

4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 ~ 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2008	Aug. 08, 2009

NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

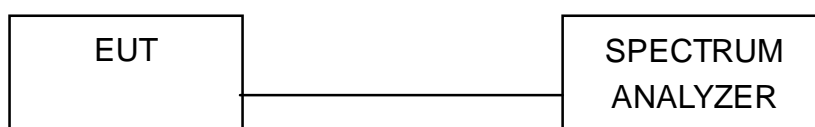
4.5.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6

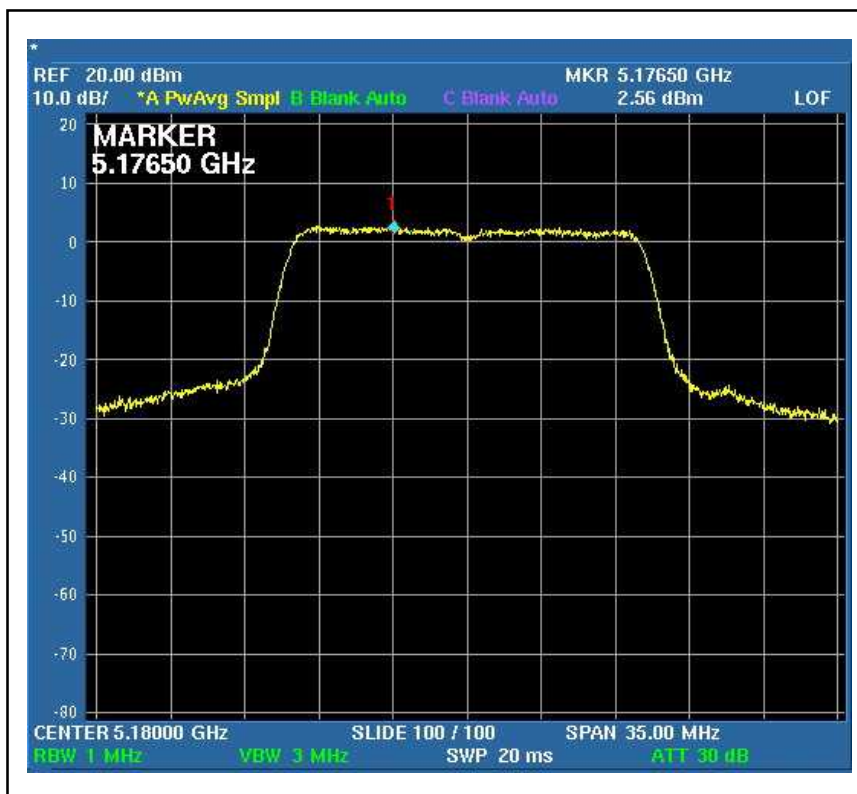
4.5.7 TEST RESULTS

802.11a OFDM modulation

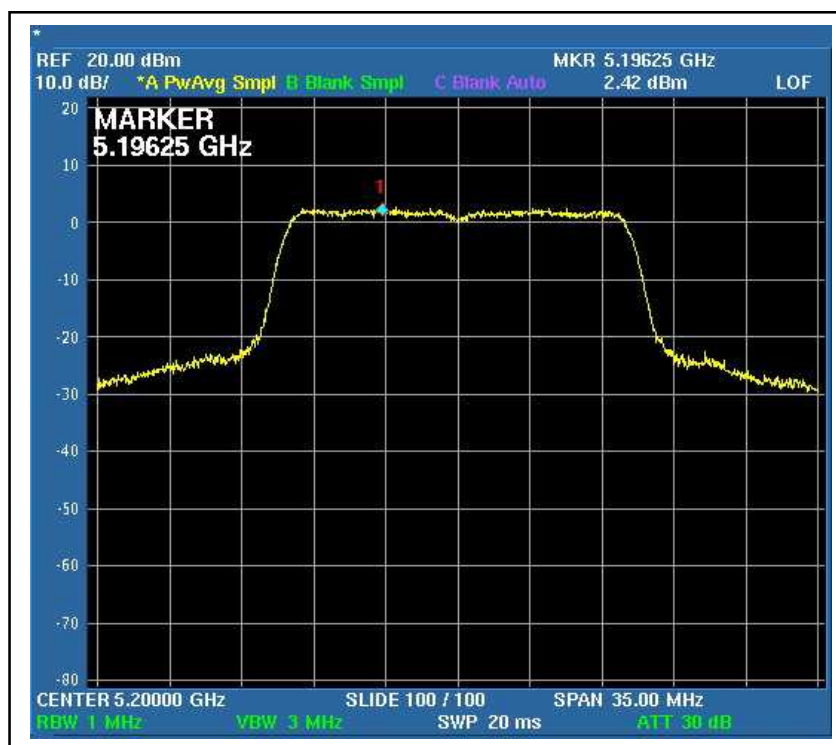
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	5180	2.56	4	PASS
2	5200	2.42	4	PASS
4	5240	2.82	4	PASS
5	5260	2.66	11	PASS
7	5300	2.84	11	PASS
8	5320	2.97	11	PASS
9	5500	3.32	11	PASS
14	5600	2.61	11	PASS
19	5700	2.71	11	PASS

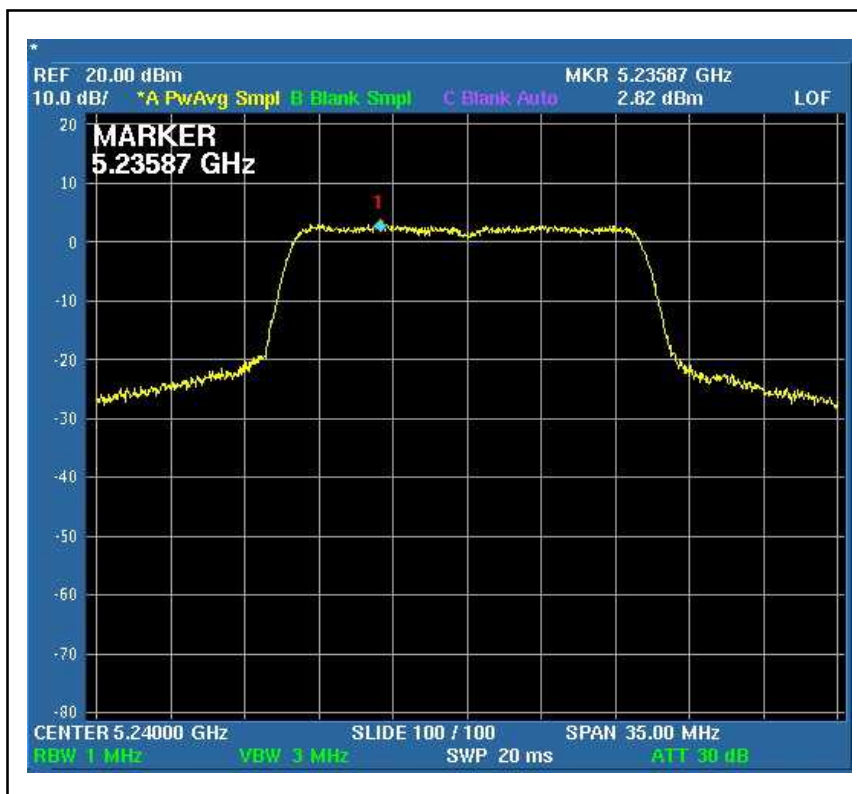
CH1



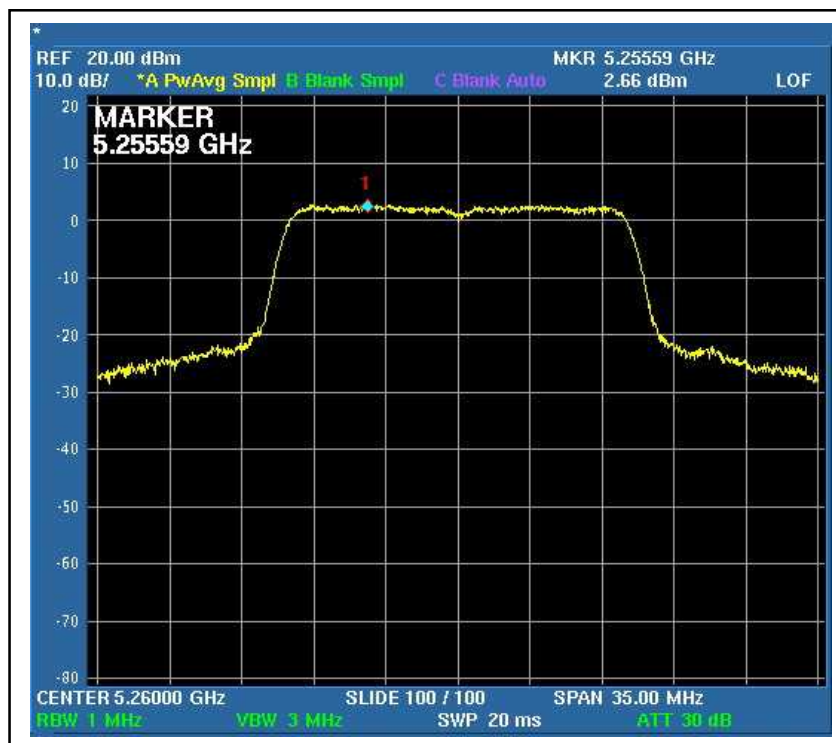
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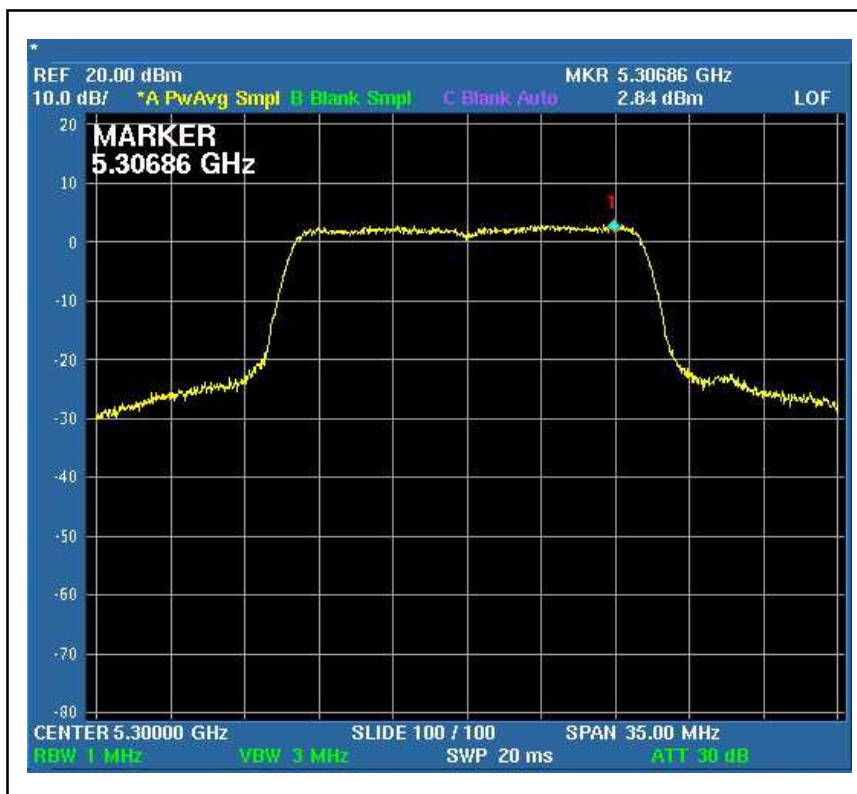
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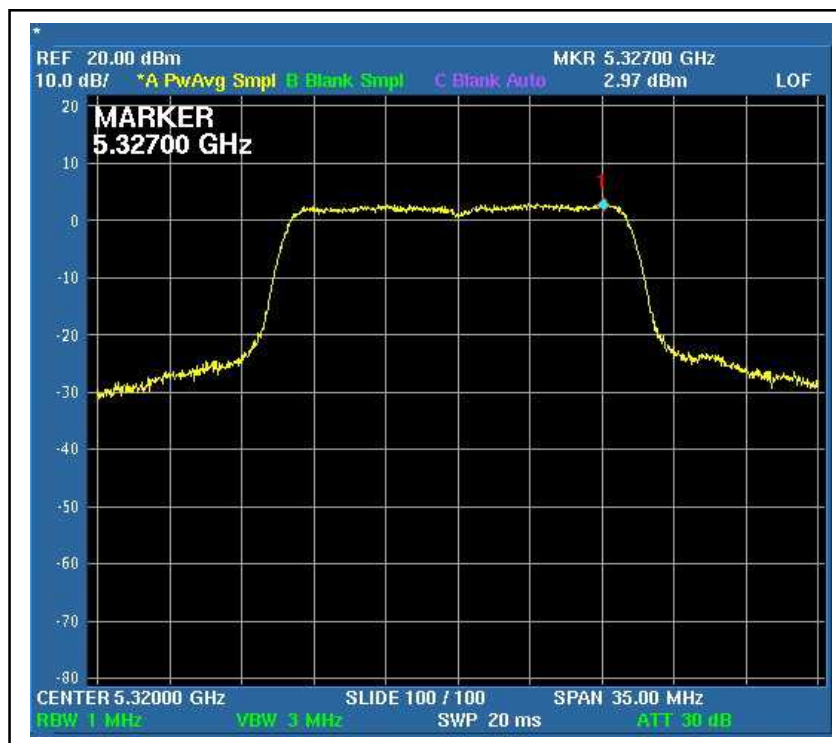
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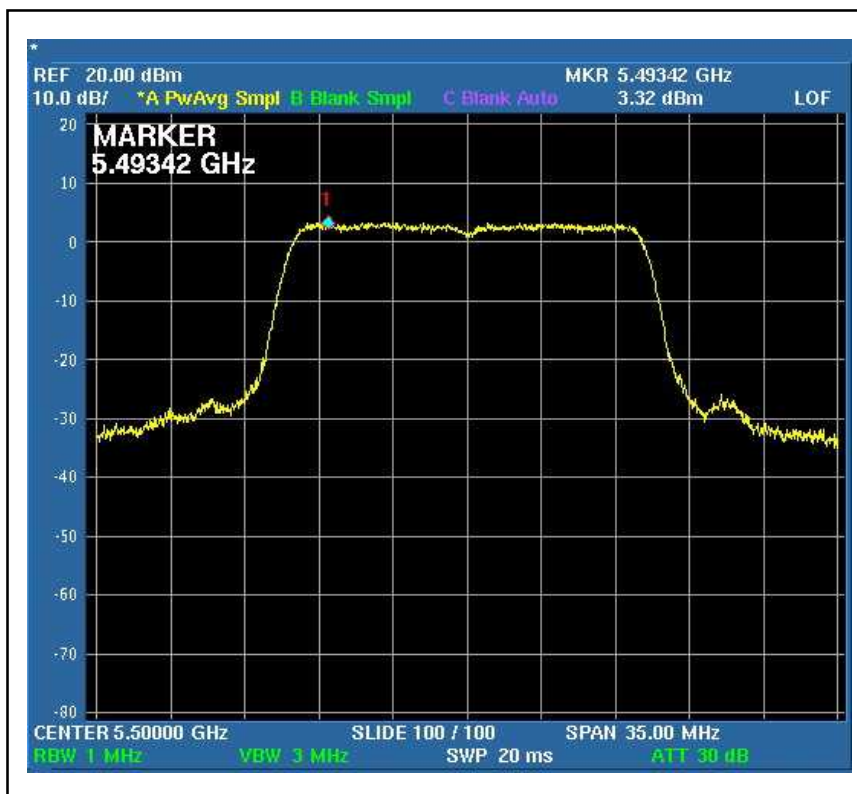
CH7



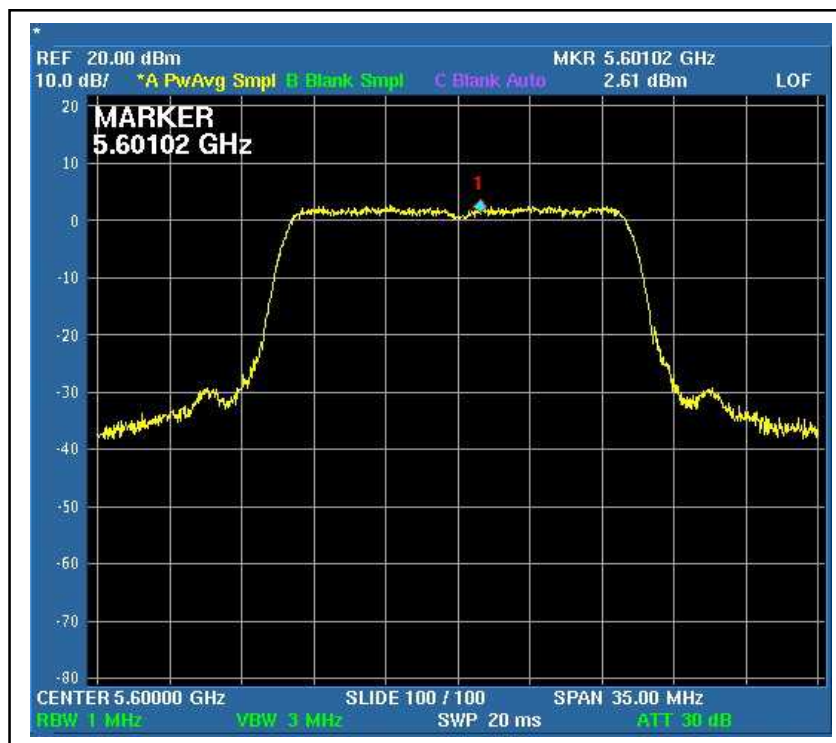
CH8



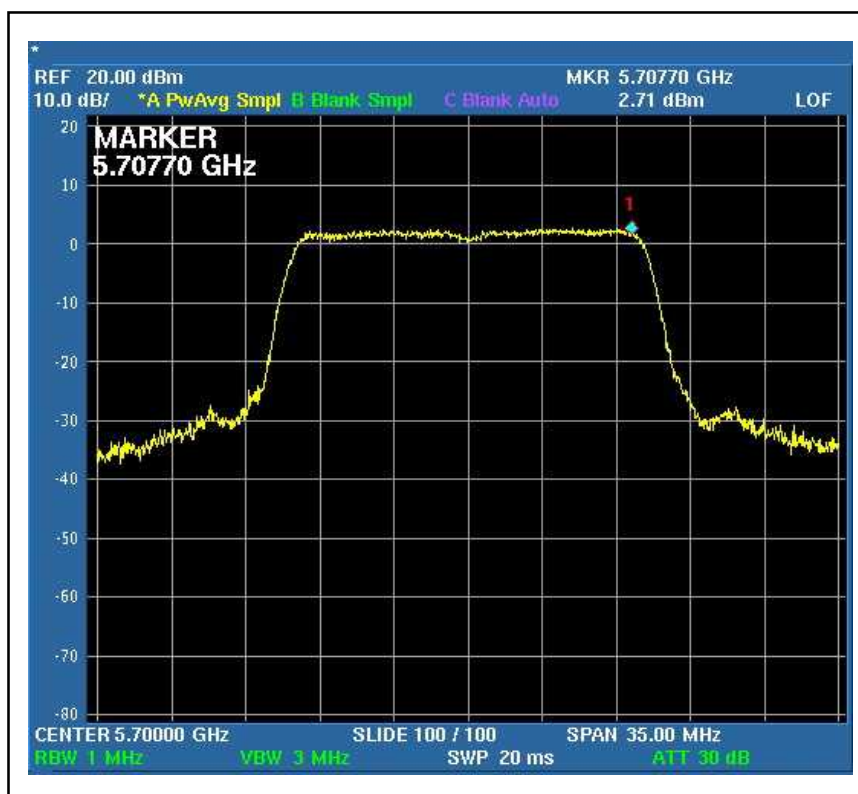
CH9



CH14



CH19

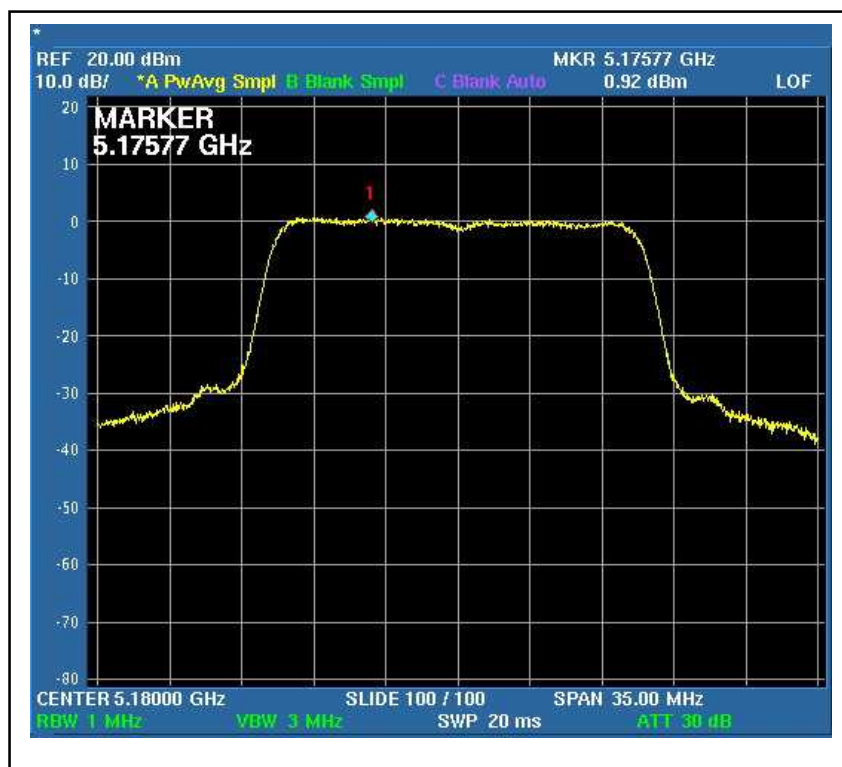


DRAFT 802.11n (20MHz) OFDM MODULATION:

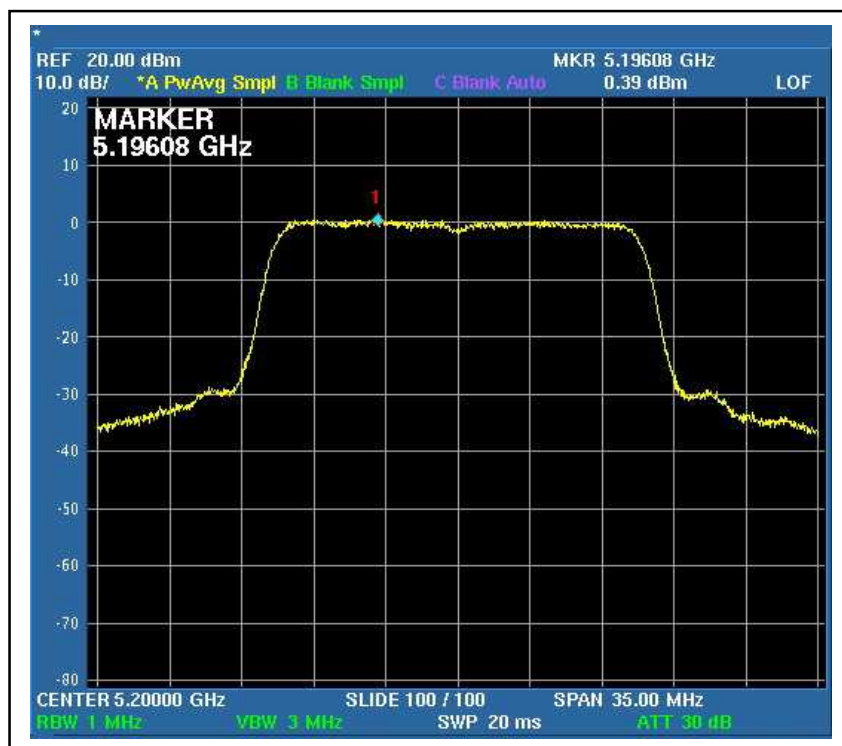
MODULATION TYPE	BPSK	TRANSFER RATE	13Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)			
1	5180	0.92	0.42	3.69	4	PASS
2	5200	0.39	0.15	3.28	4	PASS
4	5240	0.11	0.18	3.16	4	PASS
5	5260	0.24	0.06	3.16	11	PASS
7	5300	0.42	0.77	3.61	11	PASS
8	5320	0.10	0.78	3.46	11	PASS
9	5500	1.05	0.31	3.71	11	PASS
14	5600	-0.04	-0.42	2.79	11	PASS
19	5700	-1.75	-0.10	2.16	11	PASS

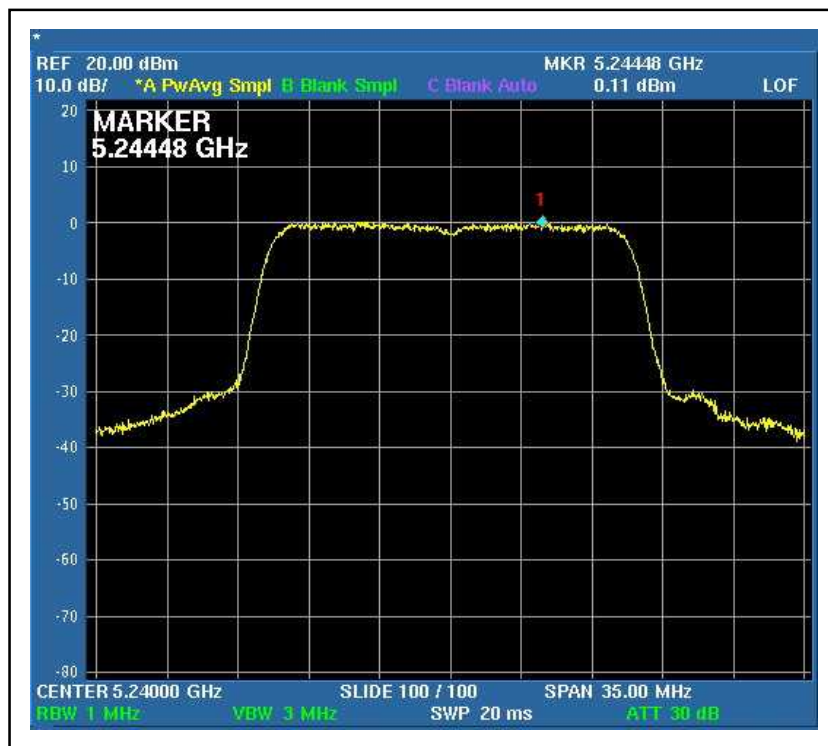
For Chain (0) : CH1



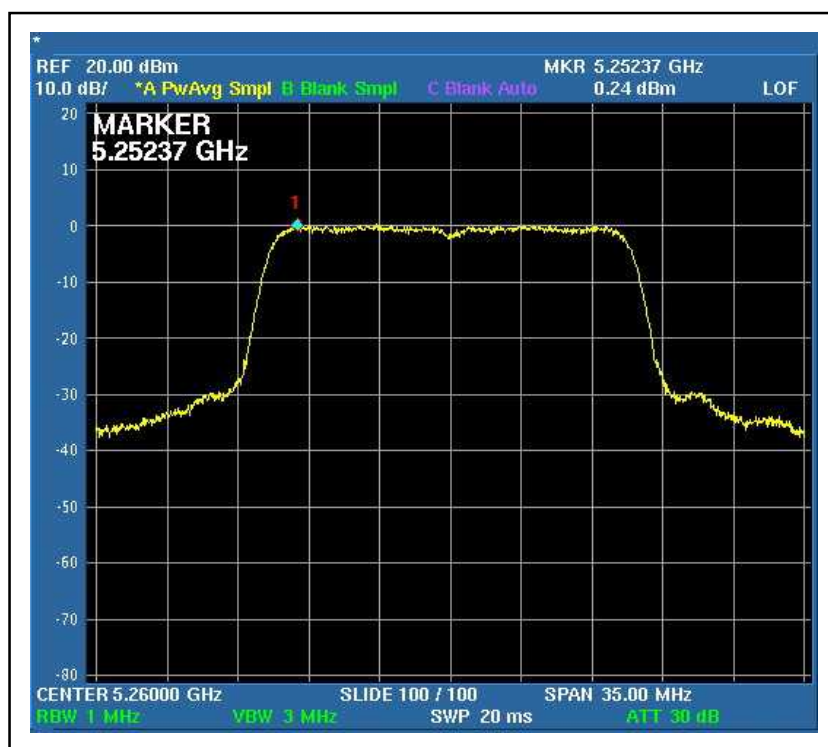
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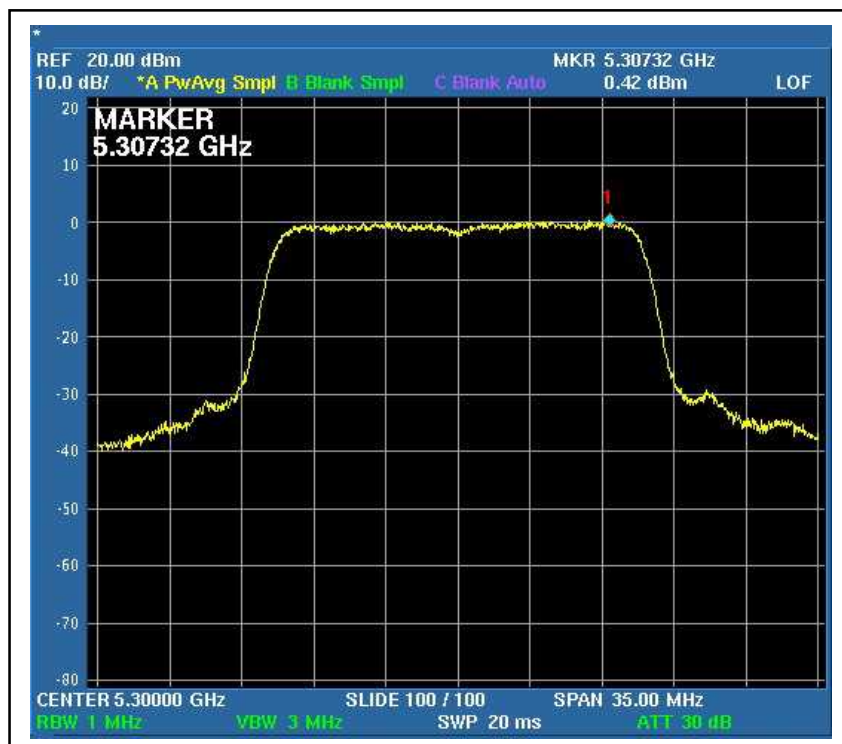
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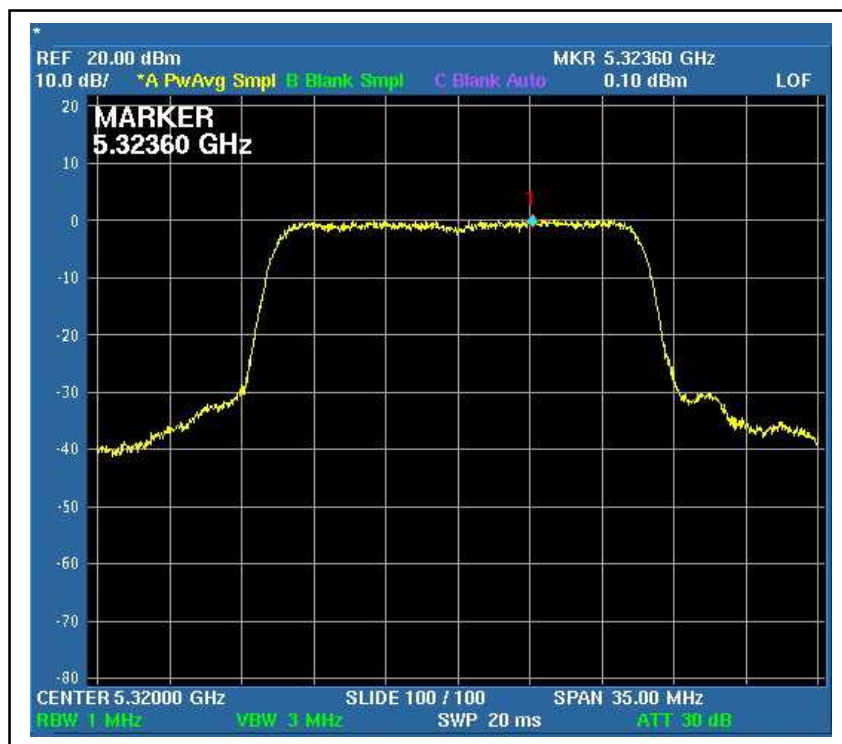
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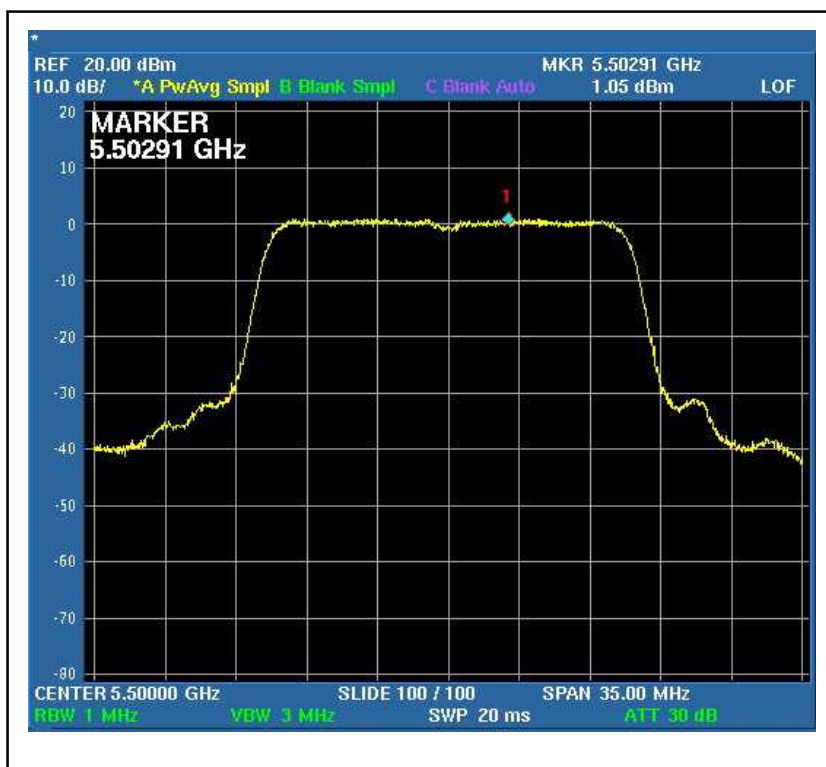
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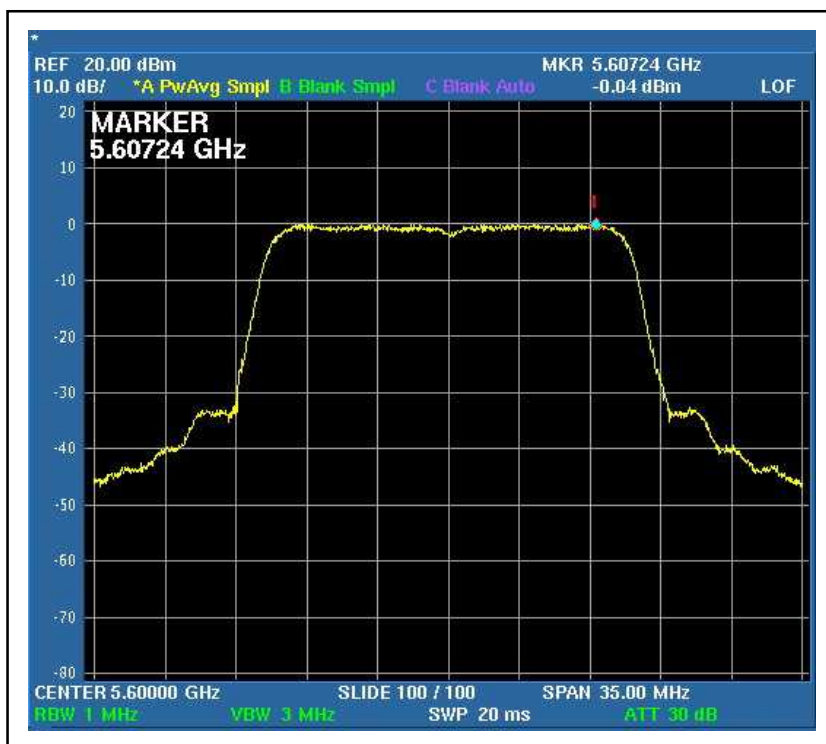
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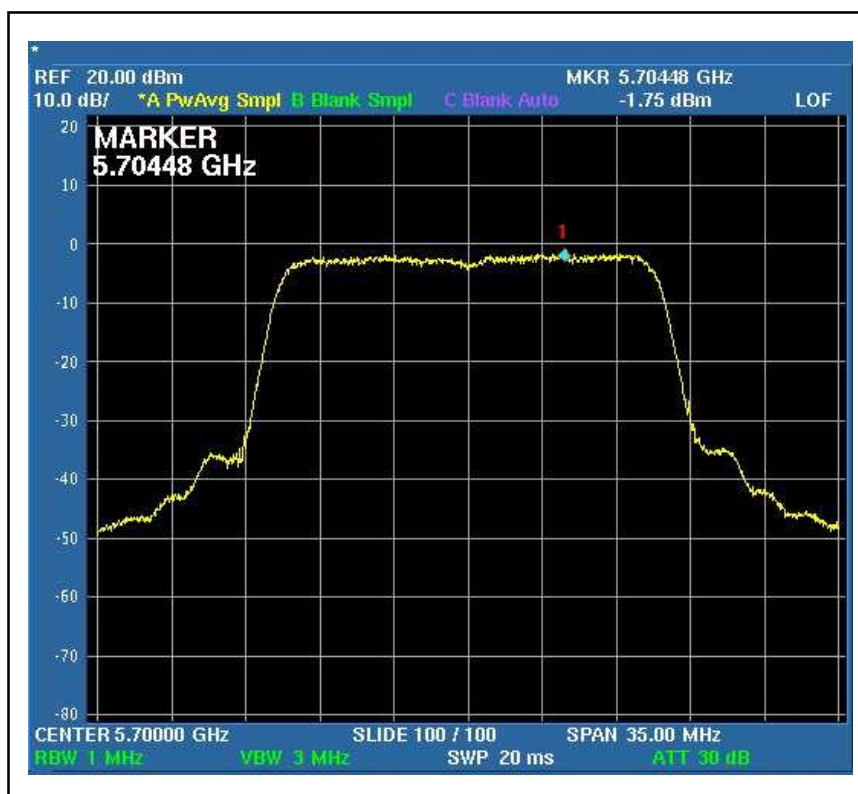
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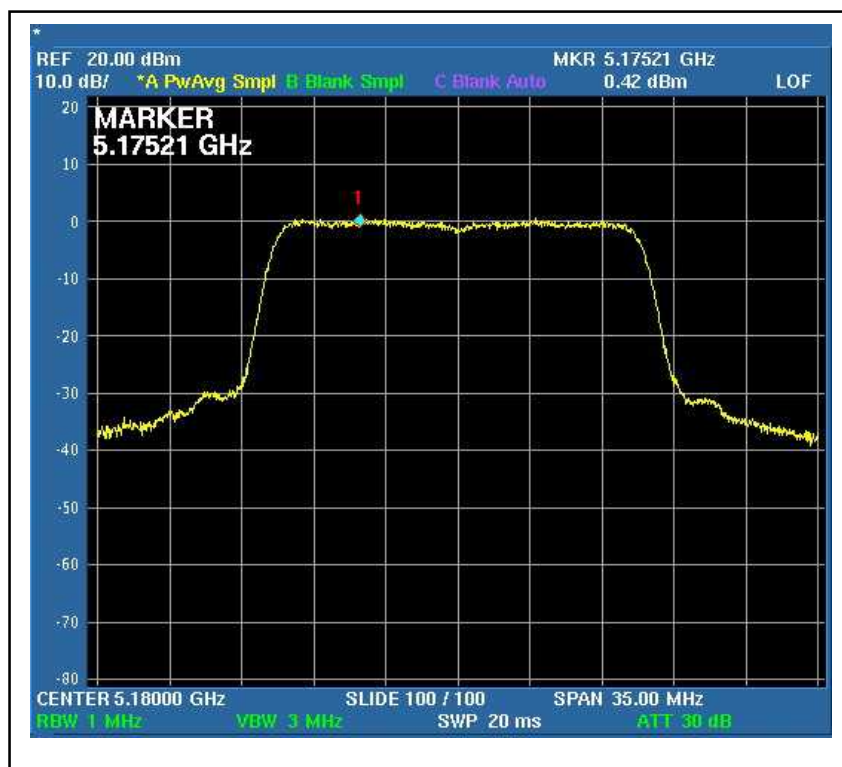
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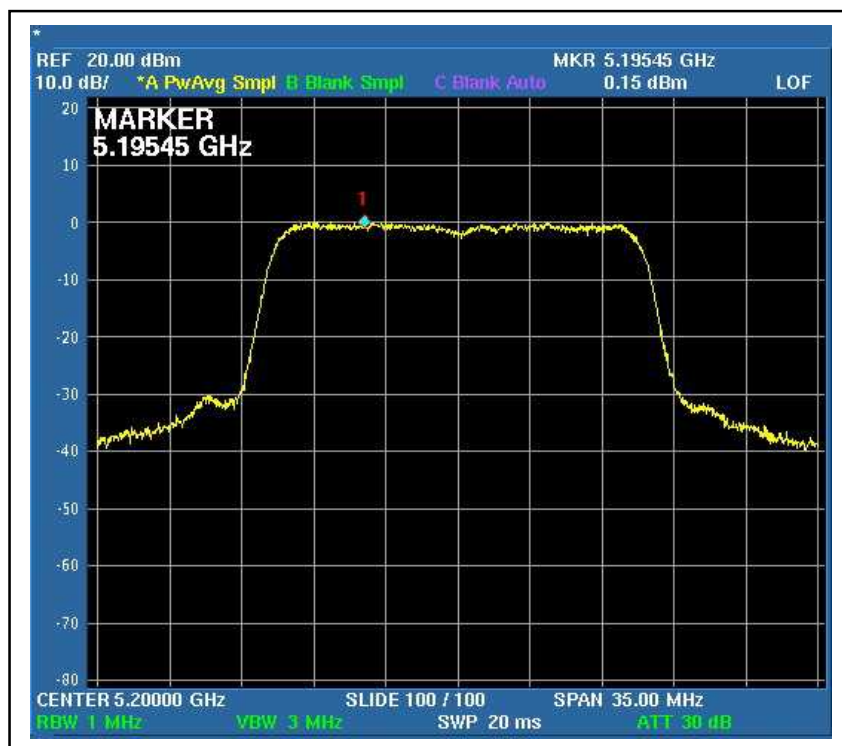
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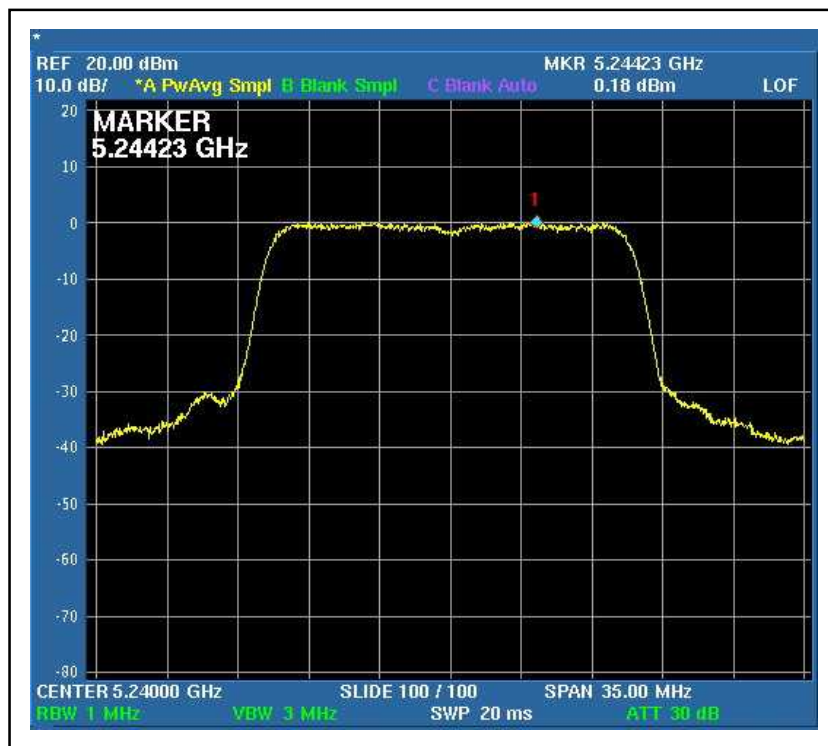
For Chain (1) : CH1



