EMC
TEST REPORT

CFR 47 FCC Part 2 and Part 27, Subpart C

Report No. : EME-070467

Model No. : MAX-100

Issued Date : Jun. 26, 2007

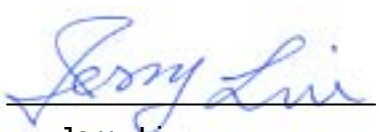
Applicant : ZyXEL Communications Corporation
6, Innovation Rd II, Science-Based Industrial Park,
Hsin-Chu, Taiwan

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer

Marx Yan

Reviewed By



Jerry Liu

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1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
RF Power Output	CFR 47, Part 2, Para 2.1046 CFR 47, Part 27, Para 27.50(h)	Pass
Occupied Bandwidth	CFR 47, Part 2, Para 2.1049 CFR 47, Part 27, Para 27.53(l)	Pass
Spurious Emission at Antenna Terminals	CFR 47, Part 2, Para 2.1051 CFR 47, Part 27, Para 27.53(l)	Pass
Field Strength of Spurious Radiation	CFR 47, Part 2, Para 2.1053 CFR 47, Part 15.209 CFR 47, Part 27, Para 27.53(l)	Pass
AC Power Line Conducted Emission	CFR 47, Part 15.207	Pass

2. General Information

Identification of the EUT

Applicant	: ZyXEL Communications Corporation
Product	: 2.5GHz WiMAX PCMCIA card
Model No.	: MAX-100
FCC ID.	: I88MAX100
Frequency Range	: 2496MHz to 2690MHz
Type(s) of Modulation	: QPSK, 16QAM
Emission Designator	: For 5MHz: 5M00G9W For 10MHz:10M0G9W
RF Power Output (EIRP)	: 24.28dBm at antenna terminals
Rated Power	: 3.3Vdc from Notebook PC
Power Cord	: N/A
Sample Received	: May 21, 2007
Test Date(s)	: Jun. 22, 2007 ~ Jun. 26, 2007

EUT RF Profile of WiMax forum:

1. RF Profile:

Frequency Range (GHz)	Channel Frequency Step (kHz)	Channel Bandwidth(s)(MHz)	FFT size	Duplexing Mode
2.496 – 2.69	250	5	512	TDD
		10	1024	TDD

2. PHY Parameter:

Parameter	Uplink	Uplink
System Bandwidth	5MHz	10MHz
FFT Size	512	1024
Null Sub-Carriers	104	184
Pilot Sub-Carriers	136	280
Data Sub-Carriers	272	560
Sub-Channels	17	35
Symbol Period, Ts	102.9 microseconds	
Frame Duration	5 millisecond	
OFDM Symbols/Frame	48	
Data OFDM Symbols	44	
Modulations	QPSK 1/2 CTC , QPSK 3/4 CTC 16QAM 1/2 CTC , 16QAM 3/4 CTC	

Description of EUT

The EUT is a 2.5GHz WiMAX PCMCIA card, it has two type of Bandwidth, one is 5MHz the other is 10MHz and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

The EUT used Runcom’s chips for WiMAX solution.
All test have been done in accordance with the WiMAX standard IEEE 802.16e-2005. and with compliance to the MRCT requirements.
(Ref. Runcom Technologies Ltd MSS Test results)

Antenna description

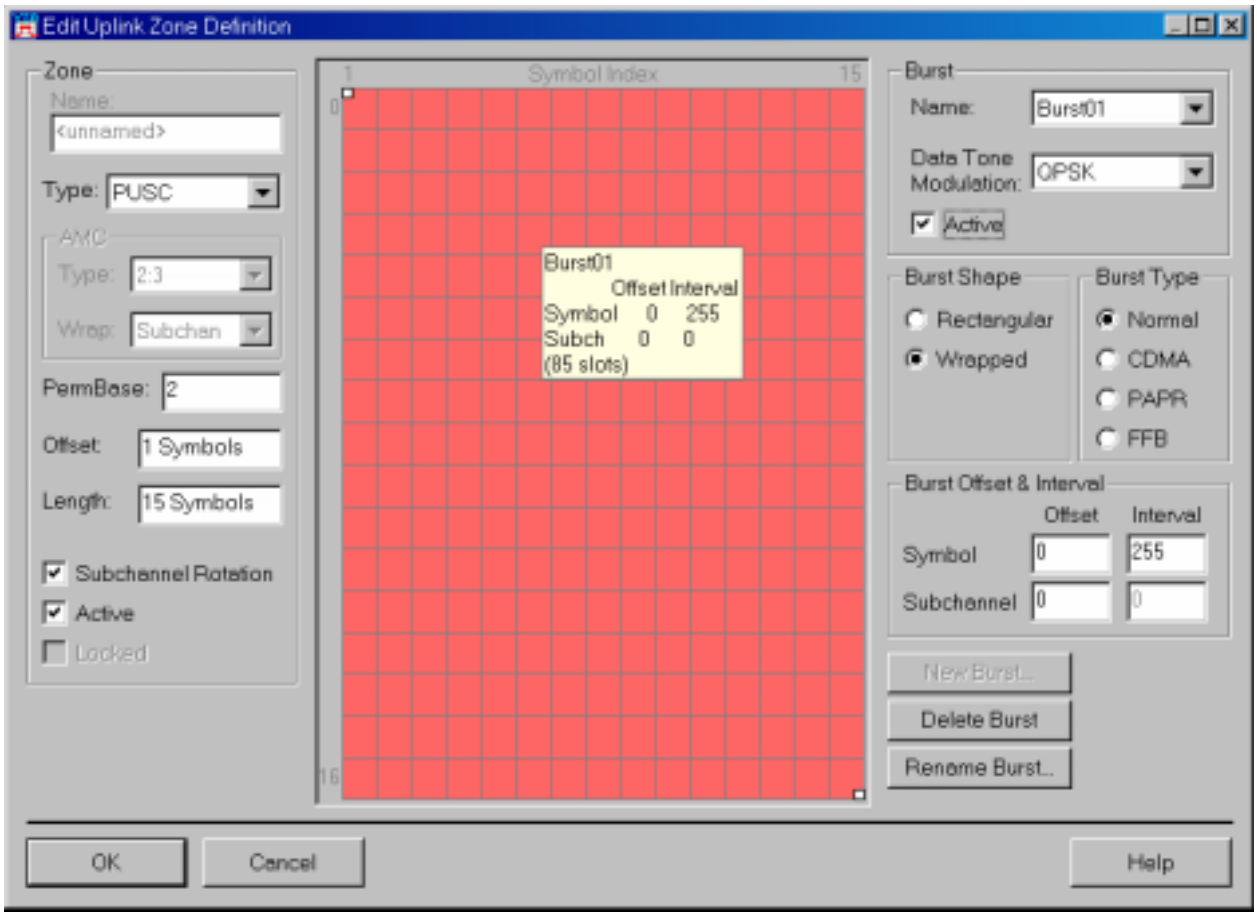
The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain	: 2dBi max
Antenna Type	: Dipole antenna
Connector Type	: U.FL-R-SMT

Test description

Since the EUT has 16QAM and QPSK modulation, after verifying both modulations, the maximum output power and the worst case were found at OFDMA QPSK 1/2 for 5 MHz Bandwidth and 10 MHz Bandwidth. The final tests has been executed under these conditions and recorded in this report individually.

The EUT was transmitted continuously during the test and subchannelizations as below (for 5MHz. &10MHz Bandwidth)



3. RF Power Output (EIRP Power)

Name of Test	RF Power Output
Base Standard	FCC 2.1046 & 27.50(h)

Tested By: Marx Yan
Test Date: Jun. 22, 2007

Test Equipment: EC396

Test Result: Complies
Test Procedure and Setup: See Appendix A
Measurement Data: See Table1.

Note: The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

Table1. EIRP

QPSK 1/2

Frequency (MHz)	Power Meter Reading (dBm)	Cable Loss (dB)	Ant. Gain (dBi)	EIRP (dBm)	Limit (dBm)	Band Width (MHz)
2500	20.65	1.5	2	24.15	33	5
2590	20.78	1.5	2	24.28	33	5
2685	18.88	1.5	2	22.38	33	5
2505	20.63	1.5	2	24.13	33	10
2590	20.54	1.5	2	24.04	33	10
2685	18.70	1.5	2	22.20	33	10

QPSK 3/4

Frequency (MHz)	Power Meter Reading (dBm)	Cable Loss (dB)	Ant. Gain (dBi)	EIRP (dBm)	Limit (dBm)	Band Width (MHz)
2500	20.48	1.5	2	23.98	33	5
2590	20.65	1.5	2	24.15	33	5
2685	18.77	1.5	2	22.27	33	5
2505	20.51	1.5	2	24.01	33	10
2590	20.41	1.5	2	23.91	33	10
2685	18.62	1.5	2	22.12	33	10

16QAM 1/2

Frequency (MHz)	Power Meter Reading (dBm)	Cable Loss (dB)	Ant. Gain (dBi)	EIRP (dBm)	Limit (dBm)	Band Width (MHz)
2500	20.39	1.5	2	23.89	33	5
2590	20.51	1.5	2	24.01	33	5
2685	18.67	1.5	2	22.17	33	5
2505	20.44	1.5	2	23.94	33	10
2590	20.33	1.5	2	23.83	33	10
2685	18.53	1.5	2	22.03	33	10

16QAM 3/4

Frequency (MHz)	Power Meter Reading (dBm)	Cable Loss (dB)	Ant. Gain (dBi)	EIRP (dBm)	Limit (dBm)	Band Width (MHz)
2500	20.33	1.5	2	23.83	33	5
2590	20.48	1.5	2	23.98	33	5
2685	18.59	1.5	2	22.09	33	5
2505	20.34	1.5	2	23.84	33	10
2590	20.25	1.5	2	23.75	33	10
2685	18.41	1.5	2	21.91	33	10

Remark: EIRP= Power Meter Reading + Cable Loss + Ant. Gain

4. Occupied Bandwidth

Name of Test	Occupied Bandwidth
Base Standard	FCC 2.1049 & 27.53(l)

Tested By: Marx Yan
Test Date: Jun. 26, 2007

Test Equipment: EC365

Test Result: Complies
Test Procedure and Setup: See Appendix B
Measurement Data: See attached plots

Note: The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

Frequency (MHz)	Bandwidth (MHz)
2500	5.04
2590	4.95
2685	4.98
2505	9.66
2590	9.66
2685	9.66

Figure 1. Occupied Bandwidth @ low channel (5MHz)

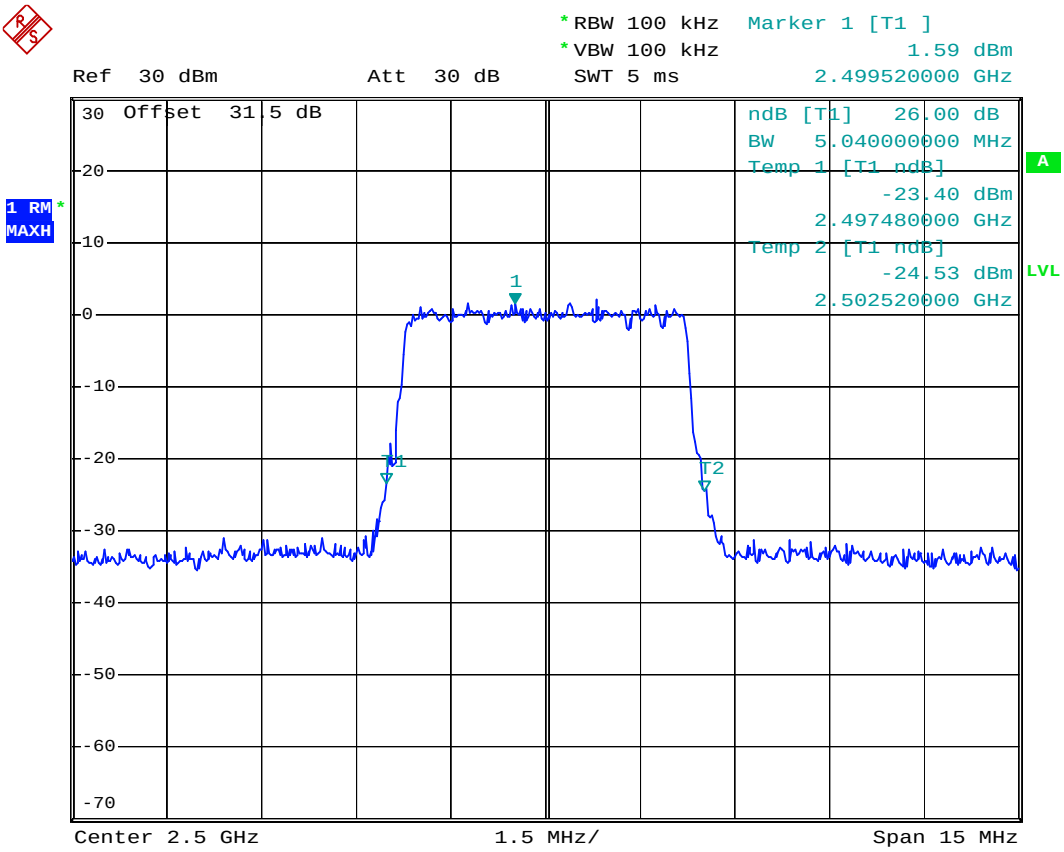


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Figure 2. Occupied Bandwidth @ middle channel (5MHz)

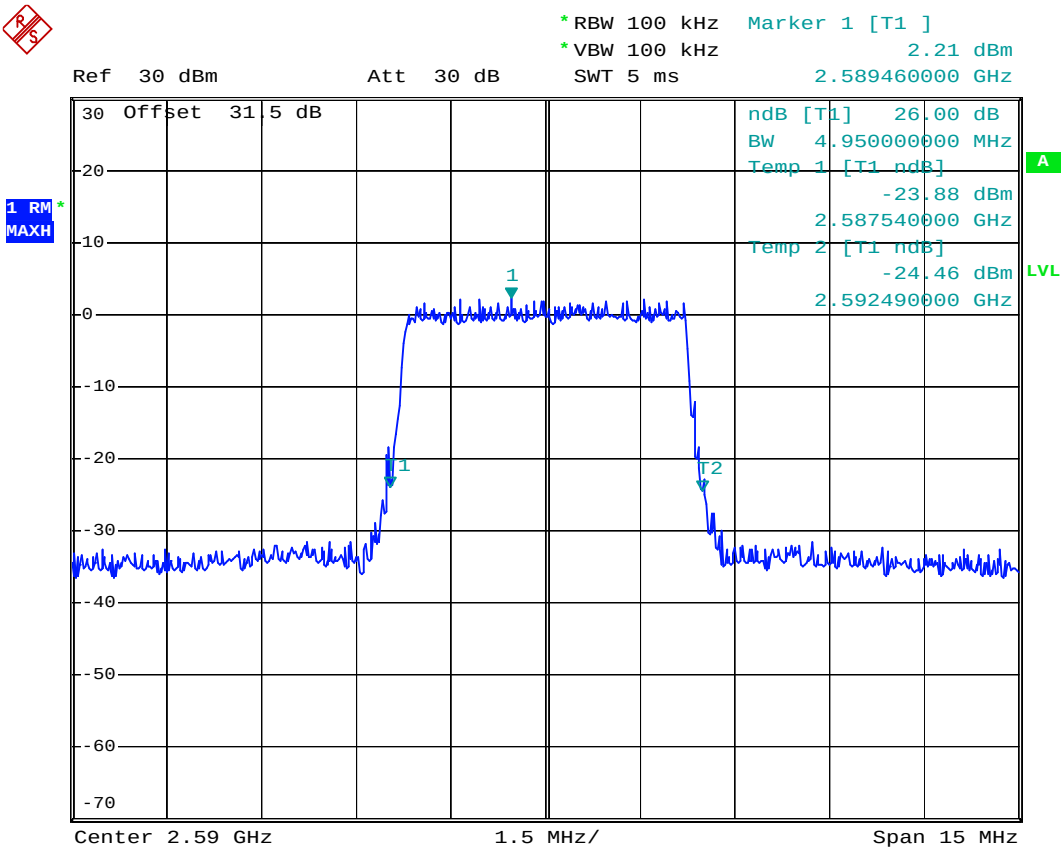

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Figure 3. Occupied Bandwidth @ high channel (5MHz)

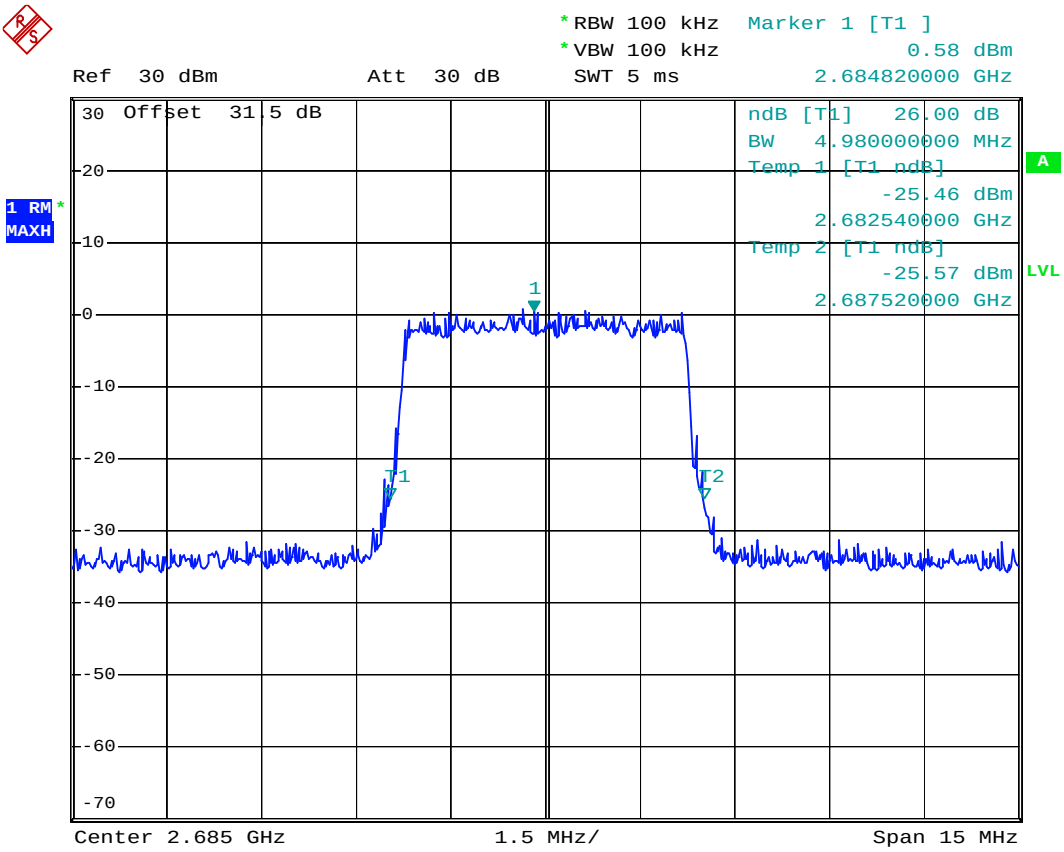

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Figure 4. Occupied Bandwidth @ low channel (10MHz)

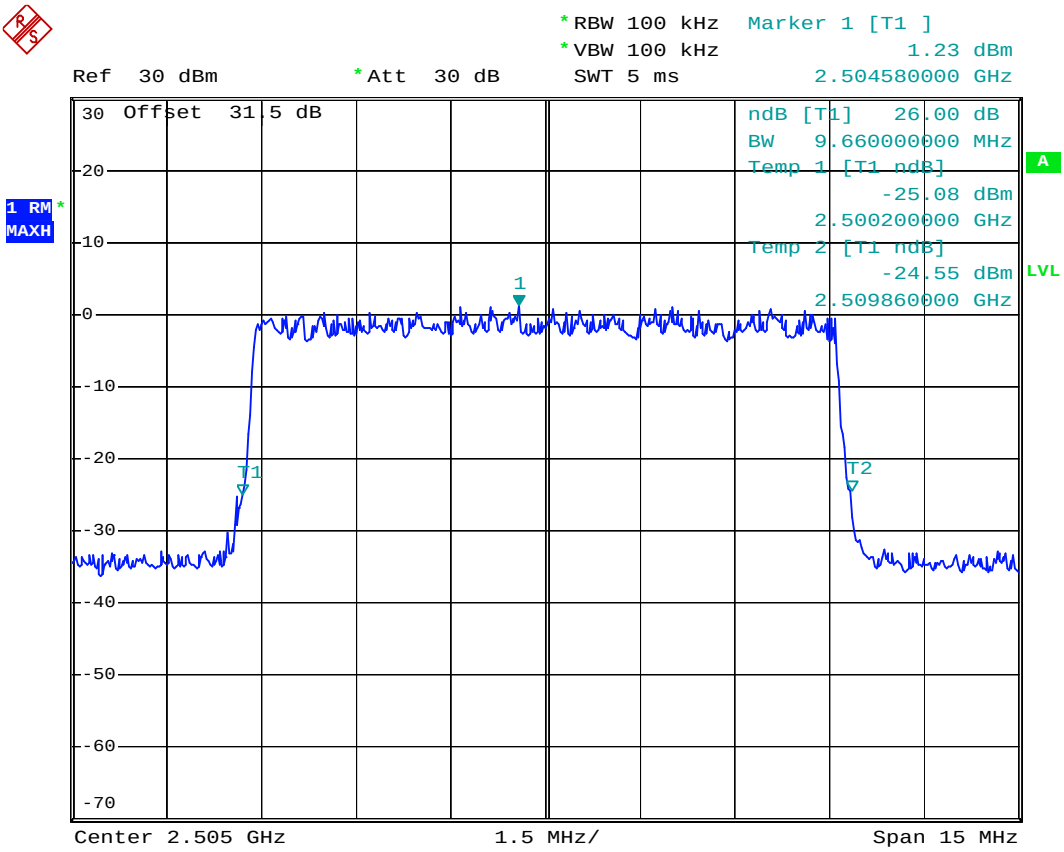

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Figure 5. Occupied Bandwidth @ middle channel (10MHz)

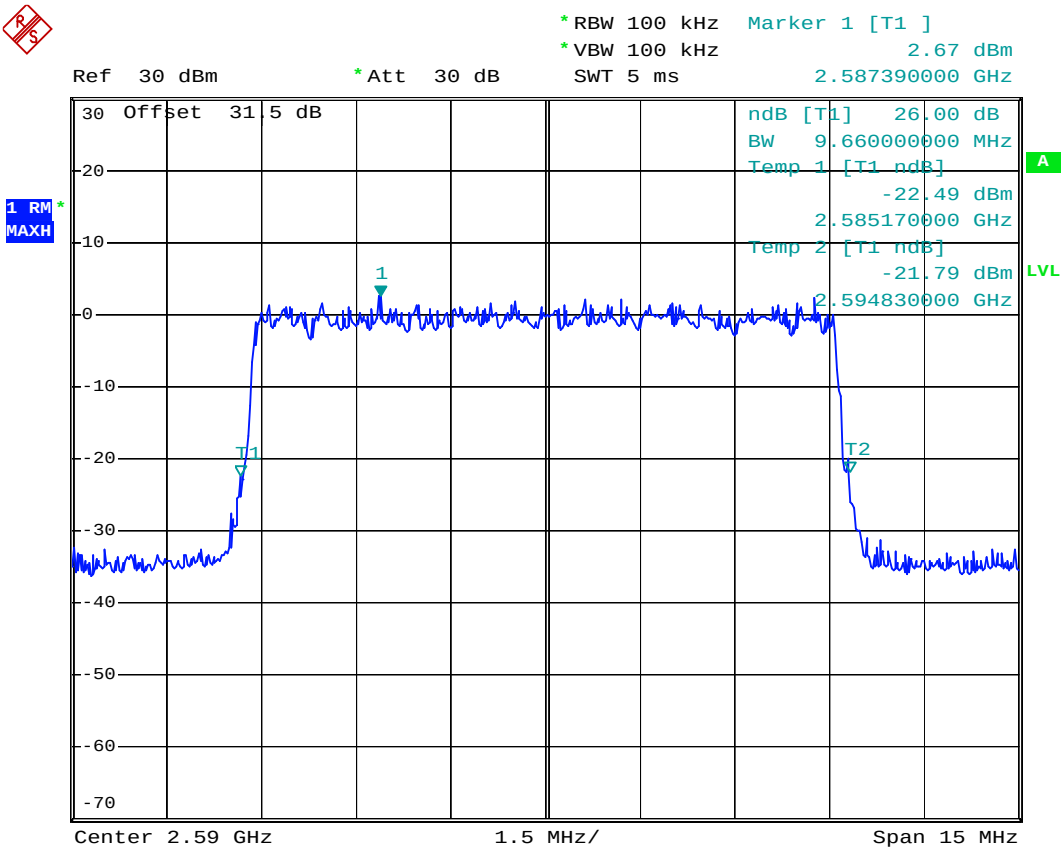

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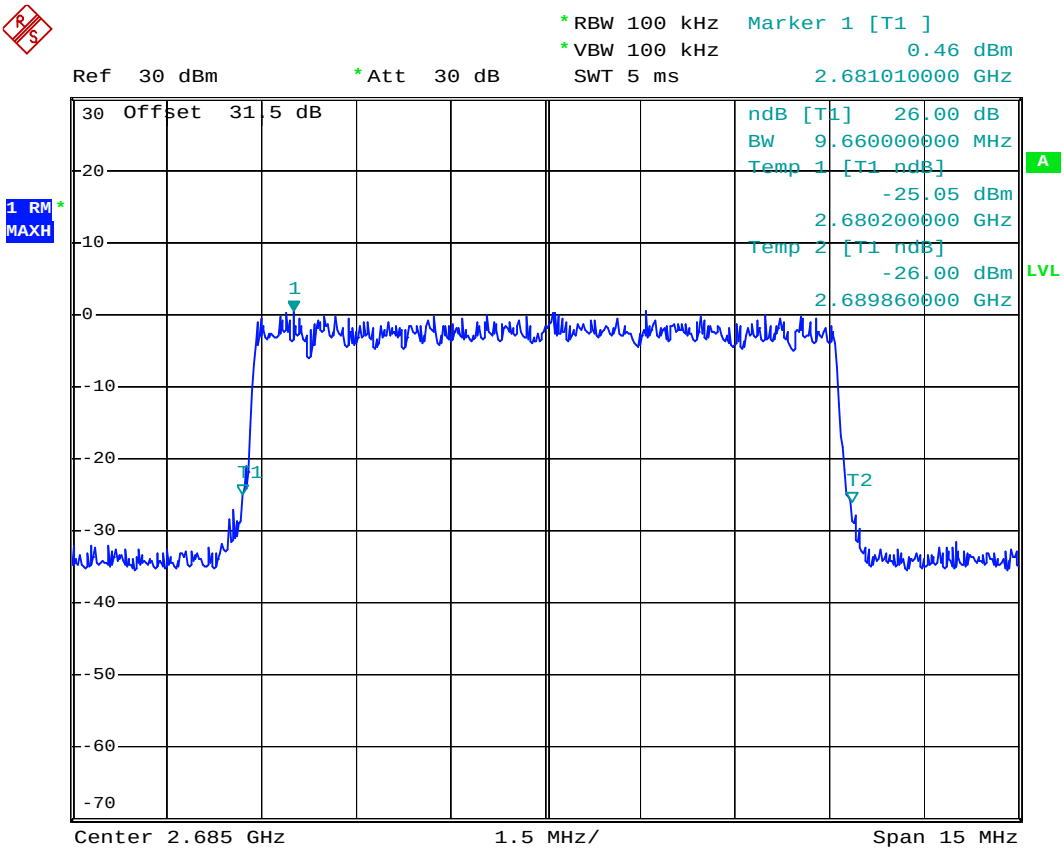
Figure 6. Occupied Bandwidth @ high channel (10MHz)



5. Spurious Emissions at Antenna Terminals

Name of Test	Spurious Emission at Antenna Terminals
Base Standard	FCC 2.1051 & 27.53(l)

Tested By: Marx Yan
Test Date: Jun. 22, 2007

Test Equipment: EC365

Test Result: Complies
Test Procedure and Setup: See Appendix C
Measurement Data: See attached plots

Note: (1) The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.
(2) The EUT operating at 2.5GHz band. Frequency Range scanned from 30MHz to 27GHz.

