TESTING
No. L2264

EN300 328
Test Report

Product Name	Embedded WiFi module
Model	HF-A11x
Client	Hi-flying Electronics Technology Co.,Ltd.

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Product Name	Embedded WiFi module	**Model**	HF-A11x
Report No.	RZA1202-0233RF02R1		
Client	Hi-flying Electronics Technology Co.,Ltd.		
Manufacturer	Hi-flying Electronics Technology Co.,Ltd.		
Reference Standard(s)	**ETSI EN300 328 V1.7.1 (2006-10**）Electromagnetic compatibility and Radio spectrum Matters (ERM);Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive		
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 2 of this test report are below limits specified in the relevant standards. General Judgment: Pass (Stamp) **Date of issue: March 14th, 2012**		
Comment	The test result only responds to the measured sample.		

Approved by 杨伟中 Director **Revised by** 徐凯 RF Manager **Performed by** RF Engineer

TABLE OF CONTENT

1. Competence and Warranties

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

If the electrical report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing laboratory

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Yang Weizhong
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	yangweizhong@ta-shanghai.com

1.3. Applicant Information

Company:	Hi-flying Electronics Technology Co.,Ltd.
Address:	Room B101,456 Bibo Road Pudong,SHANGHAI
City:	SHANGHAI
Postal Code:	/
Country:	CHINA
Contact:	SEN XIE
Telephone:	021-33908861-8017
Fax:	021-33908861-8004

1.4. Manufacturer Information

Company:	Hi-flying Electronics Technology Co.,Ltd.
Address:	Room B101,456 Bibo Road Pudong,SHANGHAI
City:	SHANGHAI
Postal Code:	/
Country:	CHINA
Telephone:	021-33908861-8017
Fax:	021-33908861-8004

1.5. Information of EUT

General information

Device Type:	Portable Device
Product Name:	Embedded WiFi module
IMEI:	/
Hardware Version:	V3.1
Software Version:	V3.1
Antenna Type:	Internal Antenna
Device operating configurations:	
Supporting Function:	802.11b, 802.11g, 802.11n(HT20) , 802.11n(HT40); (tested)
Power Supply:	DC Power
Rated Power Supply Voltage:	3.3 V
Extreme Voltage:	Minimum: 3.135 V Maximum: 3.465 V
Extreme Temperature:	Lowest: -10℃ Highest: +70℃
Operating Frequency Range(s)	2400 ~ 2483.5 MHz

Equipment Under Test (EUT) is Embedded WiFi module. The EUT supports WiFi function.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from March 5, 2012 to March 8, 2012.

2. Test Information

2.1. Summary of measurement results

Number	Summary of measurement results	Verdict
1	Maximum E.I.R.P. Transmit Power	PASS
2	Maximum E.I.R.P. Spectral Density	PASS
3	Frequency Range	PASS
4	Medium Access Protocol	PASS
5	Transmitter Spurious Emissions	PASS
6	Receiver Spurious Emissions	PASS

2.2. Maximum E.I.R.P. Transmit Power

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

This measurement shall be preformed at normal and extreme test conditions.
The test procedure shall be as follows:

Step 1:

- using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
- The output of the diode detector shall be connected to the vertical channel of an oscilloscope;
- The combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal;
- The observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, (0 < x < 1)and recorded.

Step 2:

- The average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- The e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:

- P = A + G + 10 log (1/x);

The measurement shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.

Limit

Limits	≦20 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 2. U= 1.19 dB

Test Results

Conducted Power- 802.11b

Data Rate (Mbit/s)	Test Condition	Average Conducted Power (dBm)		
		CH1	CH7	CH13
1	Tnom=25℃,Vnom=3.3V	15.65	15.62	15.32
	Tmax=55℃,Vmax= 3.465V	15.66	15.62	15.36
	Tmax=55℃,Vmin= 3.135V	**15.67**	**15.63**	**15.31**
	Tmin=-20℃,Vmax= 3.465V	15.61	15.67	15.34
	Tmin=-20℃,Vmin= 3.135V	15.62	15.61	15.33
2	Tnom=25℃,Vnom=3.3V	15.54	15.54	15.23
5.5	Tnom=25℃,Vnom=3.3V	15.45	15.48	15.14
11	Tnom=25℃,Vnom=3.3V	15.43	15.45	14.95

Note: 1.The following testing items should be tested at the data rate with the maximum output power.
2. The maximum output power values are marked in bold.

