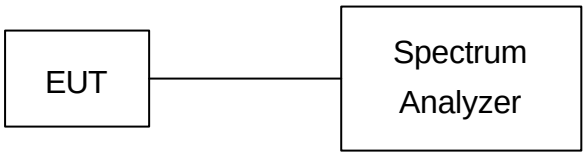
7. Peak Transmit Power

7.1. Test Procedure

The antenna port (RF output) of the EUT was connected to the input (RF input) of a spectrum analyzer. Power was read directly from the spectrum analyzer and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

7.2. Test Setup Layout



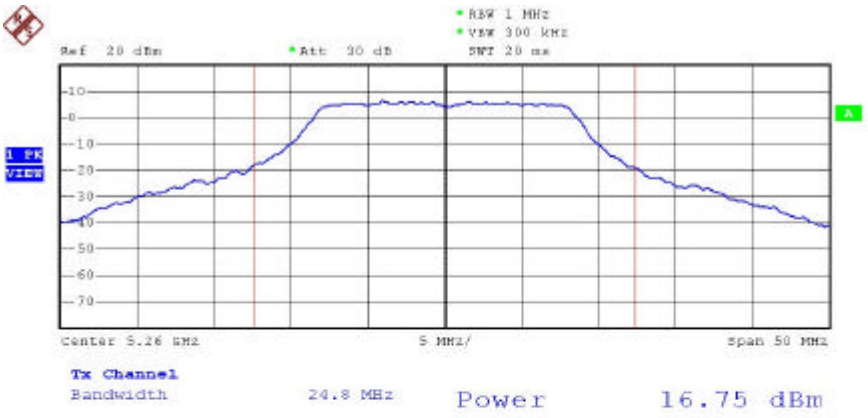
7.3. Test Result and Data

Test Mode: Normal, Transmit Rate: 54Mbps

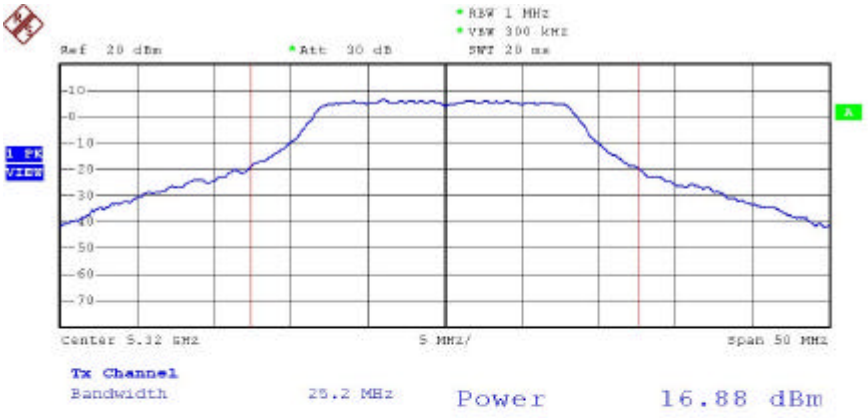
Test Date: Apr. 17, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	26dB Occupied Bandwidth (MHz)
5	5260	16.75	47.32	24.8
8	5320	16.88	48.75	25.2
9	5745	16.70	46.77	24.3
11	5785	15.12	32.51	26.8
13	5825	14.06	25.47	25.5

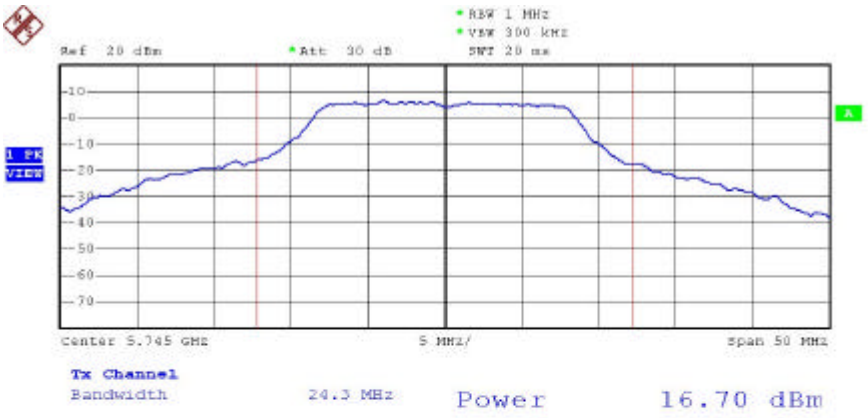
Peak Transmit Power



Date: 17.APR.2005 18:57:43



Date: 17.APR.2005 18:58:59



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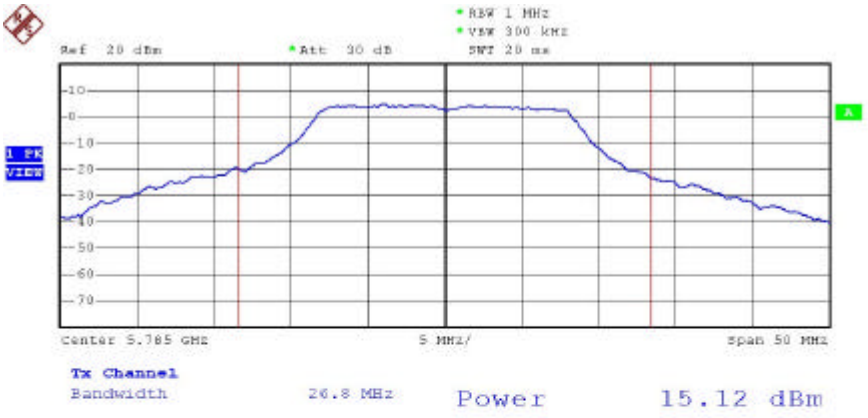

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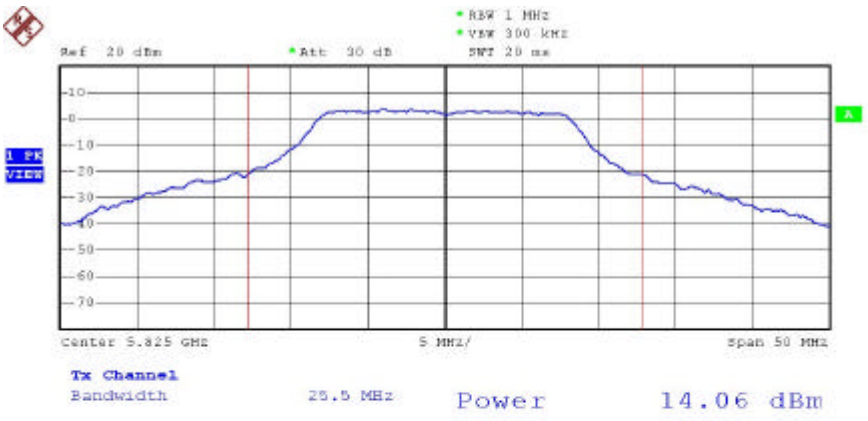
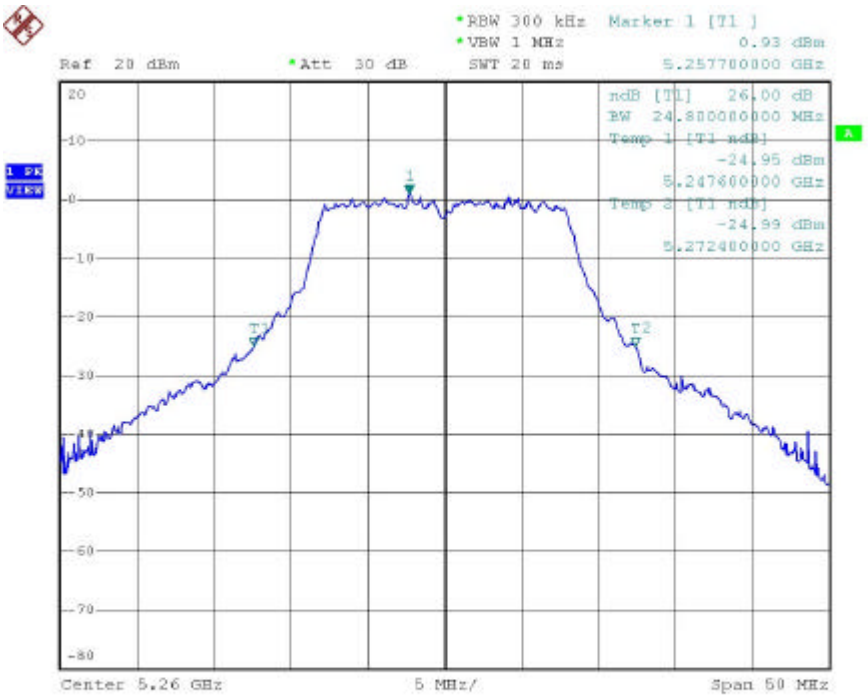
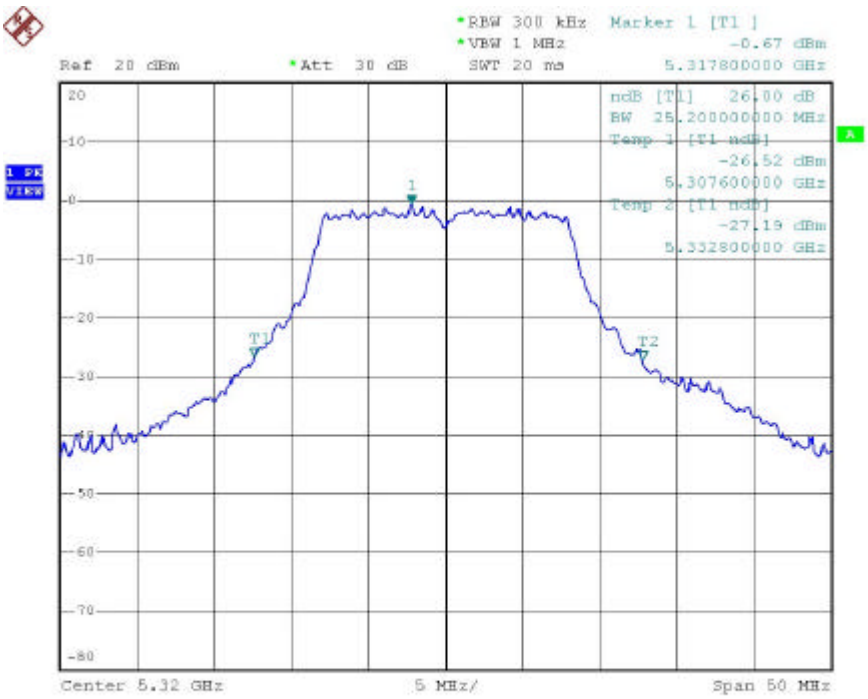