Figure 7. Lower Band Edge (5MHz)

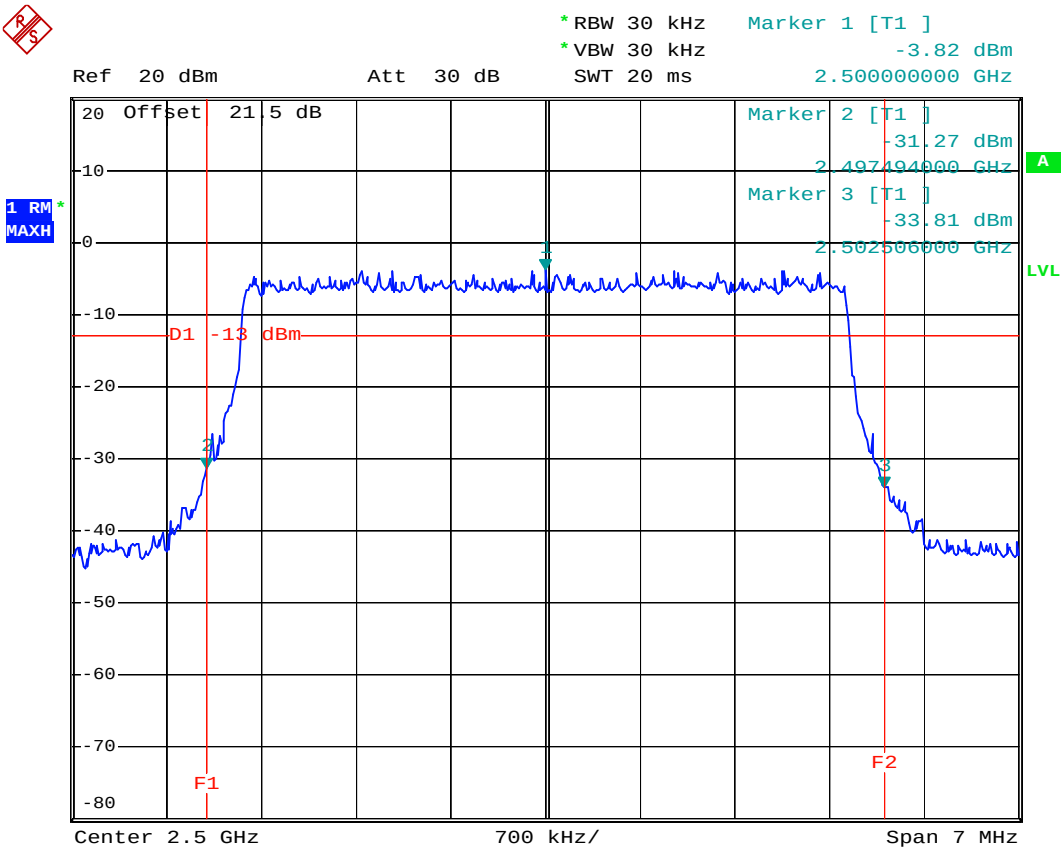


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Figure 8. Upper Band Edge (5MHz)

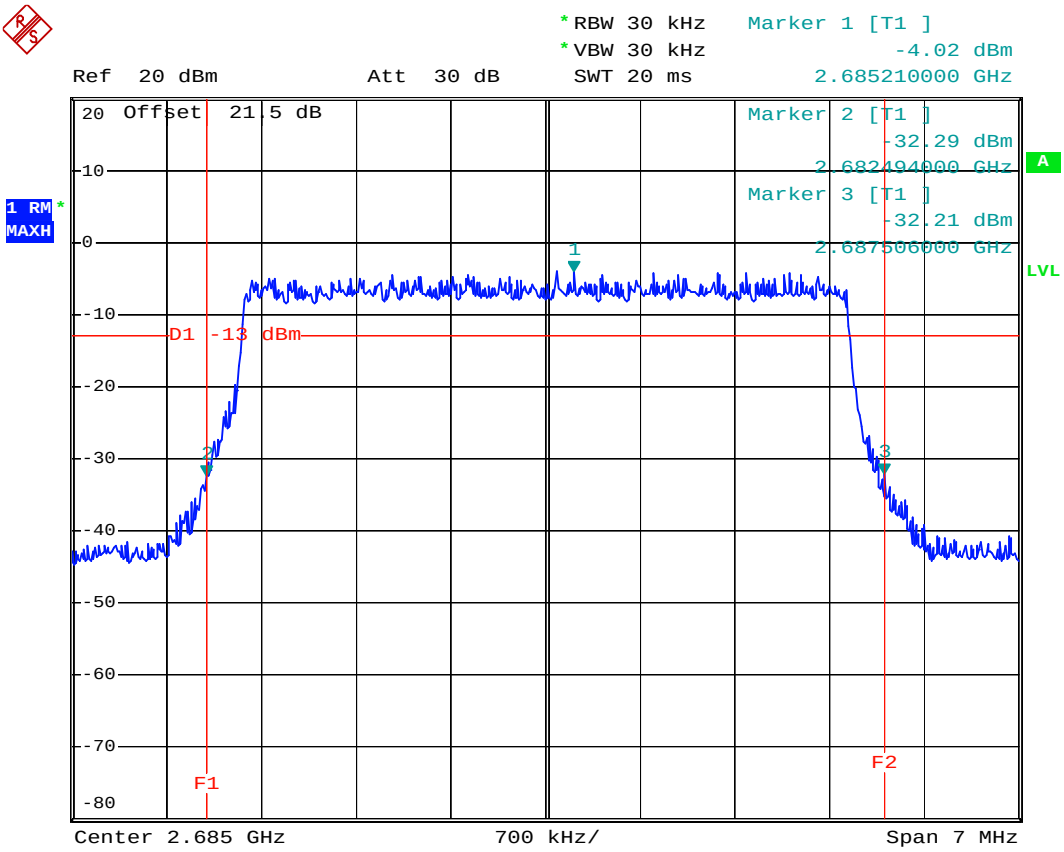

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Figure 9. Lower Band Edge (10MHz)

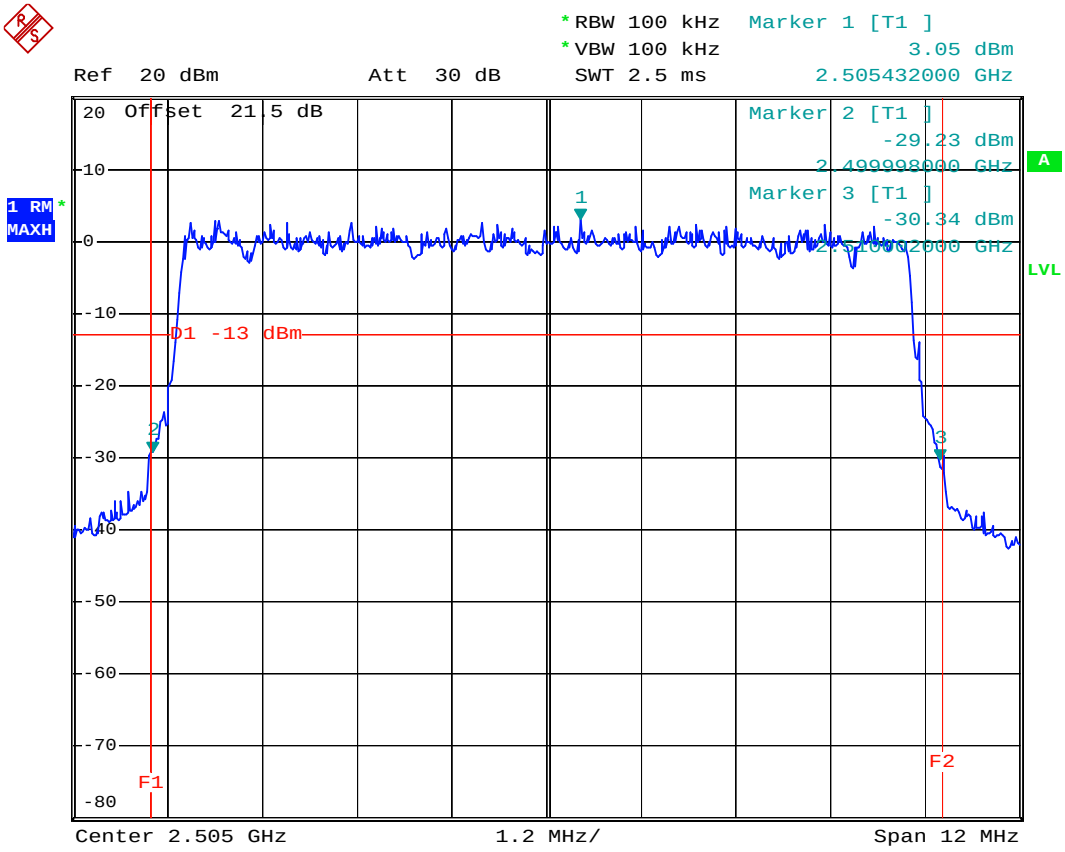

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Figure 10. Upper Band Edge (10MHz)

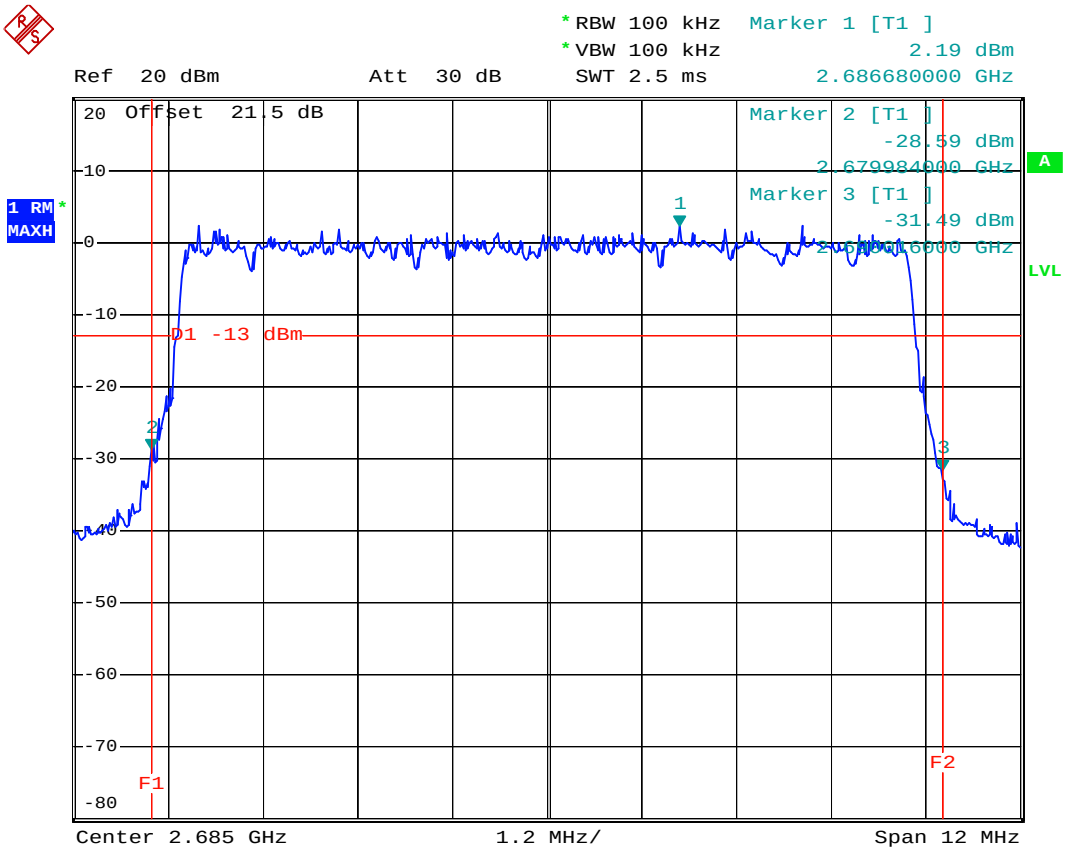

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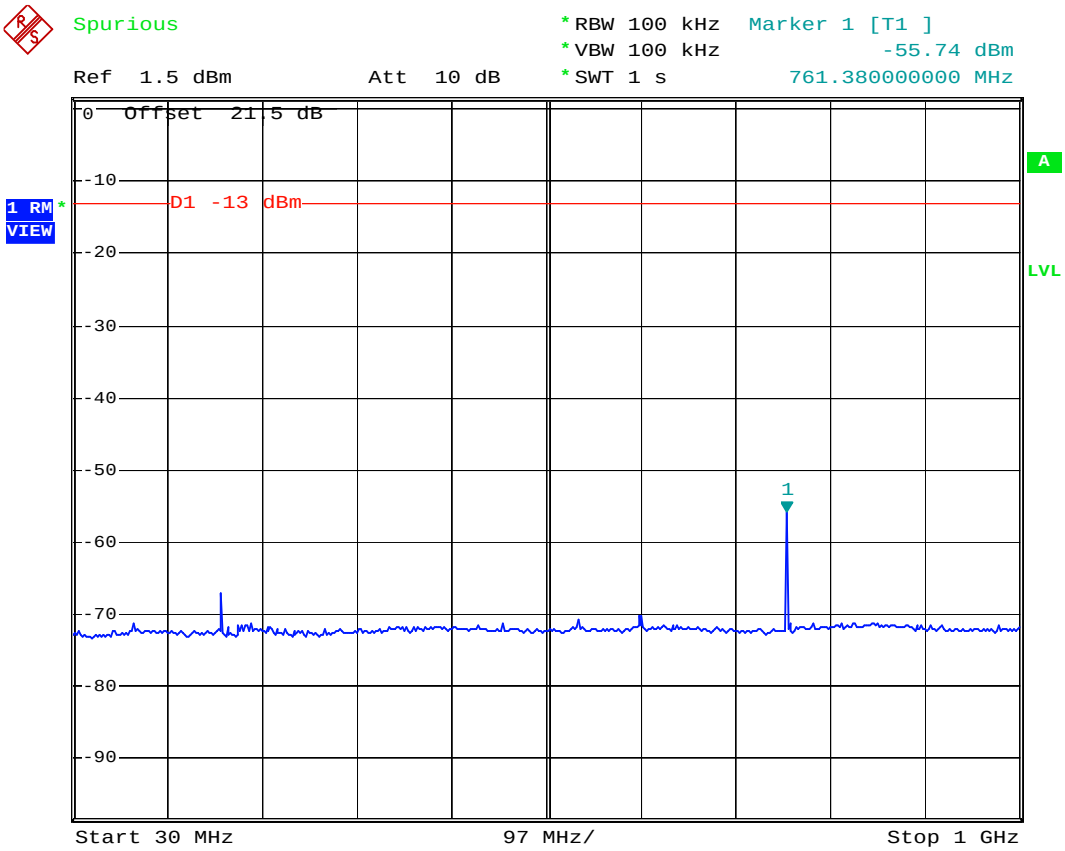
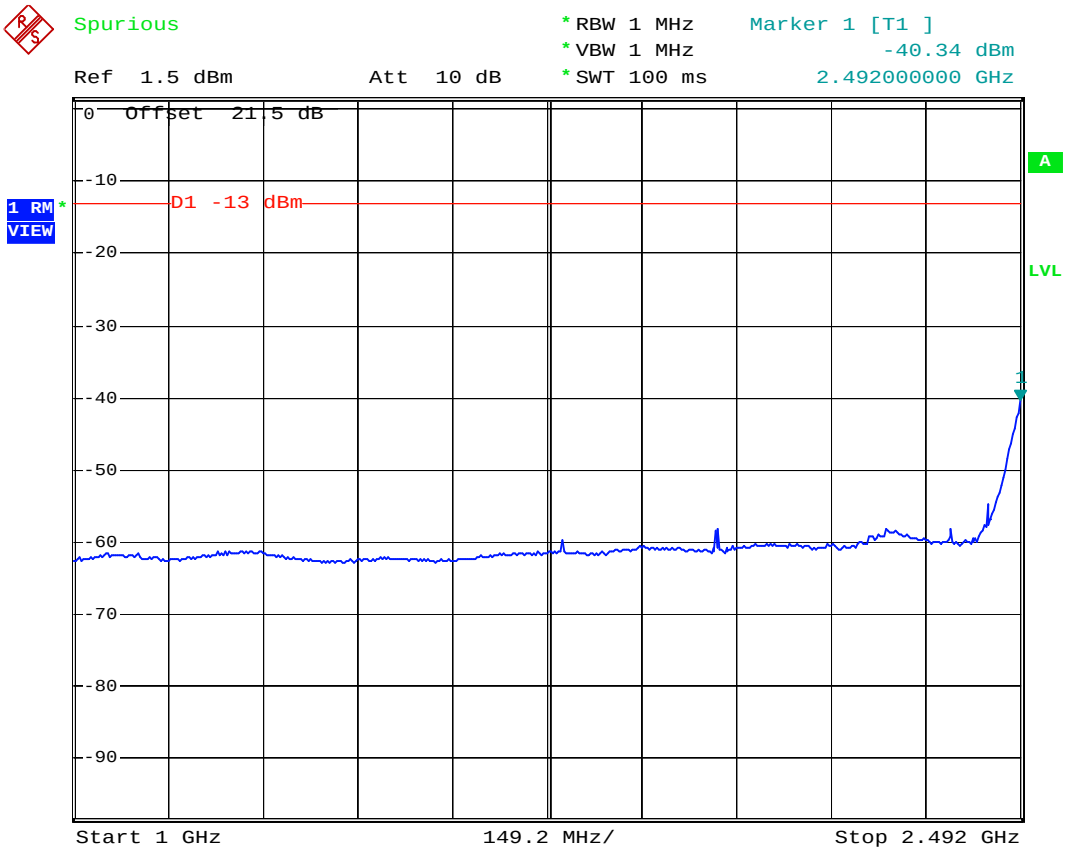
Figure 11. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 1 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:36:30

Figure 12. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 2 of 8



2500MHz at Test mode

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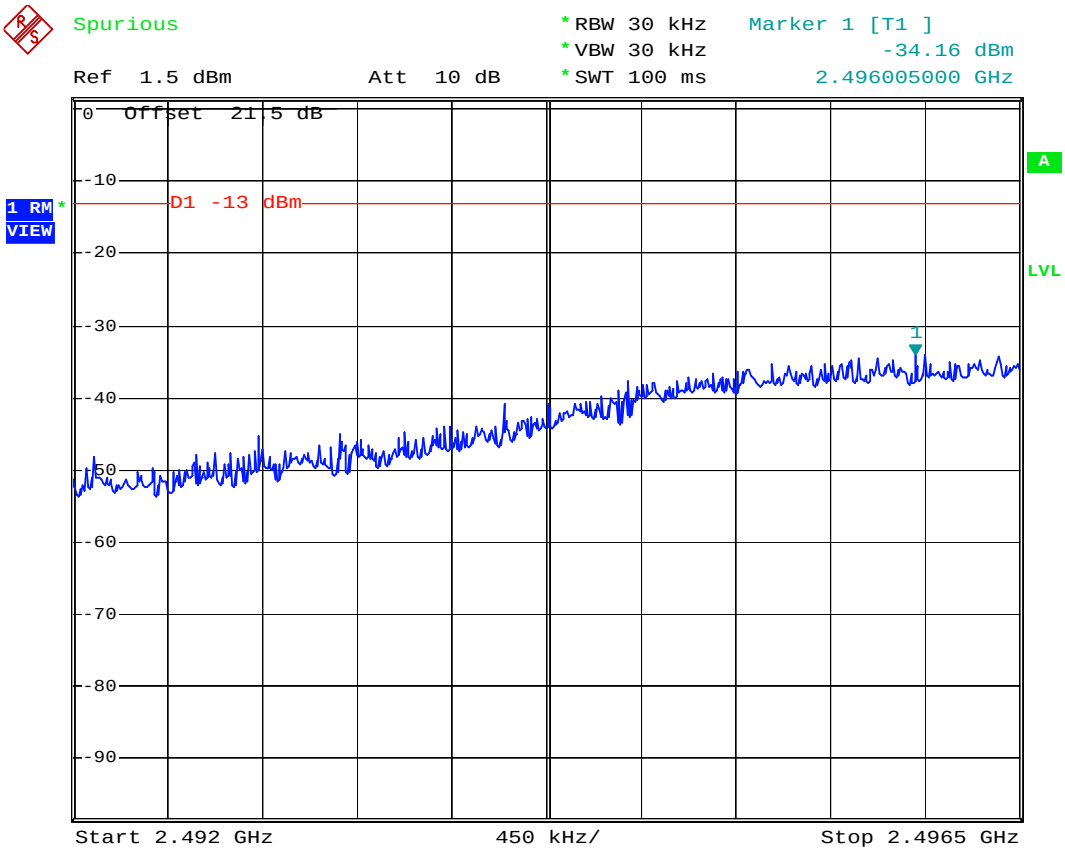
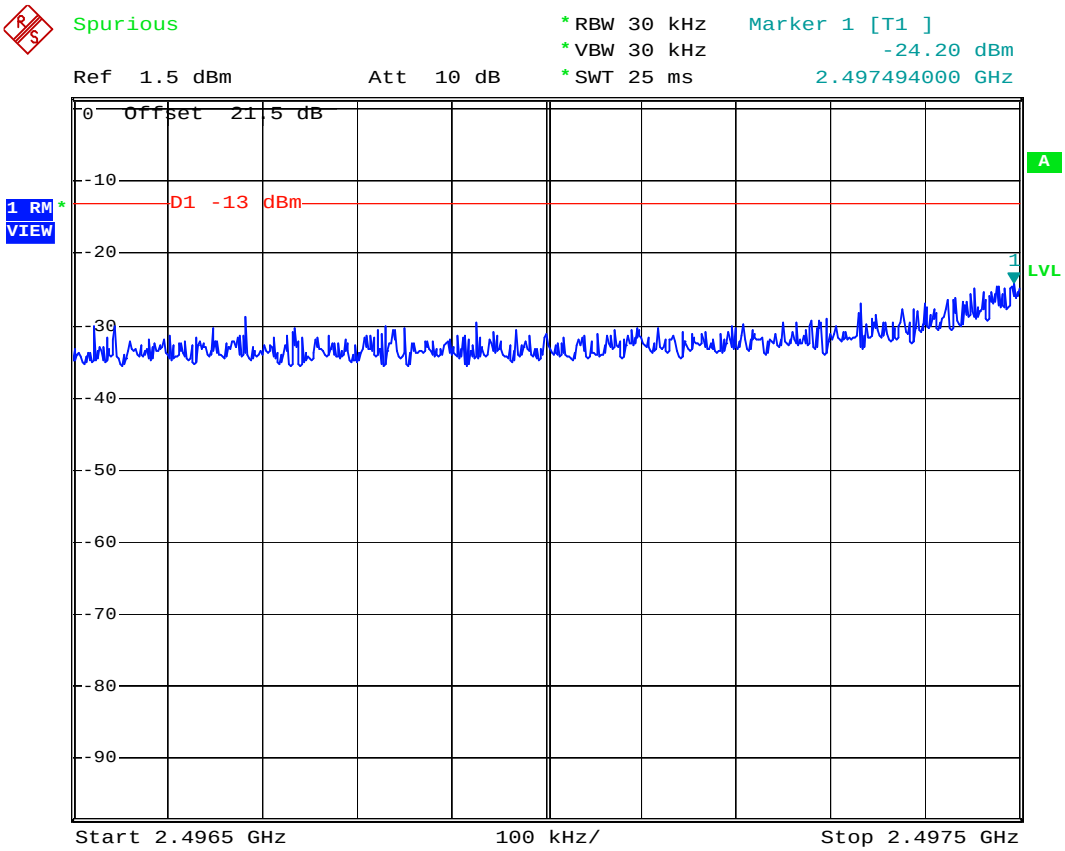
Figure 13. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 3 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:37:04

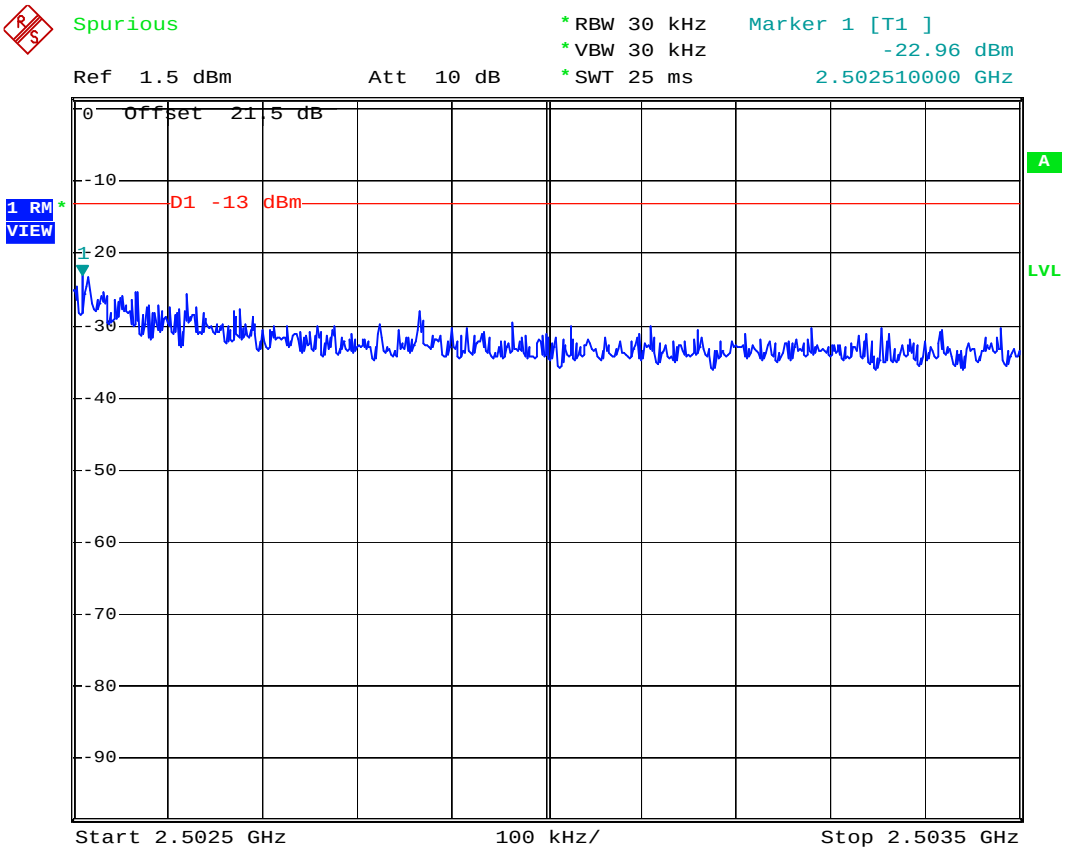
Figure 14. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 4 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:37:22

