TEST REPORT NO: RU1211/6824

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ISSUE NO: 1

FCC ID: Q639505A

REPORT ON THE CERTIFICATION TESTING OF AN IRIDIUM SATELLITE LLC MONACO HANDSET WITH RESPECT TO THE FCC RULES CFR 47, PART 25

TEST DATE: 3rd – 7th February 2006

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = GB, O = TRL Compliance Ltd Reason: I am the author of this document Date: 2006.02.15 08:42:51 Z — D WINSTANLEY

APPROVED BY: Peter Green — Peter Green I am approving this document 2006.02.15 10:49:11 Z — P GREEN PRODUCT MANAGER EMC

DATE: 14th February 2006

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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.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	Q639505A
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC Rules CFR 47, Part 25
TEST RESULT:	Compliant to Specification
ITU EMISSIONS DESIGNATOR	41K7V7E
EQUIPMENT UNDER TEST:	Monaco Handset
EQUIPMENT TYPE:	Satellite Telephone
MAXIMUM OUTPUT	10.29dBW, 40.29dBm
ANTENNA TYPE:	Part No: Radiated Antenna Type - C7032-GR082 Conducted Antenna Type - C7032-GR080
CHANNEL SPACING:	41.667 kHz
NUMBER OF CHANNELS:	252
MODULATION TYPE:	V7E
POWER SOURCE(s):	+3.7 Vdc
TEST DATE(s):	3rd – 7th February 2006
ORDER No(s):	026153/MC3
APPLICANT:	Iridium Satellite LLC
ADDRESS:	6701 Democracy Blvd. Suite 500 Bethesda United States of America MD 20817

TESTED BY:	Daniel Winstanley Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = GB, O = TRL Compliance Ltd Reason: I am the author of this document Date: 2006.02.15 08:42:41 Z	D WINSTANLEY
APPROVED BY:	Peter Green I am approving this document 2006.02.15 10:49:22 Z	P GREEN PRODUCT MANAGER EMC

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Monaco Handset
EQUIPMENT TYPE:	Satellite Telephone
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC Rules CFR 47, Part 25
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S CONTACT PERSON(s):	Mr C Geibel
E-mail address:	Conrad.geibel@iridium.com
APPLICANT:	Iridium Satellite LLC
ADDRESS:	6701 Democracy Blvd. Suite 500 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):	Ms M Campbell
E-mail address:	marion.campbell@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 EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	3rd – 7th Febuary 2006
TEST REPORT No:	RU1211/6824

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 Monaco handset 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 Monaco handset.

2. Product Use: Satellite Telephone and Data Communications

3. Emission Designator: 41k7V7E

4. Temperatures: Ambient (Tnom) 15^{o}C

5. Supply Voltages: Vnom +3.7 Vdc

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

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

7. Channel spacing:
   Narrowband [X] 41.667 kHz
   Wideband [ ]

8. Test Location
   TRL Compliance Limited
   Up Holland [X]
   Long Green [ ]

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

Product Description

The satellite telephone 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. 8x41.667kHz). Up to 30 sub-bands containing 240 frequency accesses may be used for duplex channels.

Standard References

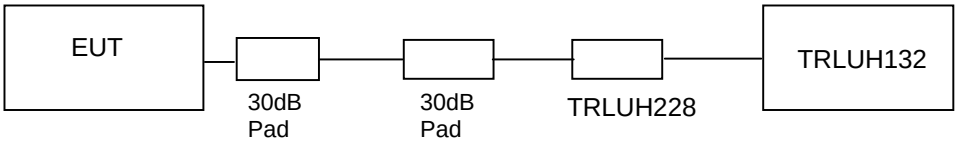
47 CFR 2 10-1-03 Edition	Code of Federal Regulations, Title 47, Part 2, “Frequency allocations and Radio Telemetry Matters; General Rules and Regulations”
47 CFR 25 10-1-03 Edition	Code of Federal Regulations, Title 47, Part 25,”Sattelite Communications” Subpart C, “Technical Matters”
C63.4-2003	American 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	=	15°C	Radio Laboratory
Relative humidity	=	45%	
Supply voltage	=	+3.7 Vdc	
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 the manual test command 27 XXX YY Z# (See Annex D for explanation of test command). The antenna gain, included in the table below, represents the highest gain of any antennas that are used with this system.

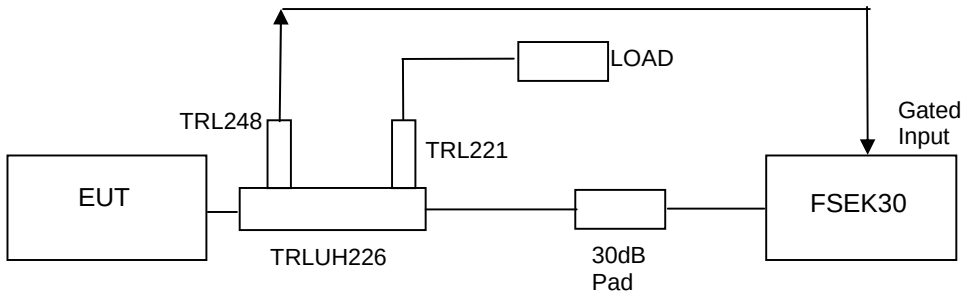
Frequency MHz	Attenuator and cable loss dB	Level at Power Meter dBm	Antenna Gain dB	Duty Cycle Factor dB (See Annex D)	Carrier power dBm	Carrier power dBW	Limit dBW
Channel 1	61.70	-34.81	3	10.4	40.29	10.29	40
Channel 75	61.70	-35.48	3	10.4	39.62	9.62	40
Channel 150	61.70	-35.44	3	10.4	39.66	9.66	40
Channel 240	61.70	-35.73	3	10.4	39.37	9.37	40

Notes: 1. Duty Cycle Factor = 10 x log (1/**X**) Where **X**= (Ton / Tframe). 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	=	18^{o}C	Radio Laboratory
Relative humidity	=	45%	
Supply voltage	=	+3.7 Vdc	



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 the manual test command 27 XXX YY Z# (See Annex D for explanation of test command).

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

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

Where the Authorised Bandwidth = 41.667 kHz

Note

1. The 3 kHz to 4 kHz bandwidth correction has been taken into account in the Ref level offset figure.

2. The antenna gain has been taken into account by lowering the limit line.

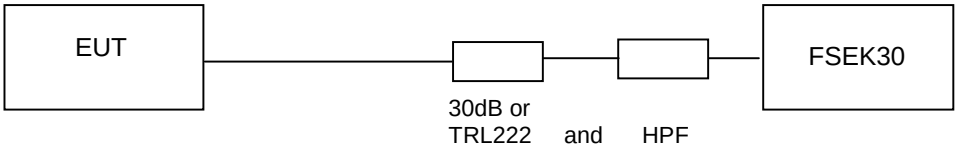
The Monaco handset was found to comply with the limits

See plots in Annex F.

TRANSMITTER TESTS

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

Ambient temperature	=	18°C	Radio Laboratory
Relative humidity	=	45%	
Supply voltage	=	+3.7 Vdc	



For measurements between 1599 MHz and the band edge of 1610MHz the same test setup as per emissions limitations test was used. For measurements below 1599 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 pad 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 four channels .The unit was put into test mode and set to operate at maximum power and with a random modulating signal using the manual test command 27 XXX YY Z# (See Annex D for explanation of test command).

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 (P)dB

$(10\log P_{watts}) – (43+10\log (P_{watts} * 1000)) = LIMIT = -13$ 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	1 240	1604.539 1603.156	-75.83 -76.50	30.2 30.2	-45.63 -46.30	-40
1605MHz – 1610MHz	1 240	1605.000 1605.000	-76.48 -76.48	30.2 30.2	-46.28 -46.28	-40 (Note 4)
1628.5MHz – 16.3 GHz	No Significant emissions within 20 dB of the Limit					-13

Notes :

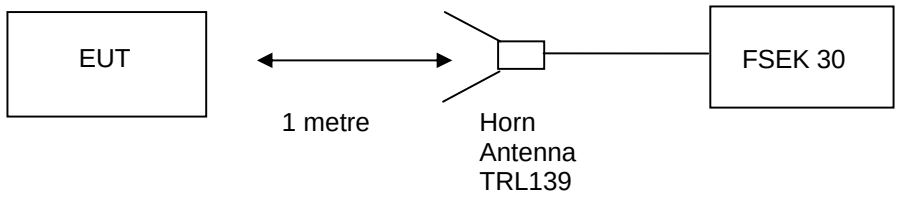
1. Emissions Checked up to 10 times Fc
2. Reference level offset of Scan plots in Annex G already have approximate attenuator losses taken into account (30dB < 3GHz < 10 dB)
3. Average measurement in a carrier on state were taken in the bands 1599MHz to 1605MHz and 1605MHz -1610MHz. All other scans were peak hold for worst case.
4. -40 to -10 Linearly interpolated in dBm Vs frequency offset.
5. Correction Factor for dBm to dBW = -30dB6.
6. Fully charged batteries were used for each channel.

The Monaco handset was found to comply with the limits. See Annex G for plots

TRANSMITTER TESTS

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

Ambient temperature	=	18°C
Relative humidity	=	52%
Conditions	=	OATS
Supply voltage	=	+3.7 Vdc
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 four channels .The unit was put into test mode and set to operate at maximum power and with a random modulating signal using the manual test command 27 XXX YY Z# (See Annex D for explanation of test command). The unit was mounted on a turntable and rotated through 360^0 to find the worst case emission.

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	CHANNEL NUMBER	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	CALCULATED ERP/EIRP (dBm)	LIMIT (dBm)
30MHz – 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 360^0 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.

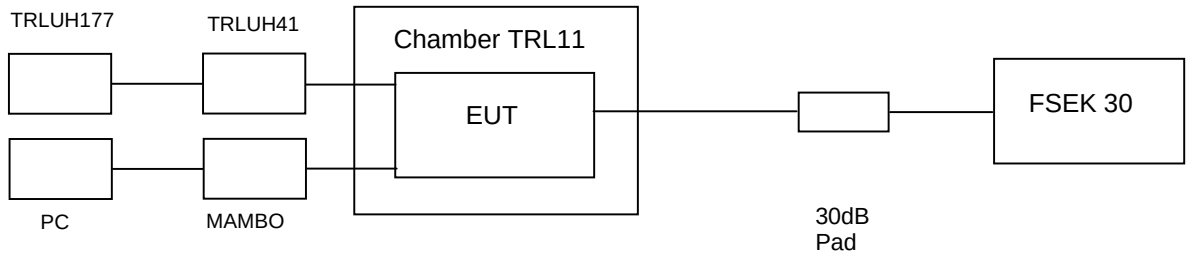
The Monaco handset was found to comply with the limits. See annex H for plots

TRANSMITTER TESTS

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

Ambient temperature = 15°C
Relative humidity = 61%
Supply voltage = +3.7 Vdc

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 that were equivalent to the manual test command 27 XXX YY Z# (See Annex D for explanation of test command). The Analyser was set to max hold.

RESULTS

TEMP	Frequency (MHz)			
^{0}C	Channel 1	Channel 75	Channel 150	Channel 240
+60	1616.01961	1619.10415	1622.22867	1625.97885
+50	1616.01990	1619.10308	1622.22811	1625.97824
+40	1616.02130	1619.10409	1622.22830	1625.97229
+30	1616.02129	1619.10423	1622.22908	1625.97888
+20	1616.02045	1619.10491	1622.22990	1625.97908
+10	1616.02049	1619.10429	1622.23008	1625.97949
0	1616.02189	1619.10389	1622.22868	1625.97850
-10	1616.02190	1619.10409	1622.22870	1625.97908
-20	1616.02190	1619.10349	1622.22850	1625.97828
-30	1616.02109	1619.10168	1622.22733	1625.97781

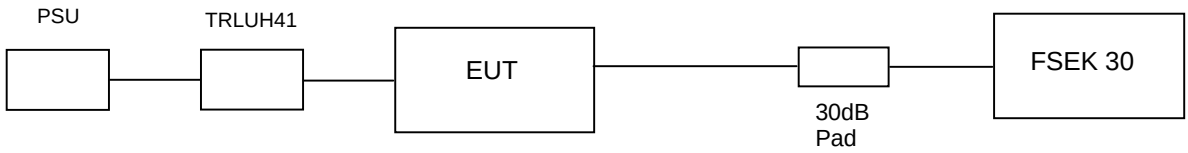
Notes: 1.Limit ± 10ppm (See Annex I for frequency stability plots verses limit)

The Monaco handset was found to comply with the limits

TRANSMITTER TESTS

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

Ambient temperature	=	23°C	Radio Laboratory
Relative humidity	=	42%	
Supply voltage	=	+3.7 Vdc	



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 the manual test command 27 XXX YY Z# (See Annex D for explanation of test command). The Analyser was set to max hold.

RESULTS

VOLTAGE	Frequency (MHz)			
%	Channel 1	Channel 75	Channel 150	Channel 240
85	1616.02035	1619.10440	1622.22936	1625.97939
90	1616.02114	1619.10455	1622.20315	1625.98028
95	1616.02094	1619.10450	1622.22924	1625.98023
100	1616.02104	1619.10435	1622.22939	1625.97929
105	1616.02168	1619.10435	1622.22929	1625.97870
110	1616.02069	1619.10435	1622.22909	1625.97959
115	1616.02112	1619.10452	1622.22949	1625.97939

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

The Monaco handset was found to comply with the limits

ANNEX A

PHOTOGRAPHS

PHOTOGRAPH 1. **RADIATED TEST SETUP**

PHOTOGRAPH 2. **CONDUCTED TEST SETUP**

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
PSU	MANSON	EP-603	60316619	UH177
PSU	THURLBY THANDAR	PL320QMD	N/A	N/A
RF DIODE	SUHNER	H7	1001.17.A	248
HORN	EMCO	3115	9010-3580	138
HORN	EMCO	3115	9010-3581	139
BIDIRECTIONAL COUPLER	NARDA	3022	72622	UH226
CABLE	ROSENBERGER	MICRO COAX	N/A	280
ENVIRONMENTAL CHAMBER(TEMP)	SHARTREE	TCC125-815P	CS 203	11
POWER METER	MARCONI	6960B	236997010	UH132
POWER SENSOR	MARCONI	6920	1564	UH228
LOAD	SUHNER	65 BNC-50-0-1	N/A	N/A
20dB ATTENUATOR	BIRD	8340-200-N	MFC 70998	221
10dB ATTENUATOR	BIRD	8340-100-N	N/A	222
THERMOMETER	FLUKE	52 Series II	74700044	426
MULTIMETER	AVOmeter	M3004	M3270006	UH41
MAMBO BOX	CCL	C7032-GA-002	114	N/A
30 dB ATTENUATOR	NARDA	776C-30	619	N/A
30 dB ATTENUATOR	JFW	50PF-030	N/A	N/A
HIGH PASS FILTER	AFL	N/A	N/A	N/A
SPECTRUM ANALYSER	R & S	FESK 30	10057	N/A

ANNEX D

TEST COMMANDS

TEST COMMANDS

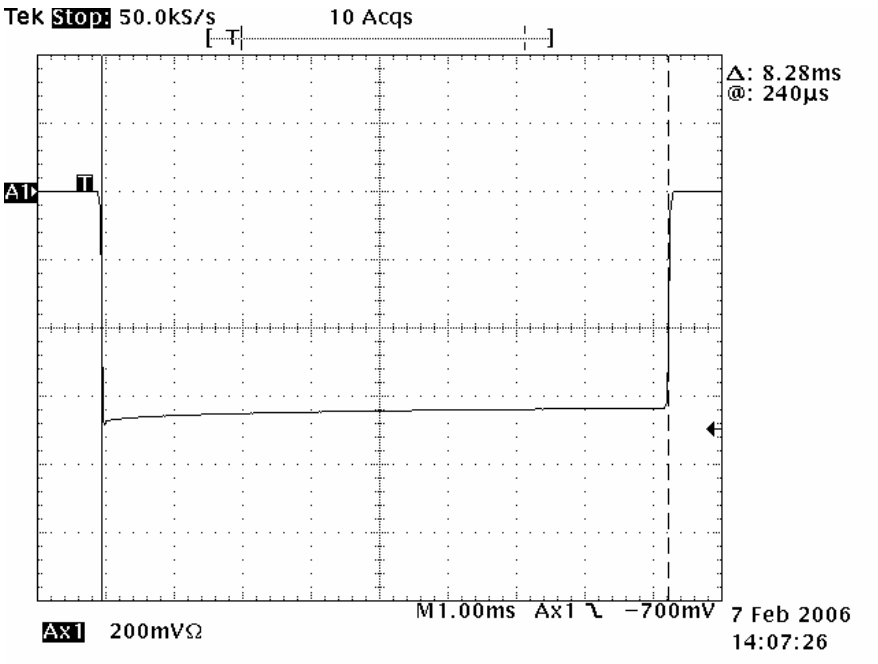
Command Function	Keypad Sequence
Enter Manual Test Mode	Press and Hold # Key for more than 3 seconds
Exit Manual Test Mode	01#
Turn on transmission selecting channel, power level and modulation type (random data or tone).	27 xxx yy z# xxx = Channel Number yy = power step z = Modulation
Example 1 Channel number 001 (Min frequency), power setp 00 (Max) Modulation set to random data (z = 1, z = 0 is a tone)	27 001 00 1#
Example 2 Channel number 240 (Max frequency), power level 08 (Min) Modulation set to tone (z = 0, z = 1 is random modulation)	27 240 08 0#
Turn off transmission	27#

Notes: To enter test mode a test sim card is required.