Date: 17.APR.2005 19:03:41

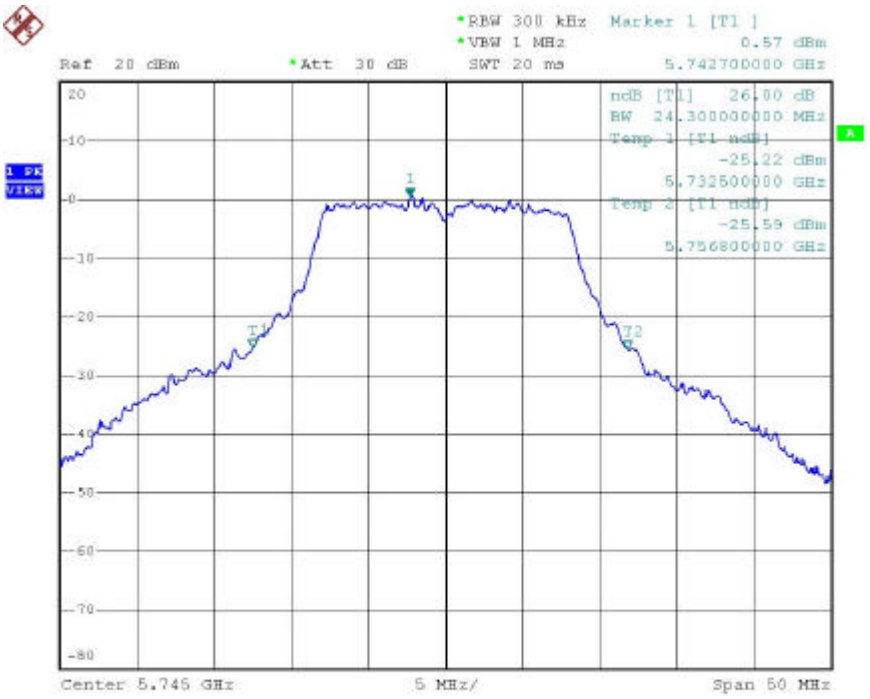
26dB Occupied Bandwidth (MHz)



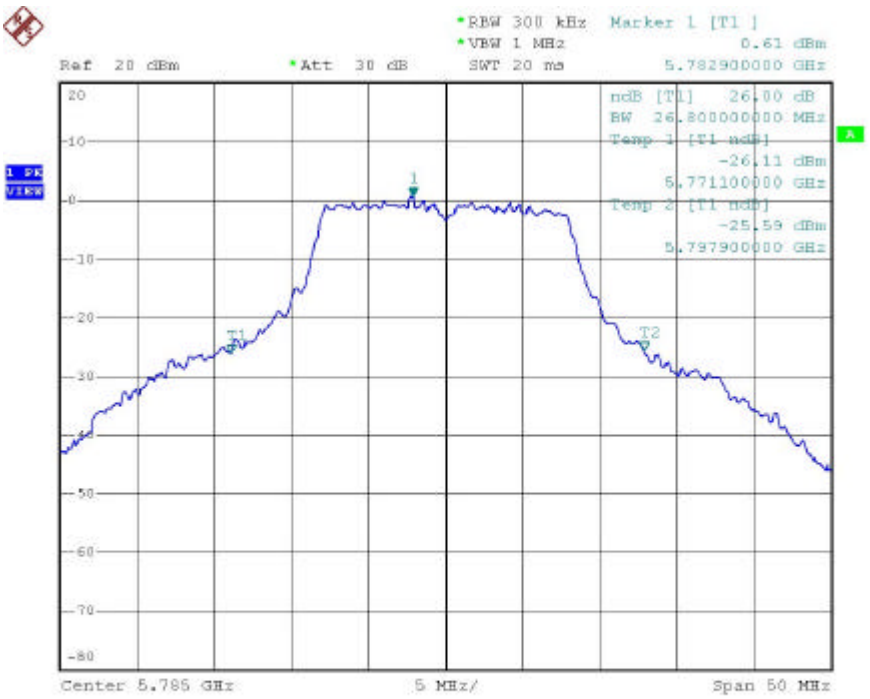
Date: 17.APR.2005 18:34:16



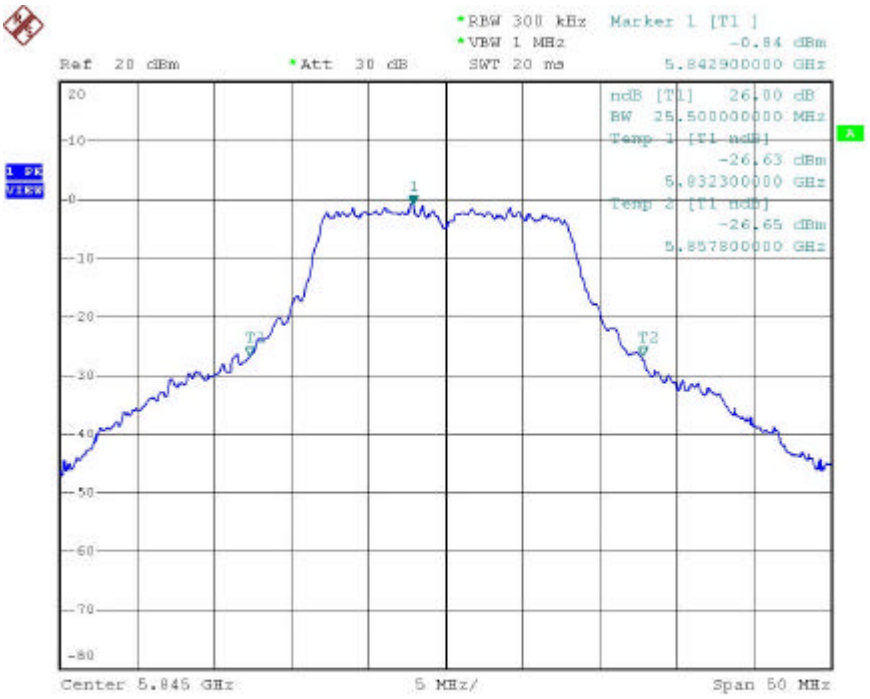
Date: 17.APR.2005 18:35:14



Date: 17.APR.2005 18:38:55



Date: 17.APR.2005 18:40:31


RBW 300 kHz
VBW 1 MHz
SWT 20 ms
Marker 1 [T1]
-0.84 dBm
5.842900000 GHz
Ref 20 dBm
Att 30 dB
ndB [T1] 26.00 dB
BW 25.500000000 MHz
Temp 1 [T1 ndB]
-26.63 dBm
5.832300000 GHz
Temp 2 [T1 ndB]
-26.65 dBm
5.857800000 GHz
Center 5.845 GHz
5 MHz/
Span 50 MHz
Date: 17.APR.2005 18:41:48

8. Peak Power Excursion

8.1. Test Procedure

1.The transmitter output was connected to the spectrum analyzer.

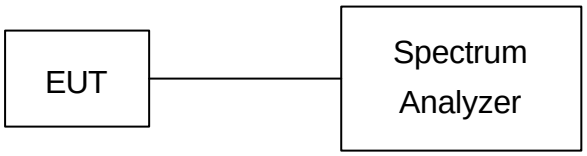
2.Using Peak detector and max-hold function for Trace 1 MHz and VBW to 3 MHz for Trace 1.

3.Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz for Trace 1.

Set RBW of spectrum analyzer to 1 MHz and VBW to 300 kHz for Trace 2.

4.The largest difference between Trace 1 and Trace 2 in any 1 MHz band on any frequency was recorded.