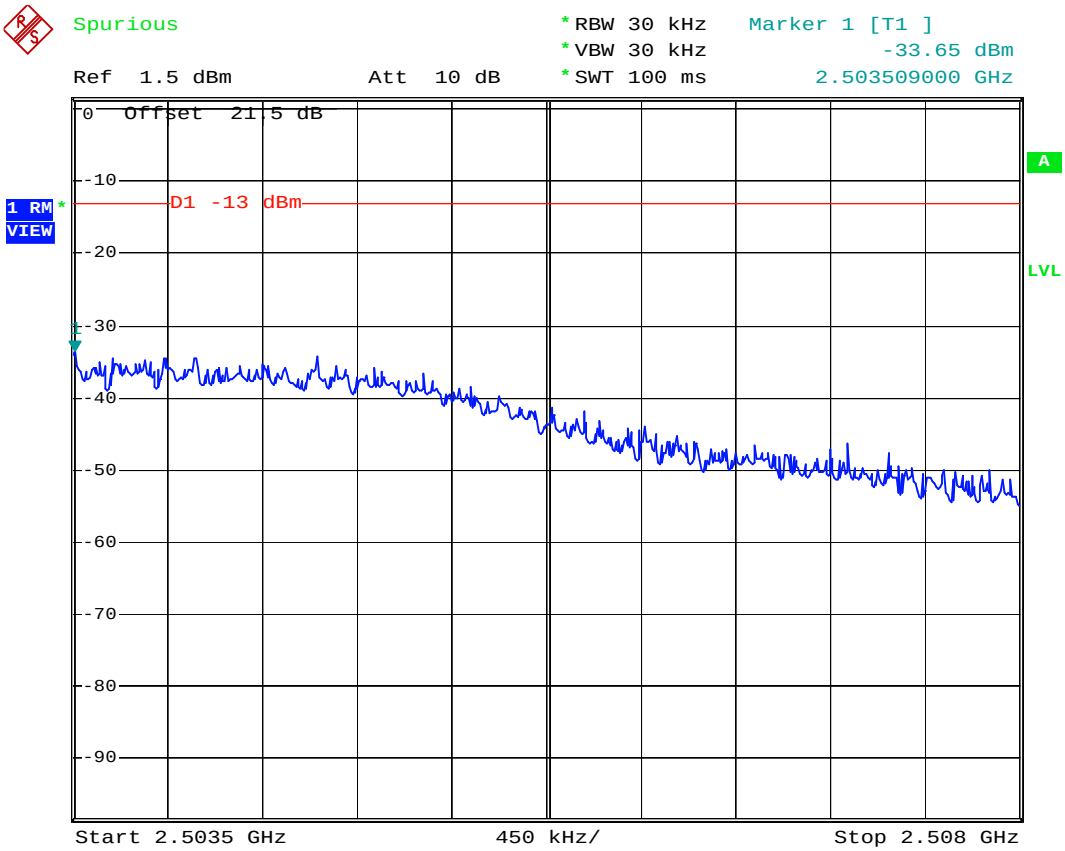
Figure 15. Spurious Emission at Antenna Terminals @ low channel (5MHz) – 5 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:37:28

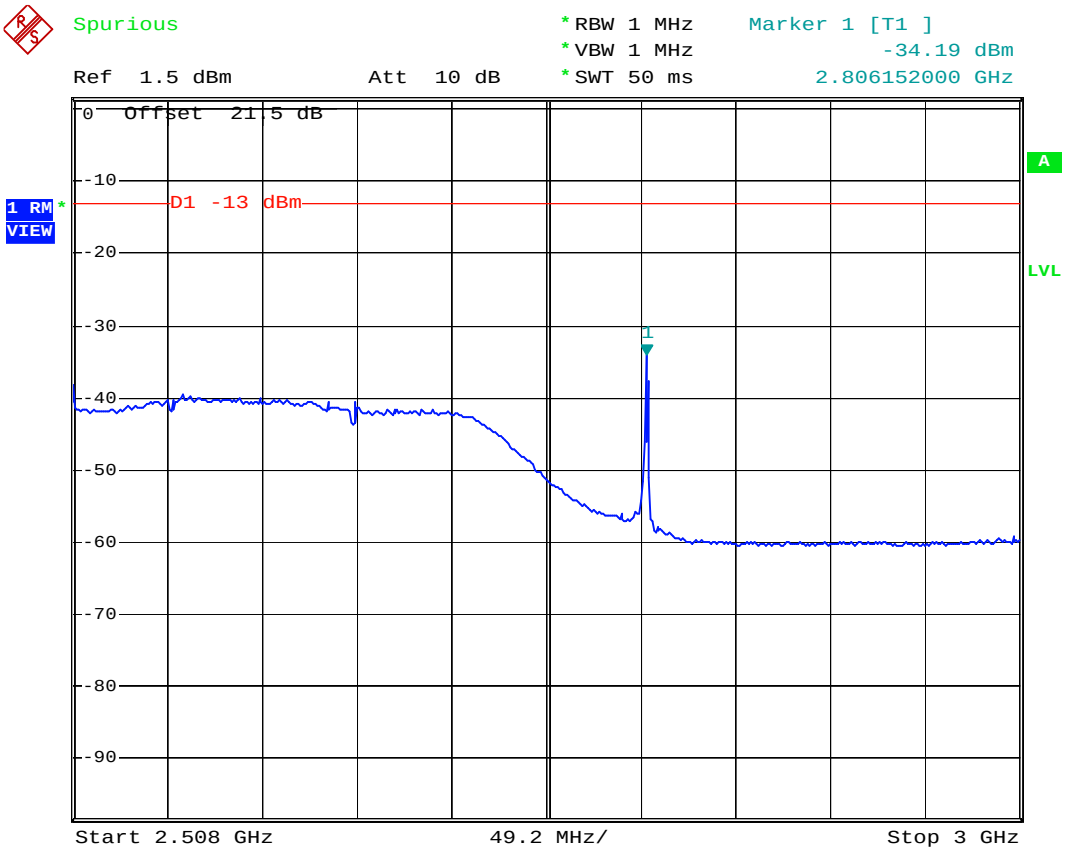
Figure 16. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 6 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:37:45

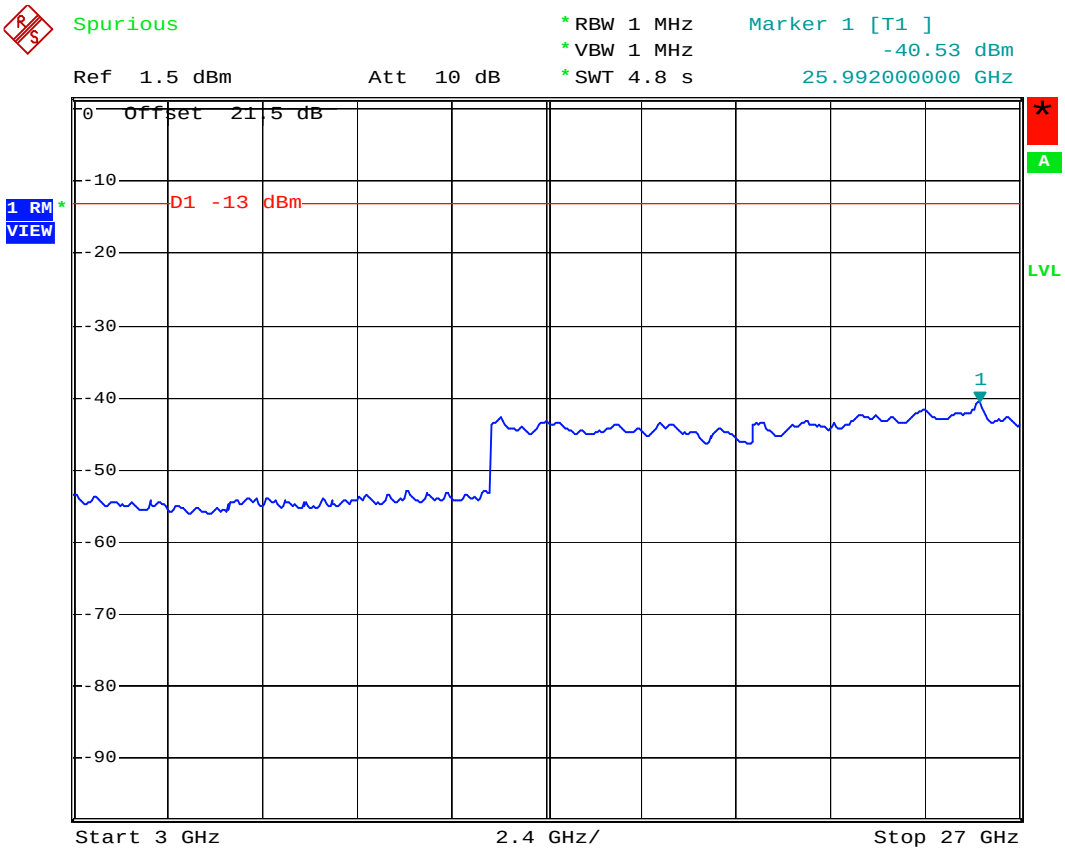
Figure 17. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 7 of 8



2500MHz at Test mode

Date: 22.JUN.2007 17:37:53

Figure 18. Spurious Emission at Antenna Terminals @ low channel (5MHz) - 8 of 8



2500MHz at Test mode

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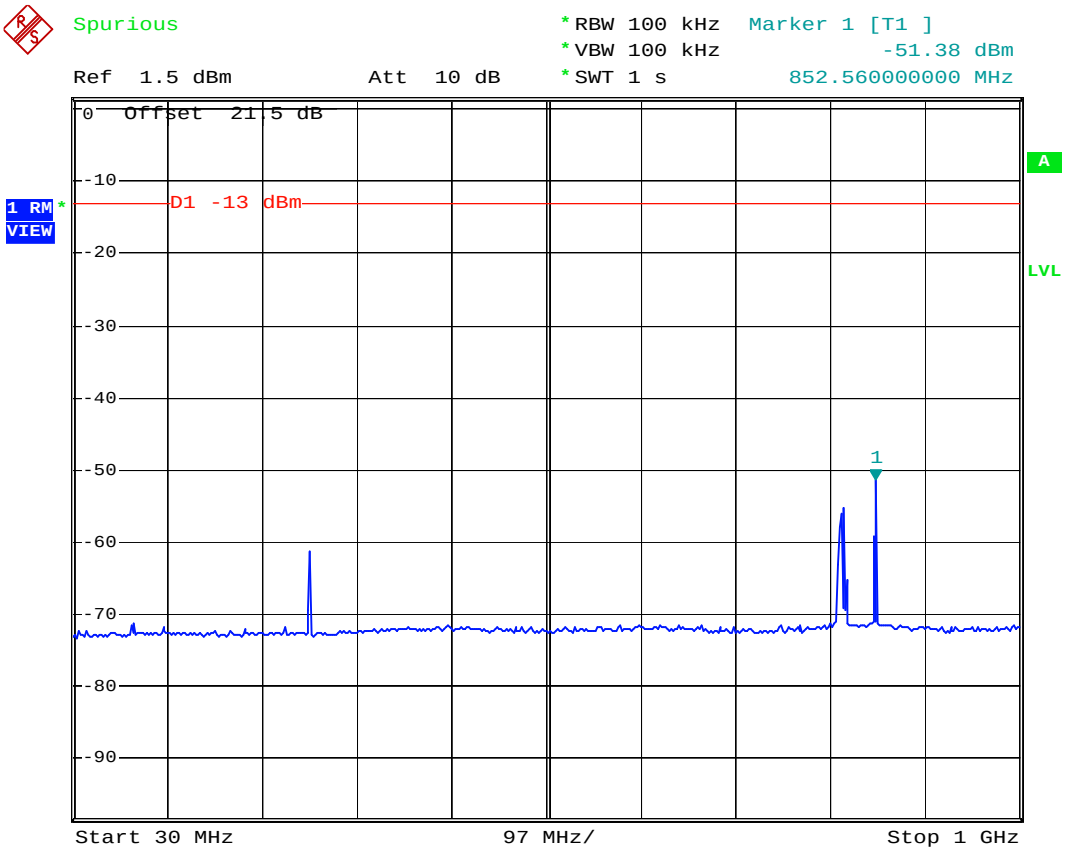
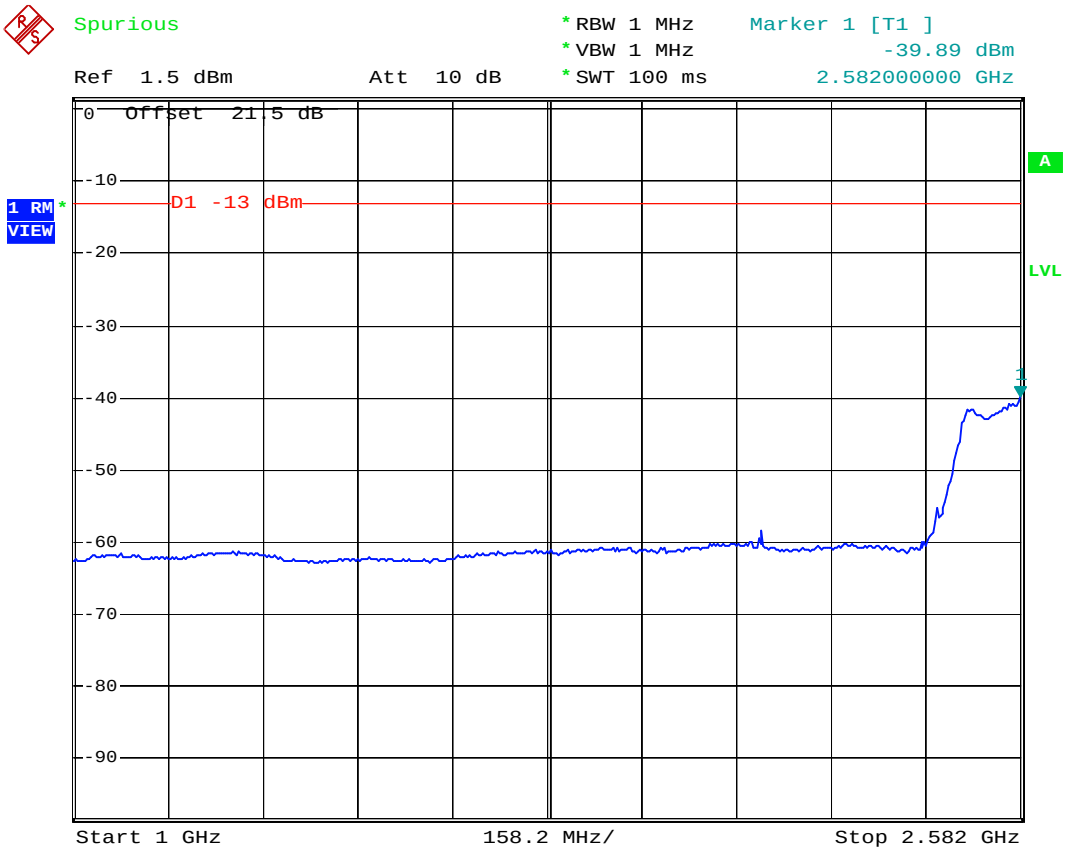
Figure 19. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 1 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:40:20

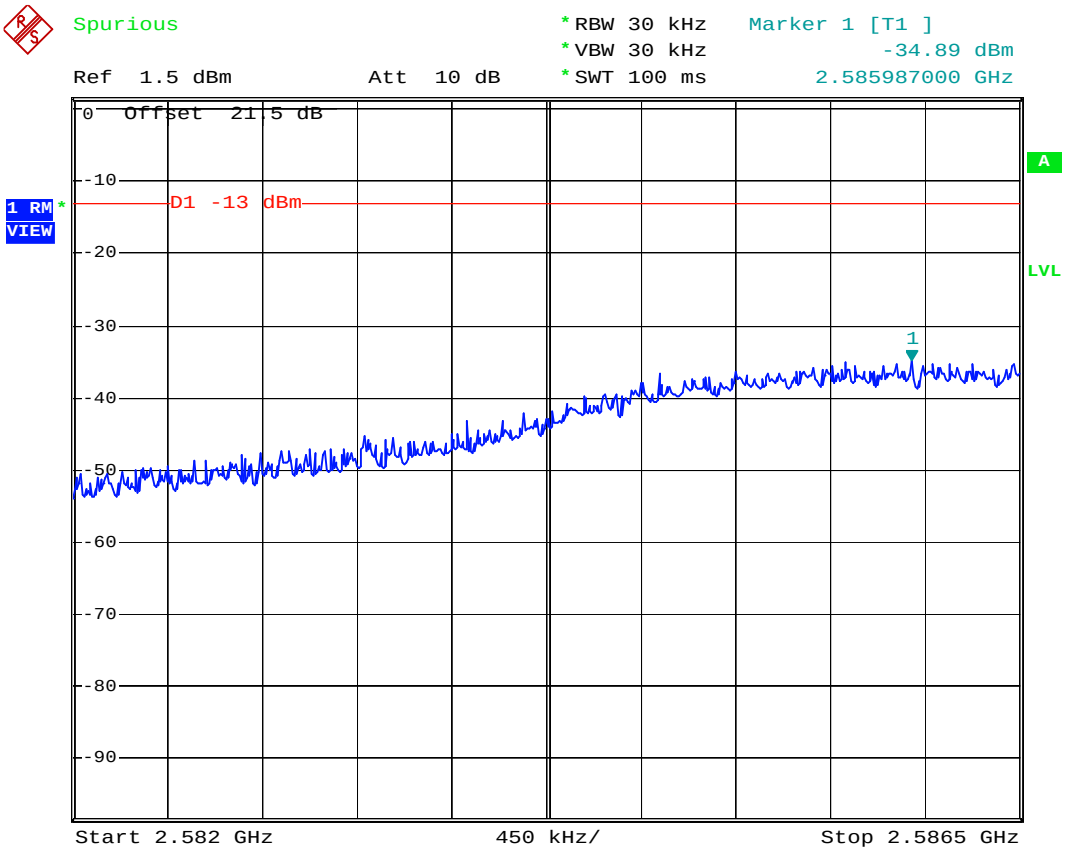
Figure 20. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 2 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:40:41

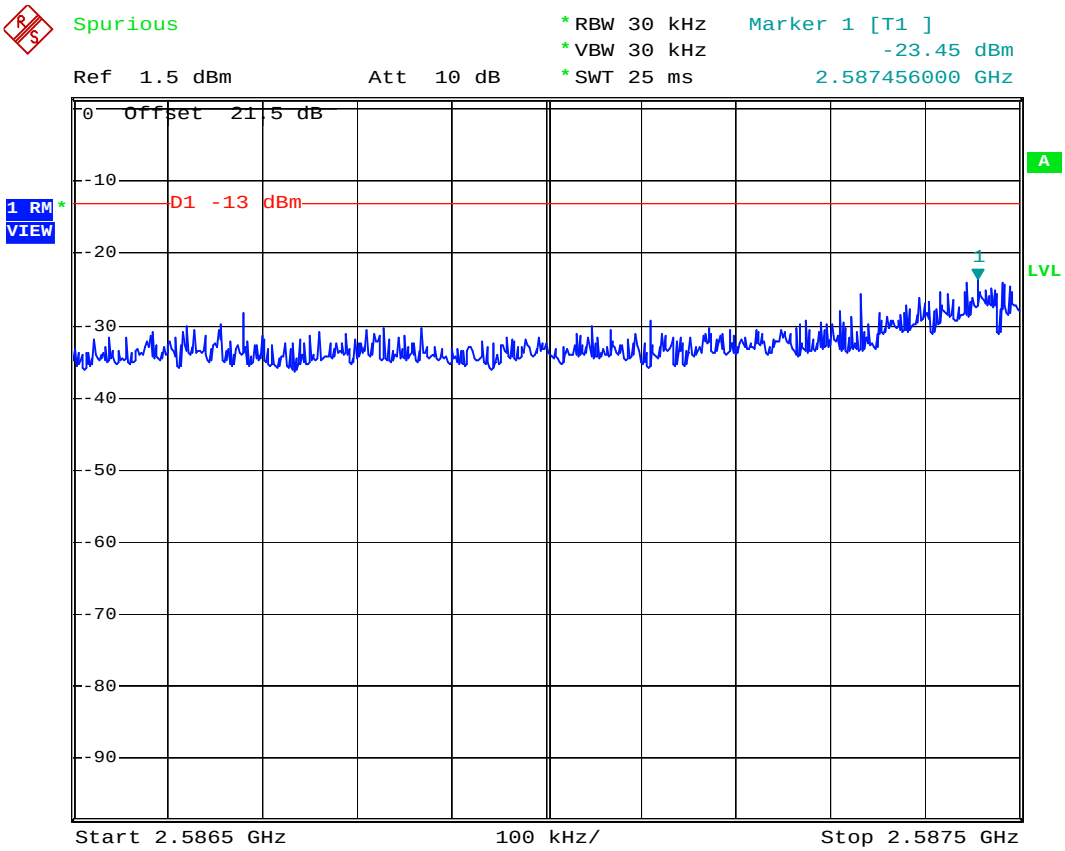
Figure 21. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 3 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:40:48

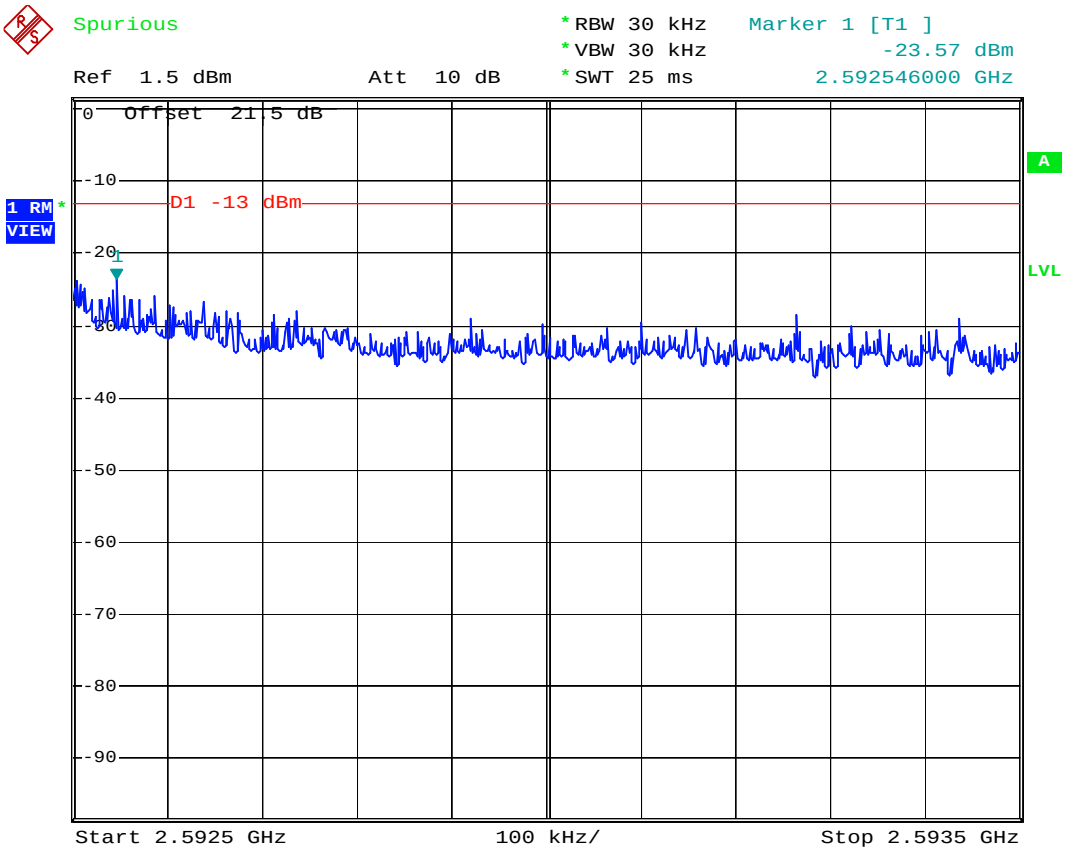
Figure 22. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 4 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:41:05

Figure 23. Spurious Emission at Antenna Terminals @ middle channel (5MHz) – 5 of 8



2590MHz at Test mode

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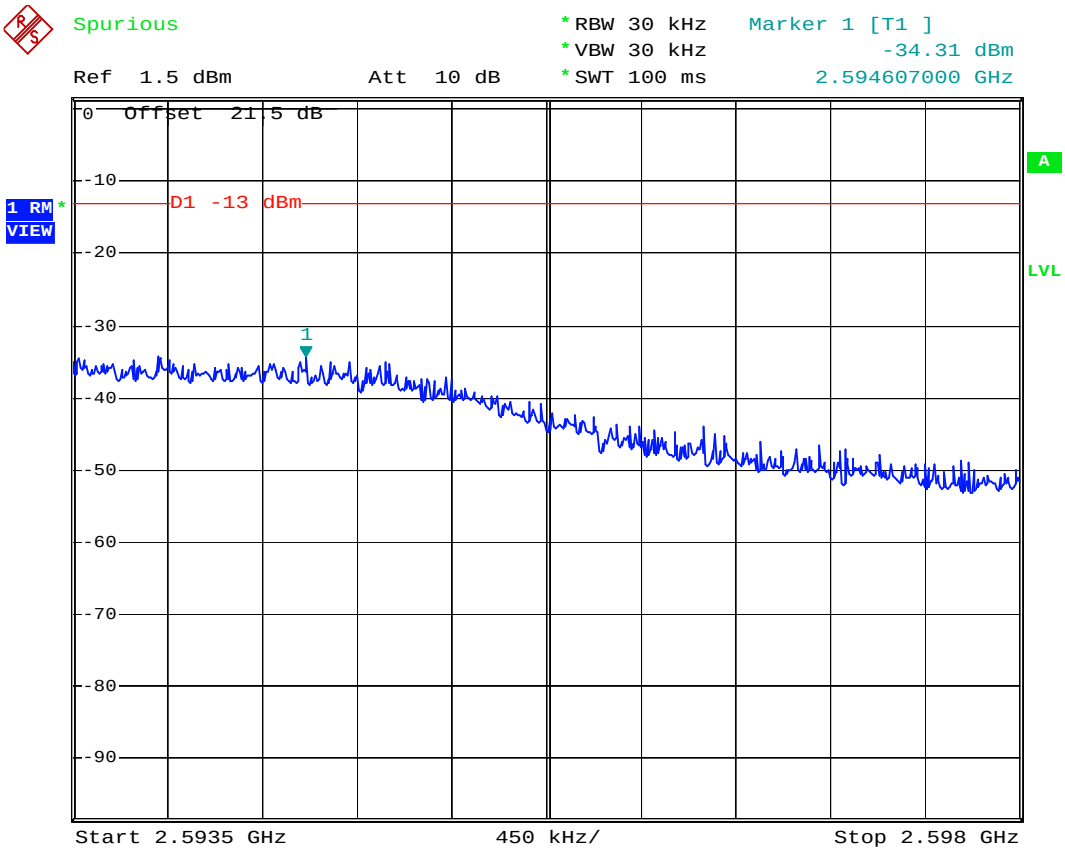
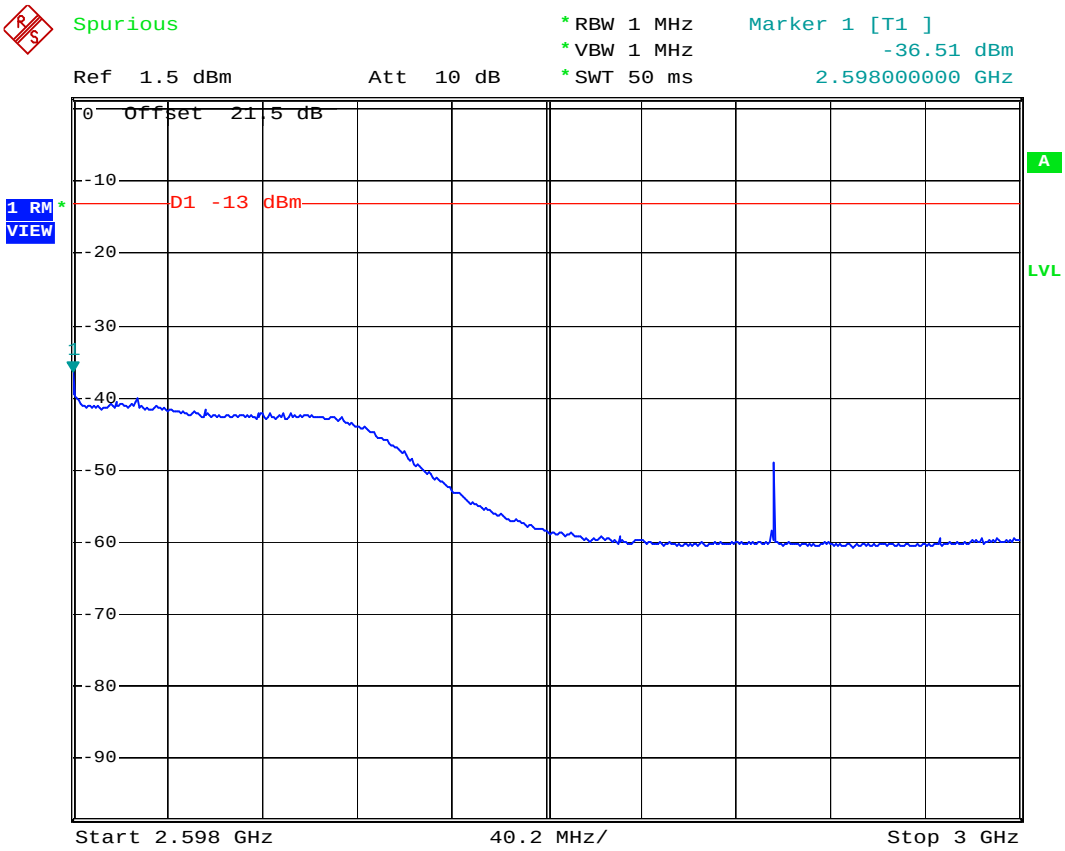
Figure 24. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 6 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:41:28

