4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 23, 2006

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
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 PROCEDURE

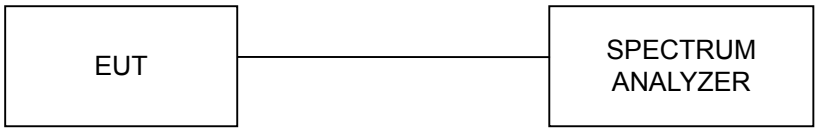
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

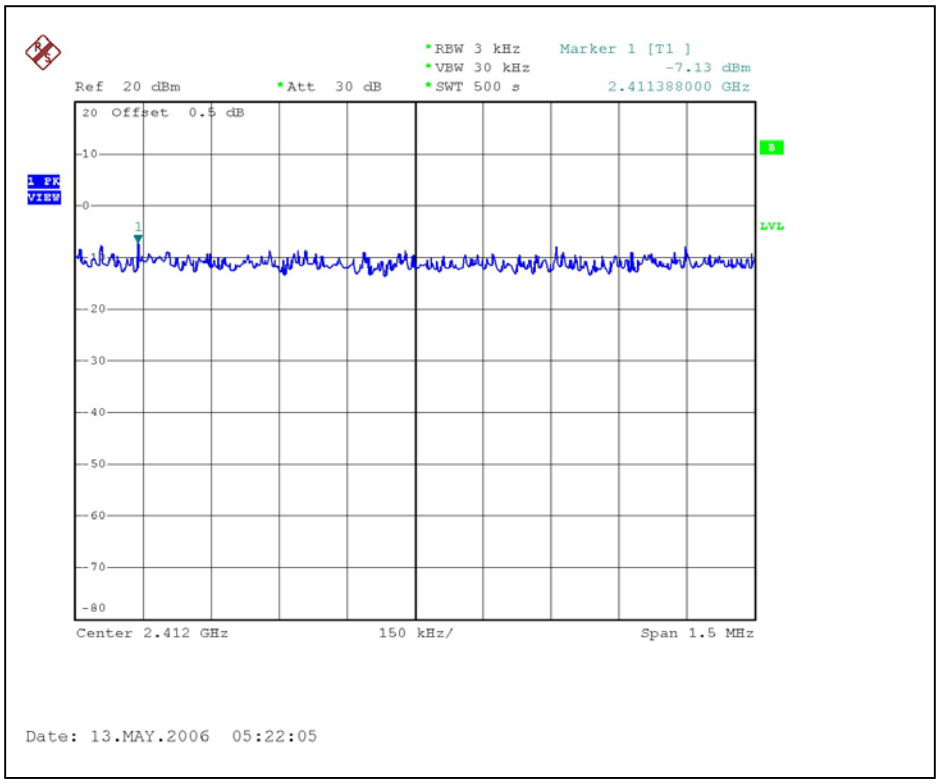
4.5.7 TEST RESULTS

802.11b DSSS MODULATION:

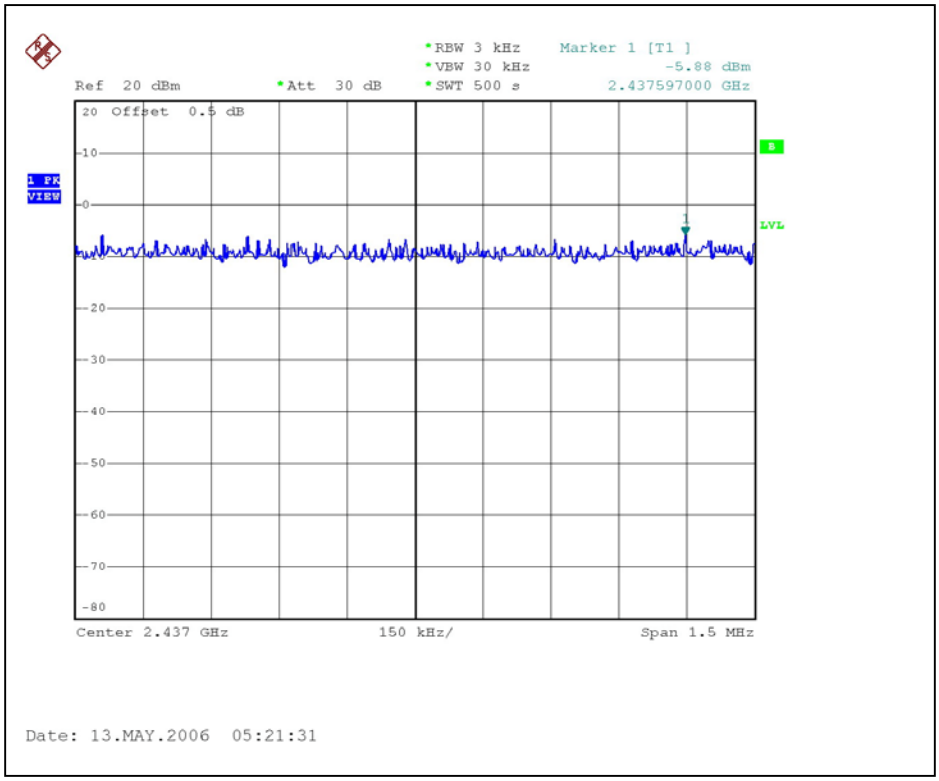
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22deg.C, 68%RH, 962hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-7.13	8	PASS
6	2437	-5.88	8	PASS
11	2462	-6.20	8	PASS

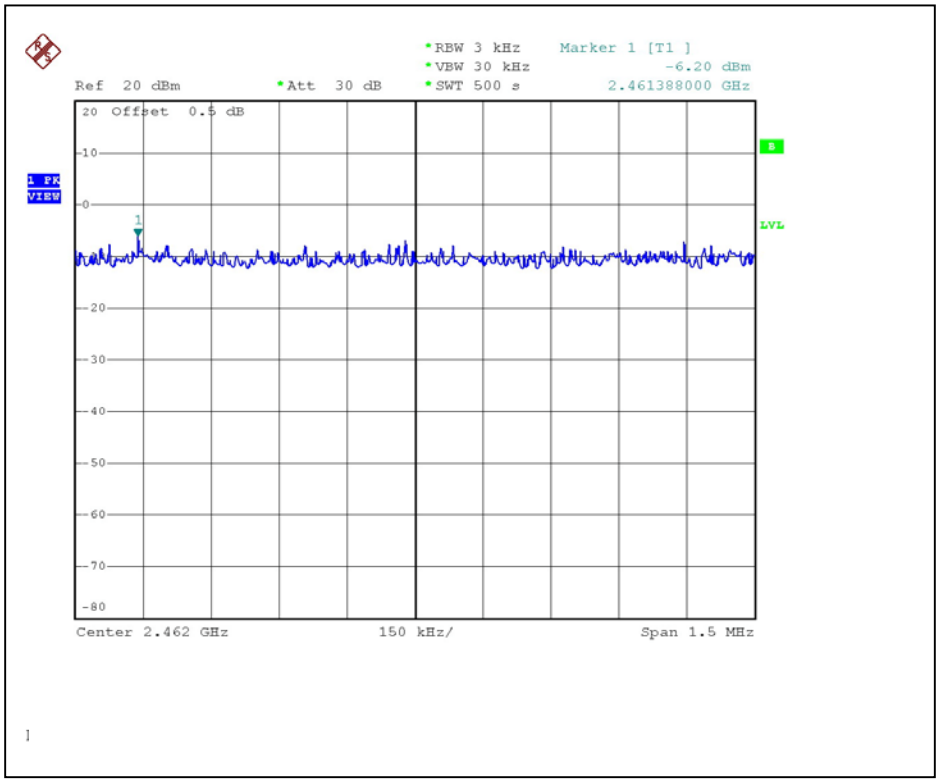
CH1



CH6


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-5.88 dBm
2.437597000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.437 GHz
150 kHz/
Span 1.5 MHz
Date: 13.MAY.2006 05:21:31

CH11

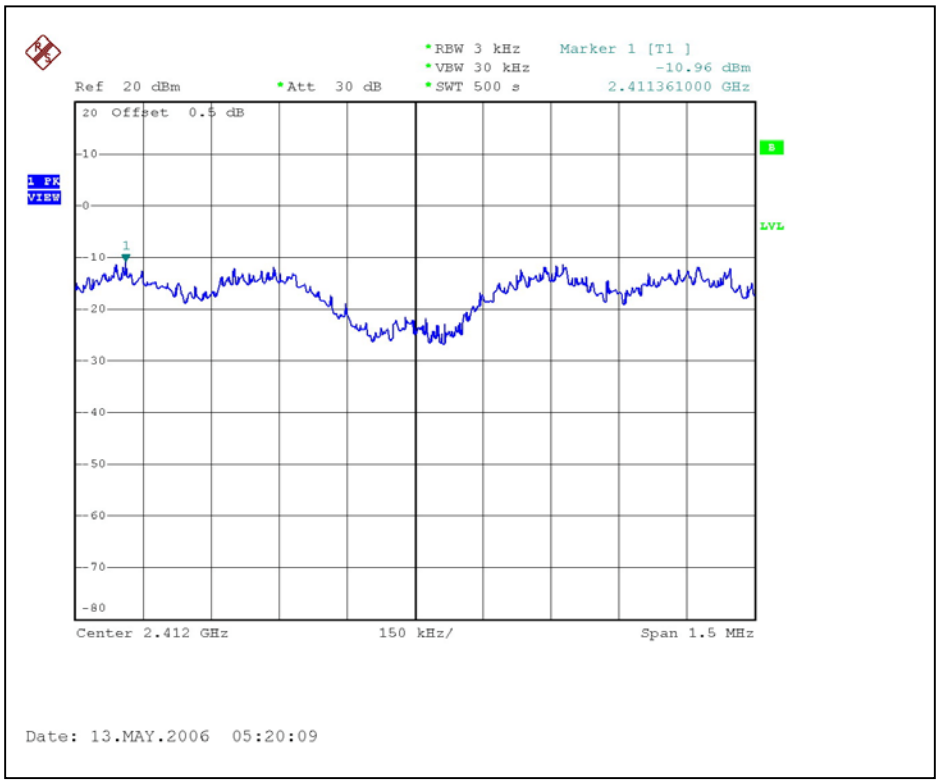

RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-6.20 dBm
2.461388000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.462 GHz
150 kHz/
Span 1.5 MHz

802.11g OFDM MODULATION:

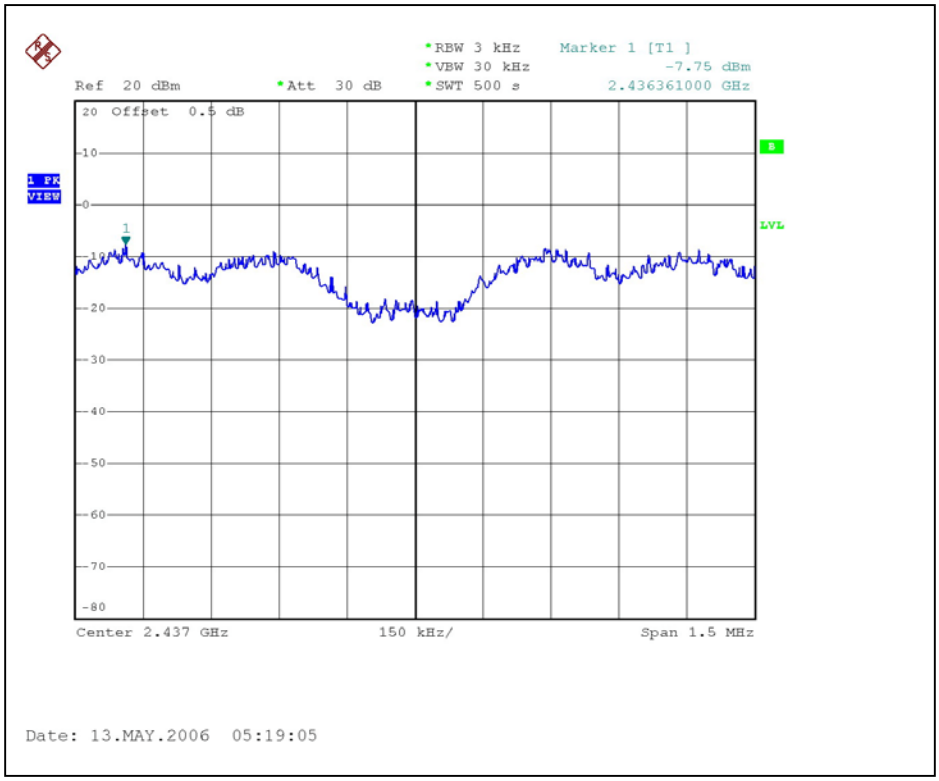
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22deg.C, 68%RH, 962hPa
TESTED BY	Sky iao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
1	2412	-10.96	8	PASS
6	2437	-7.75	8	PASS
11	2462	-10.98	8	PASS