8.2. Test Setup Layout

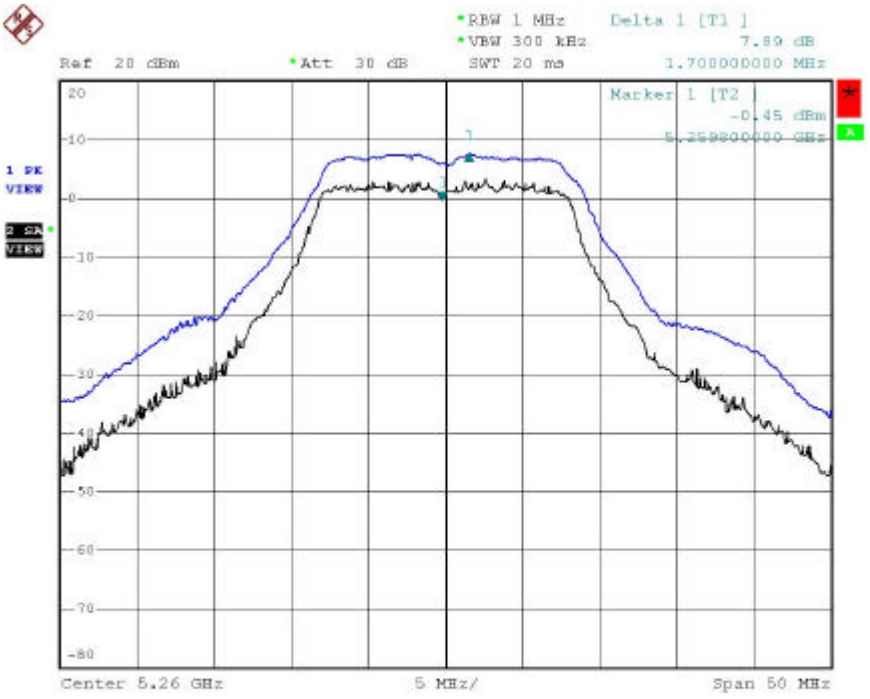


8.3. Test Result and Data

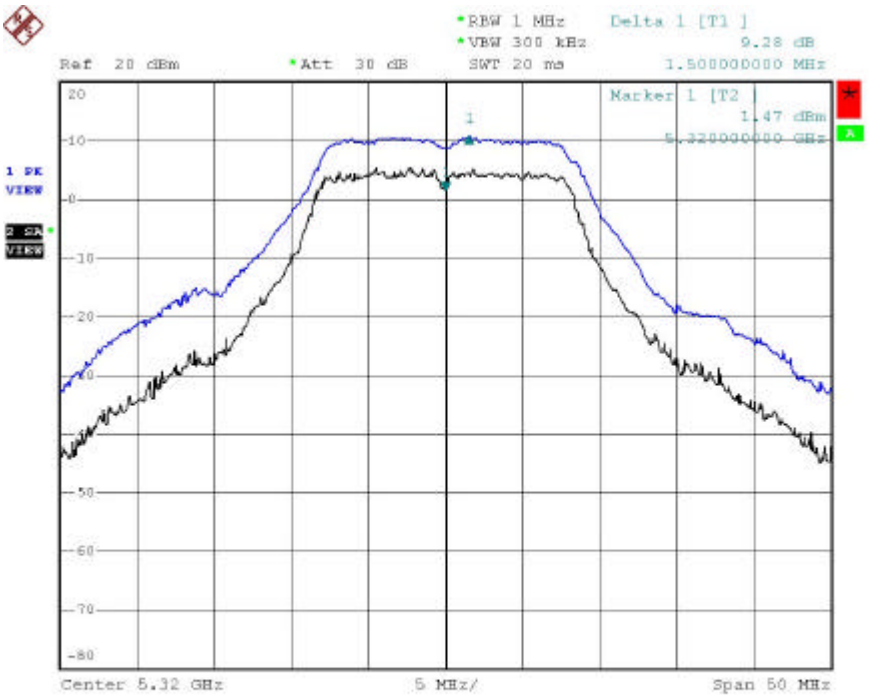
Test Mode: Normal, Transmit Rate: 54Mbps

Test Date: Apr. 17, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel	Frequency (MHz)	Peak Power Excursion (dBm)
5	5260	7.89
8	5320	9.28
9	5745	7.65
11	5785	7.58
13	5825	7.54



Date: 17.APR.2005 19:21:14



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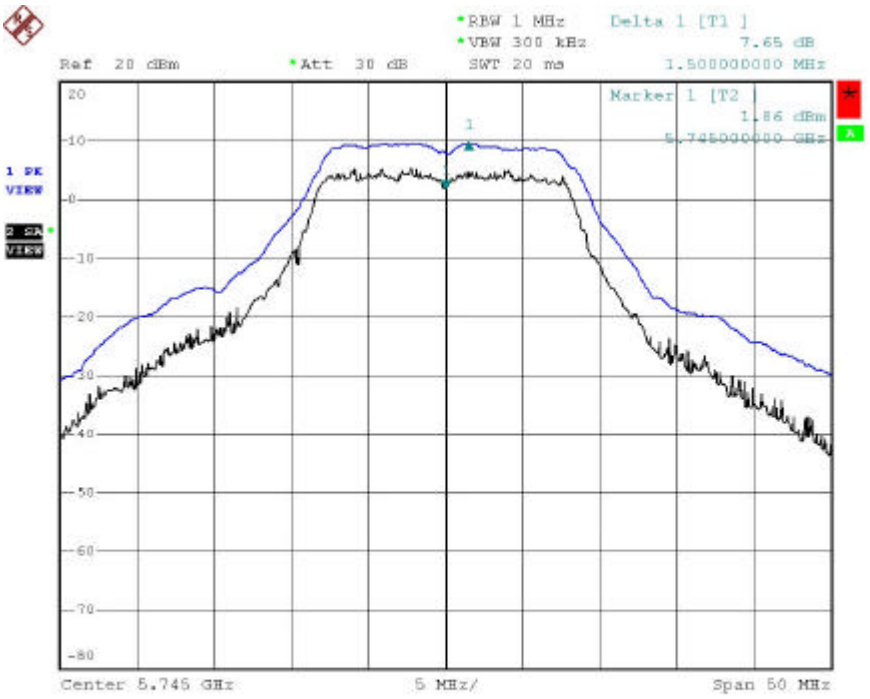
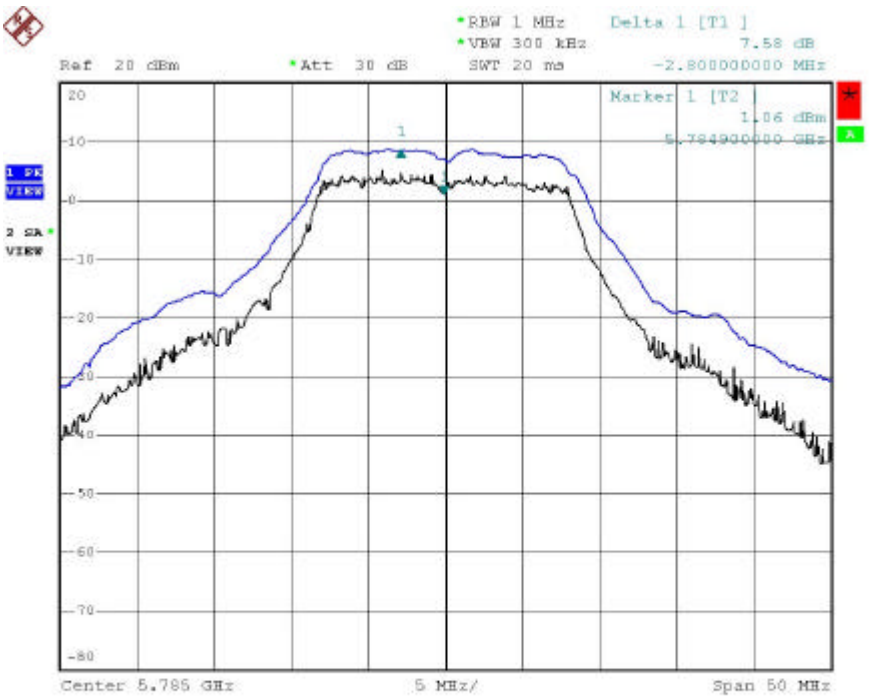
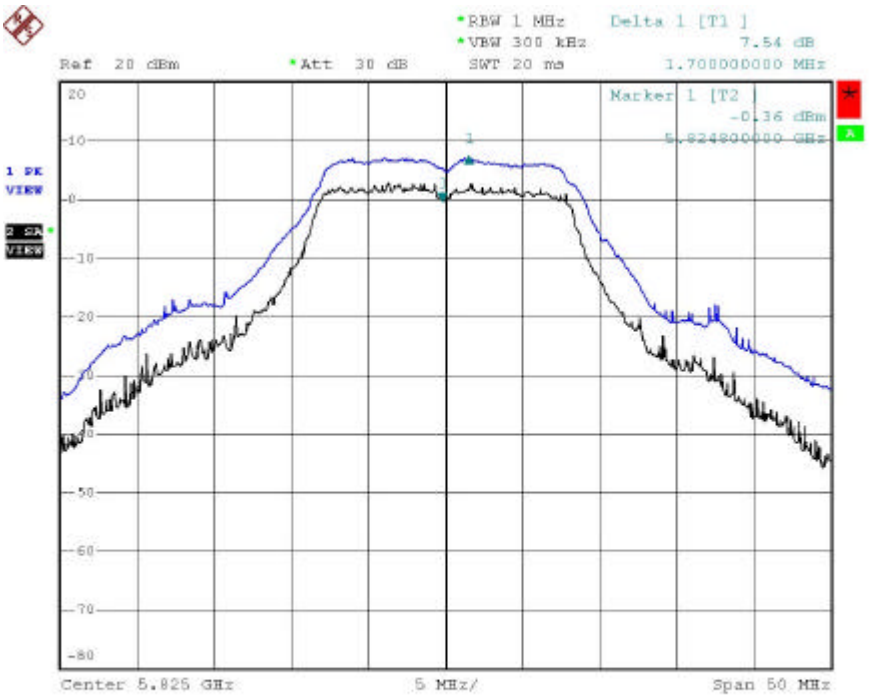


Date: 17.APR.2005 19:16:37



Date: 17.APR.2005 19:14:05



Date: 17.APR.2005 19:09:36

9. Peak Power Spectral Density

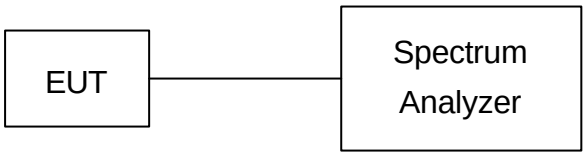
9.1. Test Procedure

1.The transmitter output was connected to spectrum analyzer.