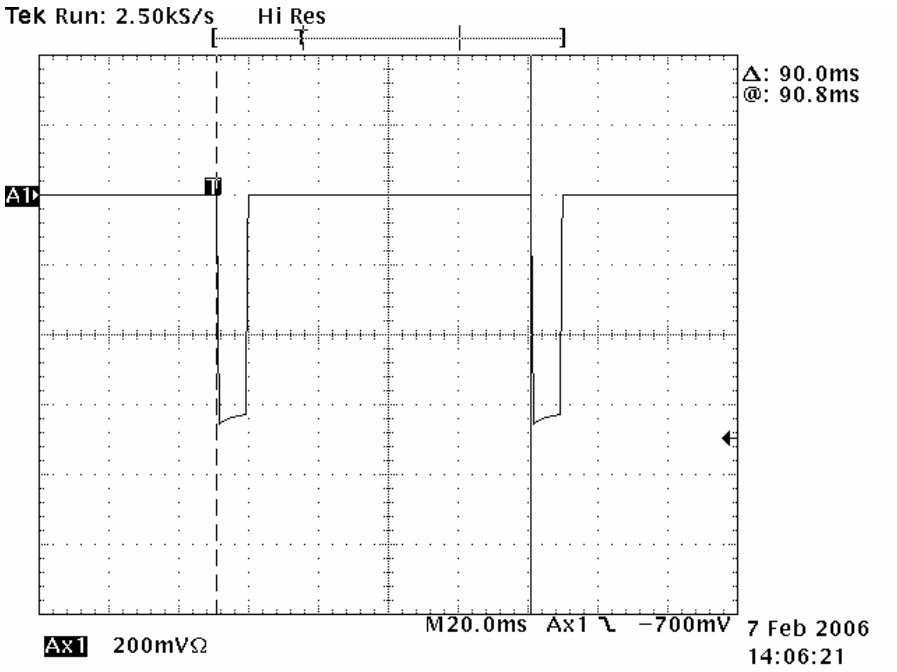
ANNEX E

DUTY CYCLE

Duty Cycle Plots



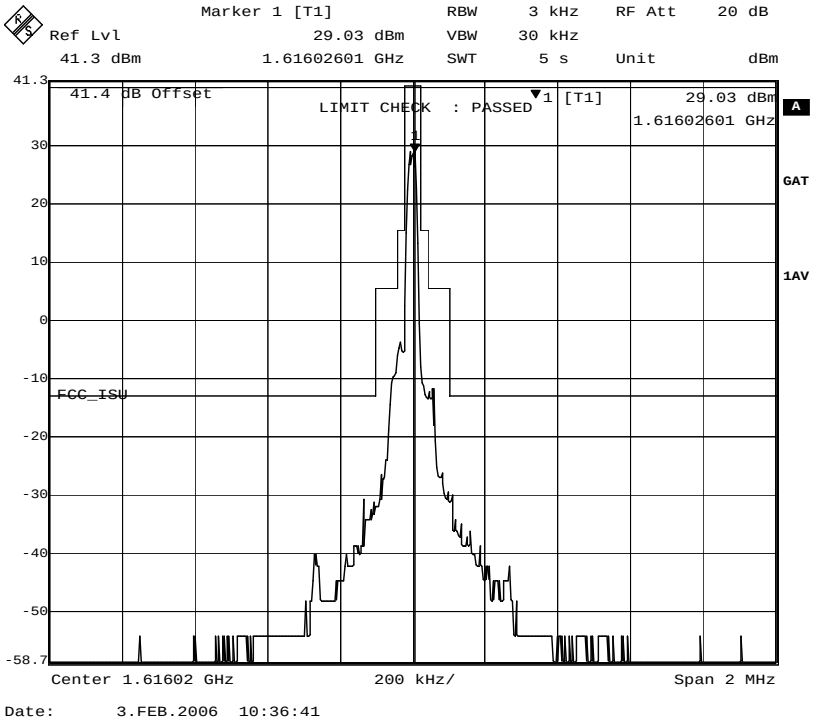
T_{on} = 8.28mS



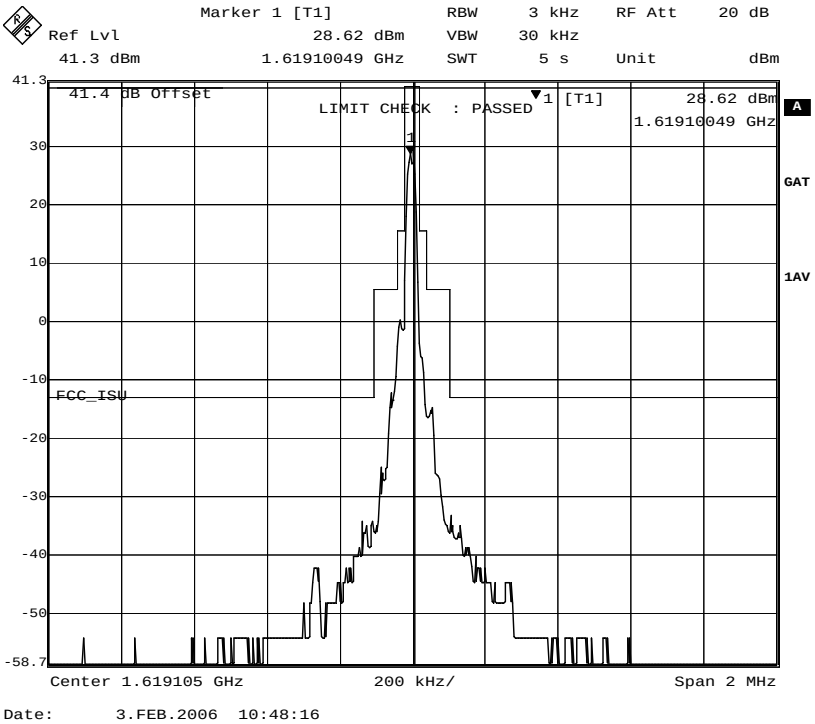
T_{frame} = 90mS

ANNEX F

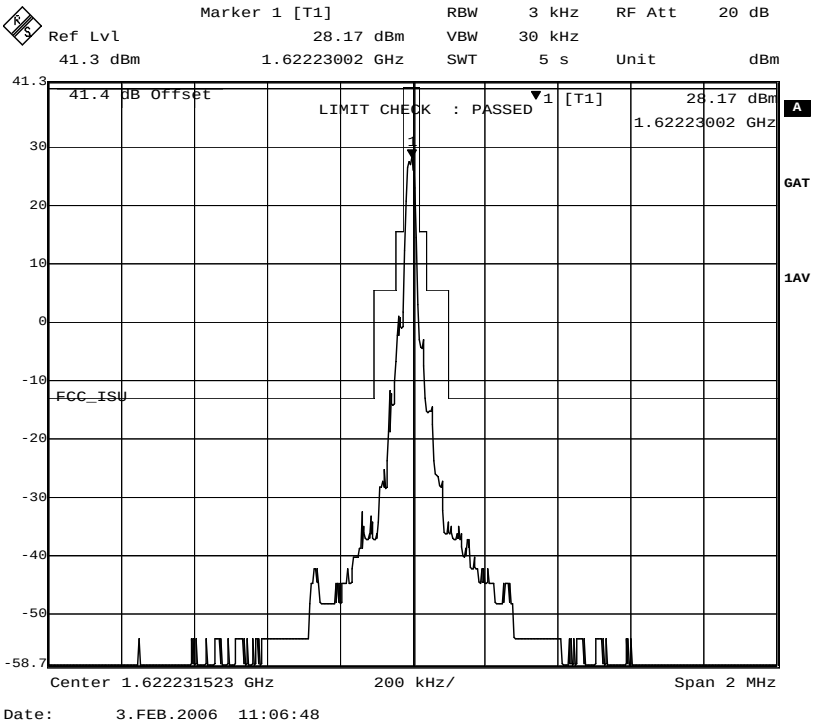
EMISSIONS LIMITATIONS



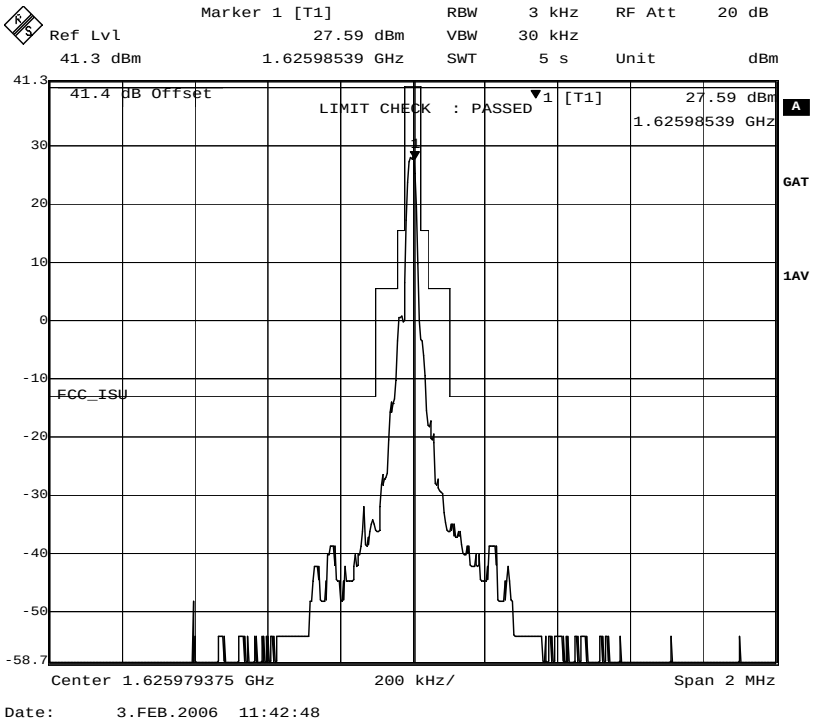
Channel 1



Channel 75



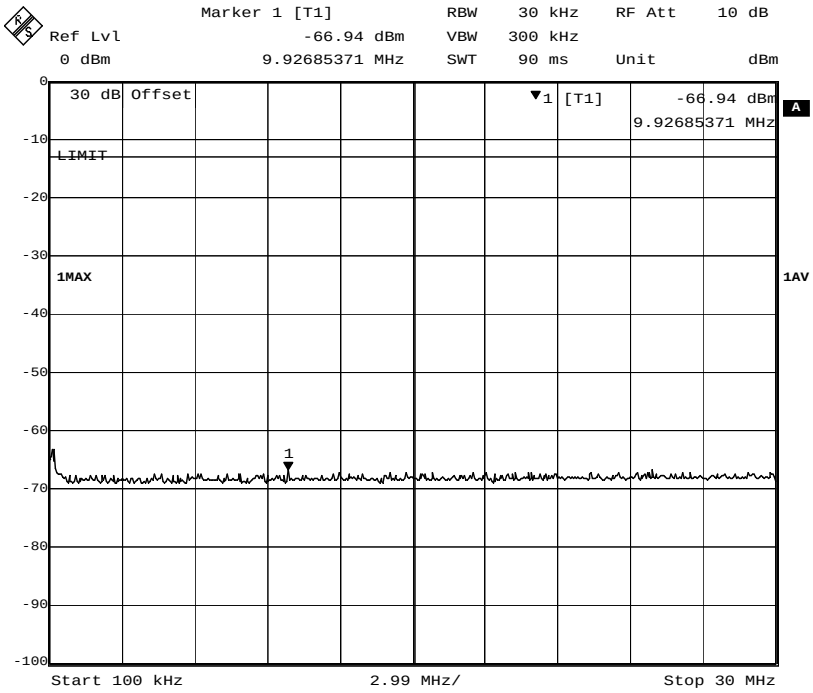
Channel 150



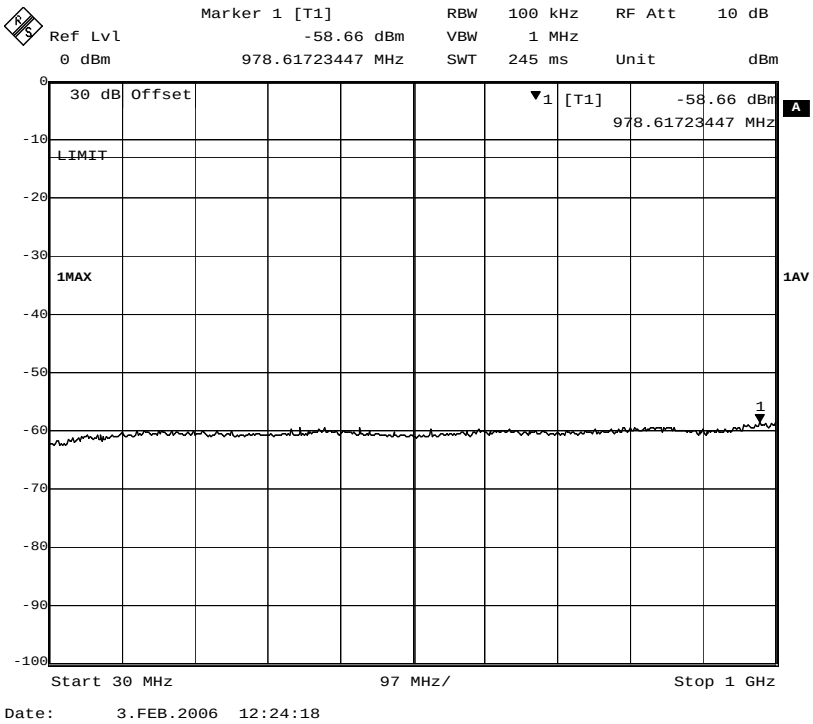
Channel 240

ANNEX G

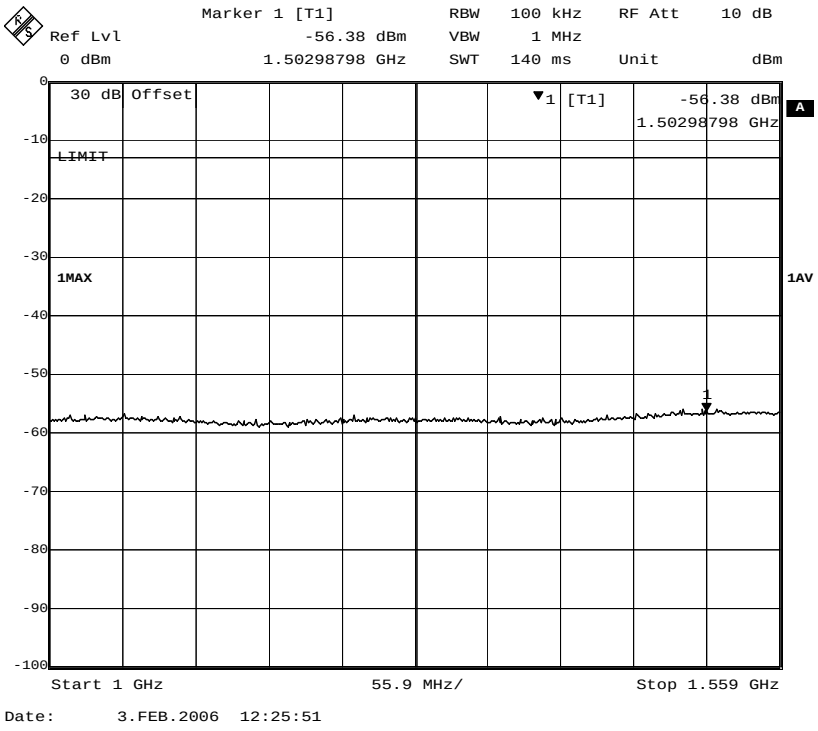
TRANSMITTER SPURIOUS EMISSIONS – Conducted