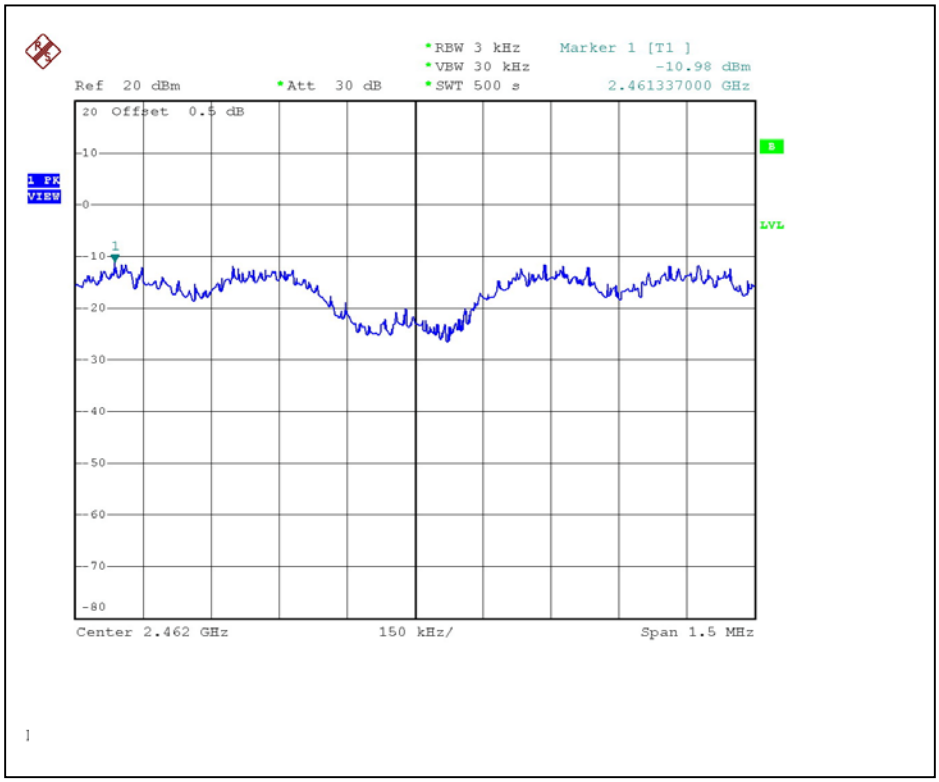
CH1



CH6


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-7.75 dBm
2.436361000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.437 GHz
150 kHz/
Span 1.5 MHz
Date: 13.MAY.2006 05:19:05

CH11

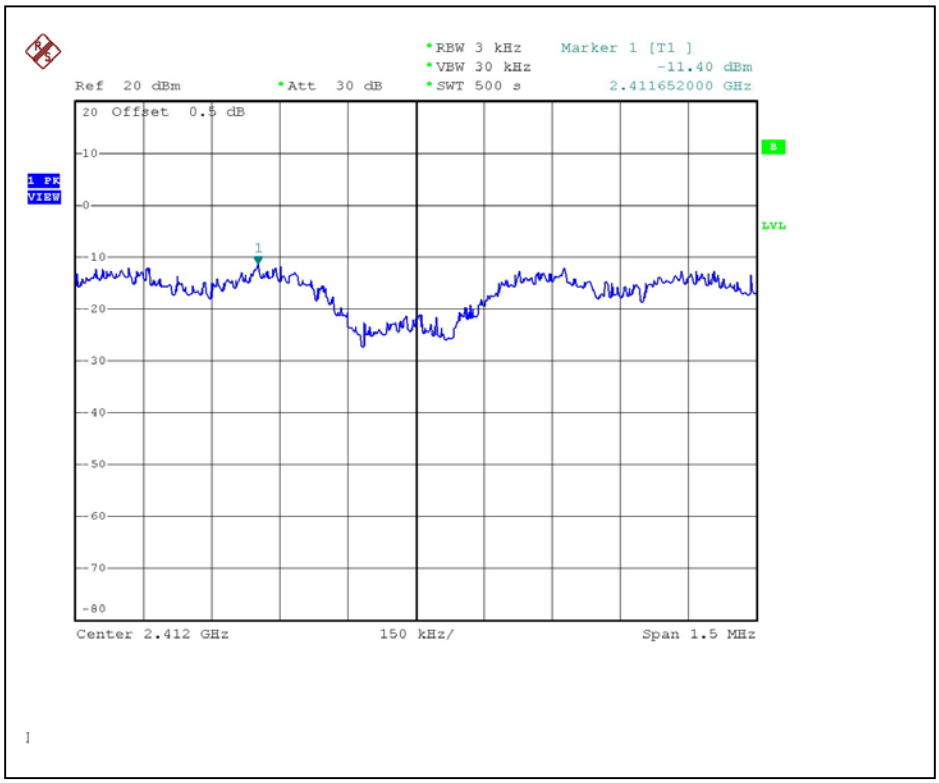

RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-10.98 dBm
2.461337000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.462 GHz
150 kHz/
Span 1.5 MHz

DRAFT 802.11n (20MHz) OFDM MODULATION: DUAL TX:

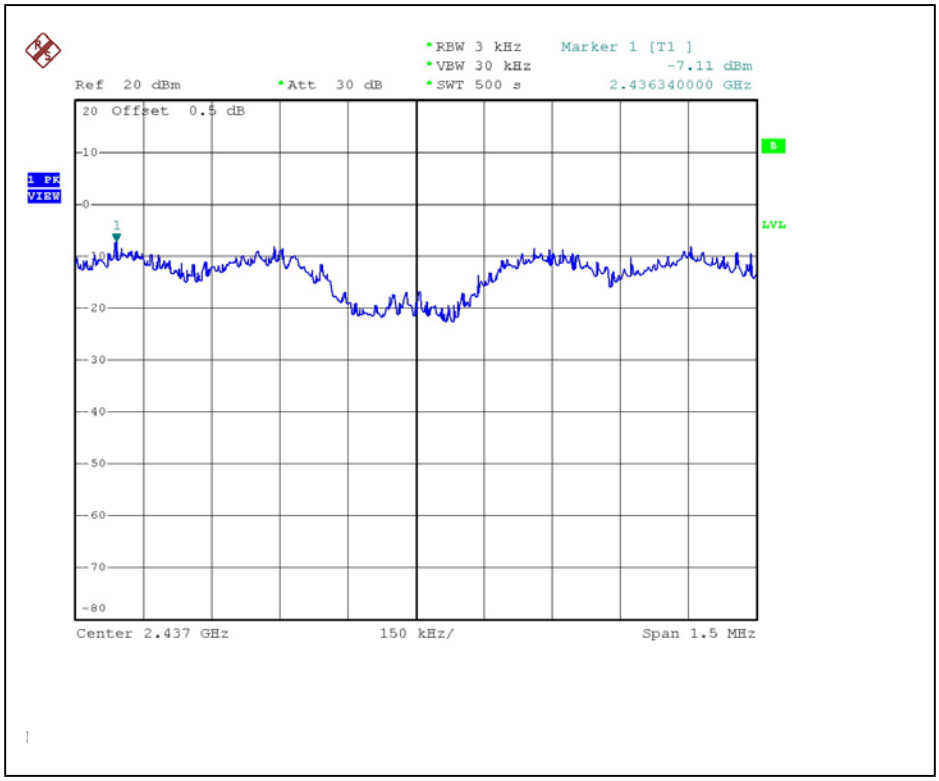
MODULATION TYPE	BPSK	**TRANSFER RATE**	6.5Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	22deg.C, 68%RH, 962hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	-11.40	-11.28	8	PASS
6	2437	-7.11	-7.24	8	PASS
11	2462	-12.70	-10.66	8	PASS

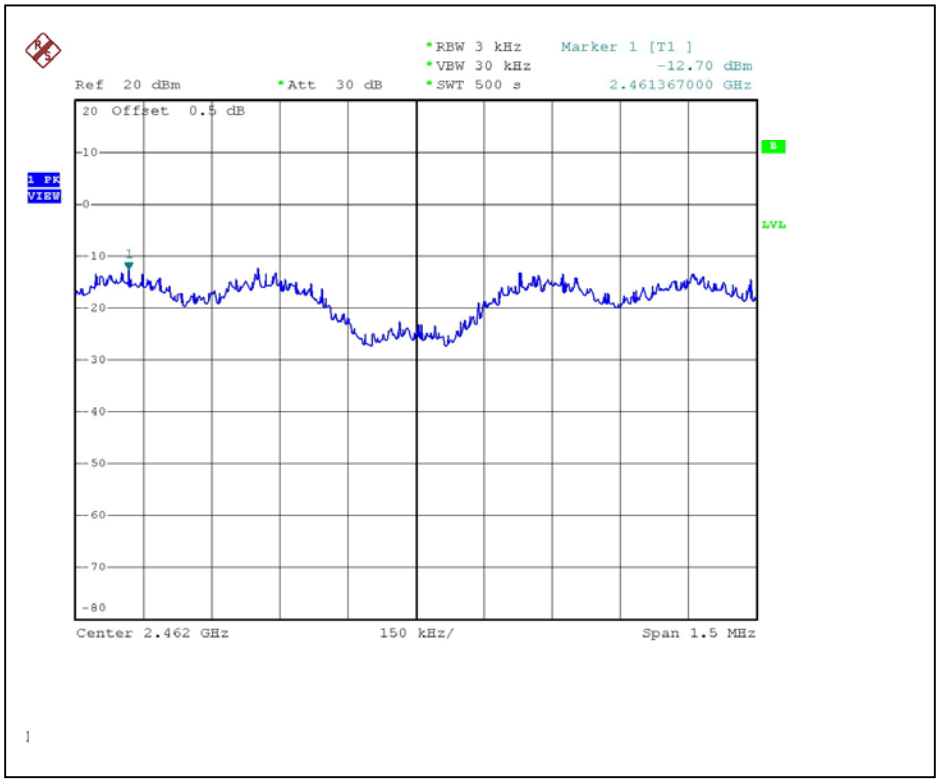
FOR CHAIN 0: CH1



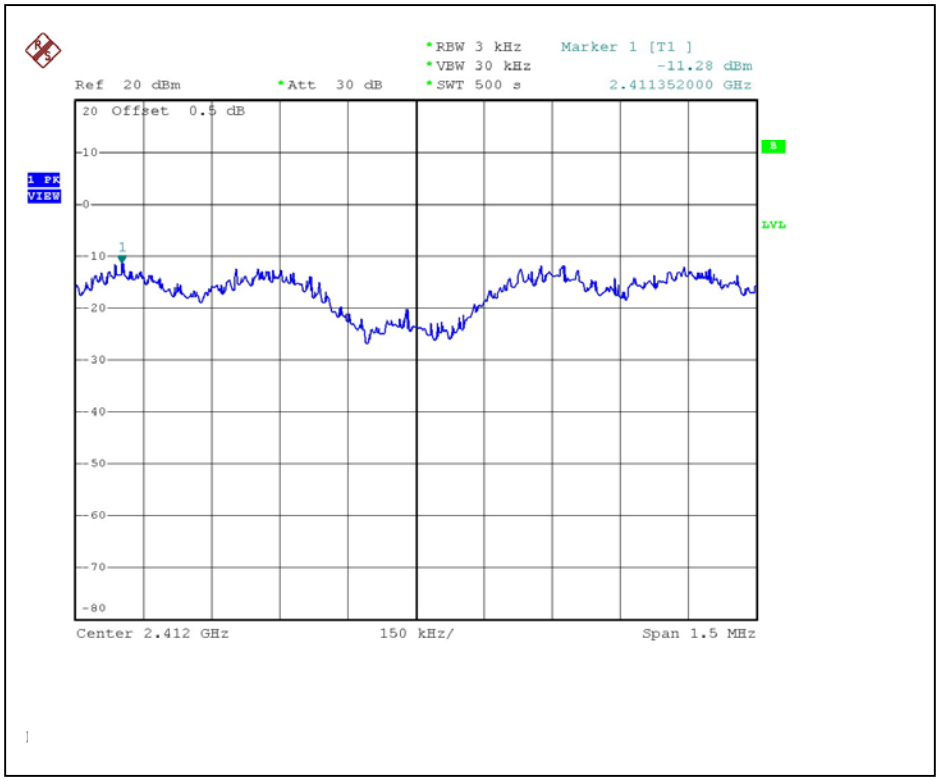
CH6


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-7.11 dBm
2.436340000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.437 GHz
150 kHz/
Span 1.5 MHz