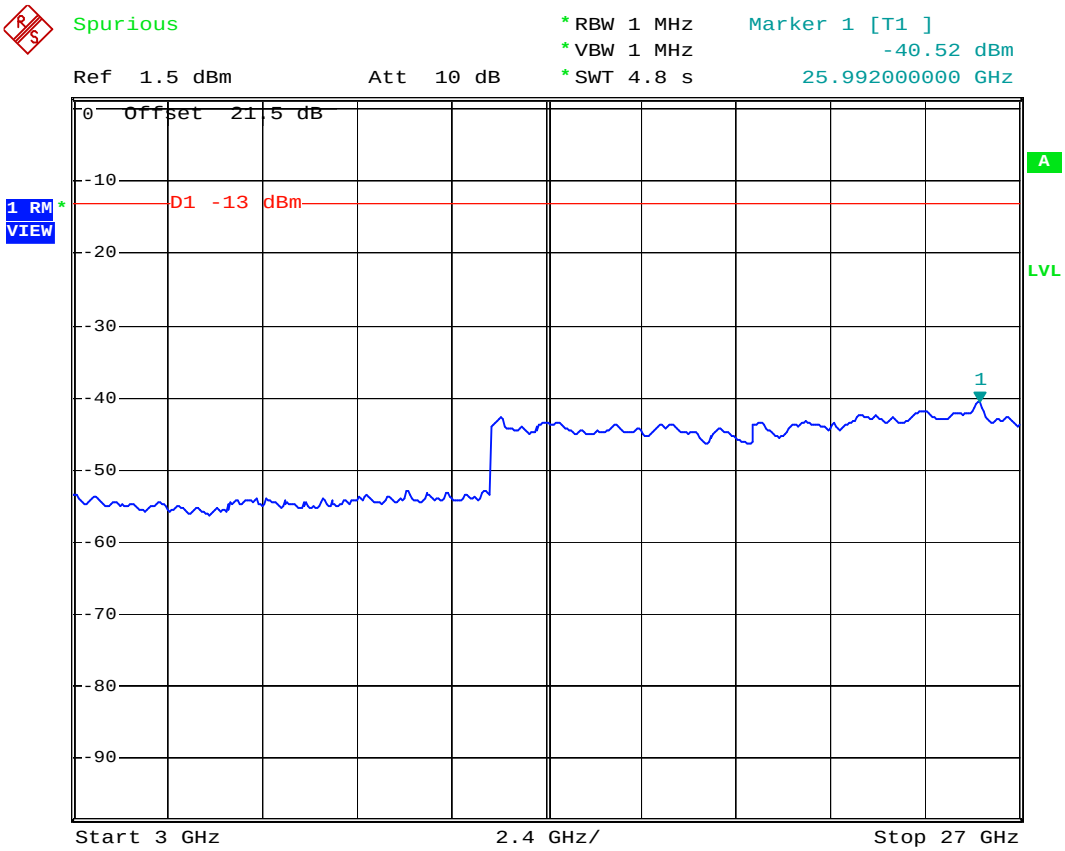
Figure 25. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 7 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:41:50

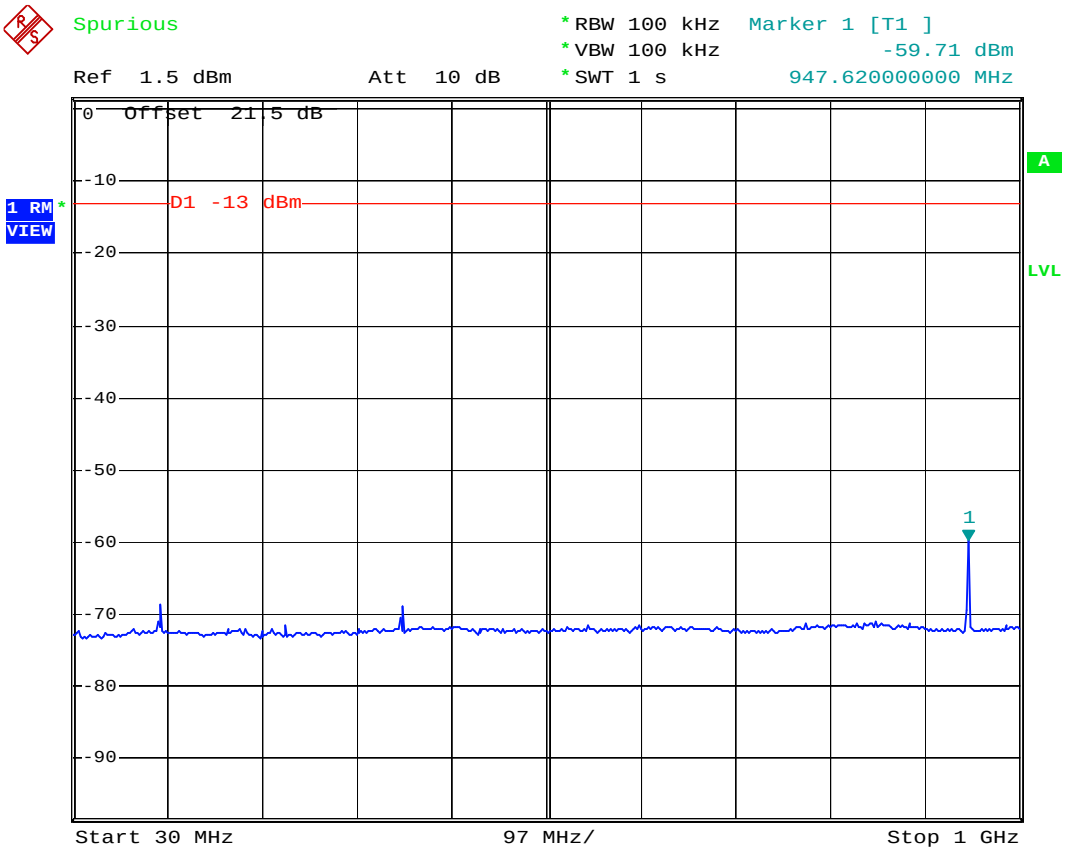
Figure 26. Spurious Emission at Antenna Terminals @ middle channel (5MHz) - 8 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:42:13

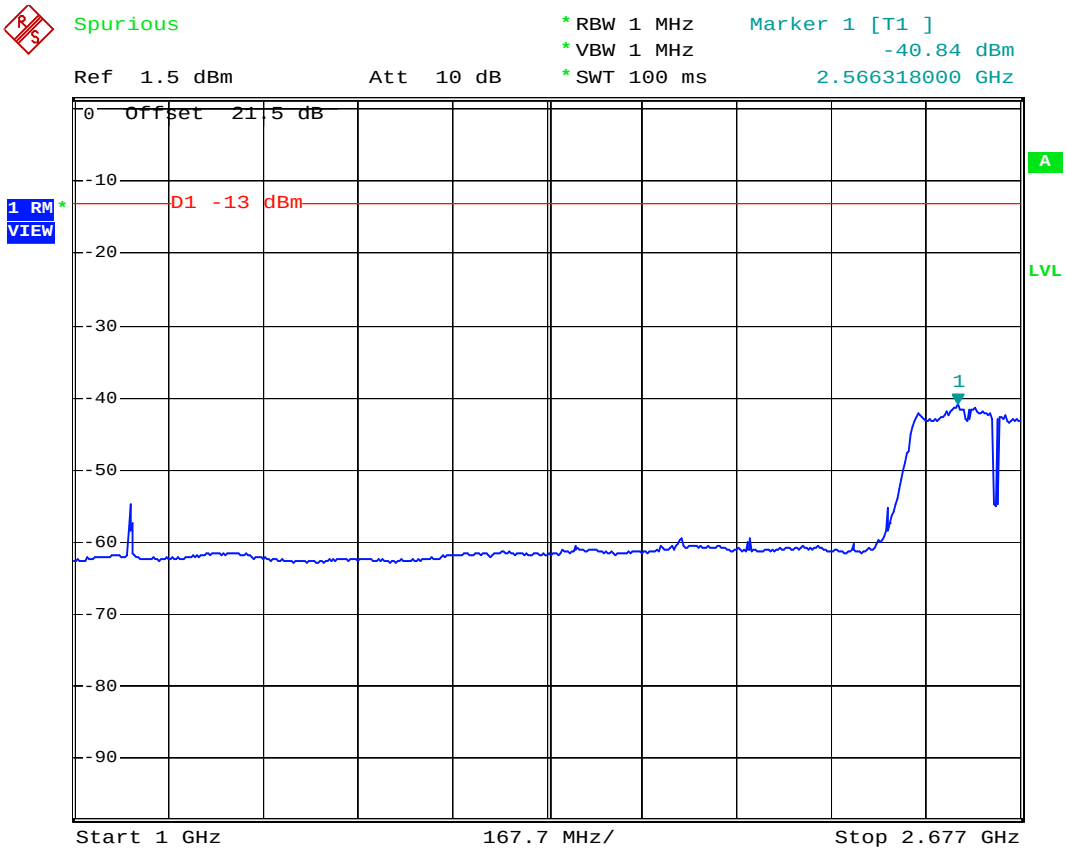
Figure 27. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 1 of 8



2685MHz at Test mode

Date: 22.JUN.2007 17:43:32

Figure 28. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 2 of 8



2685MHz at Test mode

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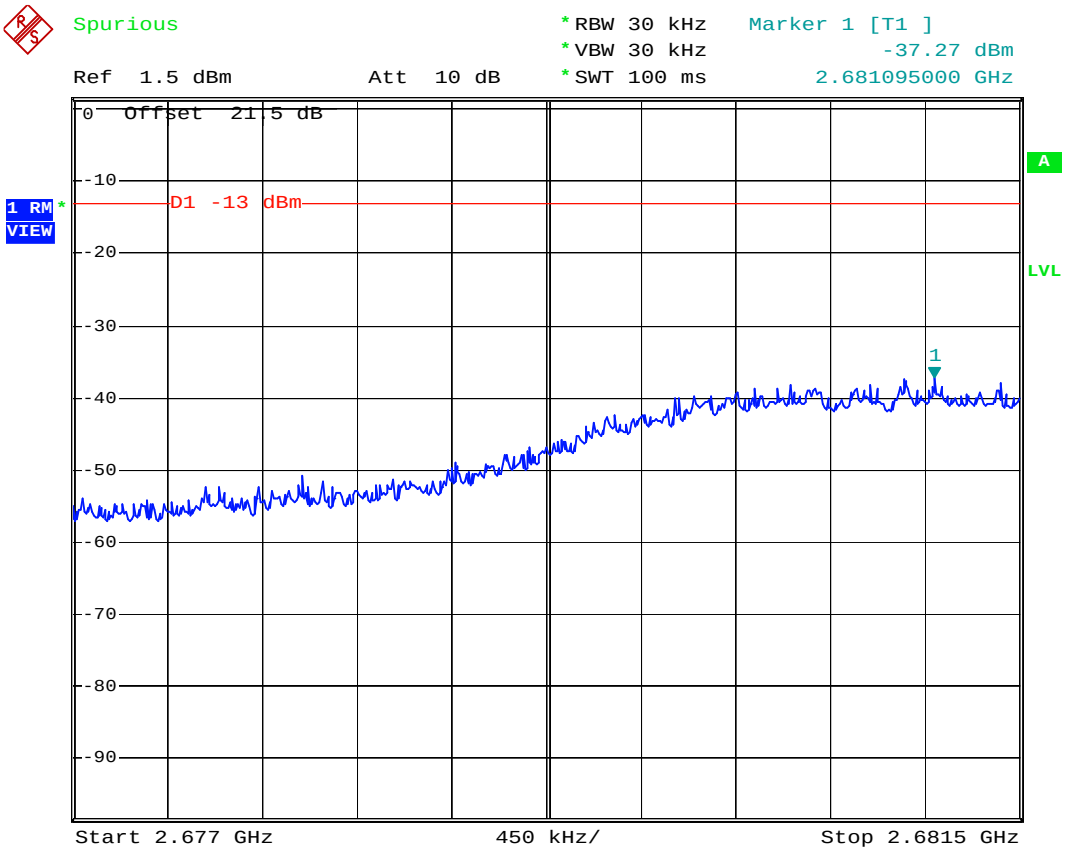
Figure 29. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 3 of 8



2685MHz at Test mode

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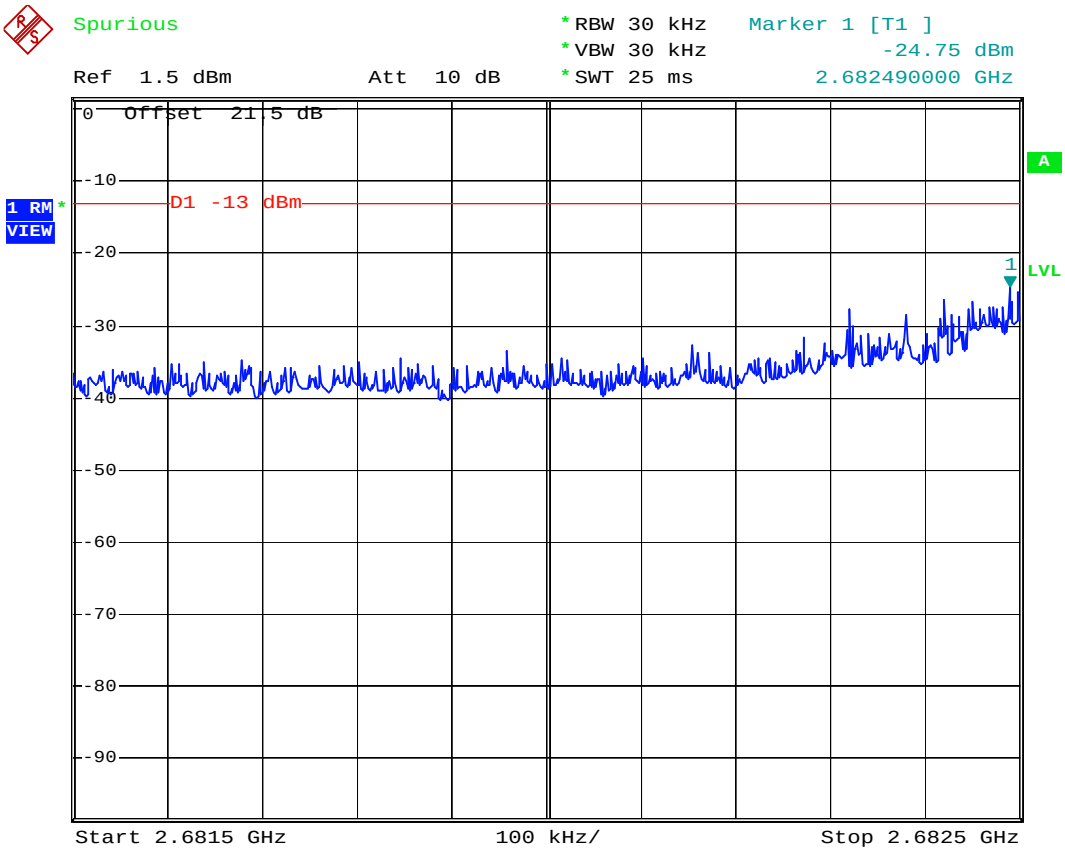
Figure 30. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 4 of 8



2685MHz at Test mode

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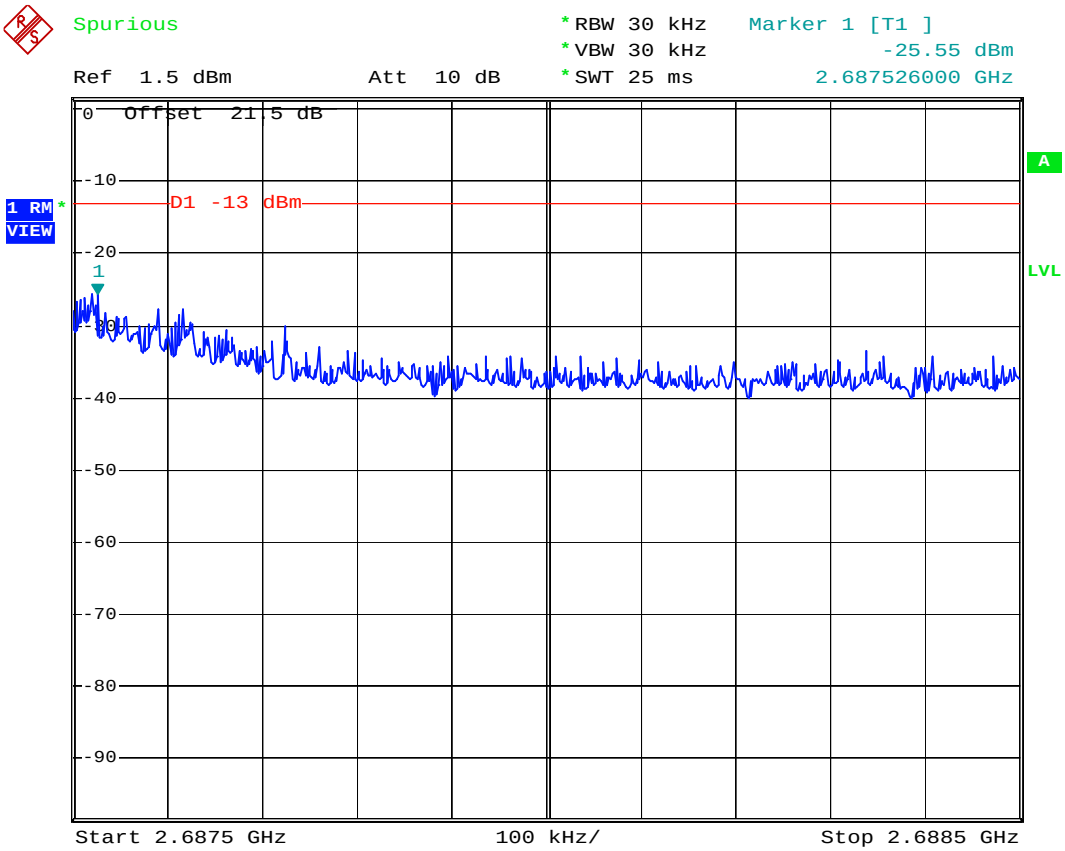
Figure 31. Spurious Emission at Antenna Terminals @ high channel (5MHz) – 5 of 8



2685MHz at Test mode

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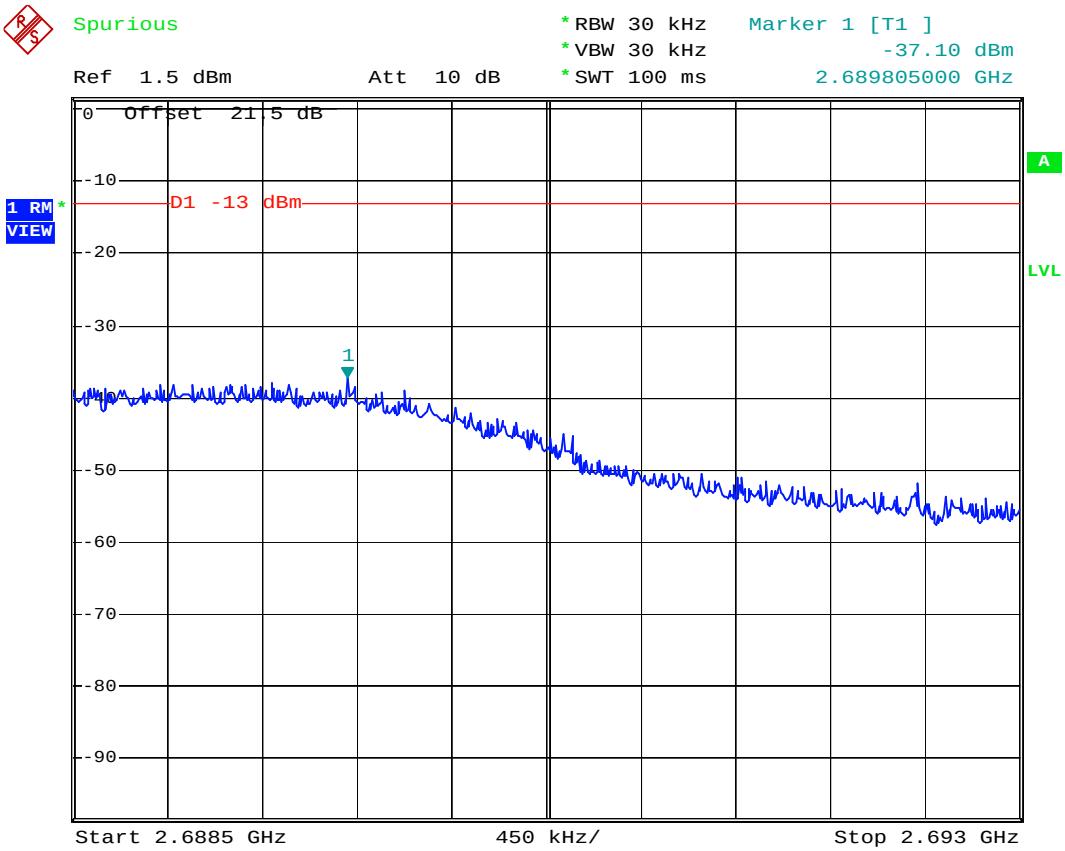
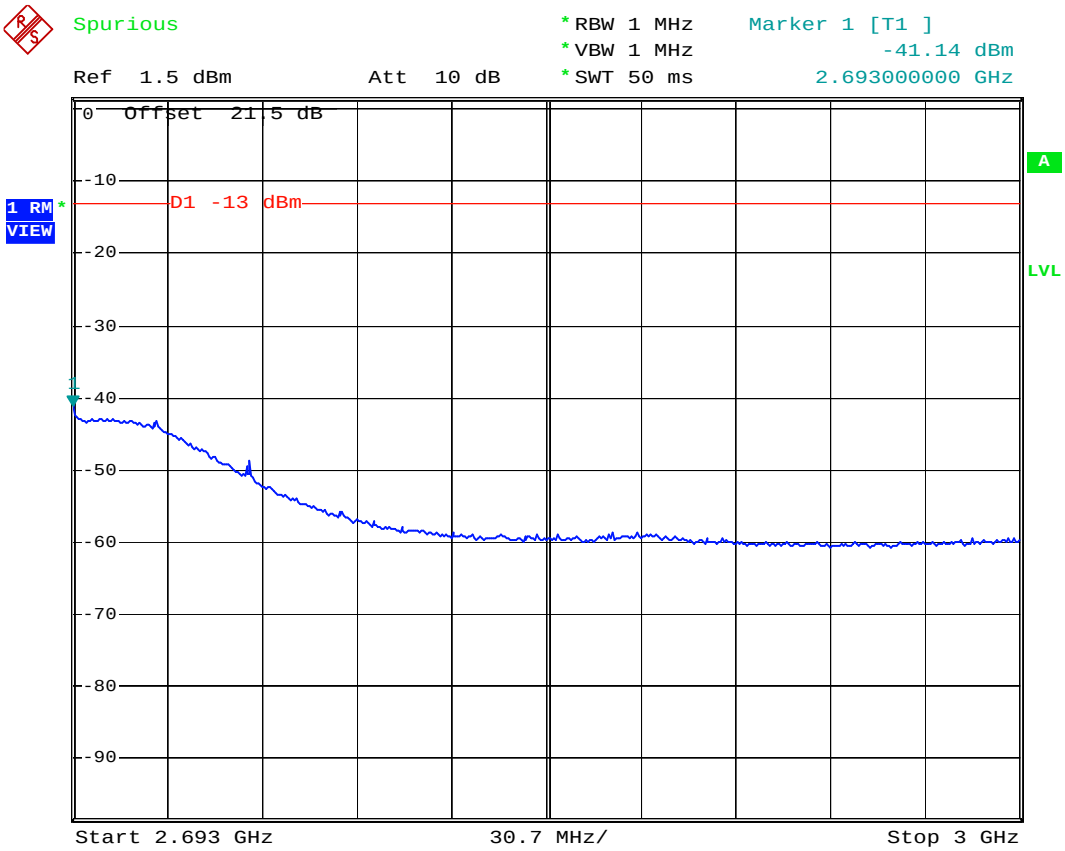
Figure 32. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 6 of 8