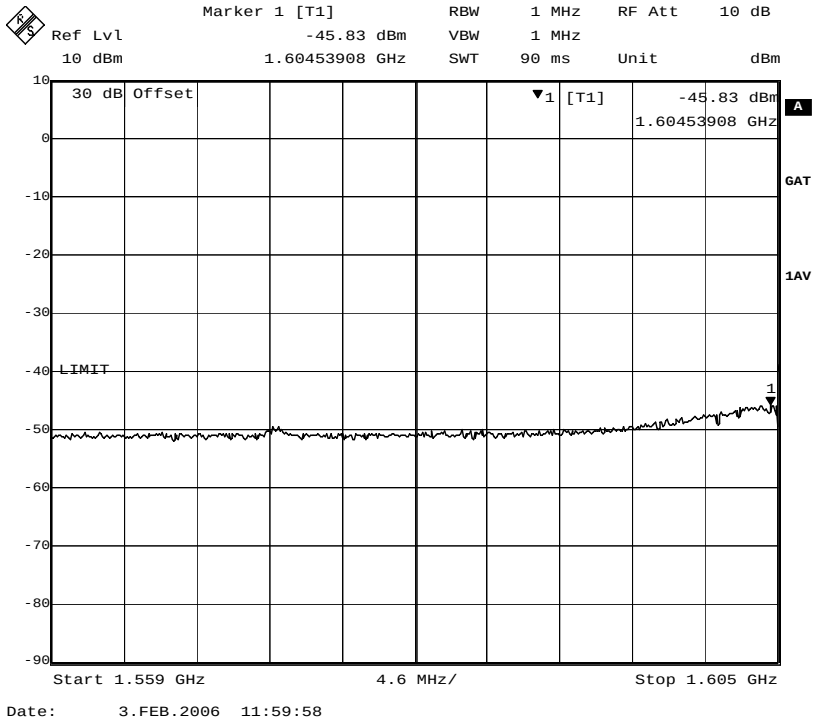
100 kHz – 30MHz



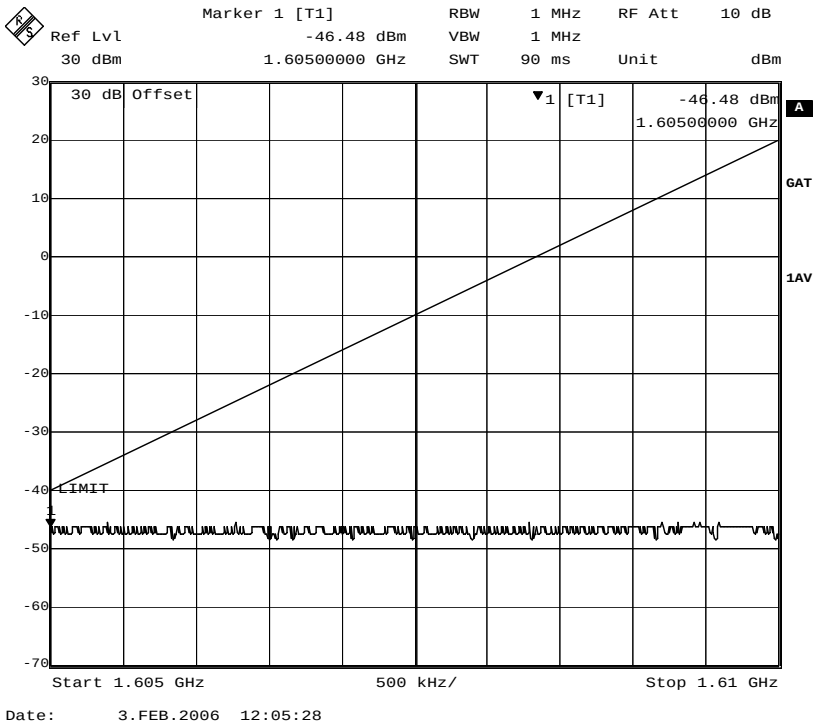
30MHz – 1000MHz



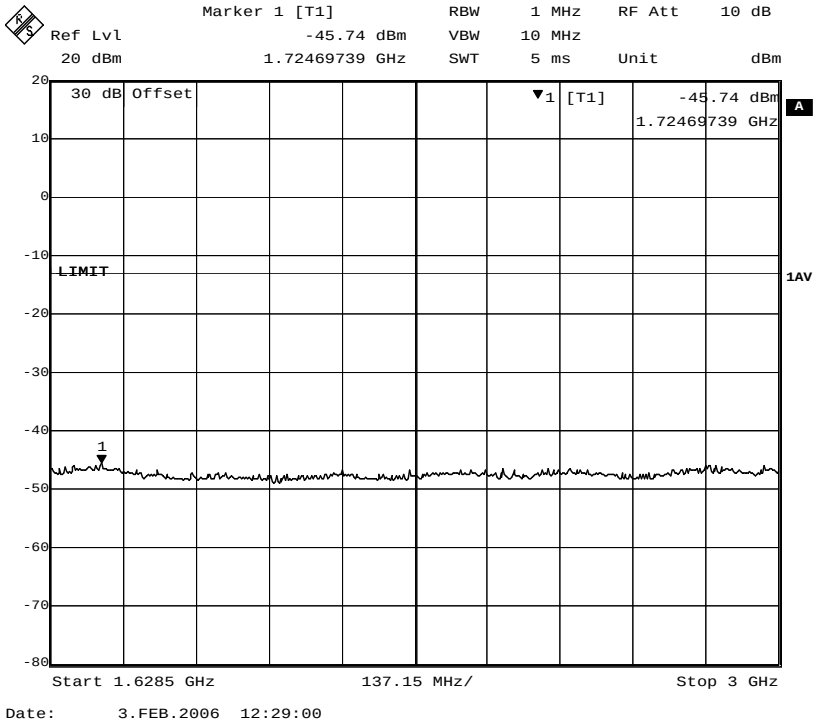
1000MHz – 1559MHz



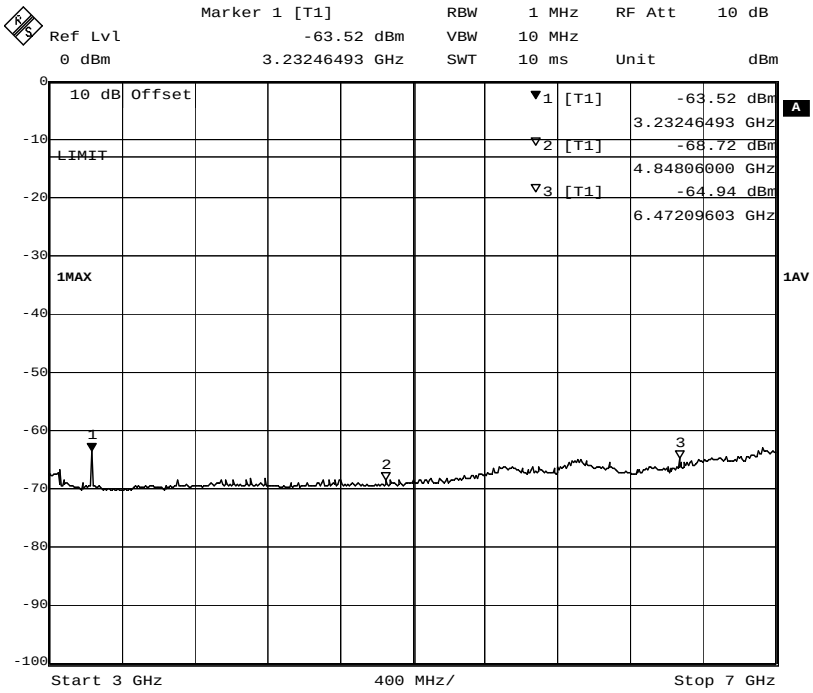
1559MHz – 1605MHz



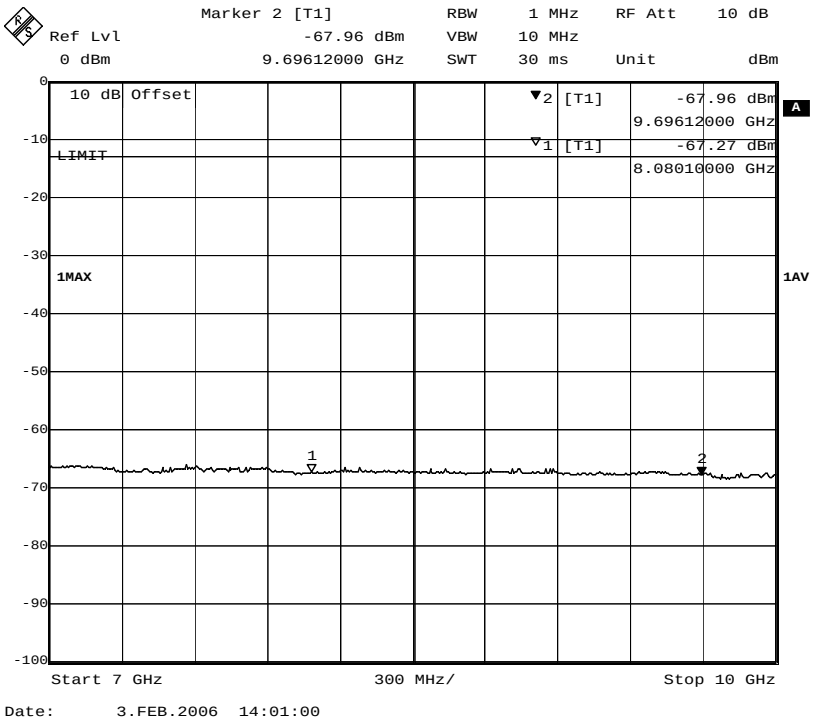
1605MHz – 1610MHz



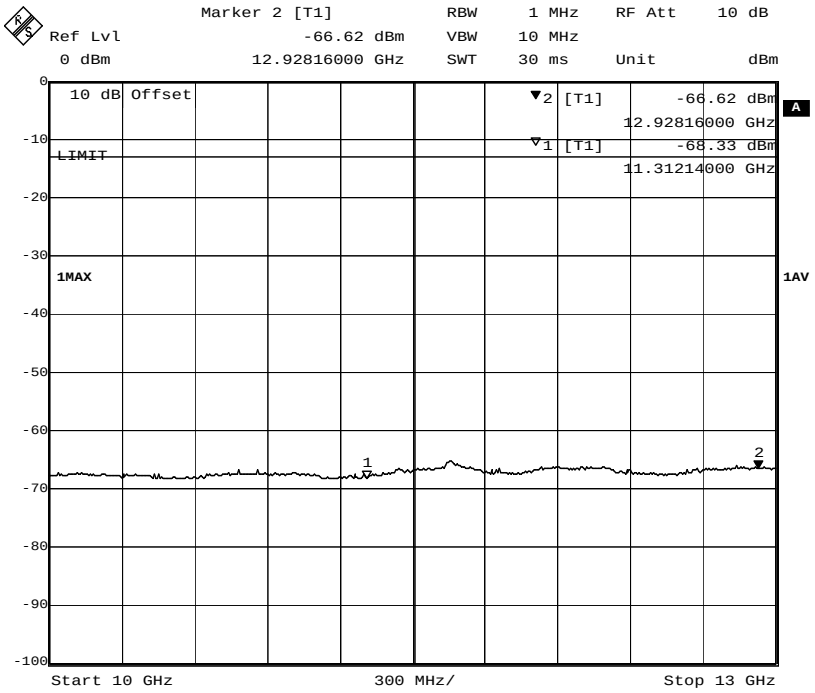
1628.5MHz – 3000MHz



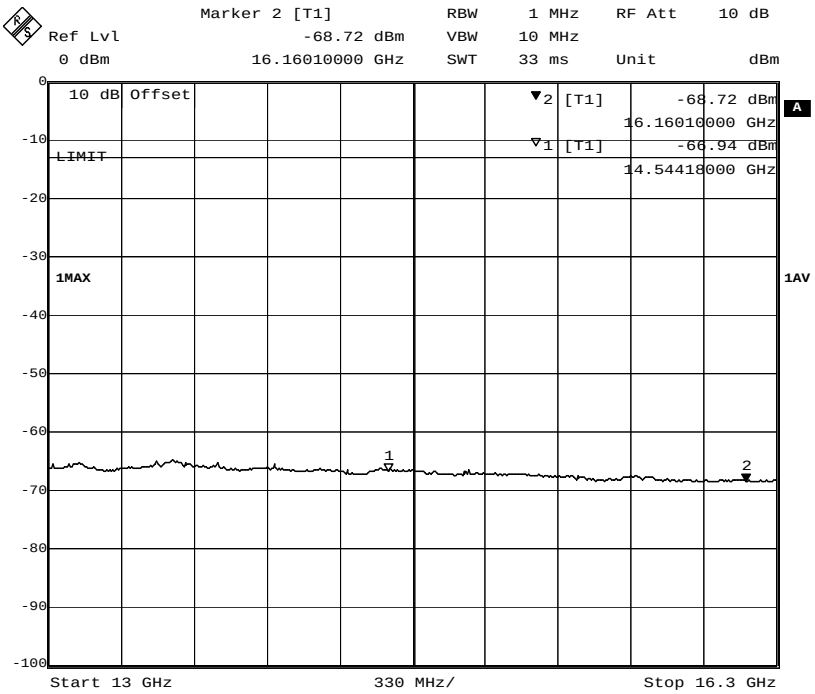
