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**REPORT ON THE CERTIFICATION TESTING OF AN
IRIDIUM SATELLITE LLC
S2 L-BAND TRANSCEIVER
WITH RESPECT TO
FCC RULES CFR 47, PART 25
AND
FCC RULES CFR 47, PART 15**



TEST REPORT NO: RU1474/8659
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IRIDIUM SATELLITE LLC
S2 L-BAND TRANSCEIVER
WITH RESPECT TO
FCC RULES CFR 47, PART 25
AND
FCC RULES CFR 47, PART 15**

TEST DATE: 17th – 27th June 2008

TESTED BY: D WINSTANLEY

APPROVED BY: J CHARTERS
RADIO SECTION
LEADER

DATE: 10th July 2008

Distribution:

- Copy Nos:
1. Iridium Satellite LLC
 2. TCB: TRL Compliance Limited
 3. TRL Compliance Ltd

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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.			



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CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	Q639522B
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC Rules CFR 47, Part 25 & Part 15
TEST RESULT:	Compliant to Specification
ITU EMISSIONS DESIGNATOR	41K7Q7W
EQUIPMENT UNDER TEST:	S2 L-Band Transceiver
EQUIPMENT TYPE:	Satellite Communications Module
PEAK OUTPUT POWER:	10.03dBW, 40.03dBm
MEAN OUTPUT POWER:	-0.42dBW, 29.58dBm
CHANNEL SPACING:	41.667 kHz
NUMBER OF CHANNELS:	252 (240 Transmit Channels)
MODULATION TYPE:	Q7W
POWER SOURCE(s):	+4Vdc to +28Vdc
TEST DATE(s):	17 th – 27 th June 2008
ORDER No(s):	0649
APPLICANT:	Iridium Satellite LLC
ADDRESS:	6707 Democracy Blvd. Suite 300 Bethesda United States of America MD 20817
TESTED BY:	----- D WINSTANLEY
APPROVED BY:	----- J CHARTERS RADIO SECTION LEADER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): S2 L-Band Transceiver

EQUIPMENT TYPE: Satellite Communications Module

PURPOSE OF TEST: Certification

TEST SPECIFICATION(s): FCC Rules CFR 47, Part 25 & Part 15

TEST RESULT: COMPLIANT Yes
No

APPLICANT'S CATEGORY: MANUFACTURER
IMPORTER
DISTRIBUTOR
TEST HOUSE
AGENT

APPLICANT'S CONTACT PERSON(s): Donna Bethea-Murphy

E-mail address: donna.bethea-murphyl@iridium.com

APPLICANT: Iridium Satellite LLC

ADDRESS: 6707 Democracy Blvd.
Suite 300
Bethesda
United States of America
MD 20817

TEL: +1 301 571 6277

FAX: +1 301 571 6250

MANUFACTURER: Iridium Satellite LLC

DEVELOPMENT AGENT: Cambridge Consultants Limited

DEVELOPMENT AGENTS CONTACT PERSON(s): Mr S Hart

E-mail address: steve.hart@cambridgeconsultants.com

ADDRESS: Science Park
Milton Road
Cambridge
CB4 4DW
United Kingdom

TEL: +44 (0)1223 420024

FAX: +44 (0)1223 423373

EUT(s) COUNTRY OF ORIGIN: United States

TEST LABORATORY: TRL Compliance Ltd

UKAS ACCREDITATION No: 0728

TEST DATE(s) 17th – 27th June 2008

TEST REPORT No: RU1474/8659

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	FCC Part 2	FCC Part 25	APPLICABILITY	RESULT
	RF Power Output	-	25.204 (a)	YES	PASS
	Emissions Limitations	-	25.202 (f)	YES	PASS
	Spurious Emissions at Antenna Terminals	2.1051	25.202 (f) 25.213	YES	PASS
	Protection of the Radio Navigation Satellite Service	-	25.216(c) 25.216(f)	YES	PASS
	Spurious Emissions Radiated	2.1053	25.202 (f) 25.213	YES	PASS
	Frequency Stability Temperature	2.1055	25.202 (d)	YES	PASS
	Frequency Stability Voltage	2.1055	25.202 (d)	YES	PASS

Note: The S2 L-Band Transceiver is subject to FCC Part 25 & Part 2 for FCC Certification for units marketed within the United States. The above tests, as specified in FCC Part 2, with limits as defined in FCC Part 25 were performed on the S2 L-Band Transceiver.

- 2. Product Use: Satellite Telephone and Data Communications

 - 3. Emission Designator: 41k7Q7W

 - 4. Temperatures: Ambient (Tnom) 20°C

 - 5. Supply Voltages: Vnom +4Vdc to + 28Vdc
- Note: Vnom voltages are as stated above unless otherwise shown on the test report page
- 6. Equipment Category: Single channel
Two channel
Multi-channel

 - 7. Channel spacing: Narrowband 41.667 kHz
Wideband

 - 8. Test Location: TRL Compliance Limited
Up Holland
Malvern

 - 9. Modifications made during test program No modifications were performed.

Product Description

The satellite communications module consists of an L-Band Transceiver (LBT) capable of simultaneous transmit and receive (duplex) operation covering the frequency range of 1616MHz to 1626.5MHz. The frequency accesses used for duplex channels are organised into sub-bands each of which contains eight frequency accesses. Each sub-band, therefore occupies 333.33 kHz (i.e. $8 \times 41.667\text{kHz}$). Up to 30 sub-bands containing 240 frequency accesses may be used for duplex channels.

Standard References

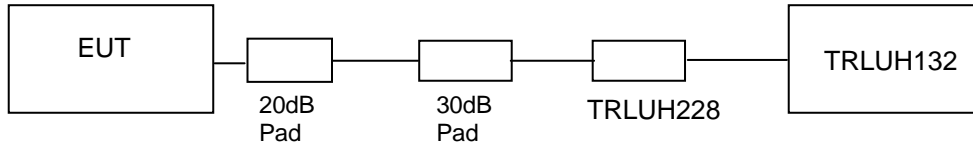
- | | |
|-------------------------------|---|
| 47 CFR 2
10-1-03 Edition | Code of Federal Regulations, Title 47, Part 2, "Frequency allocations and Radio Telemetry Matters;
General Rules and Regulations" |
| 47 CFR 25
10-1-03 Edition | Code of Federal Regulations, Title 47, Part 25, "Sattelite Communications" Subpart C, "Technical Matters" |
| 47 CFR 15
20-09-07 Edition | Code of Federal Regulations, Title 47, Part 15, "Radio Frequency Devices" Subpart B, "Unintentional Radiators" |
| C63.4-2003 | 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" |

COMPLIANCE TESTS

TRANSMITTER TESTS

RF OUTPUT POWER – CONDUCTED – PART 25.204 (a)

Ambient temperature	=	20°C	Radio Laboratory
Relative humidity	=	55%	
Supply voltage	=	+4Vdc to +28Vdc	
Channel number	=	See test results	



See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on four channels. The unit was put into test mode and set to operate at maximum power and with a random modulating signal using test commands sent from a PC via the MAMBO Box. The antenna gain, included in the table below, represents the highest gain of any antennas that are used with this system. The unit was operated at the upper and lower nominal voltages.

EUT Operating At Upper Nominal Voltage

Frequency MHz	Attenuator and cable loss dB	Level at Power Meter dBm	Antenna Gain dB	Duty Cycle Factor dB (See Annex D)	Carrier power dBm	Carrier power dBW	Limit dBW
Channel 1	48.3	-21.63	3	10.35	40.02	10.02	40
Channel 75	48.3	-21.65	3	10.35	40.00	10.00	40
Channel 150	48.3	-21.63	3	10.35	40.02	10.02	40
Channel 240	48.3	-21.62	3	10.35	40.03	10.03	40

- Notes:
1. Duty Cycle Factor = $10 \times \log(1/X)$ Where $X = (T_{on} / T_{frame})$. See Annex E for duty cycle plots
 2. Correction Factor for dBm to dBW = -30dB
 3. Antenna gain of 3dBi is the worst case gain over an isotropic antenna

EUT Operating At Lower Higher Voltage

Frequency MHz	Attenuator and cable loss dB	Level at Power Meter dBm	Antenna Gain dB	Duty Cycle Factor dB (See Annex D)	Carrier power dBm	Carrier power dBW	Limit dBW
Channel 1	48.3	-21.97	3	10.35	39.68	9.68	40
Channel 75	48.3	-21.92	3	10.35	39.73	9.73	40
Channel 150	48.3	-21.94	3	10.35	39.71	9.71	40
Channel 240	48.3	-21.87	3	10.35	39.78	9.78	40

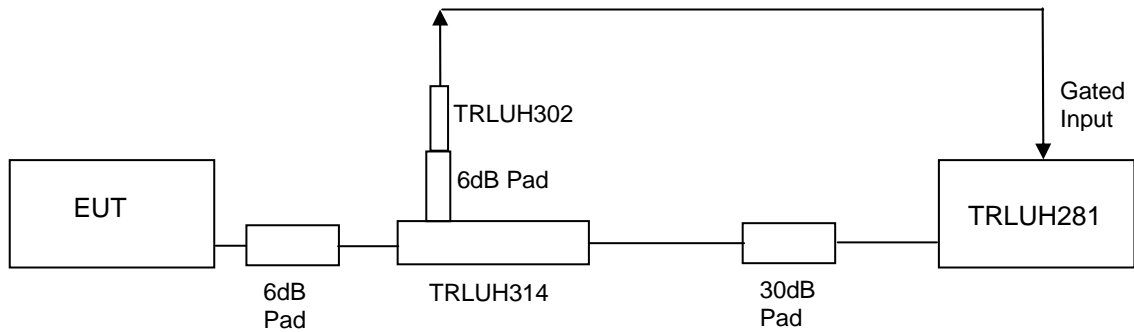
- Notes:
1. Duty Cycle Factor = $10 \times \log(1/X)$ Where $X = (T_{on} / T_{frame})$. See Annex E for duty cycle plots
 2. Correction Factor for dBm to dBW = -30dB
 3. Antenna gain of 3dBi is the worst case gain over an isotropic antenna

TRANSMITTER TESTS

EMISSIONS LIMITATIONS – CONDUCTED – PART 25.202 (f)

Ambient temperature = 20°C
 Relative humidity = 55%
 Supply voltage = +28Vdc

Radio Laboratory



See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on four channels. The unit was put into test mode and set to operate at maximum power and with a random modulating signal using test commands sent from a PC via the MAMBO Box. The unit was operated at the upper nominal voltage.

To enable an average measurement to be taken the gated input trigger of the spectrum analyser was used.

The Spurious limit is as follows:

On any frequency removed from the assigned frequency by the following percentage of the authorised bandwidth

±50%	-	100%	-25 dBc
±100%	-	250 %	-35 dBc
> ±250%			At least 43 + 10 log PdB

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

Where the Authorised Bandwidth = 41.667 kHz

Note

1. The 3 kHz to 4 kHz bandwidth correction, cable and attenuator losses and antenna gain have been taken into account in the Ref level offset figure.

The S2 L-Band Transceiver was found to comply with the limits

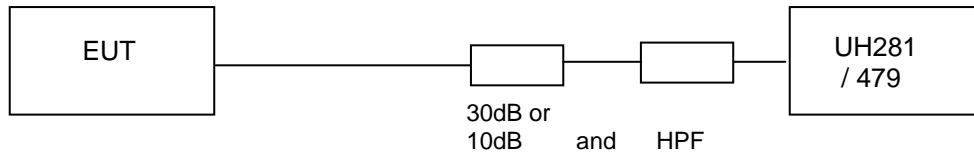
See plots in Annex G.

TRANSMITTER TESTS

SPURIOUS EMISSIONS – CONDUCTED – PART 25.202 (f) & 25.213

Ambient temperature = 21°C
 Relative humidity = 36%
 Supply voltage = +28Vdc

Radio Laboratory



For measurements between 1559 MHz and the band edge of 1610MHz the same test setup as per emissions limitations test was used. For measurements below 1559 MHz and above the band edge of 1628.5MHz the above test setup was used. A 30 dB pad was used for measurements below 3GHz and a 10dB attenuator and high pass filter for measurements above 3GHz.

See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on two channels. The unit was put into test mode and set to operate at maximum power and with a random modulating signal using test commands sent from a PC via the MAMBO Box. The unit was operated at the upper nominal voltage.

The Spurious limit was calculated as follows:

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

At least $43 + 10 \log(P)$ dB

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

RESULTS

Frequency Range (MHz)	Ch N°	Freq. of Emission	Spectrum Analyser Level (dBm)	Attenuator & Cable Losses (dB)	Spurious Emission Level (dBm)	Limit dBm
30MHz – 1559MHz	No Significant emissions within 20 dB of the Limit					-13
1559MHz – 1605MHz	1	1559.000	-81.78	34.69	-47.09	-40
	240	1559.000	-82.62	34.69	-47.93	-40
	1	1562.810	-77.84	34.69	-43.15	-40
	240	1580.351	-80.89	34.70	-46.19	-40
	1	1580.430	-83.03	34.70	-48.33	-40
1605MHz – 1610MHz	240	1587.274	-79.21	34.70	-44.51	-40
	1	1605.000	-84.28	34.78	-49.50	-40
1605MHz – 1610MHz	240	1605.000	-81.89	37.78	-47.11	-40 (Note 4)
	No Significant emissions within 20 dB of the Limit					-13

Notes :

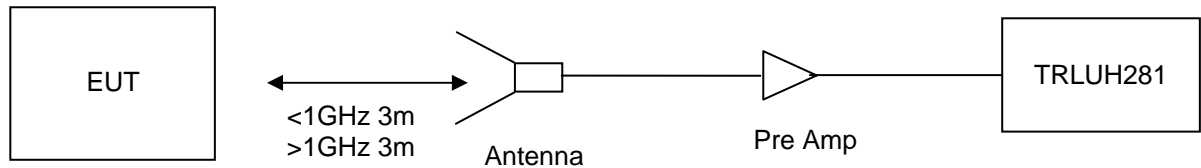
1. Emissions Checked up to 10 times Fc
2. Reference level offset of Scan plots in Annex G already have approximate attenuator losses taken into account
3. Average measurement in a carrier on state were taken in the bands 1599MHz to 1605MHz and 1605MHz -1610MHz. All other scans were peak hold for worst case.
4. -40 to -10 Linearly interpolated in dBm Vs frequency offset.
5. Correction Factor for dBm to dBW = -30dB.
6. Fully charged batteries were used for each channel.

The S2 L-Band Transceiver was found to comply with the limits. See Annex H for plots

TRANSMITTER TESTS

SPURIOUS EMISSIONS – RADIATED – PART 25.202 (f) & 25.213

Ambient temperature	=	18°C
Relative humidity	=	42%
Conditions	=	OATS
Supply voltage	=	+28Vdc
Supply Frequency	=	N/A



See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on two channels. The unit was put into test mode and set to operate at maximum power and with a tone modulating signal using test commands sent from a PC via the MAMBO Box. The unit was mounted on a turntable and rotated through 360° to find the worst case emission. The unit was operated at the upper nominal voltage.

The Spurious limit was calculated as follows:

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

At least 43 + 10 log PdB

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

RESULTS

FREQUENCY RANGE	CHANNEL NUMBER	FREQ. (MHz)	ERP/EIRP (dBm)	LIMIT (dBm)
100kHz – 1559MHz	No Significant Emissions within 20 dBs of the Limit			-13
1559MHz – 1605MHz	No Significant Emissions within 20 dBs of the Limit			-40
1605MHz – 1610MHz	No Significant Emissions within 20 dBs of the Limit			-40 to 10 Note 4
1628.5MHz – 16.3 GHz	No Significant Emissions within 20 dBs of the Limit			-13

Notes :

1. Emissions Checked up to 10 times Fc.
2. Scan plots of channels 1 & 240 with receive antenna in vertical polarization in annex H.
3. The unit was mounted on a turntable and rotated through 360° and in 3 orthogonal planes to find the worst case emission.
4. -40 to -10 Linearly interpolated in dBm Vs frequency offset.
5. Correction Factor for dBm to dBW = -30dB.
6. Fully charged batteries were used for each channel.

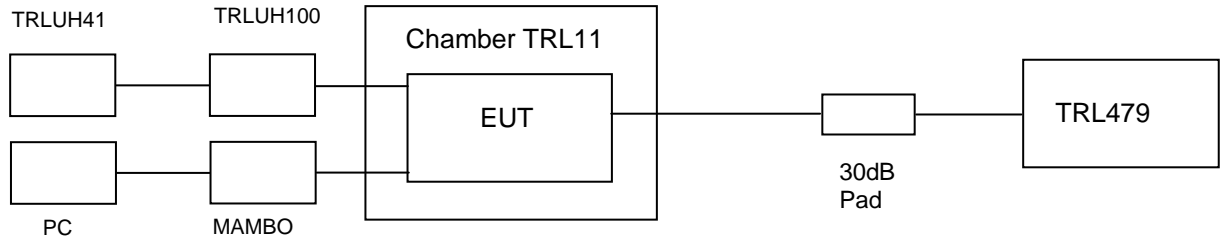
The S2 L-Band Transceiver was found to comply with the limits. See annex I for plots

TRANSMITTER TESTS

FREQUENCY STABILITY – CONDUCTED – TEMPERATURE – PART 25.202 (d)

Ambient temperature = 20°C
 Relative humidity = 46%
 Supply voltage = +28Vdc

Radio Laboratory



See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on four channels. The unit was put into test mode and set to operate at maximum power and with a tone modulating signal using test commands sent from a PC via the MAMBO Box. The Analyser was set to max hold. The unit was operated at the upper nominal voltage.

