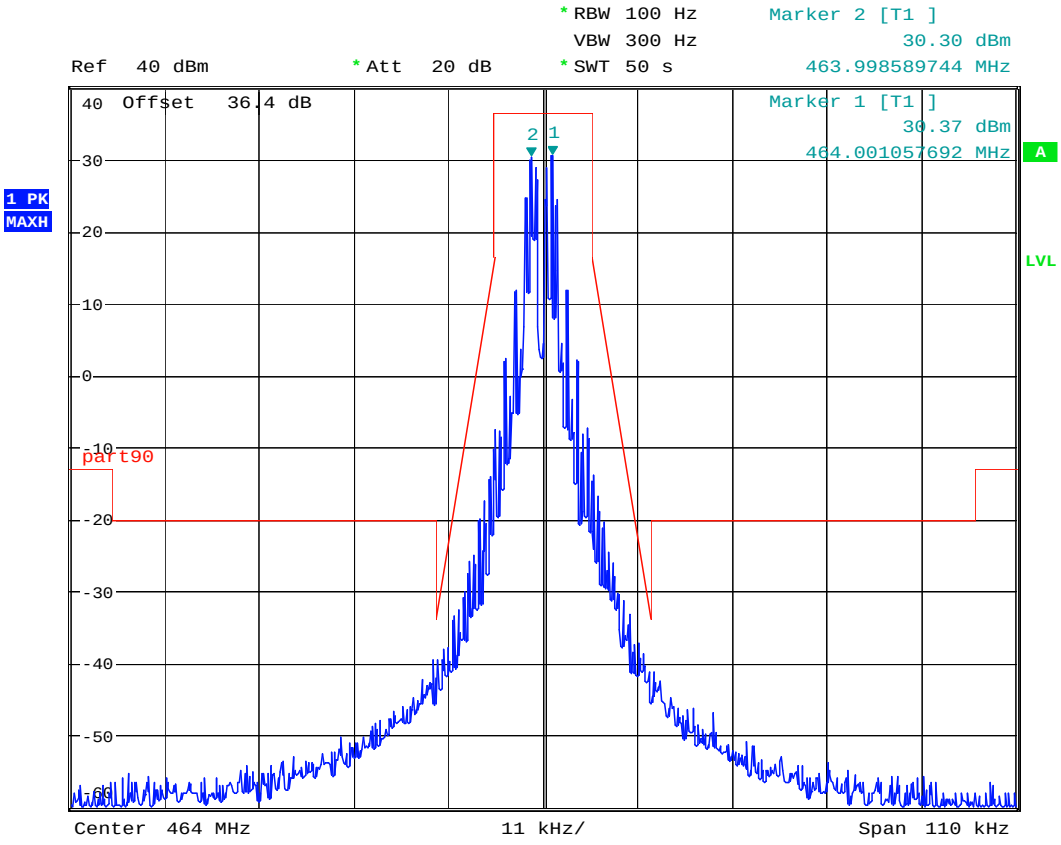
Date: 12.DEC.2008 12:23:14

EMISSIONS MASK – MIDDLE CHANNEL



Date: 12.DEC.2008 12:31:40

EMISSIONS MASK – TOP CHANNEL

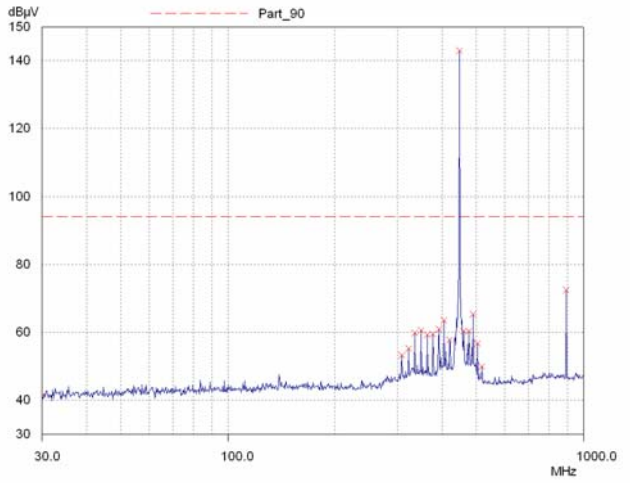


Date: 12.DEC.2008 12:35:38

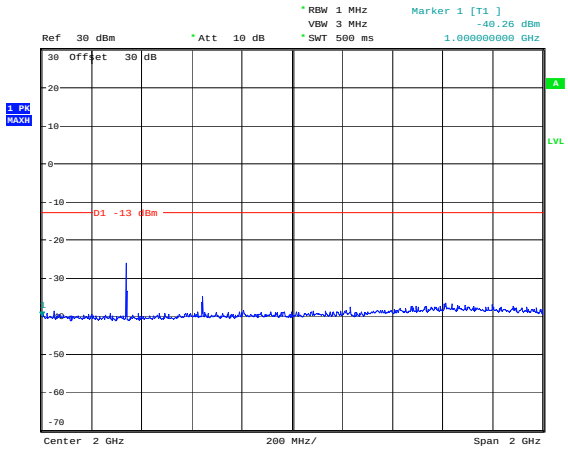
ANNEX E

CONDUCTED SPURIOUS EMISSIONS

Conducted Spurious Bottom Channel 30MHz – 1GHz

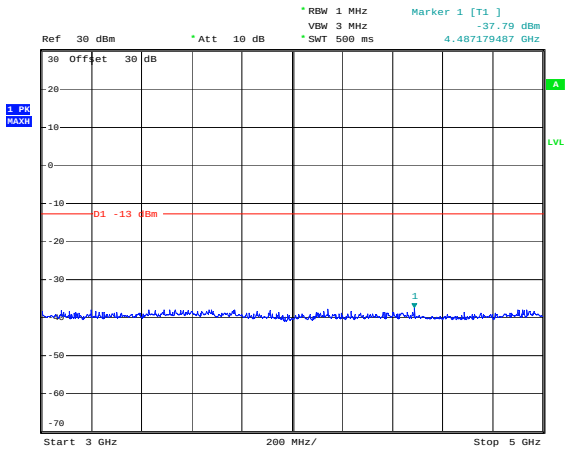


Conducted Spurious Bottom Channel 1GHz – 3GHz



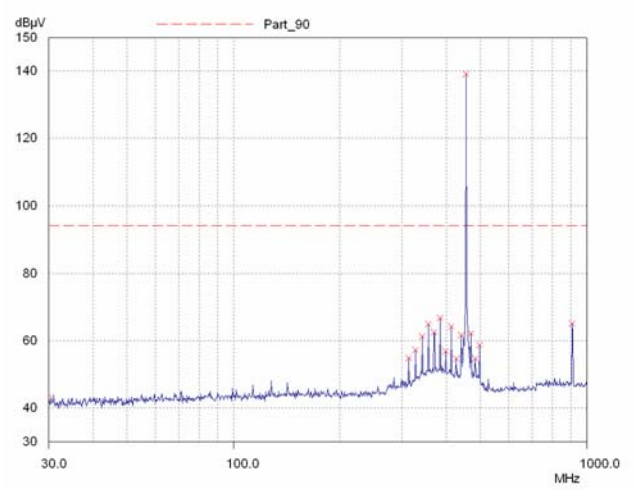
Date: 4.NOV.2008 14:13:57