2.Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.

3.The Peak Power Spectral Density is the highest level found across the emission in any 1MHz Band.

9.2. Test Setup Layout

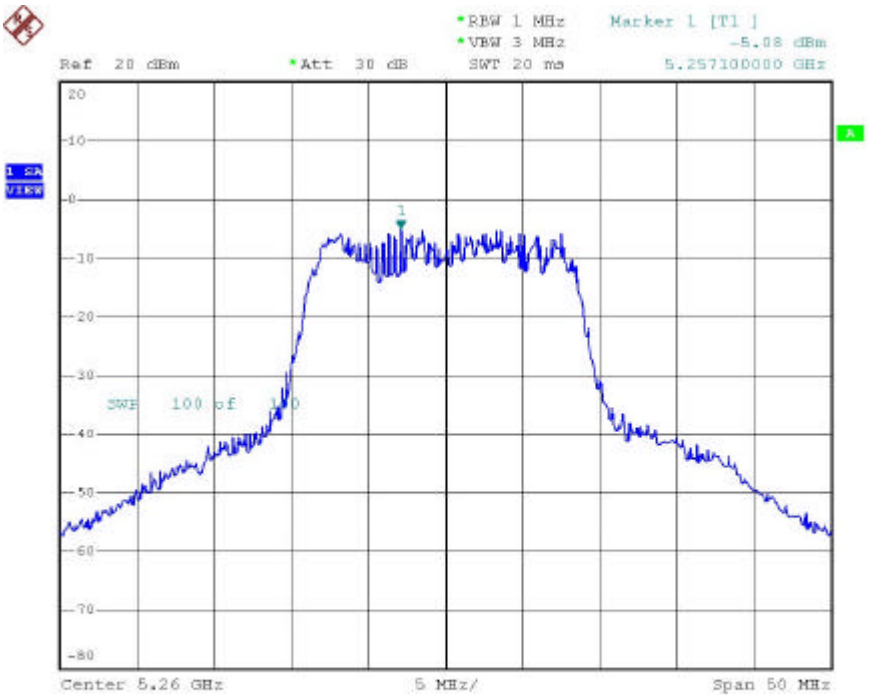


9.3. Test Result and Data

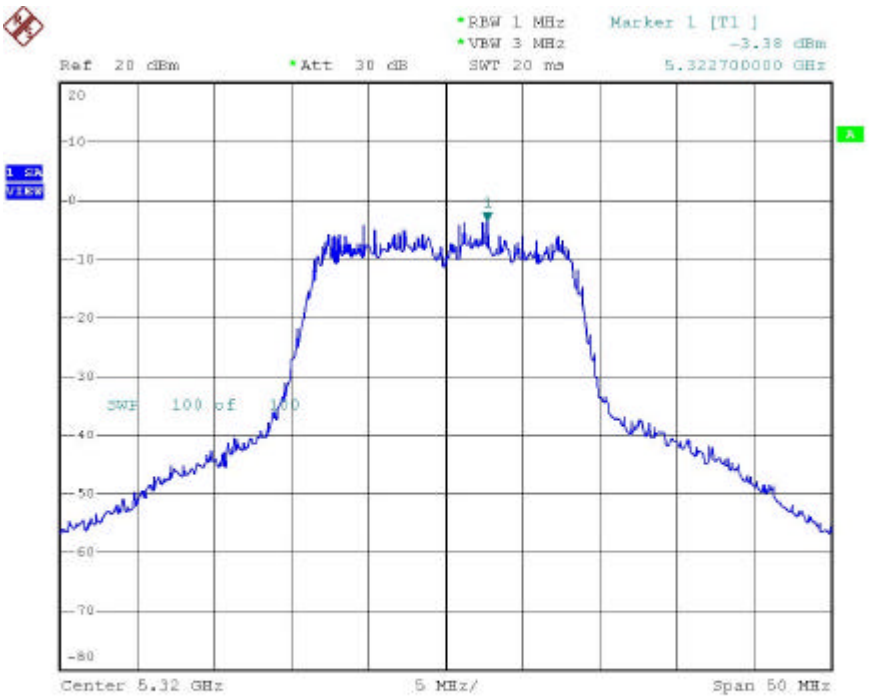
Test Mode: Normal, Transmit Rate: 654Mbps

Test Date: Apr. 17, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

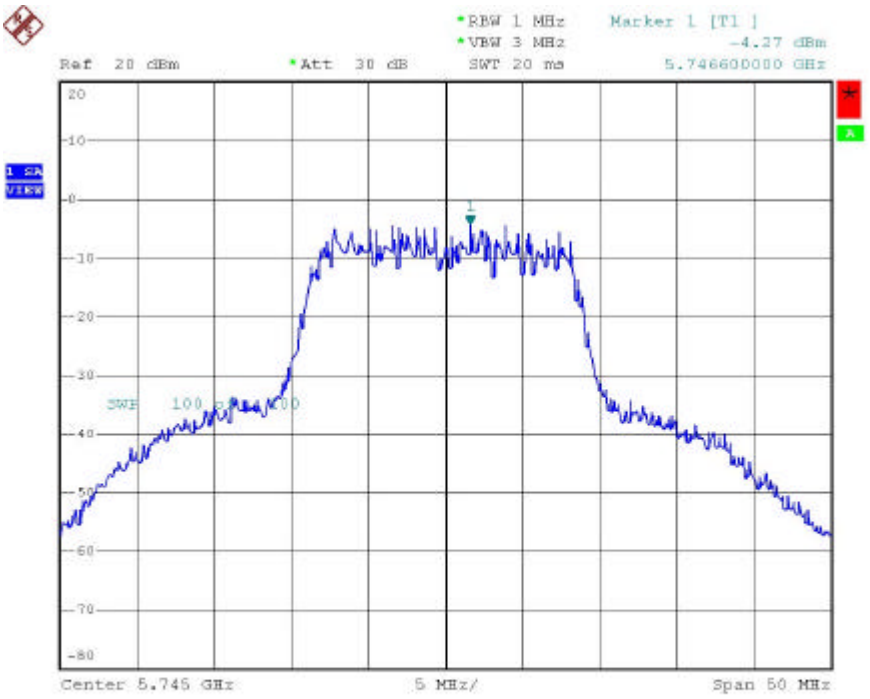
Channel	Frequency (MHz)	PF Power Level In 1MHz BW (dBm)
5	5260	-5.08
8	5320	-3.38
9	5745	-4.27
11	5785	-2.77
13	5825	-3.24