RESULTS

TEMP	Frequency (MHz)			
	Channel 1	Channel 75	Channel 150	Channel 240
°C				
+60	1616.022500	1619.105780	1622.230780	1625.980750
+50	1616.022384	1619.105740	1622.230780	1625.980764
+40	1616.022392	1619.105728	1622.230688	1625.986688
+30	1616.022140	1619.105660	1622.230670	1625.980570
+20	1616.022380	1619.105710	1622.230790	1625.980740
+10	1616.022250	1619.105560	1622.230600	1625.980650
0	1616.021960	1619.105260	1622.230260	1625.980290
-10	1616.022140	1619.105440	1622.230430	1625.980430
-20	1616.021980	1619.105310	1622.230310	1625.980300
-30	1616.021830	1619.105110	1622.230101	1625.980150

Notes: 1.Limit ± 10ppm (See Annex J for frequency stability plots verses limit)

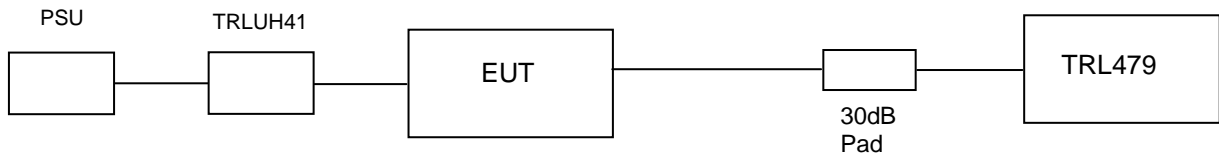
The S2 L-Band Transceiver was found to comply with the limits

TRANSMITTER TESTS

FREQUENCY STABILITY – CONDUCTED – VOLTAGE – PART 25.202 (d)

Ambient temperature = 20°C
 Relative humidity = 62%
 Supply voltage = +4Vdc to +28Vdc

Radio Laboratory



See Annex C for full list of test equipment

The test setup was as per the above diagram. The unit was tested on four channels .The unit was put into test mode and set to operate at maximum power and with a tone modulating signal using test commands sent from a PC via the MAMBO Box. The Analyser was set to max hold.

RESULTS

VOLTAGE	Frequency (MHz)			
	Channel 1	Channel 75	Channel 150	Channel 240
%				
85	1616.022530	1619.105900	1622.230860	1625.980890
90	1616.022530	1619.105910	1622.230910	1625.980930
95	1616.022480	1619.105850	1622.230920	1625.980930
Lower Nominal	1616.022570	1619.105800	1622.230920	1625.980780
Upper Nominal	1616.022540	1619.105800	1622.230880	1625.980740
105	1616.022550	1619.105790	1622.230830	1625.980820
110	1616.022560	1619.105790	1622.230880	1625.980820
115	1616.022560	1619.105790	1622.230790	1625.980870

Notes: 1.Limit ± 10ppm (See Annex K for plots verses limit)

The S2 L-Band Transceiver was found to comply with the limits

UNINTENTIONAL TRANSMITTER TESTS

UNINTENTIONAL TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.109

Ambient temperature	=	18°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	42% (<1GHz),	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 1m	[]
Supply voltage	=	+28Vdc		

	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								
	0.49MHz - 1.705MHz								
	1.705MHz - 30MHz								
	30MHz - 88MHz								
	88MHz - 216MHz								
	216MHz - 960MHz								
	960MHz - 1GHz								
	1GHz - 16.3GHz								
No Significant Emissions Within 20 dB of the limit.									
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 16.3GHz	500µV/m @ 3m							

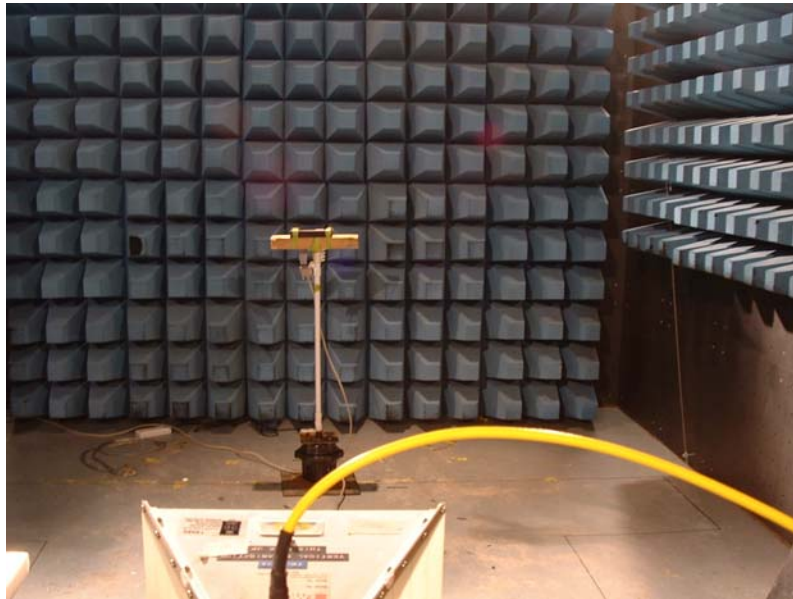
- Notes:**
- 1 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
 - 2 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
 - 3 Receiver detector >1GHz = Average, 1MHz resolution bandwidth
 - 4 Only emissions within 20 dB of the limit are recorded.
 - 5 Extrapolation factor 9.54dB from 1m to 3m, as per Part 15.31f
 - 6 See annex M for emissions plots

- 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 orthogonal planes.
Maximum results recorded.

ANNEX A
PHOTOGRAPHS

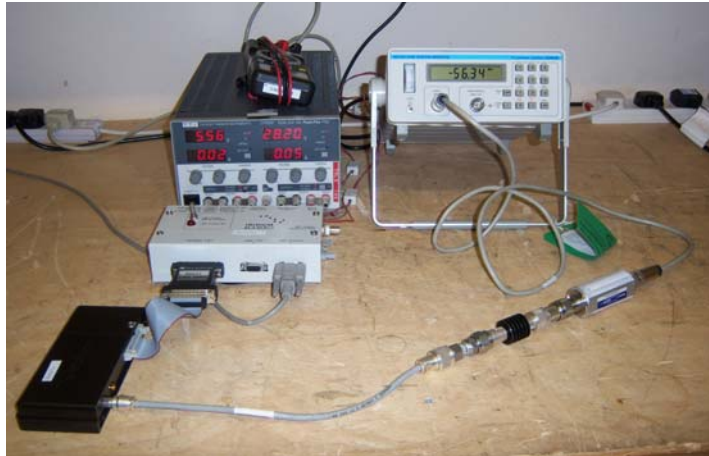
PHOTOGRAPH 1.

RADIATED TEST SETUP



PHOTOGRAPH 2.

CONDUCTED TEST SETUP



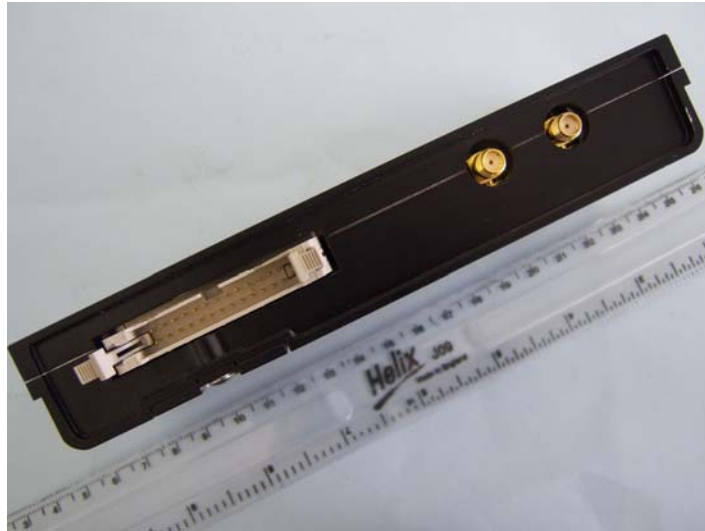
PHOTOGRAPH 3.

TOP OVERVIEW



PHOTOGRAPH 3.

CONNECTOR OVERVIEW



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	[]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
h.	CIRCUIT DIAGRAMS	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
i.	COMPONENT LOCATION	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
j.	PCB TRACK LAYOUT	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
k.	BILL OF MATERIALS	-	Tx	[]
		-	Rx	[]
		-	PSU	[]
		-	AUX	[]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C
TEST EQUIPMENT LIST

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No
ENVIRONMENTAL CHAMBER	SHARTREE	TCC 125-815P	CS 203	11
HORN	EMCO	3115	9010-3580	138
HORN	EMCO	3115	9010-3581	139
20dB ATTENUATOR	BIRD	8304-200-N	N/A	221
10 dB ATTENUATOR	BIRD	8304-100-N	N/A	222
6 dB ATTENUATOR	BIRD	8304-060	N/A	245
6 dB ATTENUATOR	BIRD	8304-0600-N	N/A	246
TEMPERATURE INDICATOR	FLUKE	52 SERIES II	74700044	426
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479
PRE AMPLIFIER	AGILENT	8449B	2118	572
MULTIMETER	AVOMeter	M3004	M3270006	UH41
ANTENNA	CHASE	CBL6112B	2803	UH93
PSU	THANDOR	PL320QMD	044749	UH100
POWER METER	MARCONI	6960B	237036/001	UH132
ANTENNA	YORK	CBL611/A	1618	UIH191
POWER SENSOR	MARCONI	6920	1564	UH228
SPECTRUM ANALYSER	R&S	FSU 46	200034	UH281
30dB ATTENUATOR	JFW	50PF-030	N/A	UH301
CRYSTAL DETECTOR	HP	8472A	1822Z00897	UH302
DIRECTIONAL COUPLER	SINGER	117310	26	UH314
HIGH PASS FILTER	AFL	N/A	N/A	N/A

ANNEX D
TEST EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
11	Temperature Chamber	Shartree	Use Calibrated Temperature Indicator		
138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
220	Attenuator	Bird	Calibrate in use		
221	Attenuator	Bird	Calibrate in use		
245	Attenuator	Bird	Calibrate in use		
246	Attenuator	Bird	Calibrate in use		
426	Temperature Indicator	Fluke	22/01/2008	12	22/01/2009
479	Spectrum Analyser	Anritsu			
572	Pre Amp	HP	01/07/2007	12	01/07/2008
UH06/07	NSA Calibration	TRL	17/12/2007	12	17/12/2008
UH028	Log Periodic Ant	Schwarbeck	06/05/2008	24	06/05/2010
UH029	Bicone Antenna	Schwarbeck	06/05/2008	24	06/05/2010
UH041	Multimeter	AVometer	15/01/2008	12	15/01/2009
UH093	Bilog	Schaffner	21/05/2007	24	21/05/2009
UH100	PSU	Thandar	Use Calibrated Multimeter		
UH132	Power meter	Marconi	15/01/2008	12	15/01/2009
UH194	Power Supply	Farnell	Use Calibrated Multimeter		
UH191	Bilog	York	11/08/2006	24	11/08/2008
UH223	Horn Antenna	Eaton	Use Calibrated Horn For Substitution		
UH226	Bidirectional Coupler	Narda	Calibrate in use		
UH228	Power Sensor	Marconi	16/01/2008	12	16/01/2009
UH281	Spectrum Analyser	R&S	24/10/2007	12	24/10/2008
UH301	Attenuator	JFW	Calibrate in use		
UH302	Crystal Detector	HP	For Information Only		
UH314	Bidirectional Coupler	Narda	Calibrate in use		
UH340	Signal Generator	HP	29/06/2006	24	29/06/2008
N/A	High Pass Filter	AFL	Calibrate in use		