Conducted Spurious Bottom Channel 3GHz – 5GHz

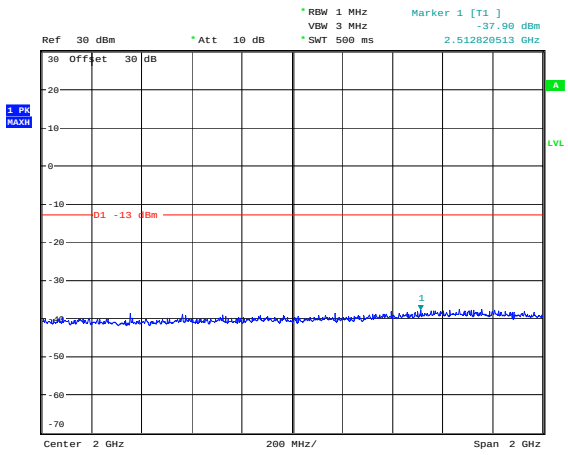


Date: 4.NOV.2008 14:14:15

Conducted Spurious Middle Channel 30MHz – 1GHz

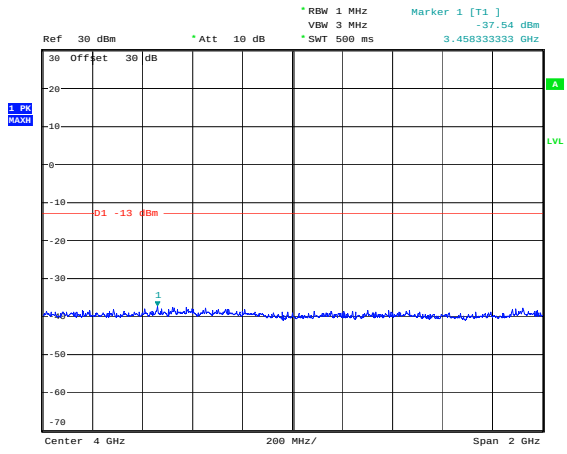


Conducted Spurious Middle Channel 1GHz – 3GHz



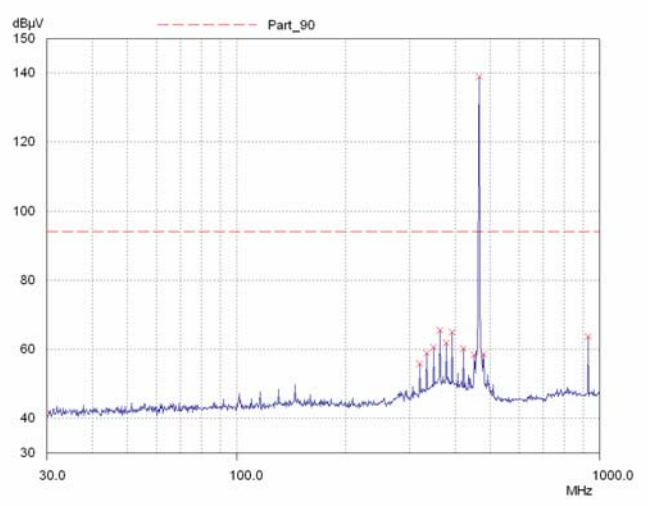
Date: 4.NOV.2008 14:15:52

Conducted Spurious Middle Channel 3GHz – 5GHz

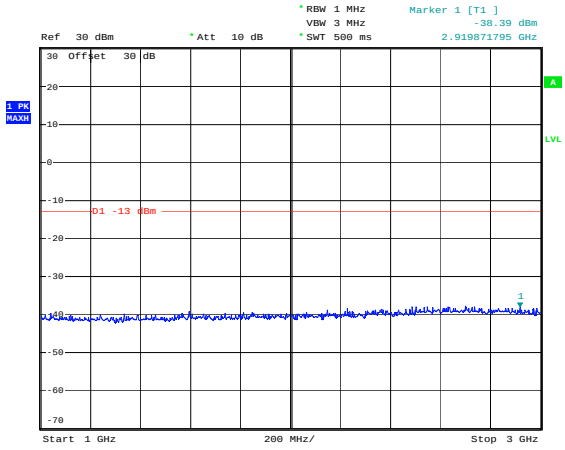


Date: 4.NOV.2008 14:16:12

Conducted Spurious Top Channel 30MHz – 1GHz

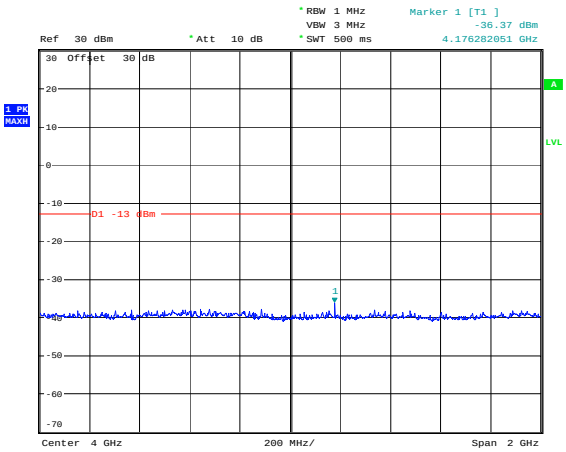