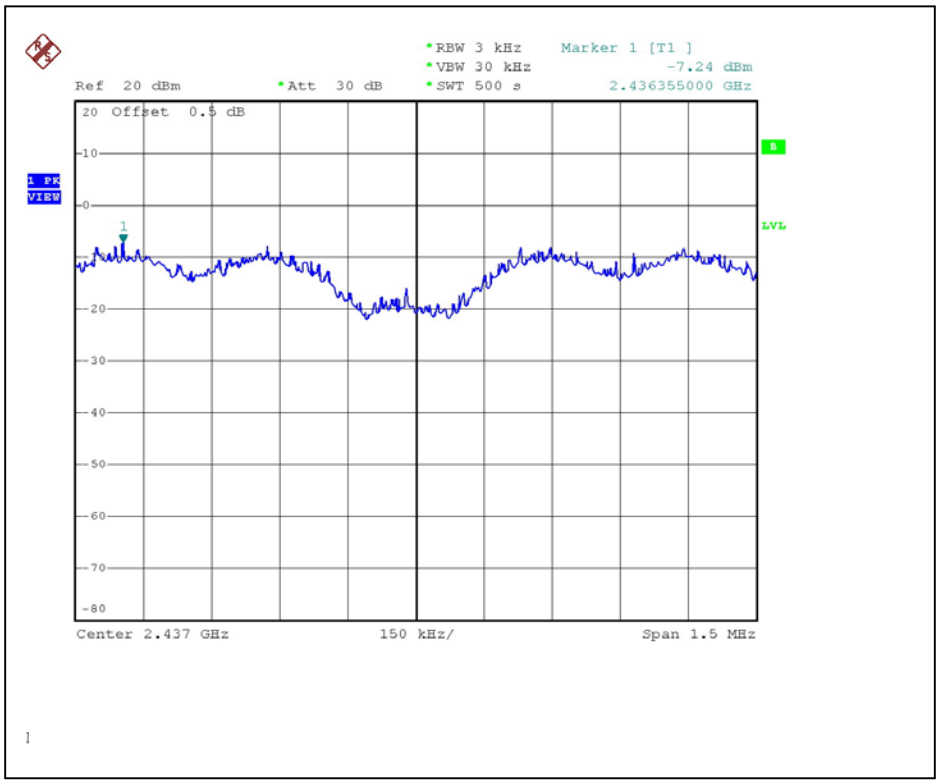
CH11


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-12.70 dBm
2.461367000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK VIEW
B
LVL
Center 2.462 GHz
150 kHz/
Span 1.5 MHz

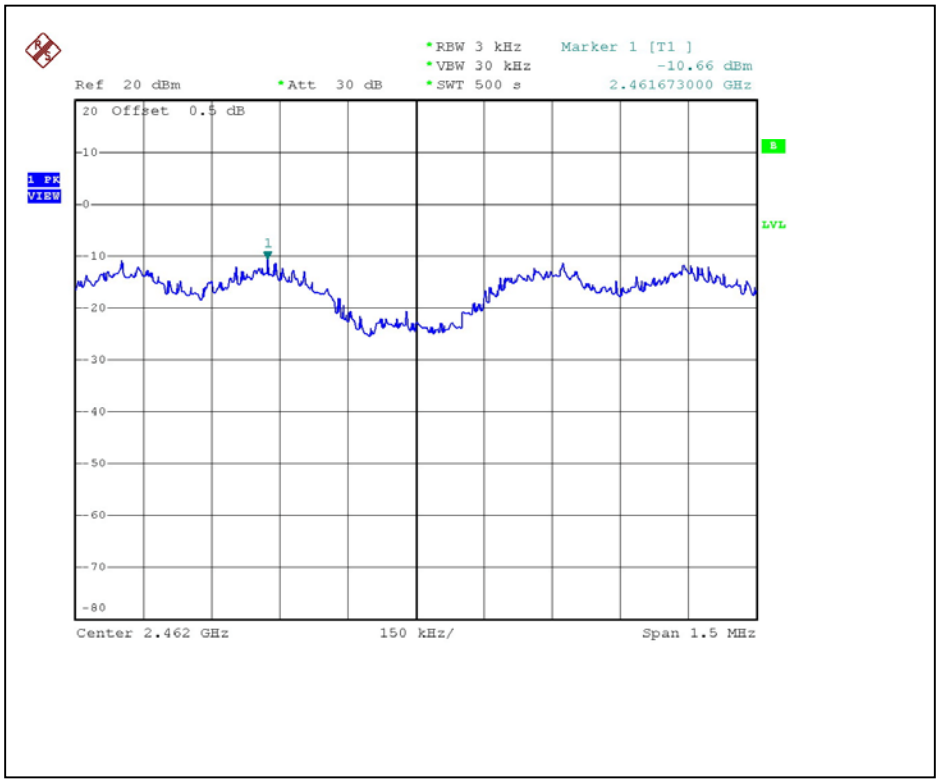
FOR CHAIN 1: CH1



CH6



CH11

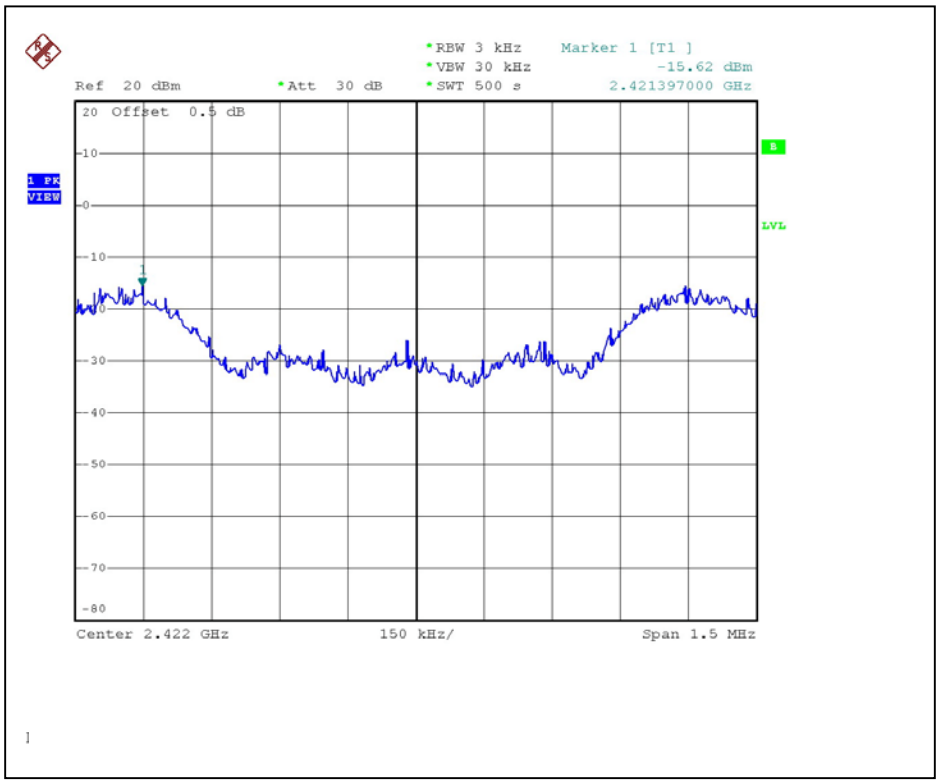

RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-10.66 dBm
2.461673000 GHz
Ref 20 dBm
Att 30 dB
Offset 0.5 dB
1 PK
VIEW
B
LVL
Center 2.462 GHz
150 kHz/
Span 1.5 MHz

DRAFT 802.11n (40MHz) OFDM MODULATION: DUAL TX:

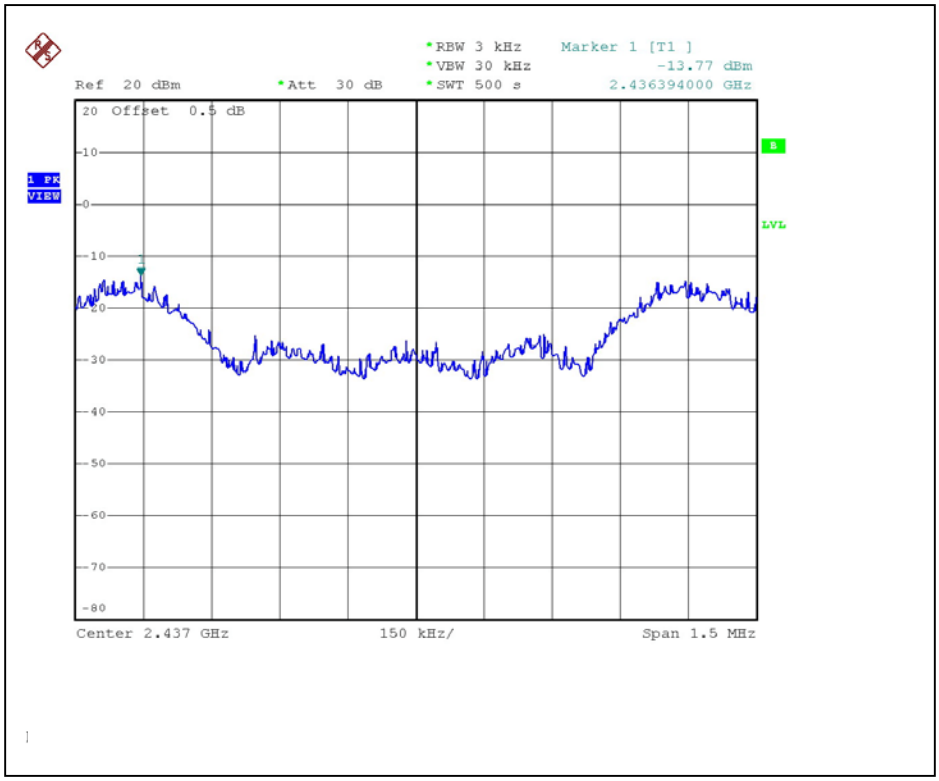
MODULATION TYPE	BPSK	TRANSFER RATE	13.5Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	22deg.C, 68%RH, 962hPa
TESTED BY	Sky Liao		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)		MAXIMUM LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2422	-15.62	-15.65	8	PASS
4	2437	-13.77	-14.59	8	PASS
7	2452	-15.94	-15.84	8	PASS

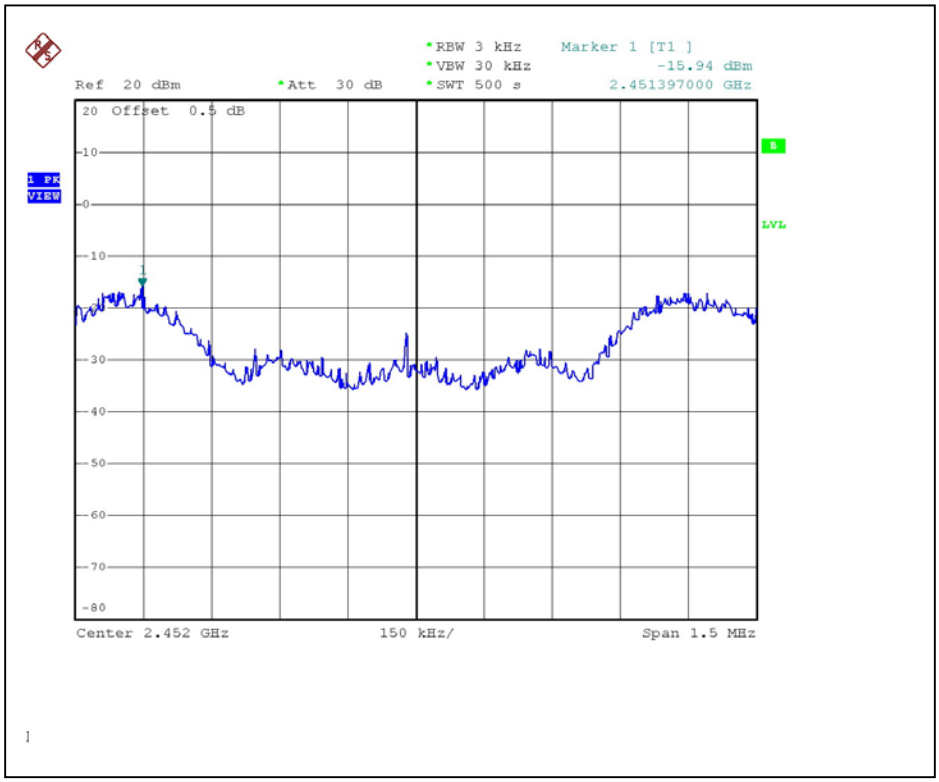
FOR CHAIN 0: CH1



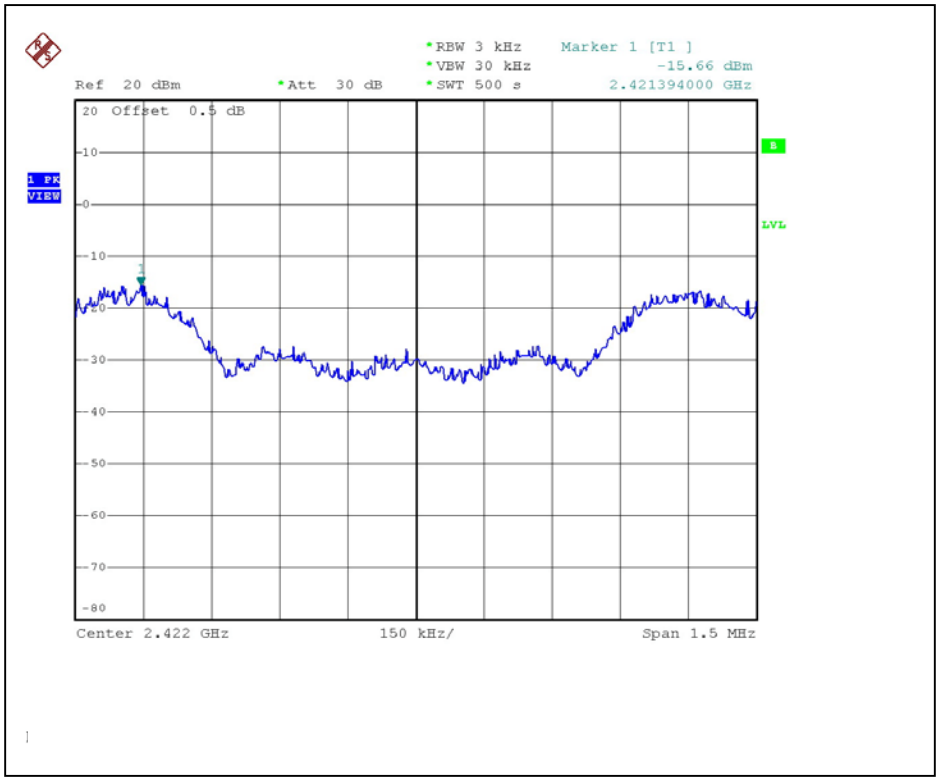
CH4


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-13.77 dBm
2.436394000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK
VIEW
B
LVL
Center 2.437 GHz
150 kHz/
Span 1.5 MHz