ANNEX E
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

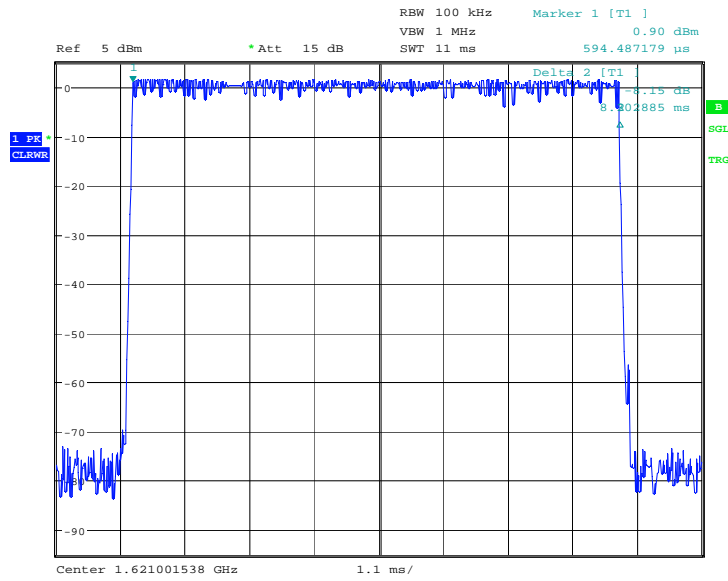
Uncertainty in test result = **3.23dB**

[18] Transmission Time Measurement

Uncertainty in test result = **7.98%**

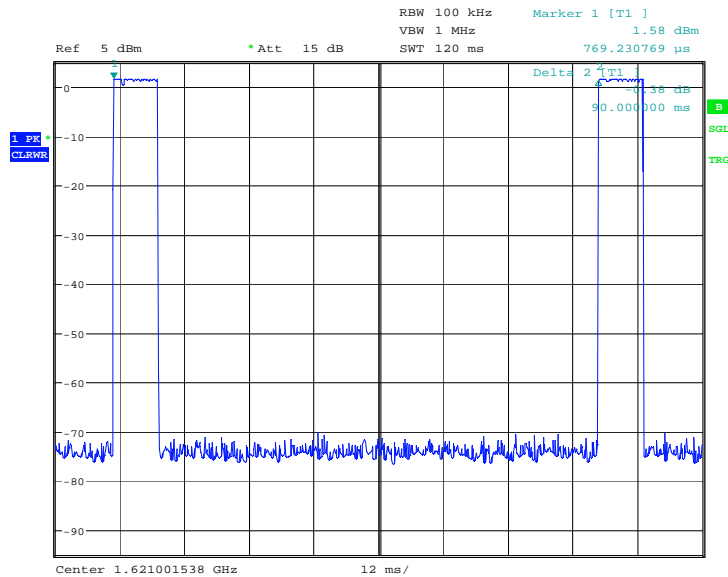
ANNEX F
DUTY CYCLE

Duty Cycle Plots



Date: 16.JUN.2008 11:58:12

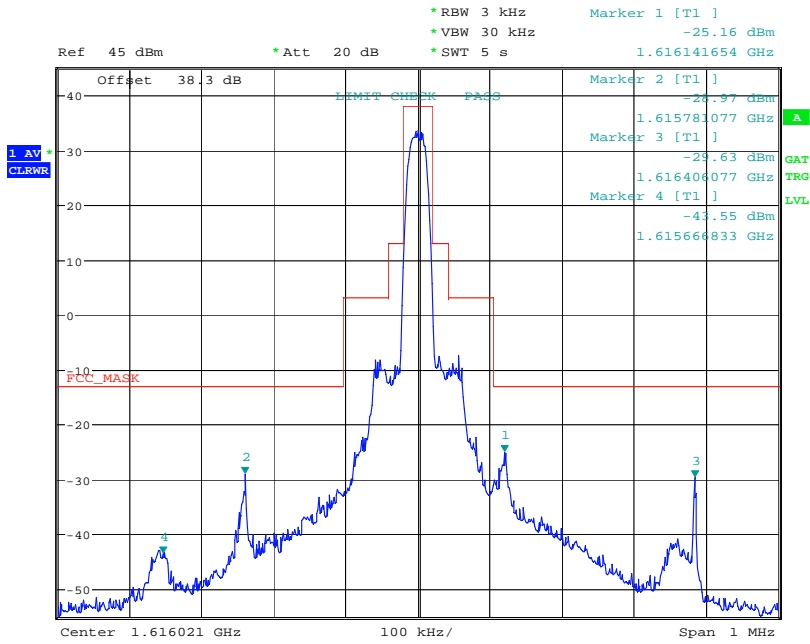
$$T_{on} = 8.30\text{mS}$$



Date: 16.JUN.2008 11:57:06

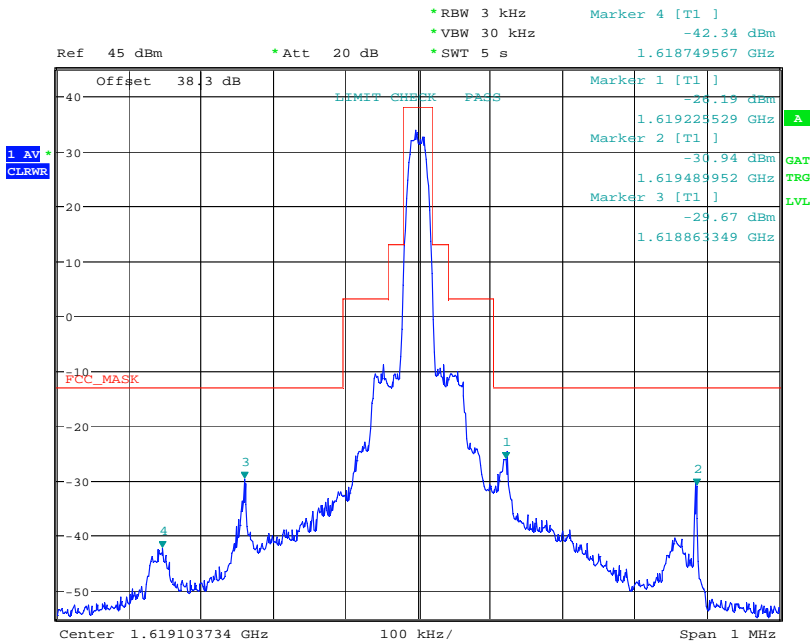
$$T_{frame} = 90\text{mS}$$

ANNEX G
EMISSIONS LIMITATIONS



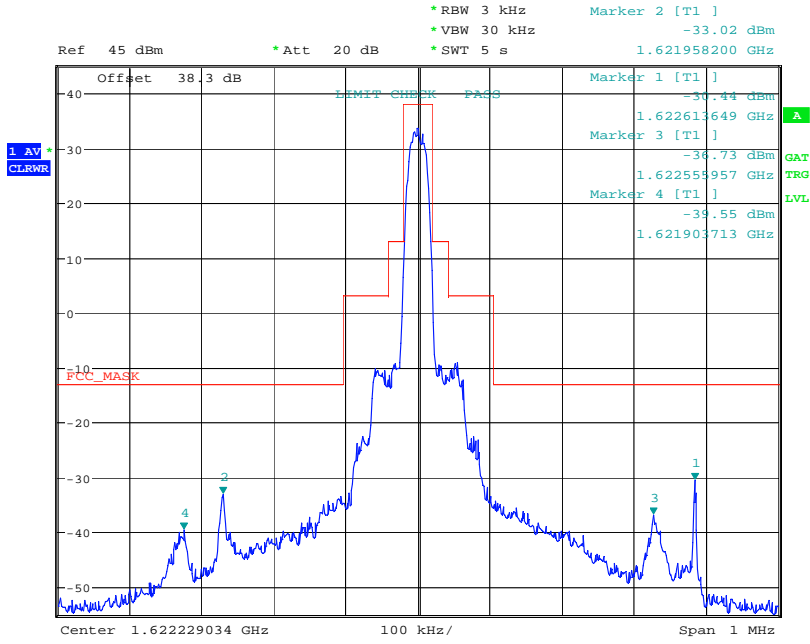
Date: 26.JUN.2008 15:01:41

Channel 1



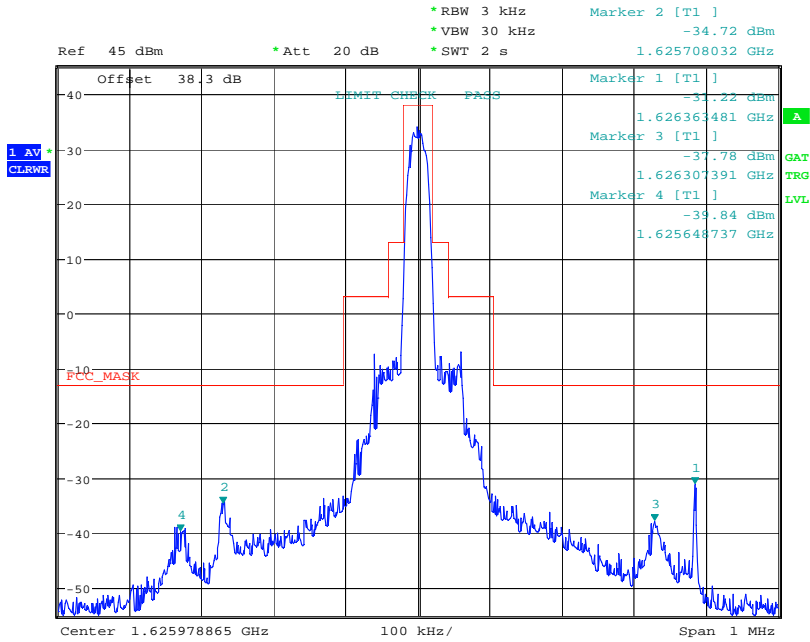
Date: 26.JUN.2008 14:48:01

Channel 75



Date: 26.JUN.2008 14:14:53

Channel 150



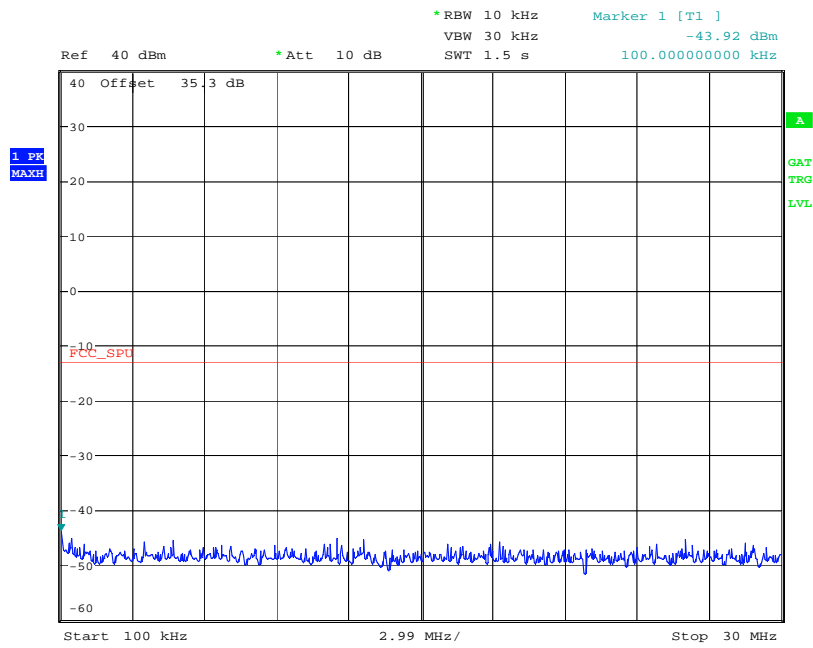
Date: 26.JUN.2008 13:44:10

Channel 240

ANNEX H
TRANSMITTER SPURIOUS EMISSIONS – Conducted

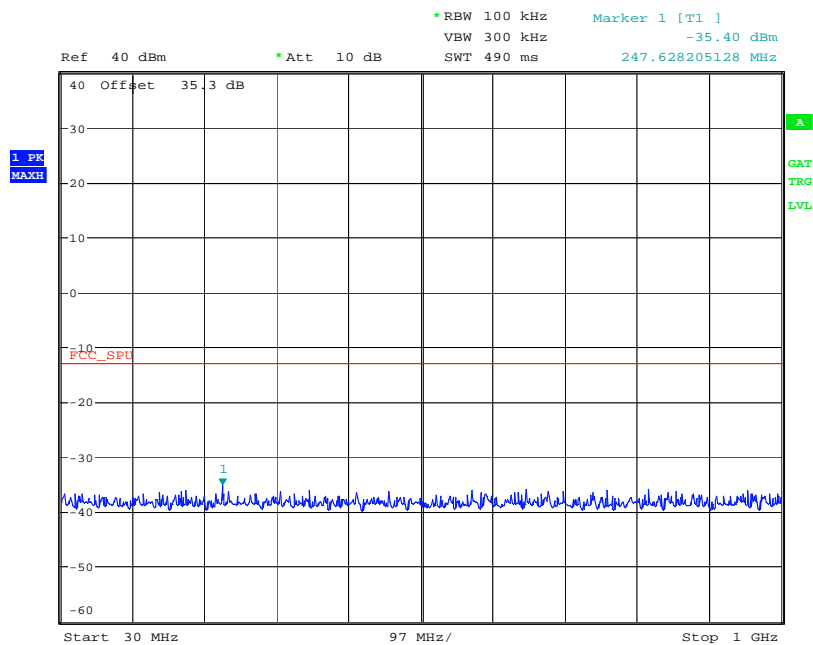
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 1



Date: 27.JUN.2008 09:15:01

100 kHz – 30MHz

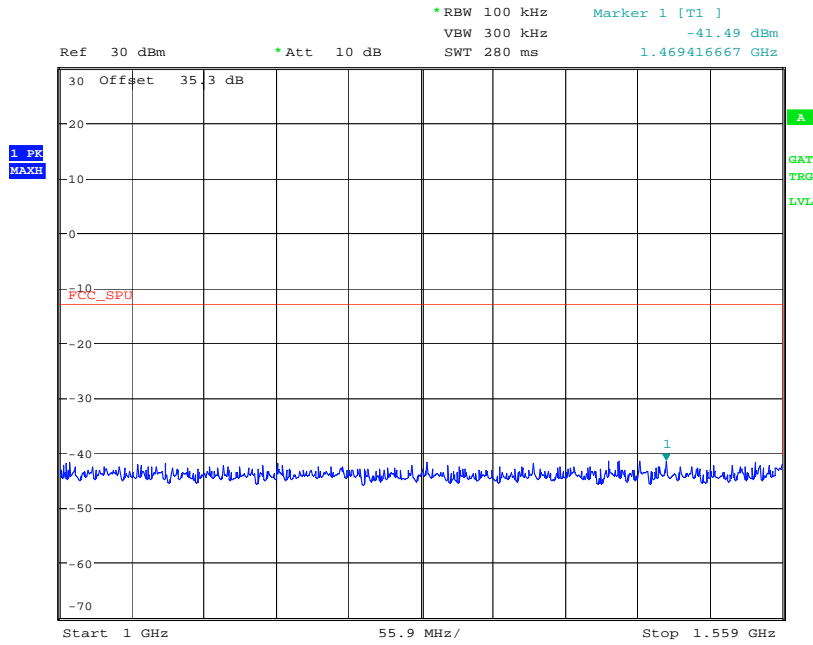


Date: 27.JUN.2008 09:15:50

30MHz – 1000MHz

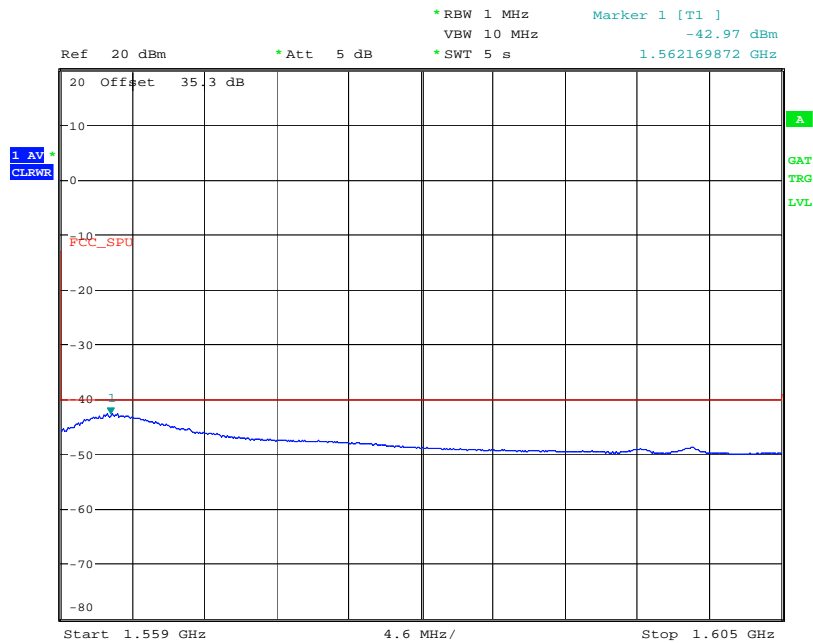
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 1



Date: 27.JUN.2008 09:16:27

1000MHz – 1559MHz

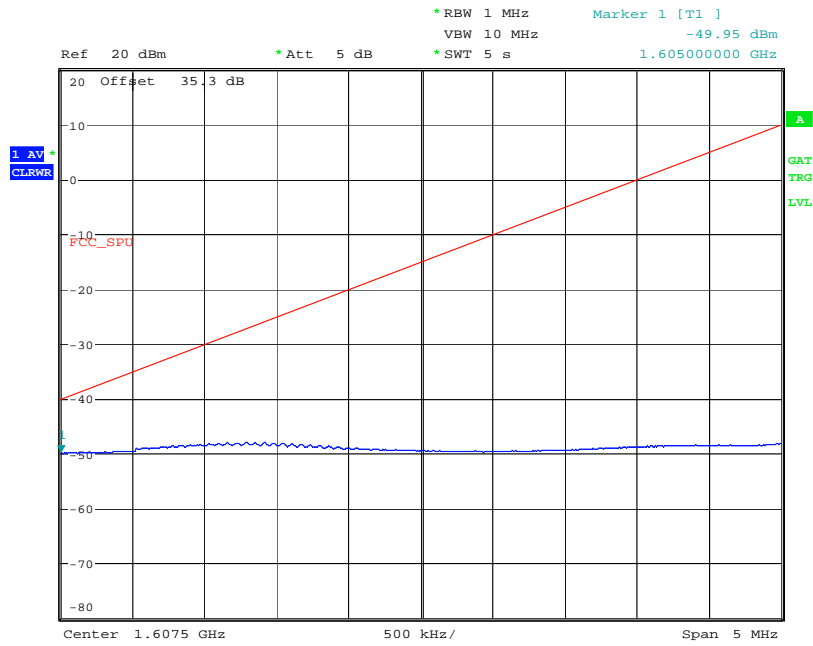


Date: 27.JUN.2008 09:24:33

1559MHz – 1605MHz

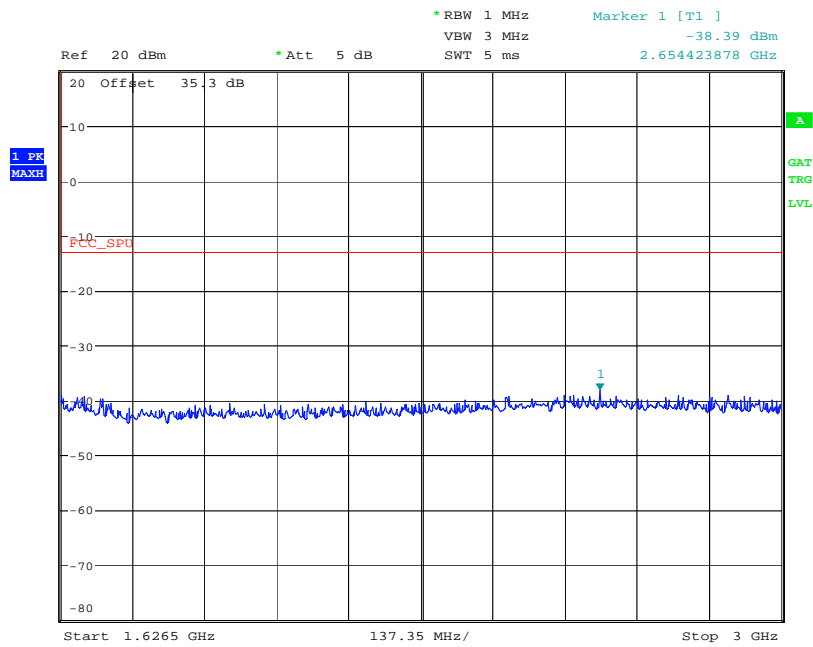
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 1