2685MHz at Test mode

Date: 22.JUN.2007 17:44:29

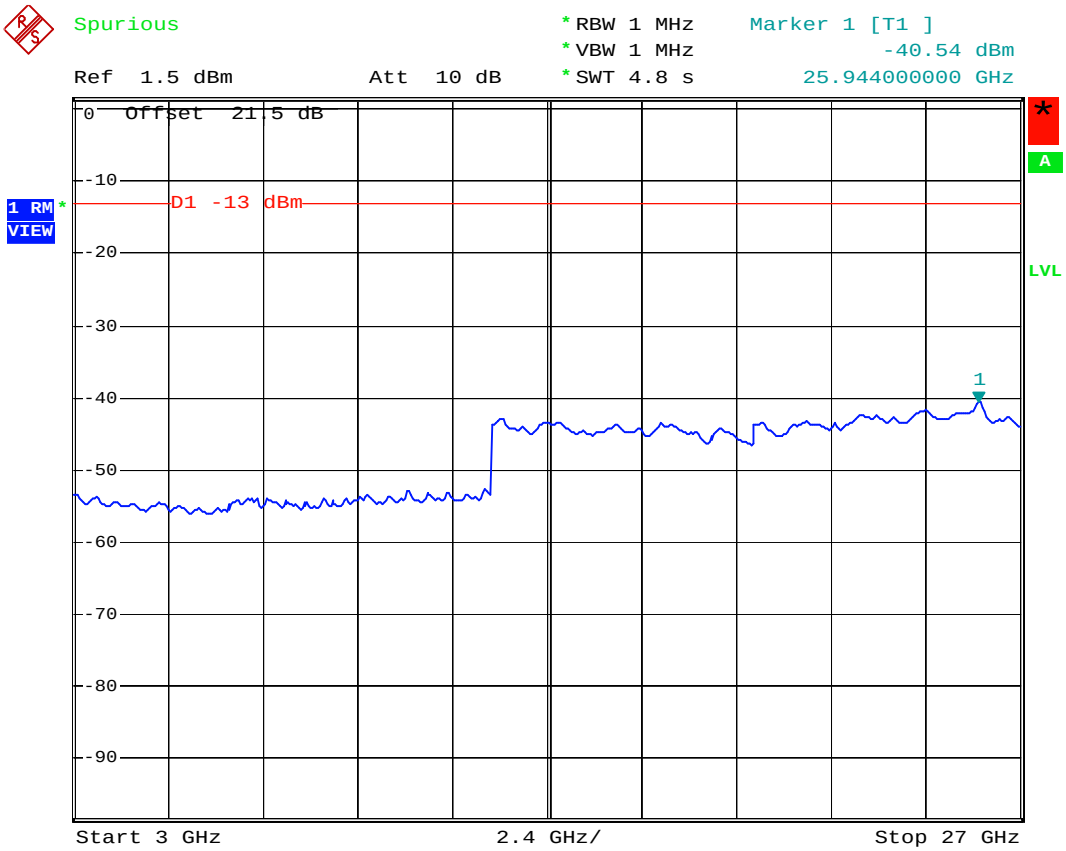
Figure 33. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 7 of 8



2685MHz at Test mode

Date: 22.JUN.2007 17:44:46

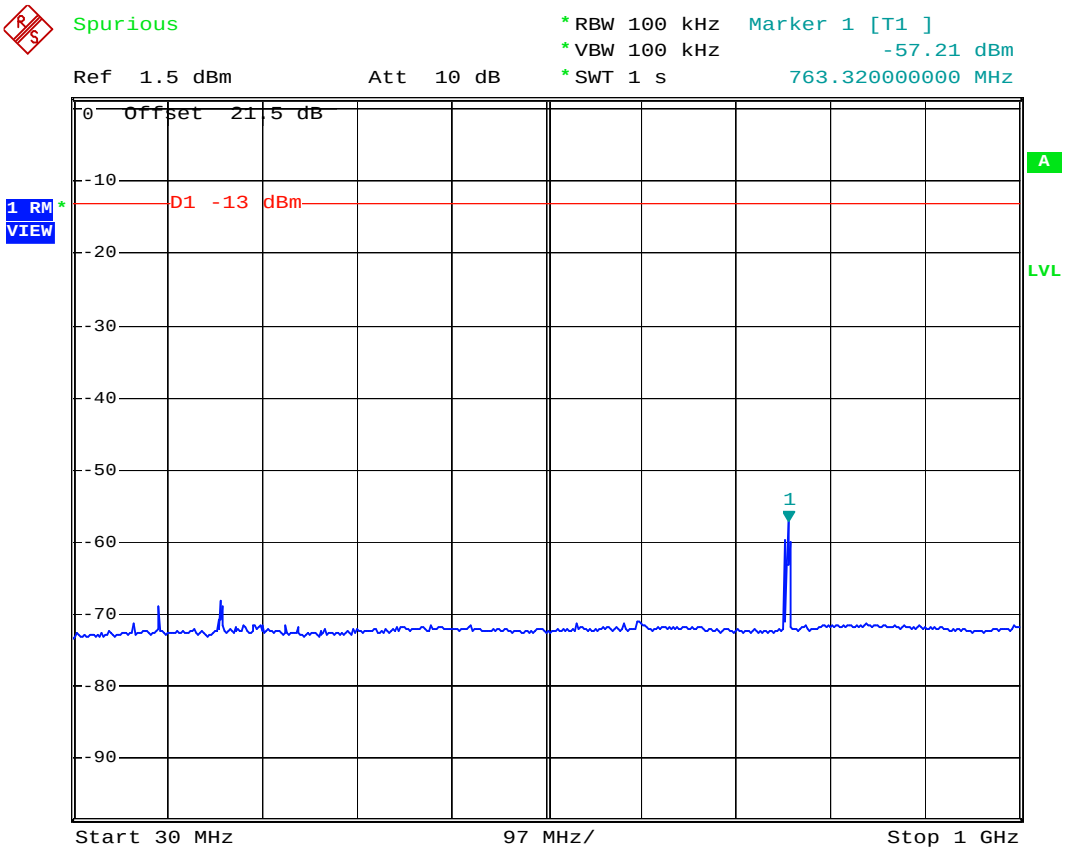
Figure 34. Spurious Emission at Antenna Terminals @ high channel (5MHz) - 8 of 8



2685MHz at Test mode

Date: 22.JUN.2007 17:45:08

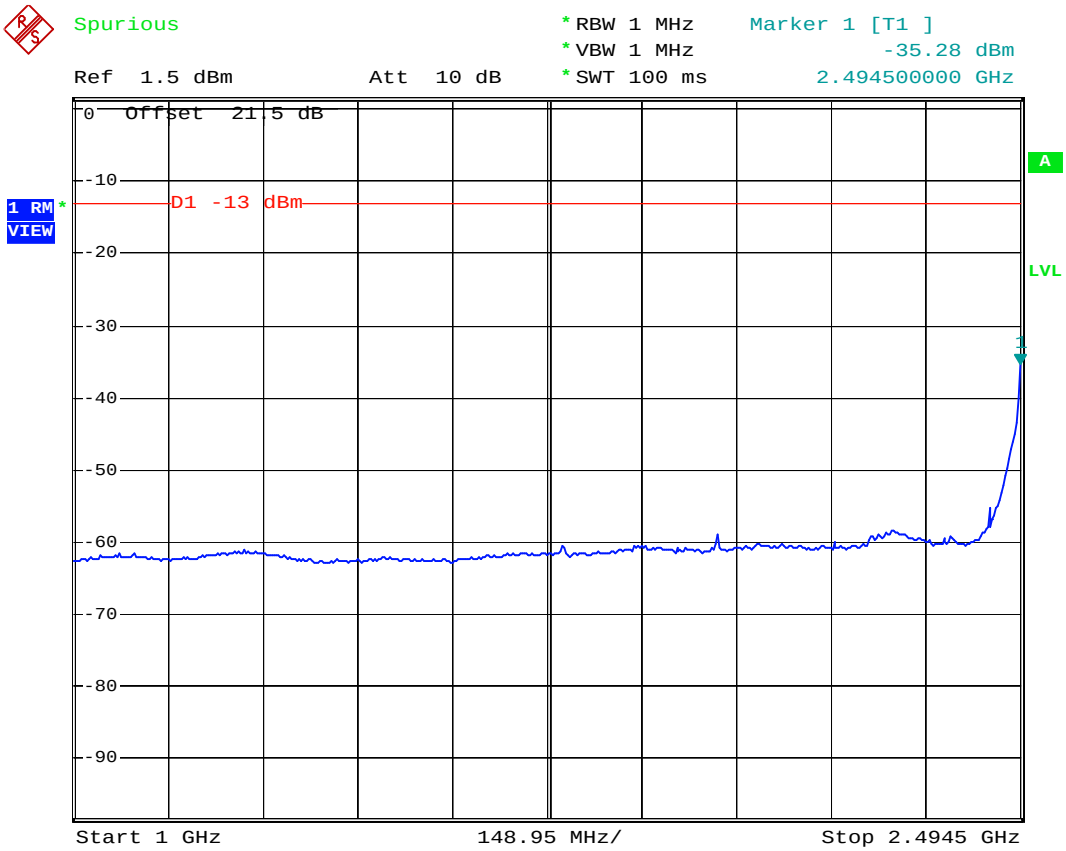
Figure 35. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 1 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:56:38

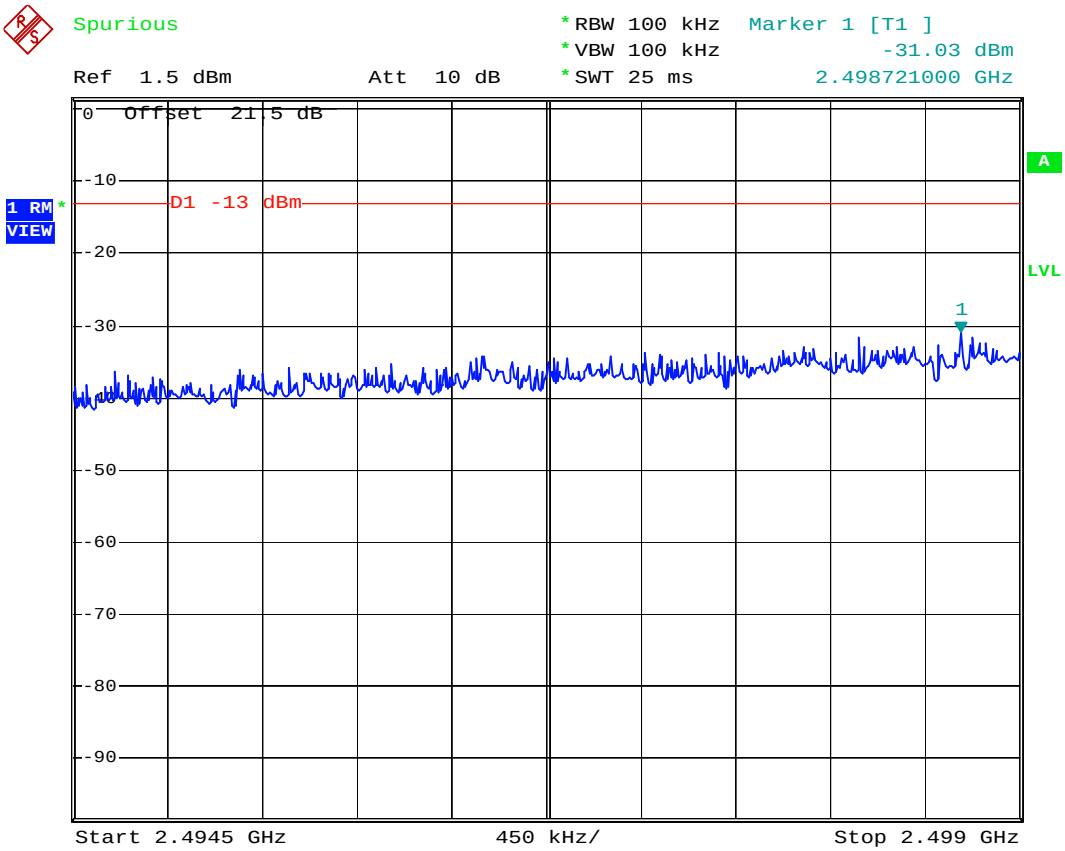
Figure 36. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 2 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:56:46

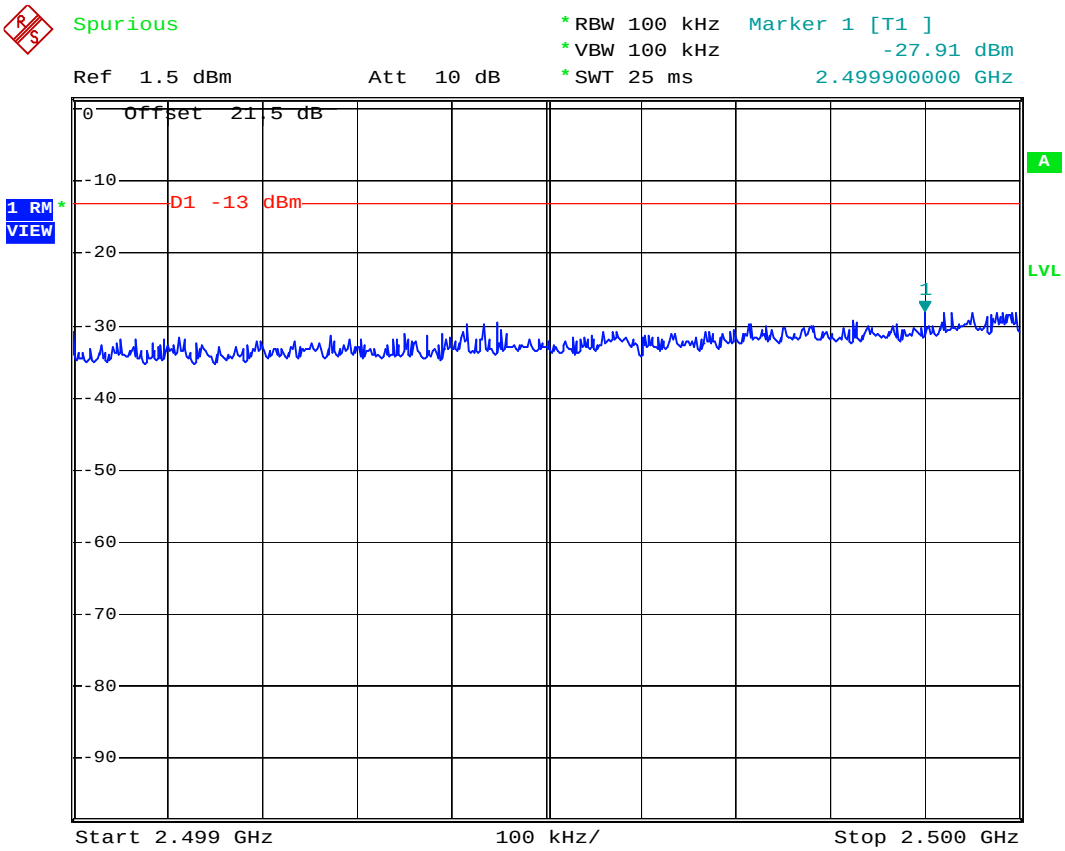
Figure 37. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 3 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:57:03

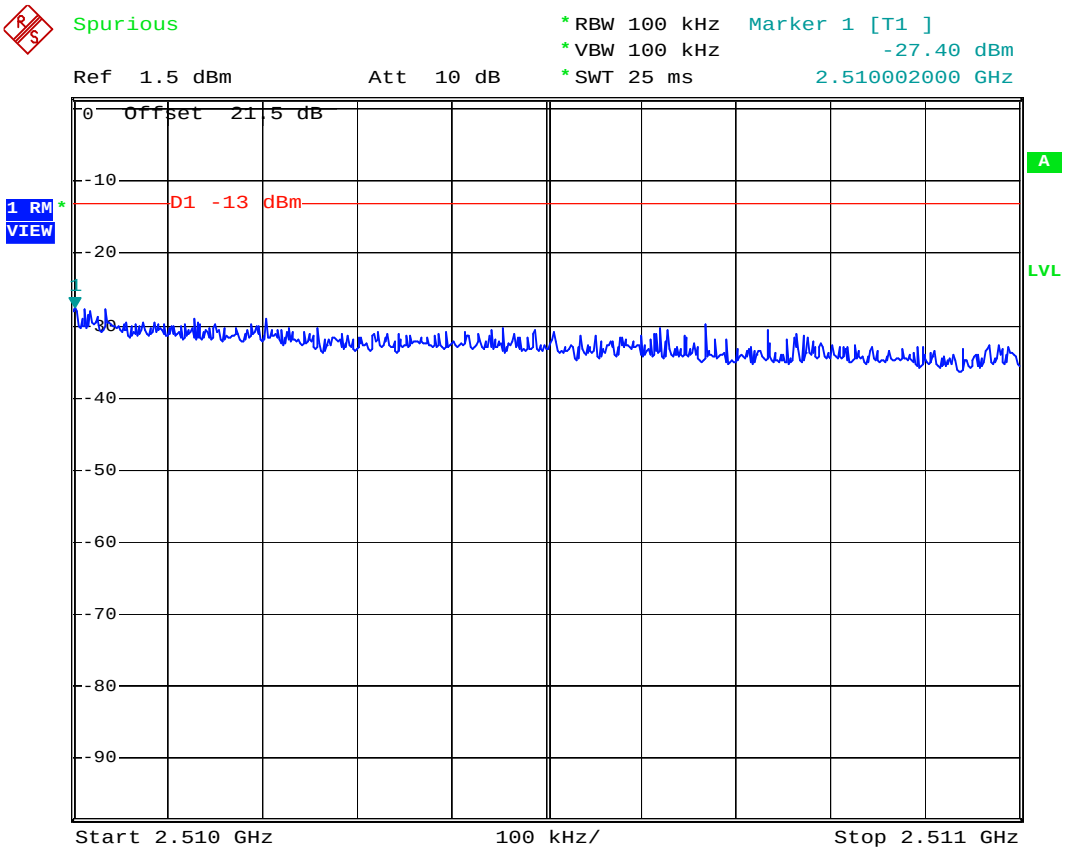
Figure 38. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 4 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:57:11

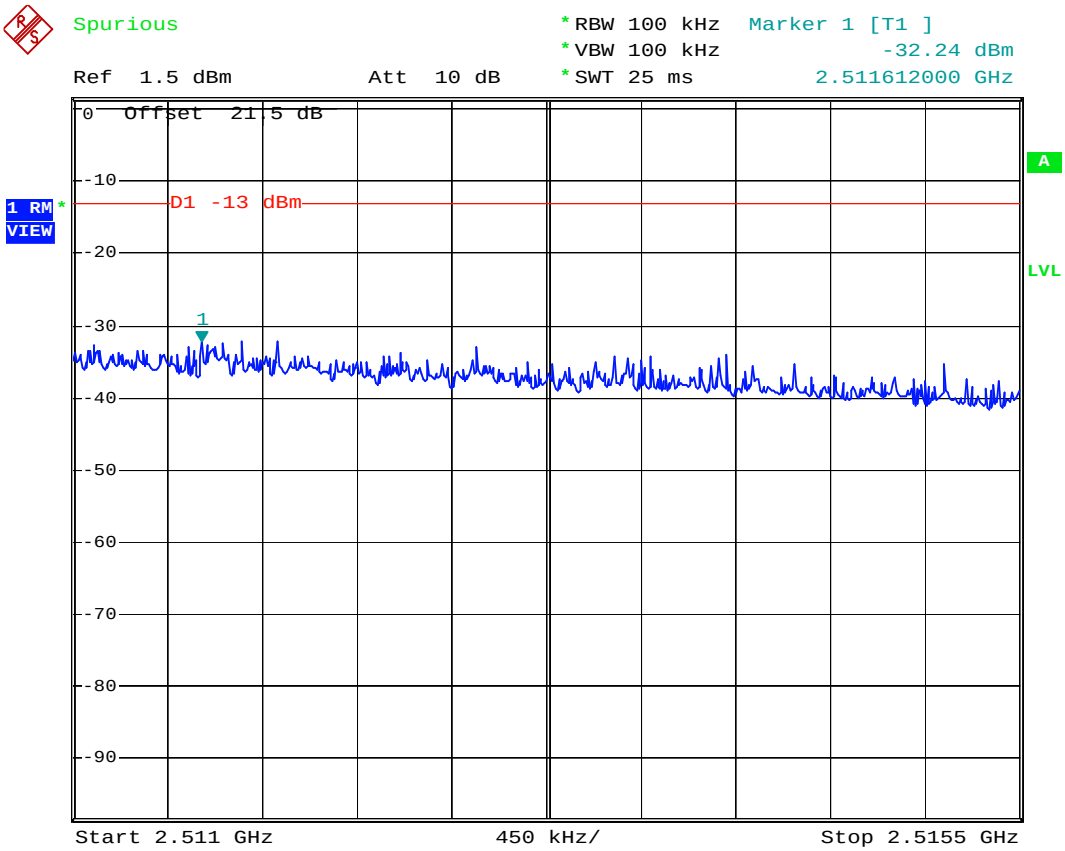
Figure 39. Spurious Emission at Antenna Terminals @ low channel (10MHz) – 5 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:57:29

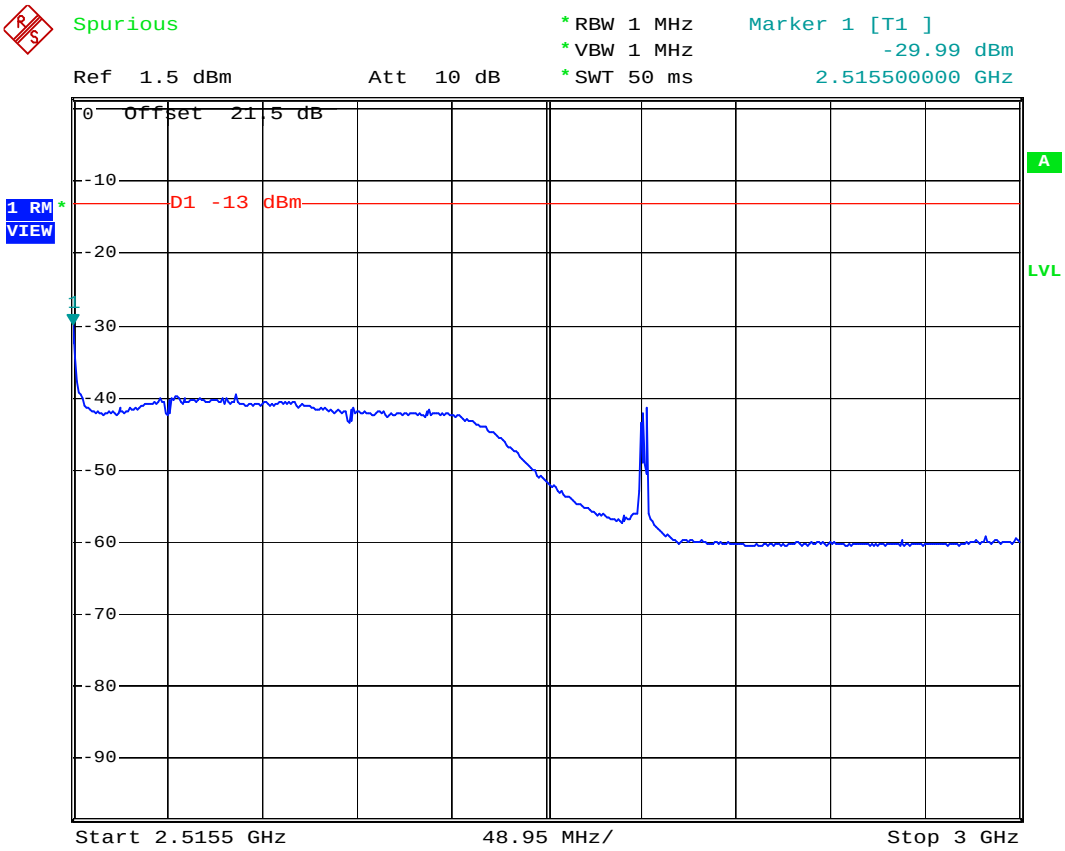
Figure 40. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 6 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:57:36

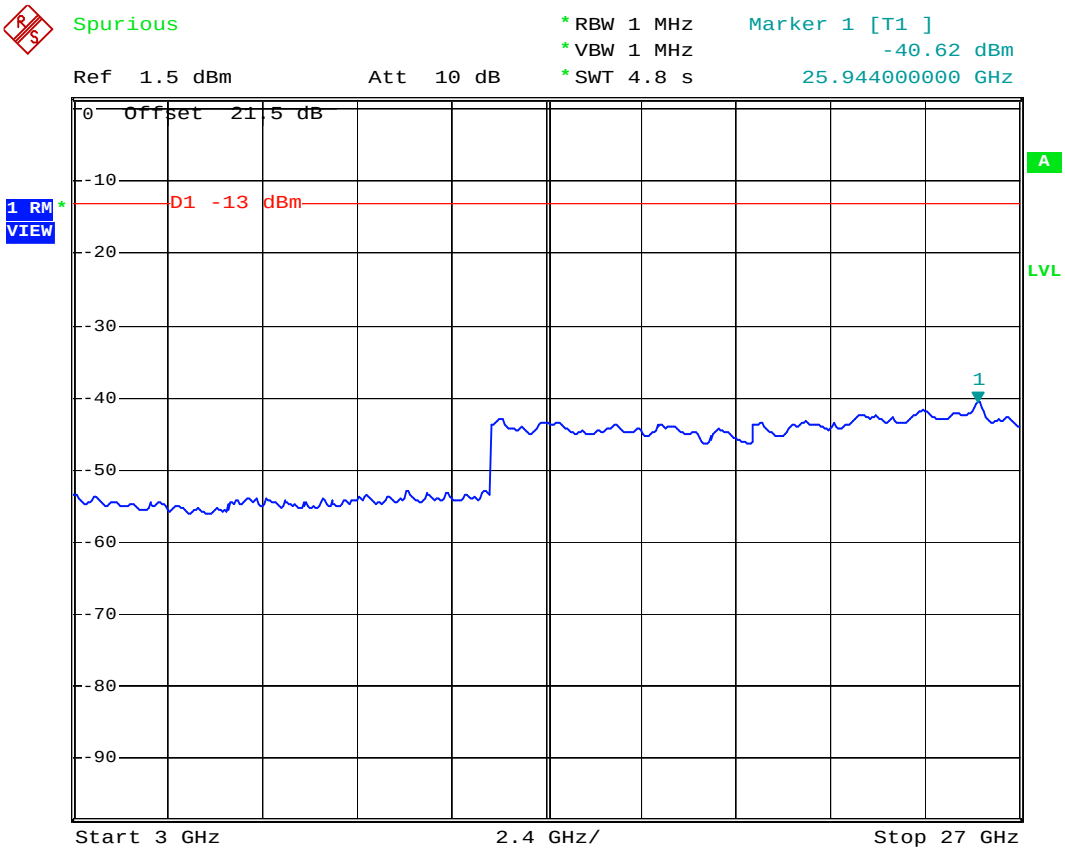
Figure 41. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 7 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:57:53