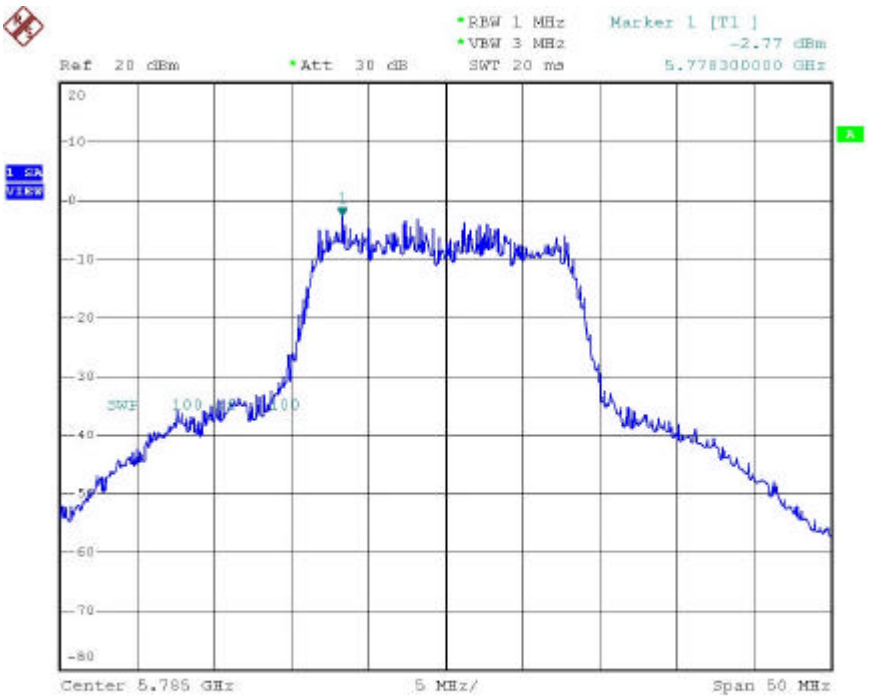
Date: 17.APR.2005 19:33:24



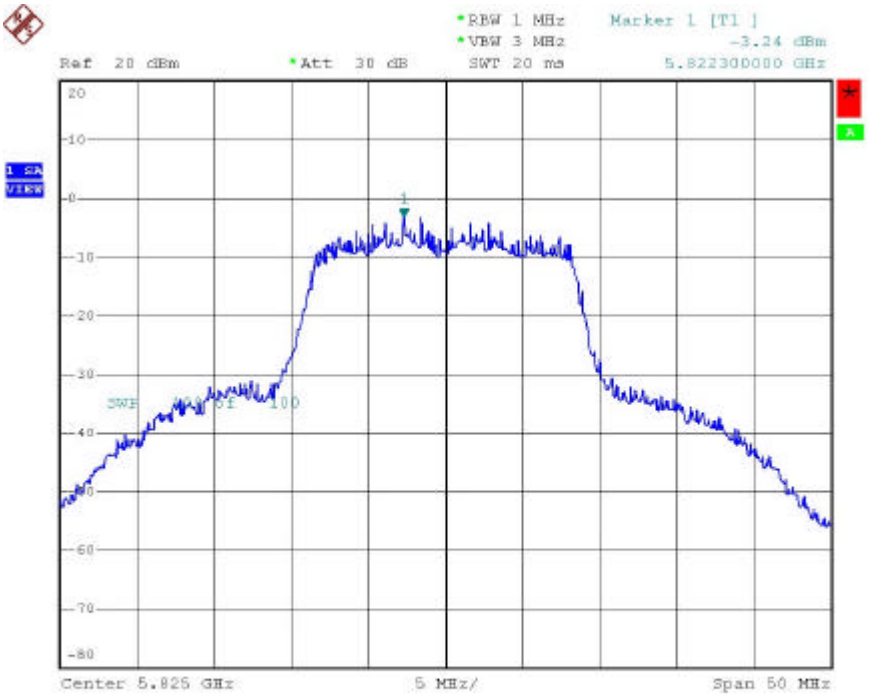
Date: 17.APR.2005 19:34:06



Date: 17.APR.2005 19:34:40



Date: 17.APR.2005 19:35:16



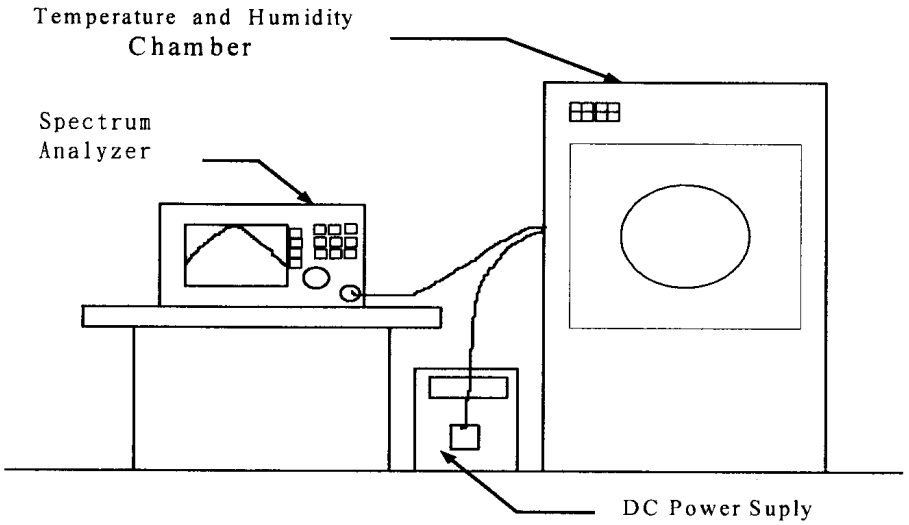
Date: 17.APR.2005 19:35:52

10. Frequency Stability

10.1. Test Procedure

1. The EUT was placed inside the Temperature and Humidity chamber.
2. The transmitter output was connected to spectrum analyzer.
3. Turn the EUT on and couple its output to a spectrum analyzer.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
6. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
7. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

10.2. Test Setup Layout



10.3. Test Result and Data

Operating frequency: 5320 MHz							
Temp (°C)	Power supply (V)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	93.5	5319.9824	-0.000331	5319.9808	-0.000361	5319.9802	-0.000372
	110	5319.9888	-0.000211	5319.985	-0.000282	5319.9826	-0.000327
	126.5	5319.9892	-0.000203	5319.9902	-0.000184	5319.9882	-0.000222
40	93.5	5319.9886	-0.000214	5319.9878	-0.000229	5319.9884	-0.000218
	110	5319.9882	-0.000222	5319.9886	-0.000214	5319.9884	-0.000218
	126.5	5319.9898	-0.000192	5319.9884	-0.000218	5319.9888	-0.000211
30	93.5	5319.9484	-0.000970	5319.9482	-0.000974	5319.9484	-0.000970
	110	5319.949	-0.000595	5319.9495	-0.000949	5319.9484	-0.000970
	126.5	5319.9484	-0.000970	5319.9488	-0.000962	5319.9484	-0.000951
20	93.5	5319.9384	-0.001158	5319.9392	-0.001143	5319.9388	-0.001150
	110	5319.9393	-0.001143	5319.9386	-0.001154	5319.9394	-0.001139
	126.5	5319.9388	-0.001150	5319.9388	-0.001150	5319.9396	-0.001135
10	93.5	5319.9502	-0.000936	5319.9492	-0.000955	5319.9502	-0.000936
	110	5319.95	-0.000940	5319.9496	-0.000947	5319.949	-0.000959
	126.5	5319.9498	-0.000944	5319.949	-0.000959	5319.9494	-0.000951
0	93.5	5319.9776	-0.000421	5319.976	-0.000451	5319.9734	-0.000500
	110	5319.9706	-0.000553	5319.9706	-0.000553	5319.969	-0.000583
	126.5	5319.9674	-0.000613	5319.9672	-0.000617	5319.9664	-0.000632
-10	93.5	5319.9778	-0.000417	5319.9774	-0.000425	5319.9776	-0.000421
	110	5319.978	-0.000414	5319.978	-0.000414	5319.9774	-0.000425
	126.5	5319.979	-0.000395	5319.9792	-0.000391	5319.9806	-0.000365
-20	93.5	5319.9828	-0.000323	5319.982	-0.000338	5319.9822	-0.000335
	110	5319.9826	-0.000327	5319.9812	-0.000353	5319.9808	-0.000361
	126.5	5319.9838	-0.000305	5319.924	-0.001429	5319.9838	-0.000305
-30	93.5	5319.9848	-0.000286	5319.989	-0.000207	5319.9852	-0.000278
	110	5319.9844	-0.000293	5319.9844	-0.000293	5319.9842	-0.000297
	126.5	5319.9826	-0.000327	5319.9842	-0.000297	5319.9846	-0.000289

Limit :

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

11. Band Edges Measurement

11.1. Test Procedure

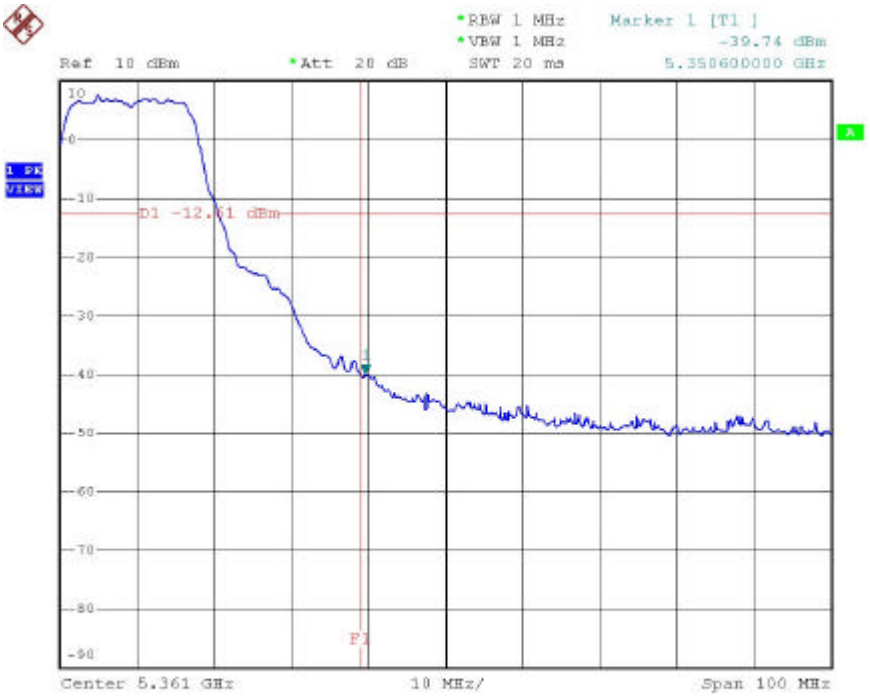
1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 MHz bandwidth from band edge.
3. The band edges was measured and recorded.

11.2. Test Result and Data

Test Mode: Normal, Transmit Rate: 54Mbps

Test Date: Apr. 17, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel	Frequency (MHz)	Maximum Value In Frequency (MHz)	Maximum Value (dBm)
8	5320	5350.6	-39.74



Date: 17.APR.2005 19:42:29

11.3. Restrict Band Emission Measurement Data

Antenna type 1 : external dipole antenna

Test Mode: Normal, Transmit Rate: 54Mbps Antenna assembly gain: 4dBi

Test Date: Apr. 20, 2005 Temperature: 24℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel 08, Fundamental Frequency: 5320 MHz

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)		Corrected Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
		Peak	Ave		Peak	Ave	Peak	Ave			
5401.20	H	44.74	30.75	8.59	53.33	39.34	74	54	-14.66	191	1.0
5399.80	V	51.30	30.89	8.59	59.89	39.48	74	54	-14.52	127	1.0

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10 MHz for Average detection at frequency above 1GHz.