Conducted Power- 802.11g

Data Rate (Mbit/s)	Test Condition	Average Conducted Power (dBm)		
		CH1	CH7	CH13
6	Tnom=25℃,Vnom=3.3V	**11.98**	**12.09**	**12.15**
	Tmax=55℃,Vmax= 3.465V	12.05	12.07	12.11
	Tmax=55℃,Vmin= 3.135V	11.89	12.06	12.12
	Tmin=-20℃,Vmax= 3.465V	11.97	12.04	12.13
	Tmin=-20℃,Vmin= 3.135V	11.96	12.05	12.14
9	Tnom=25℃,Vnom=3.3V	11.87	12.05	12.15
12	Tnom=25℃,Vnom=3.3V	11.78	11.98	11.95
18	Tnom=25℃,Vnom=3.3V	11.75	11.86	11.94
24	Tnom=25℃,Vnom=3.3V	11.54	11.79	11.78
36	Tnom=25℃,Vnom=3.3V	11.37	11.68	11.67
48	Tnom=25℃,Vnom=3.3V	11.65	11.62	11.64
54	Tnom=25℃,Vnom=3.3V	11.45	11.56	11.58

Note:1.The following testing items should be tested at the data rate with the maximum output power.
2. The maximum output power values are marked in bold.

Conducted Power- 802.11n HT20

Data Rate	Test Condition	Average Conducted Power (dBm)		
		CH1	CH7	CH13
MCS0	Tnom=25℃,Vnom=3.3V	11.53	11.71	11.62
	Tmax=55℃,Vmax= 3.465V	11.54	11.72	11.61
	Tmax=55℃,Vmin= 3.135V	11.55	11.73	11.63
	Tmin=-20℃,Vmax= 3.465V	11.57	11.74	11.64
	Tmin=-20℃,Vmin= 3.135V	**11.55**	**11.75**	**11.69**
MCS1	Tnom=25℃,Vnom=3.3V	11.45	11.68	11.58
MCS2	Tnom=25℃,Vnom=3.3V	11.43	11.65	11.65
MCS3	Tnom=25℃,Vnom=3.3V	11.52	11.64	11.68
MCS4	Tnom=25℃,Vnom=3.3V	11.36	11.54	11.54
MCS5	Tnom=25℃,Vnom=3.3V	11.18	11.46	11.44
MCS6	Tnom=25℃,Vnom=3.3V	11.25	11.39	11.42
MCS7	Tnom=25℃,Vnom=3.3V	11.27	11.46	11.38

Note:1.The following testing items should be tested at the data rate with the maximum output power.
The maximum output power values are marked in bold.

Conducted Power- 802.11n HT40

Data Rate	Test Condition	Average Conducted Power (dBm)		
		CH3	CH7	CH11
MCS0	Tnom=25℃,Vnom=3.3V	12.13	12.23	11.95
	Tmax=55℃,Vmax= 3.465V	**12.12**	**12.27**	**11.97**
	Tmax=55℃,Vmin= 3.135V	12.14	12.24	11.98
	Tmin=-20℃,Vmax= 3.465V	12.16	12.25	11.96
	Tmin=-20℃,Vmin= 3.135V	12.11	12.24	11.94
MCS1	Tnom=25℃,Vnom=3.3V	11.97	11.87	11.87
MCS2	Tnom=25℃,Vnom=3.3V	11.87	11.78	11.75
MCS3	Tnom=25℃,Vnom=3.3V	11.65	11.67	11.67
MCS4	Tnom=25℃,Vnom=3.3V	11.54	11.54	11.58
MCS5	Tnom=25℃,Vnom=3.3V	11.48	11.64	11.45
MCS6	Tnom=25℃,Vnom=3.3V	11.35	11.32	11.39
MCS7	Tnom=25℃,Vnom=3.3V	11.27	11.62	11.42

Note:1.The following testing items should be tested at the data rate with the maximum output power.
The maximum output power values are marked in bold.

EIRP -802.11b

Channel	Frequency (MHz)	X	Gain(dBi)	Conducted Power (dBm)	EIRP (dBm)
1	2412	1	0.8	15.67	16.47
7	2442		0.8	15.63	16.43
13	2472		0.8	15.31	16.11

Note: EIRP = A(Conducted Power) + G(Gain) + 10 log (1/x)

EIRP -802.11g

Channel	Frequency (MHz)	X	Gain(dBi)	Conducted Power (dBm)	EIRP (dBm)
1	2412	1	0.8	11.98	12.78
7	2442		0.8	12.09	12.89
13	2472		0.8	12.15	12.95

Note: EIRP = A(Conducted Power) + G(Gain) + 10 log (1/x)

EIRP -802.11n HT20

Channel	Frequency (MHz)	X	Gain(dBi)	Conducted Power (dBm)	EIRP (dBm)
1	2412	1	0.8	11.55	12.35
7	2442		0.8	11.75	12.55
13	2472		0.8	11.69	12.49