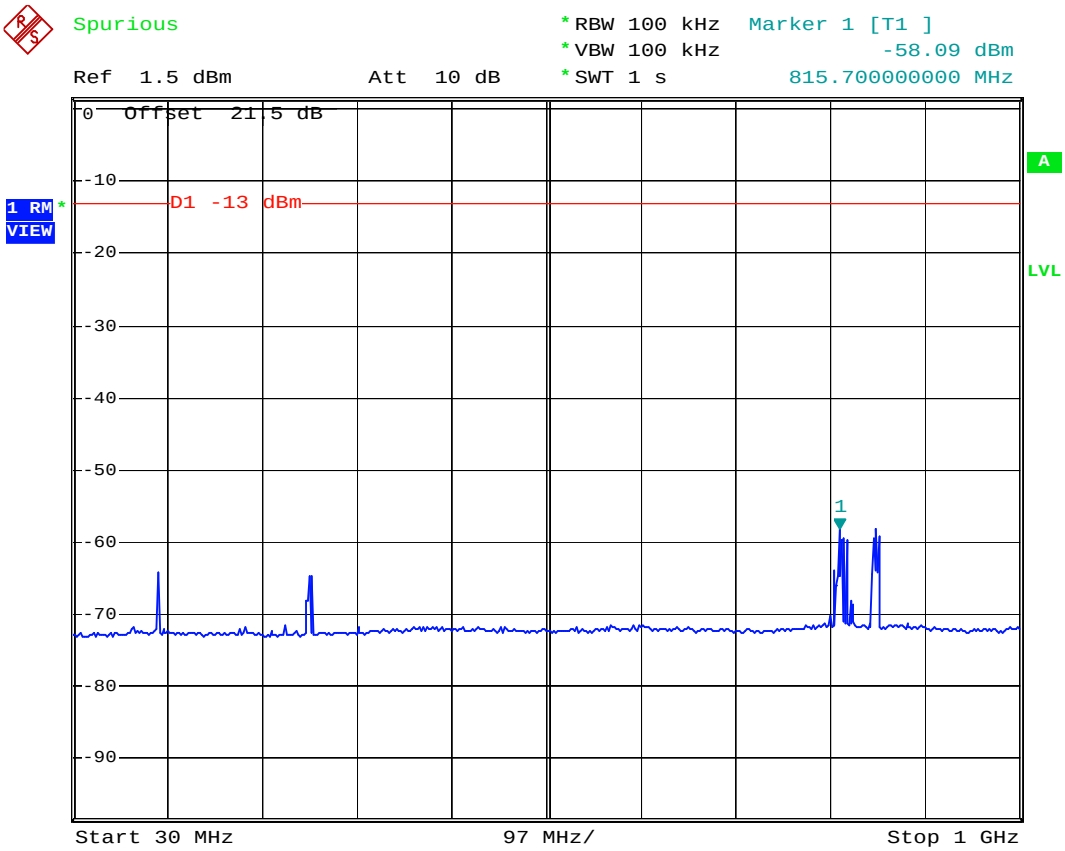
Figure 42. Spurious Emission at Antenna Terminals @ low channel (10MHz) - 8 of 8



2505MHz at Test mode

Date: 22.JUN.2007 17:58:29

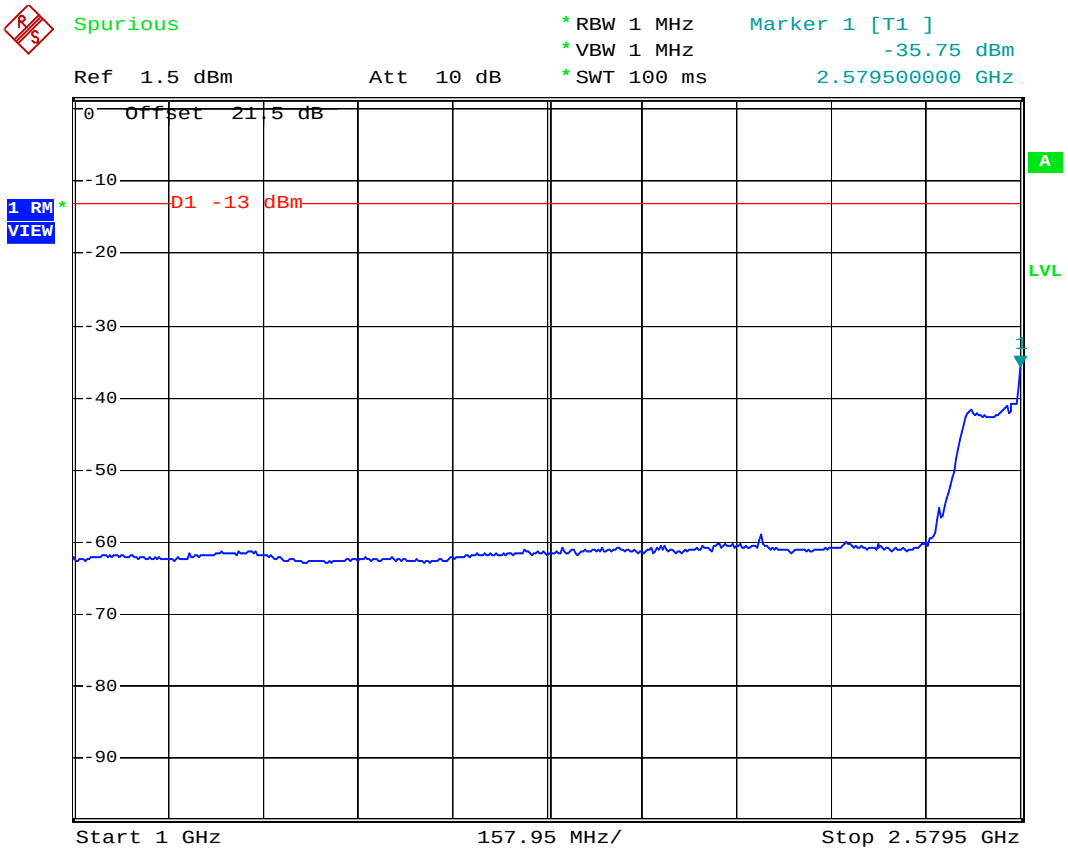
Figure 43. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 1 of 8



2590MHz at Test mode

Date: 22.JUN.2007 17:59:39

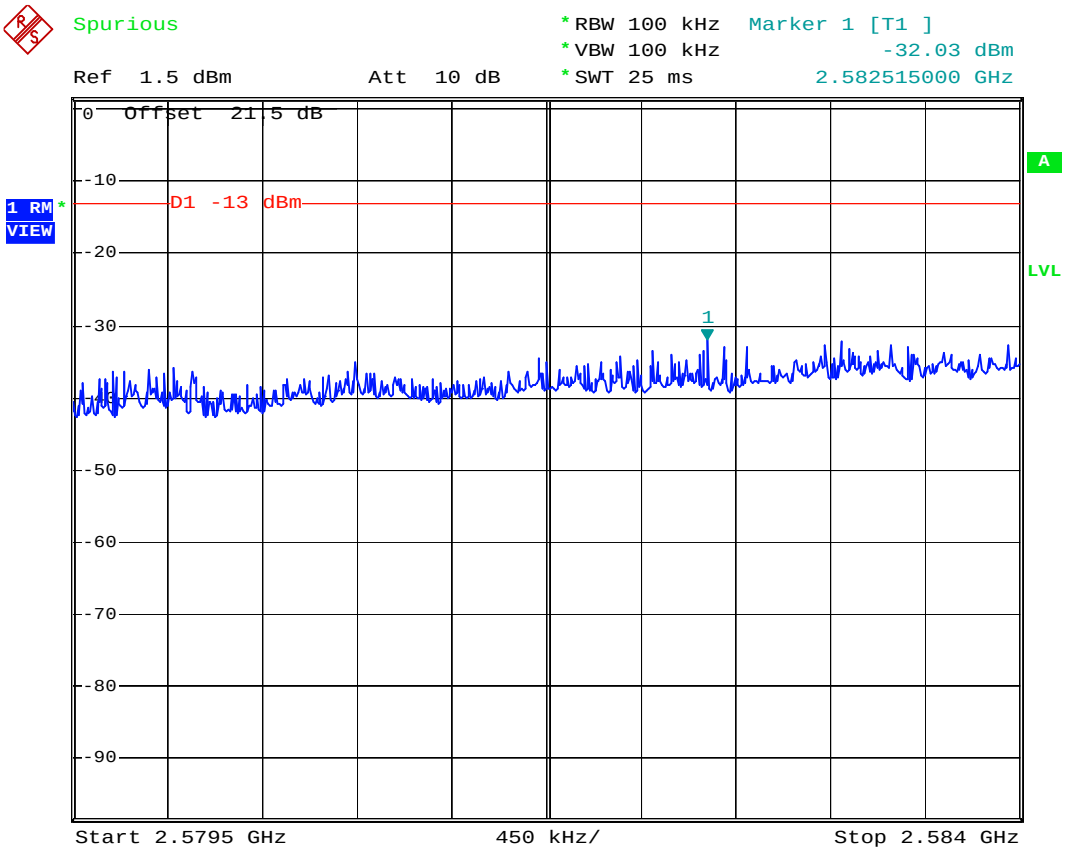
Figure 44. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 2 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:00:26

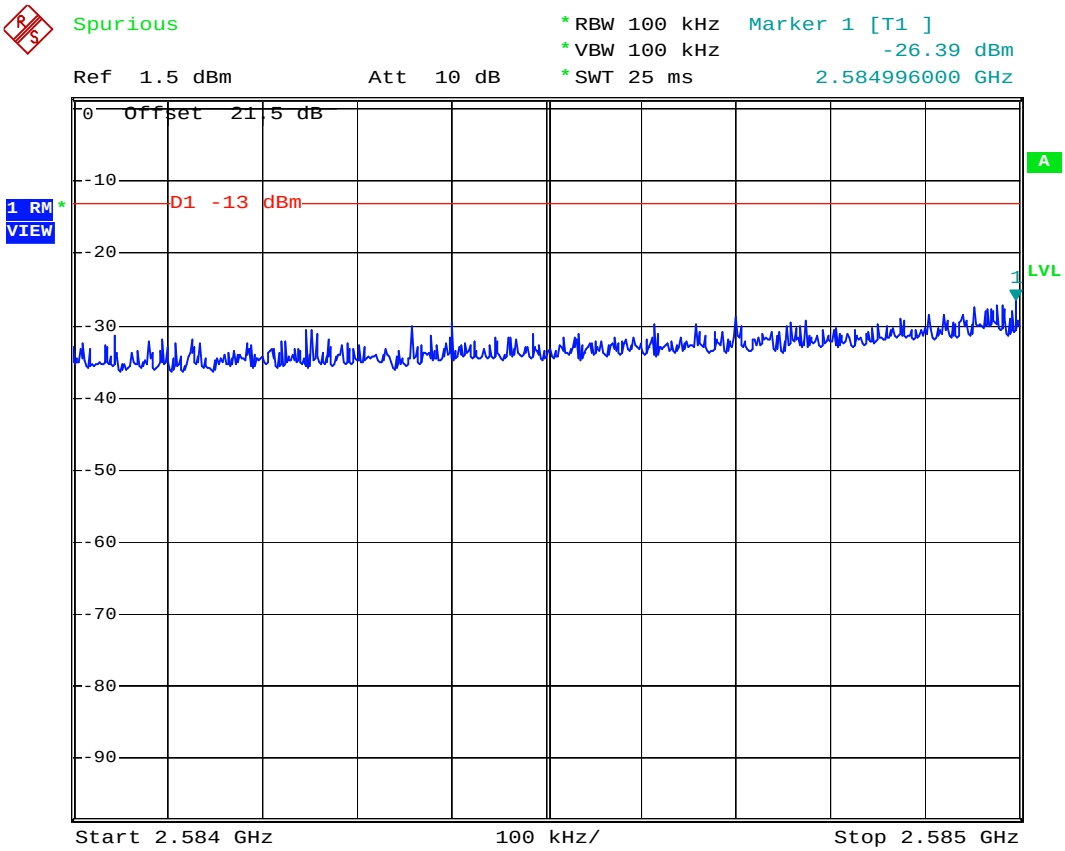
Figure 45. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 3 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:00:34

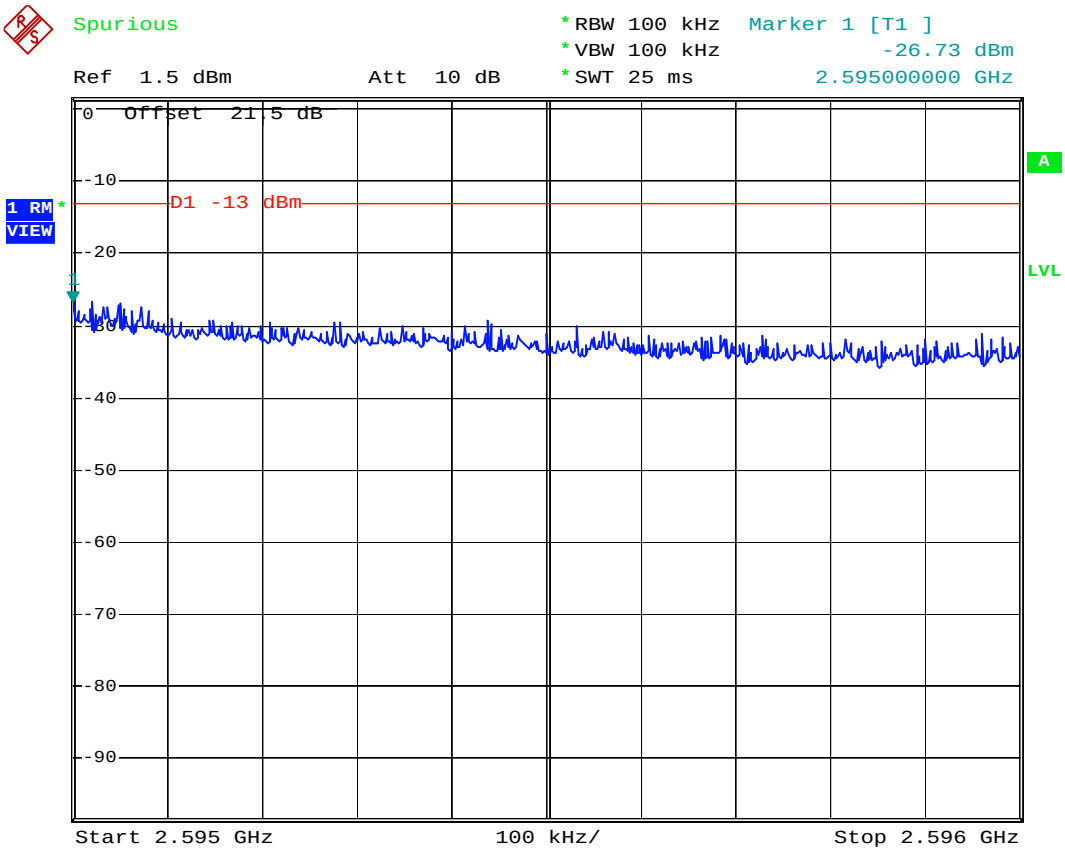
Figure 46. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 4 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:00:52

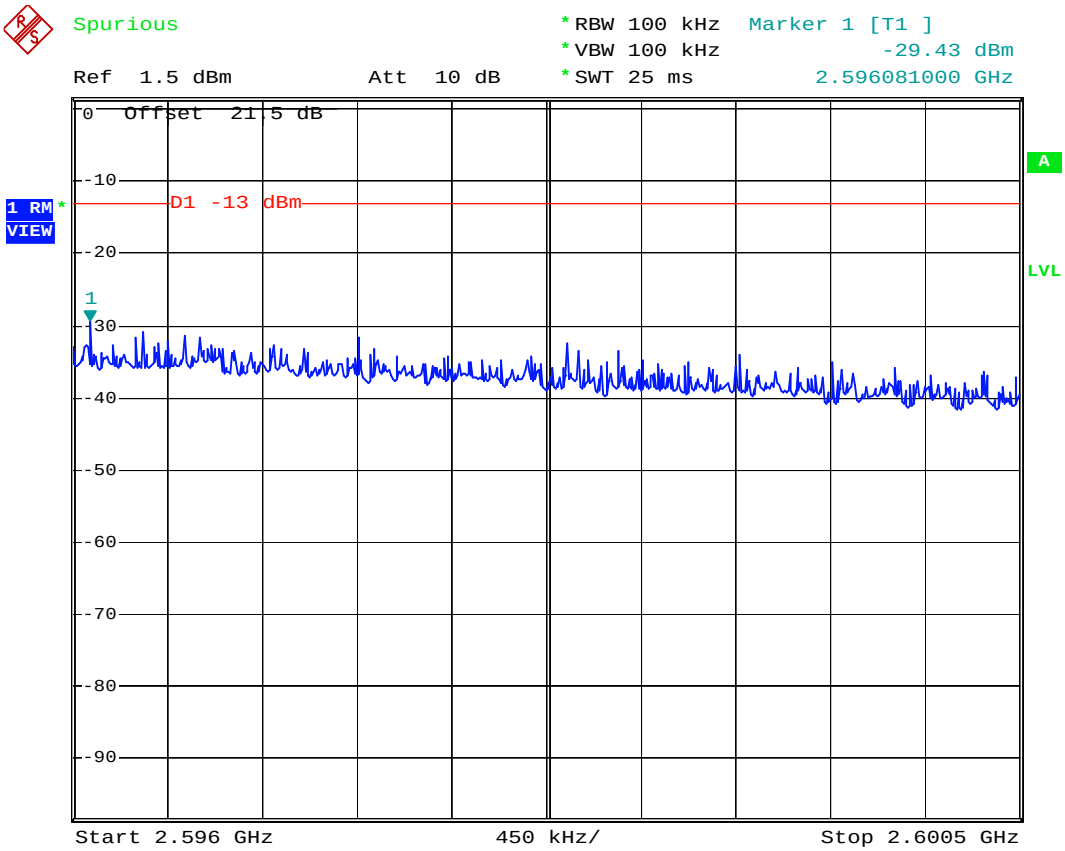
Figure 47. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 5 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:00:58

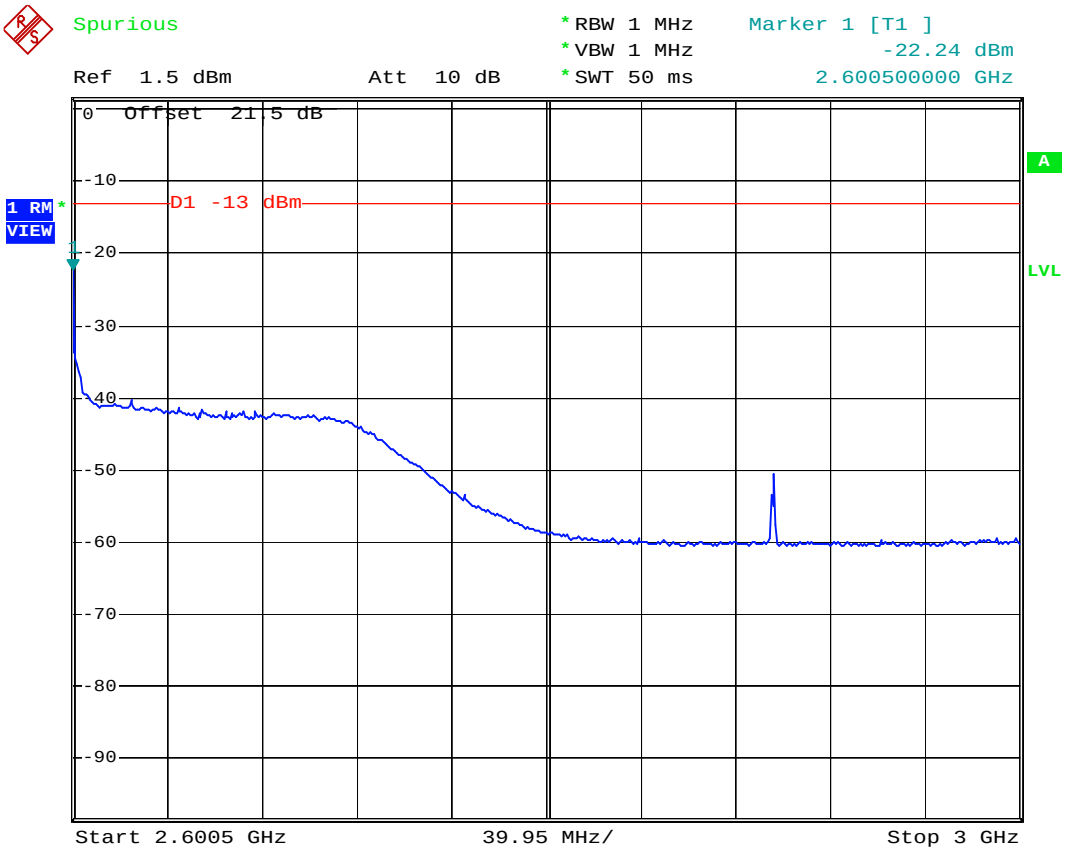
Figure 48. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 6 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:01:15

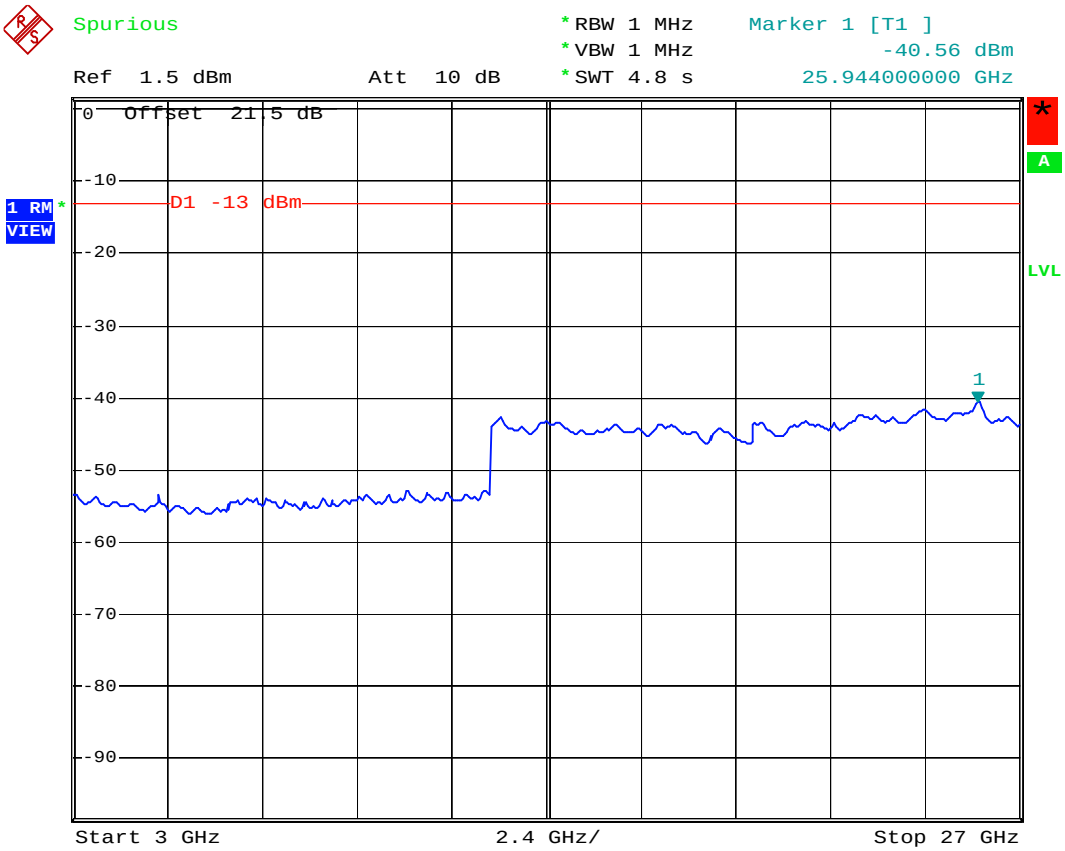
Figure 49. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 7 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:01:22

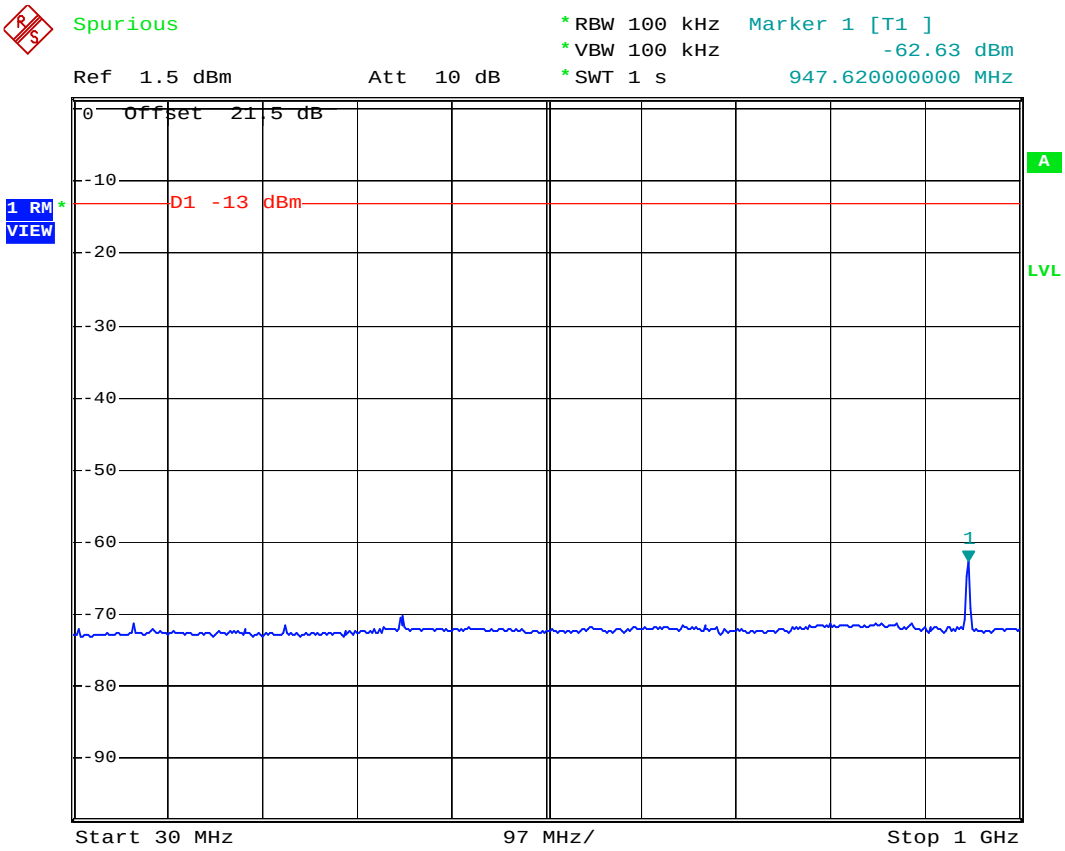
Figure 50. Spurious Emission at Antenna Terminals @ middle channel (10MHz) - 8 of 8