Date: 27.JUN.2008 09:29:53

1605MHz – 1610MHz

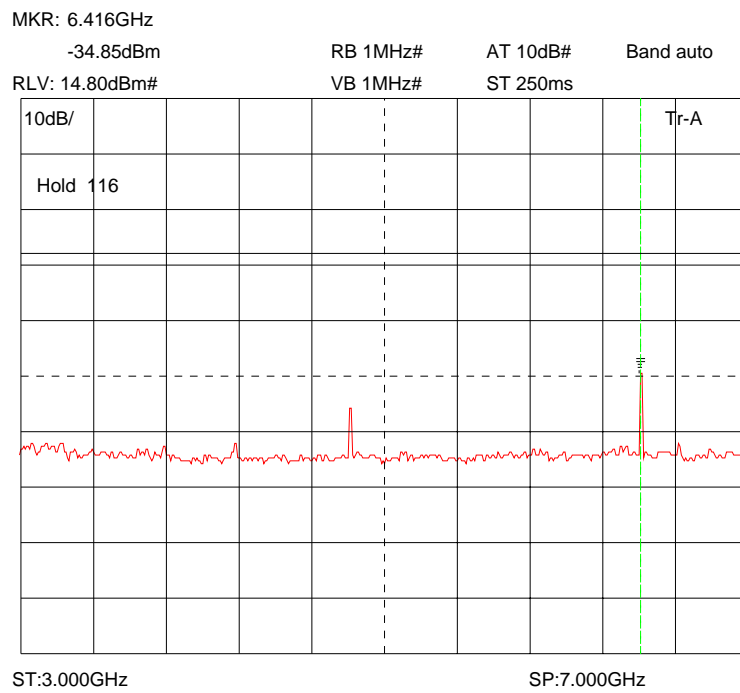


Date: 27.JUN.2008 09:31:12

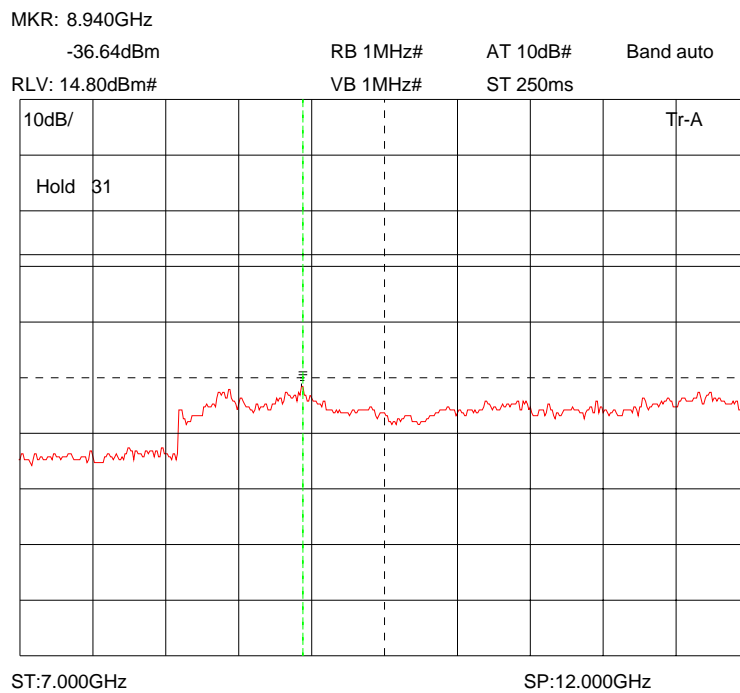
1626.5MHz – 3000MHz

TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 1



3GHz – 7GHz



7GHz – 12GHz

TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 1

MKR: 15.354GHz

-35.52dBm

RB 1MHz#

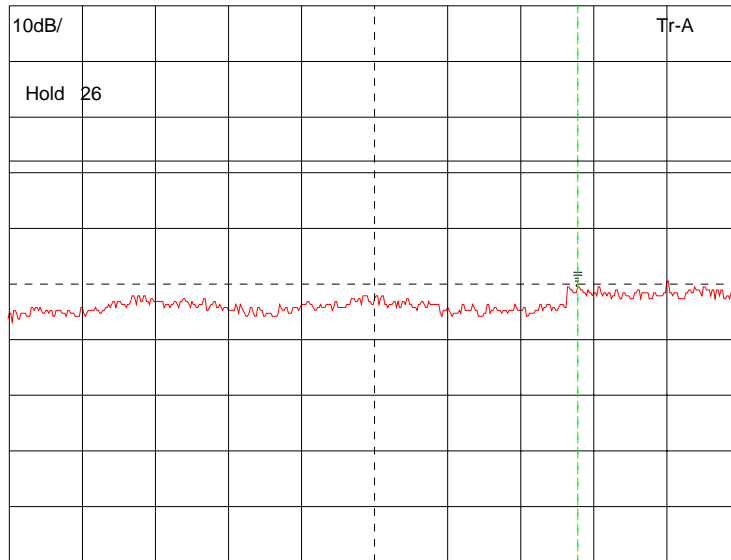
AT 10dB#

Band auto

RLV: 14.80dBm#

VB 1MHz#

ST 250ms



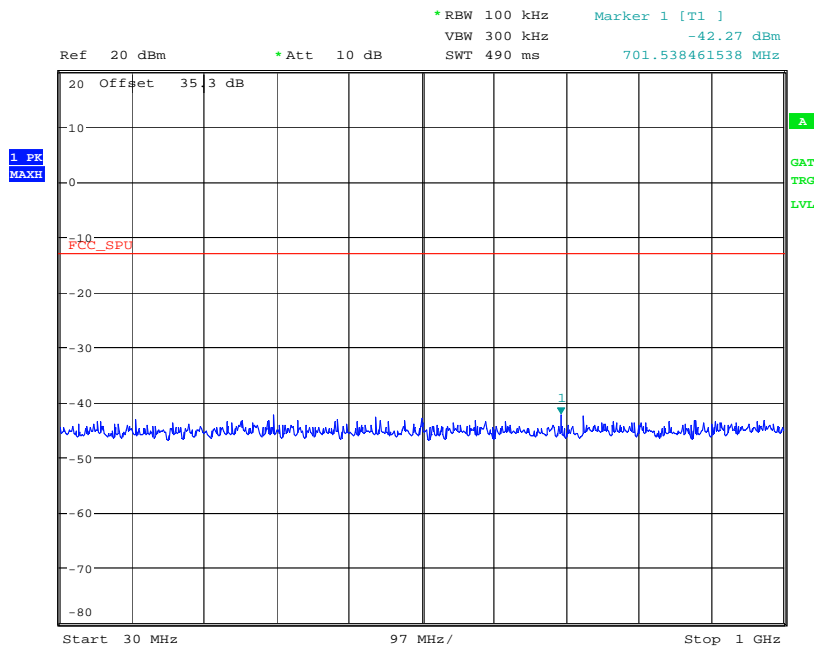
ST:12.000GHz

SP:16.300GHz

12GHz – 16.3GHz

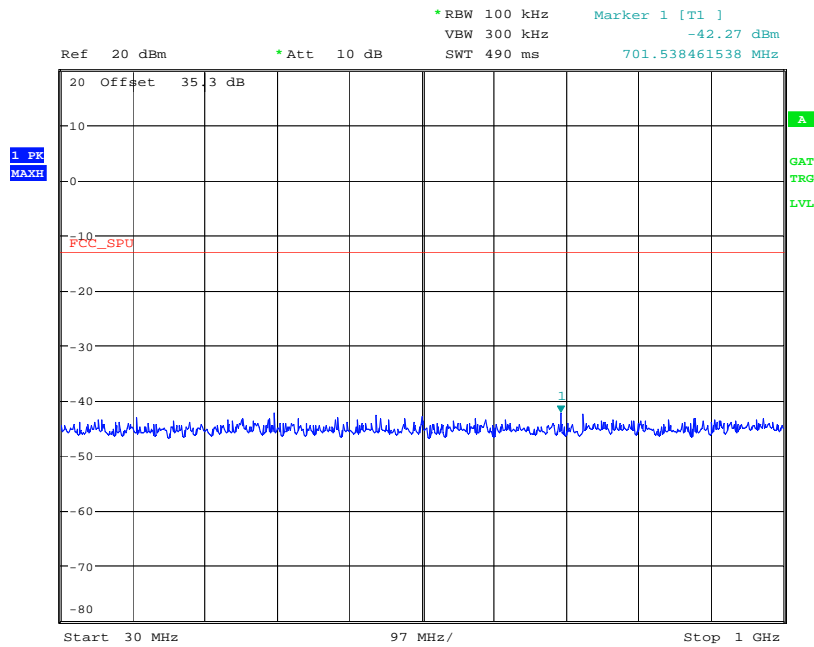
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 240



Date: 27.JUN.2008 09:35:07

100 kHz – 30MHz

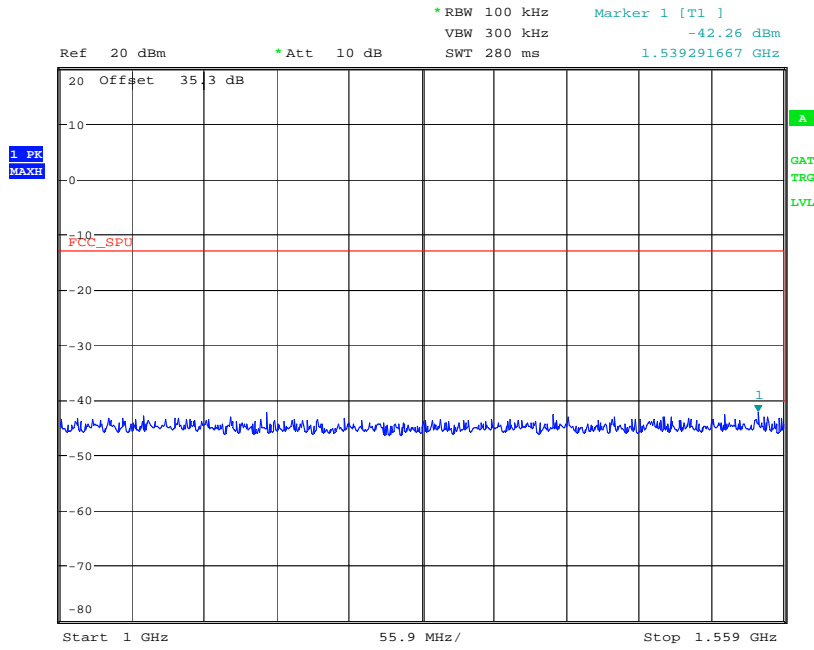


Date: 27.JUN.2008 09:35:07

30MHz – 1000MHz

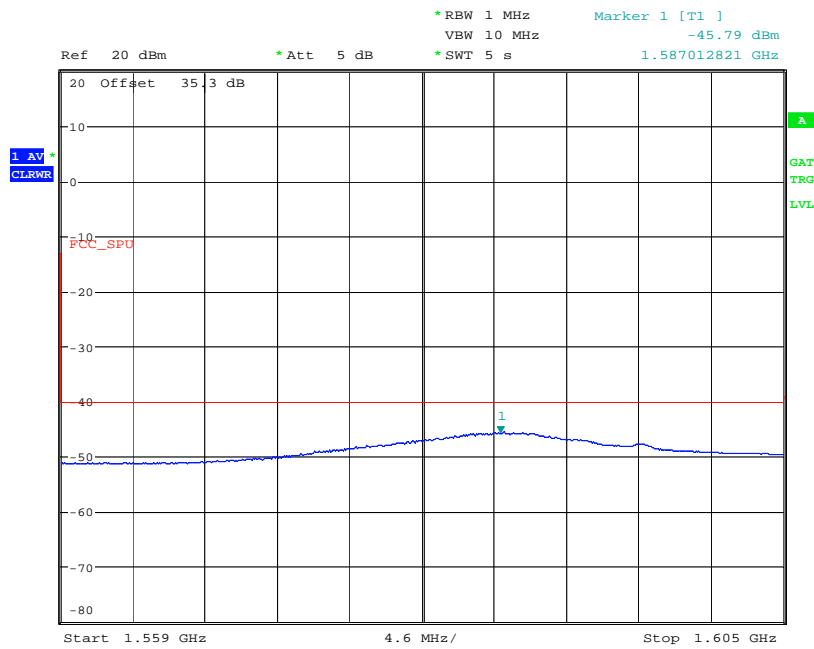
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 240



Date: 27.JUN.2008 09:35:54

1000MHz – 1559MHz

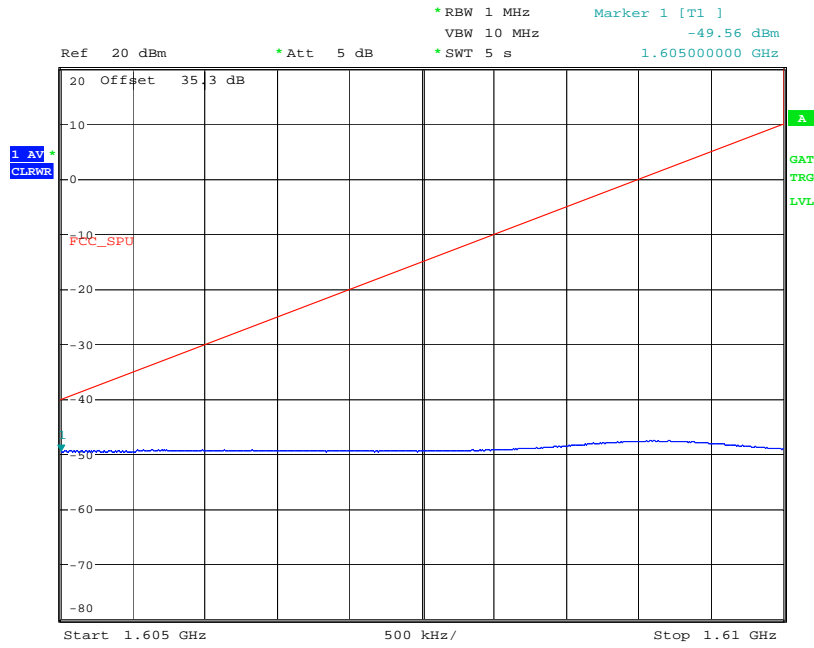


Date: 27.JUN.2008 09:39:34

1559MHz – 1605MHz

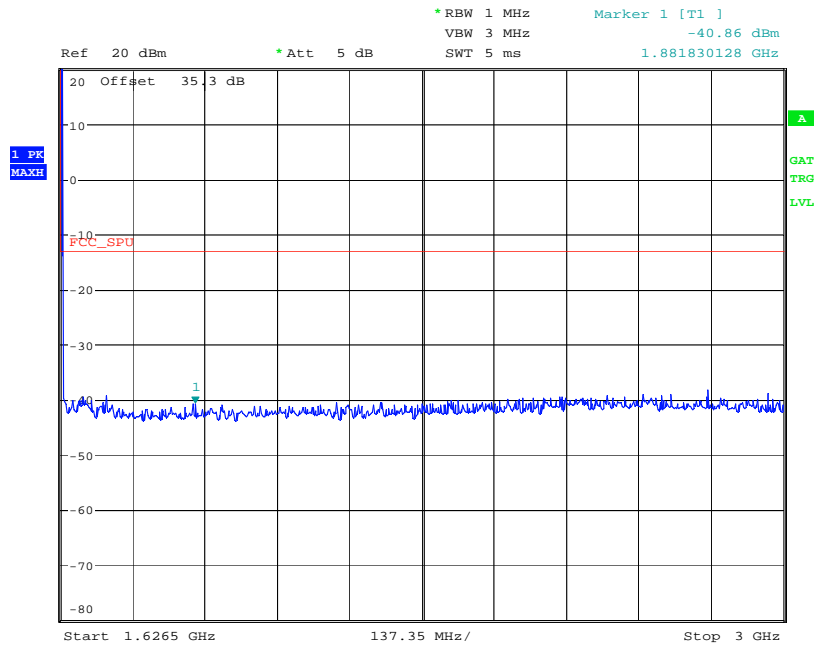
TRANSMITTER SPURIOUS EMISSIONS – Conducted