Note: EIRP = A(Conducted Power) + G(Gain) + 10 log (1/x)

EIRP -802.11n HT40

Channel	Frequency (MHz)	X	Gain(dBi)	Conducted Power (dBm)	EIRP (dBm)
3	2422	1	0.8	12.12	12.92
7	2442		0.8	12.27	13.07
11	2462		0.8	11.97	12.77

Note: EIRP = A(Conducted Power) + G(Gain) + 10 log (1/x)

2.3. Maximum E.I.R.P. Spectral Density

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The maximum e.i.r.p. spectral density is defined as the highest e.i.r.p. level in Watts per Hertz generated by the transmitter within the power envelope.
The test procedure contained shall be as follows:

Step 1

Connect the EUT to the spectrum analyzer. The centre frequency is set as the channel under test. RBW and VBW are set as 1MHz. The detector type is peak detector and Max Hold is used. The span is wide enough to cover the complete power envelope.

Step 2

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3

Change the center frequency Equal to the frequency recorded in step 2. RBW and VBW are set as 1MHz. The detector type is average detector and Max Hold is used. The sweep time is 1 min. The span is 3MHz.

Step 4

When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyzer.
Find the peak value of the trace and place the analyzer marker on this peak. This level is recorded as the highest mean power (spectral power density) D in a 1 MHz band.
Alternatively, where a spectrum analyzer is equipped with a facility to measure spectral power density, this facility maybe used to display the spectral power density D in dBm/MHz.

Step 5

The maximum e.i.r.p. spectral density is calculated from the above measured power density (D), the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

• PD = D + G + 10 log (1/x);