3GHz – 7GHz



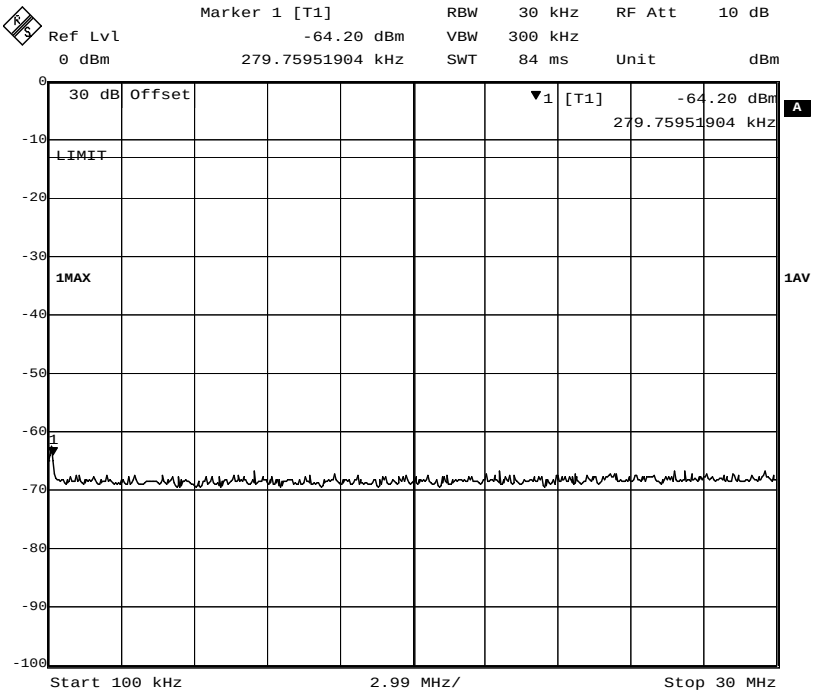
7GHz – 10GHz



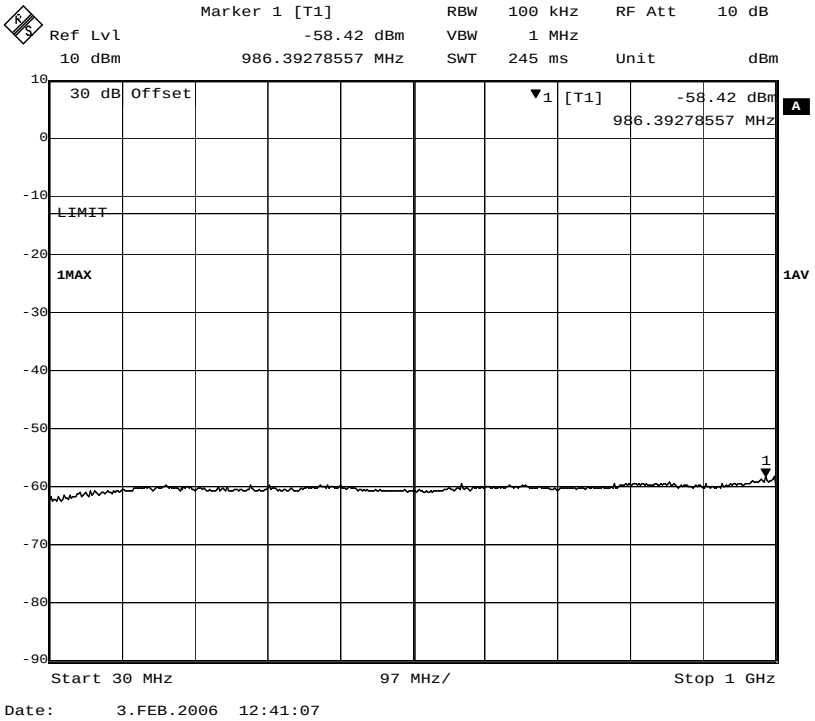
10GHz – 13GHz



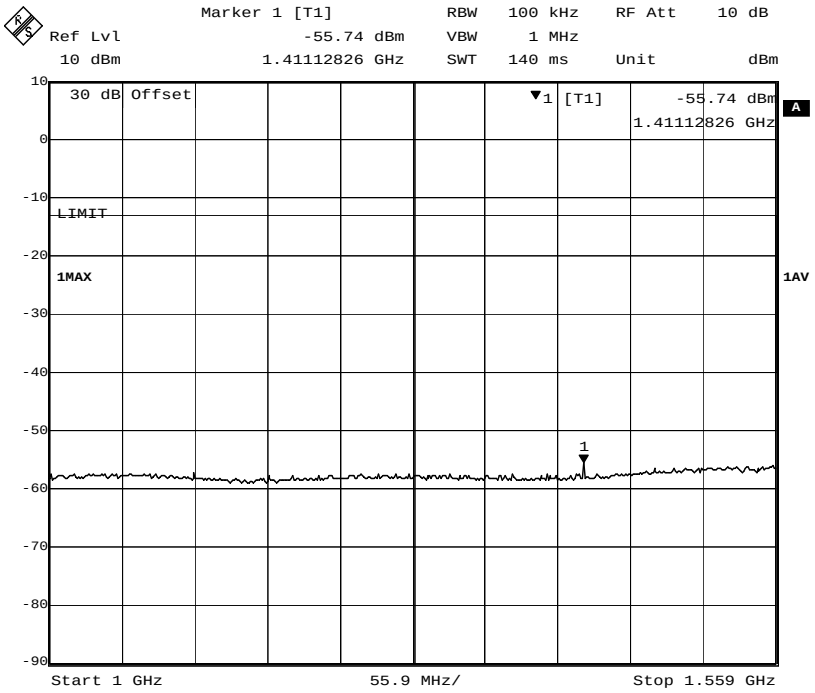
13GHz – 16.3GHz



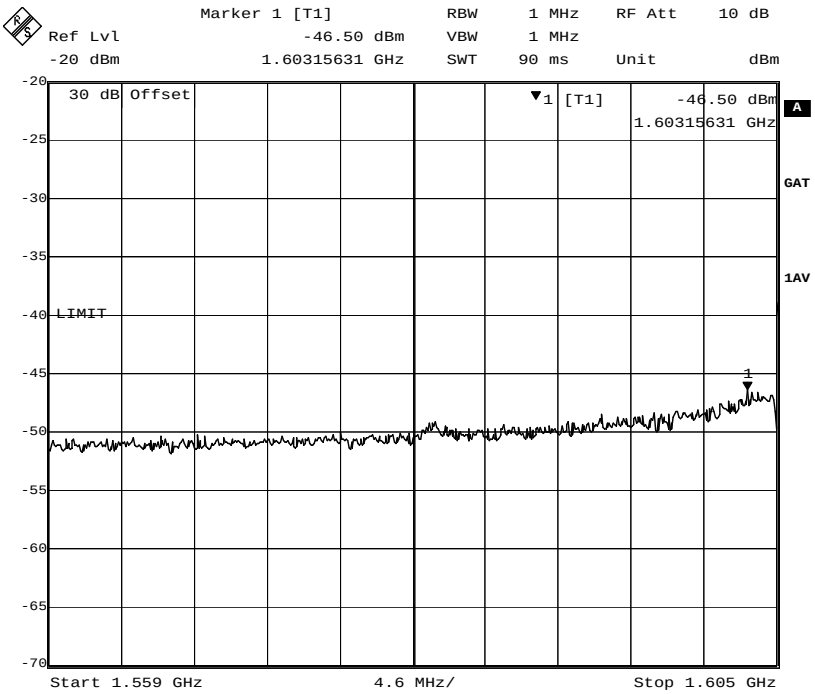
100 kHz – 30MHz



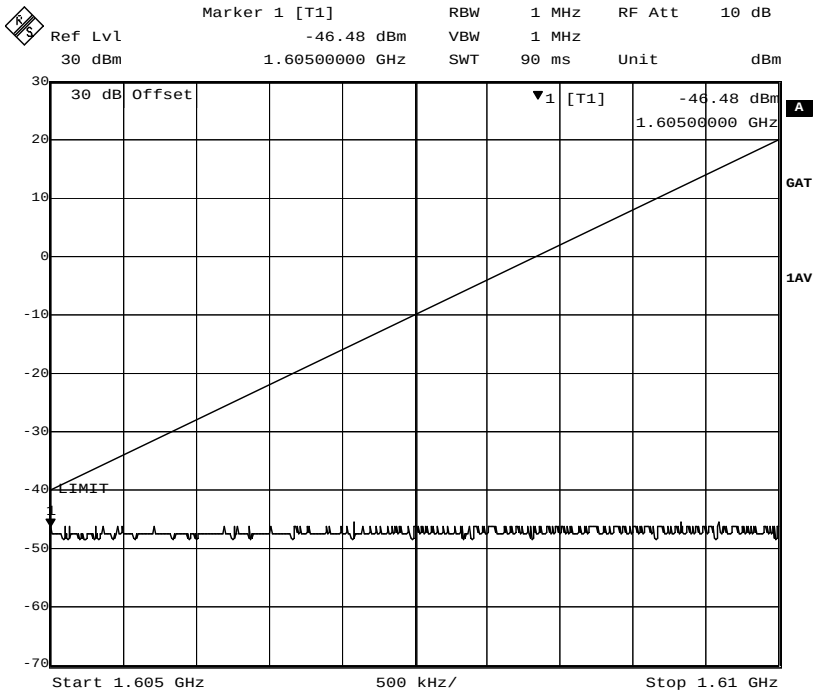
30MHz – 1000MHz



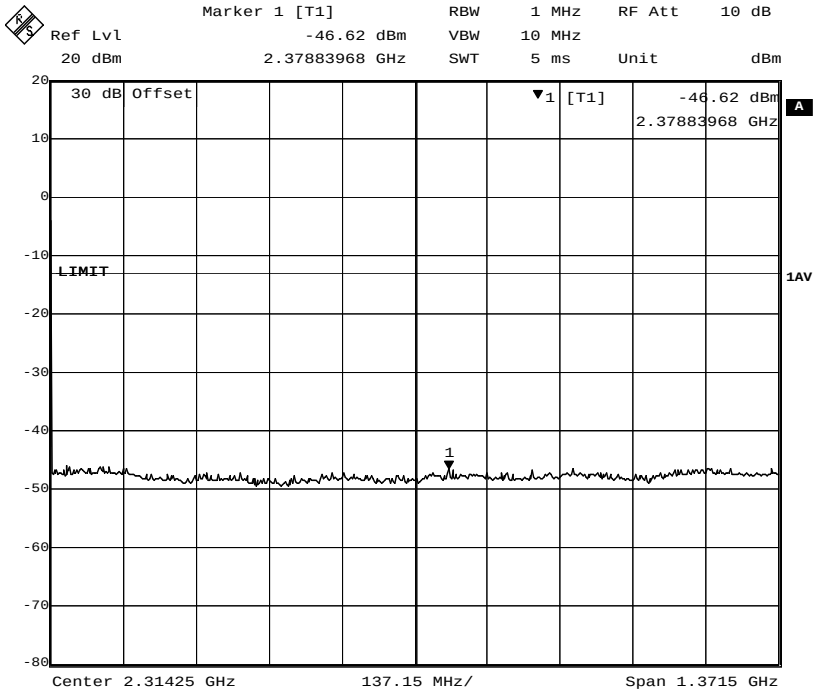
1000MHz – 1559MHz



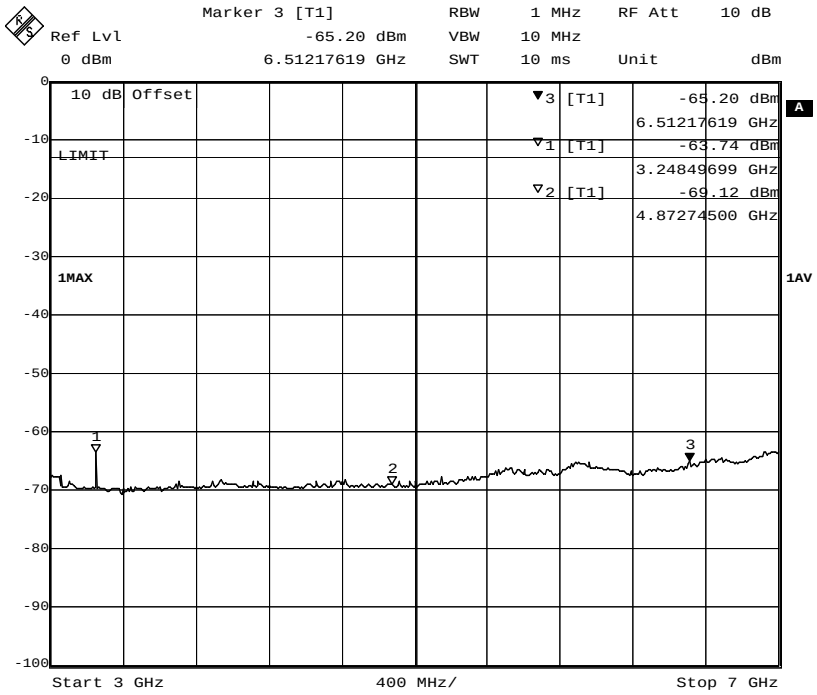
1559MHz – 1605MHz