Channel 240



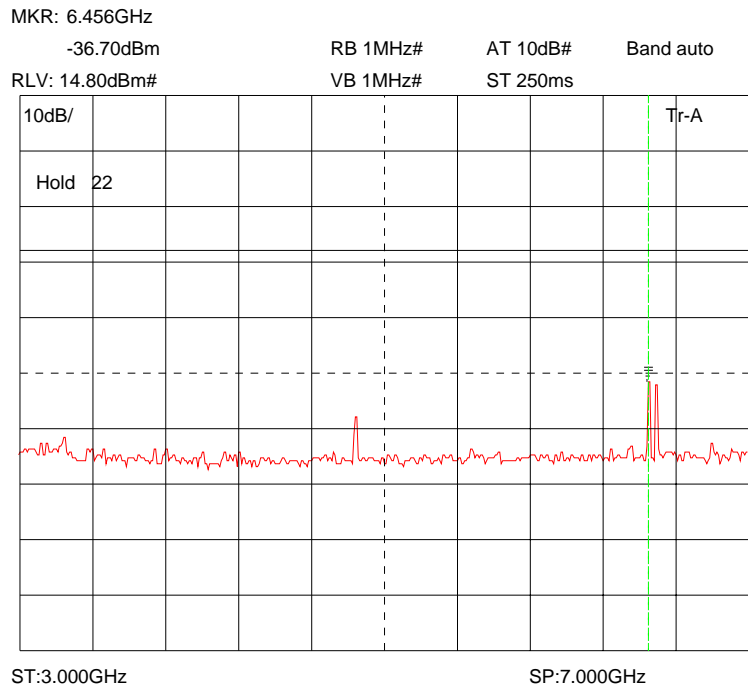
Date: 27.JUN.2008 09:42:46

1605MHz – 1610MHz

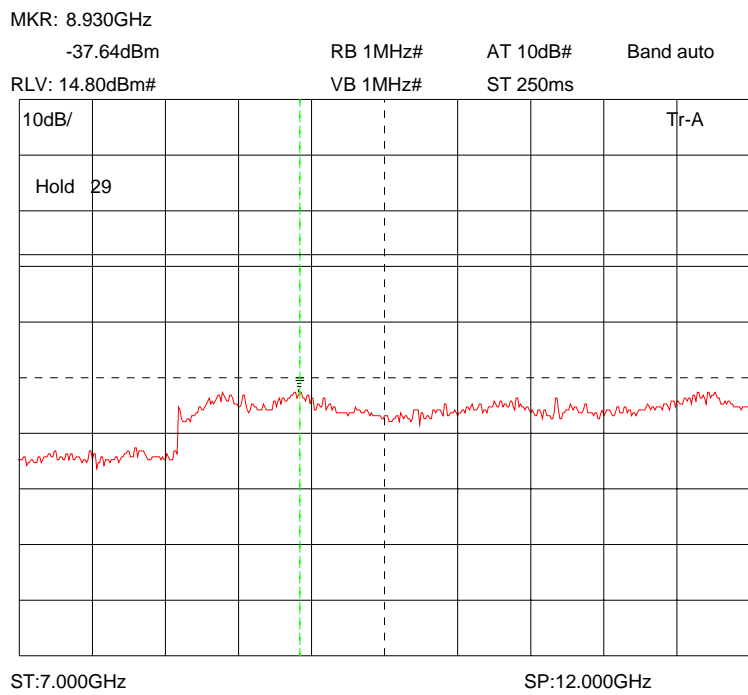


Date: 27.JUN.2008 09:32:52

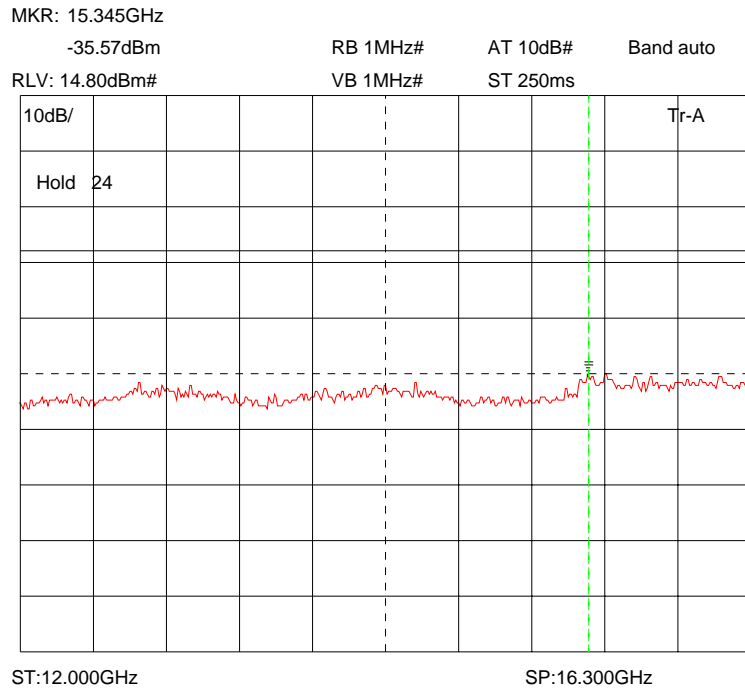
1626.5MHz – 3000MHz



3GHz – 7GHz



7GHz – 12GHz



12GHz – 16.3GHz

ANNEX I
TRANSMITTER SPURIOUS EMISSIONS – Radiated

TRL Compliance Ltd

26 Jun 2008 10:42

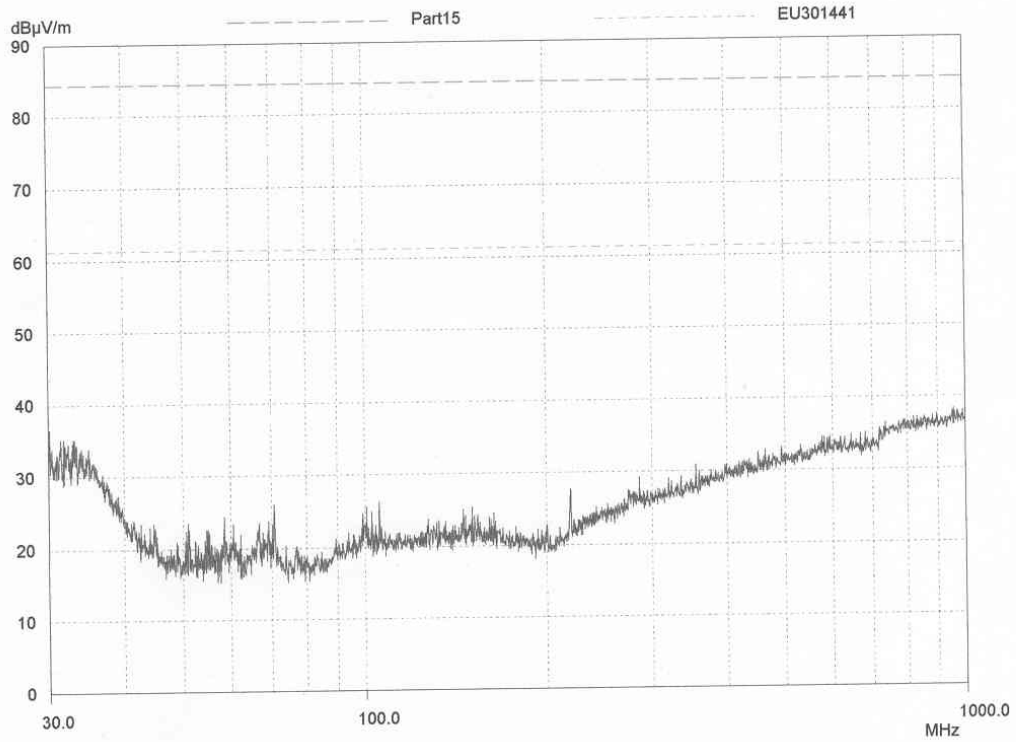
E-Field Radiation (30MHz-1GHz)

EUT: S2 LVT
 Manuf: CCL
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: S Hodgkinson
 Test Spec: Part15
 Comment: Unit in permanent Tx mode bottom channel selected , antenna ports terminated in 50 ohm load.
 Rx antenna Vertical.Vmax.

Scan Settings				Receiver Settings				
(1 Range) Frequencies								
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH93

Prescan Measurement: Detector: X PK
 Meas Time: see scan settings
 Subranges: 50
 Acc Margin: 10 dB

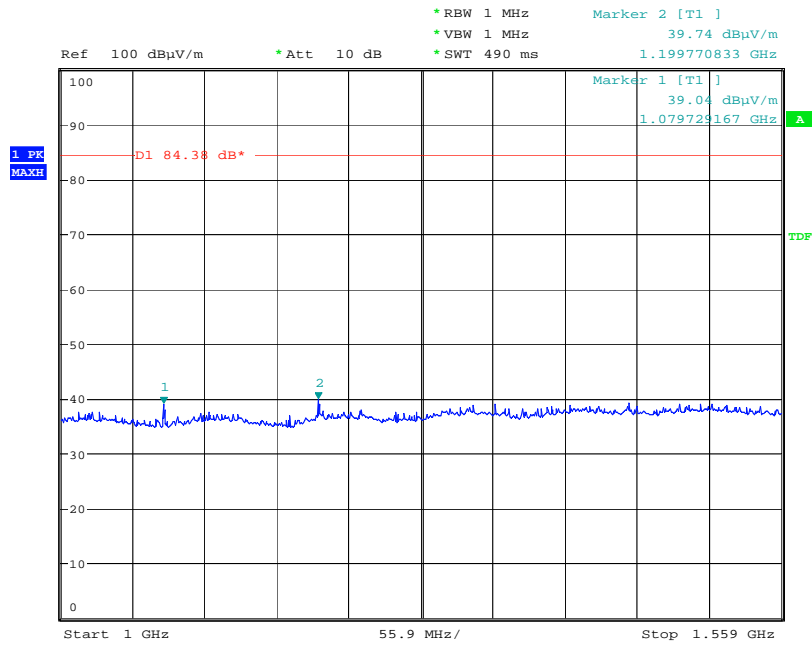


PAGE 1

30MHz – 1000MHz

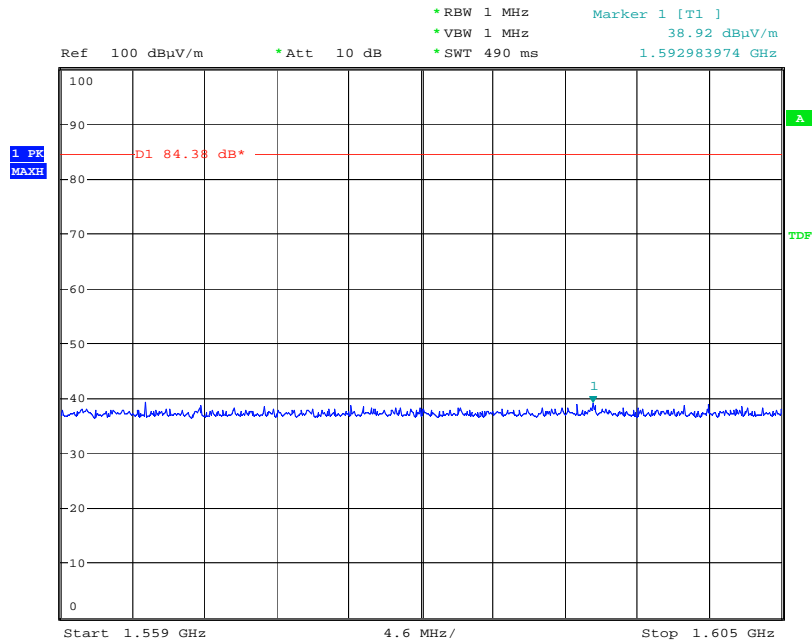
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 1



Date: 27.JUN.2008 11:09:43

1000MHz – 1559MHz

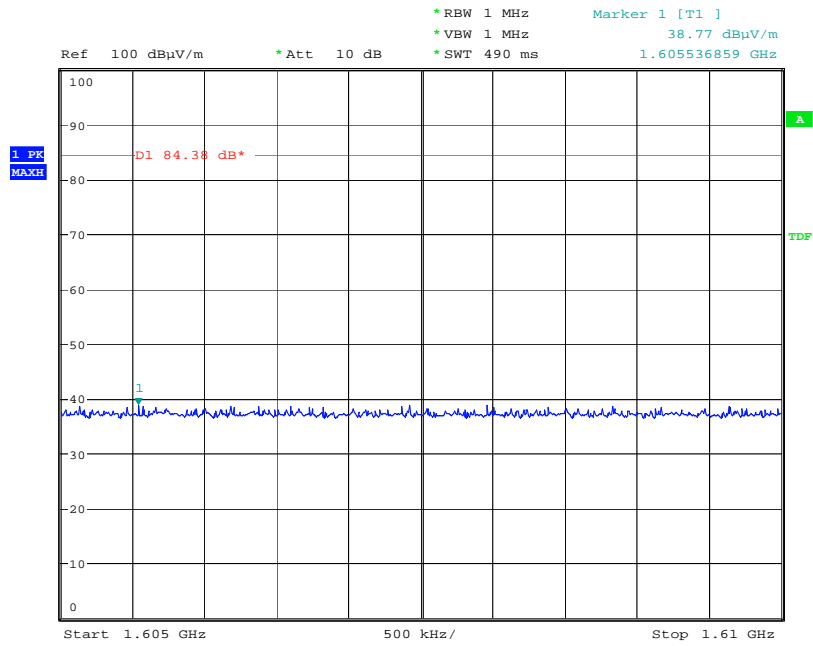


Date: 27.JUN.2008 11:10:37

1559MHz – 1605MHz

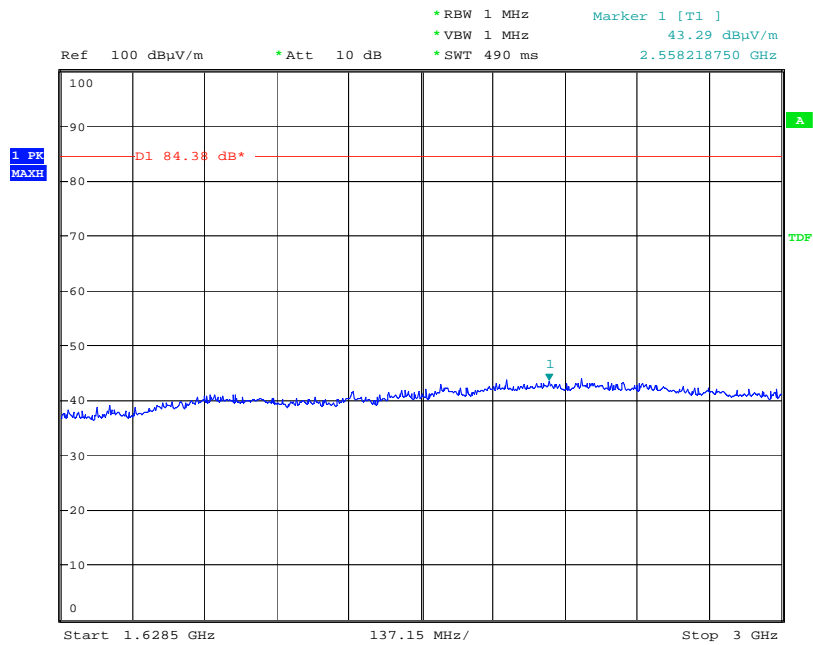
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 1



Date: 27.JUN.2008 11:11:31

1605MHz – 1610MHz

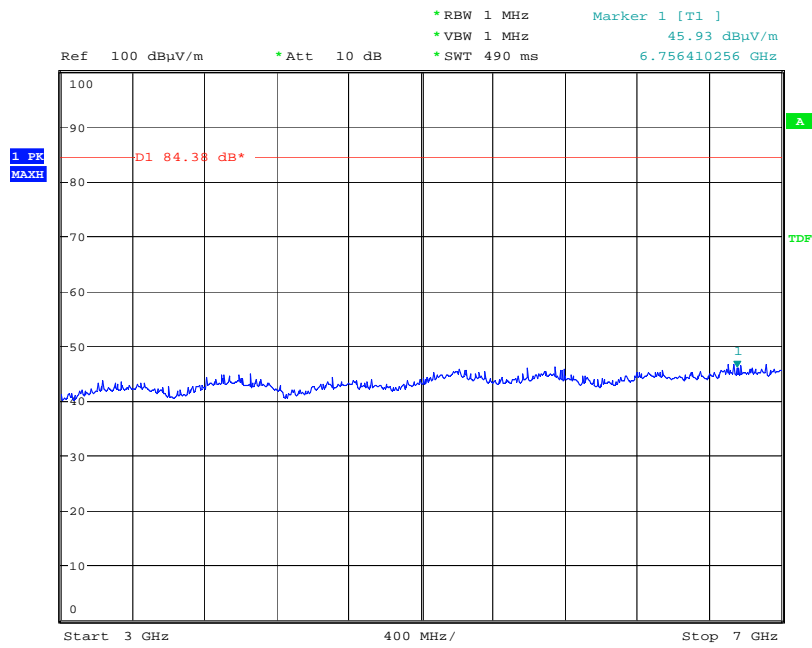


Date: 27.JUN.2008 11:13:25

1628.5MHz – 3000MHz

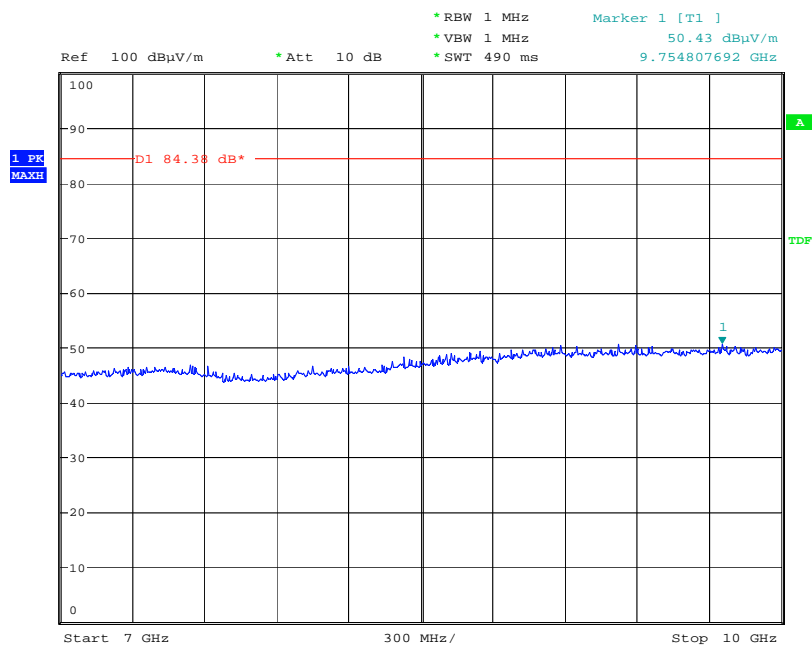
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 1