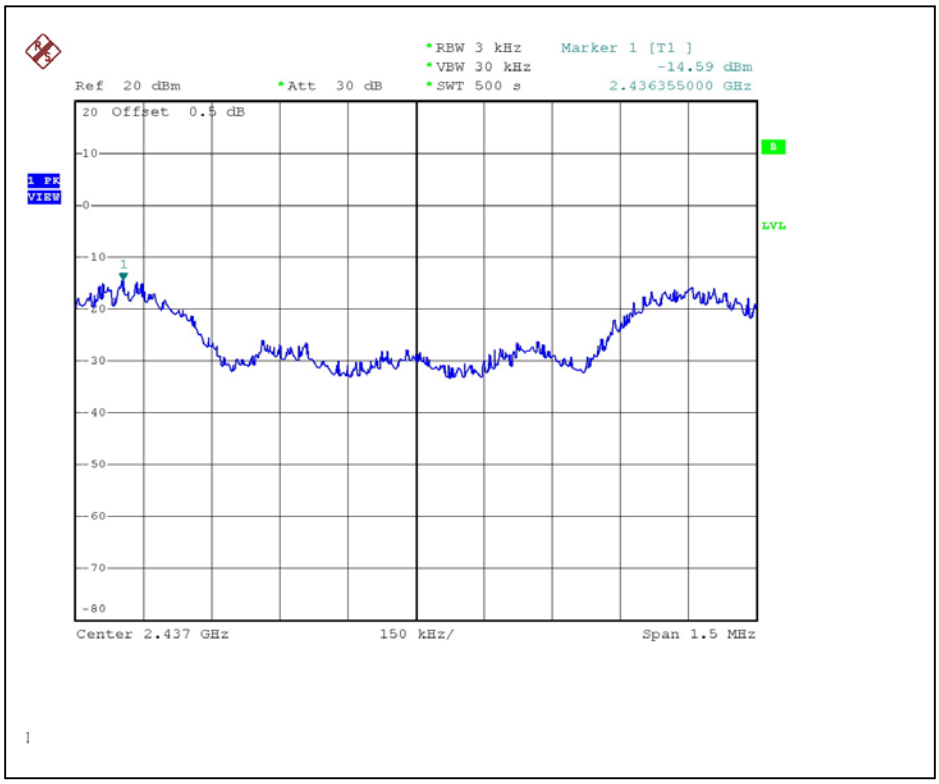
CH7


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-15.94 dBm
2.451397000 GHz
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
1 PK
VIEW
B
LVL
Center 2.452 GHz
150 kHz/
Span 1.5 MHz

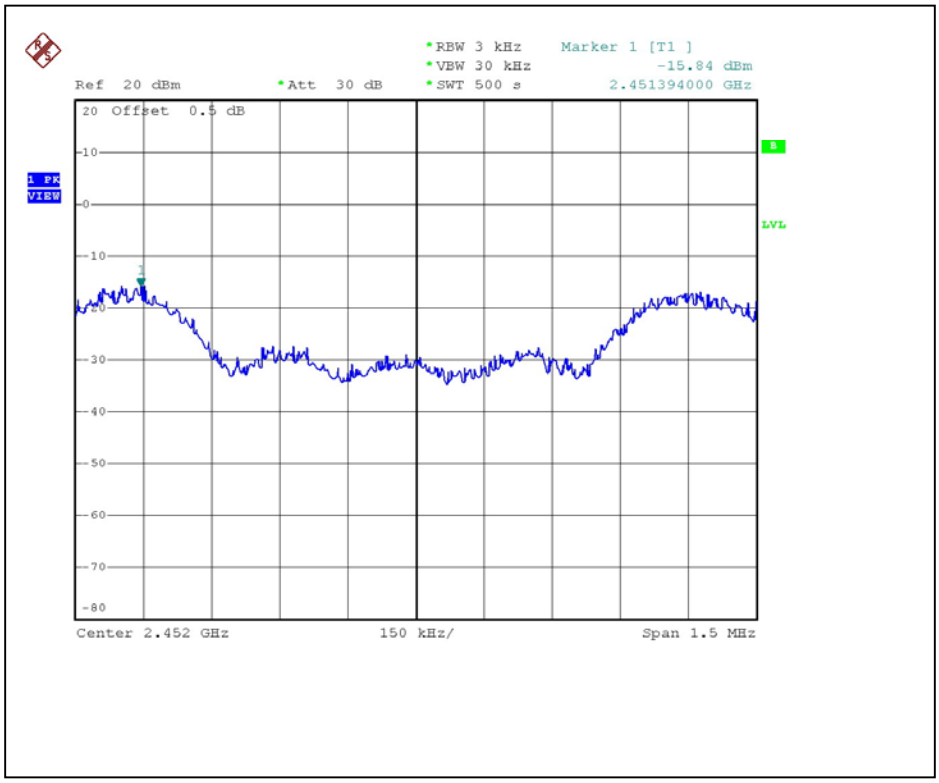
FOR CHAIN 1: CH1



CH4



CH7


RBW 3 kHz
VBW 30 kHz
SWT 500 s
Marker 1 [T1]
-15.84 dBm
2.451394000 GHz
Ref 20 dBm
Att 30 dB
Offset 0.5 dB
1 PK
VIEW
B
LVL
Center 2.452 GHz
150 kHz/
Span 1.5 MHz

4.6 CONDUCTED EMISSION AND BAND EDGES MEASUREMENT

4.6.1 LIMITS OF CONDTCTED EMISSION AND BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100036	Nov. 23, 2006

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
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

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

The spectrum plots (RBW = VBW = 100kHz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

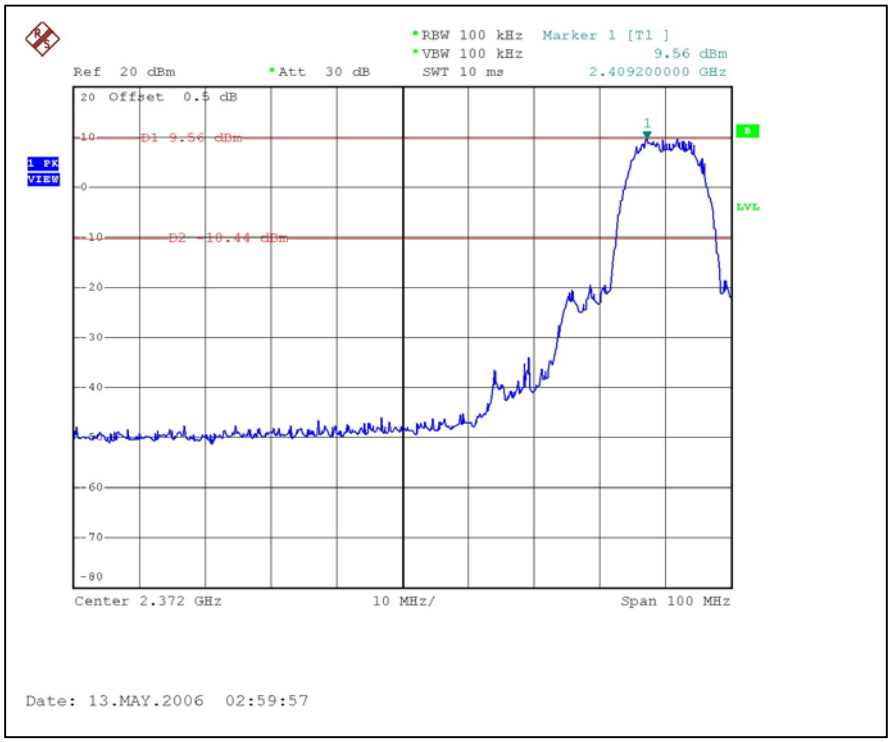
Same as Item 4.3.6

4.6.6 TEST RESULTS

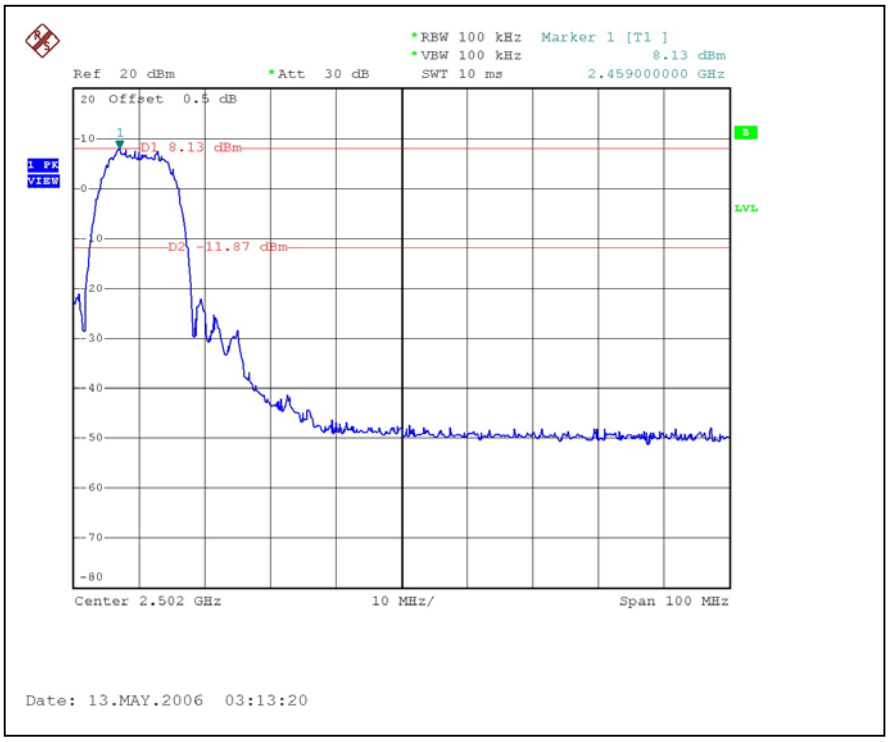
The spectrum plots are attached on the following 12 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

802.11b DSSS MODULATION:

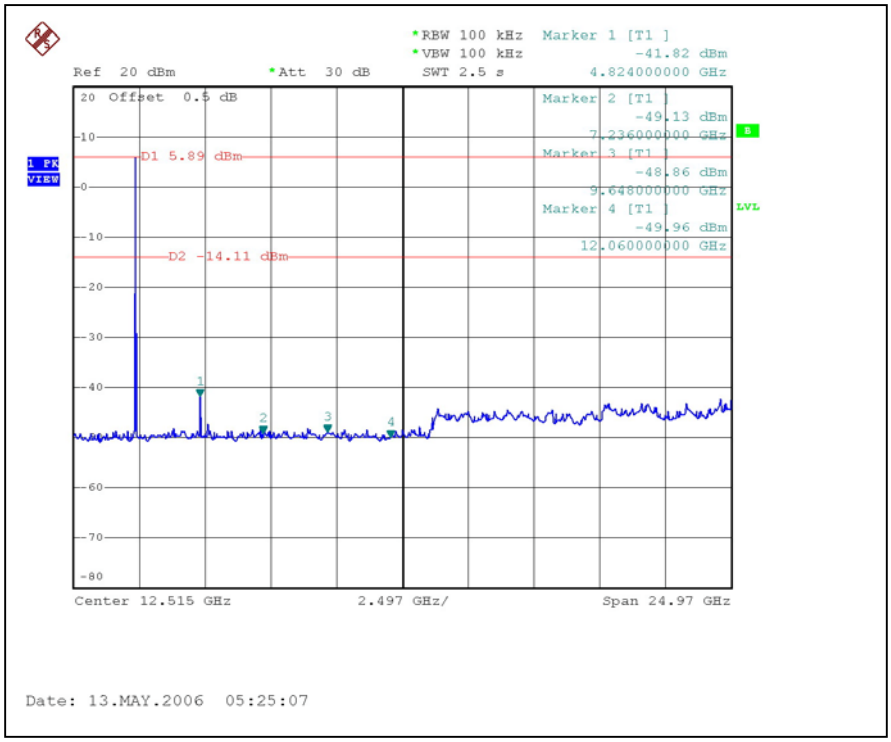
CH1



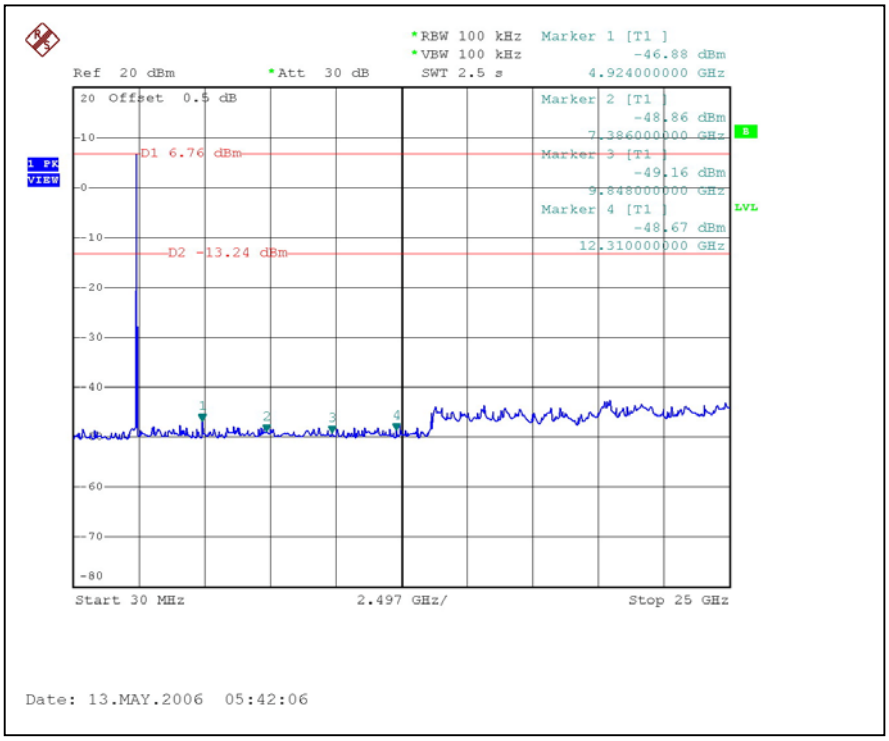
CH11



CH1

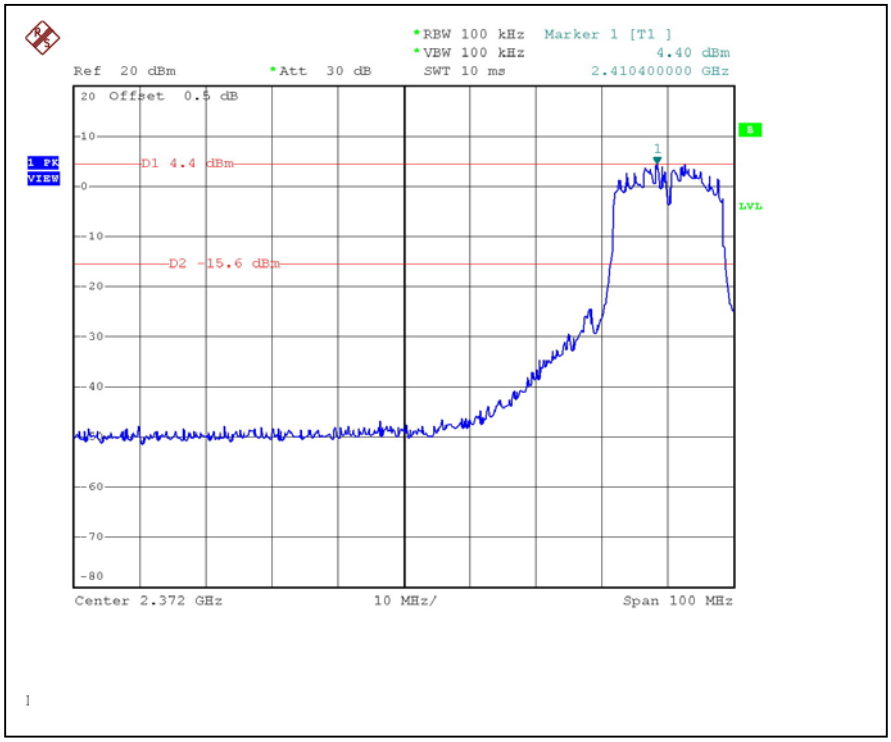

*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 2.5 s
Marker 1 [T1]
-41.82 dBm
4.824000000 GHz
20 Offset 0.5 dB
D1 5.89 dBm
D2 -14.11 dBm
Marker 2 [T1]
-49.13 dBm
7.236000000 GHz
Marker 3 [T1]
-48.86 dBm
9.648000000 GHz
Marker 4 [T1]
-49.96 dBm
12.060000000 GHz
1 PK VIEW
B
LVL
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz
Date: 13.MAY.2006 05:25:07

CH11

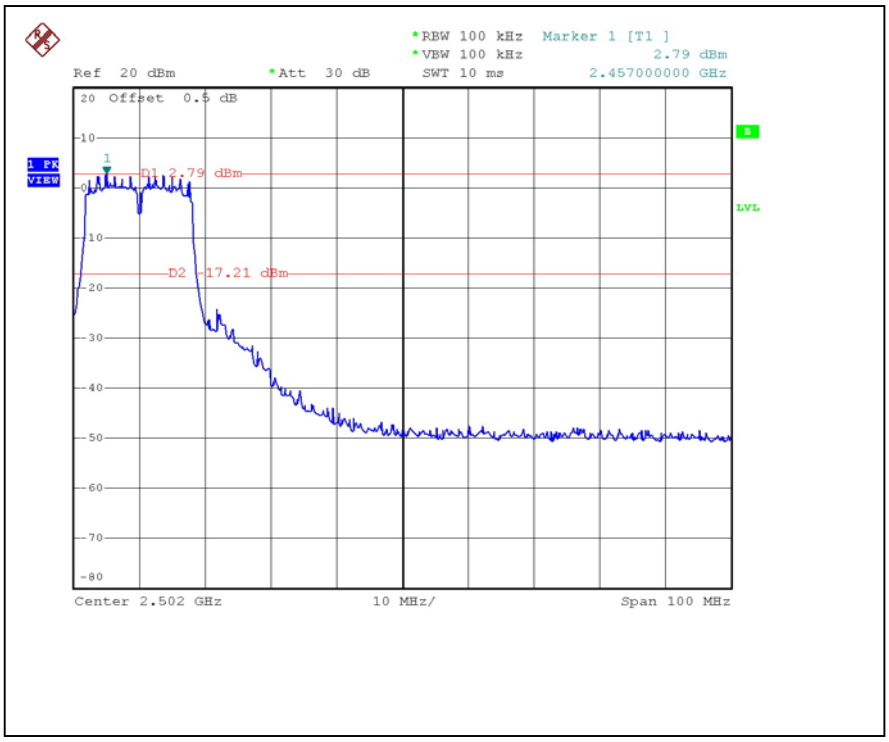

*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 2.5 s
Marker 1 [T1]
-46.88 dBm
4.924000000 GHz
20 Offset 0.5 dB
D1 6.76 dBm
D2 -13.24 dBm
Marker 2 [T1]
-48.86 dBm
7.386000000 GHz
Marker 3 [T1]
-49.16 dBm
9.848000000 GHz
Marker 4 [T1]
-48.67 dBm
12.310000000 GHz
1 PK VIEW
B
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz
Date: 13.MAY.2006 05:42:06

802.11g OFDM MODULATION:

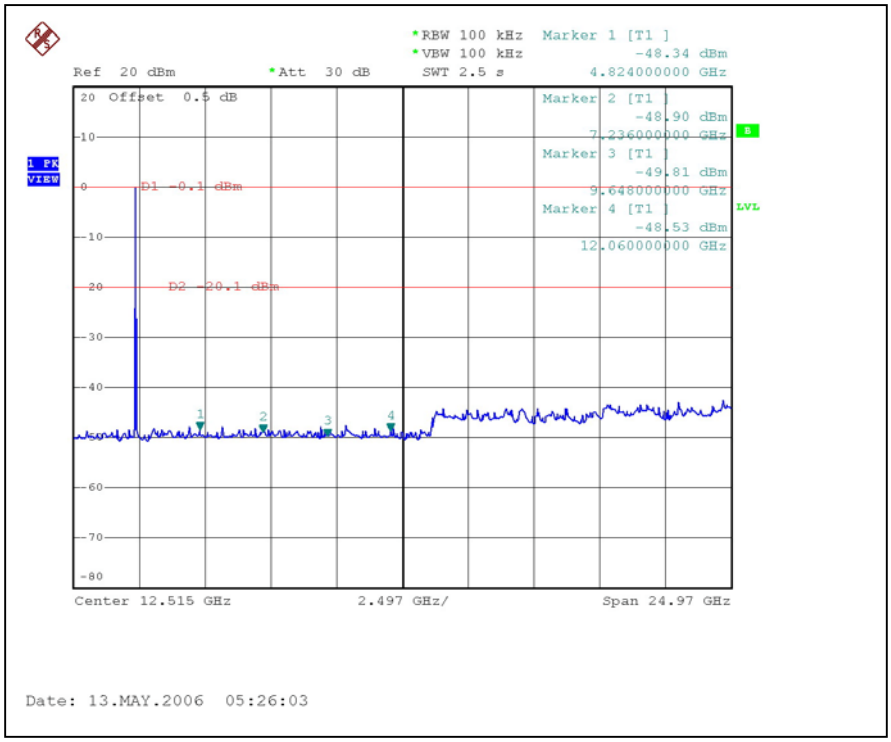
CH1



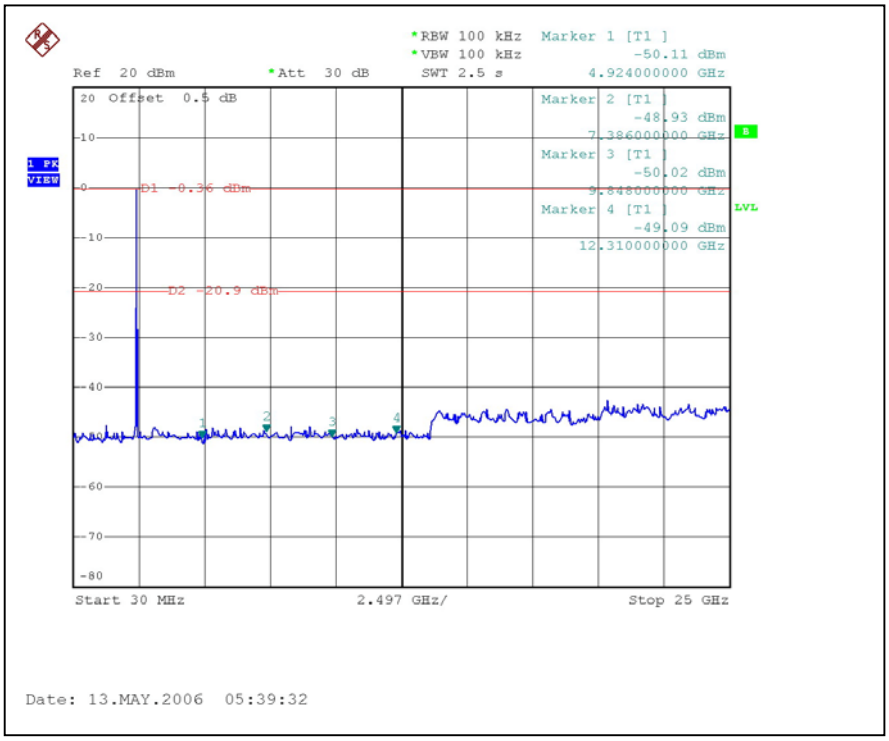
CH11



CH1

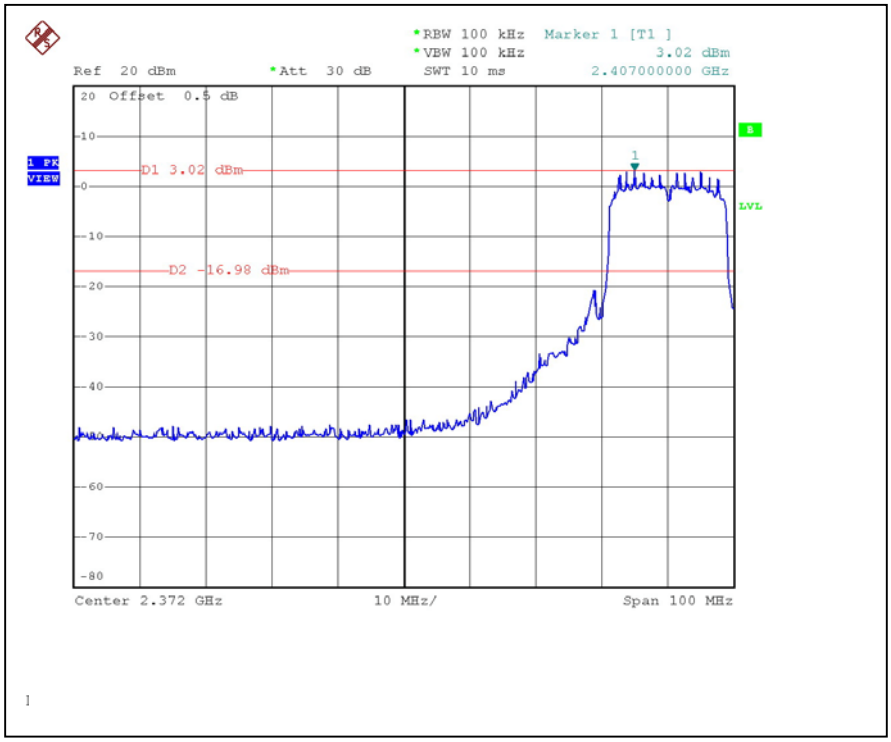

*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 2.5 s
Marker 1 [T1]
-48.34 dBm
4.824000000 GHz
20 Offset 0.5 dB
Marker 2 [T1]
-48.90 dBm
7.236000000 GHz
Marker 3 [T1]
-49.81 dBm
9.648000000 GHz
Marker 4 [T1]
-48.53 dBm
12.060000000 GHz
1 PK VIEW
D1 -0.1 dBm
D2 -20.1 dBm
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz
Date: 13.MAY.2006 05:26:03

CH11

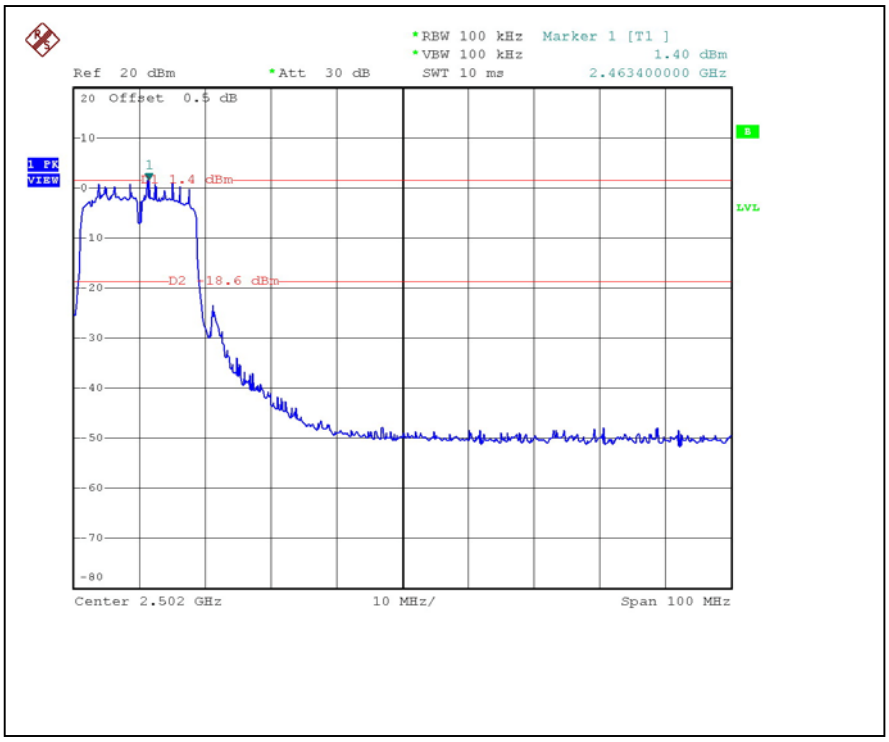

*RBW 100 kHz
*VBW 100 kHz
Ref 20 dBm
*Att 30 dB
SWT 2.5 s
Marker 1 [T1]
-50.11 dBm
4.924000000 GHz
20 Offset 0.5 dB
Marker 2 [T1]
-48.93 dBm
7.386000000 GHz
Marker 3 [T1]
-50.02 dBm
9.848000000 GHz
Marker 4 [T1]
-49.09 dBm
12.310000000 GHz
1 PK VIEW
D1 -0.36 dBm
D2 -20.9 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz
Date: 13.MAY.2006 05:39:32

DRAFT 802.11n (20MHz) OFDM MODULATION: DUAL TX:

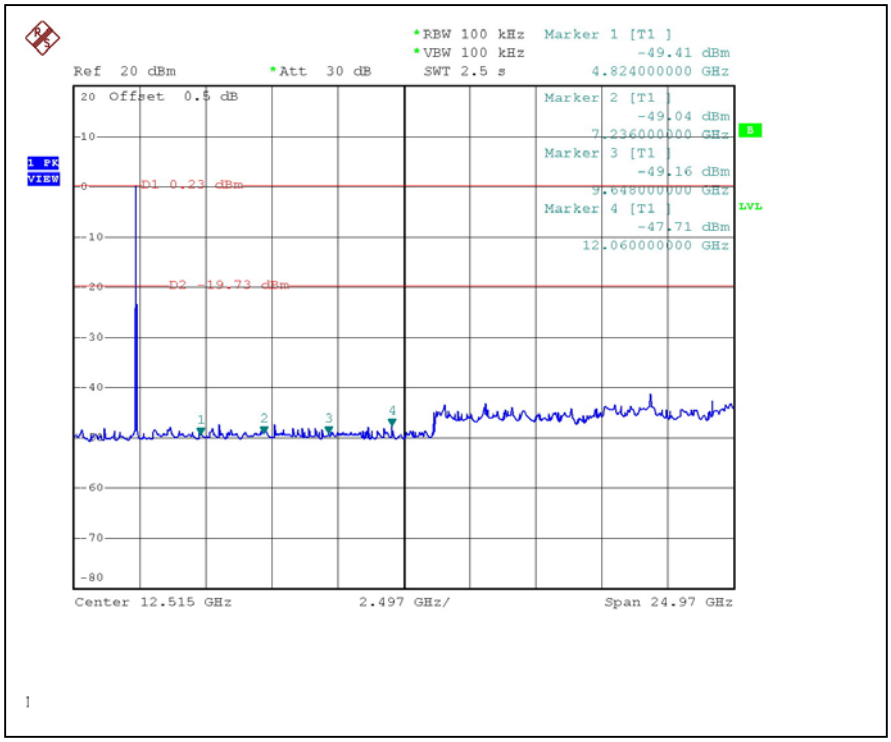
FOR CHAIN 0:CH1



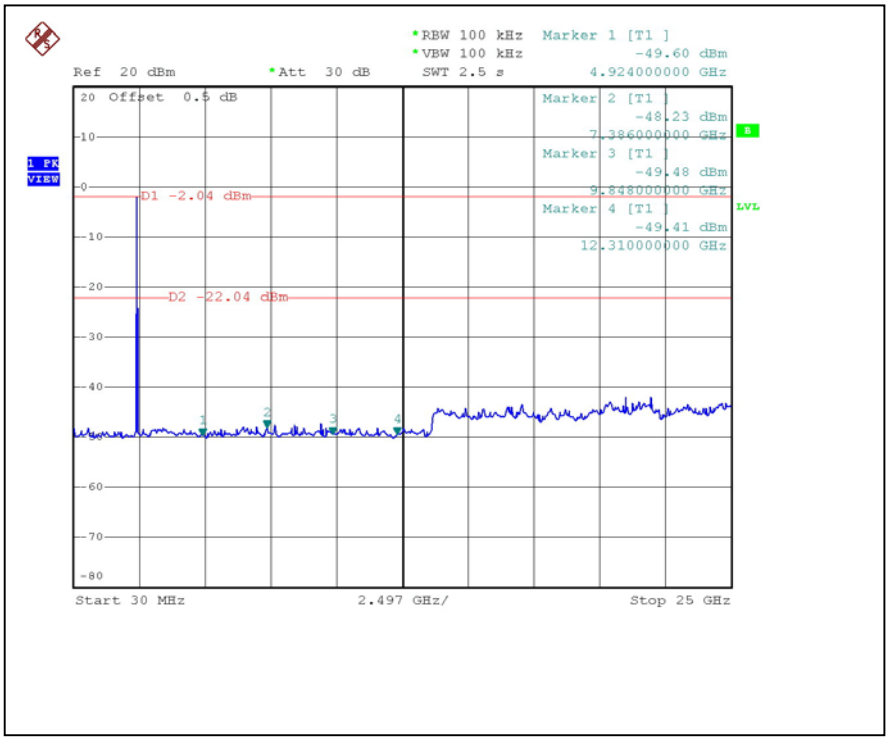
CH11



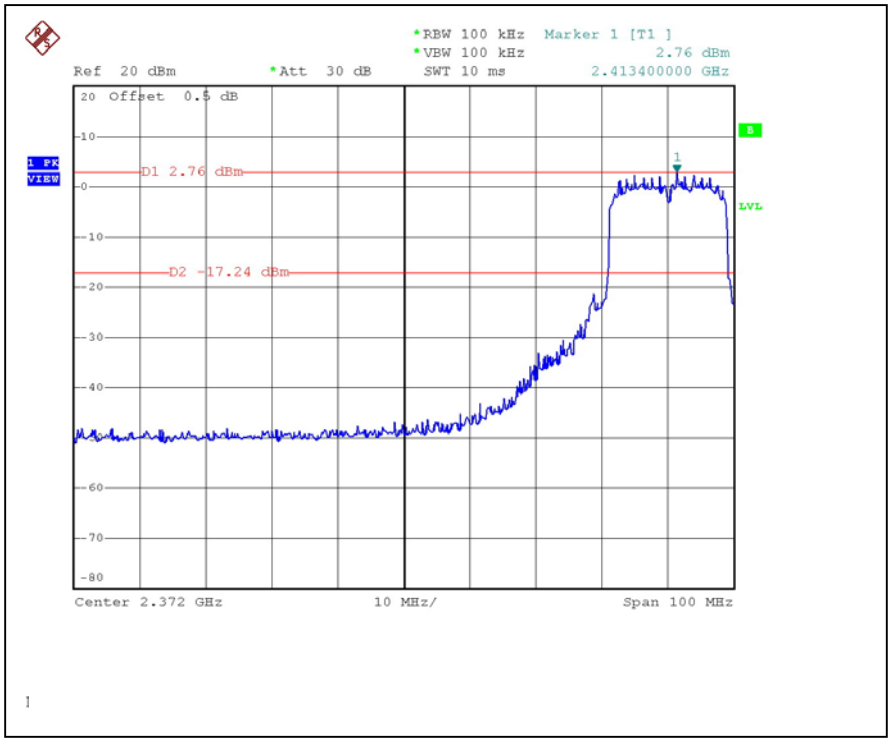
CH1


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.41 dBm
4.824000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-49.04 dBm
7.236000000 GHz
Marker 3 [T1]
-49.16 dBm
9.648000000 GHz
Marker 4 [T1]
-47.71 dBm
12.060000000 GHz
1 PK VIEW
D1 0.23 dBm
D2 -19.73 dBm
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz