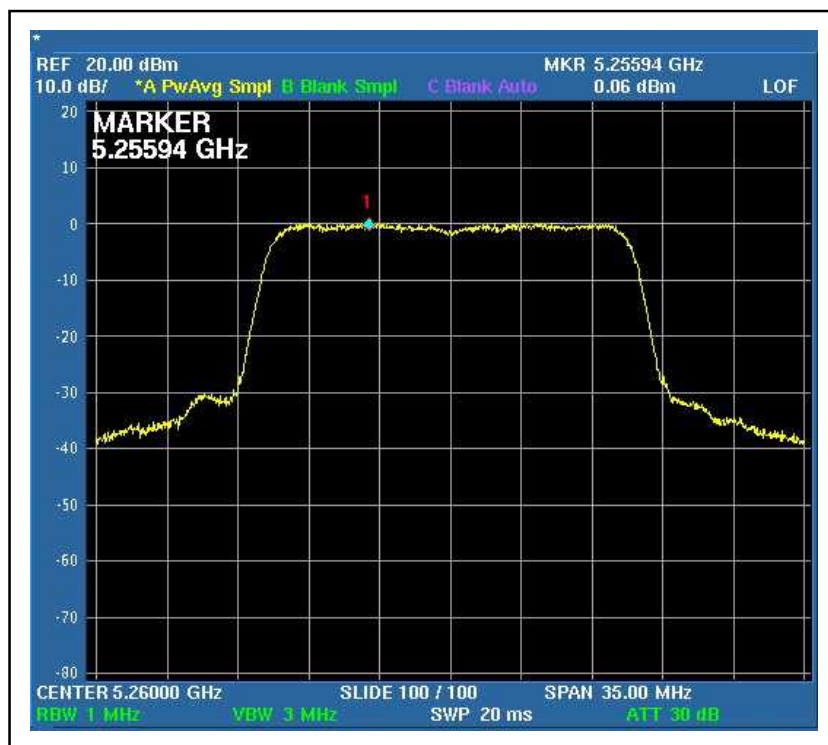
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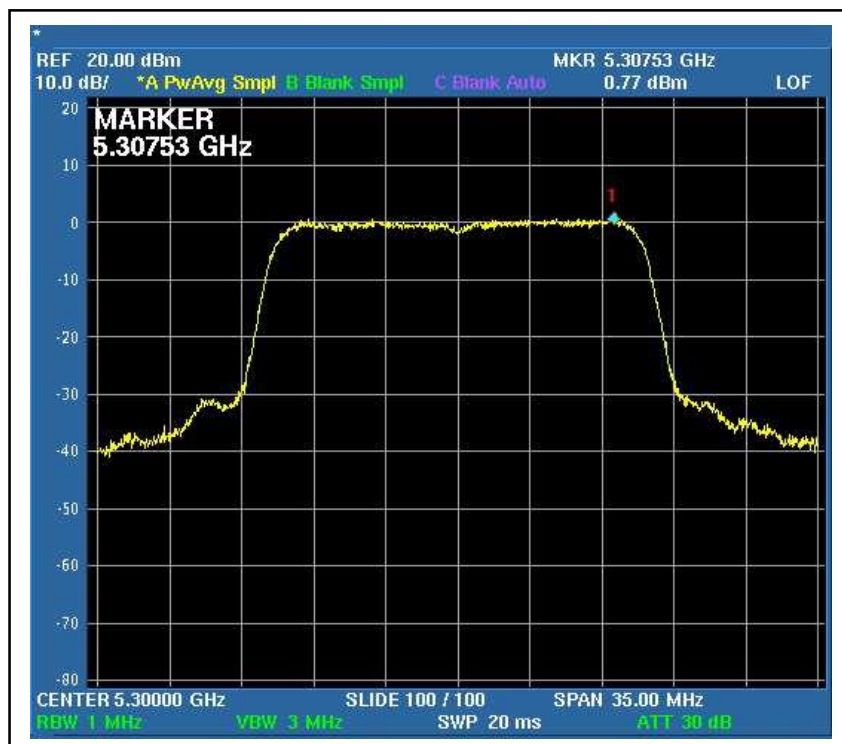
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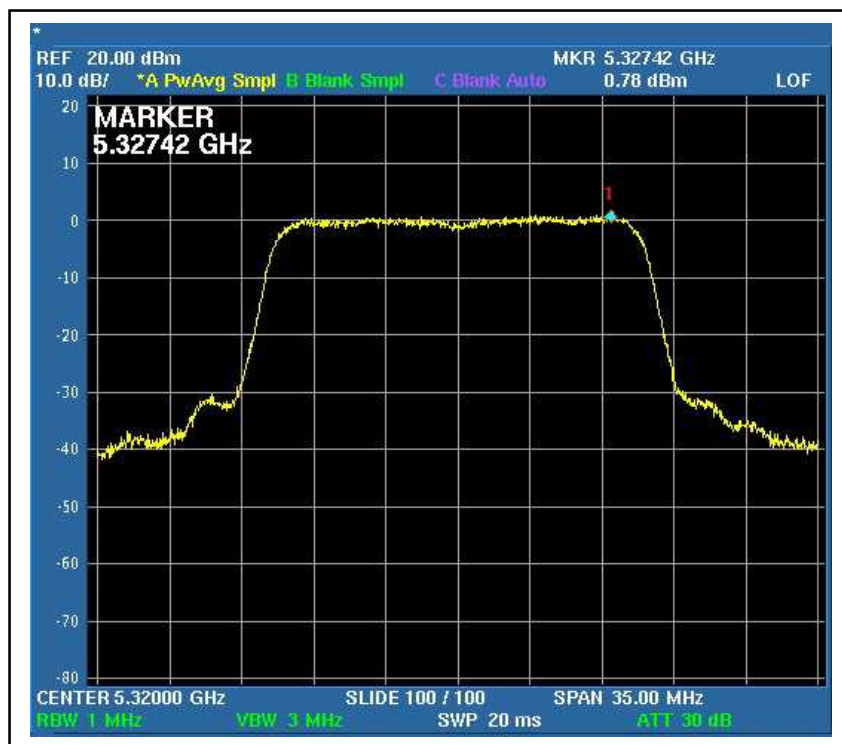
CH5



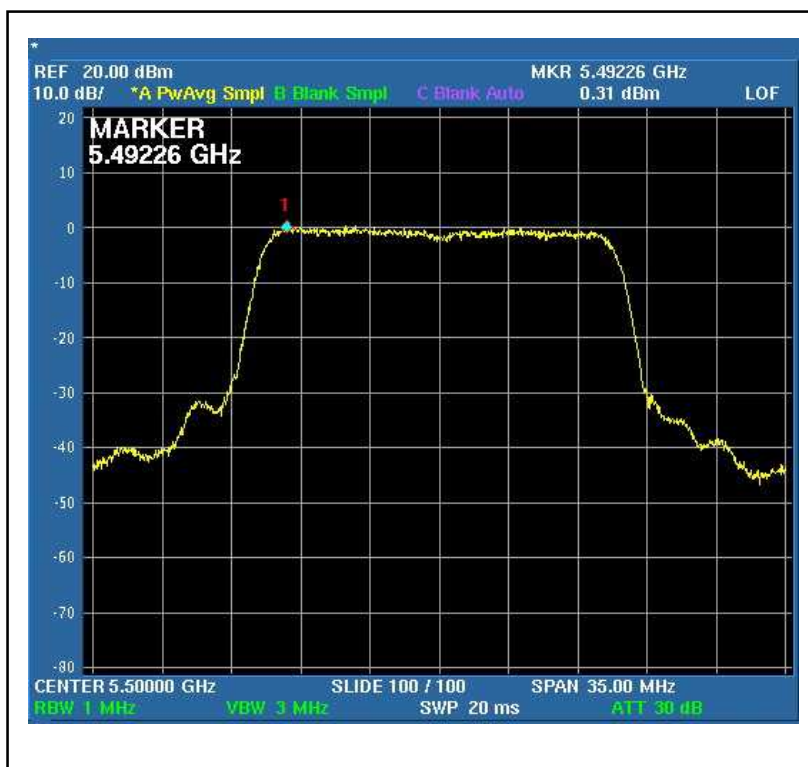
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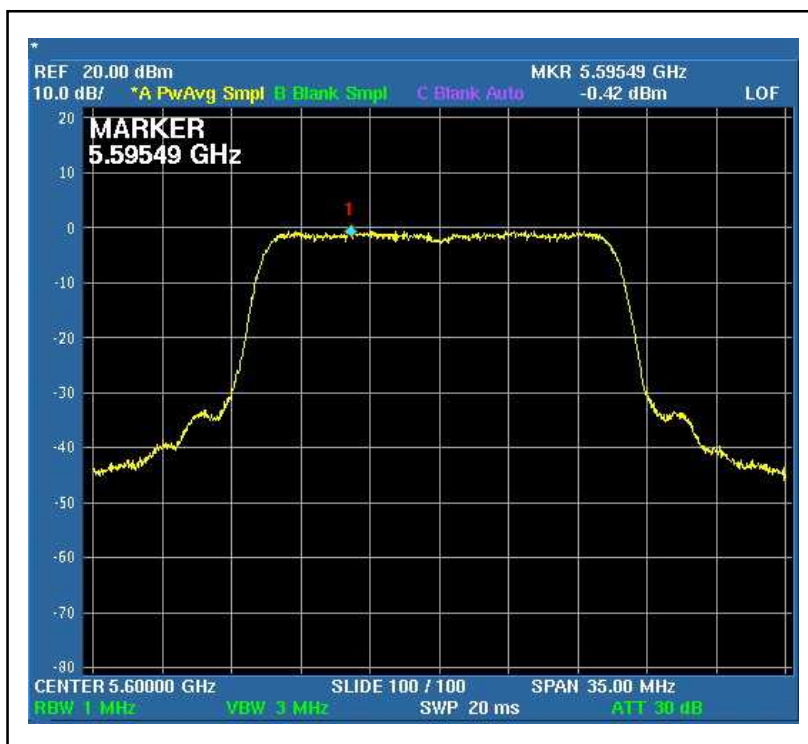
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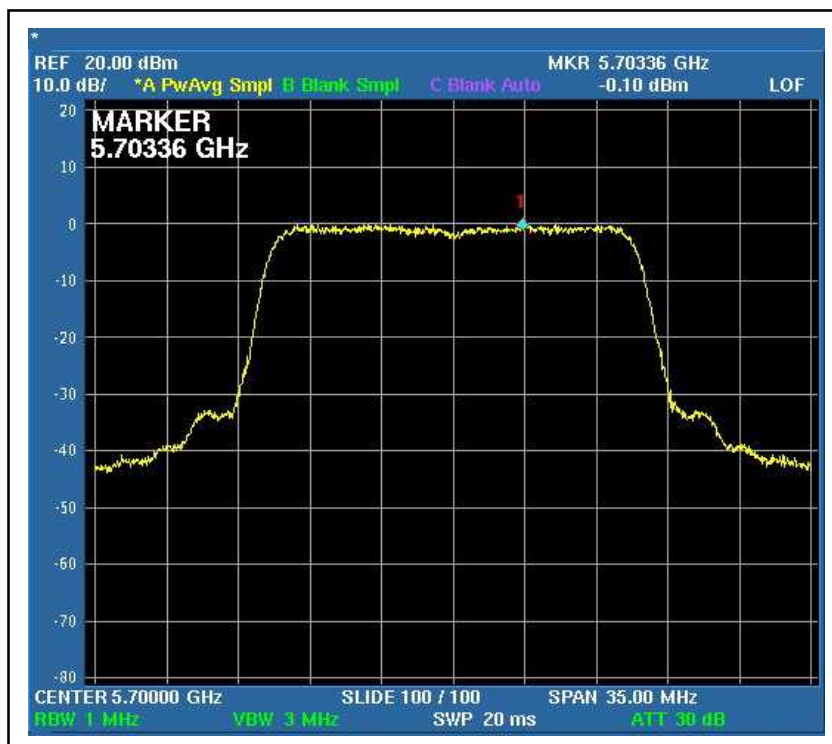
CH9



CH14



CH19

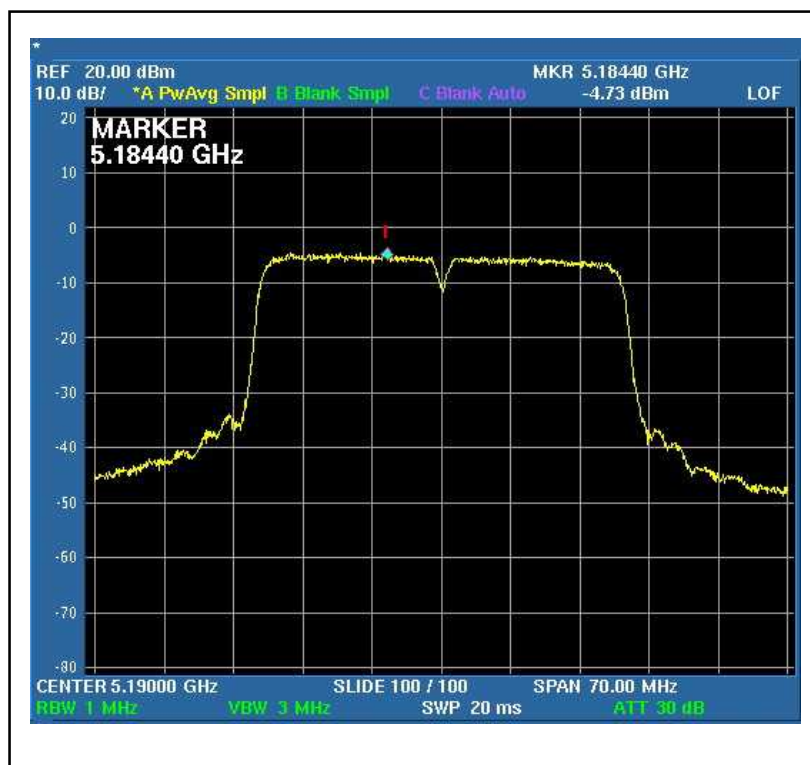


DRAFT 802.11n (40MHz) OFDM MODULATION:

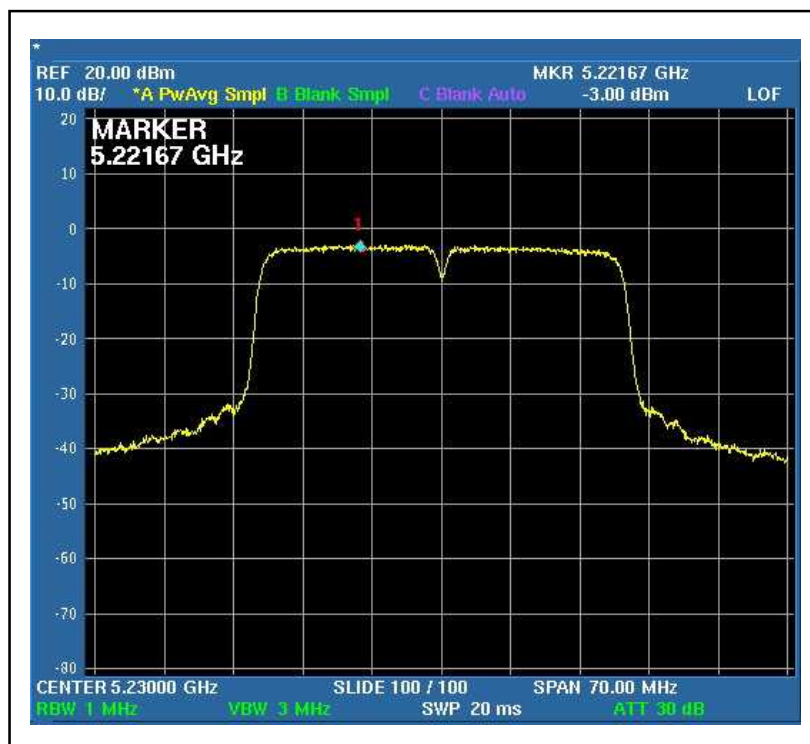
MODULATION TYPE	BPSK	TRANSFER RATE	27Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 60%RH, 965hPa
TESTED BY	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER DENSITY (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
		Chain (0)	Chain(1)			
1	5190	-4.73	-4.56	-1.63	4	PASS
2	5230	-3.00	-3.23	-0.11	4	PASS
3	5270	-3.09	-2.49	0.23	11	PASS
4	5310	-5.44	-4.07	-1.69	11	PASS
5	5510	-3.19	-2.33	0.27	11	PASS
7	5590	-3.26	-2.71	0.03	11	PASS
9	5670	-3.10	-3.00	-0.04	11	PASS