Date: 27.JUN.2008 11:14:02

3GHz – 7GHz

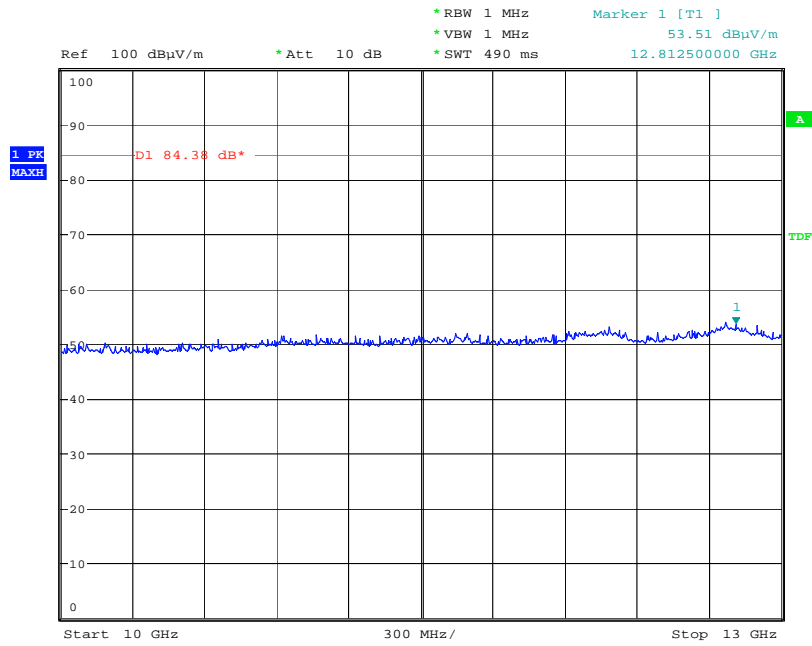


Date: 27.JUN.2008 11:14:54

7GHz – 10GHz

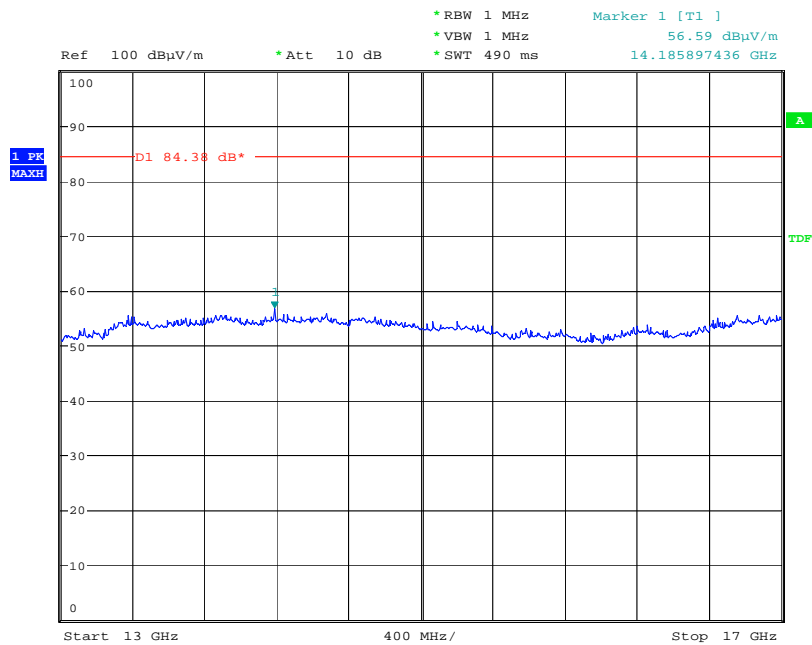
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 1



Date: 27.JUN.2008 11:16:08

10GHz – 13GHz



Date: 27.JUN.2008 11:17:19

13GHz – 17GHz

TRL Compliance Ltd

26 Jun 2008 11:22

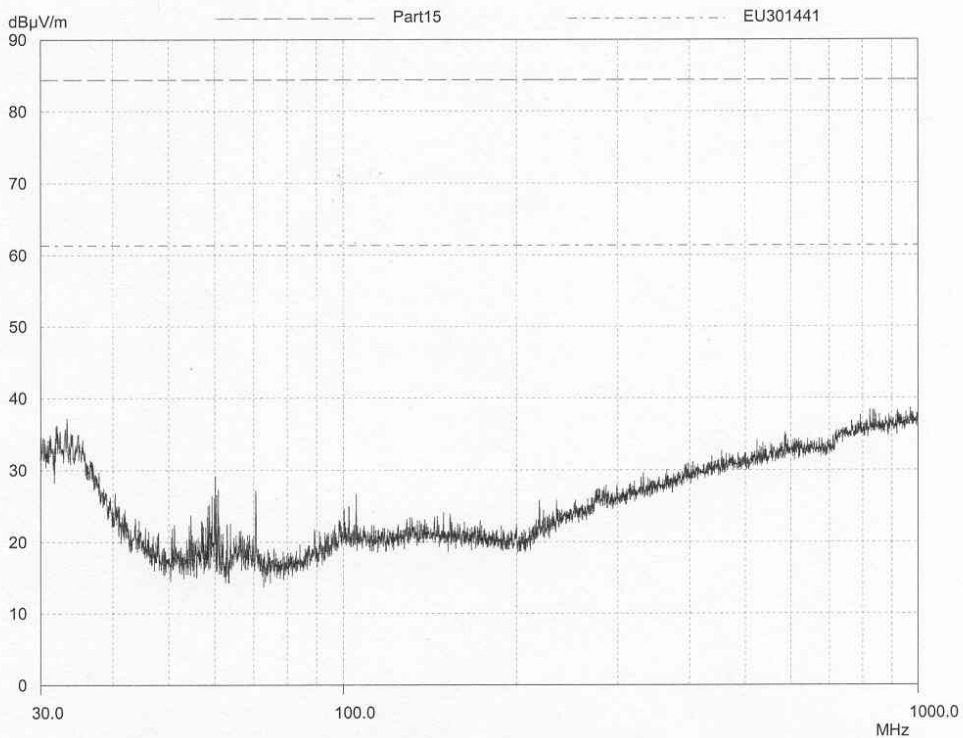
E-Field Radiation (30MHz-1GHz)

EUT: S2 LVT
 Manuf: CCL
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: S Hodgkinson
 Test Spec: Part15
 Comment: Unit in permanent Tx mode top channel selected , antenna ports terminated in 50 ohm load.
 Rx antenna Vertical Vmax.
 Result File: txvmax.dat : New Measurement

Scan Settings (1 Range)				Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH93

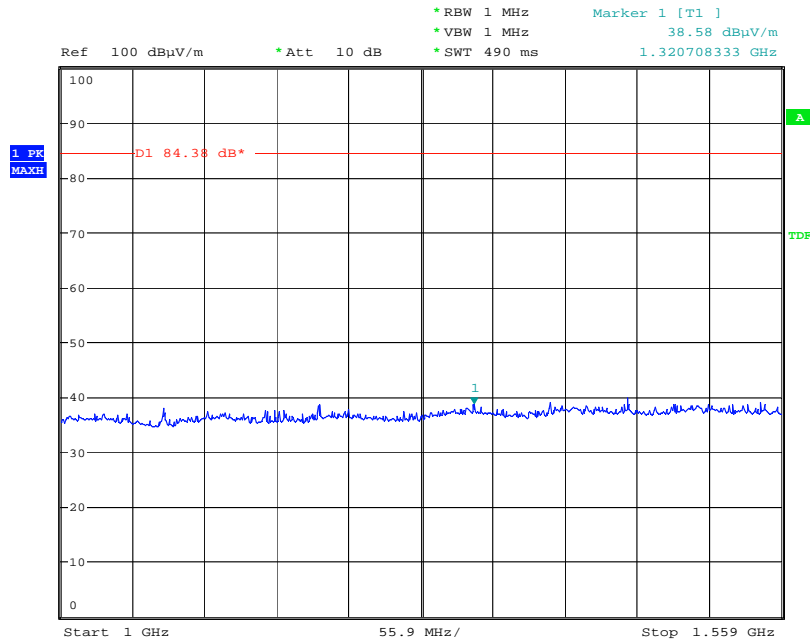
Prescan Measurement: Detector: X PK
 Meas Time: see scan settings
 Subranges: 50
 Acc Margin: 10 dB



30MHz – 1000MHz

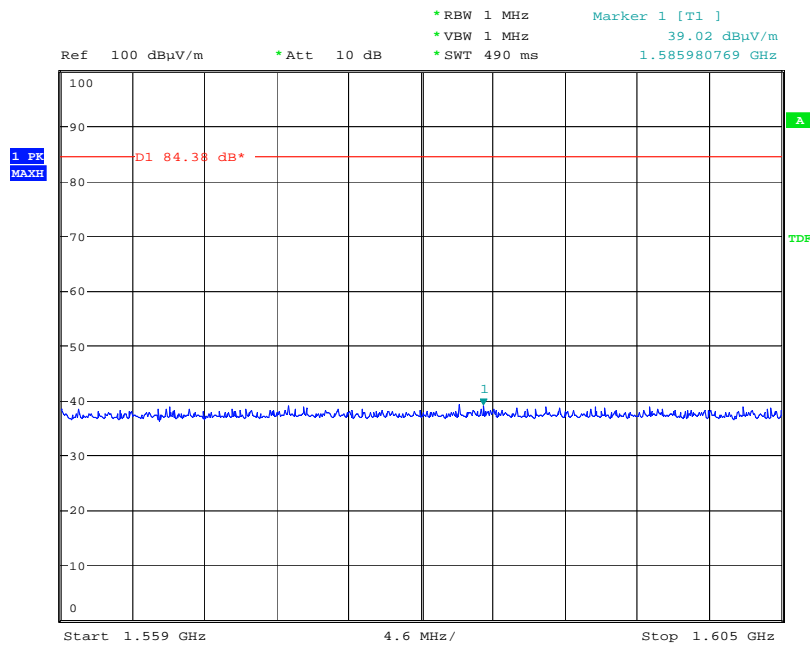
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 240



Date: 27.JUN.2008 11:30:49

1000MHz – 1559MHz



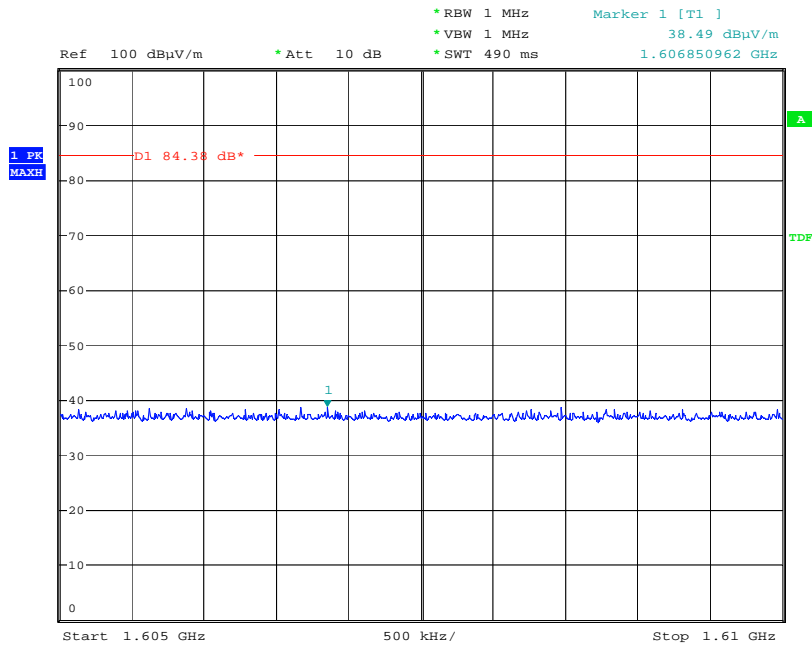
Date: 27.JUN.2008 11:32:03

1559MHz – 1605MHz

RU1474/8659

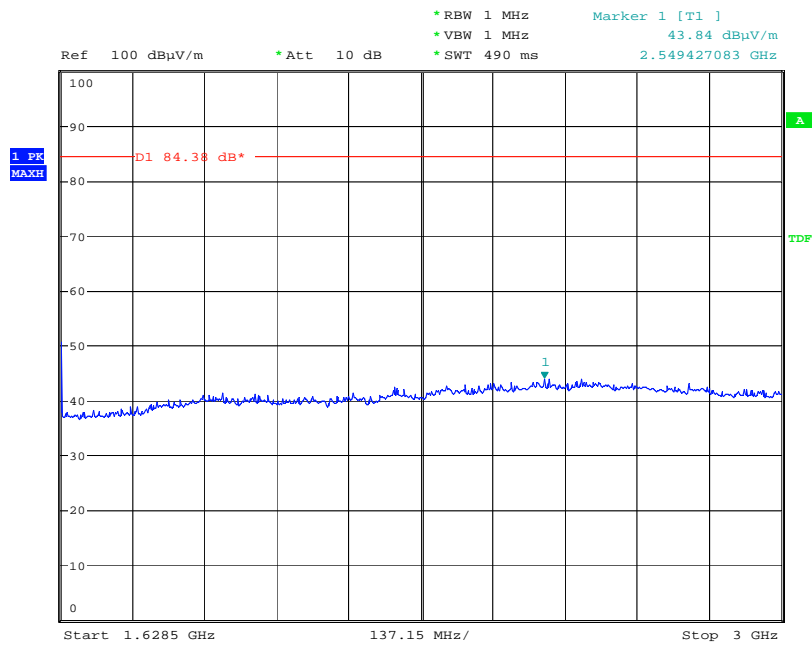
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 240



Date: 27.JUN.2008 11:37:55

1605MHz – 1610MHz

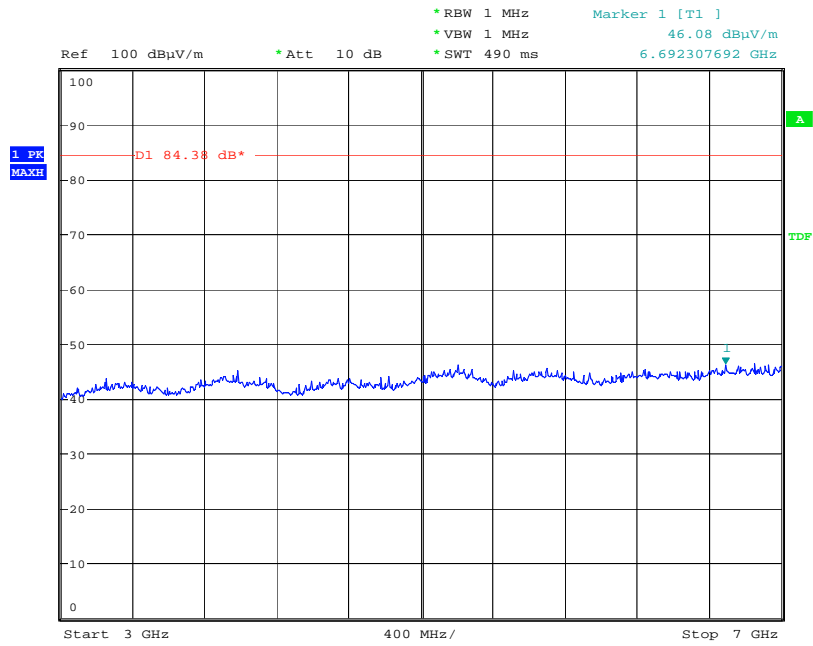


Date: 27.JUN.2008 11:40:20

1628.5MHz – 3000MHz

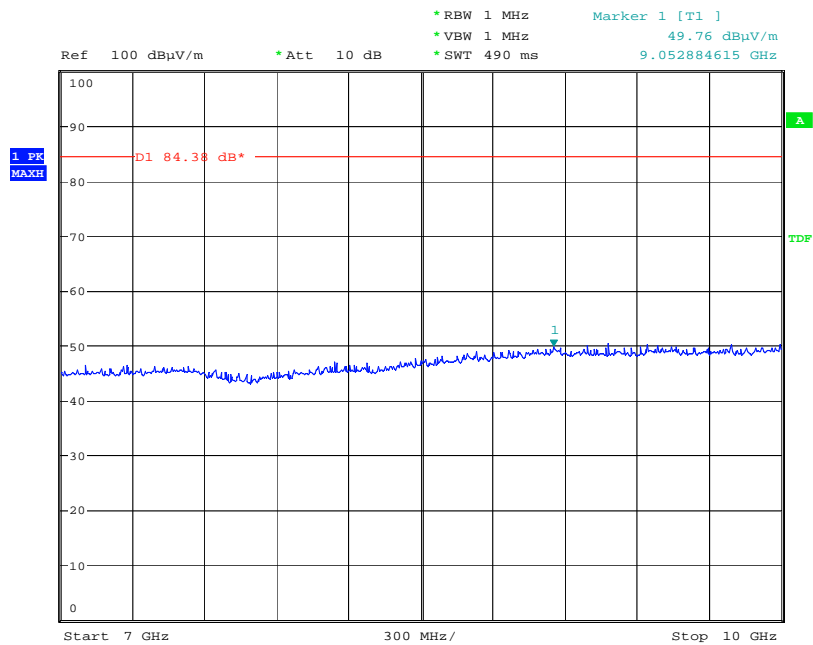
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 240