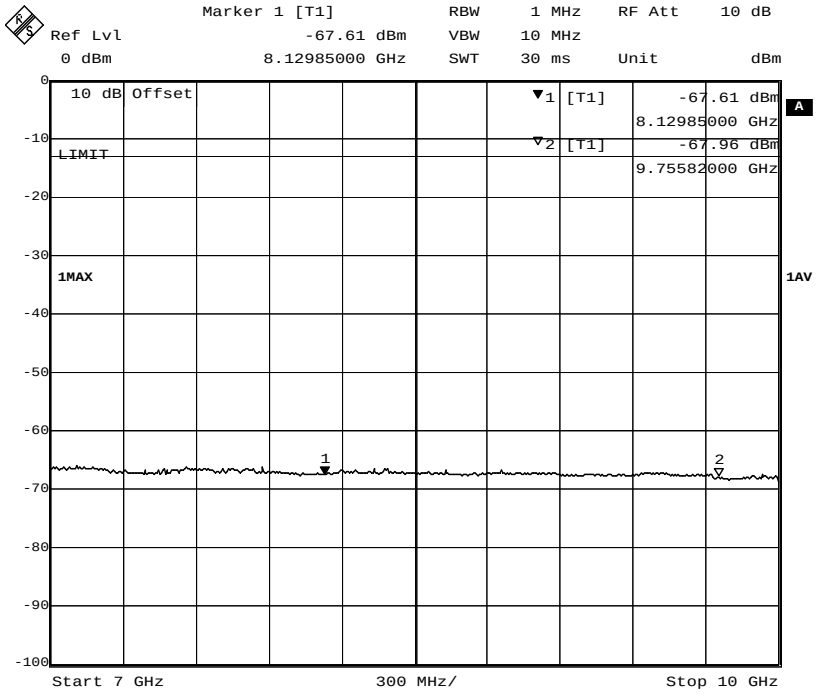
1605MHz – 1610MHz



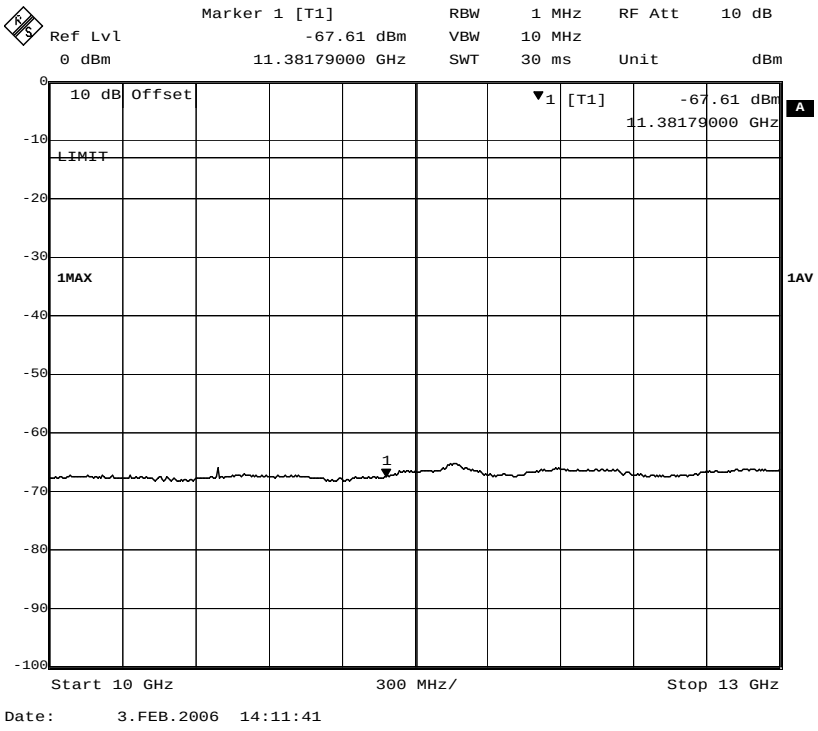
1628.5MHz – 3000MHz



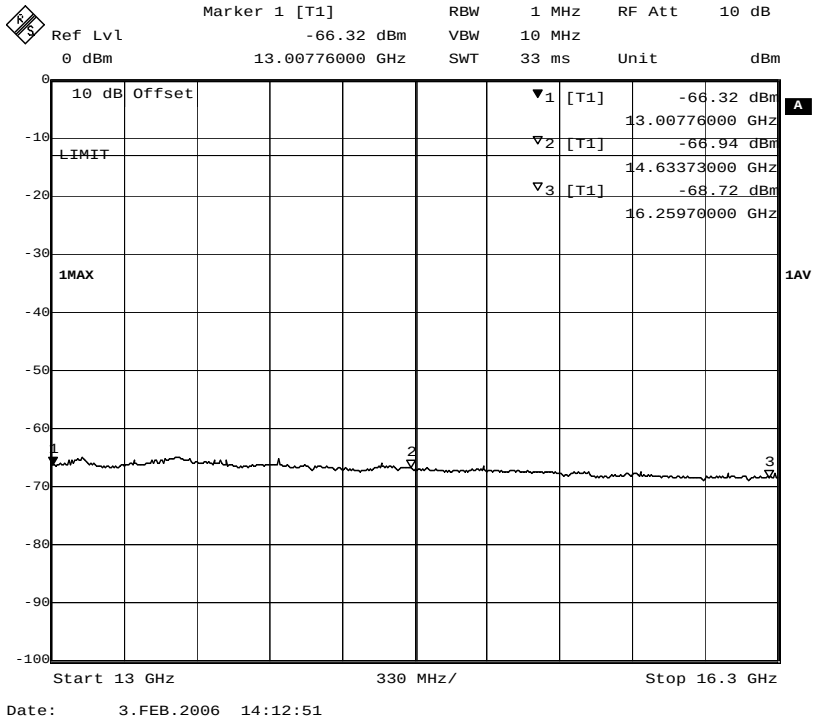
3GHz – 7GHz



7GHz – 10GHz



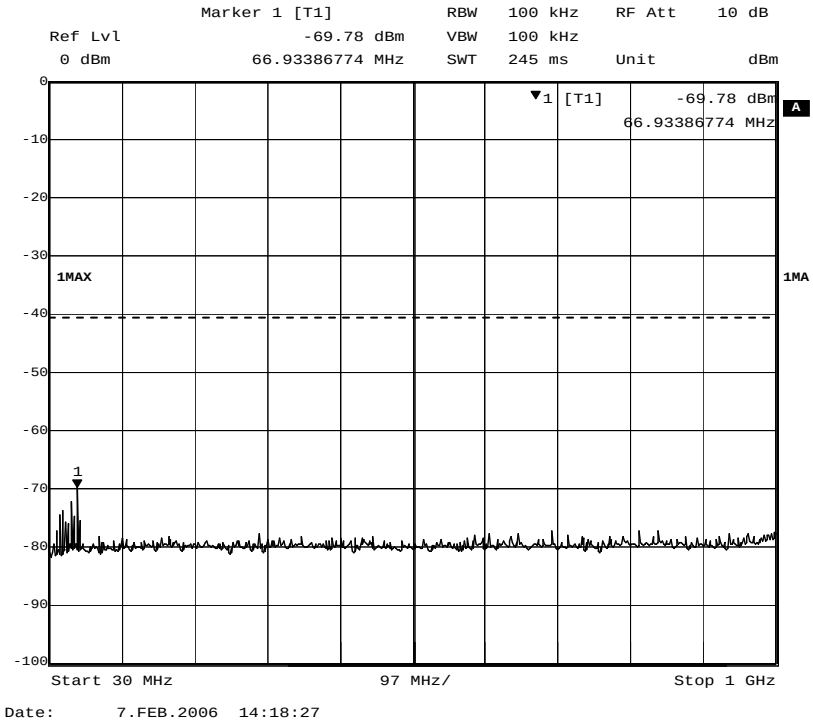
10GHz – 13GHz



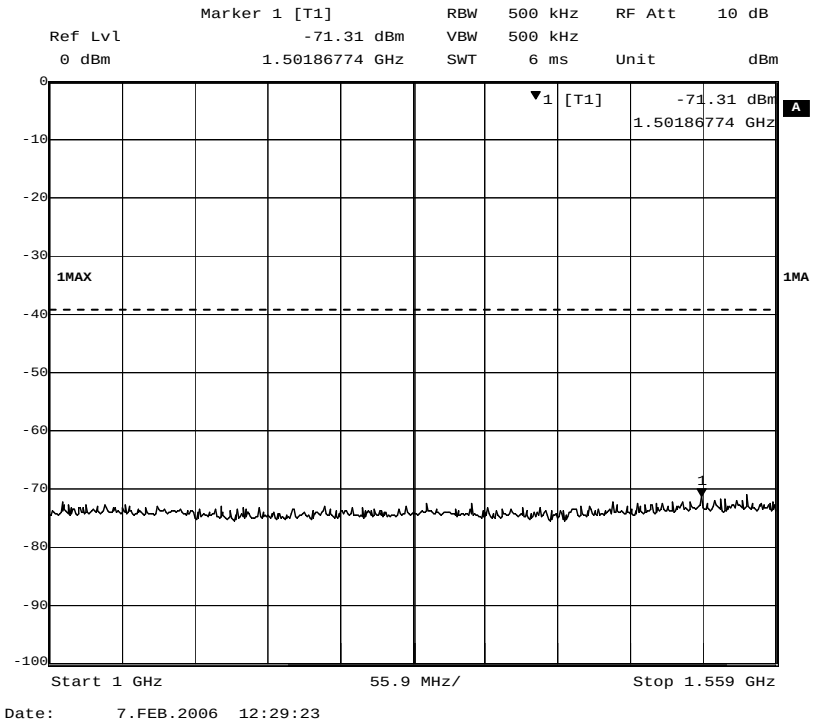
13GHz – 16.3GHz

ANNEX H

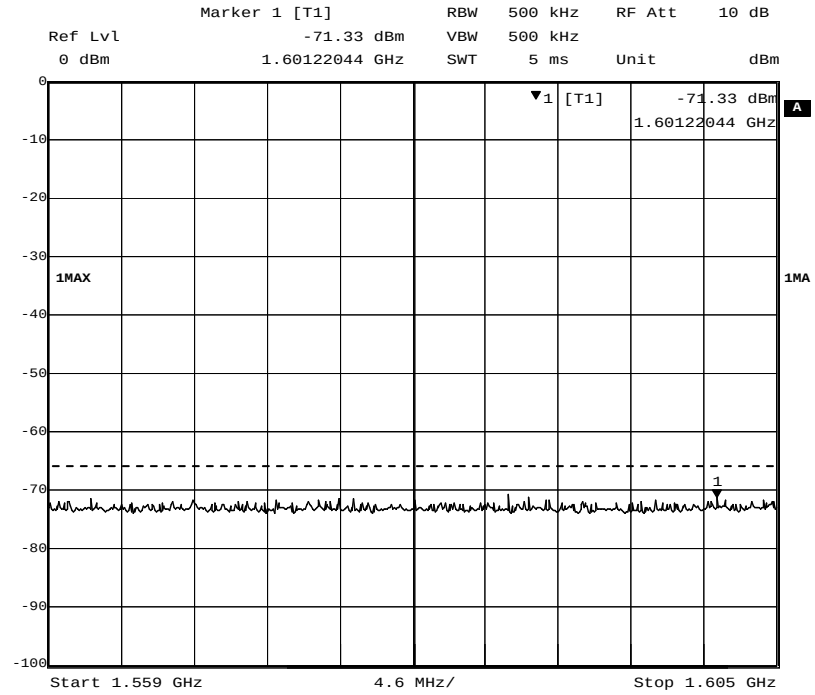
TRANSMITTER SPURIOUS EMISSIONS – Radiated