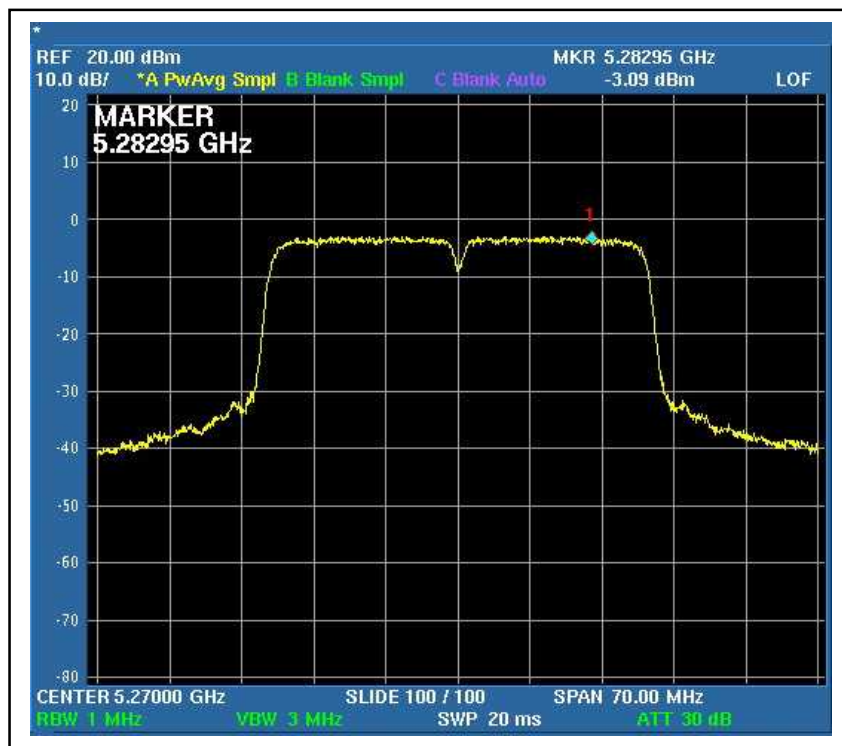
For Chain (0) : CH1



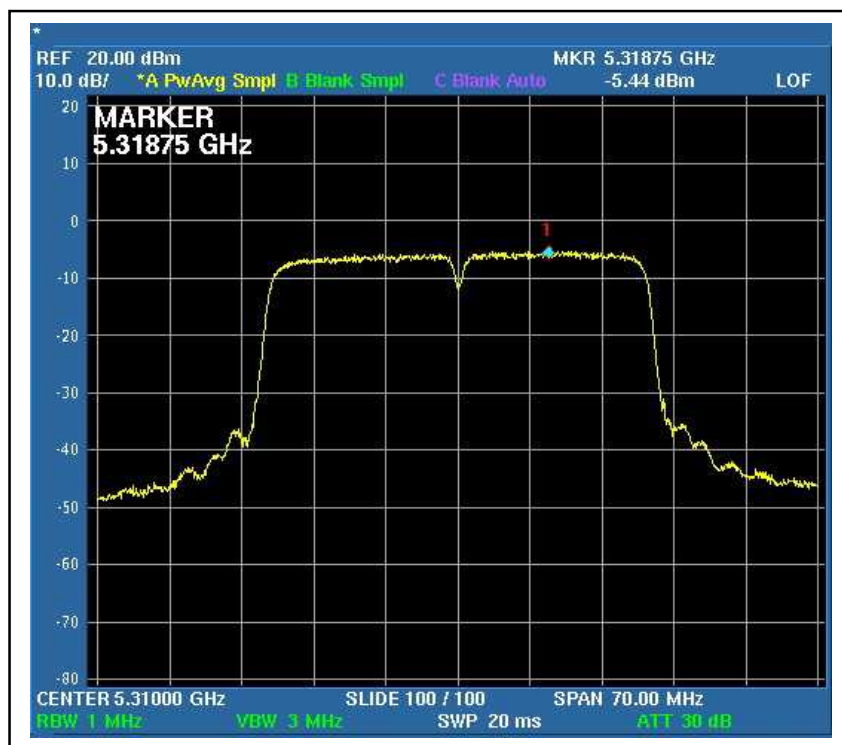
CH2



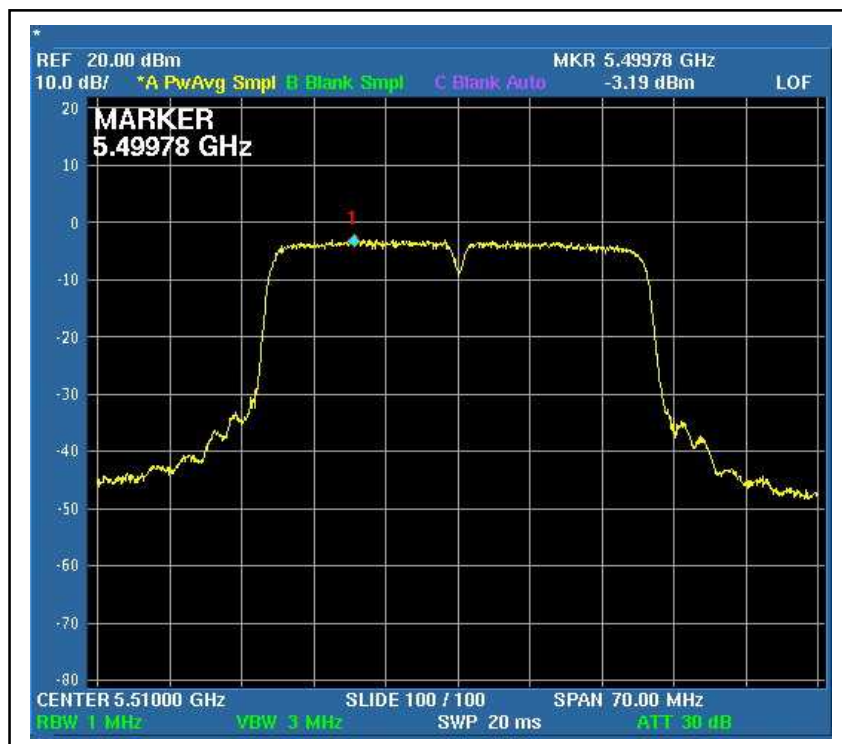
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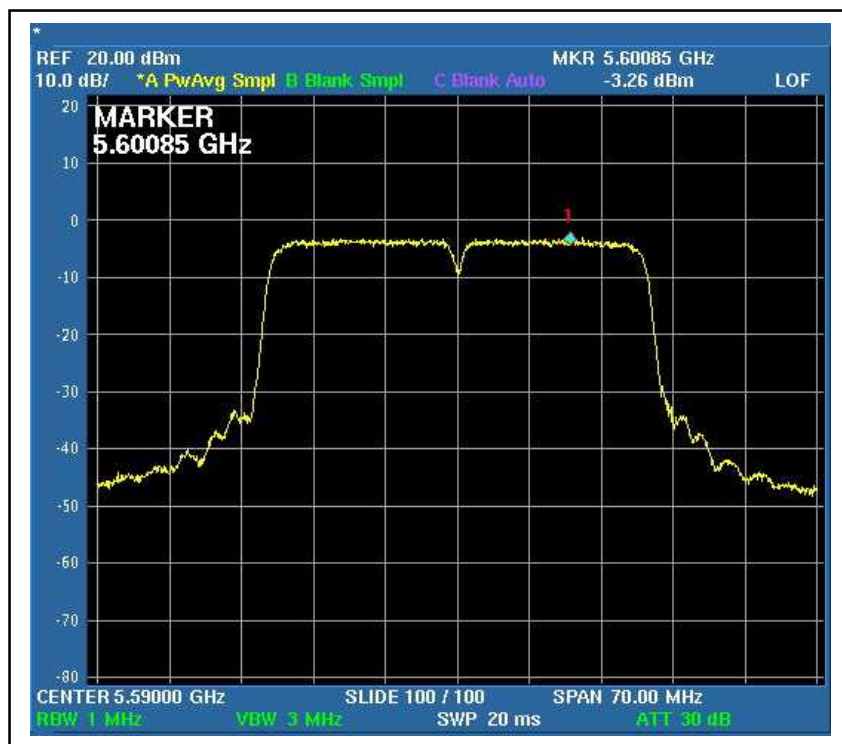
CH4



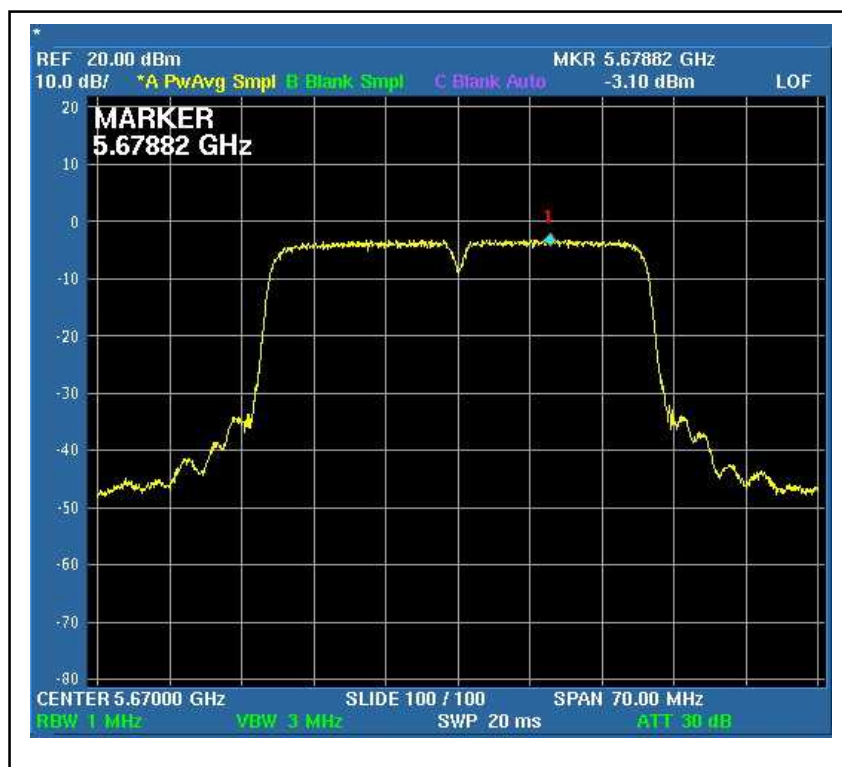
CH5



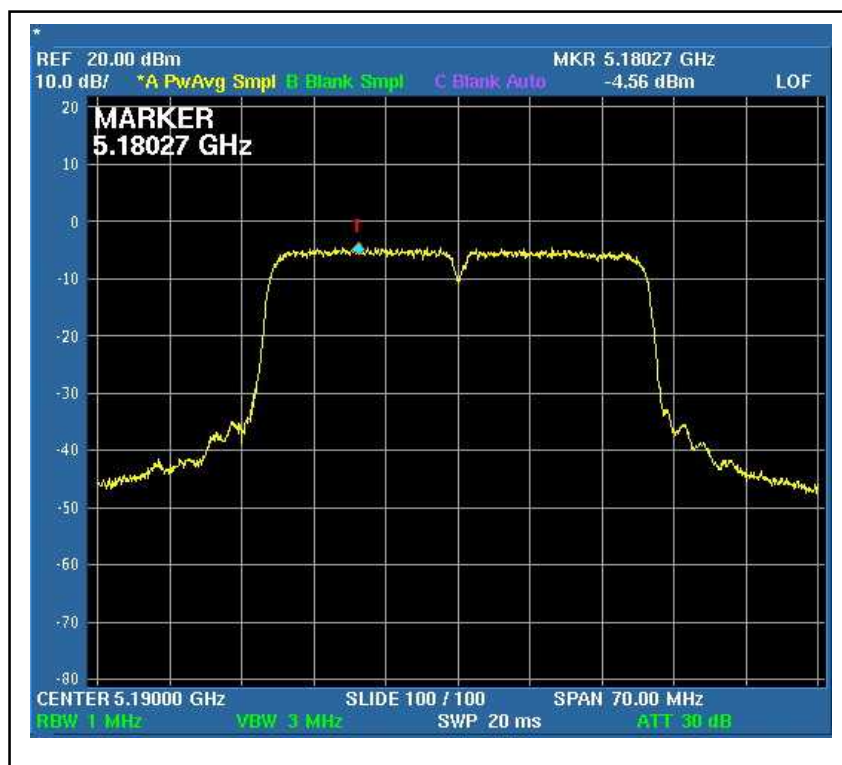
CH7



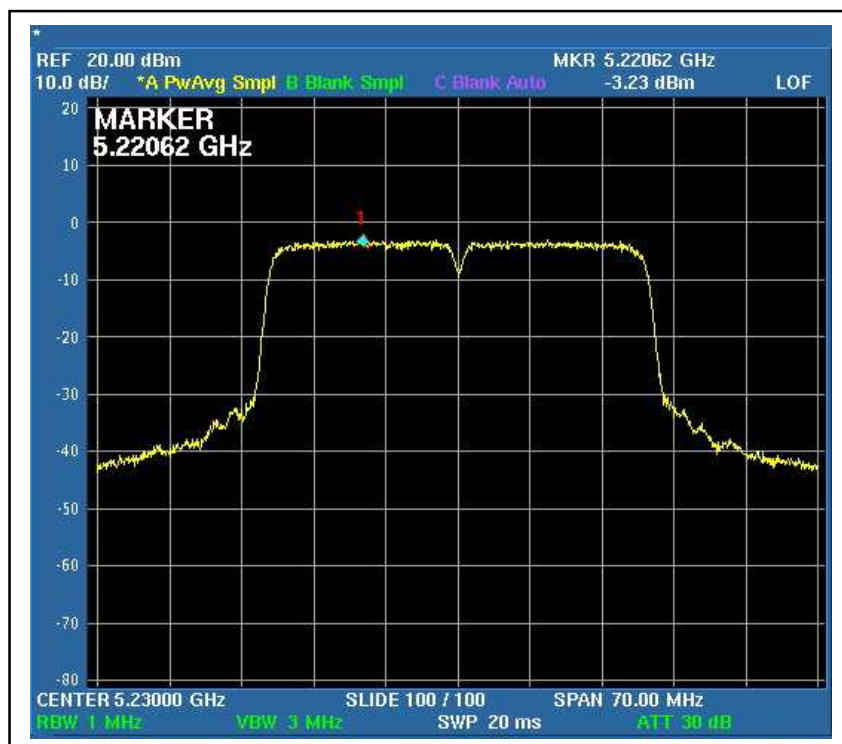
CH9



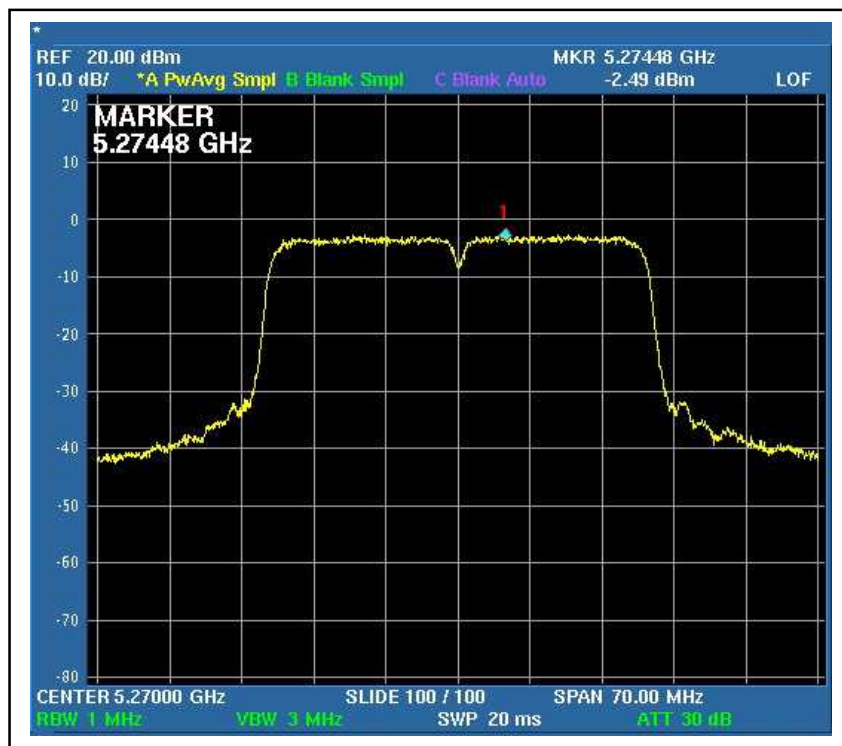
For Chain (1) : CH1



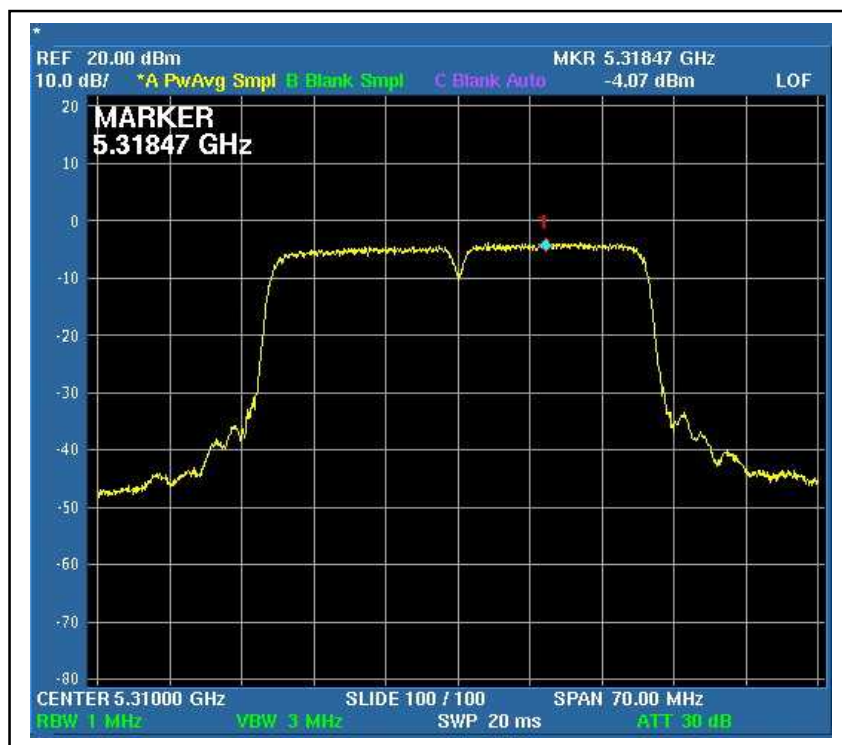
CH2



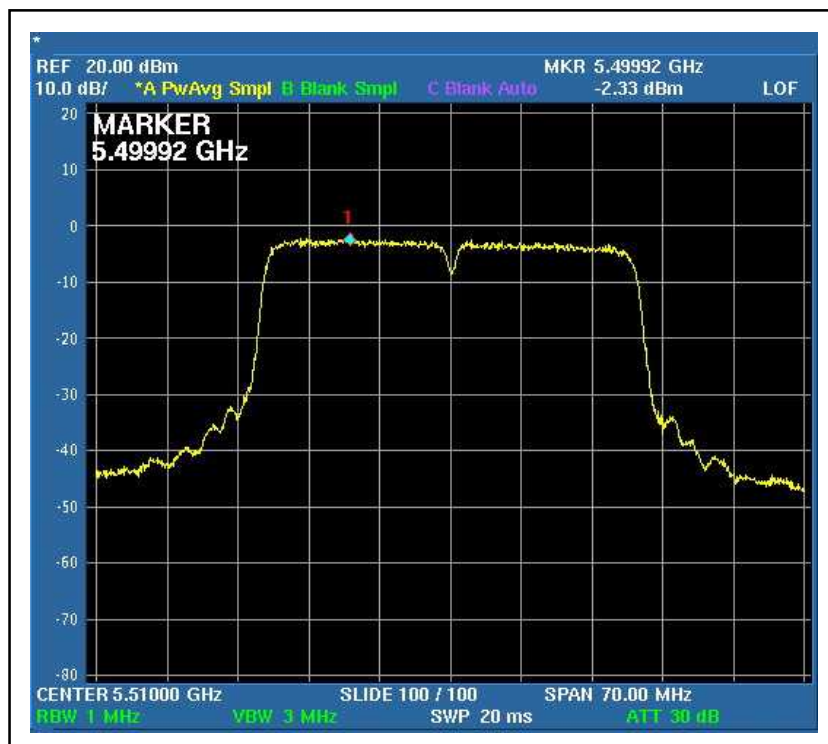
CH3



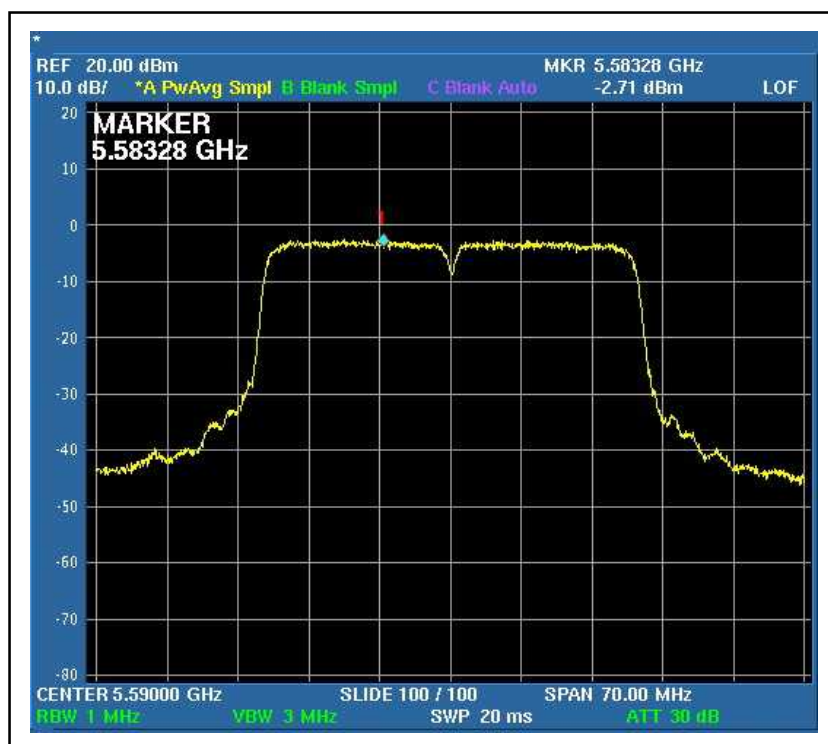
CH4



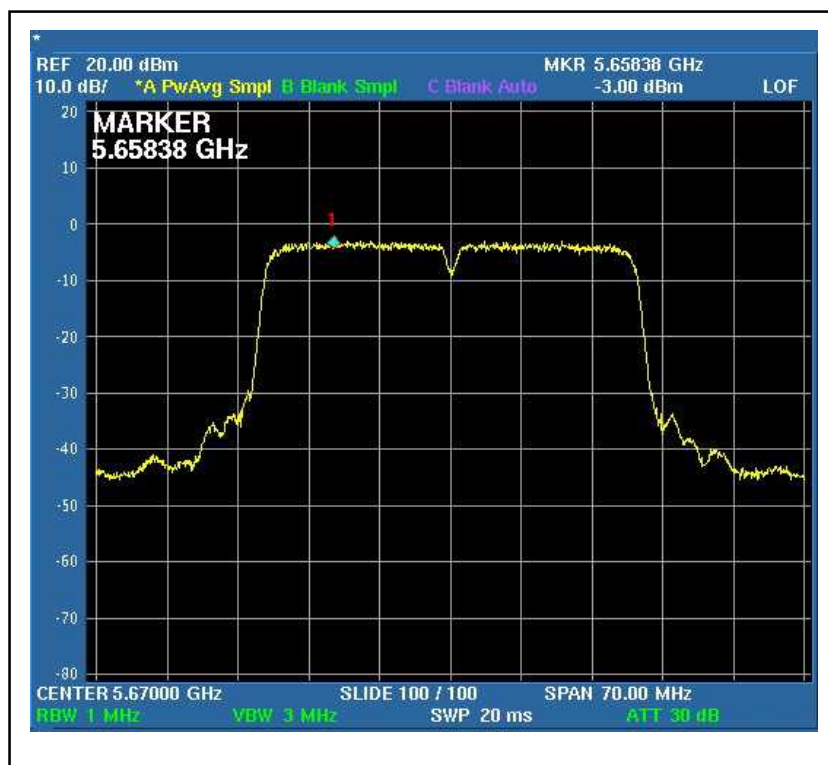
CH5



CH7



CH9



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.02\%$ of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2008	Aug. 08, 2009