Conducted Spurious Top Channel 1GHz – 3GHz



Date: 4.NOV.2008 14:19:22

Conducted Spurious Top Channel 3GHz – 5GHz

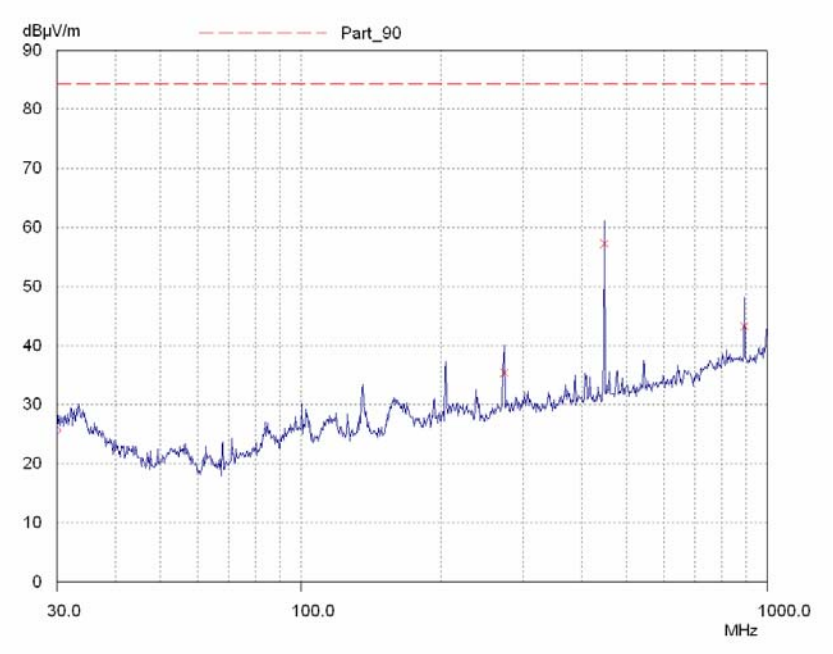


Date: 4.NOV.2008 14:19:49

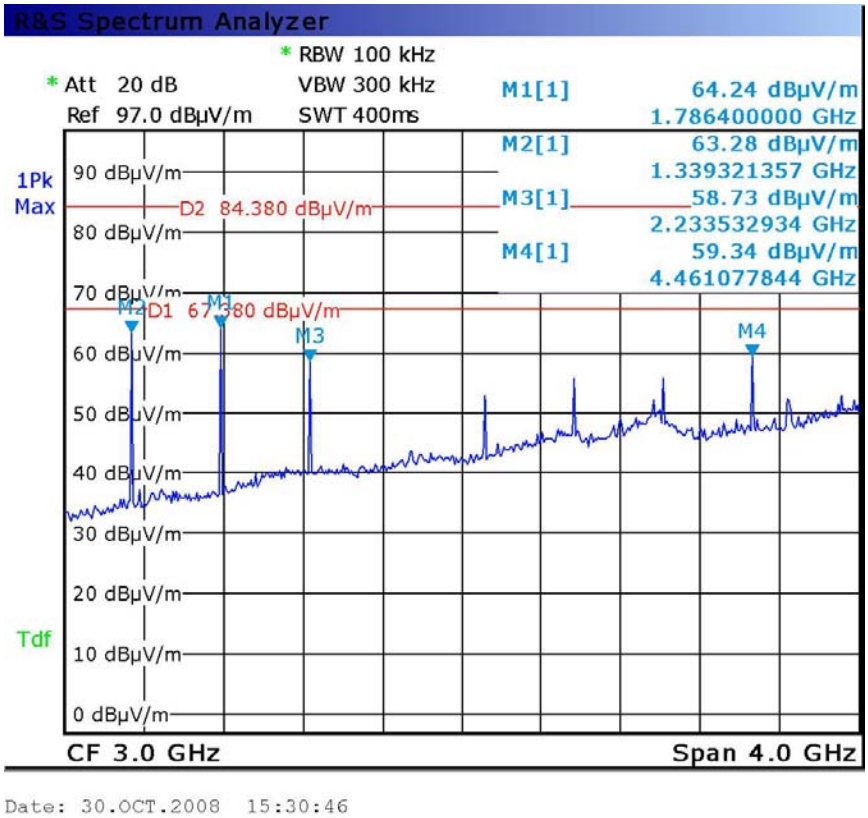
ANNEX F

RADIATED SPURIOUS EMISSIONS

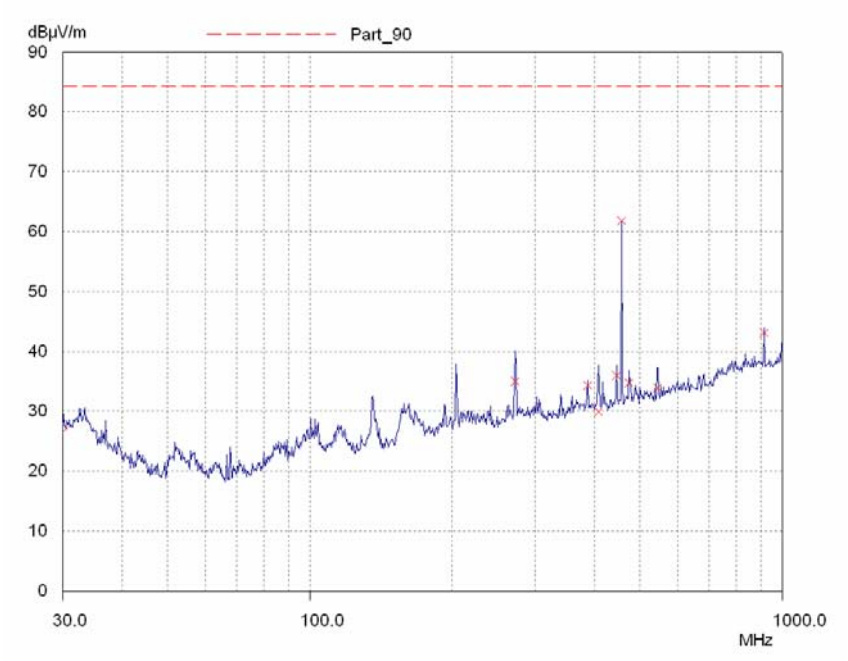
Radiated Spurious Bottom Channel 30MHz – 1GHz



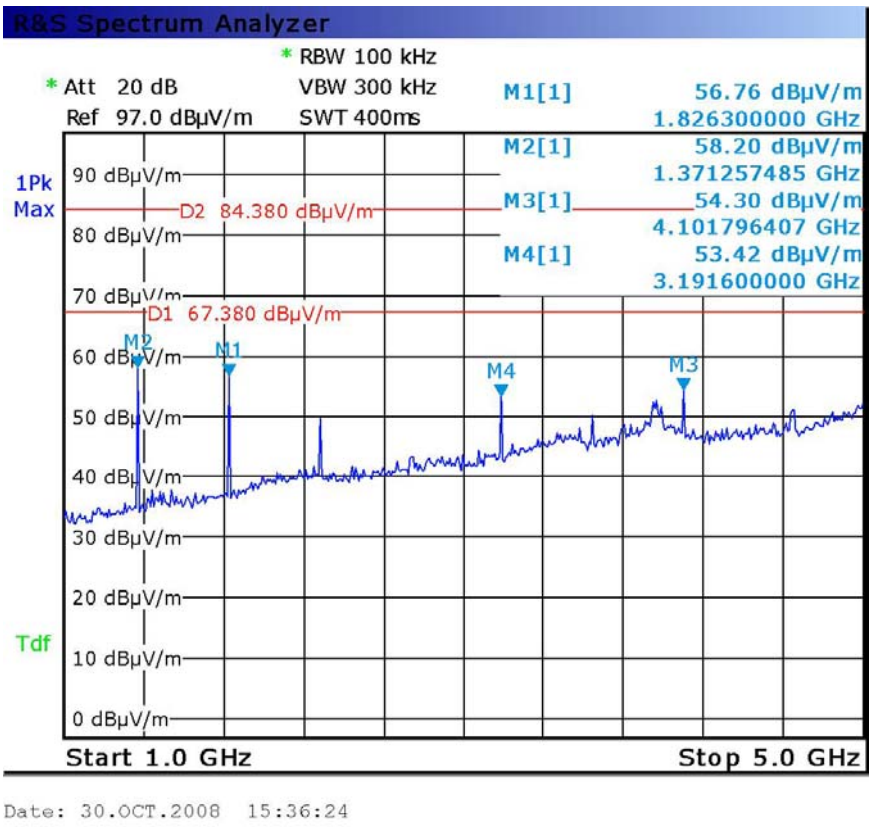
Radiated Spurious Bottom Channel 1GHz – 5GHz



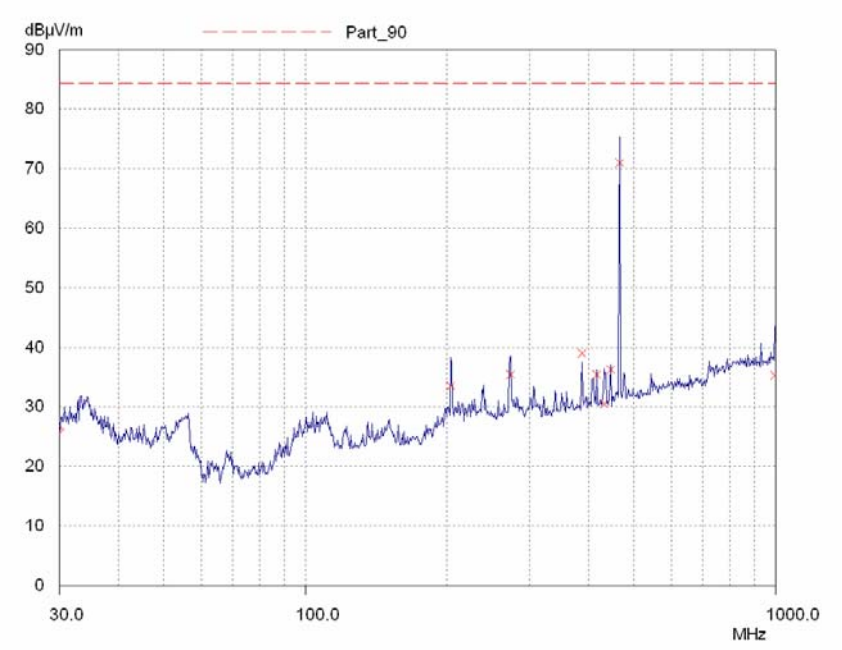
Radiated Spurious Middle Channel 30MHz – 1GHz