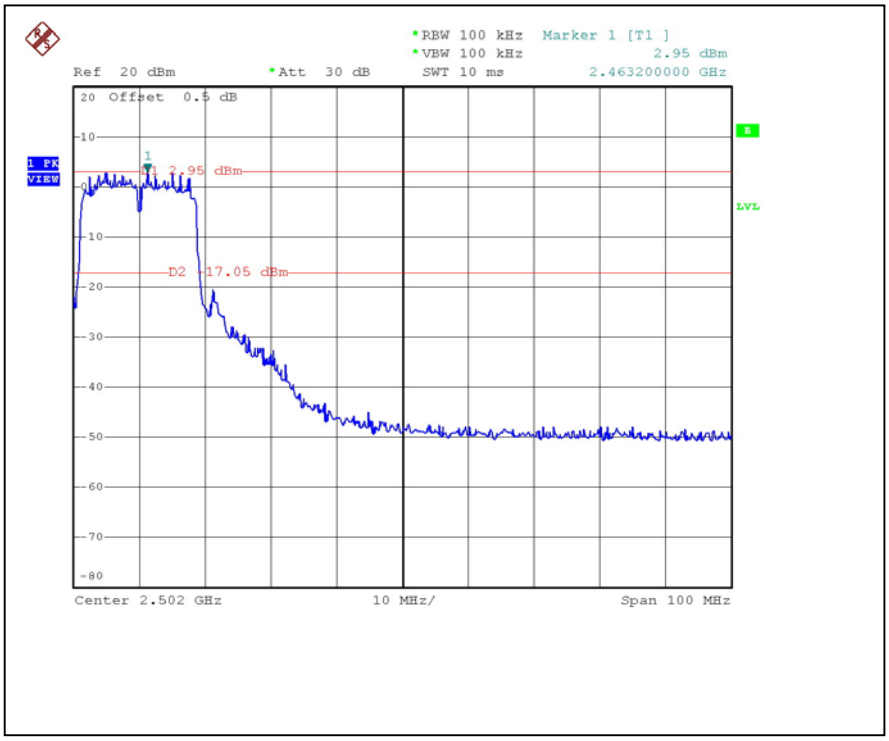
CH11


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.60 dBm
4.924000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-48.23 dBm
7.386000000 GHz
Marker 3 [T1]
-49.48 dBm
9.848000000 GHz
Marker 4 [T1]
-49.41 dBm
12.310000000 GHz
1 PK VIEW
D1 -2.04 dBm
D2 -22.04 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

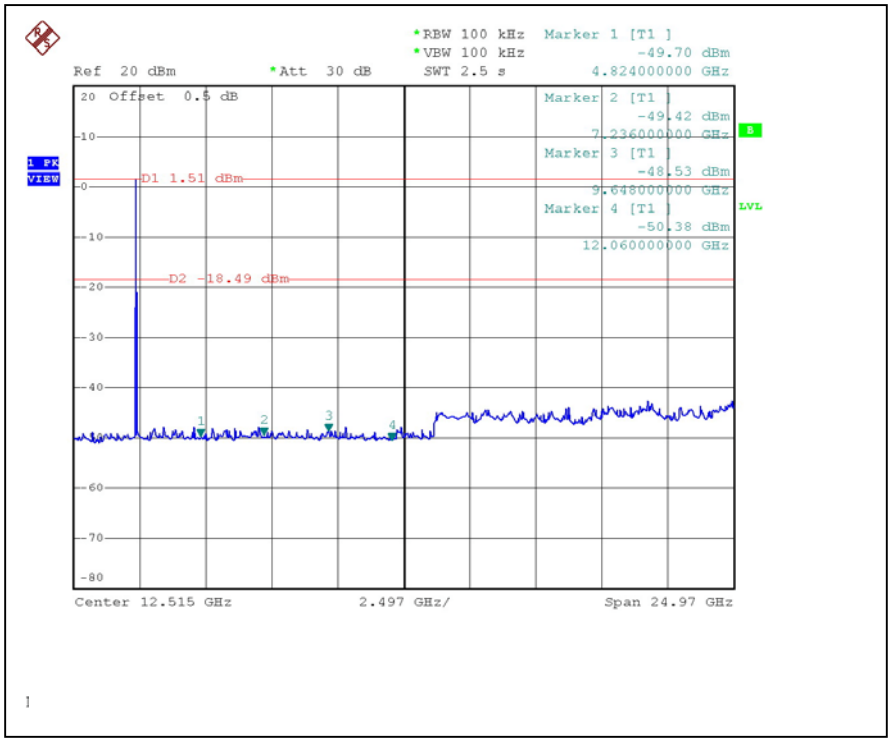
FOR CHAIN 1:CH1



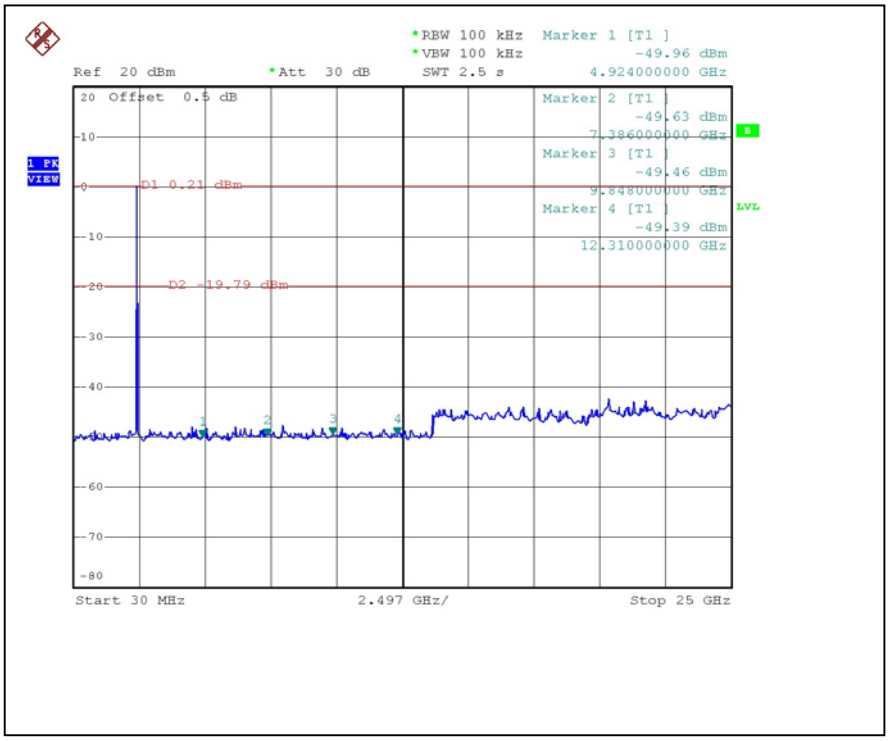
CH11



CH1

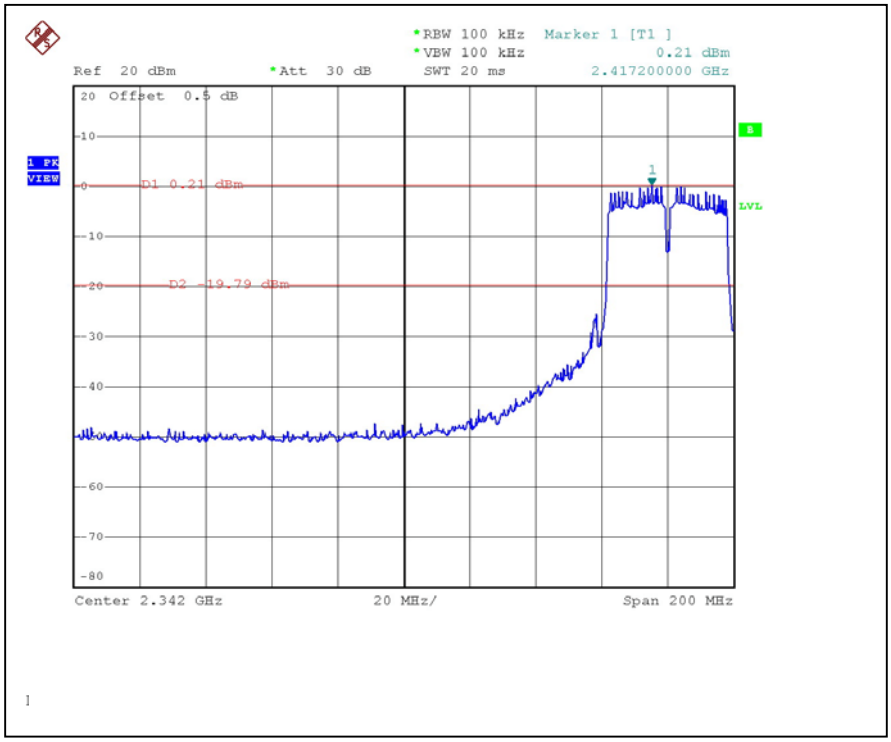

*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.70 dBm
4.824000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-49.42 dBm
7.236000000 GHz
Marker 3 [T1]
-48.53 dBm
9.648000000 GHz
Marker 4 [T1]
-50.38 dBm
12.060000000 GHz
1 PK
VIEW
D1 1.51 dBm
D2 -18.49 dBm
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz

CH11

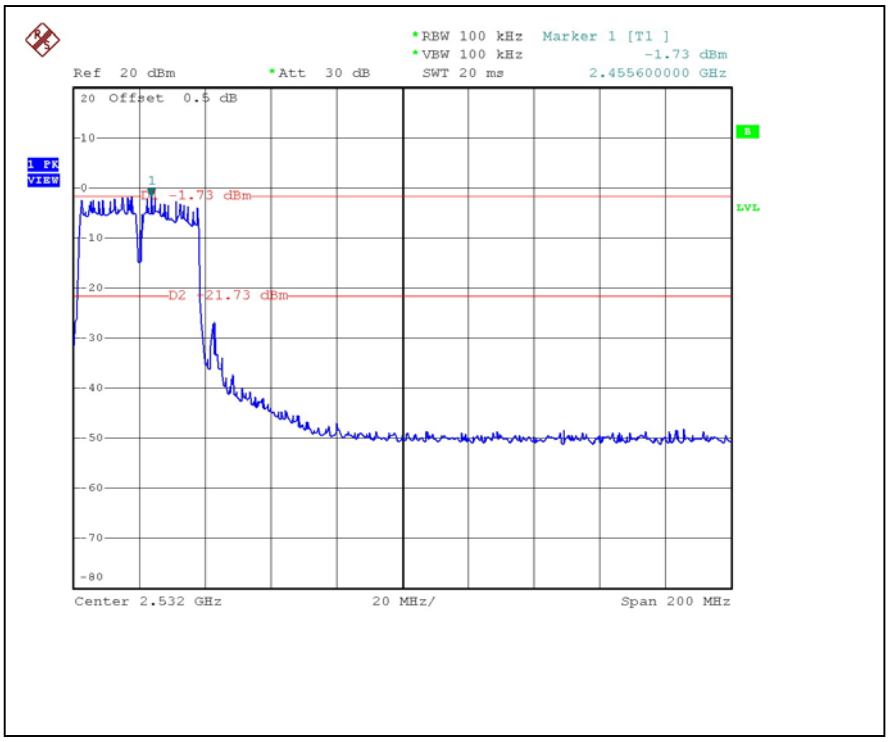

*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.96 dBm
4.924000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-49.63 dBm
7.386000000 GHz
Marker 3 [T1]
-49.46 dBm
9.848000000 GHz
Marker 4 [T1]
-49.39 dBm
12.310000000 GHz
1 PK
VIEW
D1 0.21 dBm
D2 -19.79 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

DRAFT 802.11n (40MHz) OFDM MODULATION: DUAL TX:

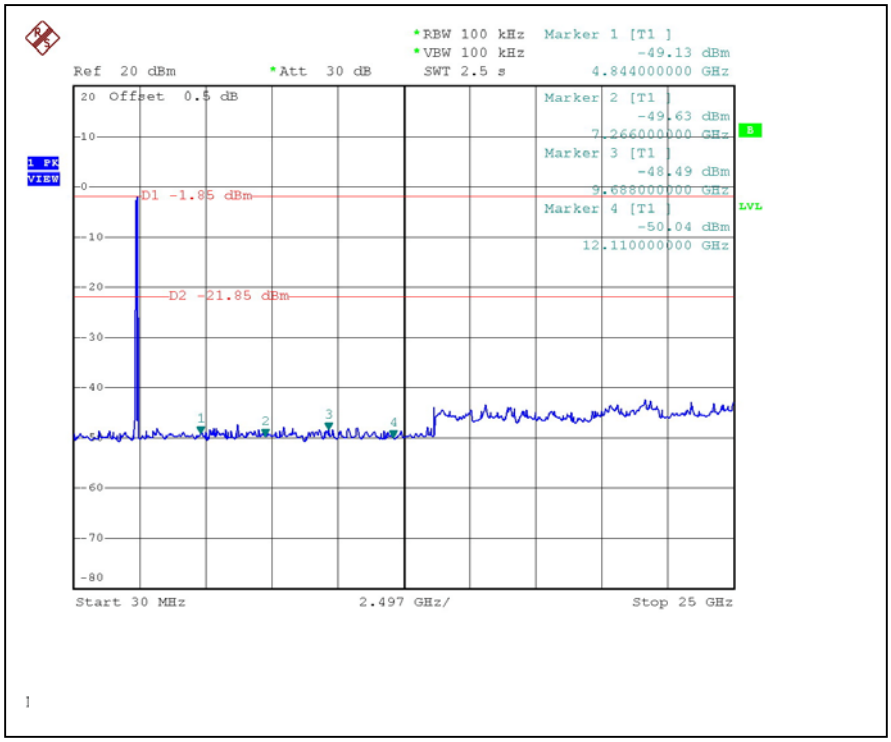
FOR CHAIN 0:CH1



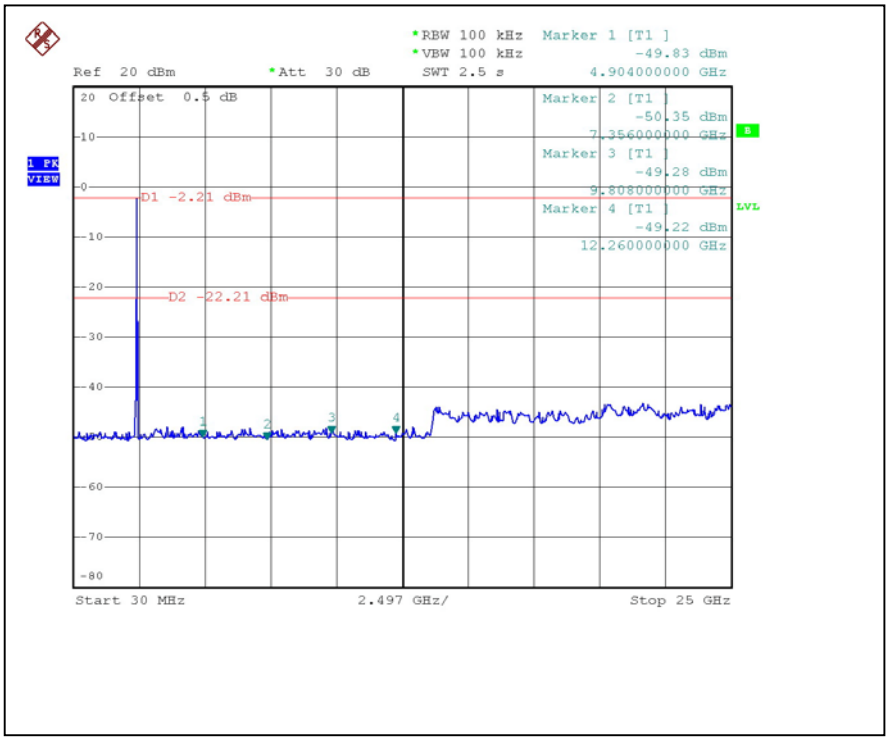
CH7



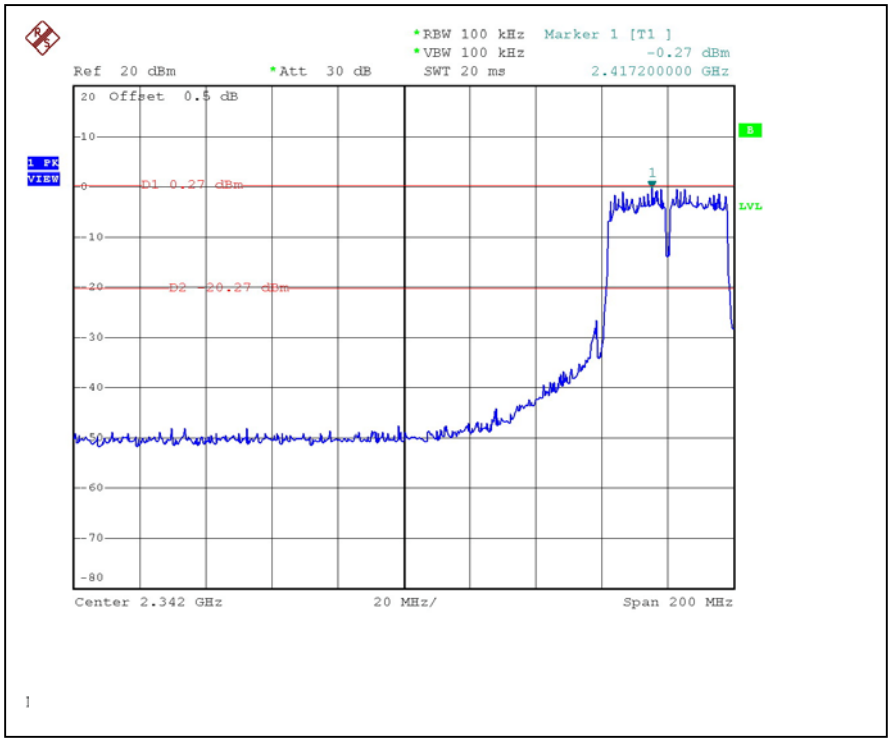
CH1


RBW 100 kHz
VBW 100 kHz
SWT 2.5 s
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
Marker 1 [T1]
-49.13 dBm
4.844000000 GHz
Marker 2 [T1]
-49.63 dBm
7.266000000 GHz
Marker 3 [T1]
-48.49 dBm
9.688000000 GHz
Marker 4 [T1]
-50.04 dBm
12.110000000 GHz
D1 -1.85 dBm
D2 -21.85 dBm
1 PK VIEW
B
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz

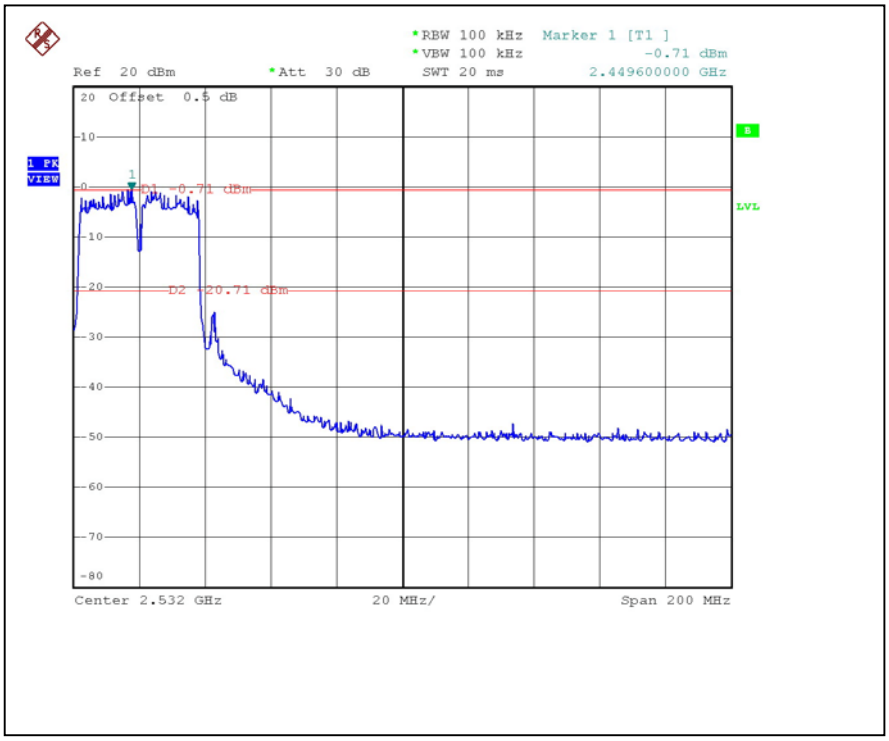
CH7


RBW 100 kHz
VBW 100 kHz
SWT 2.5 s
Ref 20 dBm
Att 30 dB
20 Offset 0.5 dB
Marker 1 [T1]
-49.83 dBm
4.904000000 GHz
Marker 2 [T1]
-50.35 dBm
7.356000000 GHz
Marker 3 [T1]
-49.28 dBm
9.808000000 GHz
Marker 4 [T1]
-49.22 dBm
12.260000000 GHz
D1 -2.21 dBm
D2 -22.21 dBm
1 PK VIEW
B
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz

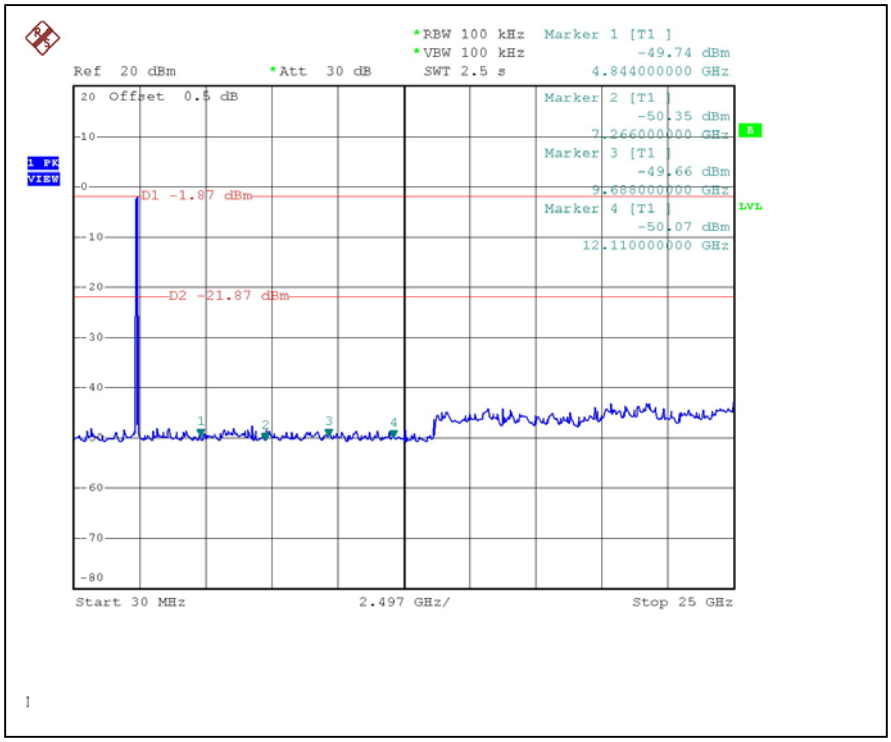
FOR CHAIN 1:CH1



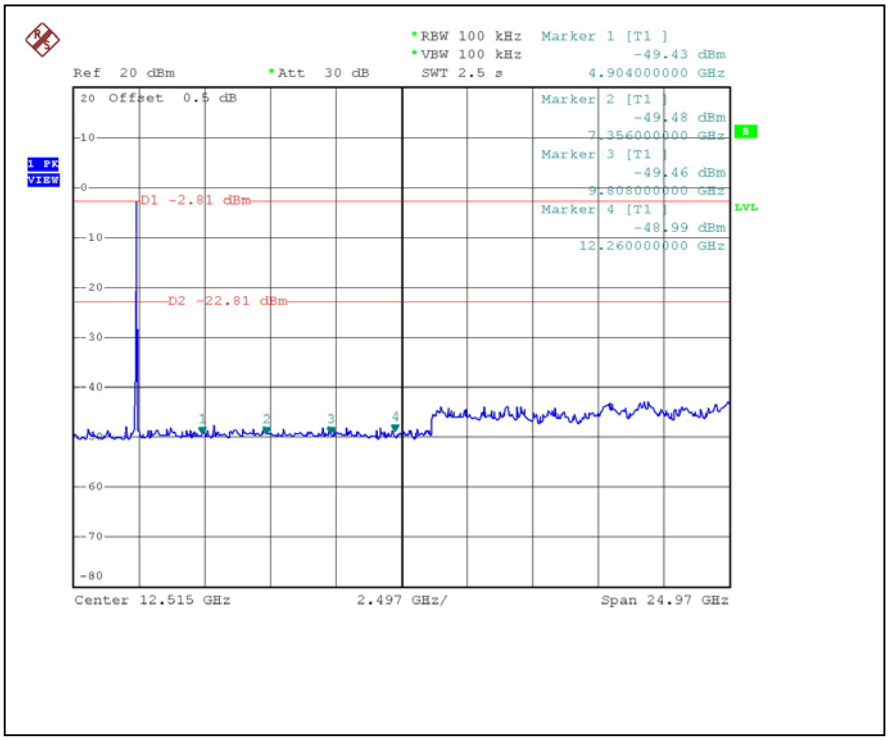
CH7



CH1


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.74 dBm
4.844000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-50.35 dBm
7.266000000 GHz
Marker 3 [T1]
-49.66 dBm
9.688000000 GHz
Marker 4 [T1]
-50.07 dBm
12.110000000 GHz
1 PK VIEW
D1 -1.87 dBm
D2 -21.87 dBm
Start 30 MHz
2.497 GHz/
Stop 25 GHz

CH7


*RBW 100 kHz
*VBW 100 kHz
SWT 2.5 s
Marker 1 [T1]
-49.43 dBm
4.904000000 GHz
Ref 20 dBm
*Att 30 dB
20 Offset 0.5 dB
Marker 2 [T1]
-49.48 dBm
7.356000000 GHz
Marker 3 [T1]
-49.46 dBm
9.808000000 GHz
Marker 4 [T1]
-48.99 dBm
12.260000000 GHz
1 PK VIEW
D1 -2.81 dBm
D2 -22.81 dBm
Center 12.515 GHz
2.497 GHz/
Span 24.97 GHz

4.7 ANTENNA REQUIREMENT

4.7.1 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 15.247 (b), 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is printed antenna without connector. The maximum Gain of the antenna is 1.8dBi.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

6. 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, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , 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.

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.