NOTE:

1. The measurement uncertainty is less than $\pm 2.6\text{dB}$, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

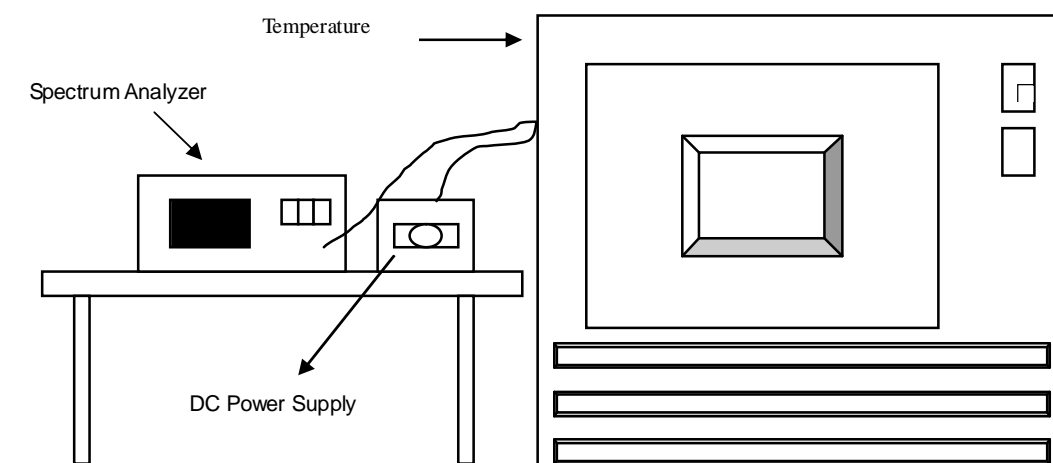
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. 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.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. 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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.6.7 TEST RESULTS

Operating frequency: 5320MHz				Limit : $\pm 0.02\%$			
Temp. (°C)	Power supply (VAC)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	126.5	5320.0084	0.000158	5320.0079	0.000148	5320.0076	0.000143
	110	5320.0084	0.000158	5320.0081	0.000152	5320.0079	0.000148
	93.5	5320.0084	0.000158	5320.0079	0.000148	5320.0076	0.000143
40	126.5	5320.0274	0.000515	5320.0258	0.000485	5320.0238	0.000447
	110	5320.0272	0.000511	5320.0278	0.000523	5320.0258	0.000485
	93.5	5320.0272	0.000511	5320.0248	0.000466	5320.0238	0.000447
30	126.5	5320.0039	0.000073	5320.0036	0.000068	5320.0033	0.000062
	110	5320.004	0.000075	5320.004	0.000075	5320.0037	0.000070
	93.5	5320.0039	0.000073	5320.0036	0.000068	5320.0033	0.000062
20	126.5	5319.989	0.000207	5319.9887	0.000212	5319.9885	0.000216
	110	5319.989	0.000207	5319.9889	0.000209	5319.9886	0.000214
	93.5	5319.989	0.000207	5319.9887	0.000212	5319.9884	0.000218
10	126.5	5319.9849	0.000284	5319.9944	0.000105	5319.9941	0.000111
	110	5319.985	0.000282	5319.9944	0.000105	5319.9943	0.000107
	93.5	5319.9949	0.000096	5319.9947	0.000100	5319.9940	0.000113
0	126.5	5320.0268	0.000504	5320.0218	0.000410	5320.0178	0.000335
	110	5320.0268	0.000504	5320.0248	0.000466	5320.0208	0.000391
	93.5	5320.0268	0.000504	5320.0208	0.000391	5320.0188	0.000353
-10	126.5	5320.0198	0.000372	5320.0148	0.000278	5320.0148	0.000278
	110	5320.0198	0.000372	5320.0178	0.000335	5320.0158	0.000297
	93.5	5320.0178	0.000335	5320.0148	0.000278	5320.0148	0.000278
-20	126.5	5320.0092	0.000173	5320.009	0.000169	5320.0087	0.000164
	110	5320.0092	0.000173	5320.009	0.000169	5320.0089	0.000167
	93.5	5320.0092	0.000173	5320.0089	0.000167	5320.0086	0.000162
-30	126.5	5320.0332	0.000624	5320.0335	0.000630	5320.0336	0.000632
	110	5320.0332	0.000624	5320.0334	0.000628	5320.0336	0.000632
	93.5	5320.0334	0.000628	5320.0332	0.000624	5320.0336	0.000632

4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 09, 2008	Aug. 08, 2009

NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set RBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

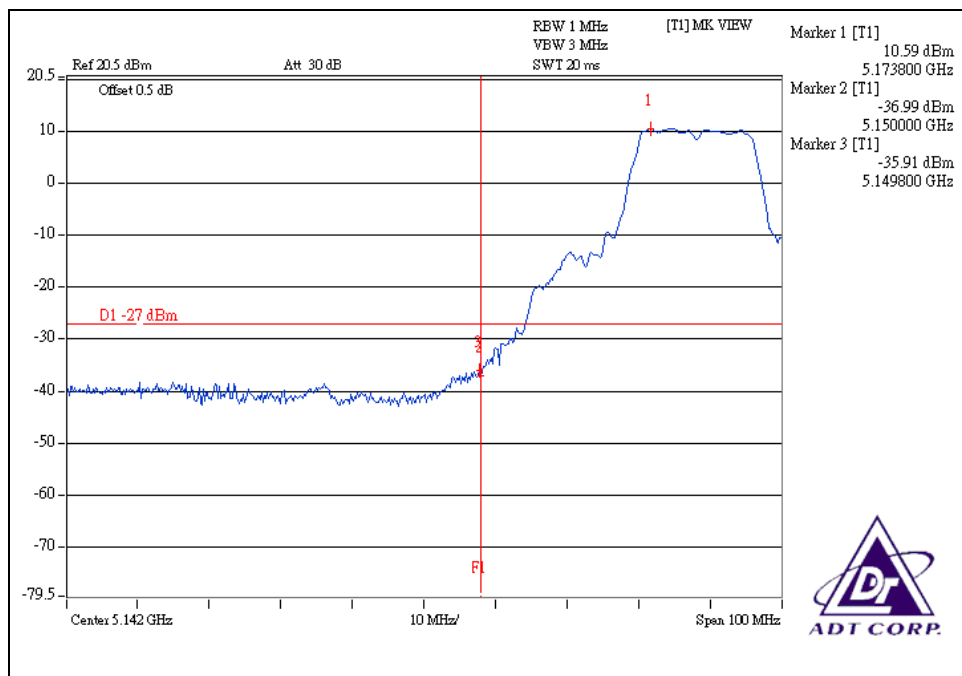
4.7.4 TEST RESULTS

For 5.15 to 5.35GHz band:

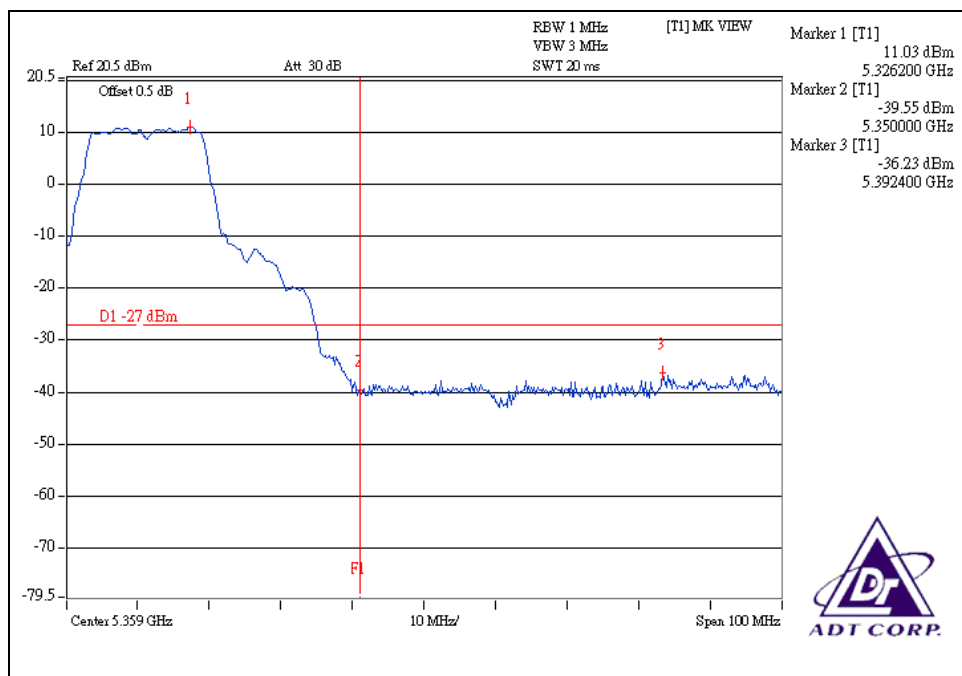
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.

802.11a OFDM modulation

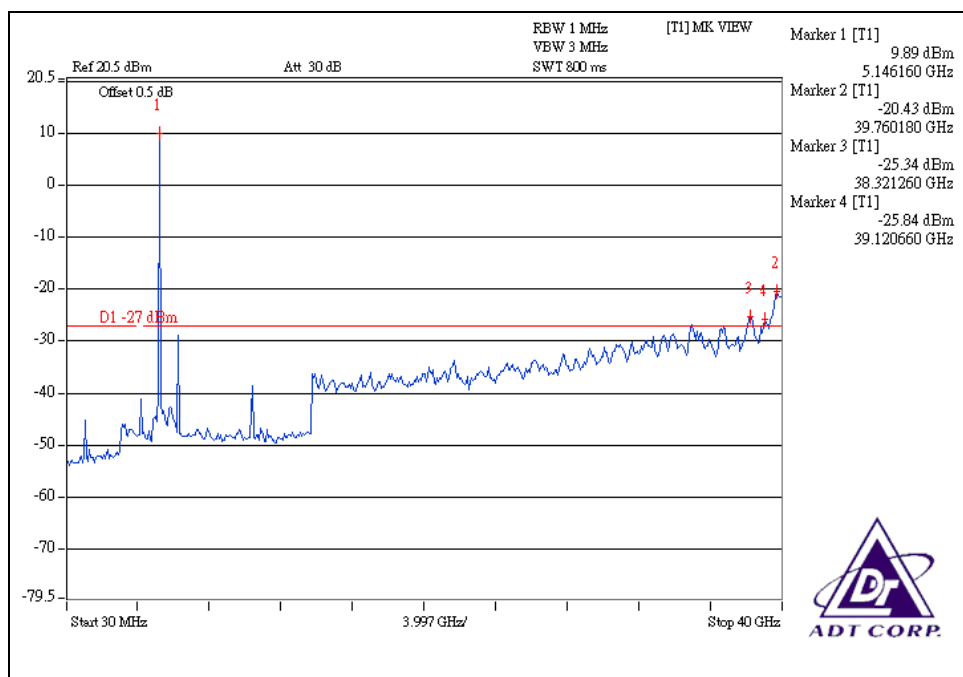
CH 1



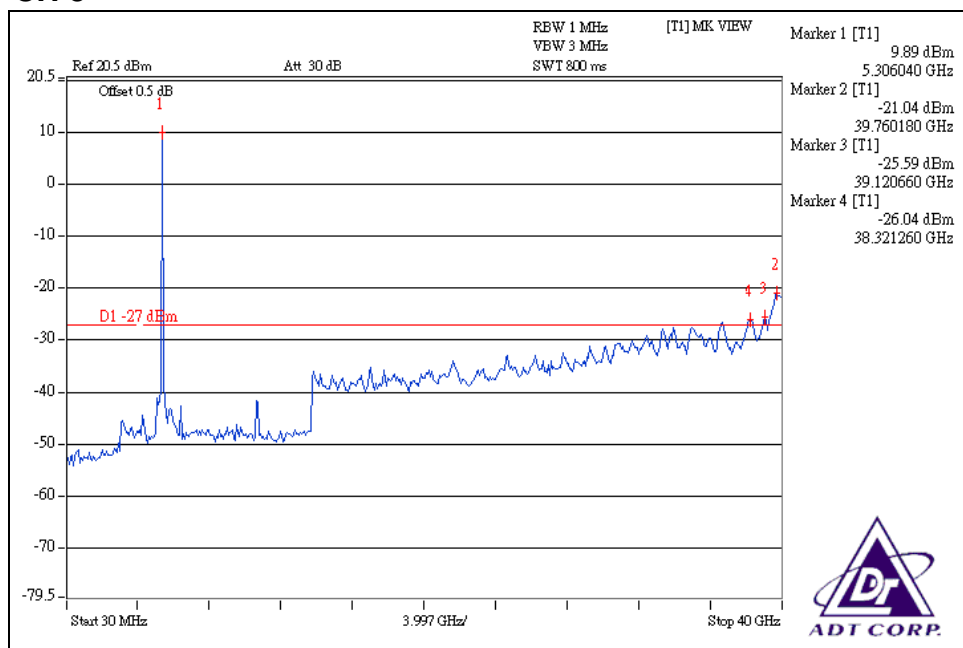
CH 8



CH 1



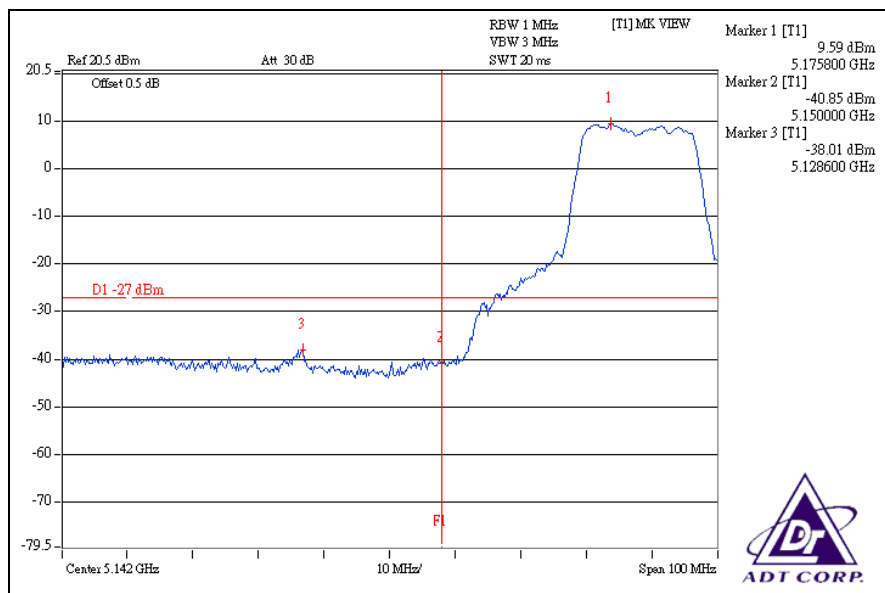
CH 8



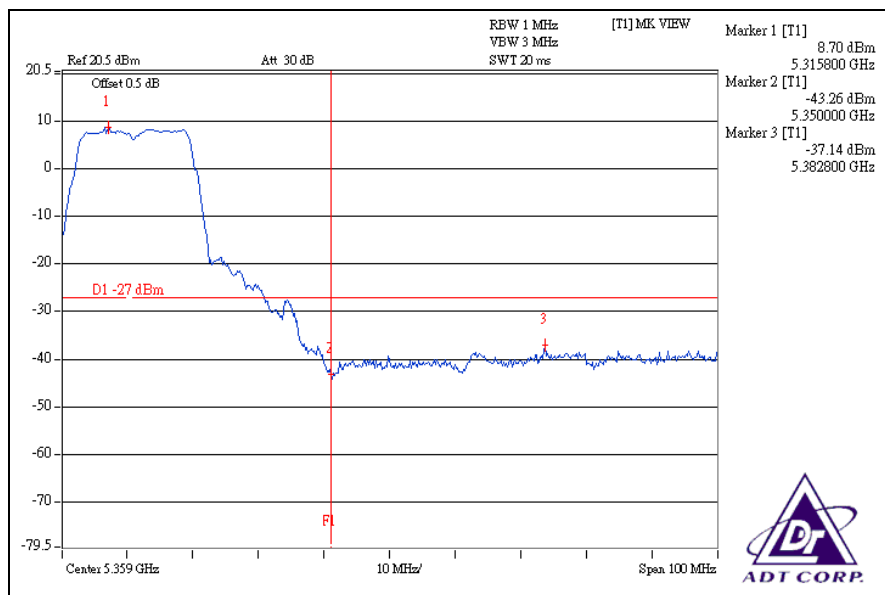
DRAFT 802.11n (20MHz) OFDM MODULATION:

For chain (0):

CH1

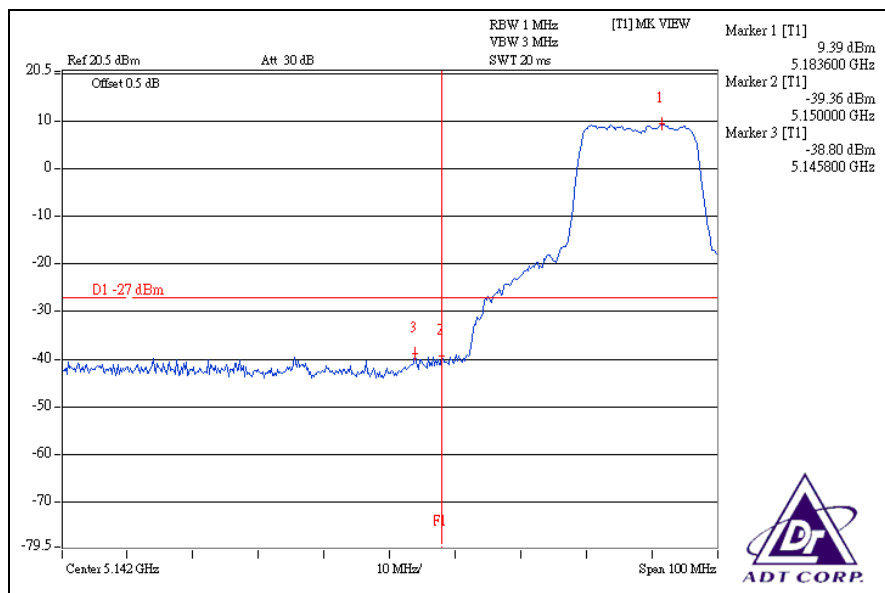


CH8

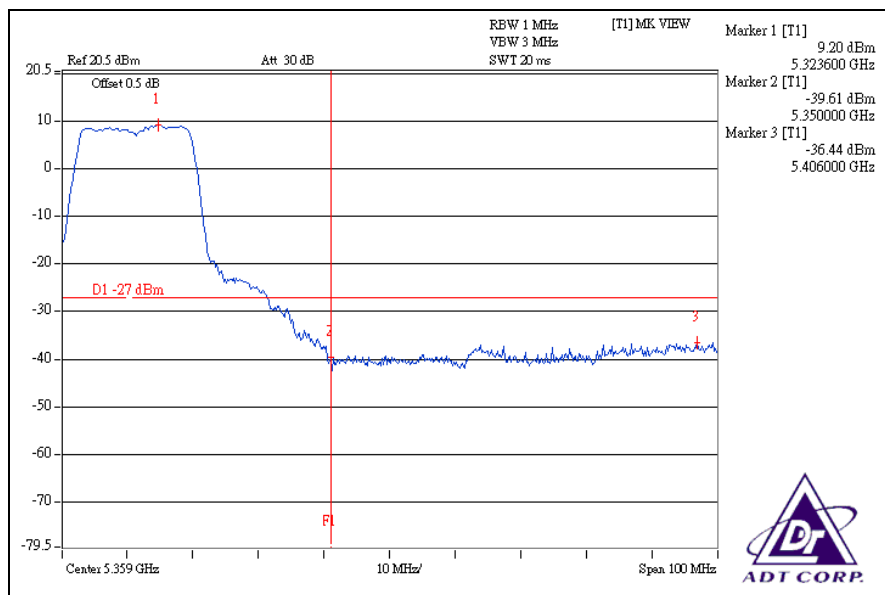


For chain (1):