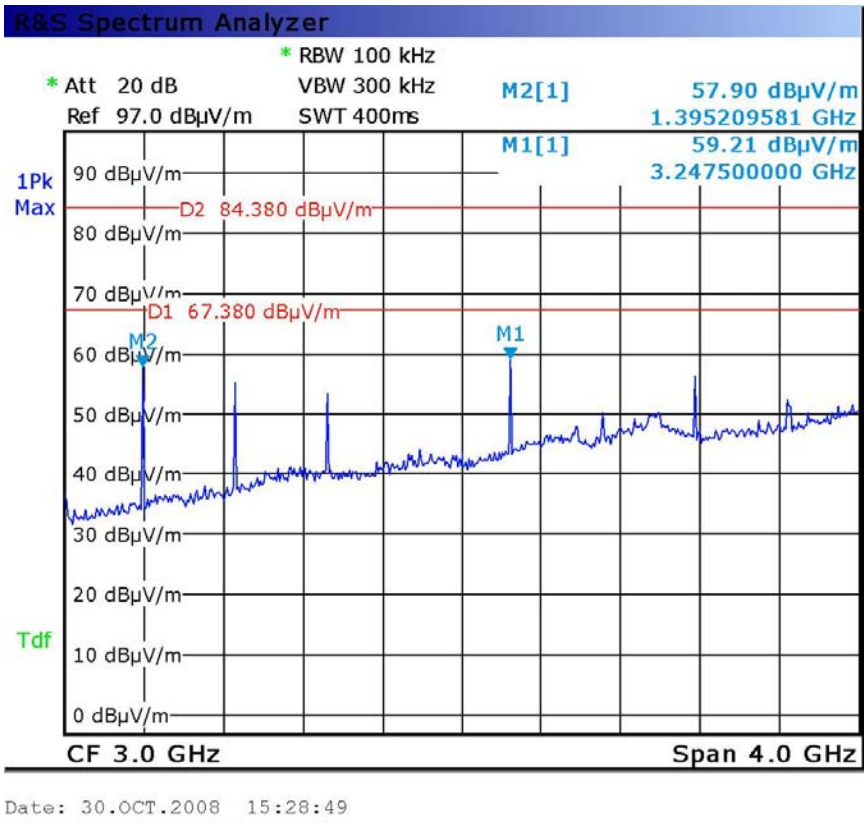
Radiated Spurious Middle Channel 1GHz – 5GHz



Radiated Spurious Top Channel 30MHz – 1GHz



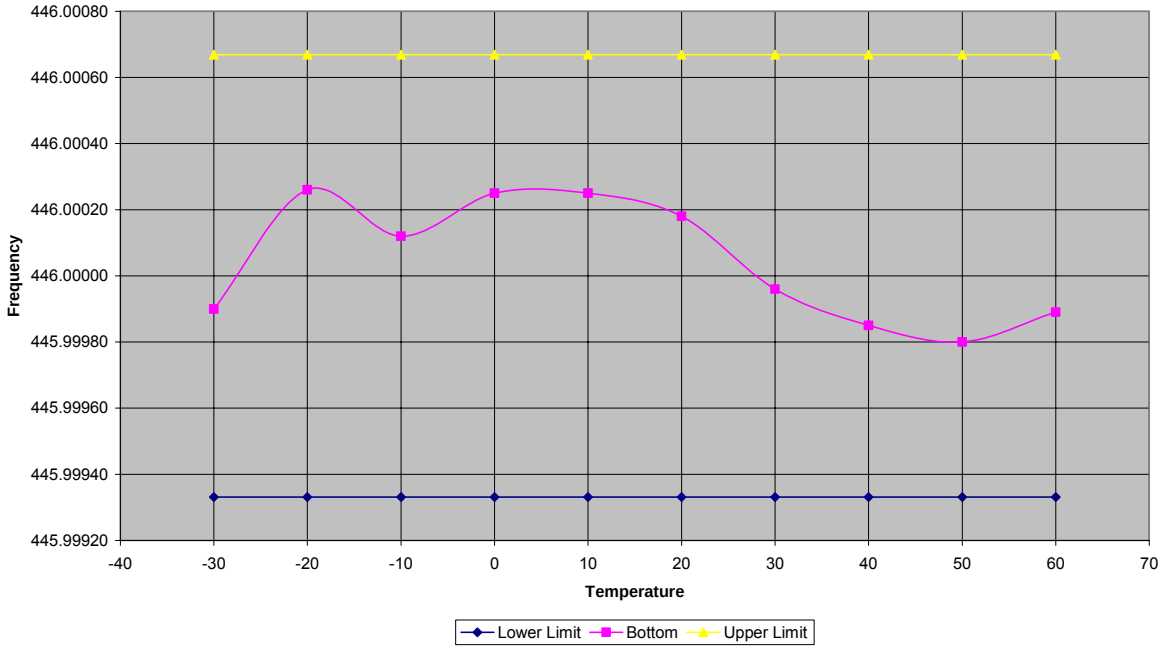
Radiated Spurious Top Channel 1GHz – 5GHz