Antenna type 2 : external GP-antenna

Test Mode: Normal, Transmit Rate: 54Mbps Antenna assembly gain: 8dBi

Test Date: Apr. 20, 2005 Temperature: 24℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel 08, Fundamental Frequency: 5320 MHz

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)		Corrected Factor (dB)	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
		Peak	Ave		Peak	Ave	Peak	Ave			
5398.20	H	44.70	31.80	8.59	53.29	40.39	74	54	-13.61	191	1.0
5401.00	V	52.00	31.34	8.59	60.59	39.93	74	54	-14.07	127	1.0

Notes:

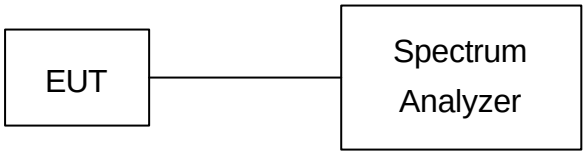
1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10 MHz for Average detection at frequency above 1GHz

12. 6dB Bandwidth

12.1. Test Procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
3. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

12.2. Test Setup Layout

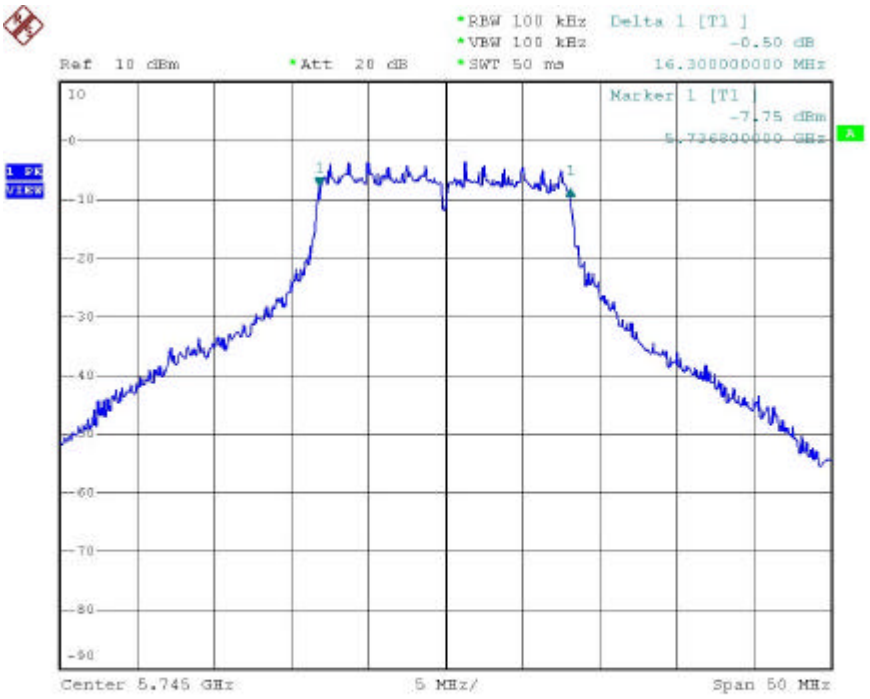


12.3. Test Result and Data

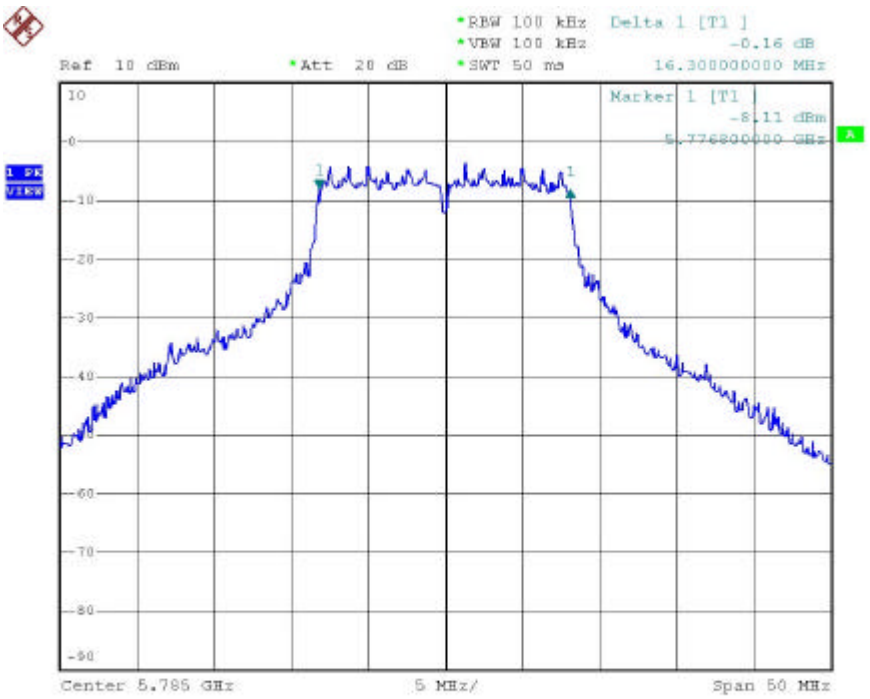
Test Mode: Normal, Transmit Rate: 54Mbps

Test Date: Feb. 16, 2005 Temperature: 26℃ Humidity: 64% Atmospheric pressure: 1030mmHg

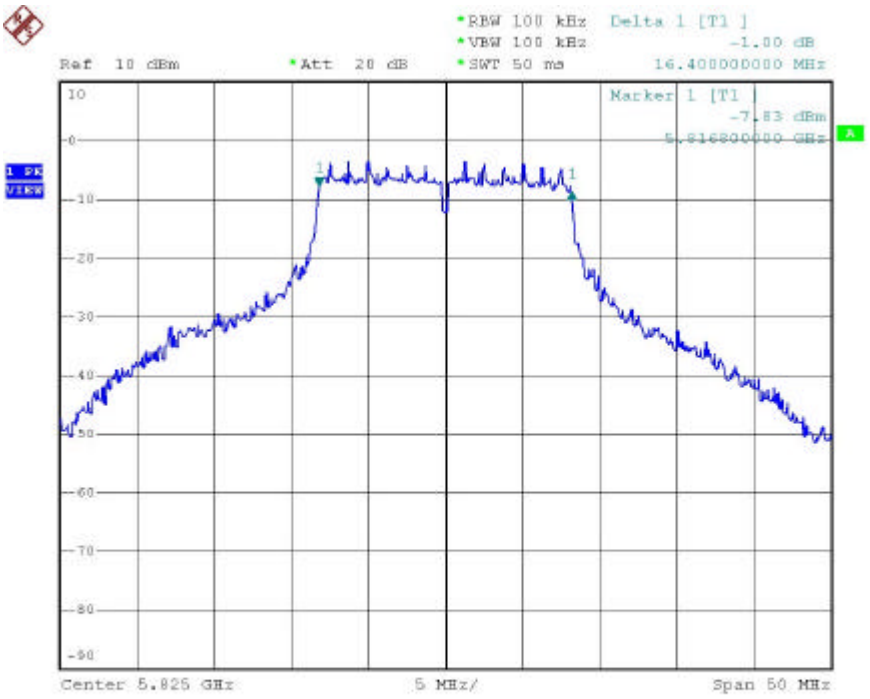
Channel	Frequency (MHz)	6dB Bandwidth
9	5745	16.3
11	5785	16.3
13	5825	16.4



Date: 16.APR.2005 13:37:20



Date: 16.APR.2005 13:40:39



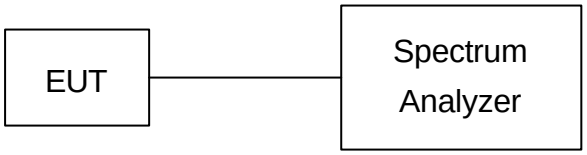
Date: 16.APR.2005 13:42:06

13. Maximum Peak Output Power

13.1. Test Procedure

The antenna port（RF output）of the EUT was connected to the input（RF input）of a spectrum analyzer. Power was read directly from the spectrum analyzer and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

13.2. Test Setup Layout

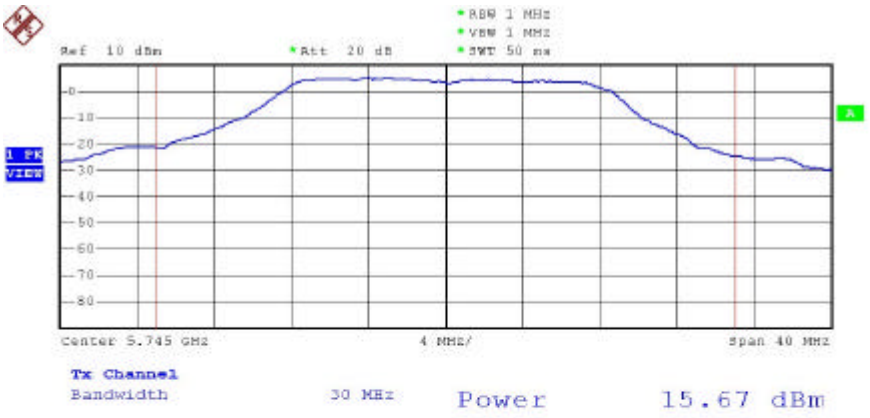


13.3. Test Result and Data

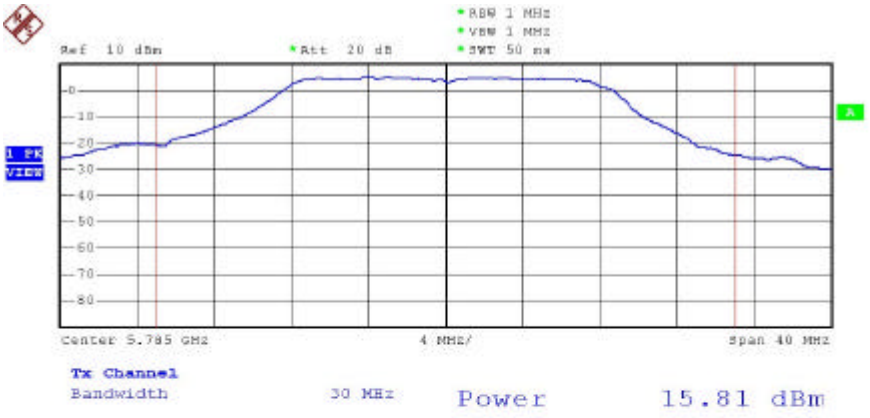
Test Mode: Normal, Transmit Rate:54Mbps

Test Date: Apr. 15, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

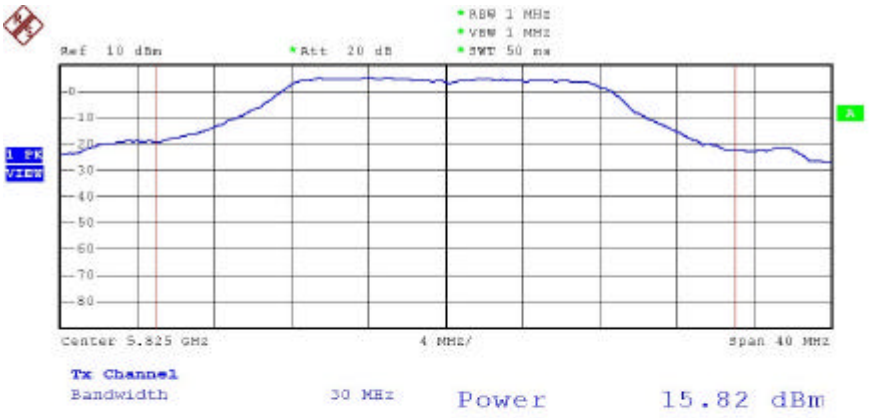
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (dW)
9	5745	15.67	36.90
11	5785	15.81	38.11
13	5825	15.82	38.19