Limit

Limits	≦10 dBm/MHz

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 1.19 dB

Test Result

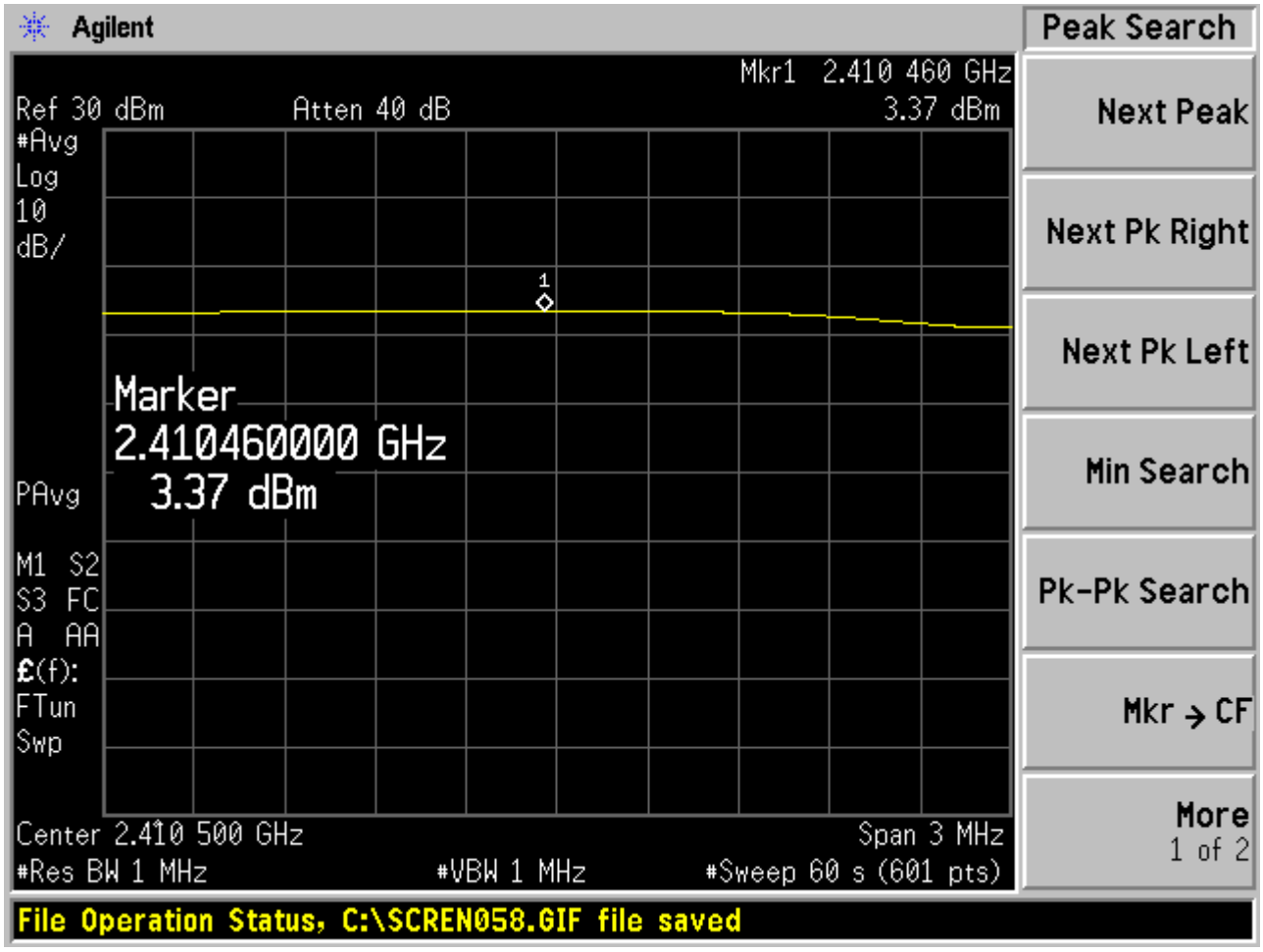
802.11b

Channel	Conducted Power Density (dBm/MHz)	E.I.R.P. Spectral Density (dBm/MHz)	Conclusion
1	3.37	4.17	PASS
7	3.95	4.75	PASS
13	3.23	4.03	PASS

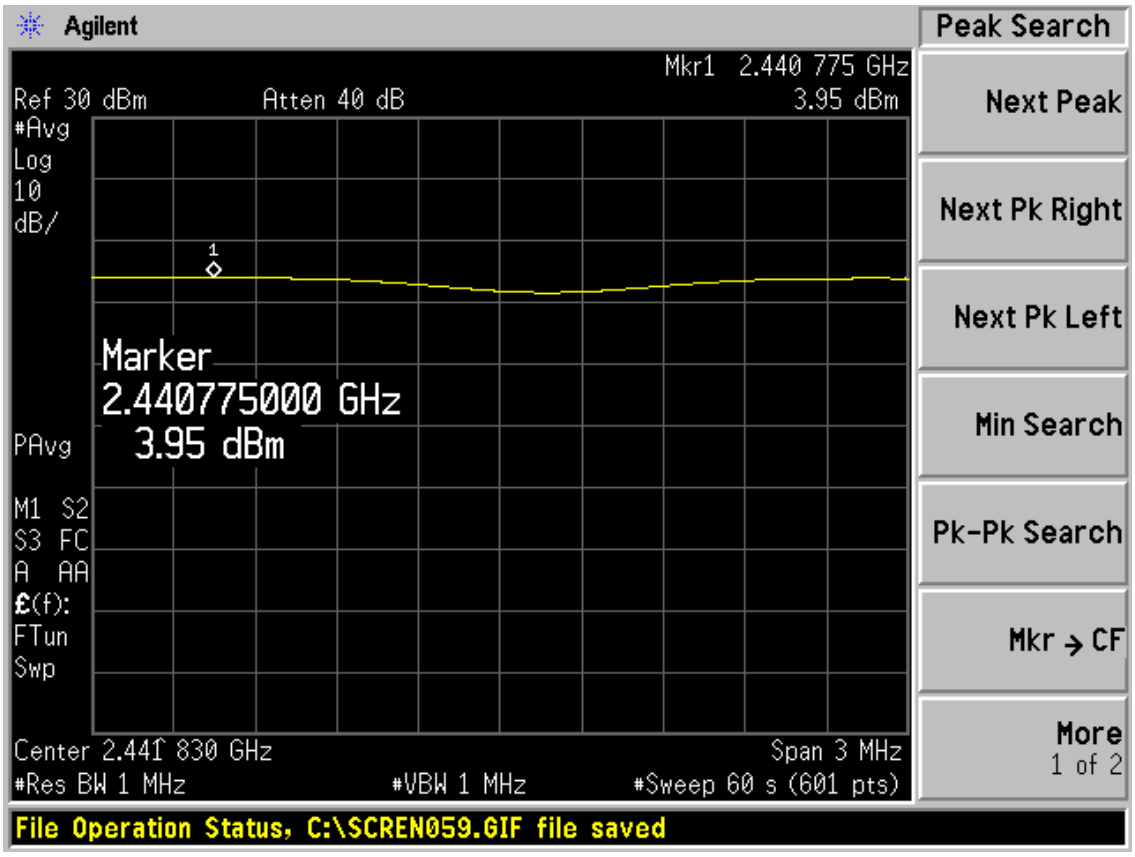
Note: PD = D + G + 10 log (1/x), X=1(802.11b)

G=0.8dBi (Channel 1)/0.8dBi (Channel 7)/0.8dBi (Channel 13)