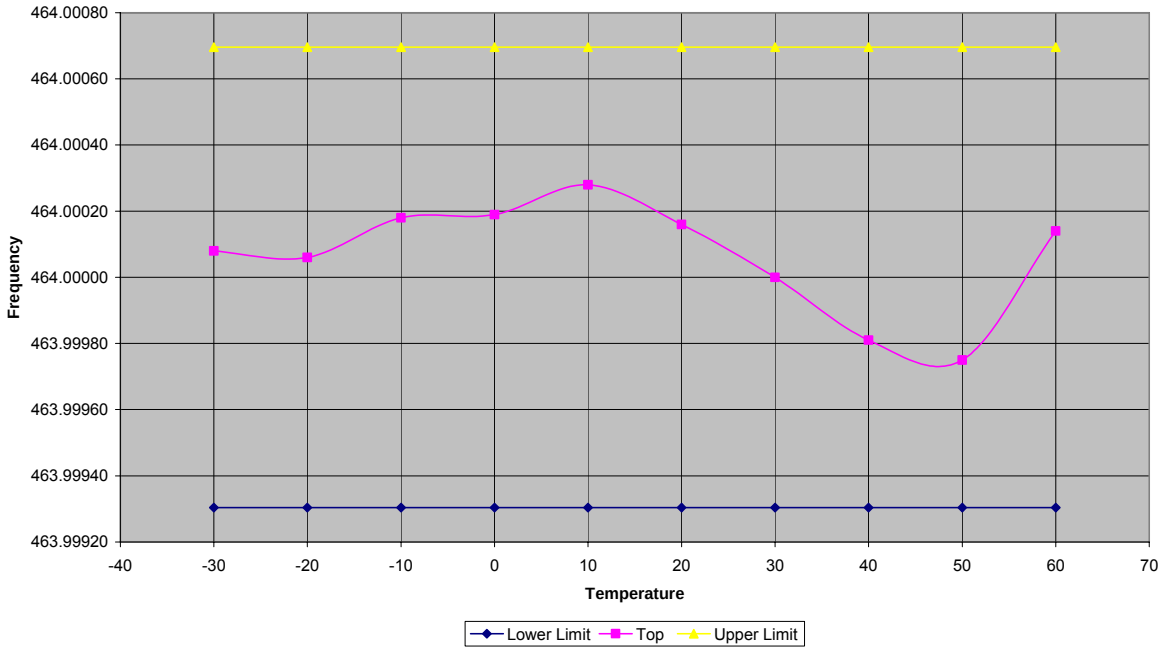
ANNEX G

FREQUENCY STABILITY - Temperature

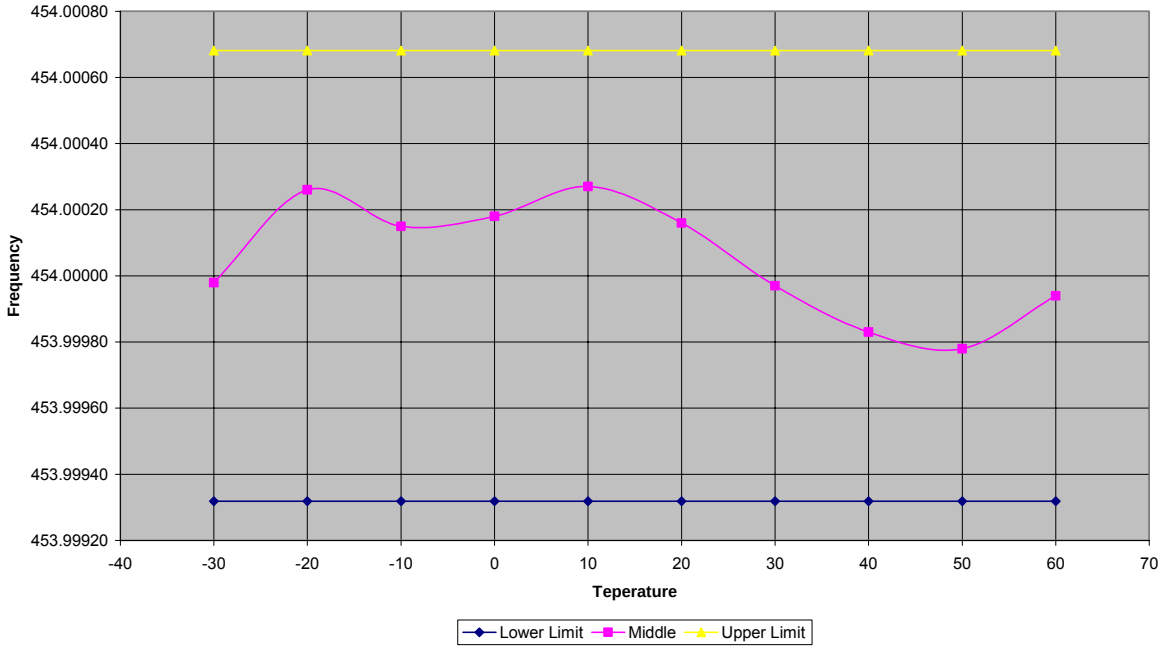
Frequency Stability - Temperature - Bottom Channel



Frequency Stability - Temperature - Top Channel



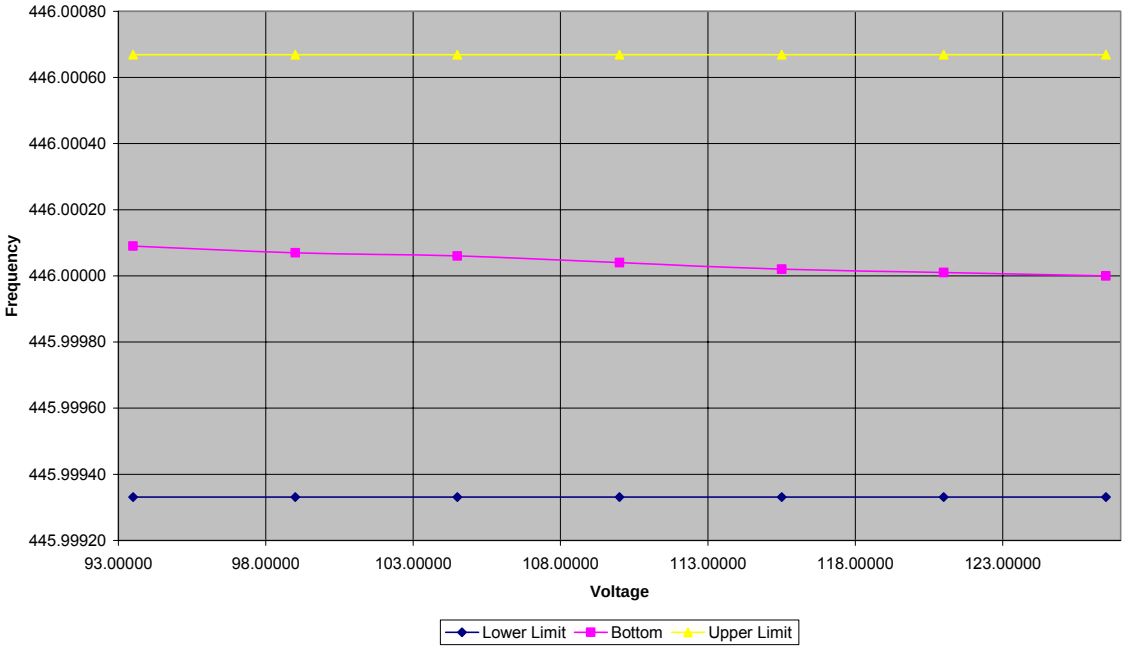
Frequency Stability - Temperature - Middle Channel