CH1

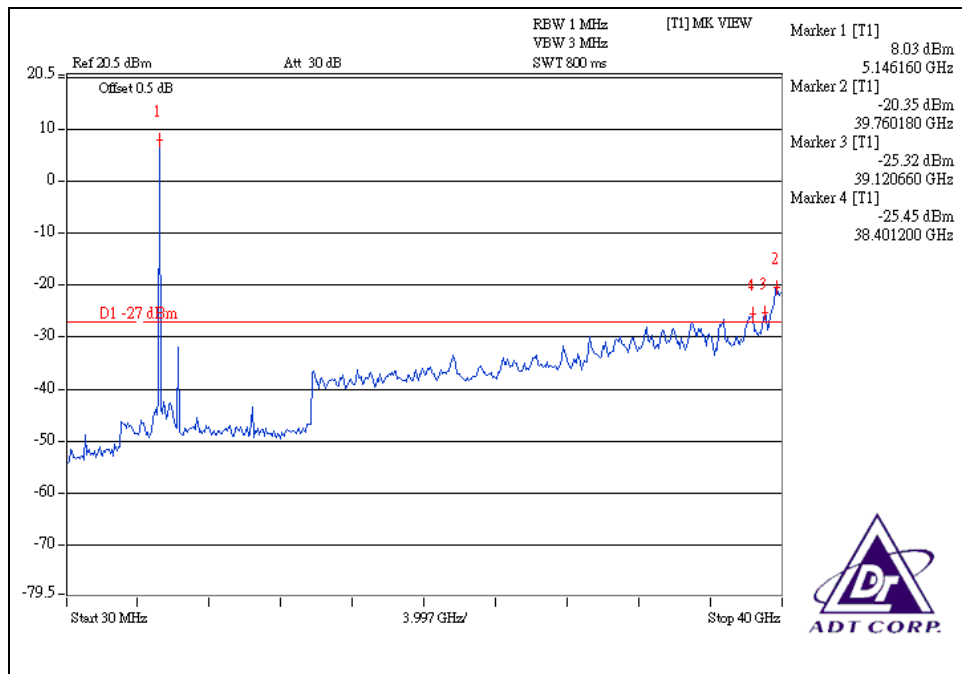


CH8

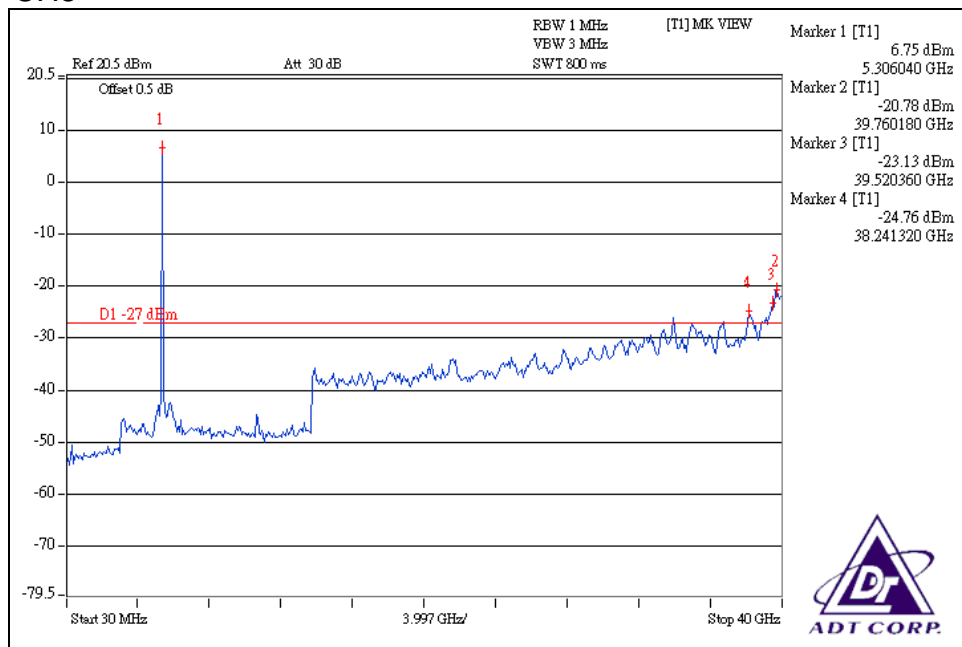


For chain (0):

CH1

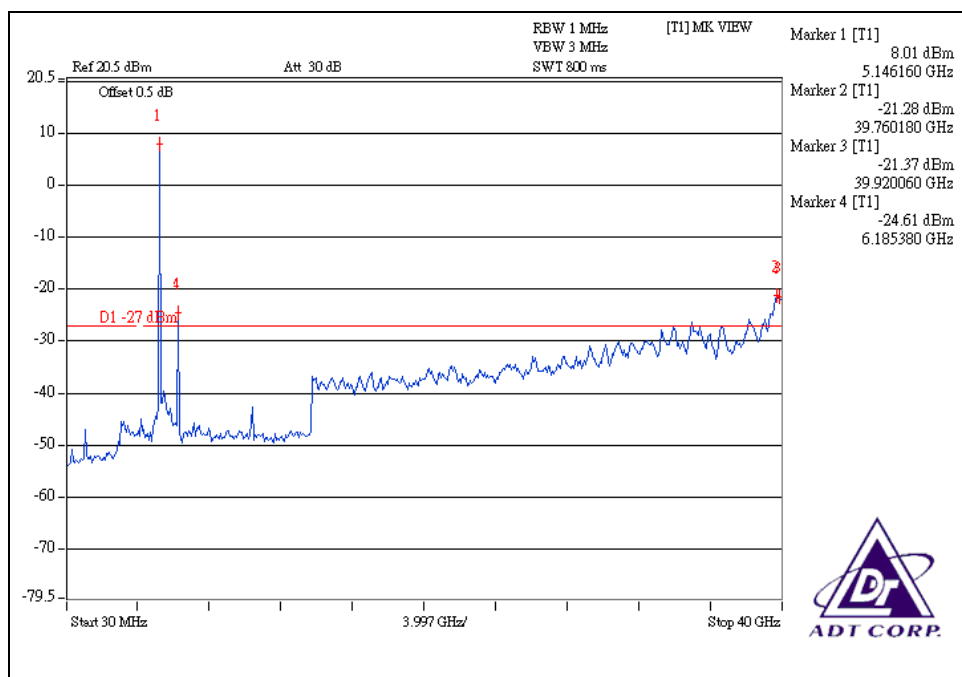


CH8

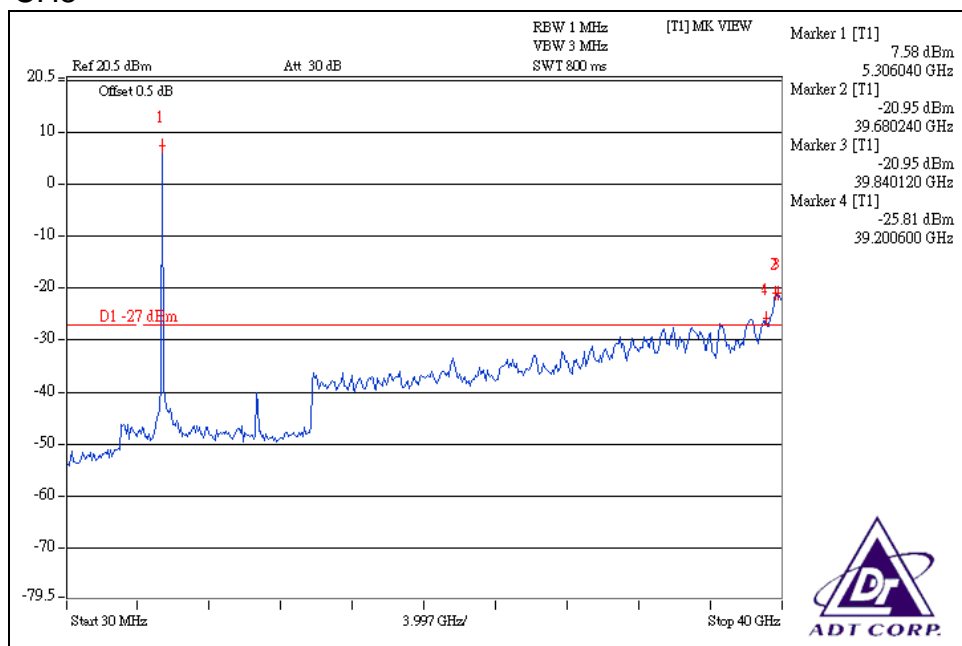


For chain (1):

CH1



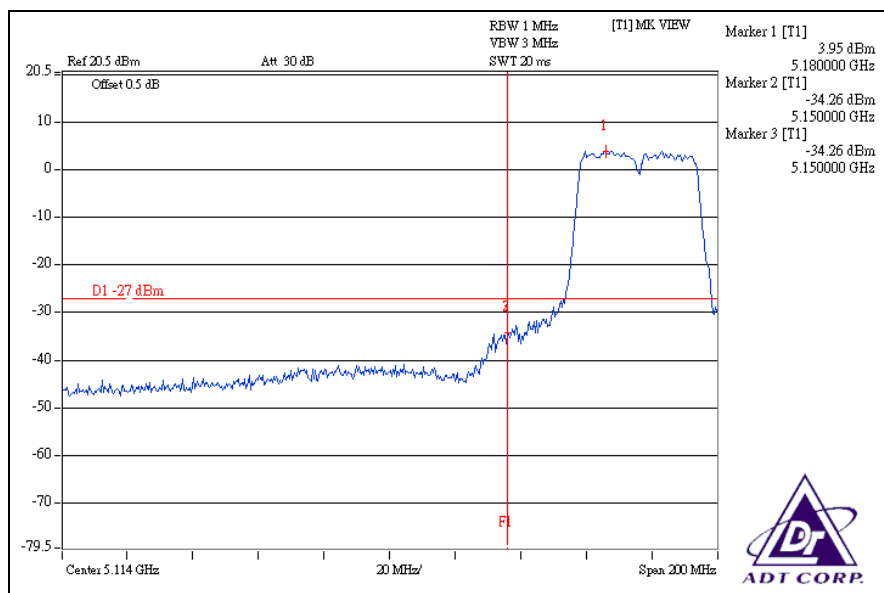
CH8



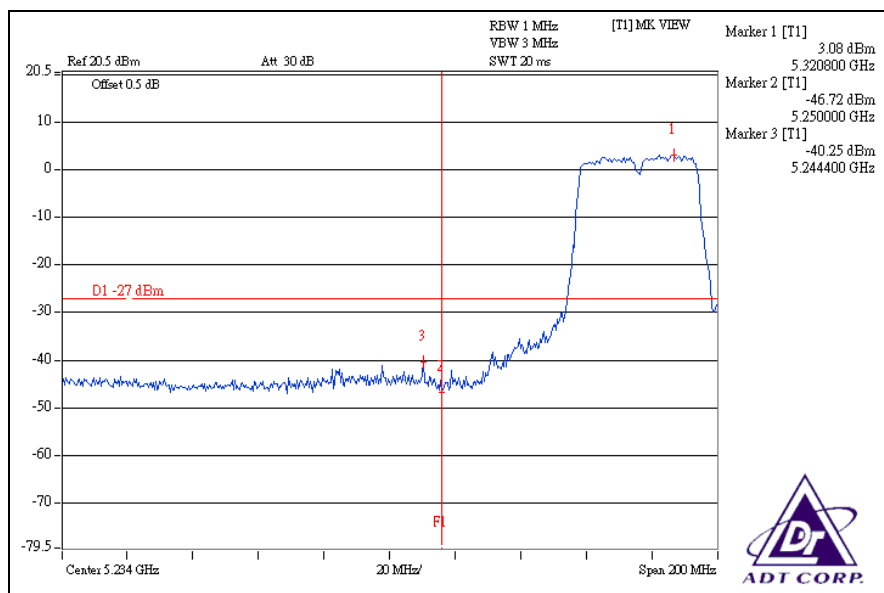
DRAFT 802.11n (40MHz) OFDM MODULATION:

For chain (0):

CH1

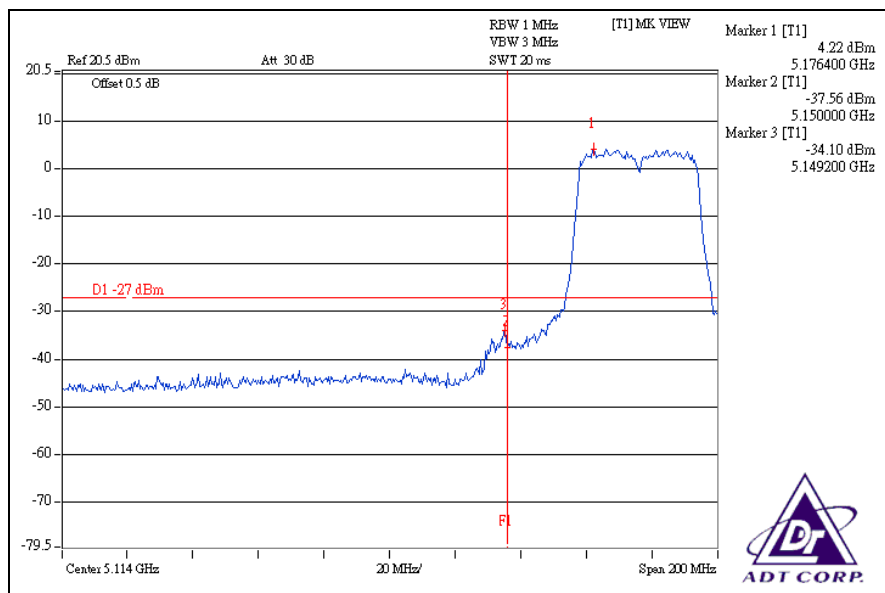


CH4

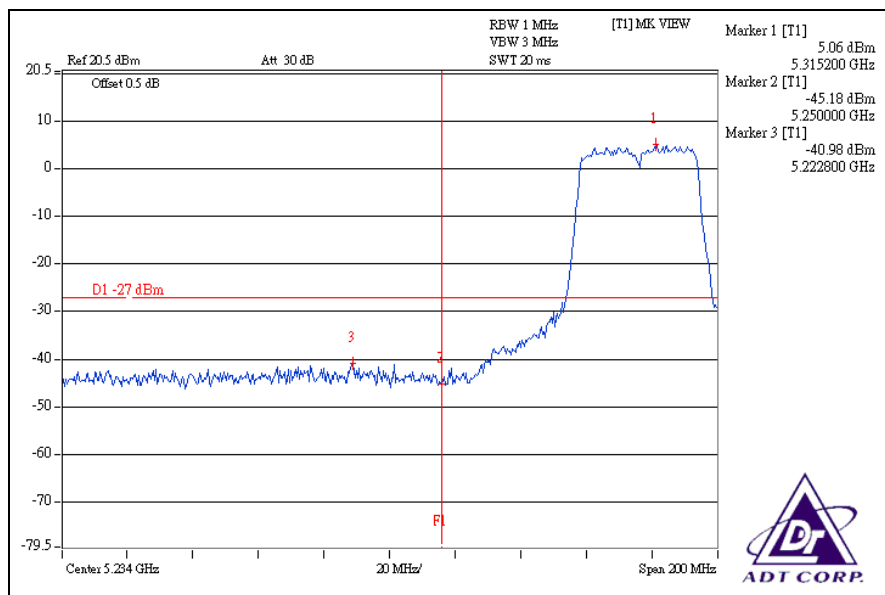


For chain (1):

CH1

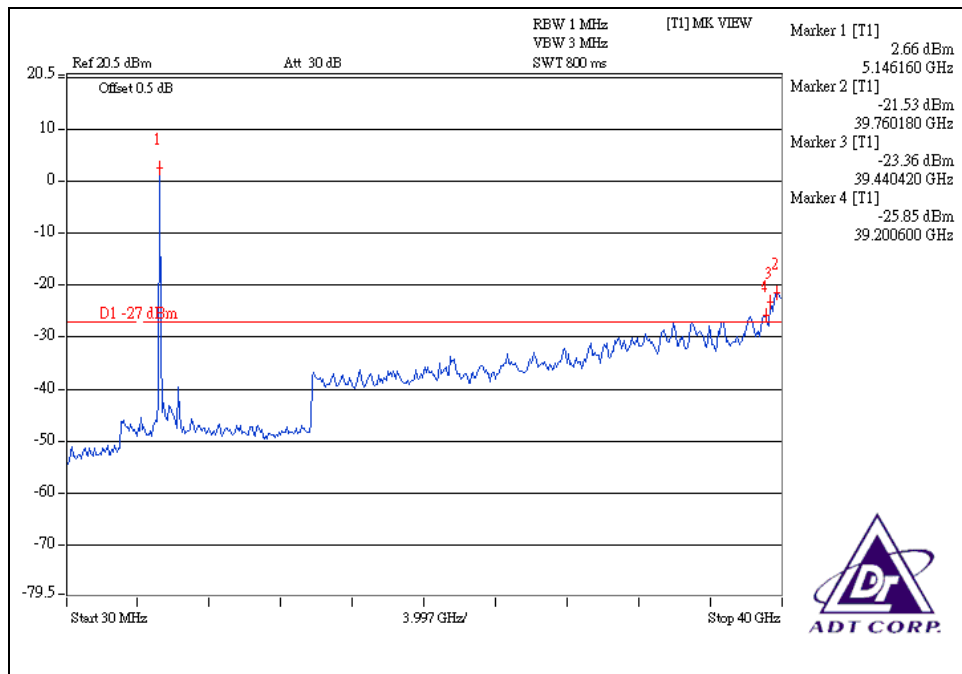


CH4

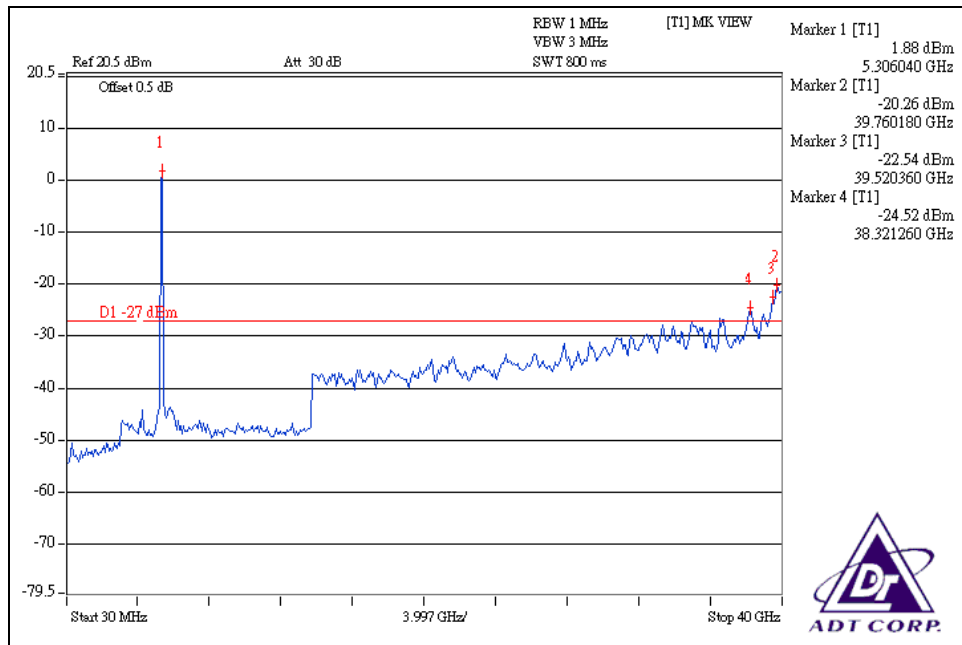


For chain (0):