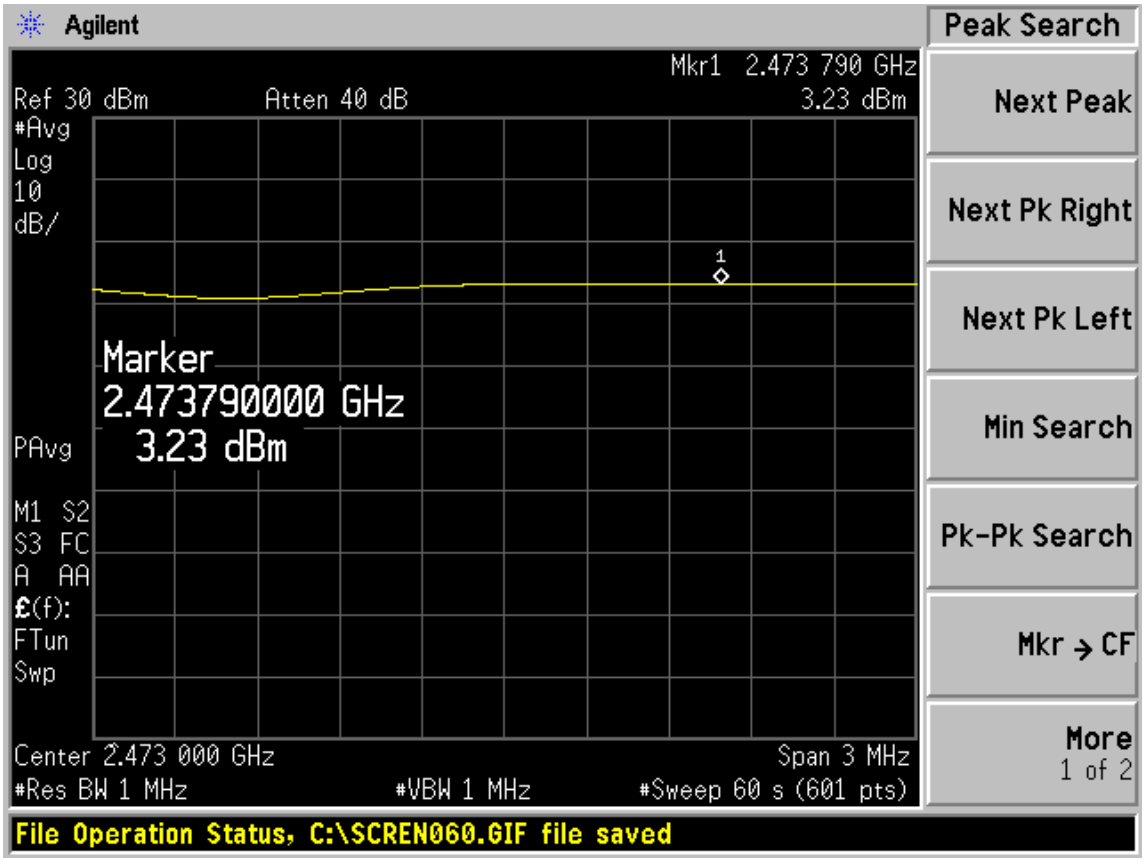
Other information please refers to the method of measurement in Chapter 2.3 of this report.