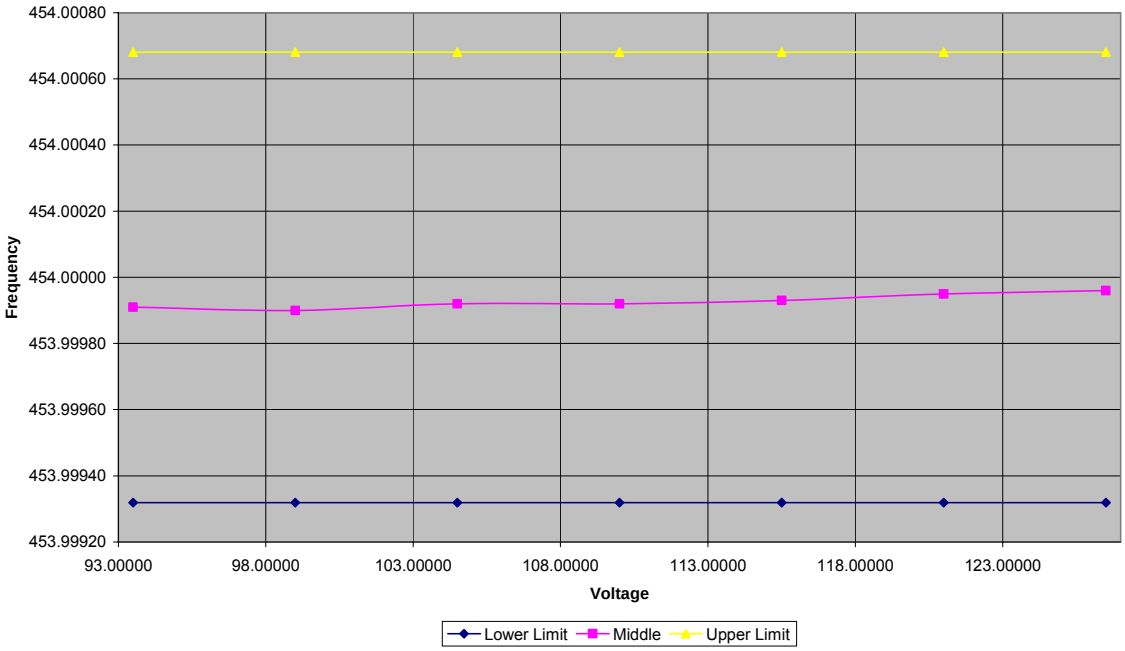
ANNEX H

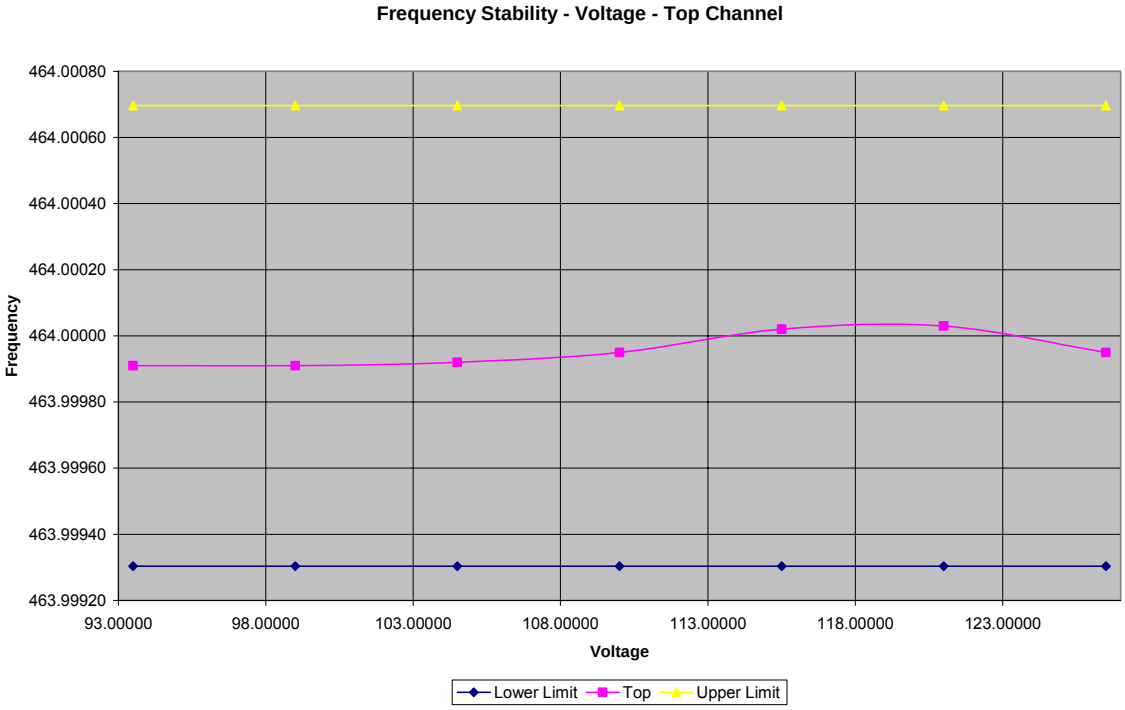
FREQUENCY STABILITY - Voltage

Frequency Stabiltiy - Voltage - Bottom Channel



Frequency Stability - Voltage - Middle Channel

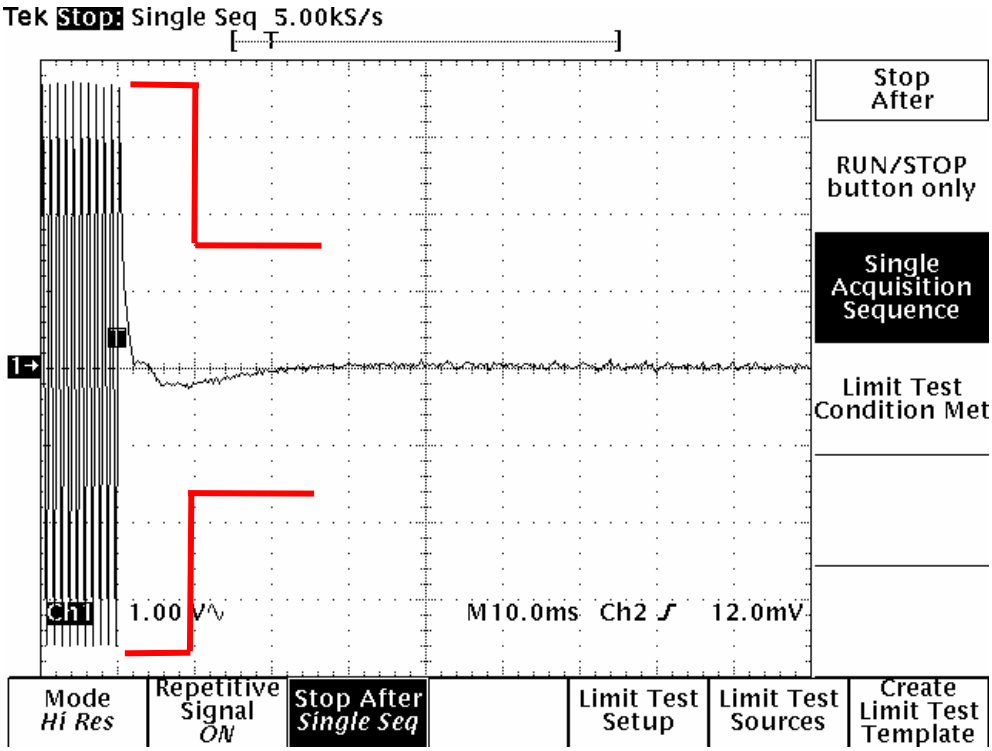



Frequency Stability - Voltage - Top Channel
464.00080
464.00060
464.00040
464.00020
464.00000
463.99980
463.99960
463.99940
463.99920
Frequency
93.00000
98.00000
103.00000
108.00000
113.00000
118.00000
123.00000
Voltage
Lower Limit
Top
Upper Limit