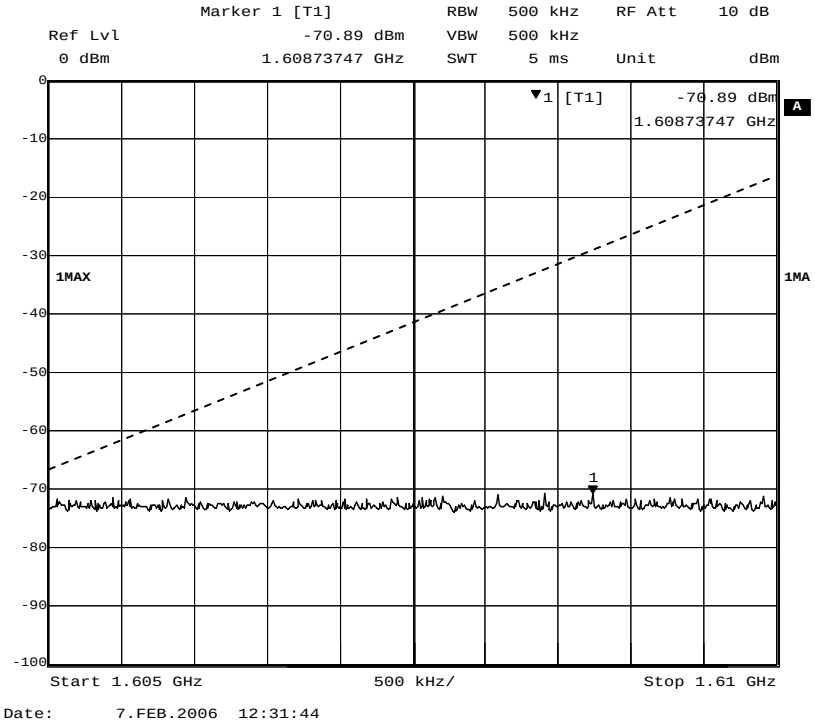
30MHz – 1000MHz



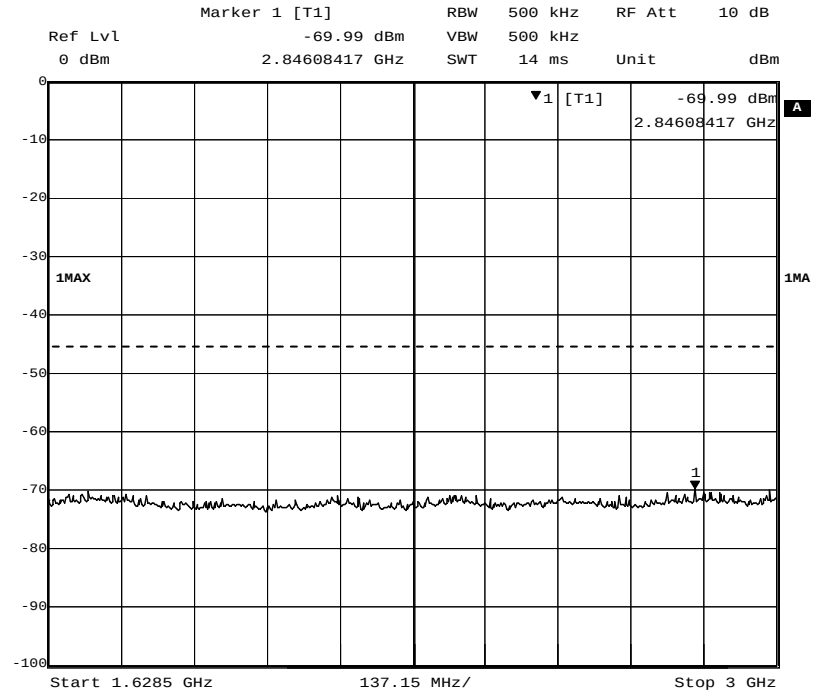
1000MHz – 1559MHz



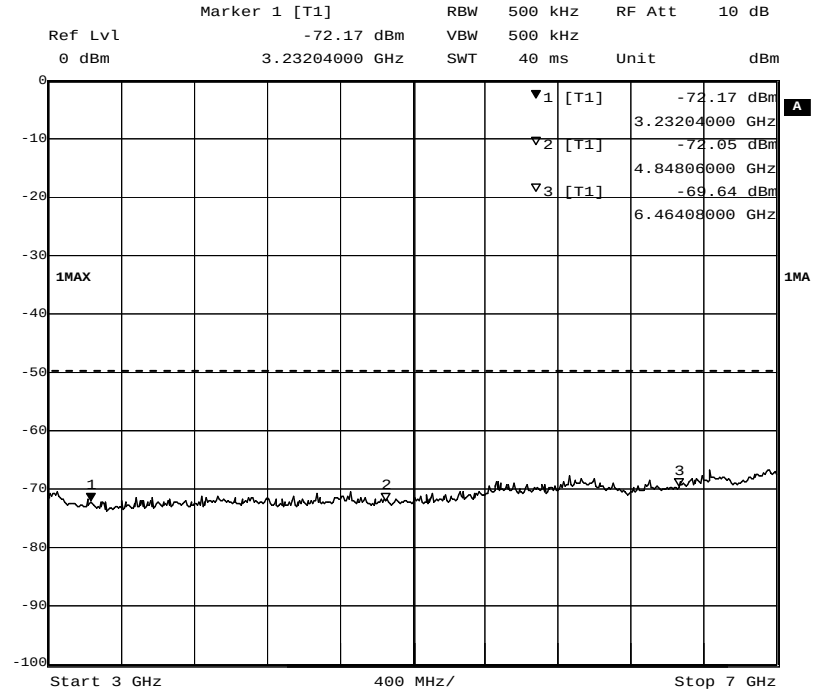
1559MHz – 1605MHz



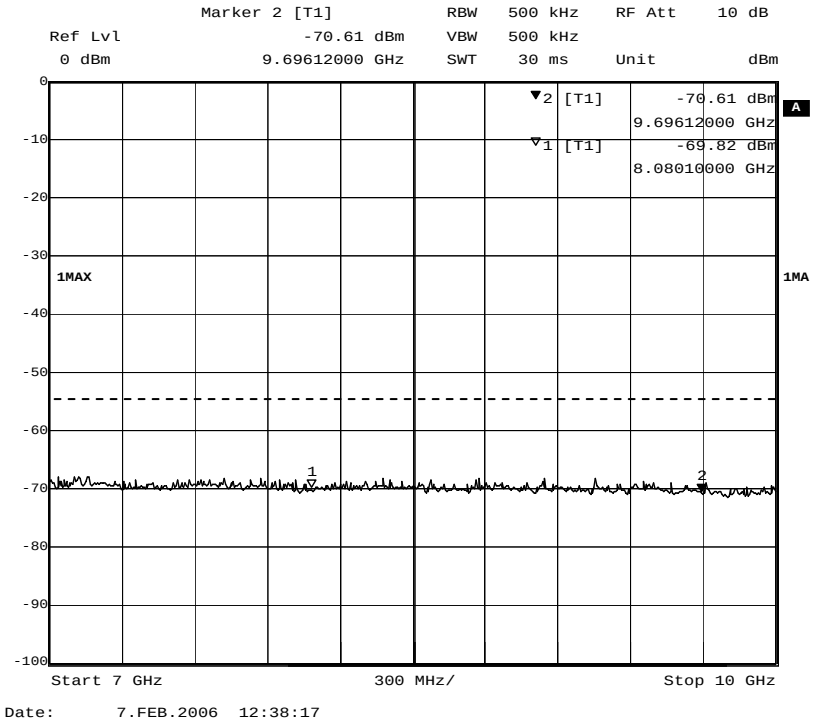
1605MHz – 1610MHz



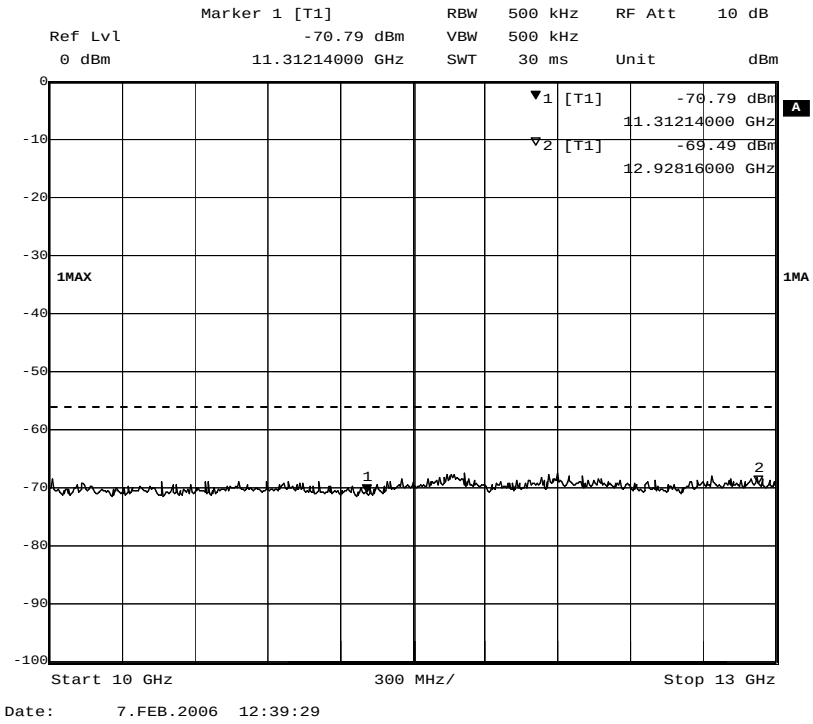
1628.5MHz – 3000MHz



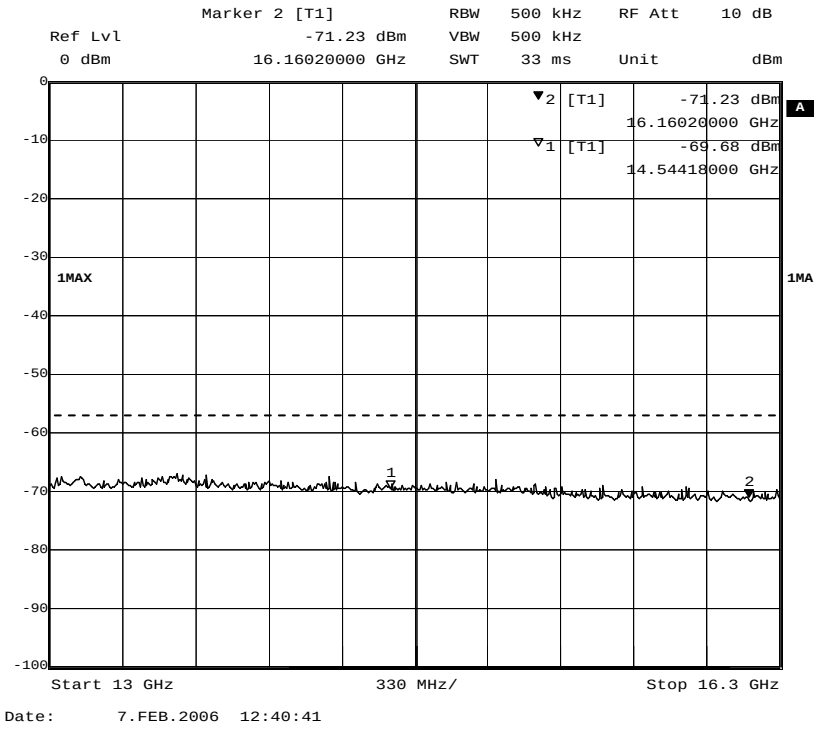
3GHz – 7GHz



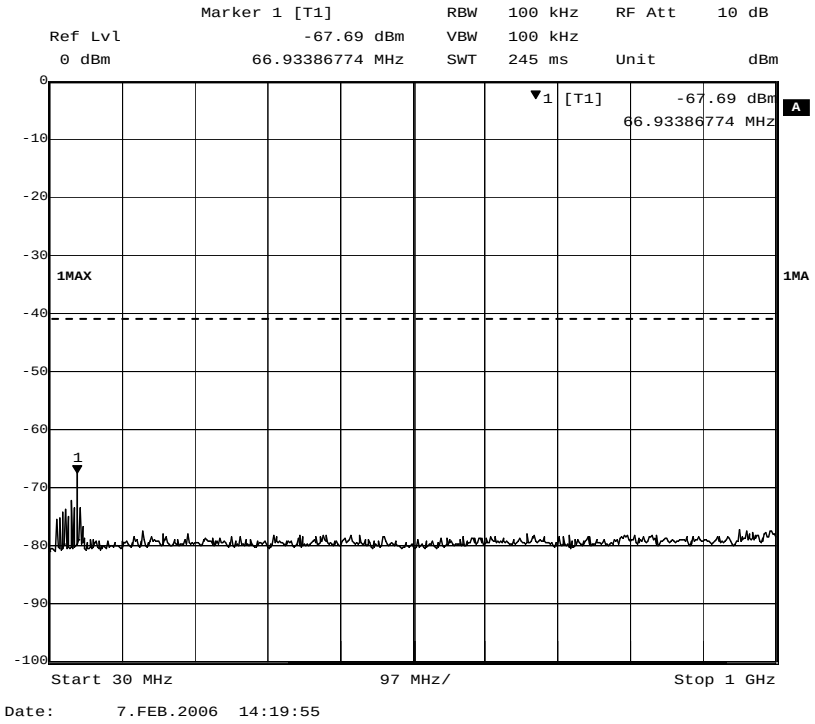
7GHz – 10GHz



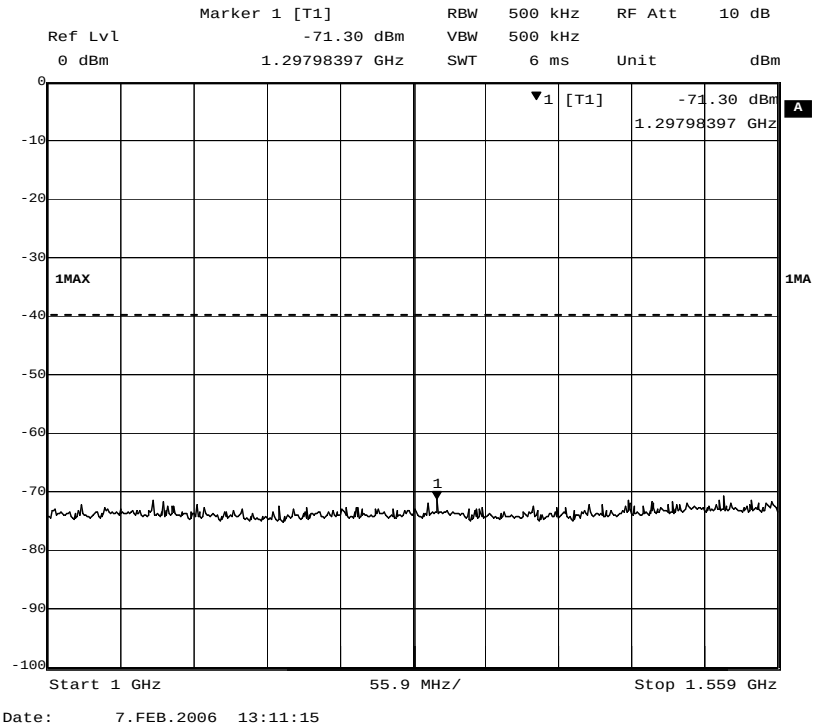
10GHz – 13GHz



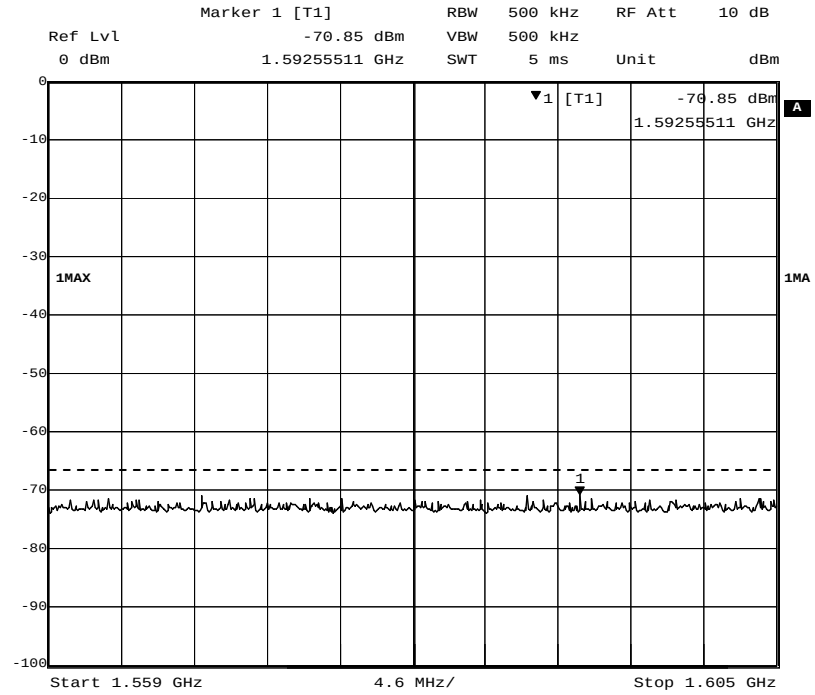
13GHz – 16.3GHz



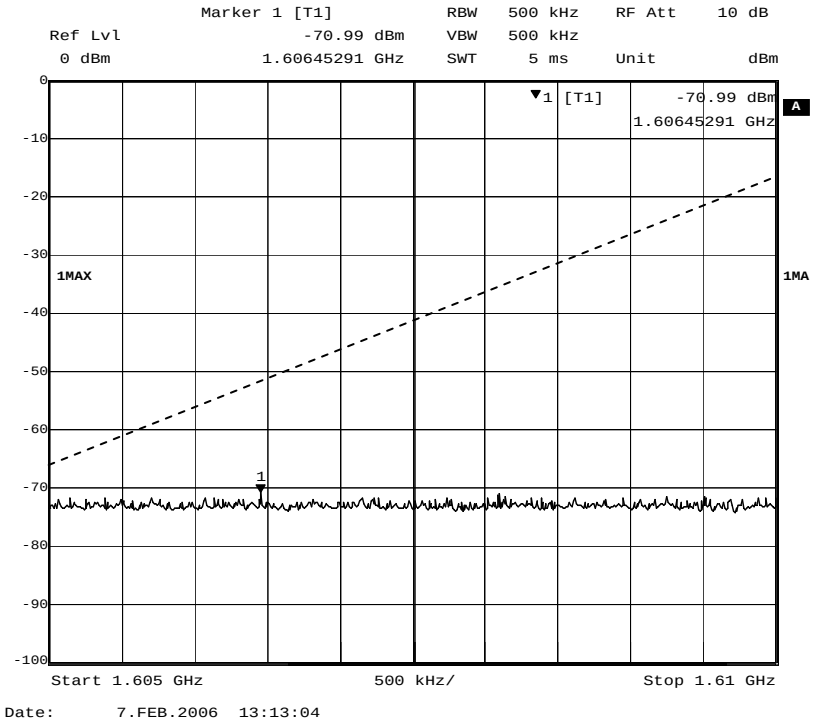