Channel 1, Carrier frequency (MHz):2412



Channel 7, Carrier frequency (MHz):2442



Channel 13, Carrier frequency (MHz):2472

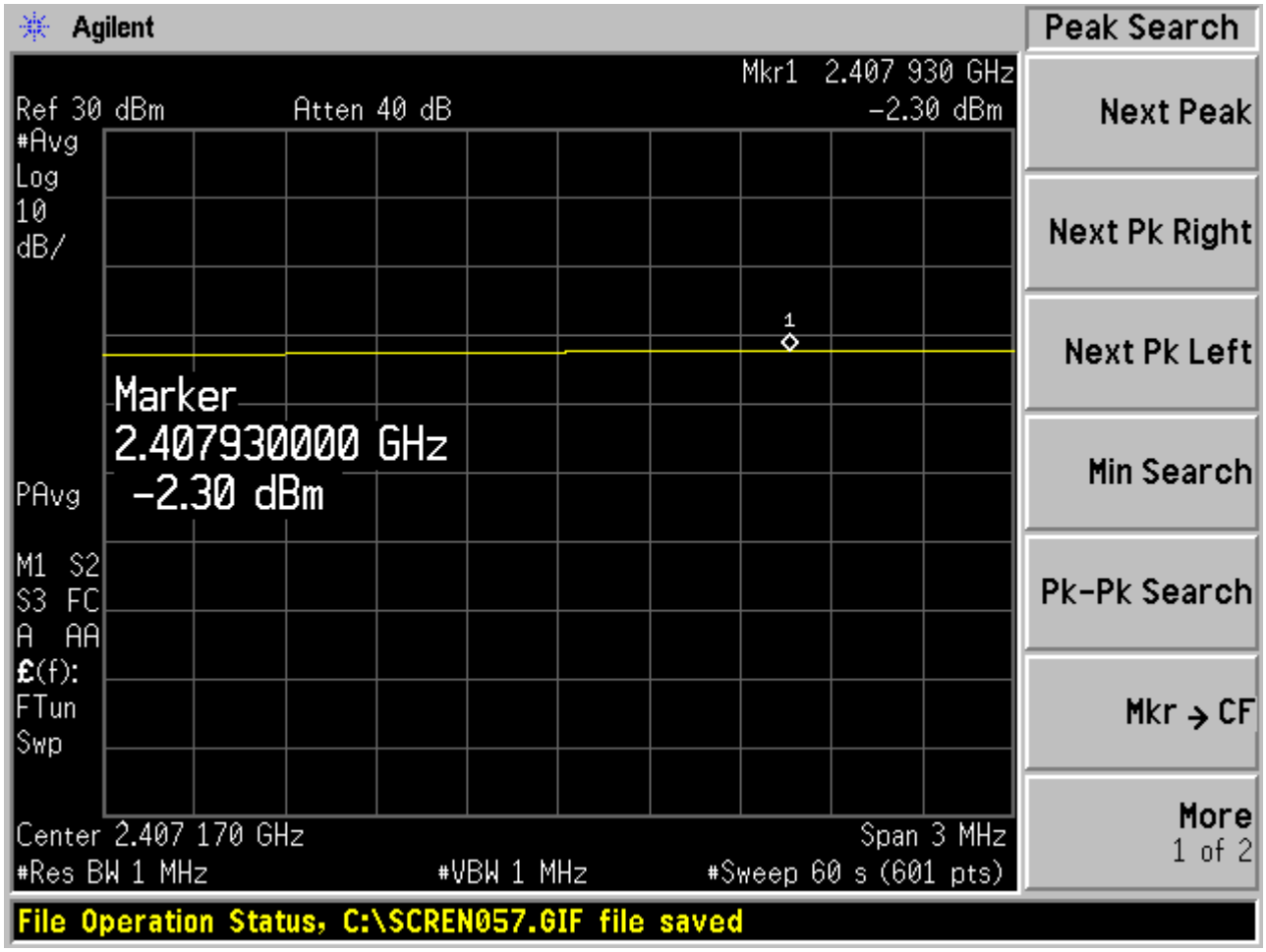
802.11g

Channel	Conducted Power Density (dBm/MHz)	E.I.R.P. Spectral Density (dBm/MHz)	Conclusion
1	-2.3	-1.5	PASS
7	-1.7	-0.9	PASS
13	-2.07	-1.27	PASS

Note: PD = D + G + 10 log (1/x), X=1(802.11g)

G=0.8dBi (Channel 1)/0.8dBi (Channel 7)/0.8dBi (Channel 13),

Other information please refers to the method of measurement in Chapter 2.3 of this report.