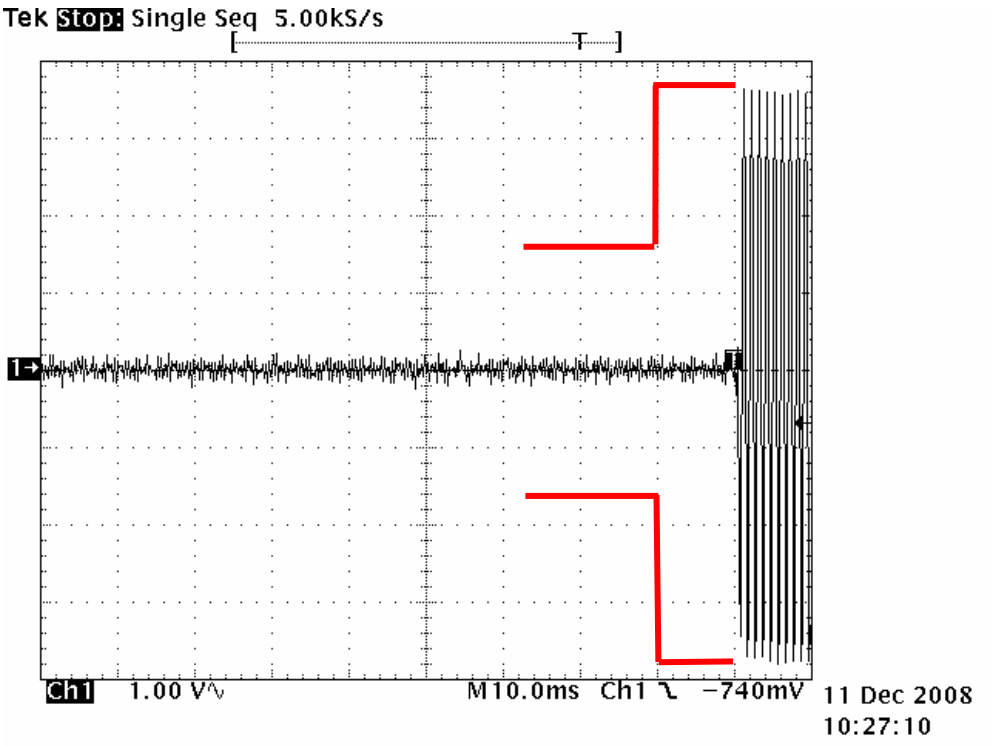
ANNEX I

TRANSMITTER TRANSIENT

Operating Frequency 446.0 MHz **Channel Spacing 12.5 kHz**

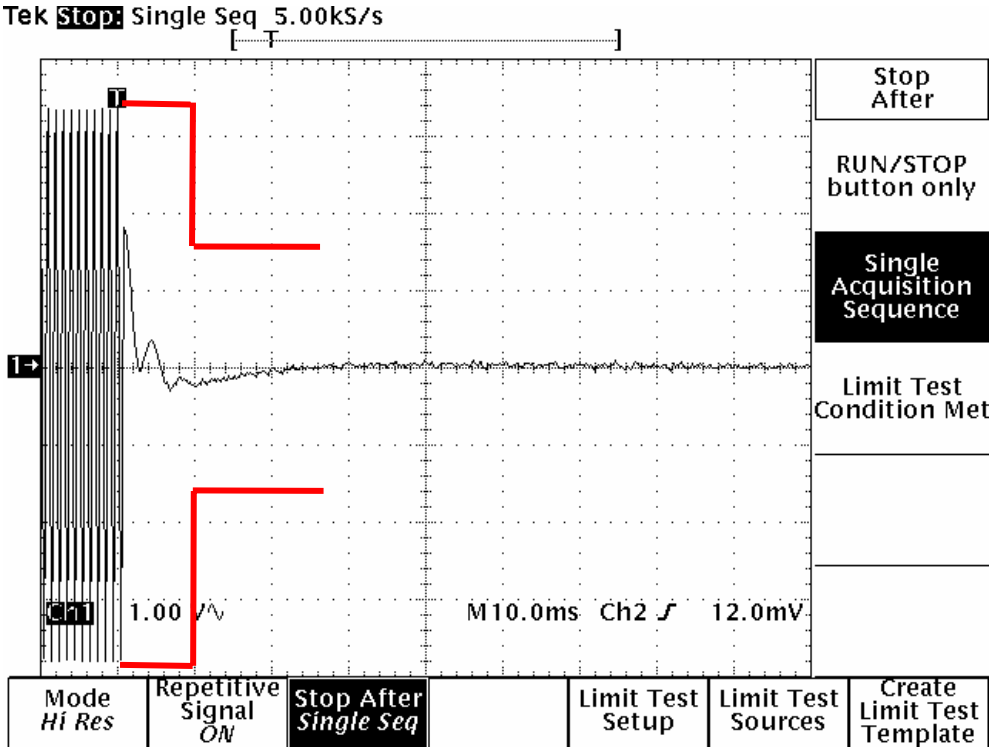


Ton

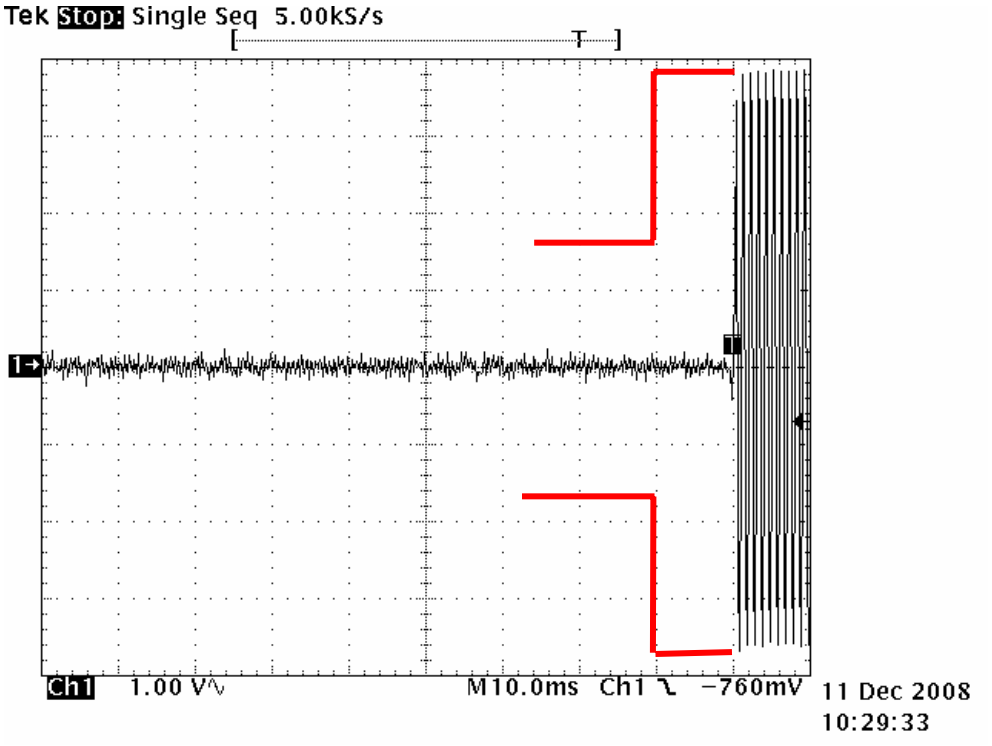


Toff

Operating Frequency 446.0 MHz **Channel Spacing 12.5 kHz**

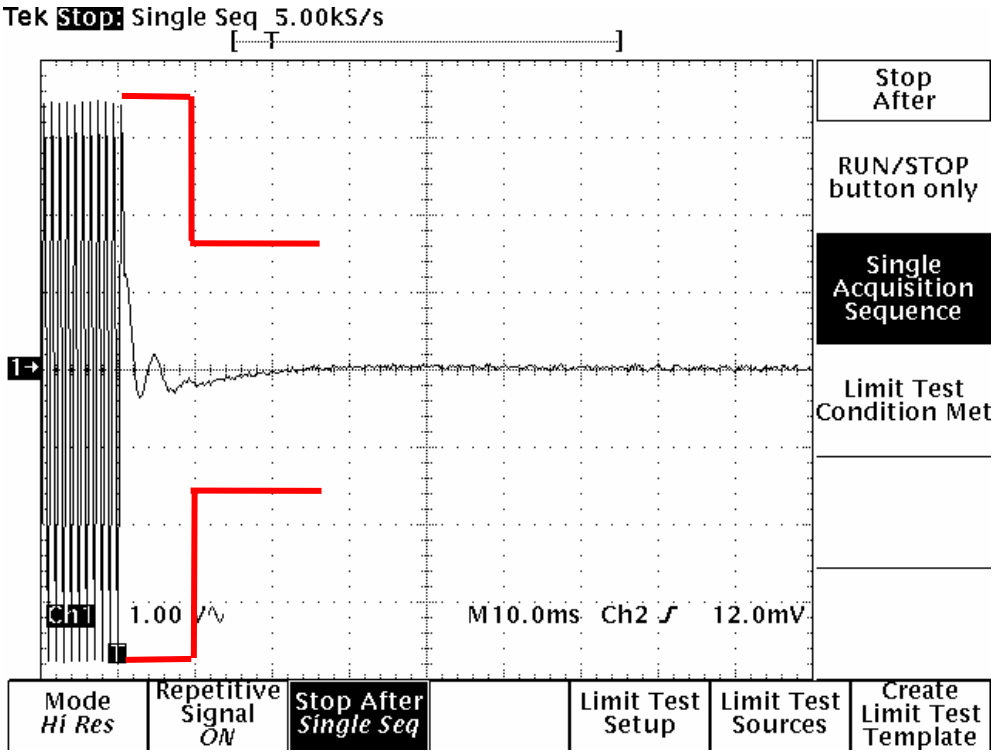


Ton

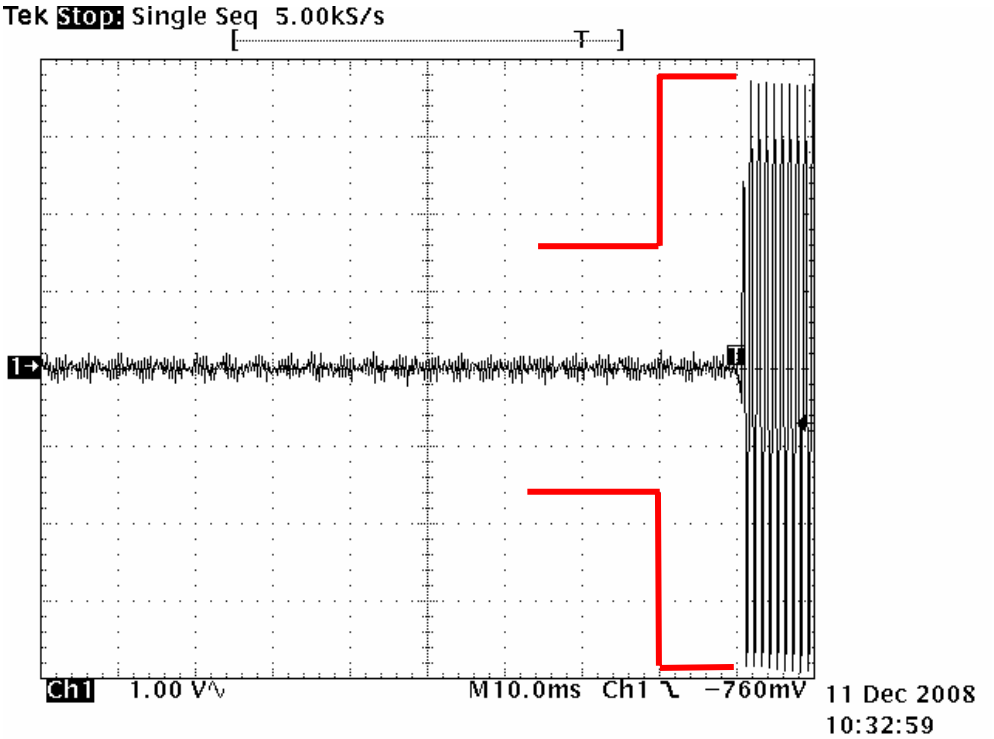


Toff

Operating Frequency 446.0 MHz **Channel Spacing 25 kHz**



Ton



Toff

ANNEX J

TEST EQUIPMENT USED

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No
CMTA	R&S	CMTA52	894715/003	05
ENVIRONMENTAL CHAMBER	SHARTREE	TCC 125-815P	CS 203	11
50Ω RESISTIVE COUPLER	ELCOM	RC-3-50	N/A	119
HORN ANTENNA	EMCO	3115	9010-3580	138
HORN ANTENNA	EMCO	3115	9010-3581	139
SIGNAL GENERATOR	MARCONI	2042	119388/080	176
BICONE ANTENNA	CHASE	VHA 9103 balu	N/A	193
LOG PERIODIC ANTENNA	CHASE	UPA6108	1061	203
ATTENUATOR	BIRD	8304-300-N	N/A	220
ATTENUATOR	BIRD	8304-100-N	N/A	222
TEMPERATURE INDICATOR	FLUKE	52 Series II	74700044	426
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04
RANGE 1	TRL	3 METRE	N/A	UH06
LOG PERIODIC ANTENNA	SCHWARZBECK	UHALP 9108	AC2404C/1	UH28
BICONE ANTENNA	SCHWARZBECK	VHAB 9123	N/A	UH29
VARIAC	FARNELL	8A	207-914	UH34
MULTIMETER	AVOMeter	M3004	M3270006	UH41
OSCILLOSCOPE	TEKTRONIX	TDS520B	B020491	UH122
BILOG ANTENNA	YORK	CBL/611/A	1618	UH191
CABLE	TRL	N/A	N/A	UH272
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU46	200034	UH281
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340
BILOG ANTENNA	CHASE	CBL6112	2129	UH93

ANNEX K

EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH004	Receiver	R&S			
UH06/07	IC OATS Submission	TRL	01/06/2007	24	01/06/2009
UH06/07	NSA Calibration	TRL	17/12/2007	12	17/12/2008
UH028	Log Periodic Ant	Schwarbeck	30/05/2007	24	30/05/2009
UH029	Bicone Antenna	Schwarbeck	06/05/2007	24	06/05/2009
UH034	Variac	Farnell	Use Calibrated Multimeter		