30MHz – 1000MHz



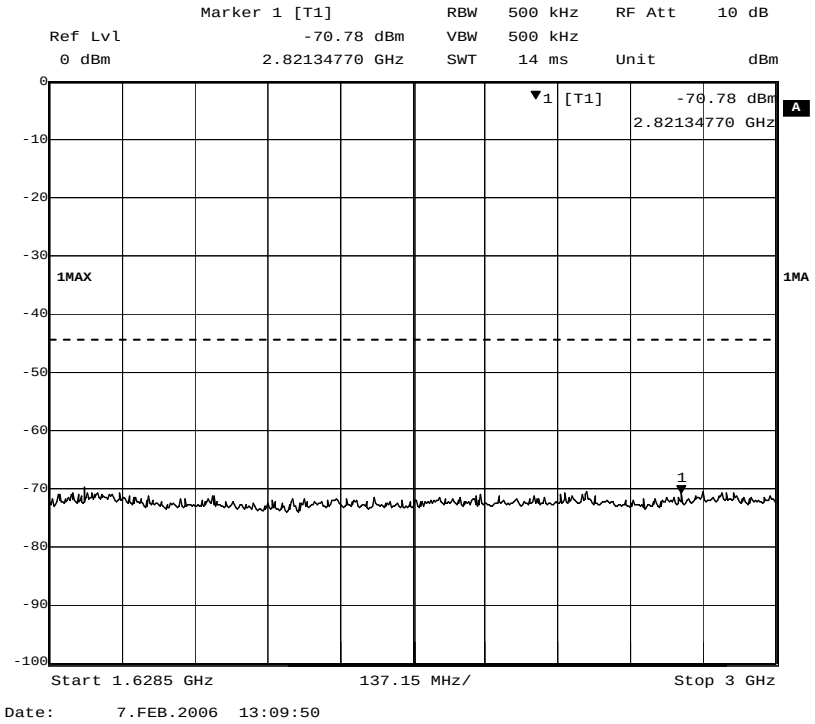
1000MHz – 1559MHz



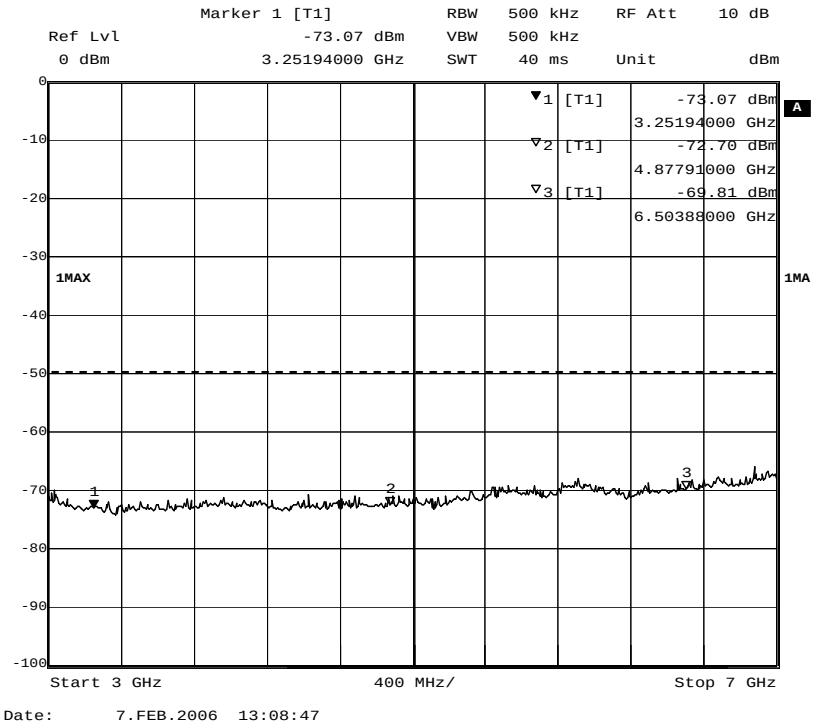
1559MHz – 1605MHz



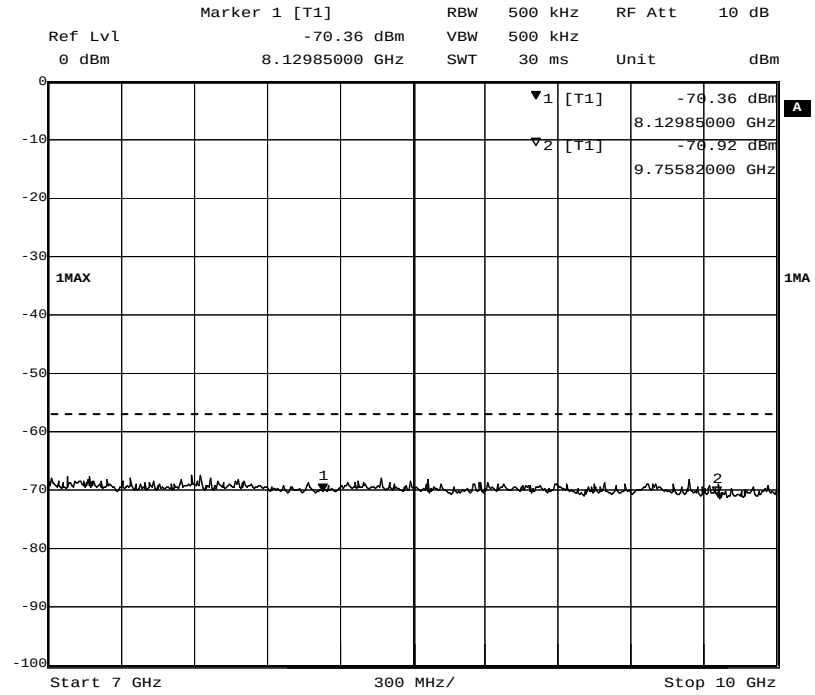
1605MHz – 1610MHz



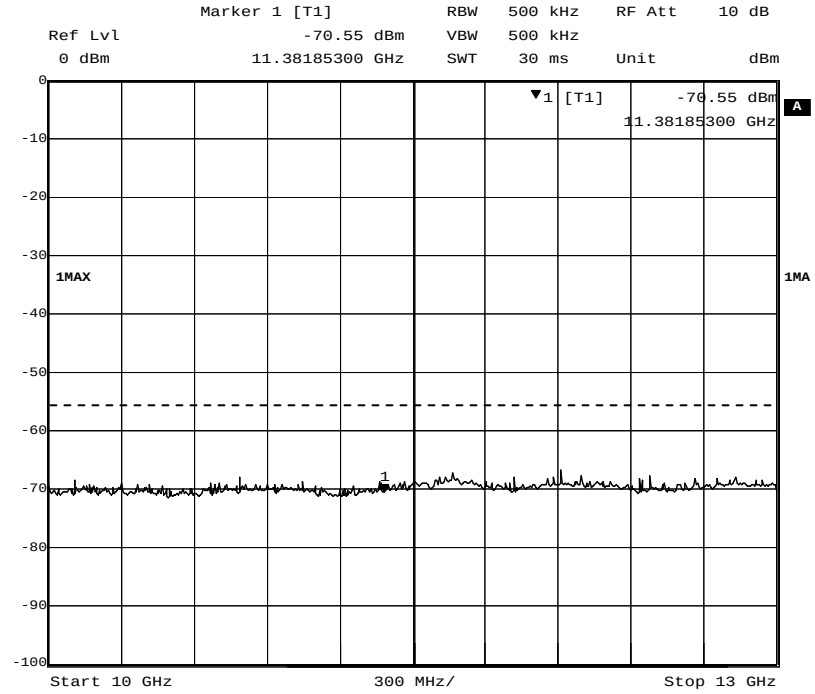
1628.5MHz – 3000MHz



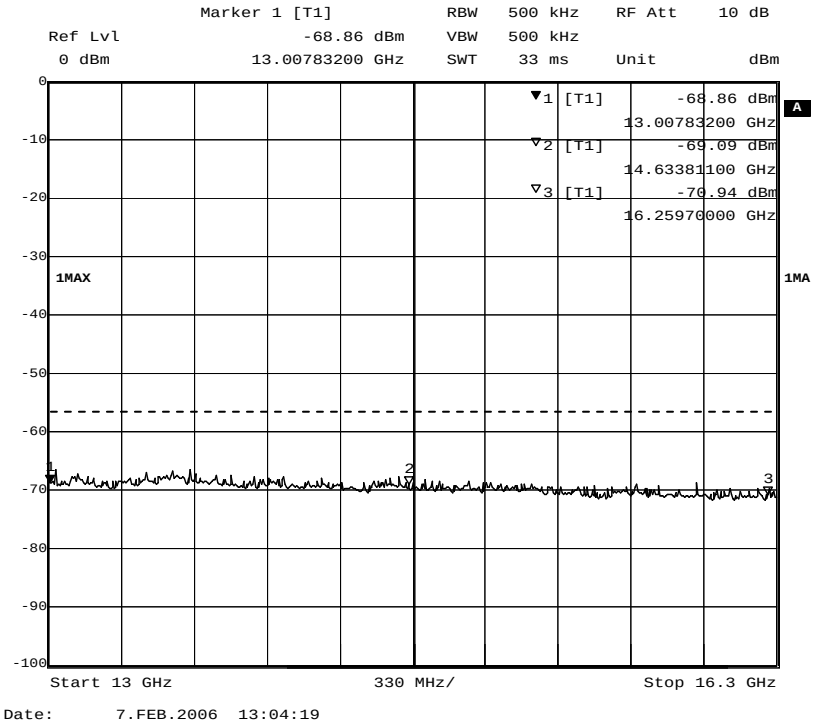
3GHz – 7GHz



7GHz – 10GHz



10GHz – 13GHz

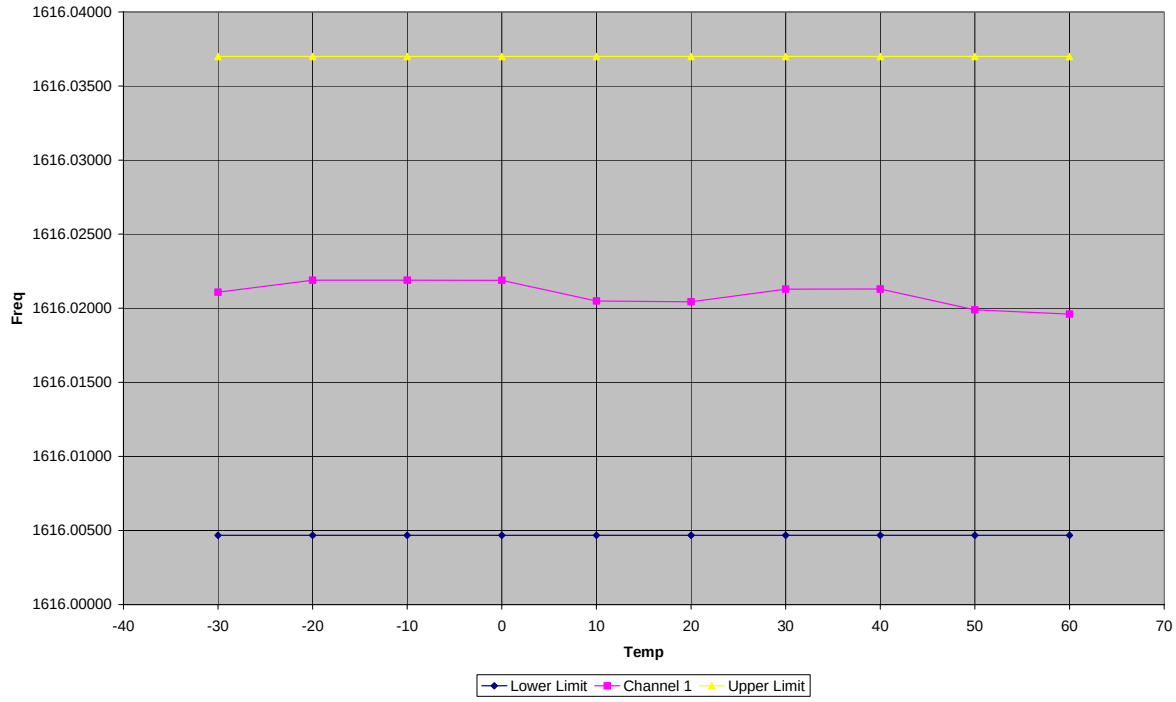


13GHz – 16.3GHz

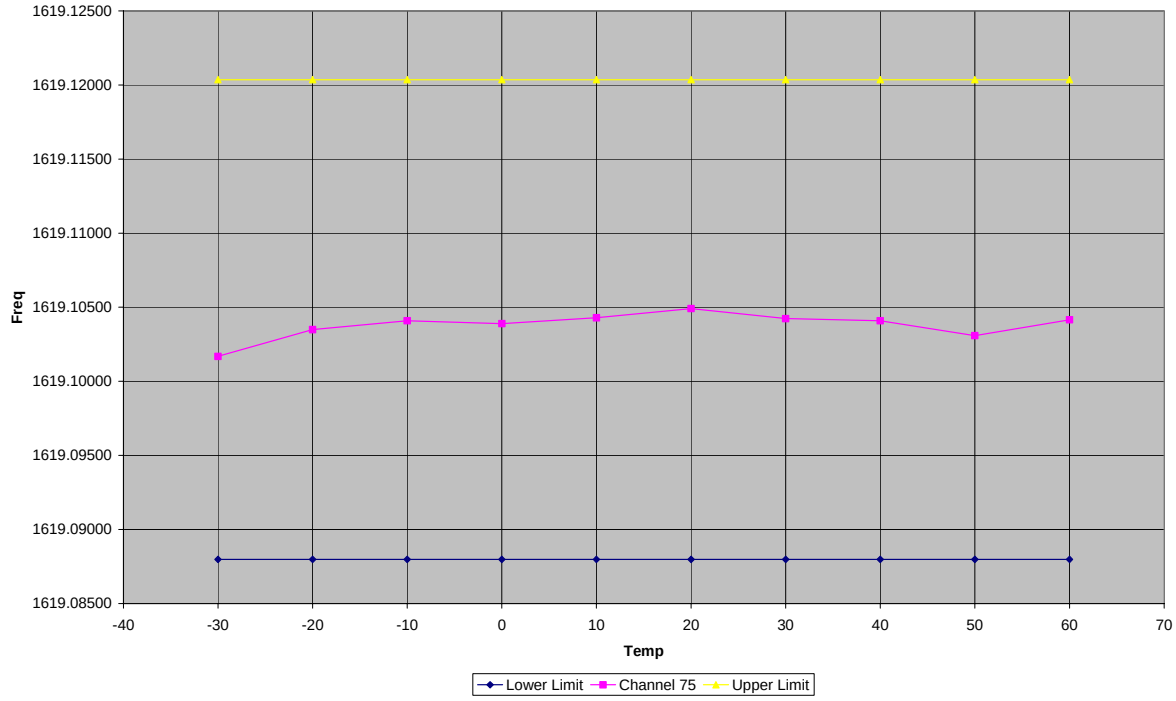
ANNEX I

FREQUENCY STABILITY – Temperature

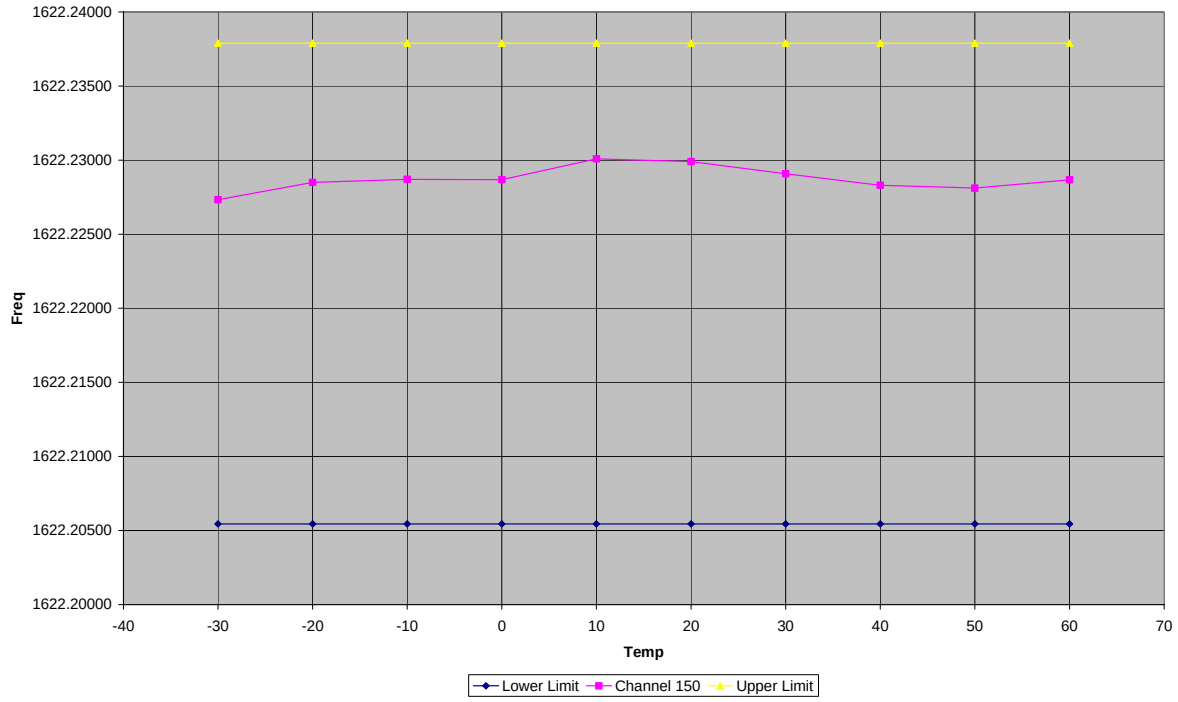
Channel 1 Frequency Stability - Temperature