Date: 27.JUN.2008 11:40:52

3GHz – 7GHz

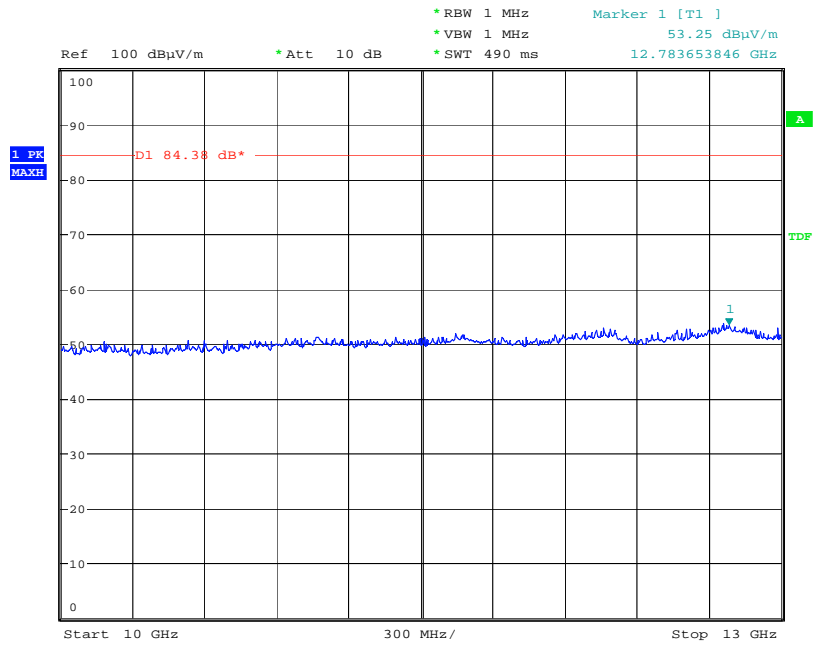


Date: 27.JUN.2008 11:41:58

7GHz – 10GHz

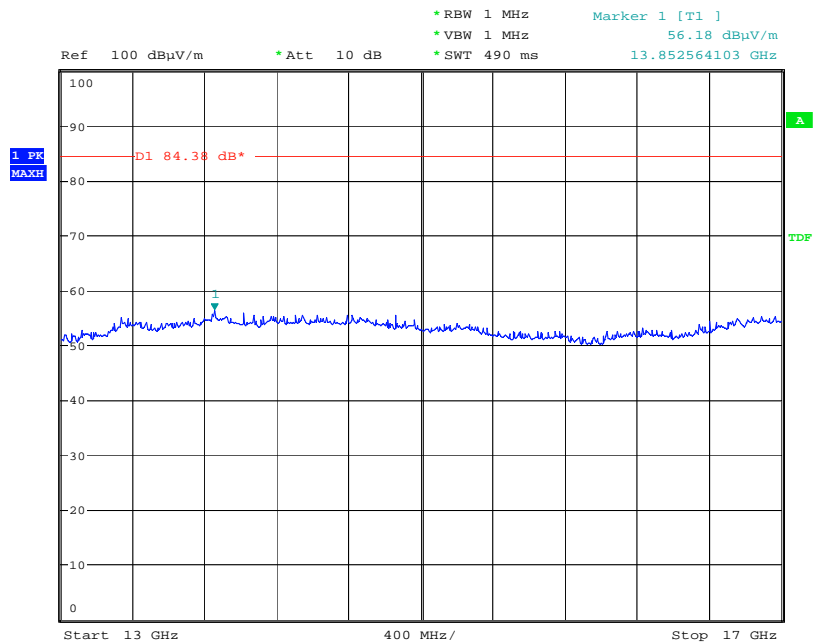
TRANSMITTER SPURIOUS EMISSIONS – Radiated

Channel 240



Date: 27.JUN.2008 11:42:33

10GHz – 13GHz

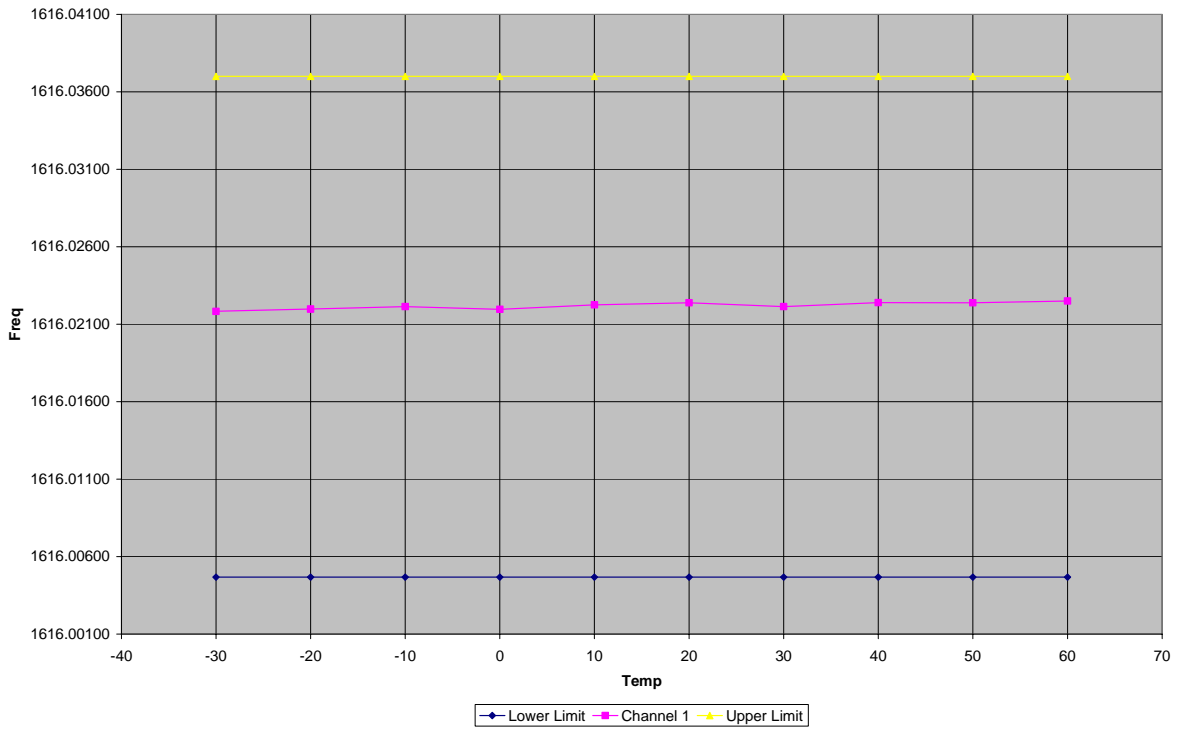


Date: 27.JUN.2008 11:43:07

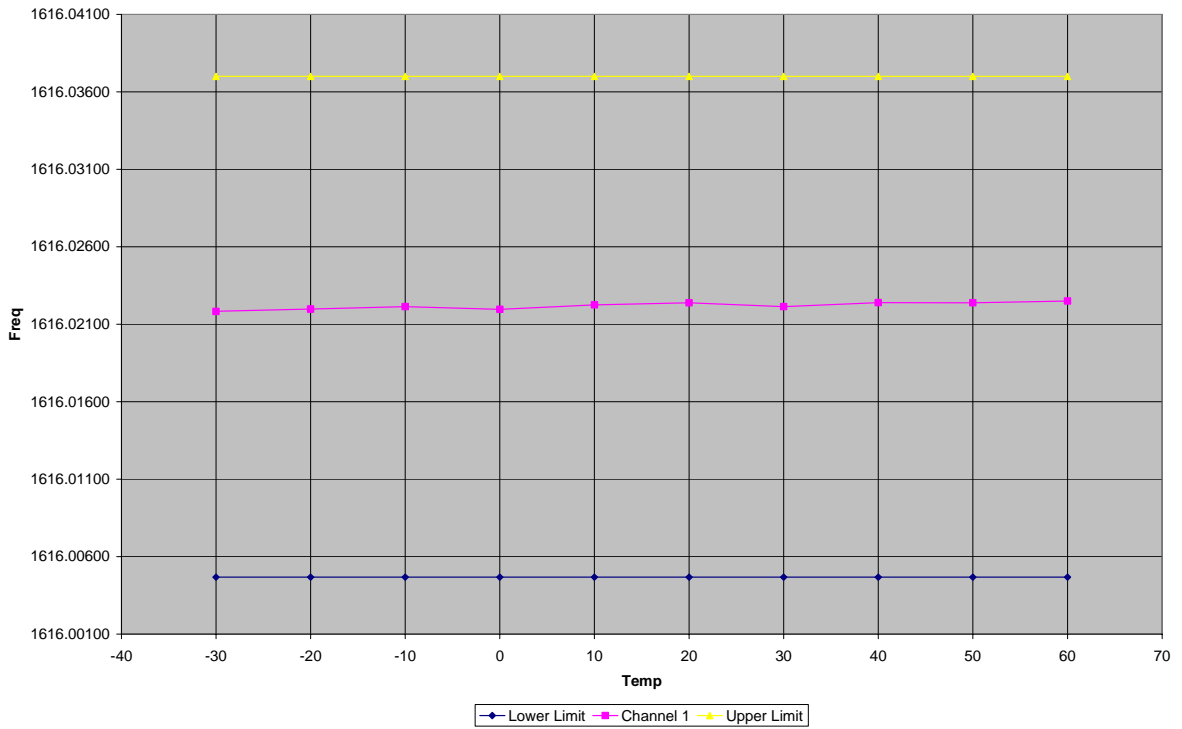
13GHz – 17GHz

ANNEX J
FREQUENCY STABILITY – Temperature

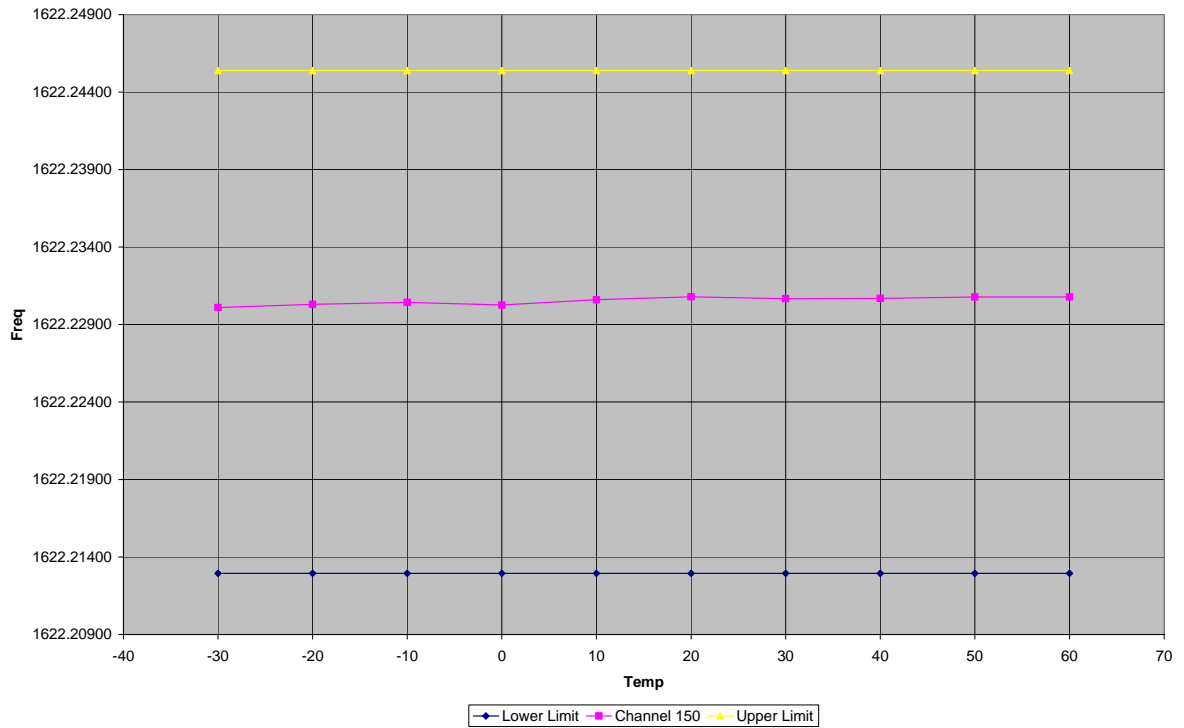
Channel 1 Frequency Stability - Temperature



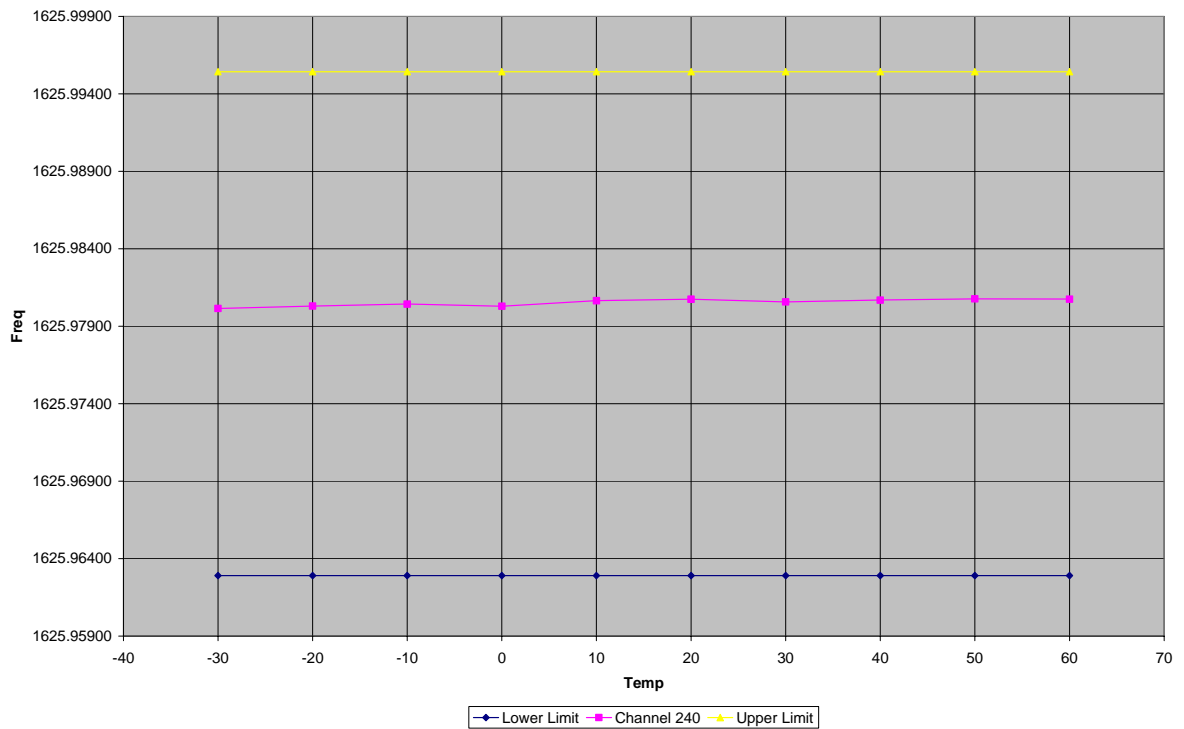
Channel 1 Frequency Stability - Temperature