Date: 16.APR.2005 13:35:19



Date: 16.APR.2005 13:33:48



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14. Band Edges Measurement

14.1. Test Procedure

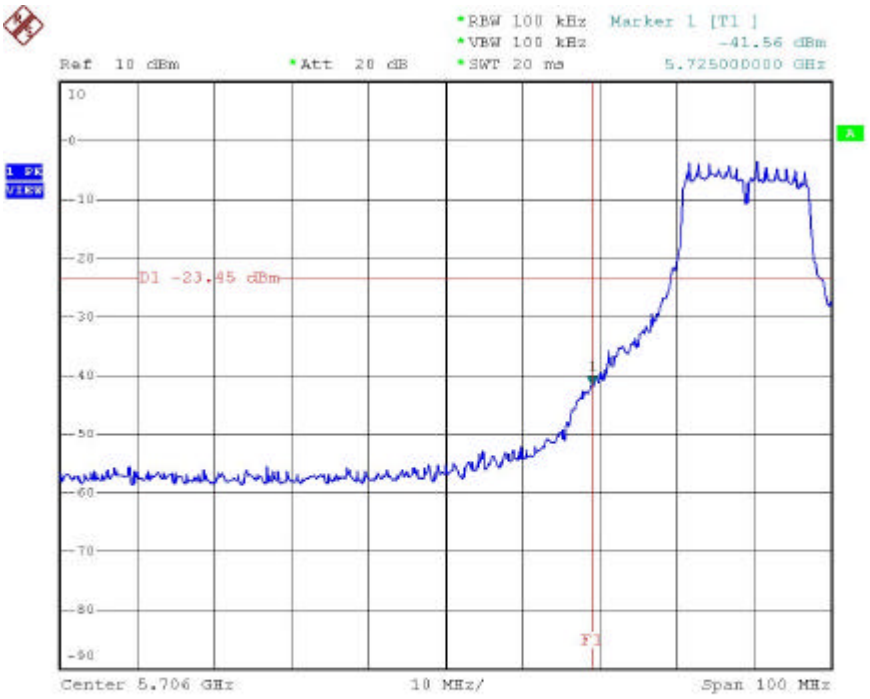
1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 MHz bandwidth from band edge.
3. The band edges was measured and recorded.

14.2. Test Result and Data

Test Mode: Normal, Transmit Rate: 54Mbps

Test Date: Apr. 15, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 10380mmHg

Channel	Frequency (MHz)	Maximum Value In Frequency (MHz)	Maximum Value (dBm)
9	5745	5725.0	-41.56
13	5825	39932.0	-45.62



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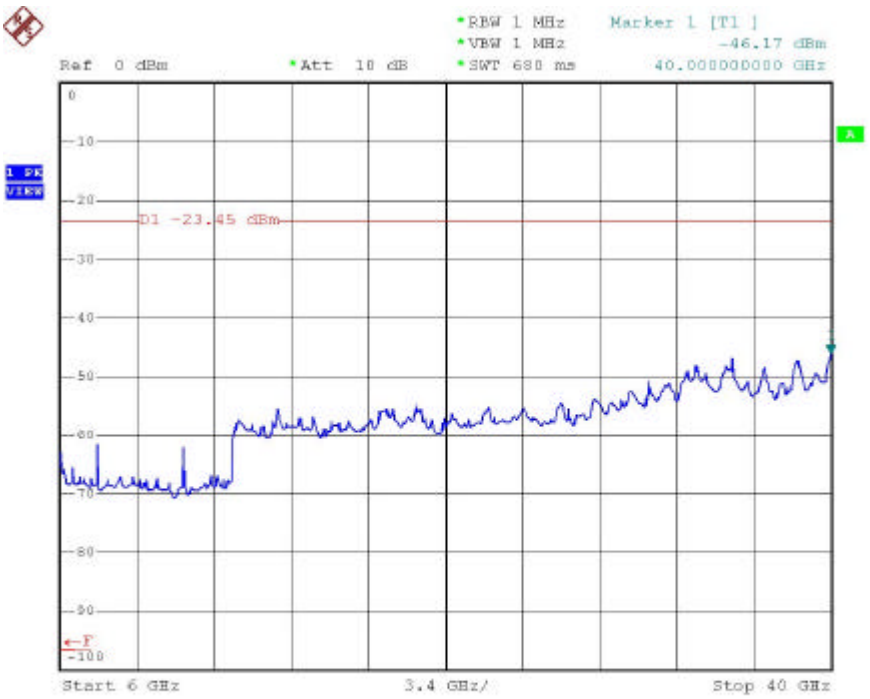
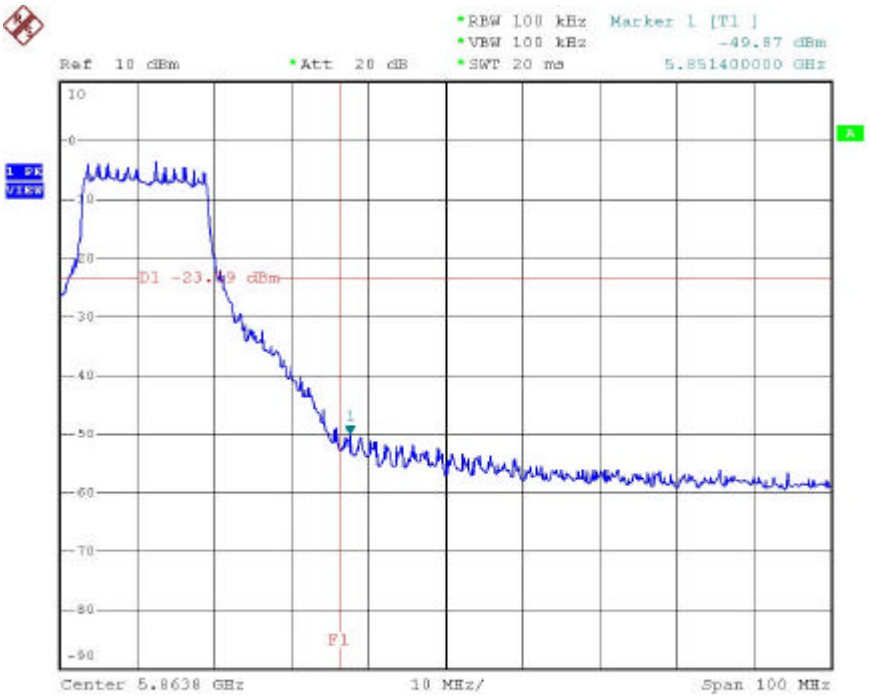
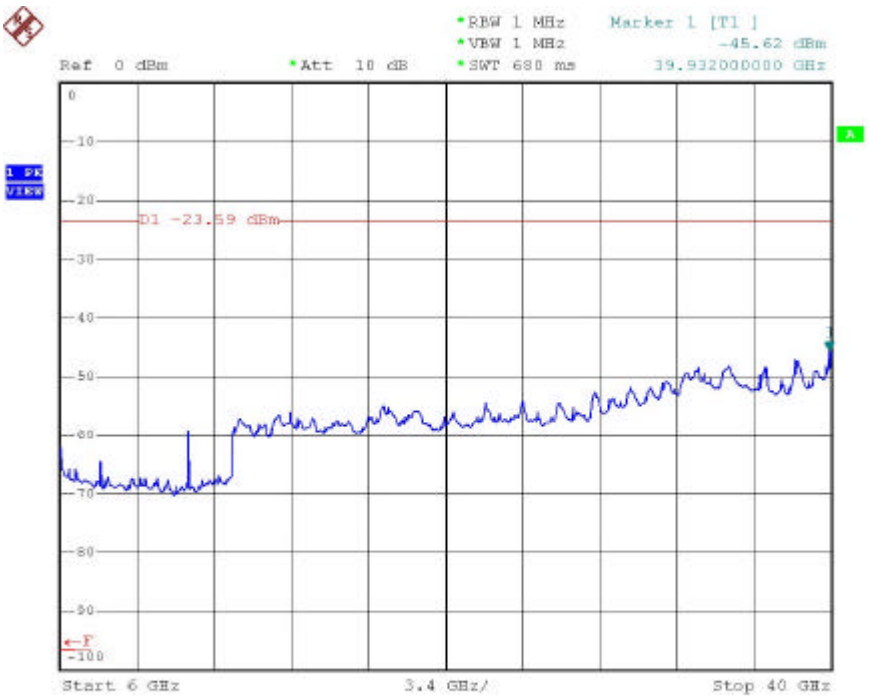