CH1

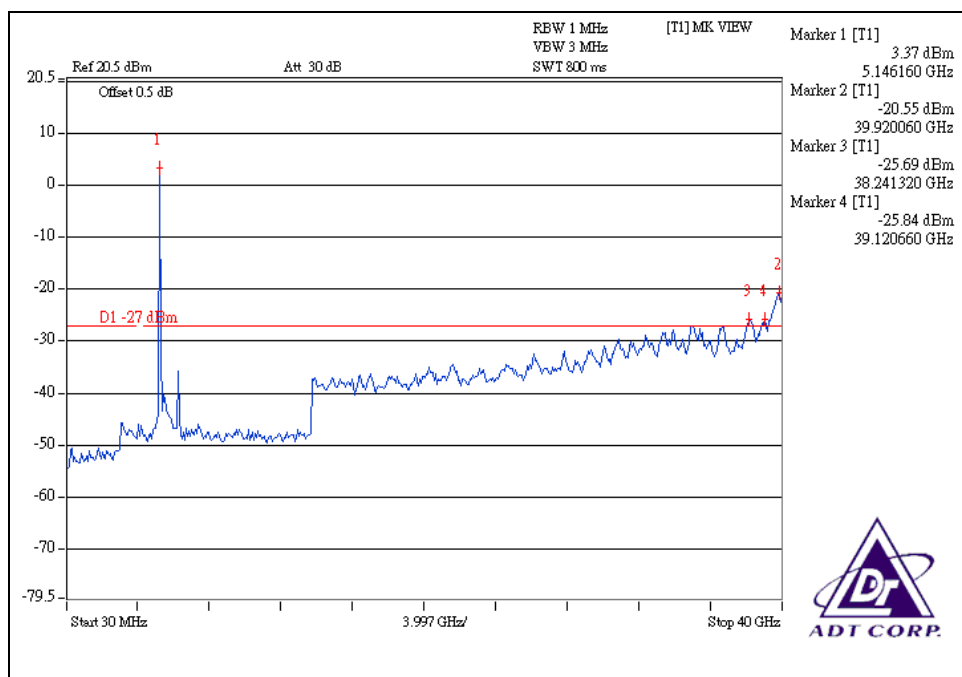


CH4

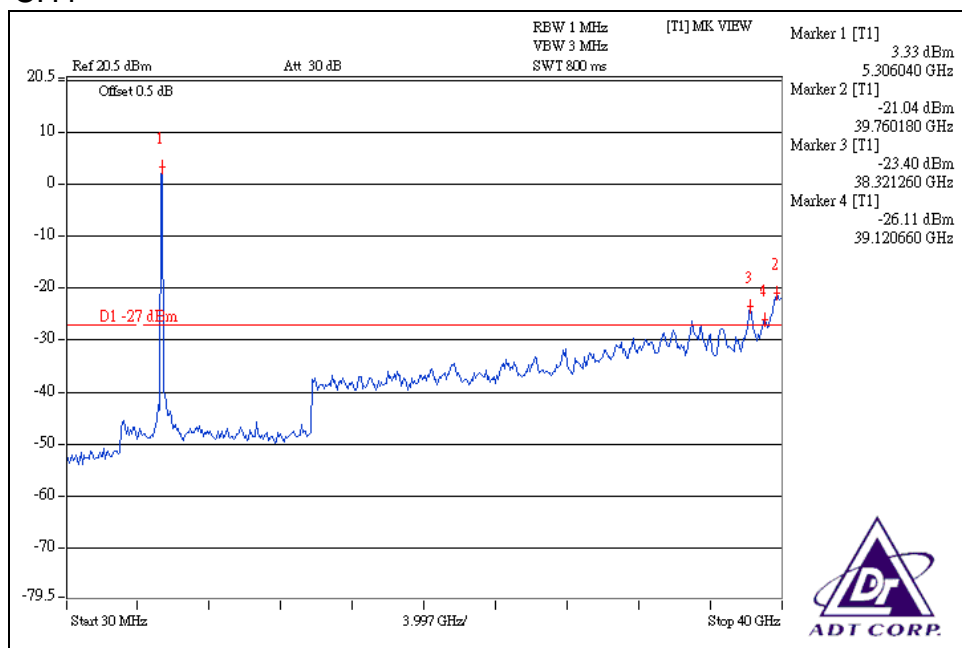


For chain (1):

CH1



CH4

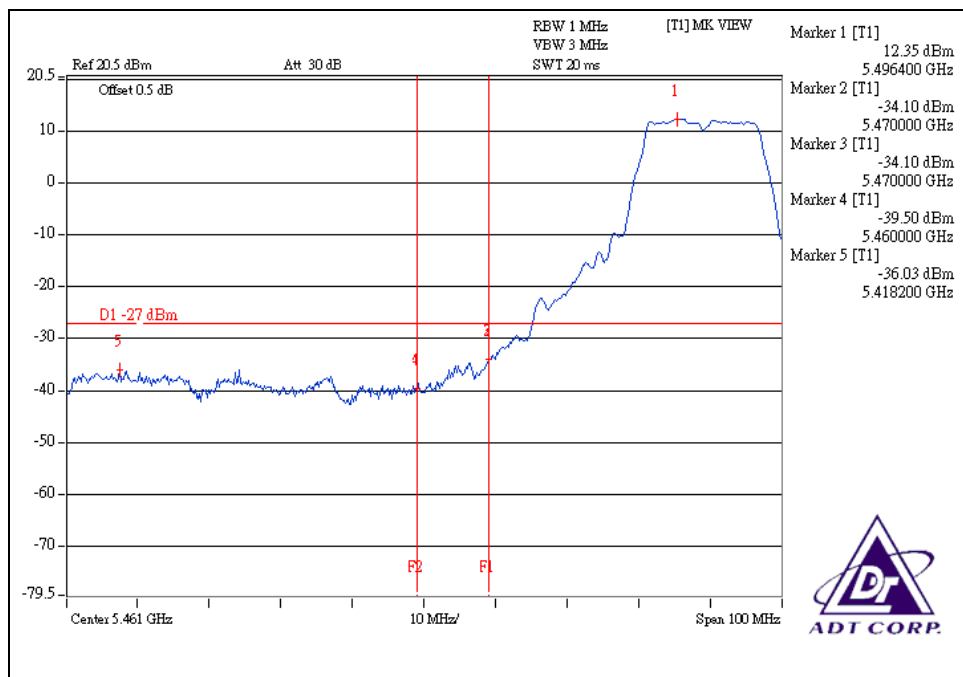


For 5.47 to 5.725GHz band:

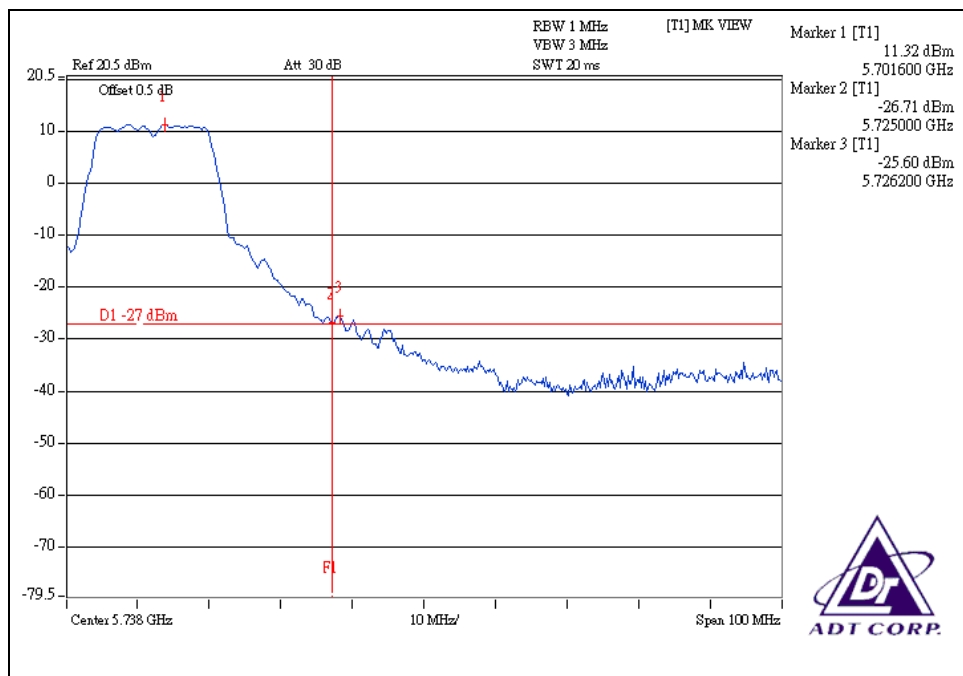
The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.

802.11a OFDM modulation

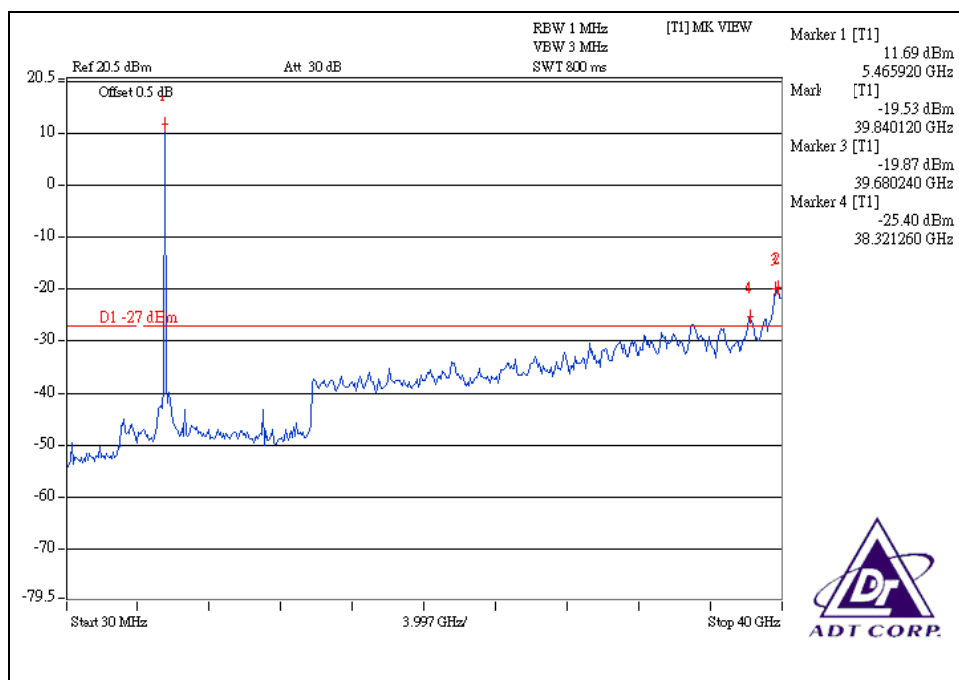
CH 9



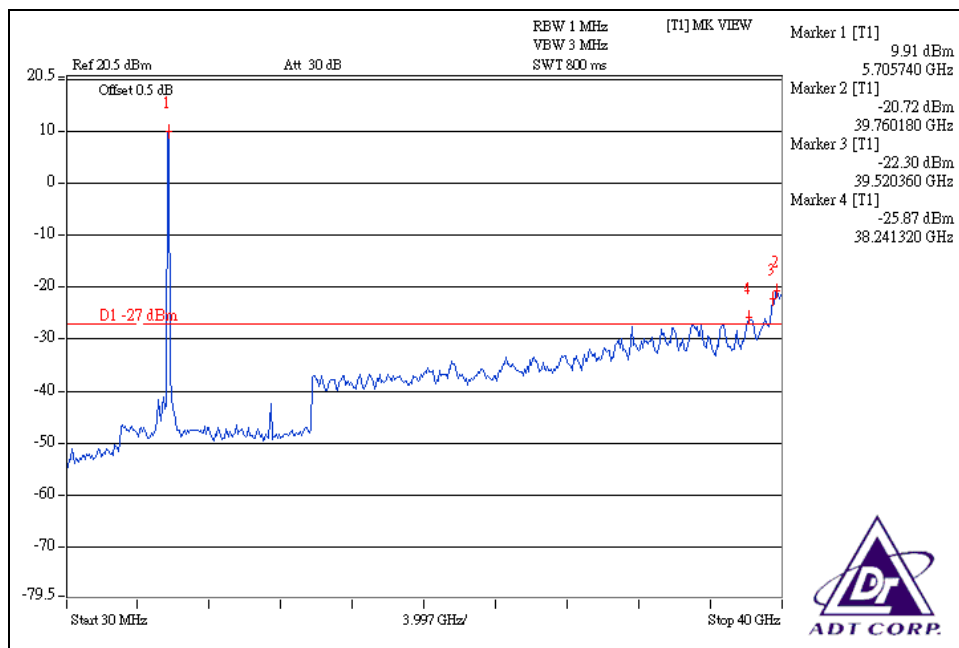
CH 19



CH 9



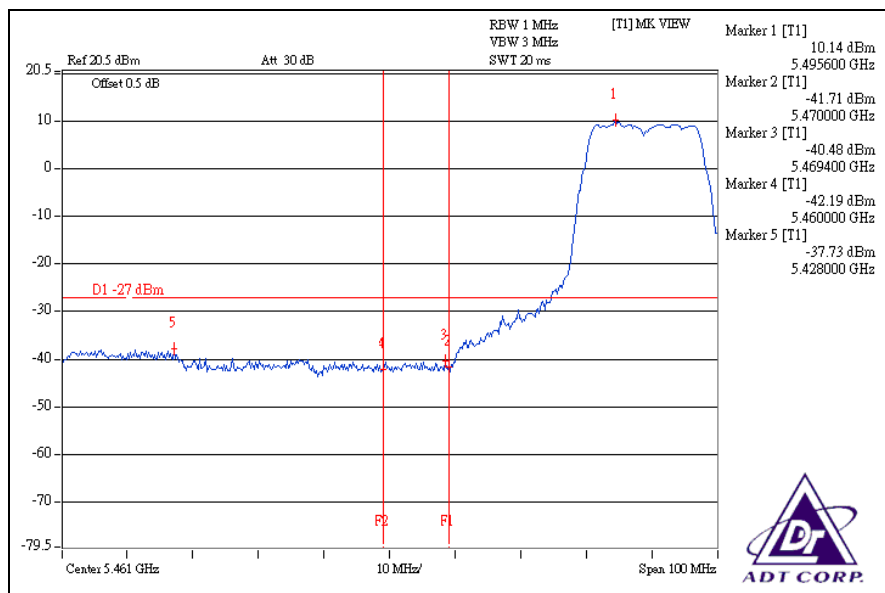
CH 19



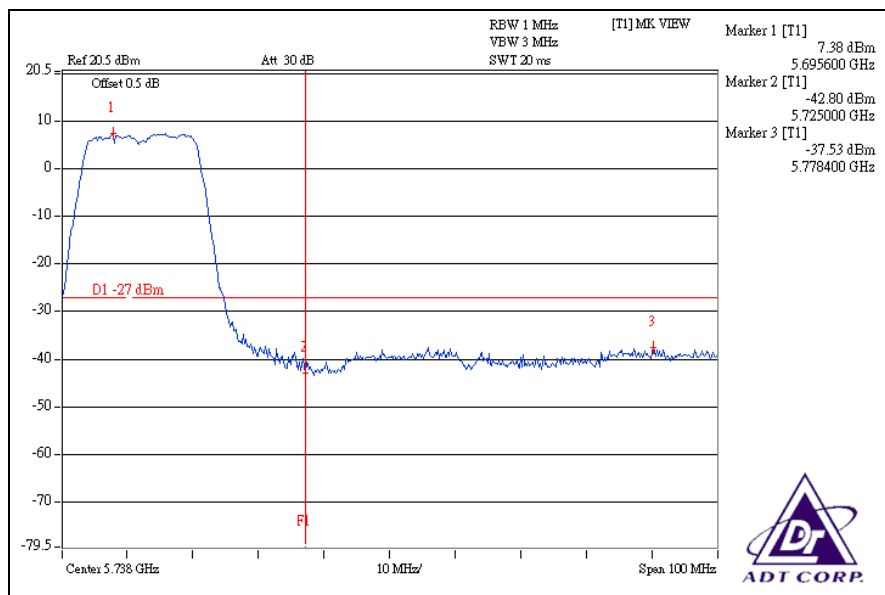
DRAFT 802.11n (20MHz) OFDM MODULATION:

For chain (0):

CH9

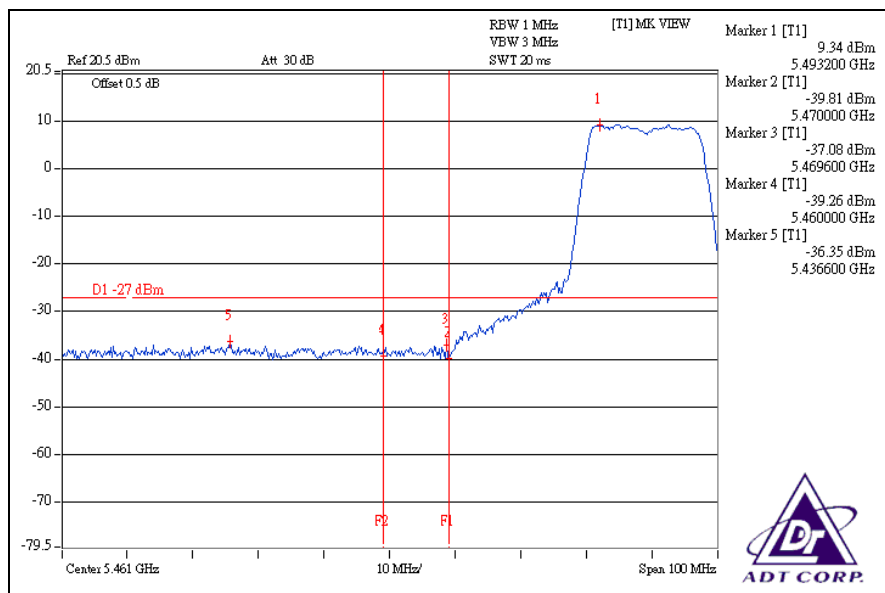


CH19

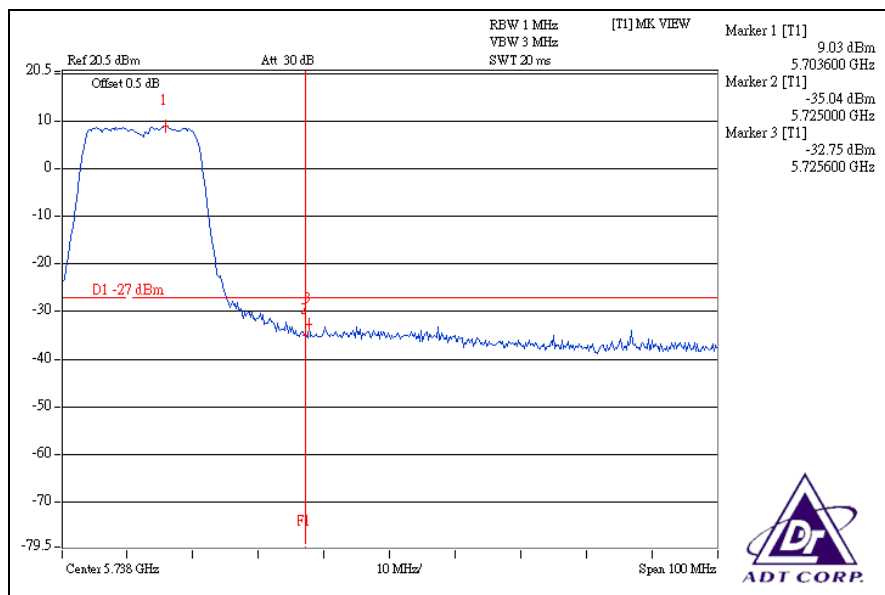


For chain (1):

CH9

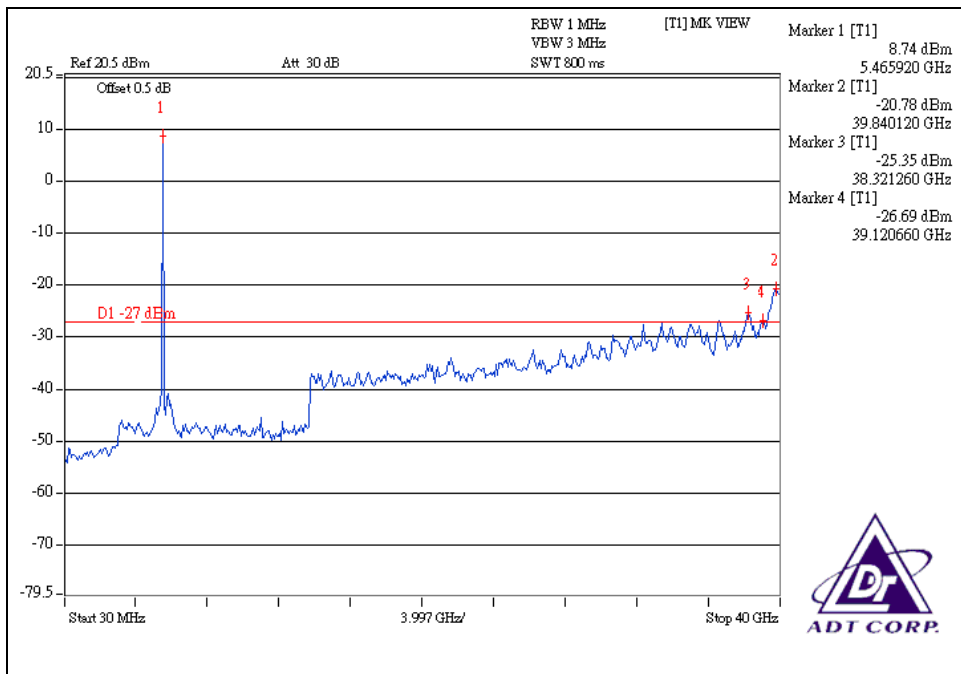


CH19

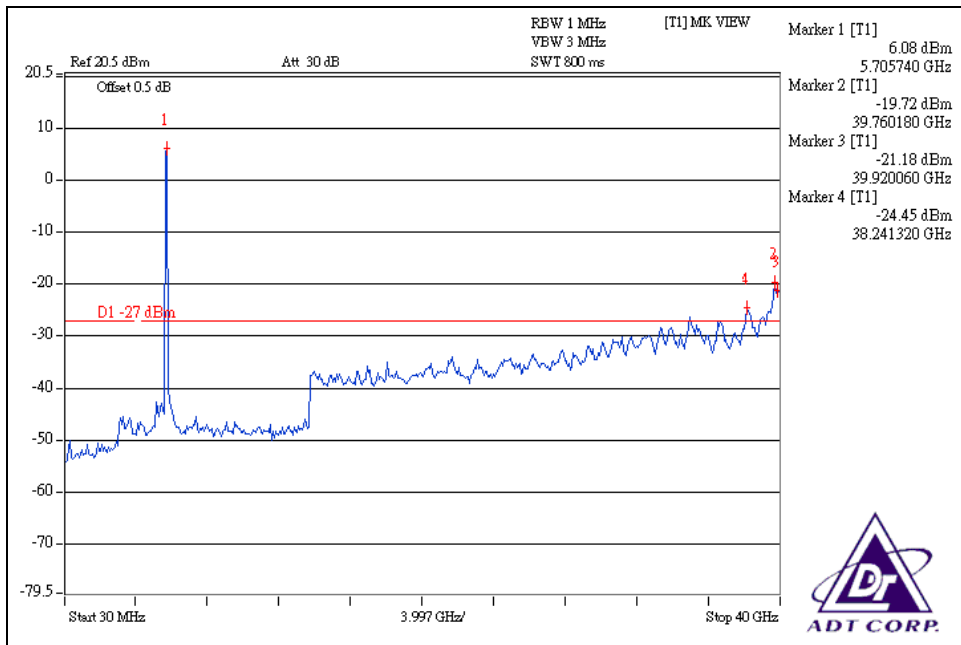


For chain (0):