Channel 150 Frequency Stability - Temperature

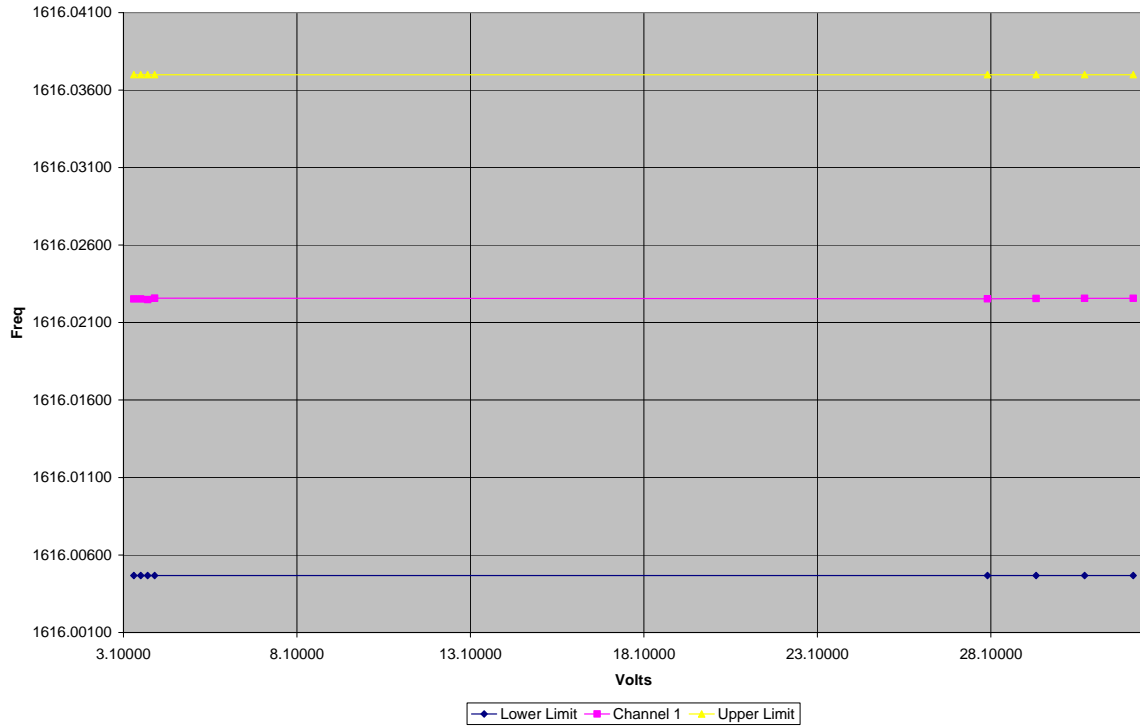


Channel 240 Frequency Stability - Temperature

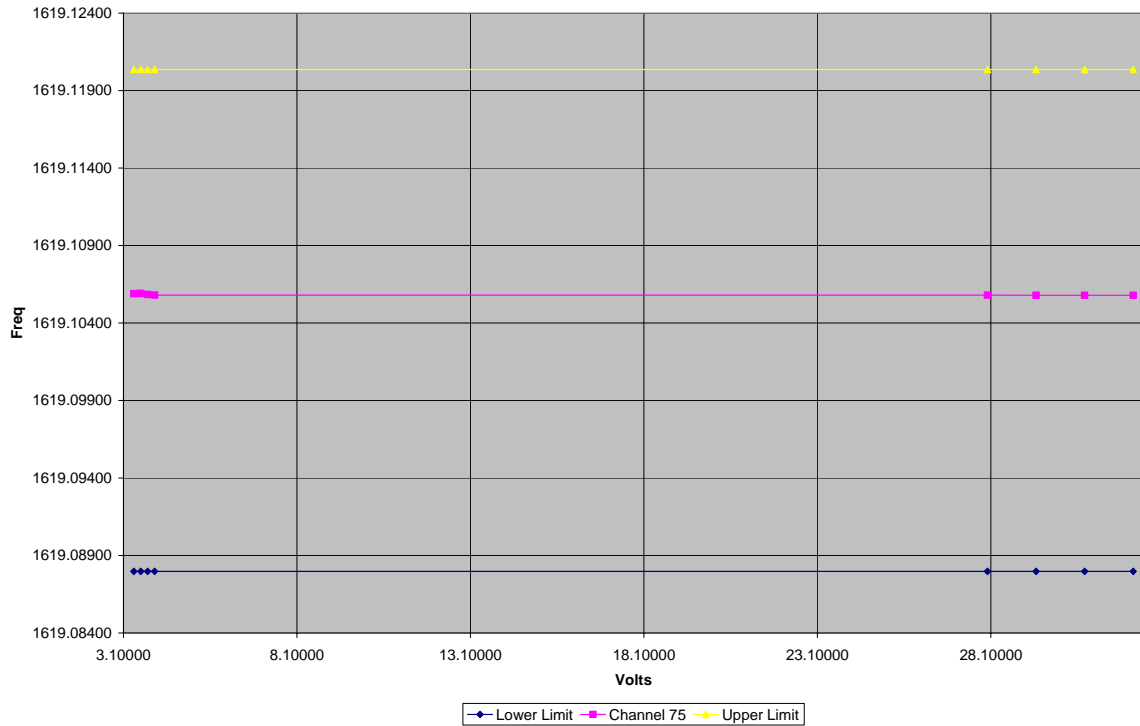


ANNEX K
FREQUENCY STABILITY – Voltage

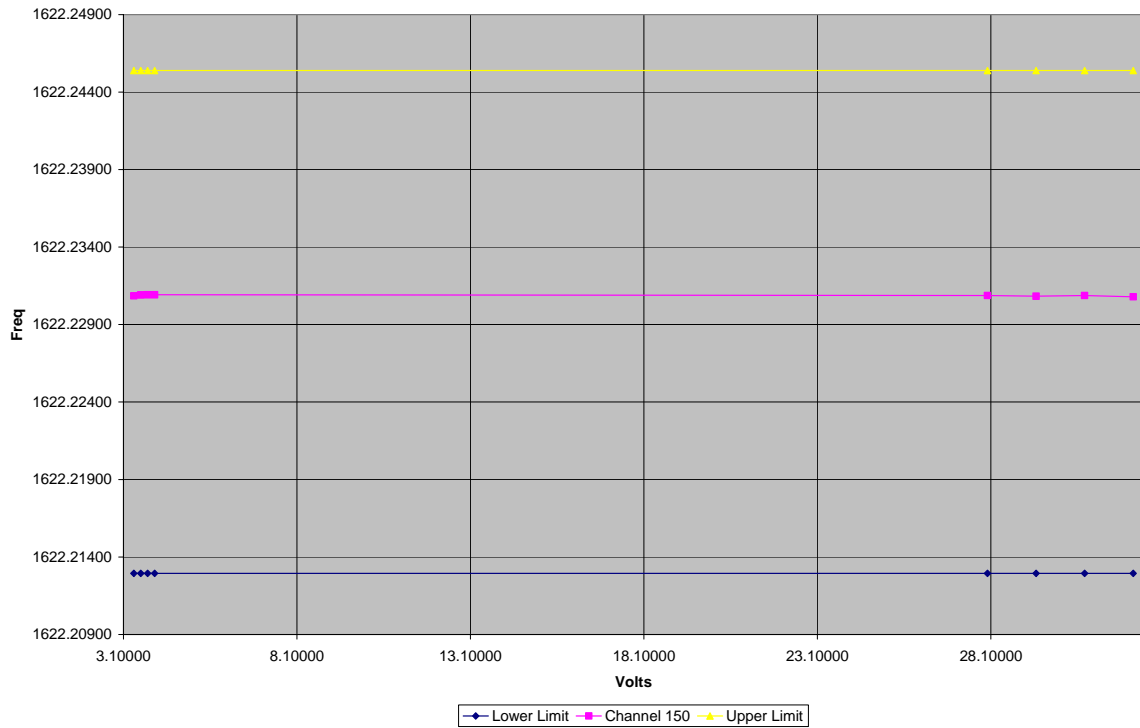
Channel 1 Frequency Stability - Voltage



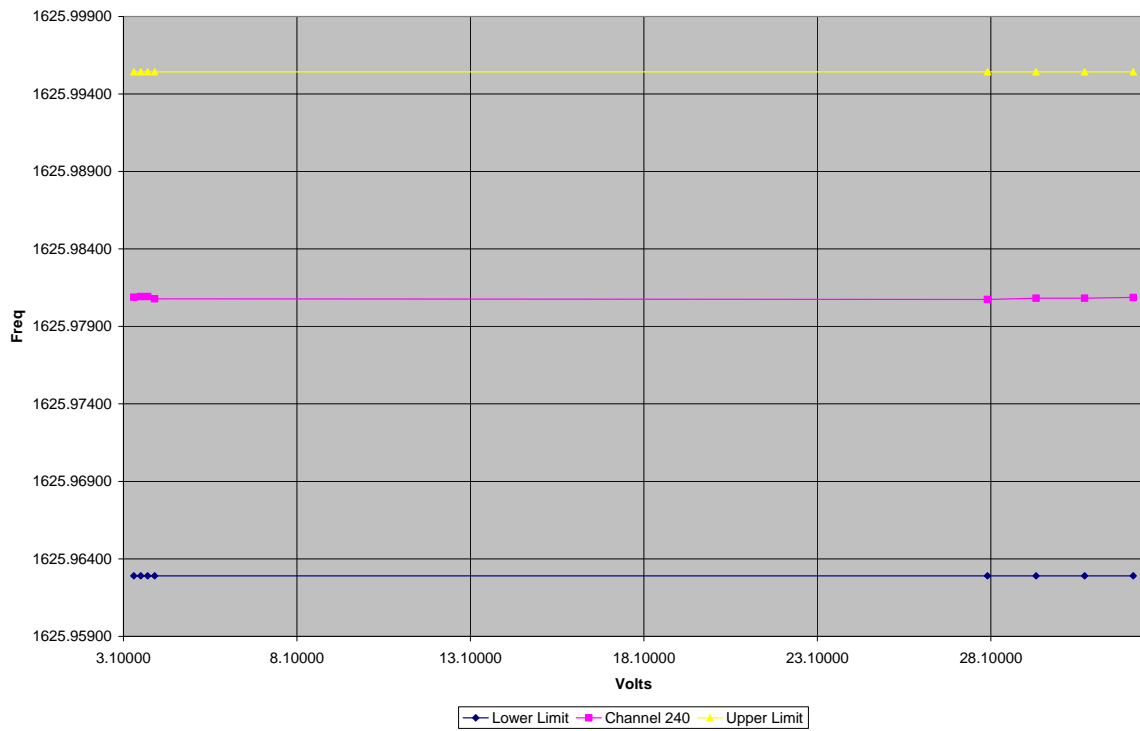
Channel 75 Frequency Stability - Voltage



Channel 150 Frequency Stability - Voltage



Channel 240 Frequency Stability - Voltage



ANNEX L

UNINTENTIONAL TRANSMITTER SPURIOUS EMISSIONS – Radiated

TRL Compliance Services Ltd
 E-Field Radiation (30MHz-1GHz)

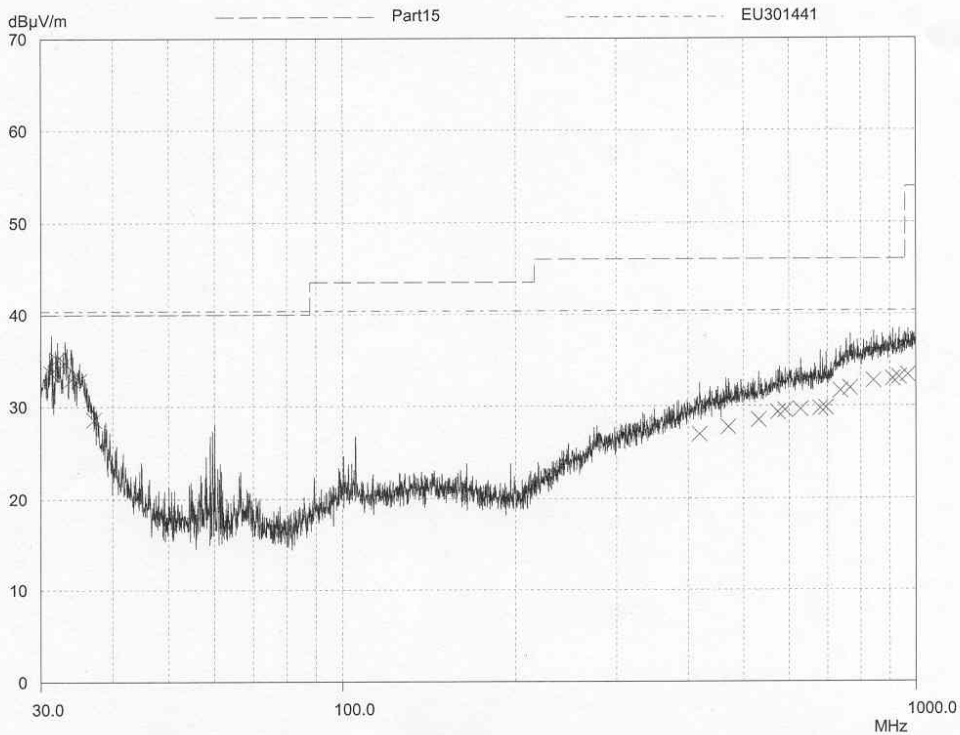
26 Jun 2008 11:59

EUT: S2 LVT
 Manuf: CCL
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: S Hodgkinson
 Test Spec: Part15
 Comment: Unit in Rx mode bottom channel selected. Antenna ports terminated into 50 ohm load.
 Rx antenna Vertical, Vmax.
 Result File: brxvmax.dat : New Measurement

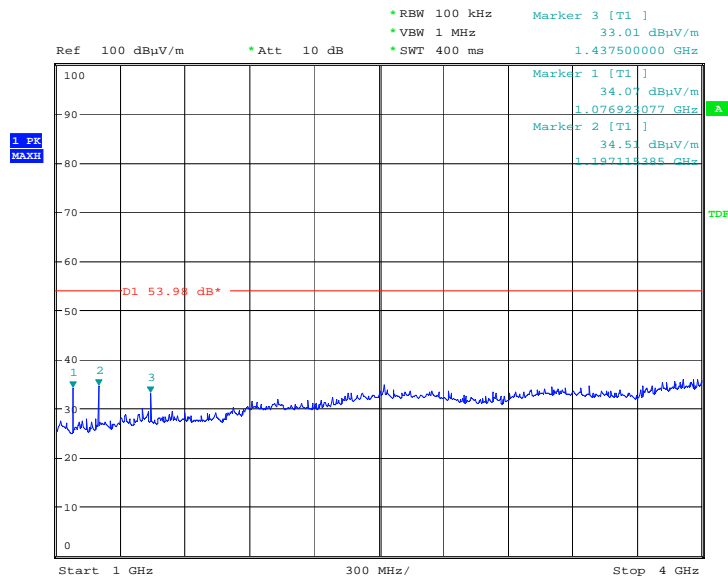
Scan Settings (1 Range)				Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH93

Final Measurement: Detector: X QP
 Meas Time: 2sec
 Subranges: 50
 Acc Margin: 10 dB

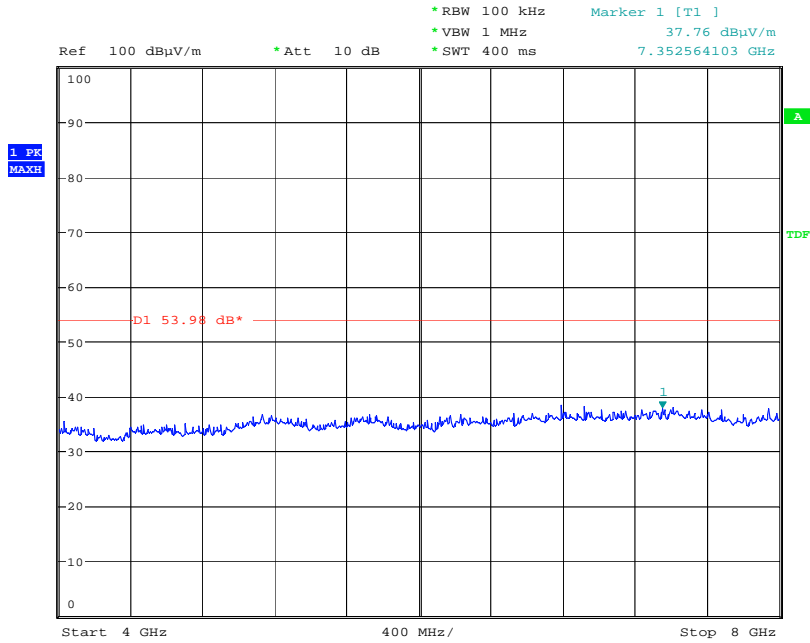


30MHz – 1000MHz



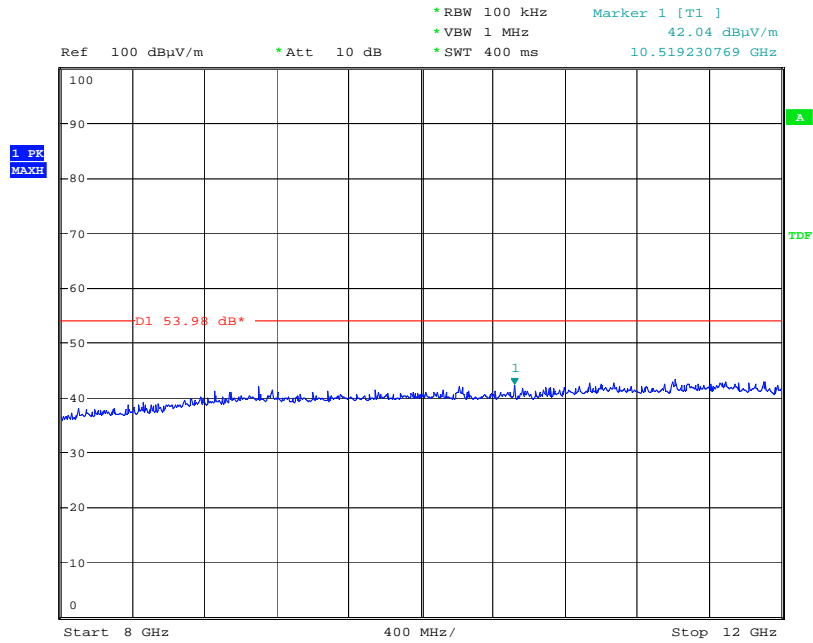
Date: 27.JUN.2008 09:59:23

1GHz – 4GHz



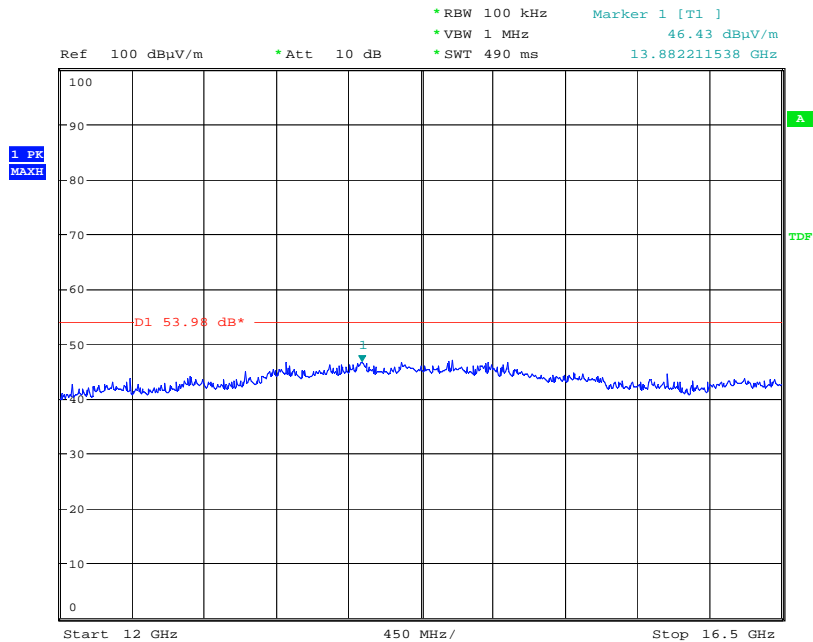
Date: 27.JUN.2008 10:03:51

4GHz – 8GHz



Date: 27.JUN.2008 10:06:46

8GHz – 12GHz



Date: 27.JUN.2008 10:10:00

12GHz – 16.5GHz