Date: 16.APR.2005 13:51:05



Date: 16.APR.2005 13:53:45



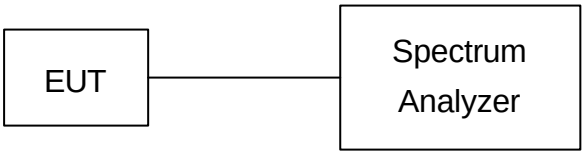
Date: 16.APR.2005 13:55:11

15. Power Spectral Density

15.1. Test Procedure

1. The transmitter output was connected to spectrum analyzer.
2. The spectrum analyzer' s resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The Sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

15.2. Test Setup Layout

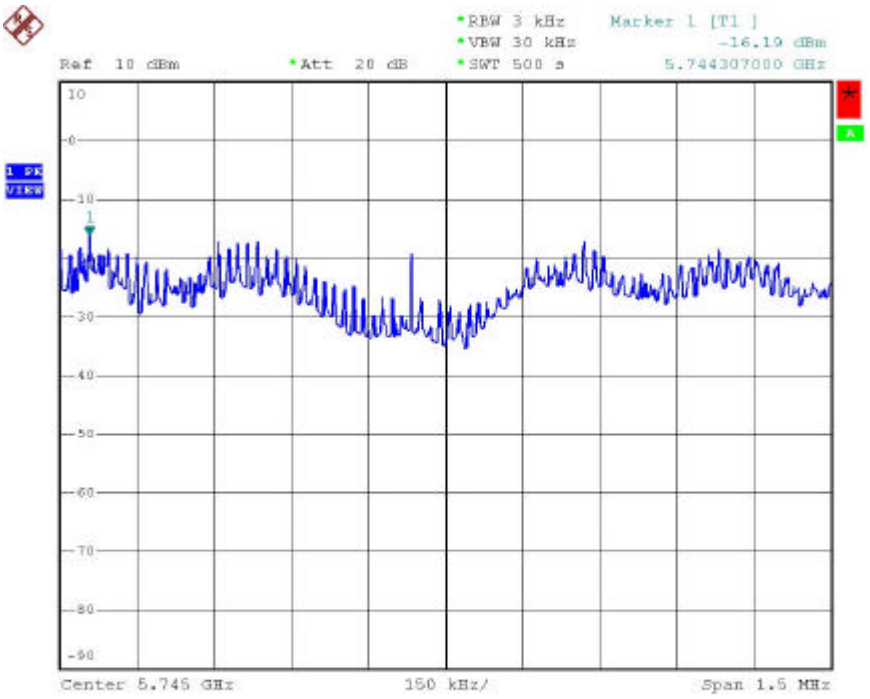


15.3. Test Result and Data

Test Mode: Normal, Transmit Rate:54Mbps

Test Date: Apr. 15, 2005 Temperature: 26℃ Humidity: 65% Atmospheric pressure: 1038mmHg

Channel	Frequency (MHz)	Maximum Power Density of 3kHz BW (dBm)
9	5745	-16.19
11	5785	-16.28
13	5825	-16.29



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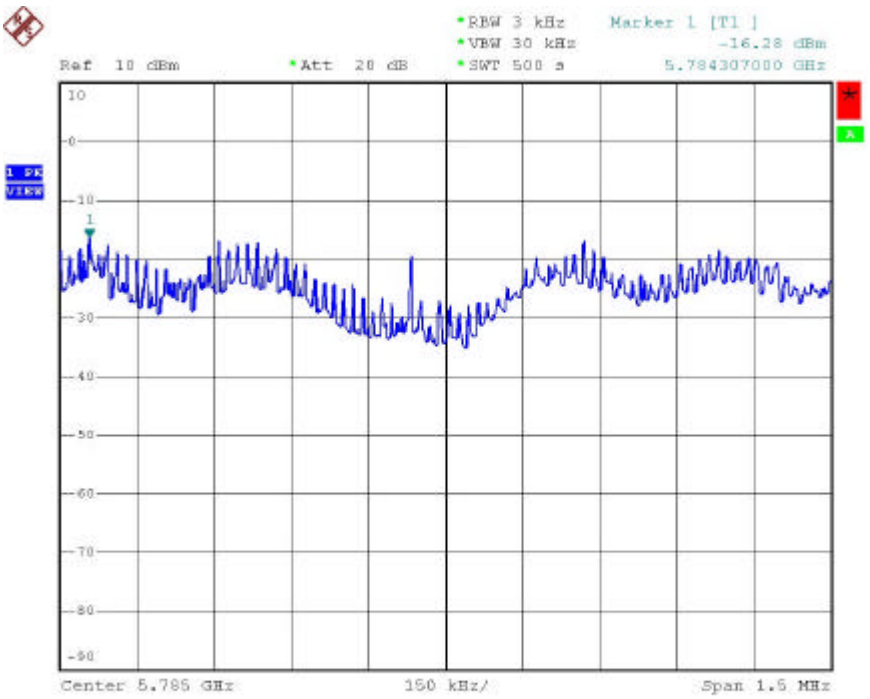

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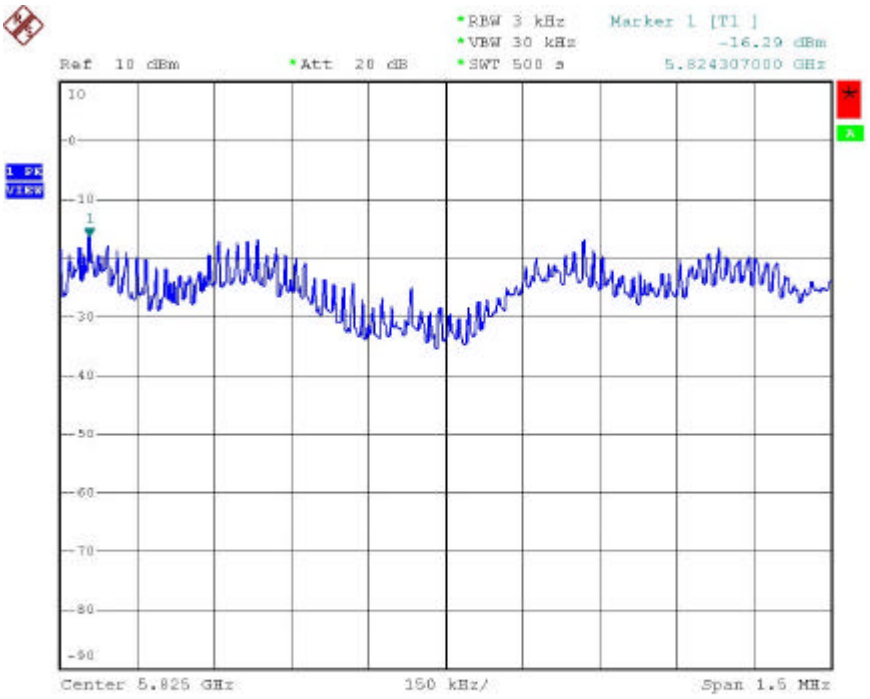

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16. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

16.1. Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

17. RF Exposure

FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093:

RF Exposure Compliance

17.1. Limit For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F=frequency in MHz *Plane-wave equivalent power density

17.2. MPE Calculations

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (mW/cm^2) = \frac{E^2}{3770}$$

E＝Electric field (V/m)

P＝Peak output power (W)

G＝Antenna numeric gain (numeric)

d＝Separation distance (m)

Because the EUT is belong to General Population/ Uncontrolled Exposure. So the Limit of Power Density is 10 W/m². We can change the formula to:

$$d = \sqrt{\frac{30 \times P \times G}{3770}}$$

17.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation. Proposed RF exposure safety information to include in User's Manual.

18. List of Measuring Equipment Used

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Valid Date.
1	Bilog Antenna	CBL6112B	Schaffner	2762	2006/04/12
2	Preamplifier	RFP4002	Schaffner	010	2005/11/03
3	Receiver	SCR3501	Schaffner	437	2005/11/03
4	Signal Generator	8648B	HP	3629U00612	2006/02/08
5	Amplifier	8447D	Agilent	2443A04650	2006/02/14
6	Amplifier	8447D	Agilent	2944A10531	2005/06/30
7	Series Power Meter	E4416A	Agilent	GB41292146	2005/10/11
8	Power Sensor	E9327A	Agilent	US40441392	2005/10/11
9	Dipole Antenna	AD-100	COM-Power	721011	2005/12/02
10	Dipole Antenna	AD-100	COM-Power	721010	2005/12/02
11	Spectrum Analyzer	FSP40	R&S	100047	2005/12/28
12	Preamplifier	8449B	Agilent	3008A01954	2005/12/27
13	Horn Antenna	3115	EMCO	31601	2006/02/21
14	Horn Antenna	3115	EMCO	31589	2006/01/13
15	Horn Antenna	3116	EMCO	31970	2006/01/30
16	Horn Antenna	3116	EMCO	31974	2006/02/21
17	EMI Receiver	8546A	HP	3807A00454	2006/02/25
18	RF Filter Section	85460A	HP	3704A00386	2006/02/25
19	Signal Generator	83640A	HP	2927A00107	2006/03/16
20	Attenuator	8491B	Agilent	50703	2005/12/27
21	Attenuator	8491B	Agilent	50705	2005/12/27
22	Temperature Chamber	TMJ-9712	T Machine	T-12-040111	2006/02/21
23	High Pass Filter	84300-80038	HP	002	N/A
24	High Pass Filter	84300-80038	HP	006	N/A
25	DC Power Supply	GPD-3030	GM	7020936	N/A
26	AC Power Converter	AFC-11005	APC	F103120008	N/A