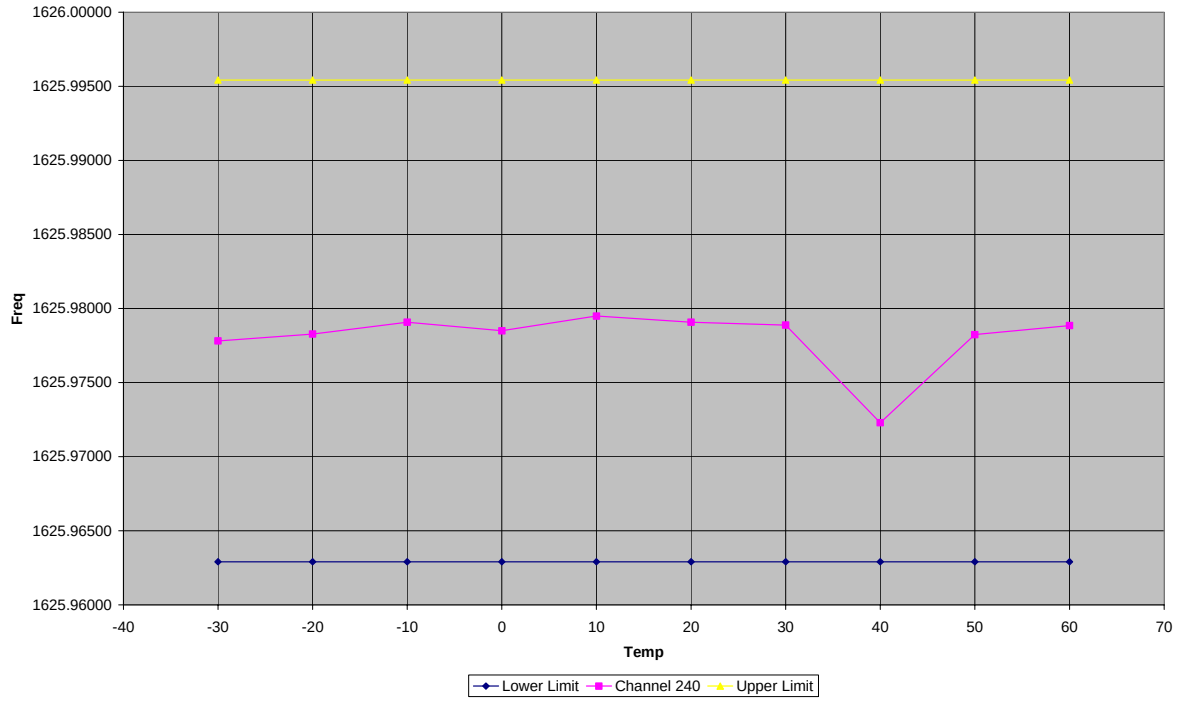
Channel 75 Frequency Stability - Temperature



Channel 150 Frequency Stability - Temperature



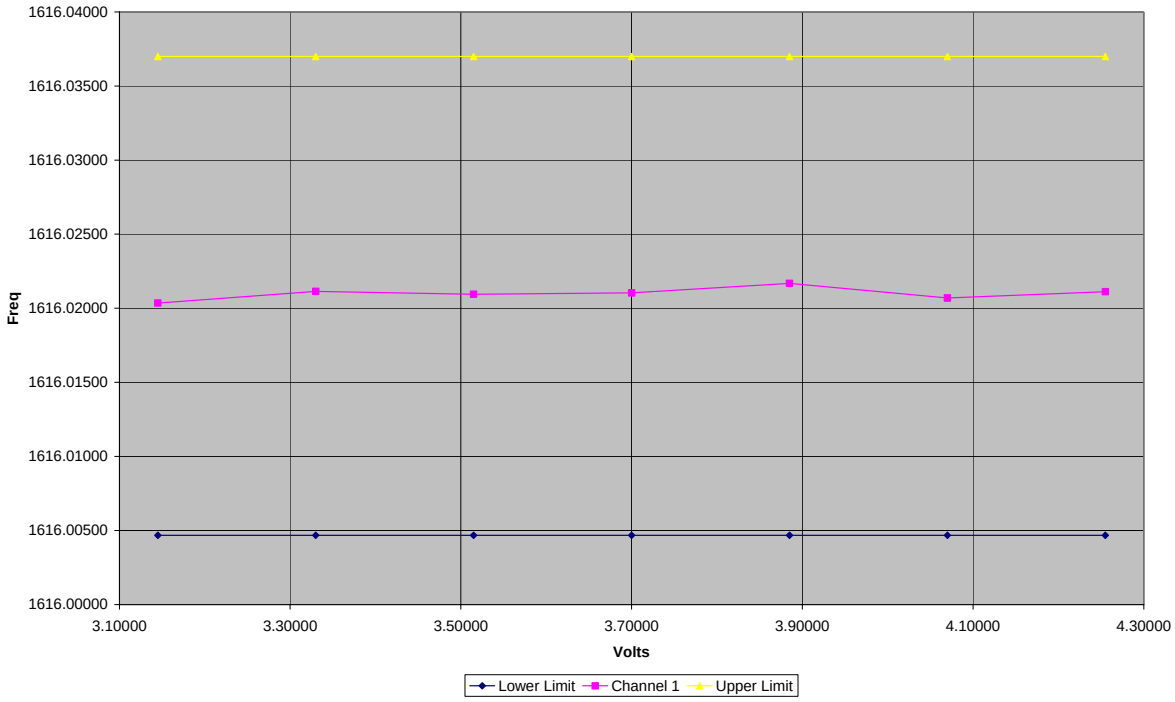
Channel 240 Frequency Stability - Temperature



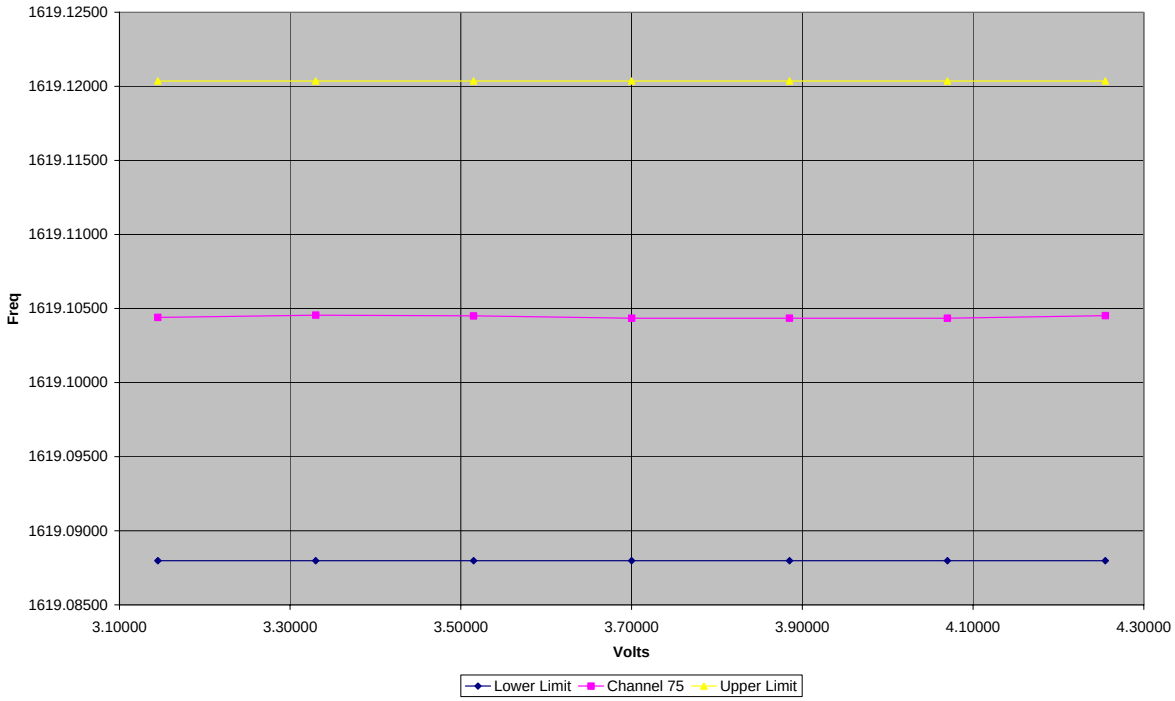
ANNEX J

FREQUENCY STABILITY – Voltage

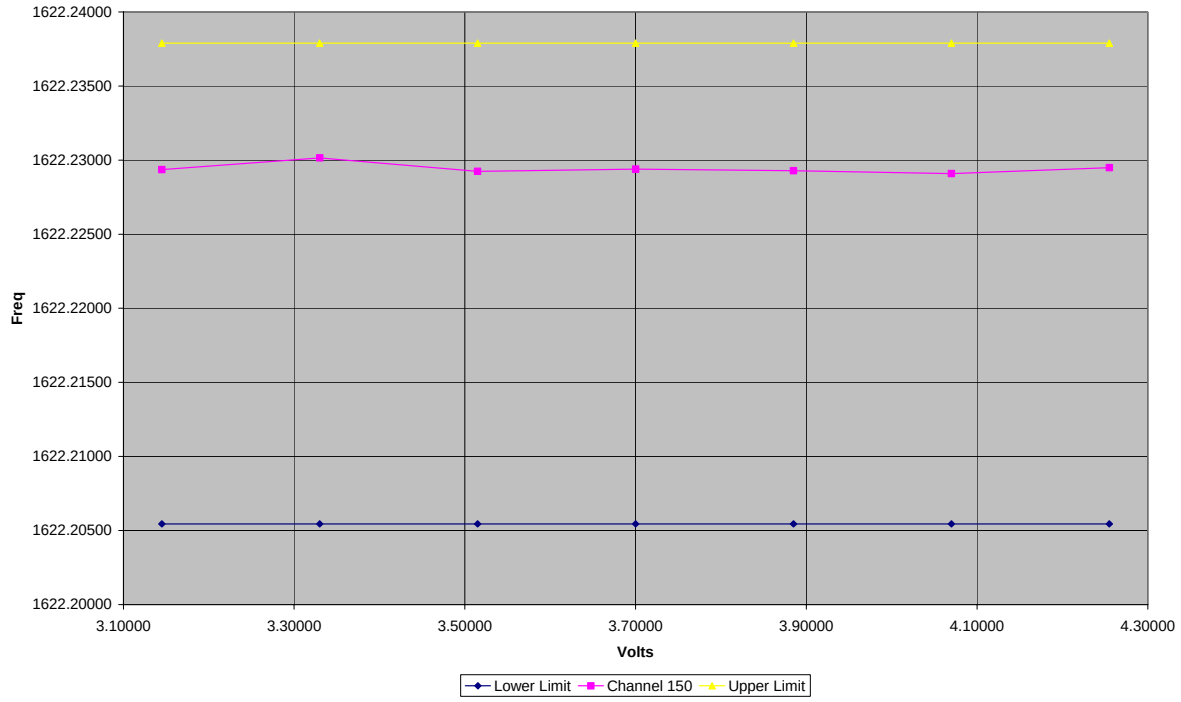
Channel 1 Frequency Stability - Voltage



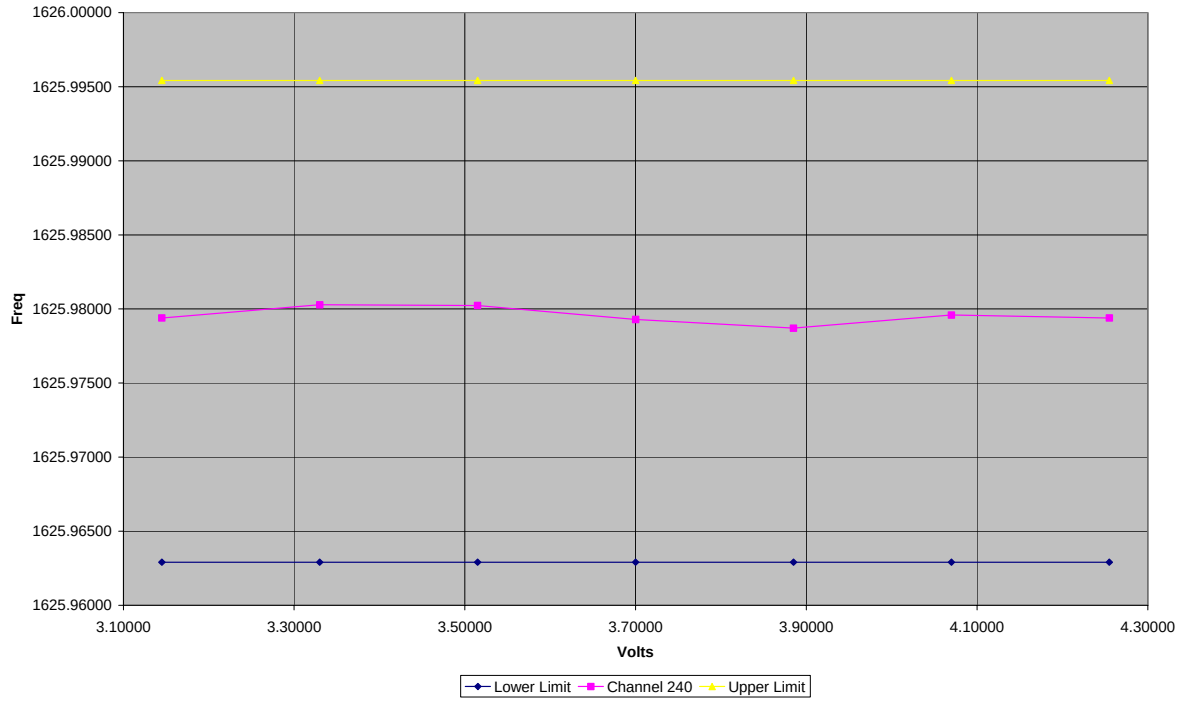
Channel 75 Frequency Stability - Voltage



Channel 150 Frequency Stability - Voltage



Channel 240 Frequency Stability - Voltage



ANNEX K

EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH006	3m Range ERP CAL	TRL	06/01/2006	12	06/01/2007
UH028	Log Periodic Ant	Schwarbeck	28/04/2005	24	28/04/2007
UH029	Bicone Antenna	Schwarbeck	27/04/2005	24	27/04/2007
UH041	Multimeter	AVOmeter	20/12/2005	12	20/12/2006
UH120	Spectrum Analyser	Marconi	15/03/2005	12	15/03/2006
UH122	Oscilloscope	Tektronix	07/06/2005	24	07/06/2007
UH132	Power meter	Marconi	03/01/2006	12	03/01/2007
UH162	ERP Cable Cal	TRL	06/01/2006	12	06/01/2007
UH177	Power Supply	Manson	Use Calibrated Multimeter		
UH179	Power Sensor	Marconi	14/12/2004	12	14/12/2005
UH191	Bilog	York	16/04/2004	24	16/04/2006
UH226	Bidirectional Coupler	Narda		Calibrate in use	
UH228	Power Sensor	Marconi	03/01/2006	12	03/01/2007
UH253	1m Cable N type	TRL	05/01/2006	12	05/01/2007
UH254	1m Cable N type	TRL	05/01/2006	12	05/01/2007
UH265	Notch filer	Telonic	24/06/2005	12	24/06/2006
L005	CMTA	R&S	05/12/2005	12	05/12/2006
L007	Loop Antenna	R&S	29/03/2005	24	29/03/2007
L011	Temperature Chamber	Shartree	Use Calibrated Temperature Indicator		
L138	1-18GHz Horn	EMCO	15/04/2005	24	15/04/2007
L139	1-18GHz Horn	EMCO	03/05/2005	24	03/05/2007
L176	Signal Generator	Marconi	31/01/2005	12	31/01/2006
L193	Bicone Antenna	Chase	12/10/2003	24	12/10/2005
L203	Log Periodic Ant	Chase	21/10/2003	24	21/10/2005
L221	Attenuator	Bird		Calibrate in use	
L222	Attenuator	Bird		Calibrate in use	
L248	RF Diode	Suhner		Calibrate in use	
L280	18GHz Cable	Rosenberger	05/01/2006	12	05/01/2007
L343	CCIR Noise Filter	TRL	07/06/2005	12	07/06/2006
L426	Temperature Indicator	Fluke	04/01/2006	12	04/01/2007
L479	Analyser	Anritsu	18/11/2005	12	18/11/2006
L552	Signal Generator	Agilent	25/04/2005	12	25/04/2006
N/A	Analyser	R&S			
N/A	30dB Pad	Narda		Calibrate in use	
N/A	30dB Pad	JFW		Calibrate in use	
N/A	Mambo Box	CCL		Not applicable	
N/A	High Pass Filter	AFL		Calibrate in use	

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**