2590MHz at Test mode

Date: 22.JUN.2007 18:01:43

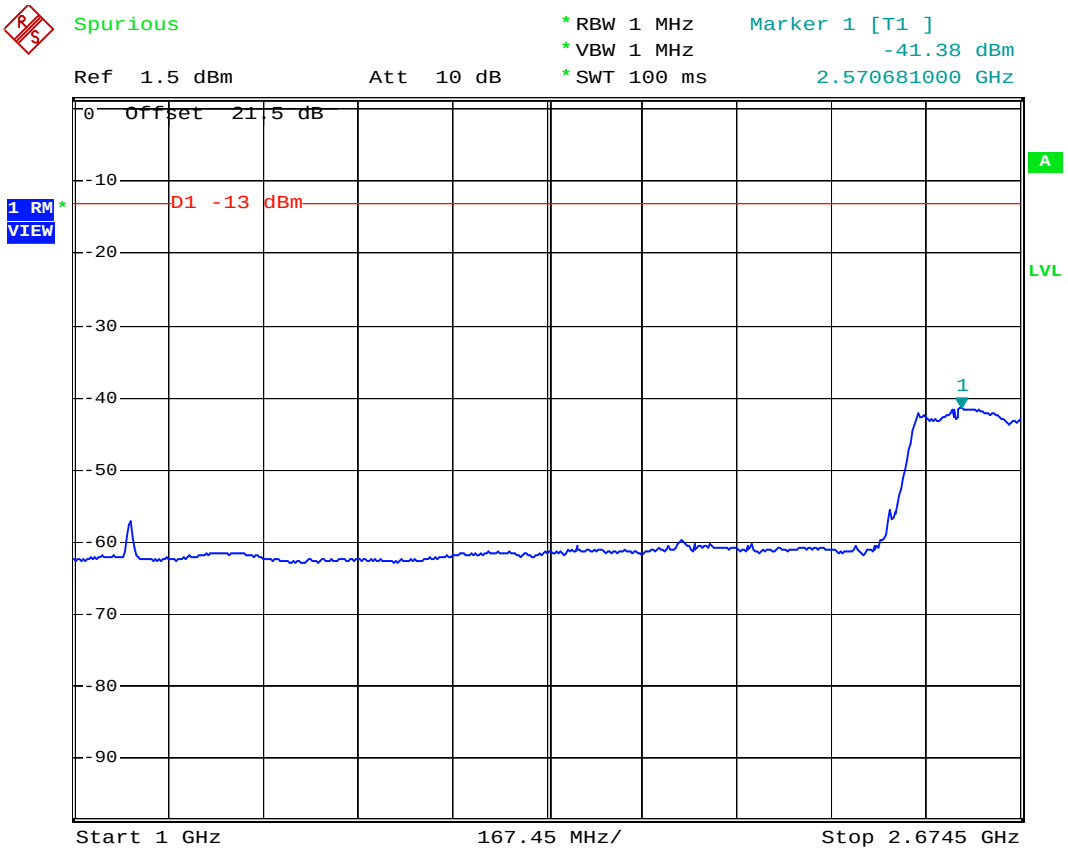
Figure 51. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 1 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:03:06

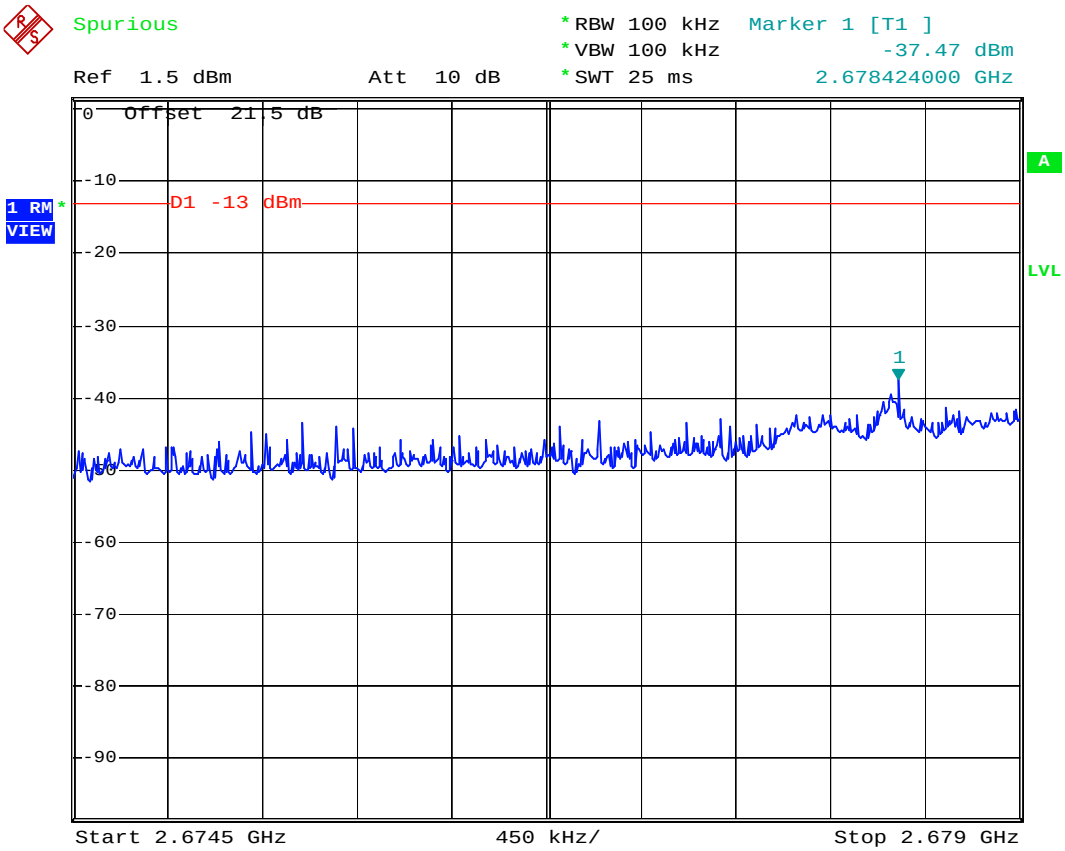
Figure 52. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 2 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:03:13

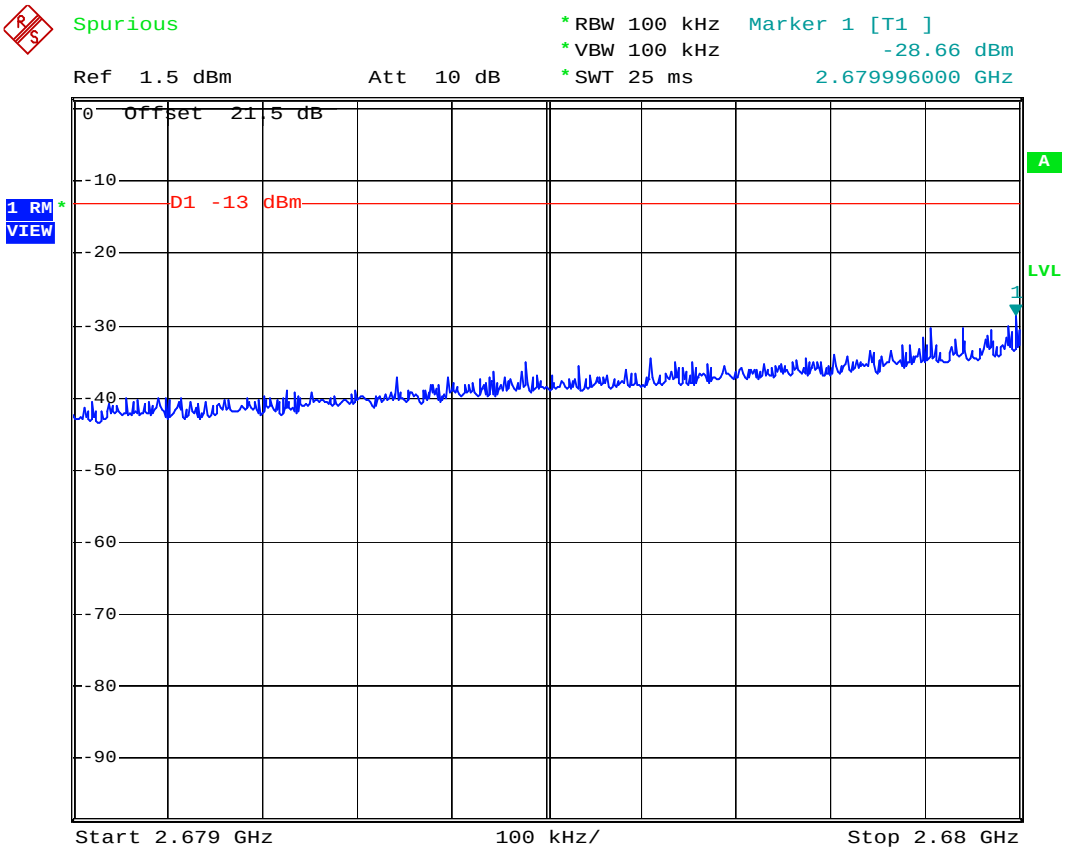
Figure 53. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 3 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:03:30

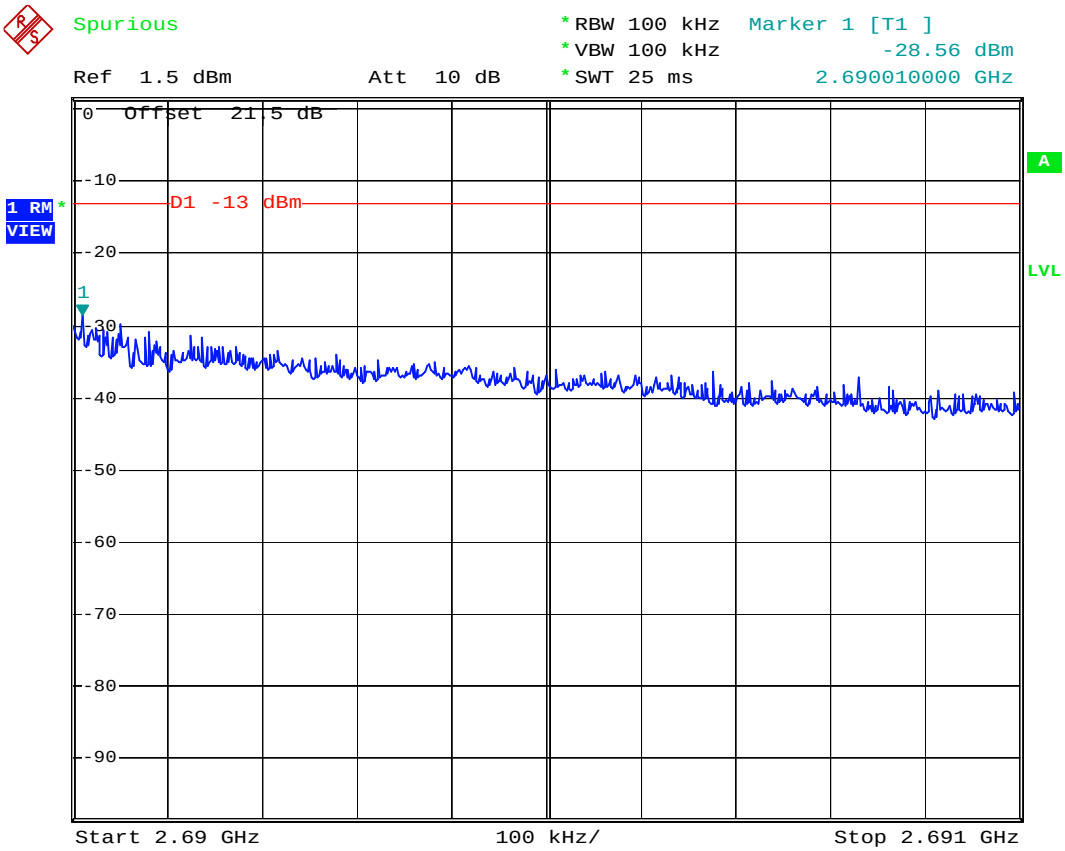
Figure 54. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 4 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:03:38

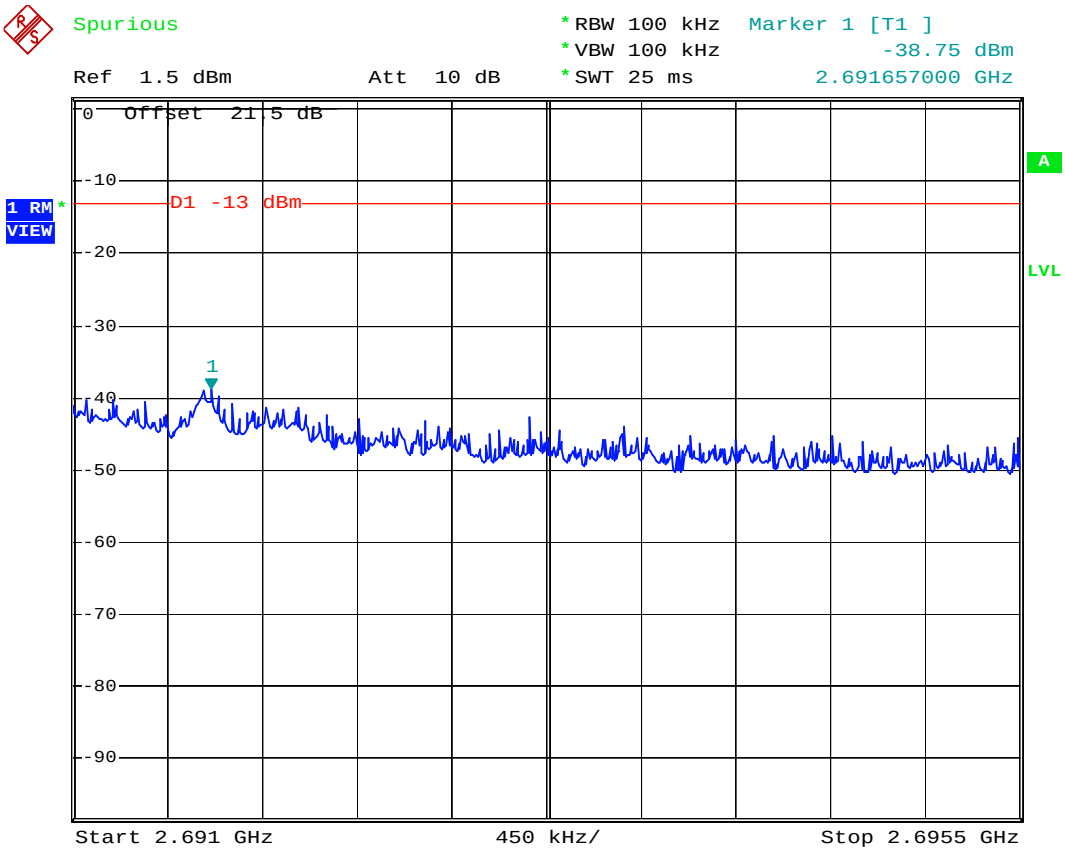
Figure 55. Spurious Emission at Antenna Terminals @ high channel (10MHz) – 5 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:03:55

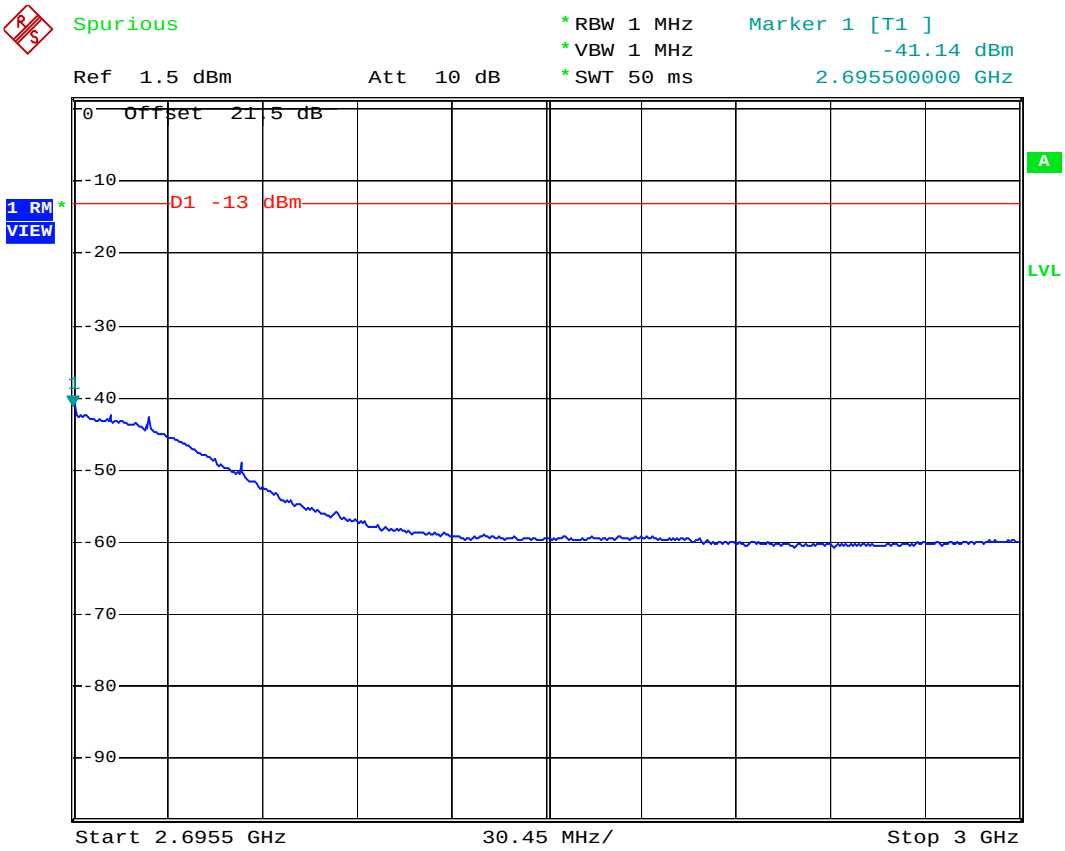
Figure 56. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 6 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:04:03

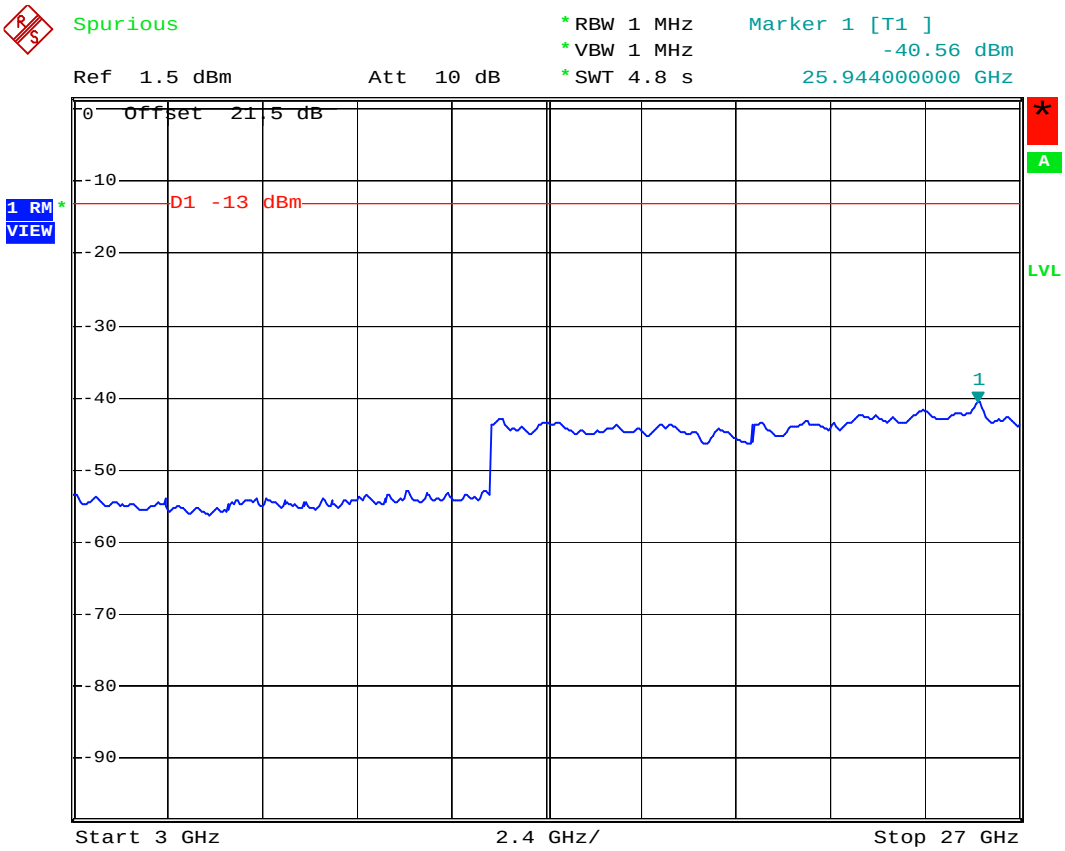
Figure 57. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 7 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:04:19

Figure 58. Spurious Emission at Antenna Terminals @ high channel (10MHz) - 8 of 8



2685MHz at Test mode

Date: 22.JUN.2007 18:04:42

6. Field Strength & Spurious Radiated Emission

Name of Test	Field Strength of Spurious Radiation
Base Standard	FCC 2.1053 & 27.53(l) and 15.209

Tested By: Marx Yan
Test Date: Jun. 26, 2007

Test Equipment: EC351, EC353, EC354, EC365, EC371, EC373, EC374, EP364, EP347

Test Result: Complies
Test Procedure and Setup: See Appendix D
Measurement Data: For FCC 15.209 see the Table2
For FCC 2.1053 & 27.53(l) see the Table3

Note: (1) The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.
(2) The EUT operating at 2.5GHz band. Frequency Range scanned from 30MHz to 27GHz.

Table2. Field Strength of Spurious

Test Mode: Normal operating mode

Polarity (V/H)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
V	65.890	QP	12.23	19.81	32.04	40.00	-7.96
V	188.110	QP	13.10	20.88	33.98	43.50	-9.53
V	316.150	QP	14.10	13.96	28.06	46.00	-17.94
V	398.600	QP	16.40	15.94	32.34	46.00	-13.66
V	549.920	QP	19.46	12.86	32.32	46.00	-13.68
V	797.270	QP	23.19	16.27	39.46	46.00	-6.54

Test Mode: Normal operating mode

Polarity (V/H)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
H	191.990	QP	11.27	20.10	31.37	43.50	-12.14
H	247.280	QP	12.36	19.28	31.64	46.00	-14.36
H	398.600	QP	16.74	20.88	37.62	46.00	-8.38
H	536.340	QP	19.65	17.38	37.03	46.00	-8.97
H	549.920	QP	19.65	17.06	36.71	46.00	-9.29
H	797.270	QP	23.52	19.29	42.81	46.00	-3.19

Table3. Spurious Radiated Emission

(1) 2500MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	74.620	-48.49	0.07	-0.98	-49.54	-13	-36.54	5
V	192.960	-69.35	0.10	4.34	-65.11	-13	-52.11	5
V	330.700	-72.89	0.30	6.20	-66.99	-13	-53.99	5
V	798.240	-62.61	0.70	6.18	-57.13	-13	-44.13	5
H	74.620	-51.10	0.07	-0.98	-52.15	-13	-39.15	5
H	196.840	-67.01	0.10	4.34	-62.77	-13	-49.77	5
H	398.600	-64.44	0.30	5.96	-58.78	-13	-45.78	5
H	798.240	-63.27	0.70	6.18	-57.79	-13	-44.79	5

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	2805.360	-27.23	0.52	9.1	-18.65	-13	-5.65	5
V	4999.100	-35.65	0.5	9.6	-26.55	-13	-13.55	5
H	5000.000	-35.82	0.5	9.6	-26.72	-13	-13.72	5
V	7501.680	-50.96	0.74	10.1	-41.6	-13	-28.6	5
H	7500.510	-50.82	0.74	10.1	-41.46	-13	-28.46	5

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

(2) 2590MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	74.620	-48.93	0.07	-0.98	-49.98	-13	-36.98	5
V	101.780	-60.73	0.10	0.42	-60.41	-13	-47.41	5
V	398.600	-70.34	0.30	5.96	-64.68	-13	-51.68	5
V	798.240	-61.71	0.70	6.18	-56.23	-13	-43.23	5
H	74.620	-50.52	0.07	-0.98	-51.57	-13	-38.57	5
H	398.600	-66.09	0.30	5.96	-60.43	-13	-47.43	5
H	522.760	-66.64	0.50	6.13	-61.01	-13	-48.01	5
H	798.240	-63.30	0.70	6.18	-57.82	-13	-44.82	5

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	5179.68	-39.21	0.5	9.6	-30.11	-13	-17.11	5
H	5180.96	-37.89	0.5	9.6	-28.79	-13	-15.79	5
V	7770.57	-48.31	1	10.9	-38.41	-13	-25.41	5
H	7771.01	-48.89	1	10.9	-38.99	-13	-25.99	5

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

(3) 2685MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	74.620	-52.12	0.07	-0.98	-53.17	-13	-40.17	5
V	206.540	-68.75	0.20	4.34	-64.61	-13	-51.61	5
V	549.920	-67.59	0.50	6.13	-61.96	-13	-48.96	5
V	798.240	-60.45	0.70	6.18	-54.97	-13	-41.97	5
H	74.620	-54.62	0.07	-0.98	-55.67	-13	-42.67	5
H	214.300	-67.81	0.20	4.34	-63.67	-13	-50.67	5
H	536.340	-65.63	0.50	6.13	-60.00	-13	-47.00	5
H	798.240	-62.46	0.70	6.18	-56.98	-13	-43.98	5

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	5369.580	-29.94	0.5	9.6	-20.84	-13	-7.84	5
H	5370.620	-40.59	0.5	9.6	-31.49	-13	-18.49	5
V	8056.920	-44.56	1.72	10.9	-35.38	-13	-22.38	5
H	8054.070	-58.35	1.72	10.9	-49.17	-13	-36.17	5

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

(4) 2505MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	74.620	-47.21	0.07	-0.98	-48.26	-13	-35.26	10
V	330.700	-71.39	0.30	6.20	-65.49	-13	-52.49	10
V	549.920	-68.37	0.50	6.13	-62.74	-13	-49.74	10
V	798.240	-64.58	0.70	6.18	-59.10	-13	-46.10	10
H	74.620	-50.12	0.07	-0.98	-51.17	-13	-38.17	10
H	192.960	-67.85	0.10	4.34	-63.61	-13	-50.61	10
H	398.600	-67.43	0.30	5.96	-61.77	-13	-48.77	10
H	522.760	-66.57	0.50	6.13	-60.94	-13	-47.94	10

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	2805.520	-27.64	0.52	9.1	-19.06	-13	-6.06	10
H	2805.680	-33.1	0.52	9.1	-24.52	-13	-11.52	10
V	5000.440	-39.49	0.5	9.6	-30.39	-13	-17.39	10
H	5000.270	-43.56	0.5	9.6	-34.46	-13	-21.46	10
V	7497.550	-56.6	0.74	10.1	-47.24	-13	-34.24	10
H	7504.720	-53.62	0.74	10.1	-44.26	-13	-31.26	10

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

(5) 2590MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	74.620	-48.15	0.07	-0.98	-49.20	-13	-36.20	10
V	260.860	-72.61	0.20	5.42	-67.39	-13	-54.39	10
V	398.600	-71.89	0.30	5.96	-66.23	-13	-53.23	10
V	798.240	-63.26	0.70	6.18	-57.78	-13	-44.78	10
H	74.620	-49.70	0.07	-0.98	-50.75	-13	-37.75	10
H	192.960	-67.12	0.10	4.34	-62.88	-13	-49.88	10
H	412.180	-65.74	0.40	5.96	-60.18	-13	-47.18	10
H	536.340	-67.31	0.50	6.13	-61.68	-13	-48.68	10

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	5178.820	-42.41	0.5	9.6	-33.31	-13	-20.31	10
H	5179.990	-40.81	0.5	9.6	-31.71	-13	-18.71	10
V	7769.320	-50.18	1	10.9	-40.28	-13	-27.28	10
H	7768.740	-53.89	1	10.9	-43.99	-13	-30.99	10