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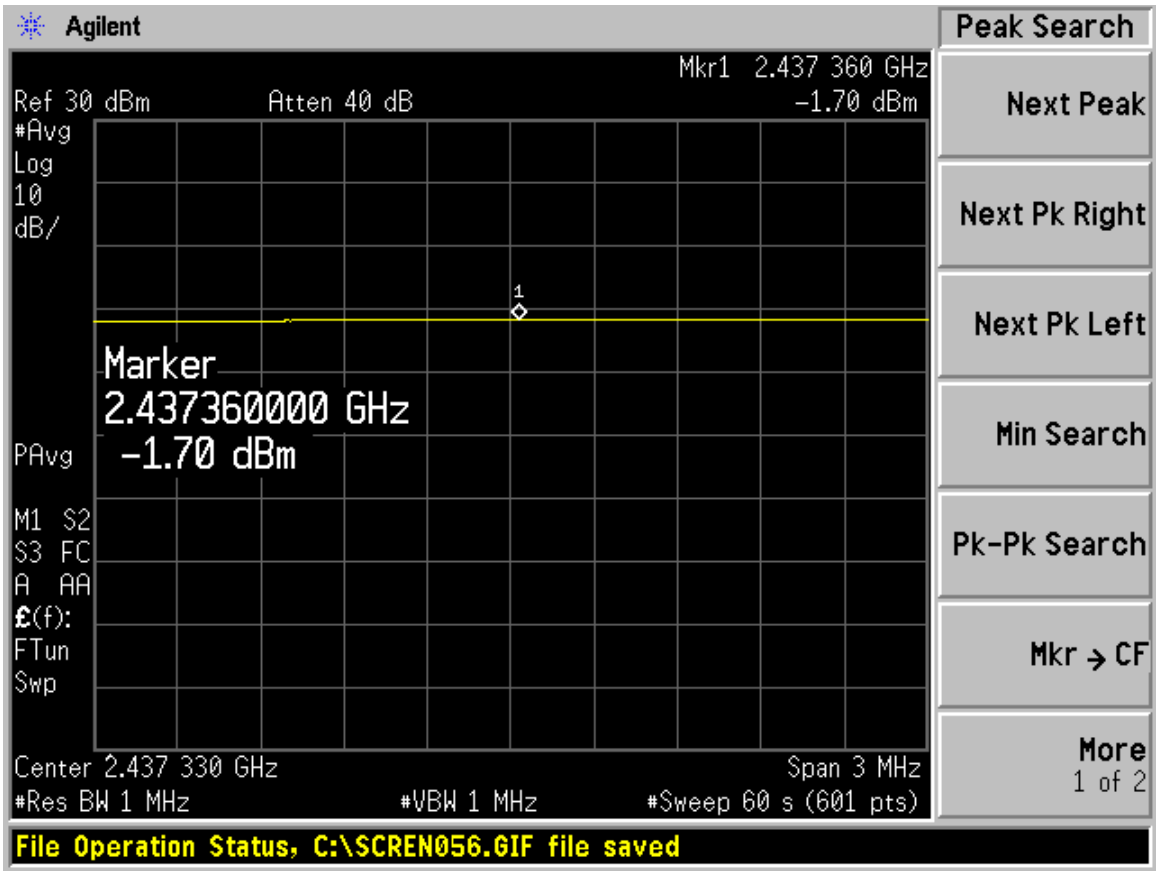

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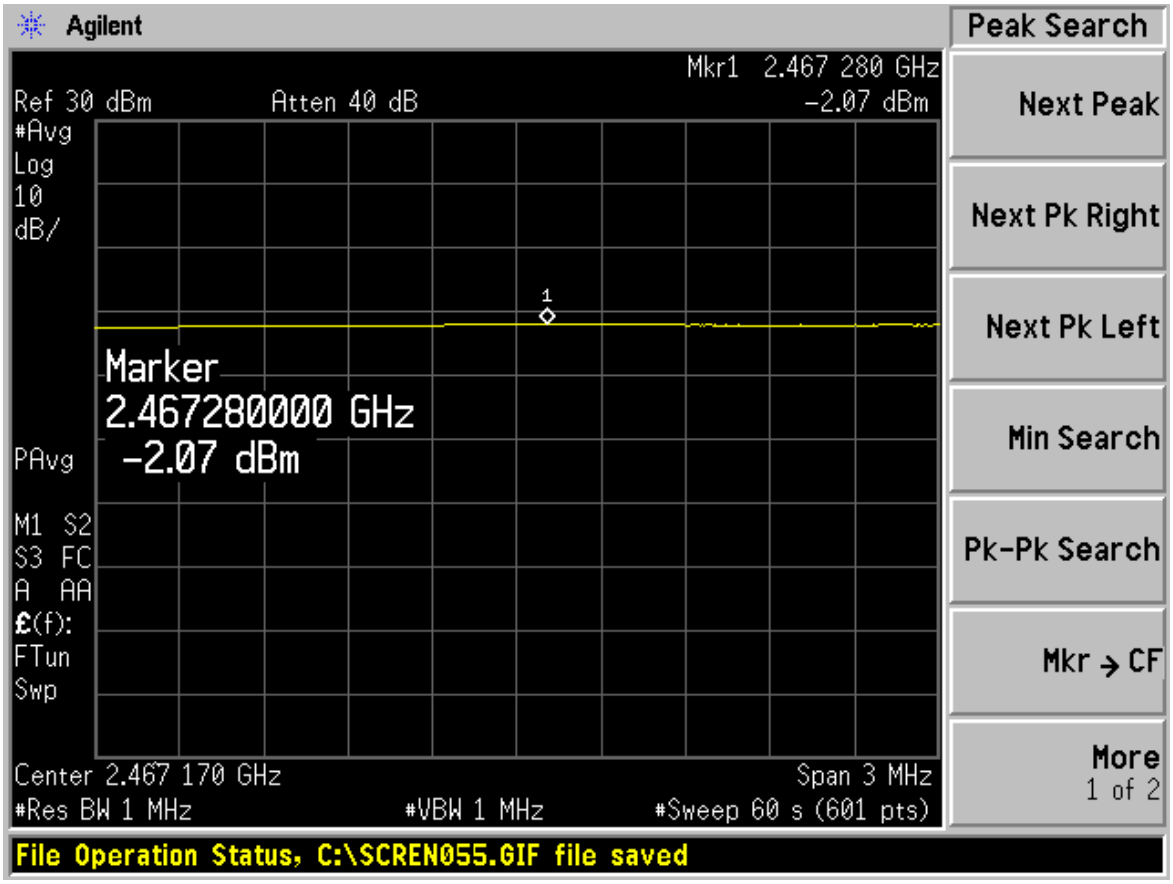