CH9

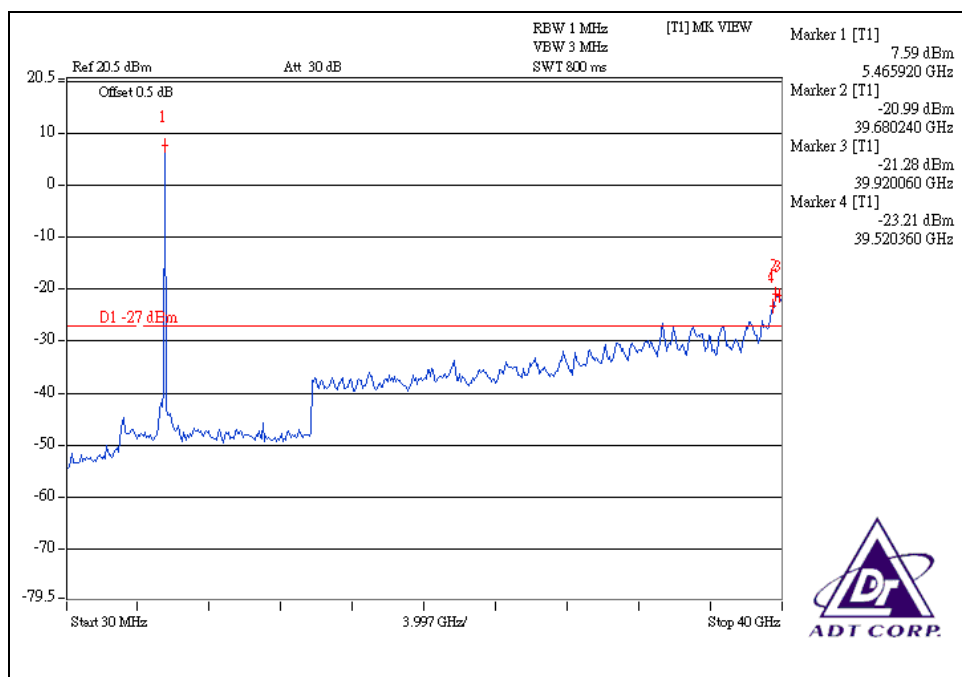


CH19

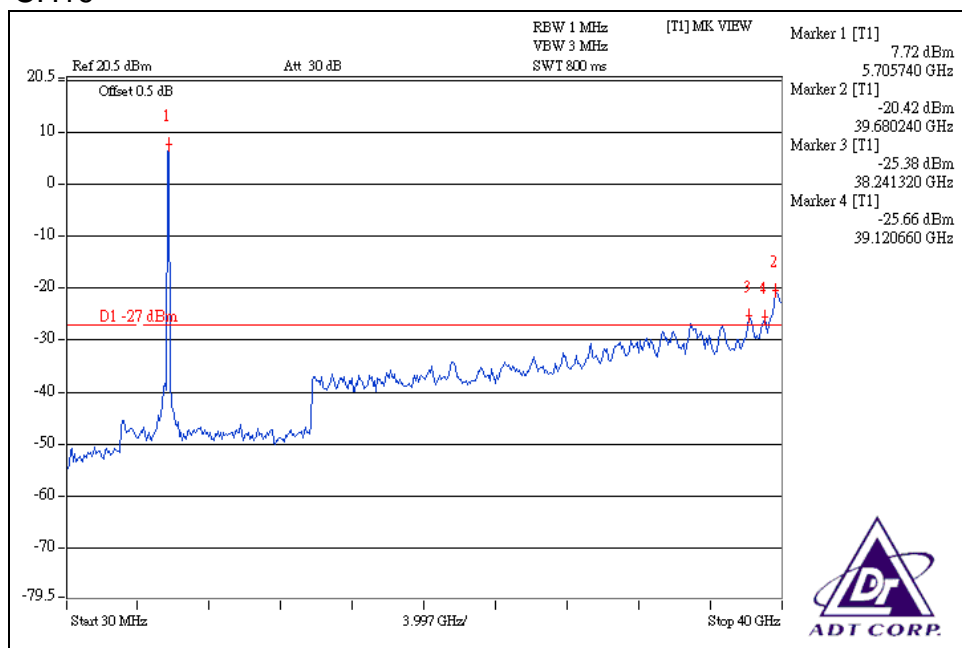


For chain (1):

CH9



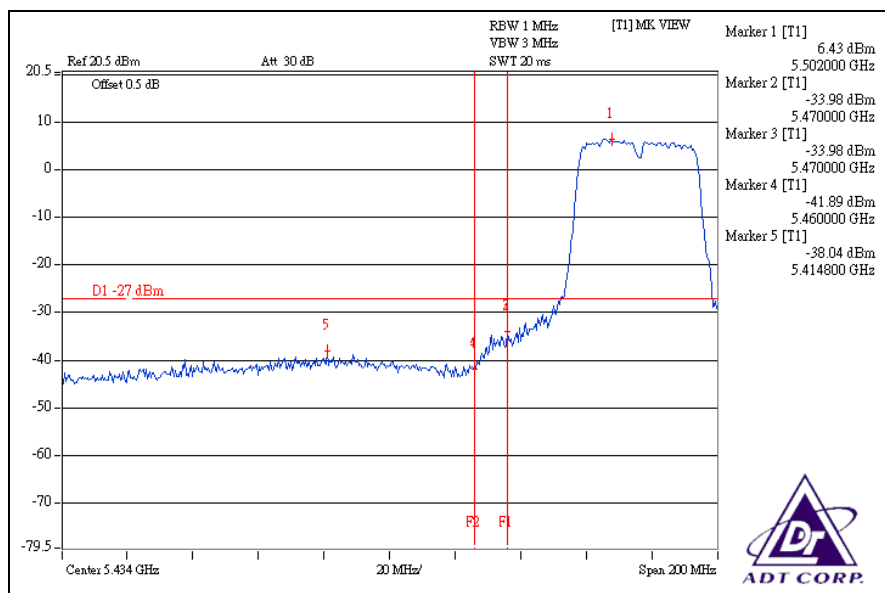
CH19



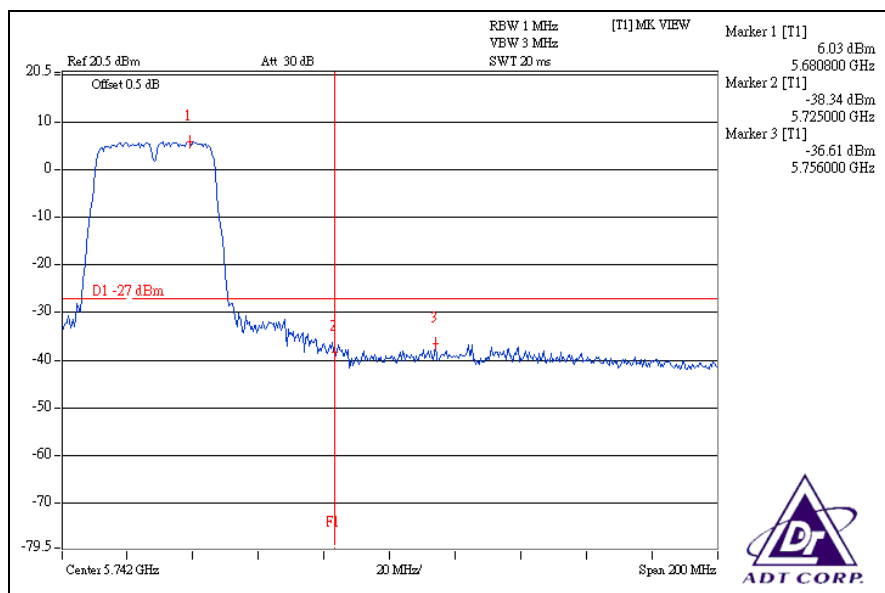
DRAFT 802.11n (40MHz) OFDM MODULATION:

For chain (0):

CH5

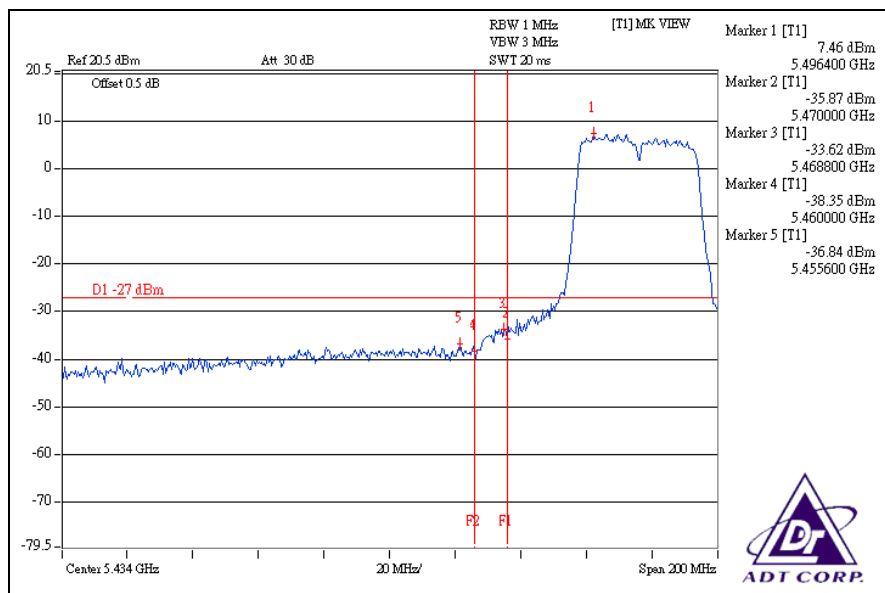


CH9

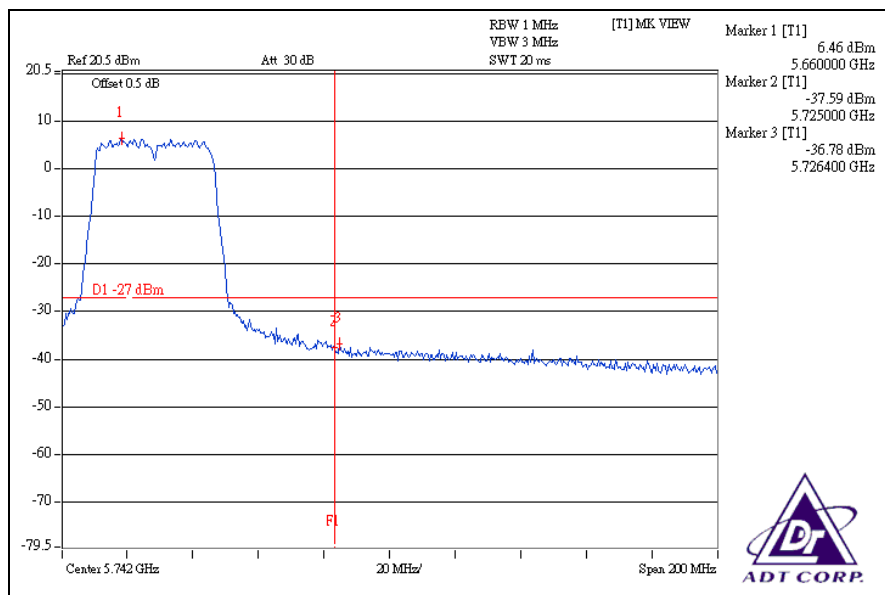


For chain (1):

CH5

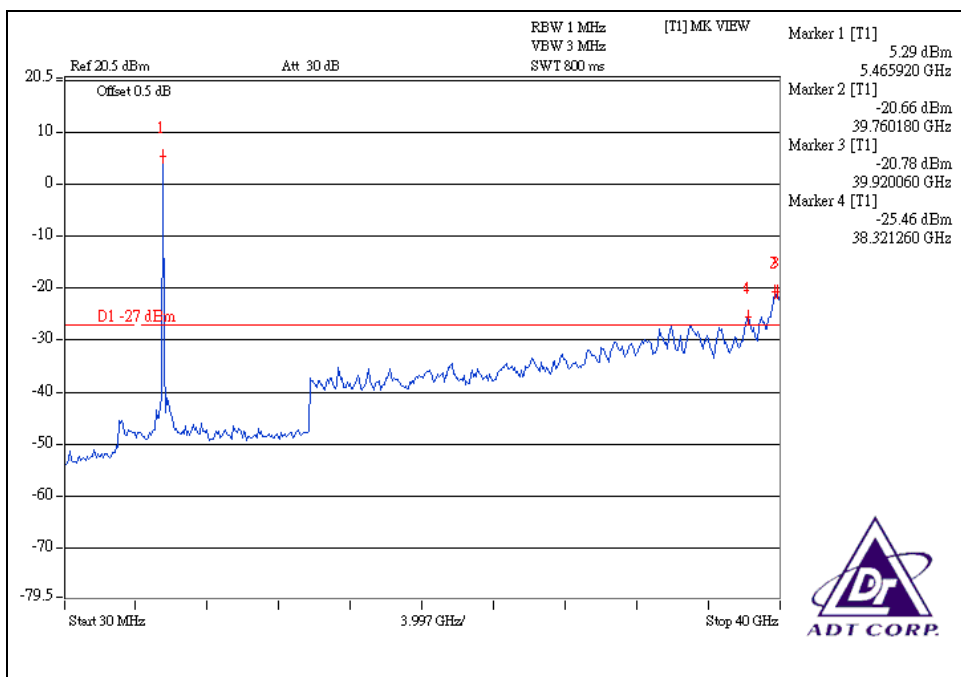


CH9

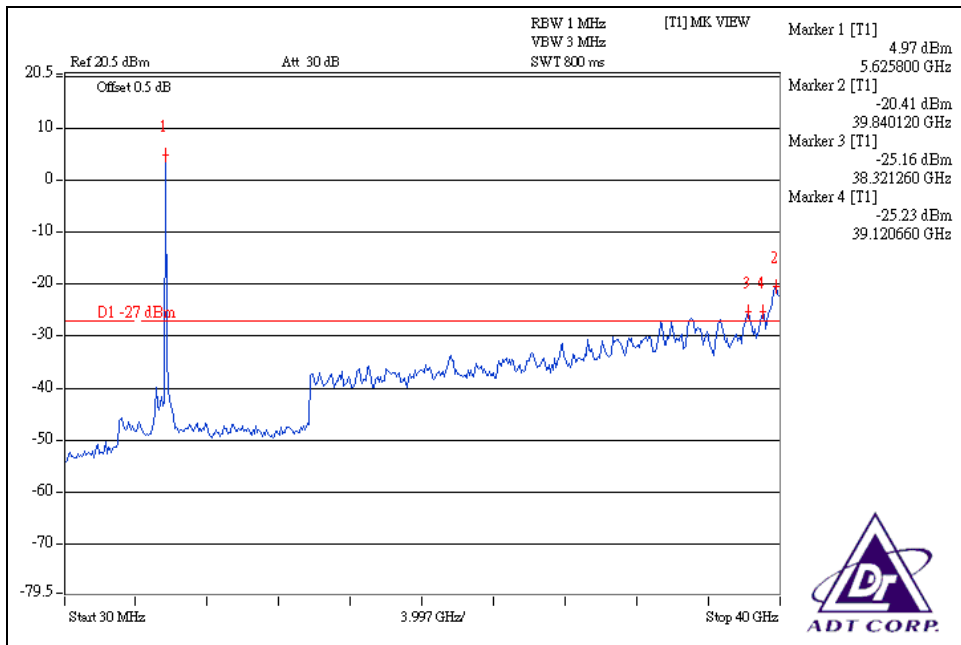


For chain (0):

CH5

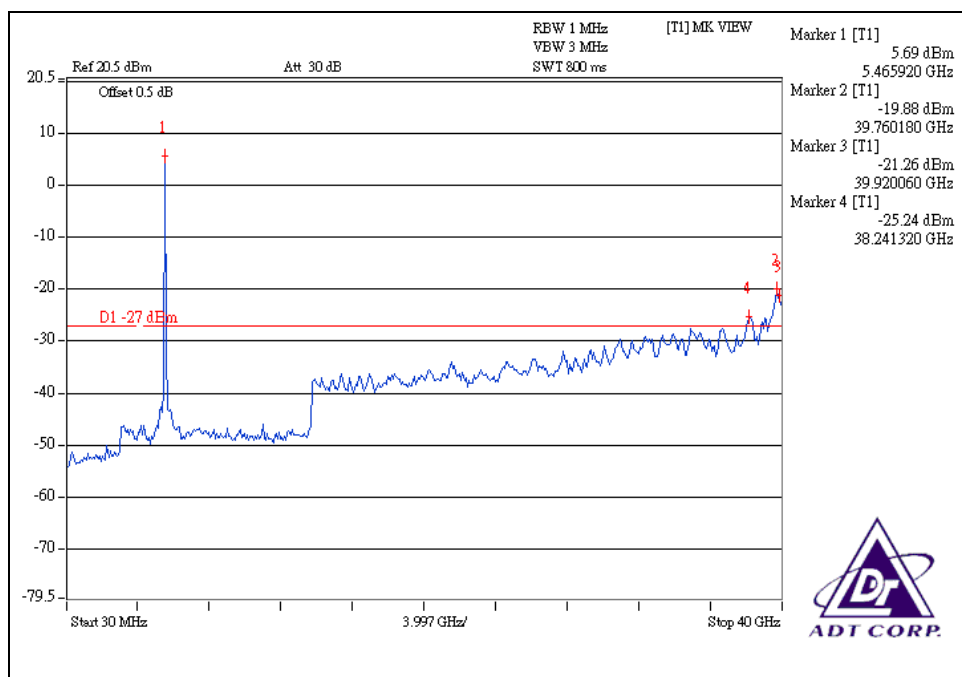


CH9

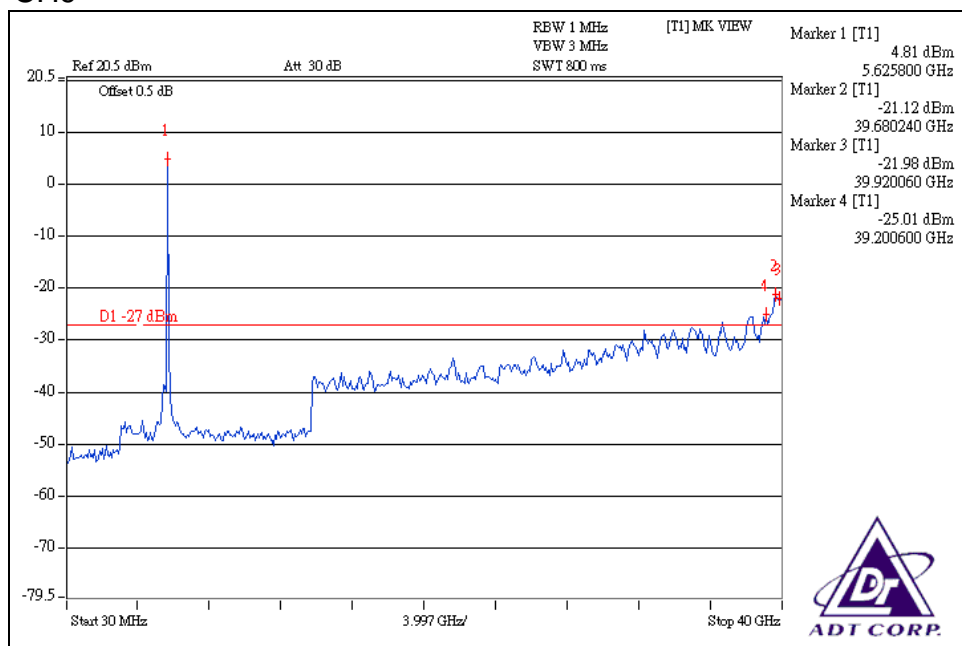


For chain (1):

CH5



CH9



4.8 ANTENNA REQUIREMENT

4.8.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.8.2 ANTENNA CONNECTED CONSTRUCTION

There two antennas provided to this EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	Antenna Gain (dBi)	Antenna Connector
Chain(0)	Dipole	2	RSMA
Chain(1)	Dipole	2	RSMA

5. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, UL
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also

6.APPENDIX-A- Modifications recorders for engineering changes to the eut BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---