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

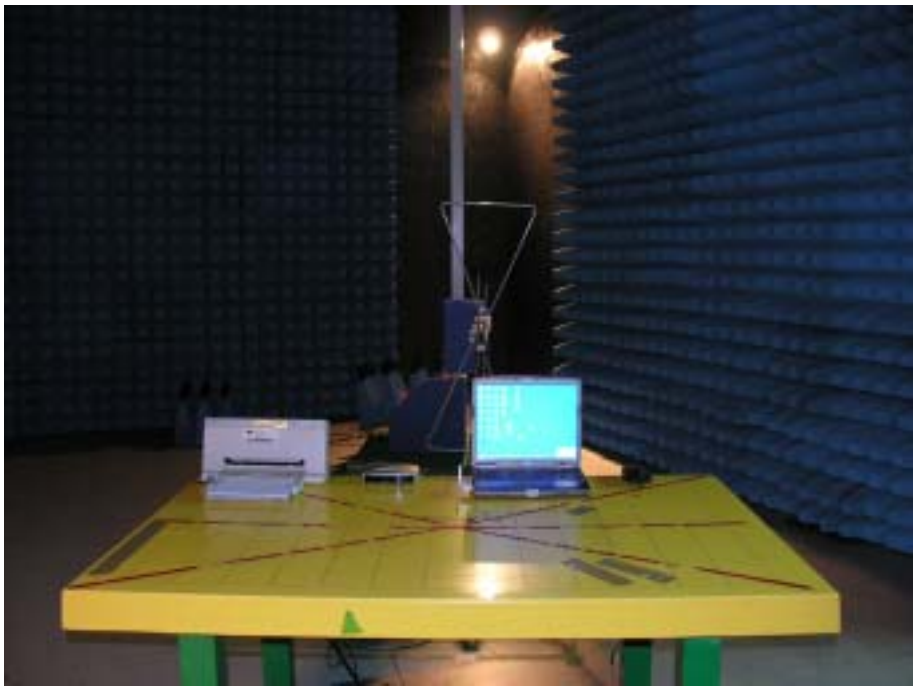
(6) 2685MHz

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	72.680	-51.30	0.07	-0.98	-52.35	-13	-39.35	10
V	206.540	-66.91	0.20	4.34	-62.77	-13	-49.77	10
V	385.020	-71.94	0.30	5.96	-66.28	-13	-53.28	10
V	798.240	-60.53	0.70	6.18	-55.05	-13	-42.05	10
H	74.620	-55.18	0.07	-0.98	-56.23	-13	-43.23	10
H	220.120	-67.08	0.20	4.34	-62.94	-13	-49.94	10
H	536.340	-64.66	0.50	6.13	-59.03	-13	-46.03	10
H	800.180	-63.08	0.80	6.18	-57.70	-13	-44.70	10

Polarity (V/H)	Frequency (MHz)	SG Level (dBm)	Cable Loss (dB)	Substitution Ant. Gain (dB)	Net (dBm)	Limit (dBm)	Margin (dB)	Band Width (MHz)
V	5370.360	-32.08	0.5	9.6	-22.98	-13	-9.98	10
H	5367.810	-43.58	0.5	9.6	-34.48	-13	-21.48	10
V	8056.730	-48.92	1.72	10.9	-39.74	-13	-26.74	10
H	8055.670	-61.97	1.72	10.9	-52.79	-13	-39.79	10

Remark: Net = SG Level - Cable Loss + Substitution Ant. Gain

Figure 59. Photos - Radiated Emissions



7. AC power line conducted emission

Name of Test	AC power line conducted emission
Base Standard	FCC 15.207

Tested By: Marx Yan
Test Date: Jun. 22, 2007

Test Equipment: EC365

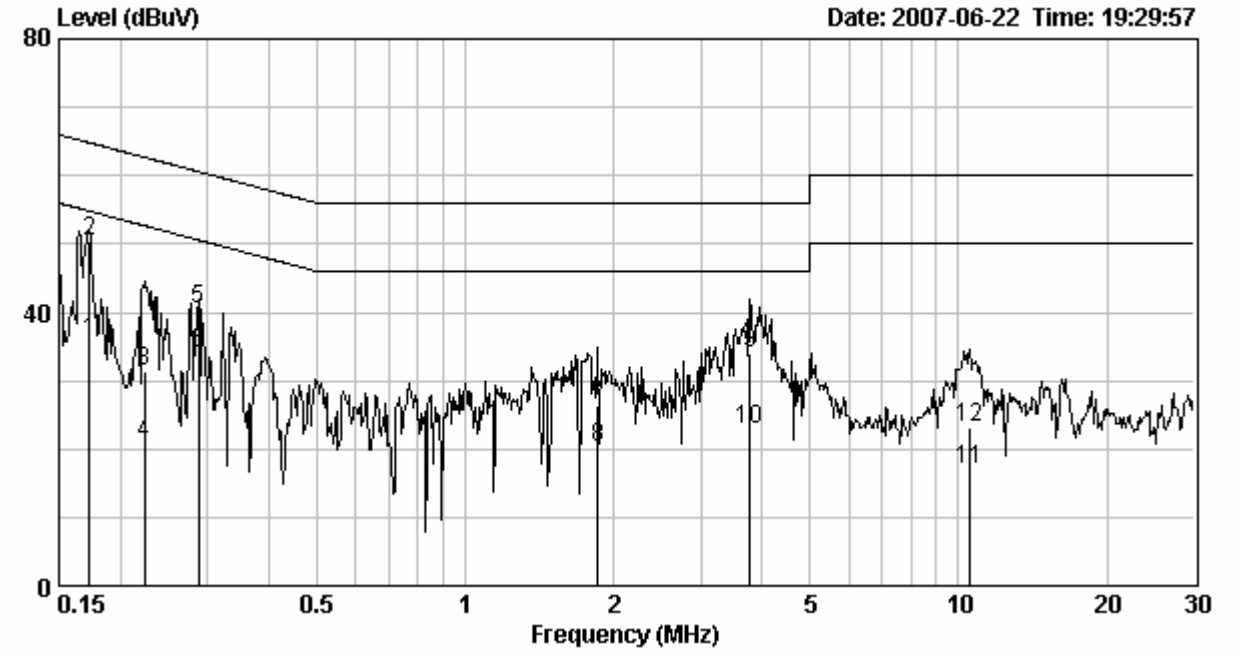
Test Result: Complies
Test Procedure and Setup: See Appendix E
Measurement Data: See Tables & plots below

Note: The EUT was tested while in normal communication mode.

Phase : Line
EUT : MAX-100
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuA)	Limit Qp (dBuA)	Level AV (dBuA)	Limit Av (dBuA)	Margin (dB) Qp	Margin (dB) Av
0.173	0.10	50.50	64.81	35.86	54.81	-14.31	-18.95
0.223	0.10	31.50	62.70	20.79	52.70	-31.20	-31.91
0.288	0.10	40.30	60.59	33.88	50.59	-20.29	-16.71
1.858	0.11	26.38	56.00	20.14	46.00	-29.62	-25.86
3.779	0.22	34.02	56.00	22.84	46.00	-21.98	-23.16
10.564	0.54	23.12	60.00	17.06	50.00	-36.88	-32.94

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral
EUT : MAX-100
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuA)	Limit Qp (dBuA)	Level AV (dBuA)	Limit Av (dBuA)	Margin (dB) Qp	Margin (dB) Av
0.171	0.10	49.70	64.90	46.15	54.90	-15.20	-8.75
0.224	0.10	39.98	62.66	34.86	52.66	-22.68	-17.80
1.210	0.10	30.03	56.00	14.53	46.00	-25.97	-31.47
2.133	0.12	32.03	56.00	21.75	46.00	-23.97	-24.25
3.509	0.21	39.10	56.00	26.20	46.00	-16.90	-19.80
4.247	0.24	28.53	56.00	14.74	46.00	-27.47	-31.26

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

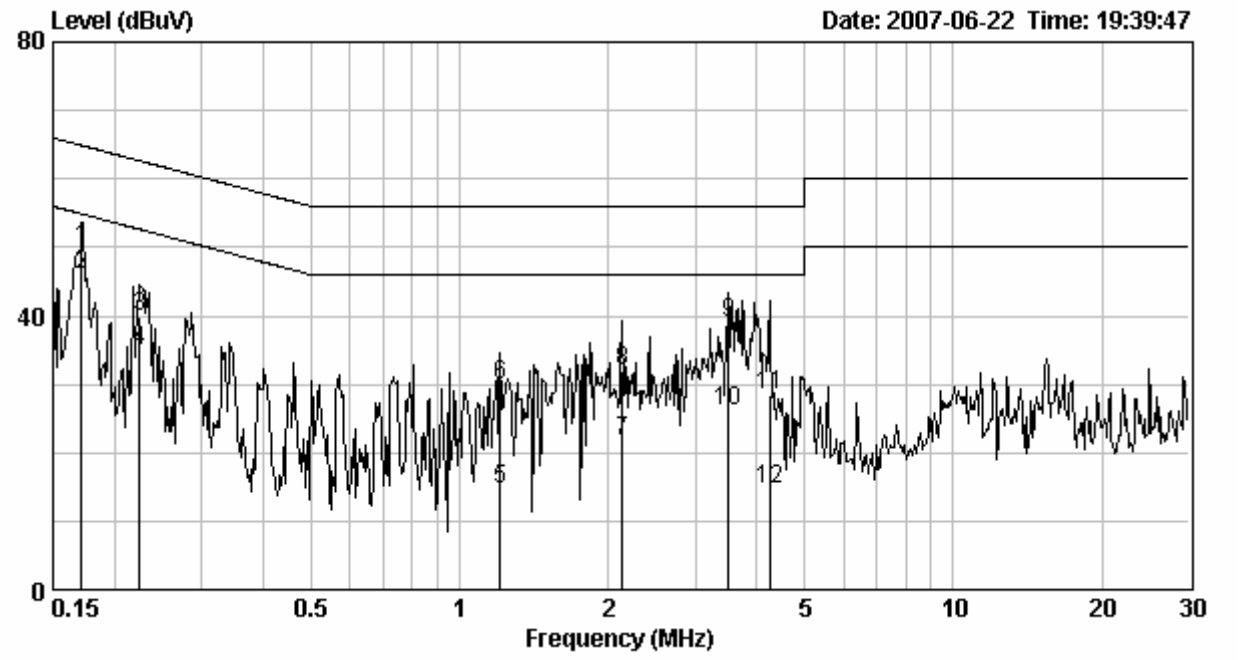
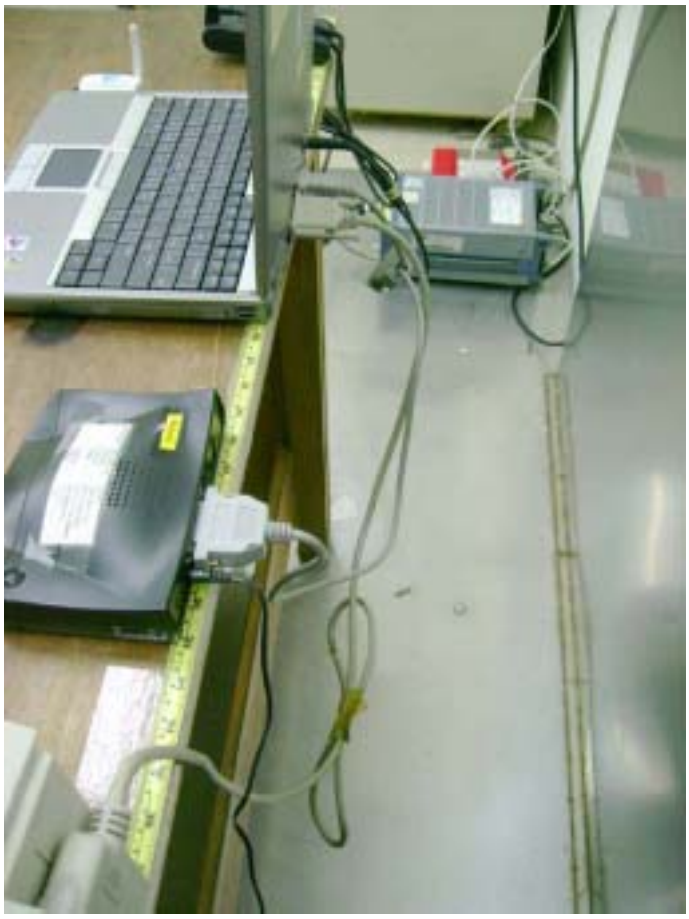


Figure 59. Photos - Conducted Emissions



8. Frequency Stability

Name of Test	Frequency Stability
Base Standard	FCC 2.1055 & 27.54

Tested By: Marx Yan
Test Date: N/A

Test Equipment: EC365

Test Result: N/A
Test Procedure and Setup: N/A
Measurement Data: N/A

Note: The EUT has been verified frequency stability of 5MHz and 10MHz Bandwidth, the temperature range from -30℃ ~ +50℃ at lowest band (2500MHz at 5MHz; 2505MHz at 10MHz) and highest band (2685MHz), the shift deviation is low than 10ppm.

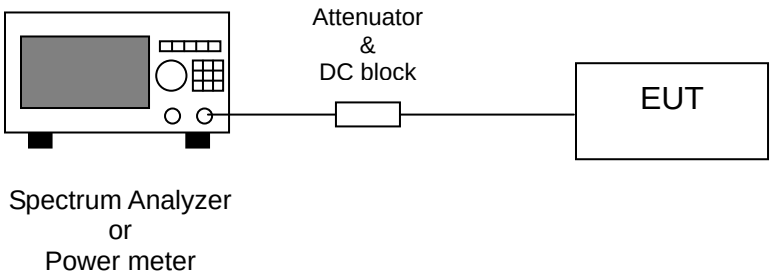
APPENDICES

Appendix A: 2.1046 - RF Power Output

A1. Method of Measurement:

The peak power at antenna terminals is measured using a Power Meter. Power output is measured with the maximum rated input level.

A2. Test Diagram:

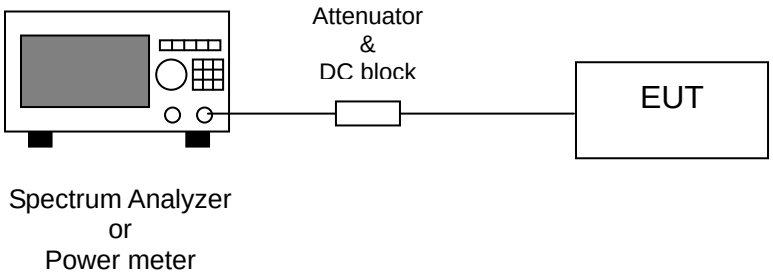


Appendix B: 2.1049 - Occupied Bandwidth

B1. Method of Measurement:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1% of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

B2. Test Diagram:

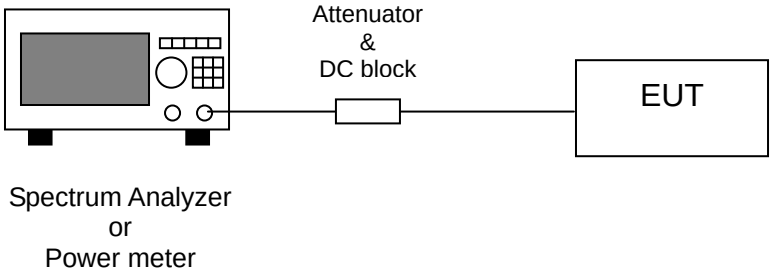


Appendix C: 2.1051 - Spurious Emission at Antenna Terminal

C1. Method of Measurement:

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of 1 MHz for emissions above 1 GHz. Below 1 GHz the resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate limit line is applied to the output waveform to verify compliance.

C2. Test Diagram:



Appendix D: Field Strength & Spurious Radiated Emission

If the antenna is detachable from the transmitter, it is removed and replaced with a 50 ohm load. Emissions are measured up to the 10th harmonic of the highest transmit frequency that the transmitter is capable of producing. If the antenna is not detachable from the transmitter, emissions are measured radiated only at a distance of 3 meters.

D1. Method of Measurement:

D1.1 Spurious Radiated Emission

The frequency range from 30MHz to 1000MHz using Bilog Antenna.
The frequency range over 1GHz using Horn Antenna (using a Spectrum analyzer RBW of 1MHz)

The maximum field strength of the spurious emission is measured at a distance of 3 meters. The device under test is then replaced with a substitution antenna of known gain with respect to a Horn antenna. A calibrated signal source is used to feed the substitution antenna. The RF level to the substitution antenna is adjusted to repeat the previously measured field strength. The RF input level to the substitution antenna is the effective radiated power of the spurious emission after any correction for substitution antenna gain against a Horn antenna.

D1.2 Radiated Field Strength

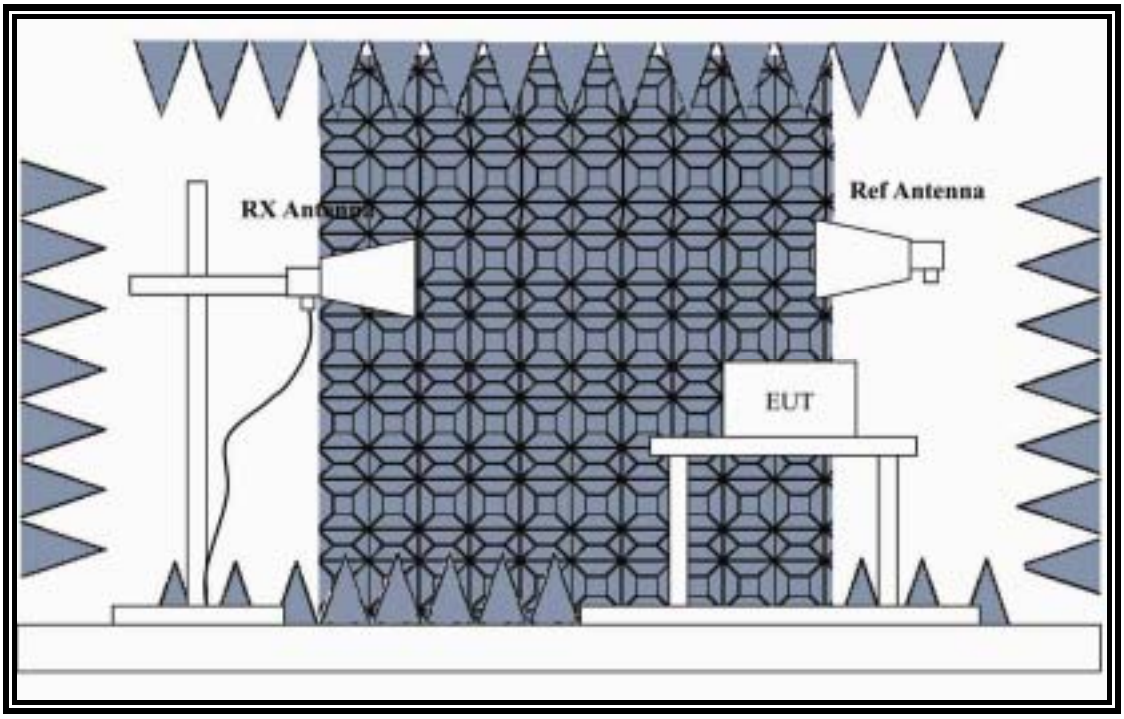
Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

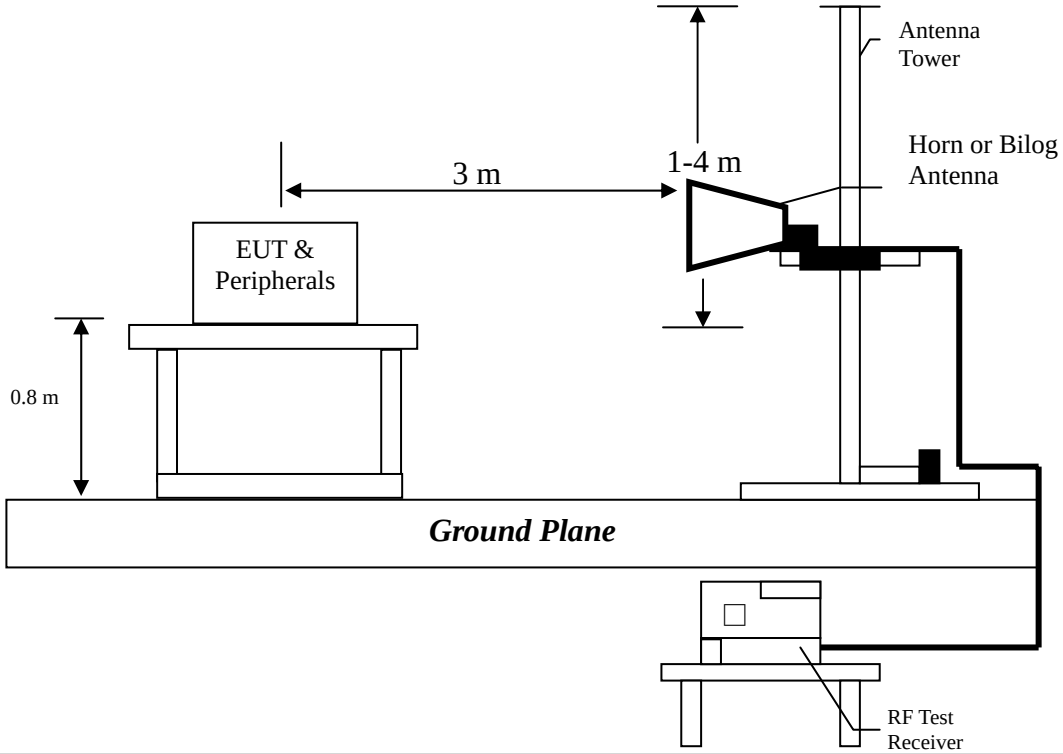
The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

D2. Test Diagram:

D2.1 Spurious **Radiated** Emission



D2.2 Radiated Field Strength



D3. Emission Limit:

D3.1 Spurious **Radiated** Emission

According to FCC 27.53(l) requirement, the spurious emission shall be attenuated at least 43 + 10 log(P) dB from the fundamental.

Sample Calculation:

Assume the EUT Pout= 2W = 33dBm
43 + 10 log(P)
43 + 10 log(2)
43 + 10 × 0.3
43 + 3 = 46 dB
33 dBm – 46 dB = -13 dBm

D3.2 Radiated Field Strength

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dBµV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

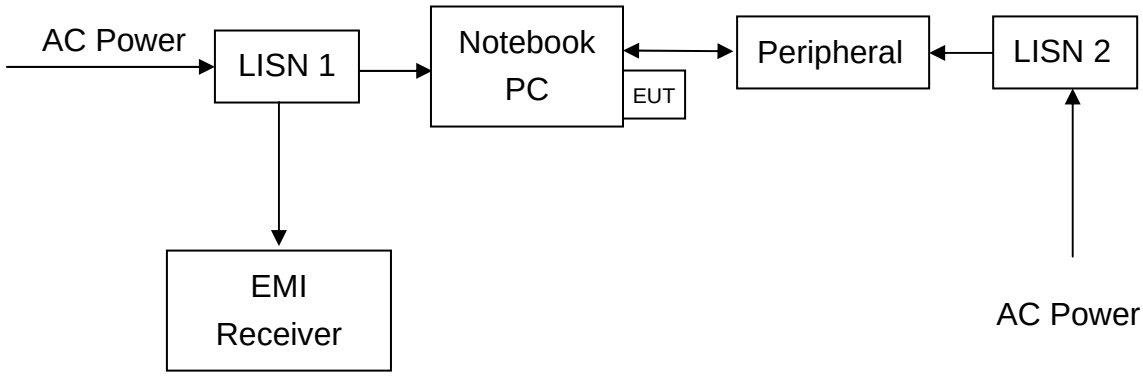
Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Appendix E: 15.207 – AC power line conducted emission

E1. Method of Measurement:

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

E2. Test Diagram:



E2. Emission Limit:

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

Appendix F: 2.1055 - Frequency Stability

F1. Method of Measurement:

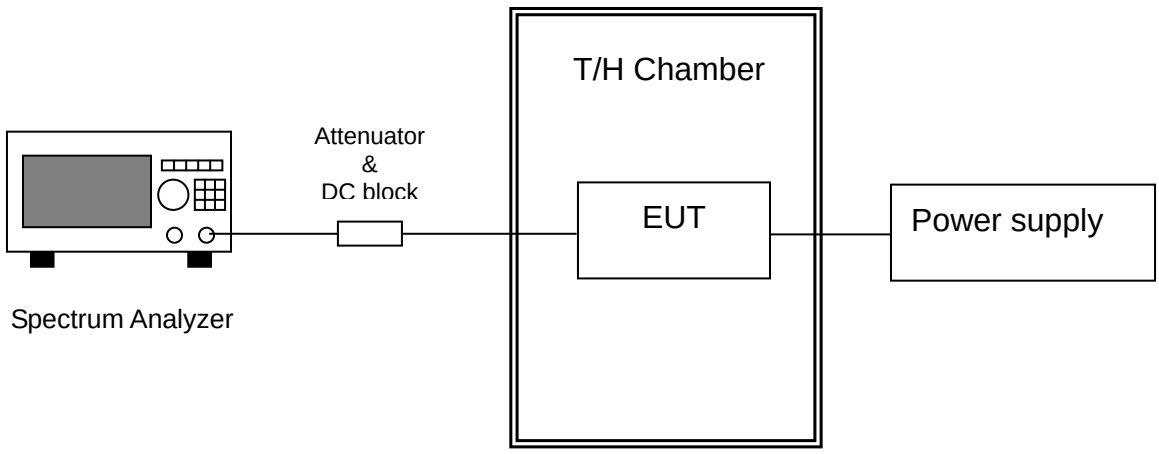
Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

F2. Test Diagram:



Appendix G: Test Equipment List

Intertek ID No.	Equipment	Brand	Model No.	Calculation Due
EC303	EMI Test Receiver	Rohde & Schwarz	ESCS 30	04/27/2008
EC353	Spectrum Analyzer	Rohde & Schwarz	FSP 30	08/06/2007
EC365	Spectrum Analyzer	Rohde & Schwarz	FSEK 30	11/12/2007
EC354	Signal Generator	Rohde & Schwarz	SMR27	11/14/2007
EC371	Horn Antenna	SCHWARZBECK	BBHA 9120 D	12/22/2007
EC351	Horn Antenna	SCHWARZBECK	BBHA 9170	03/04/2008
EC347	Bilog Antenna	SCHWARZBECK	VULB 9168	12/23/2007
EC373	Pre-Amplifier	MITEQ	919981	03/07/2009
EC374	Pre-Amplifier	MITEQ	828825	01/15/2008
EP346	Controller	HDGmbH	CM 100	N/A
EP347	Antenna Tower	HDGmbH	MA 2400	N/A
EC344	LISN	Rohde & Schwarz	ESH3-Z5	03/30/2008
EC396	Wideband Peak Power Meter/ Sensor	Anritsu	ML2497A/ MA2491A	11/12/2007
EC363	Temperature Humidity Test Chamber	Juror	TR-4010	09/18/2007
EC404-1	PSA Series Spectrum Analyzer	Agilent	E4440A	04/26/2008
EP391	WiMAX Tested	Agilent	N8990A P30	-
EC404-4	P Series Power Meter	Agilent	N1911A	02/08/2008
EC404-5	Wide band Power Sensor	Agilent	N1921A	01/20/2008
EC404-3	ESG VECTOR SIGNAL GENERATIOR	Agilent	E4438C	04/28/2008
N/A	INDUSRIAL COMPUTER	ADVANGTECH	610H	N/A

Note: 1. The above equipments are within the valid calibration period.

2. The test antennas (receiving antenna) are calibration per 3 years.

Measurement Uncertainty:

Measurement uncertainty was calculated in accordance with NAMAS NIS 81.

Parameter	Uncertainty
Radiated Emission	±4.98 dB
Conducted Emission	±2.6 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.