UH041	Multimeter	AVOmeter	15/01/2008	12	15/01/2009
UH191	Bilog Antenna	York		24	
UH122	Oscilloscope	Tektronix	10/12/2007	24	10/12/2009
UH272	1.5m Cable N type	TRL	30/01/2008	12	30/01/2009
UH281	Spectrum Analyser	R&S	28/10/2008	12	28/10/2009
UH340	Signal Generator	HP	06/05/2008	12	06/05/2009
L005	CMTA	R&S	29/10/2008	12	29/10/2009
L011	Environmental Chamber	Shartree	Use Calibrated Temperature Indicator		
L119	Combiner	Elcom	Calibrate In Use		
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L176	Signal Generator	Marconi	06/05/2008	12	06/05/2009
L193	Bicone Antenna	Chase	06/05/2008	24	06/05/2010
L203	Log Periodic Ant	Chase	06/05/2008	24	06/05/2010
L220	Attenuator	Bird	Calibrate In Use		
L222	Attenuator	Bird	Calibrate In Use		
L426	Temperature Indicator	Fluke	22/01/2008	12	22/01/2009
L479	Analyser	Anritsu	22/09/2008	12	22/09/2009
L572	Pre Amp	Agilent	04/07/2008	12	04/07/2009

ANNEX L

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 (Equipment - TRLUH120) = **2.18dB**
Uncertainty in test result (Equipment – TRL05) = **1.08dB**
Uncertainty in test result (Equipment – TRL479) = **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 (Equipment - TRLUH120) = **119ppm**
Uncertainty in test result (Equipment – TRL05) = **0.113ppm**
Uncertainty in test result (Equipment – TRL479) = **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 (Equipment TRL479) Up to 8.1GHz = **3.31dB**
Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**
Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**
Uncertainty in test result (Equipment TRLUH120) 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%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**

[12] Spectrum Mask Measurements

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

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] Transmission Time Measurement

Uncertainty in test result = **7.98%**