Channel 13, Carrier frequency (MHz):2472

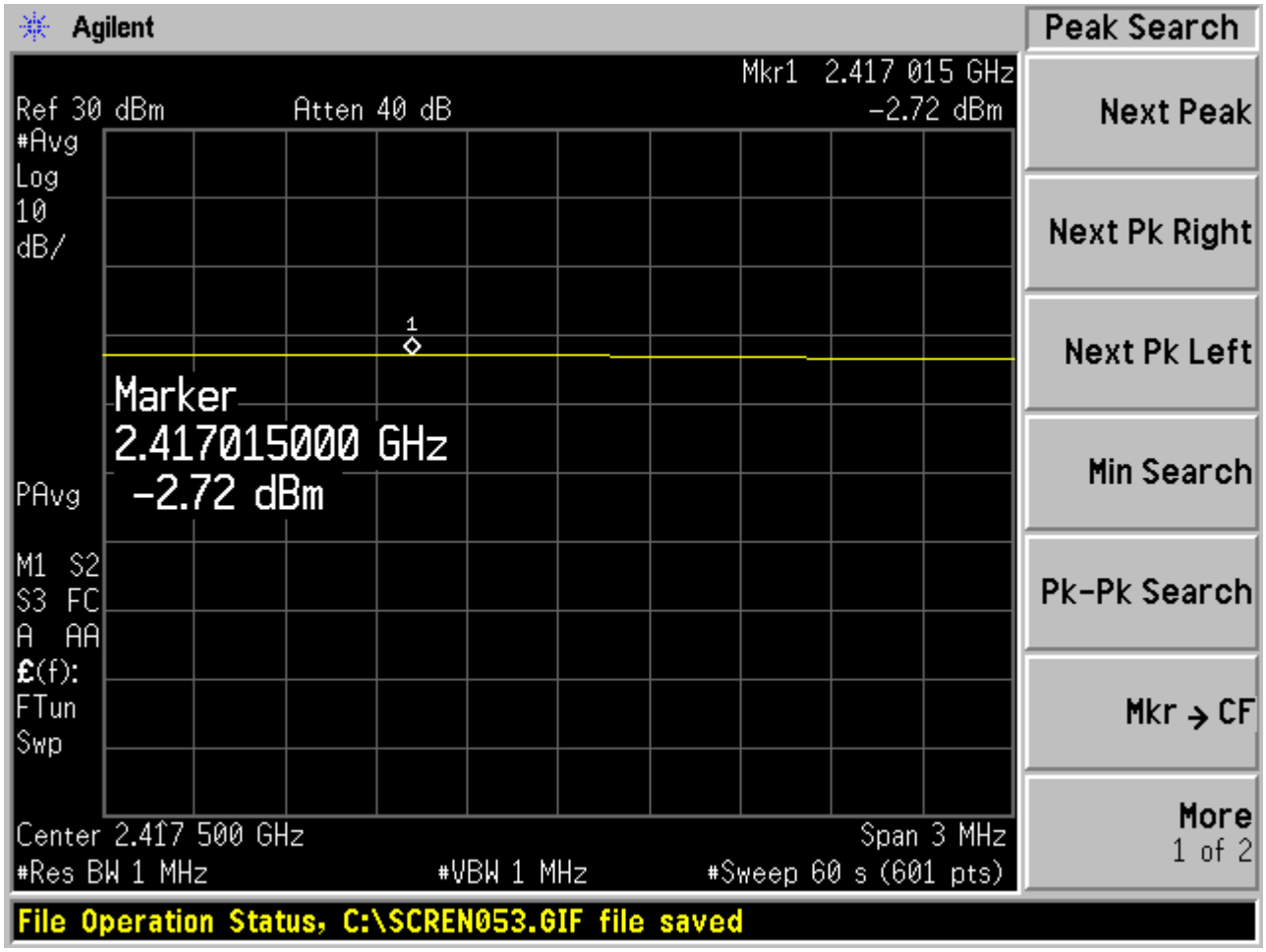
802.11n TH20

Channel	Conducted Power Density (dBm/MHz)	E.I.R.P. Spectral Density (dBm/MHz)	Conclusion
1	-2.72	-1.92	PASS
7	-1.94	-1.14	PASS
13	-2.39	-1.59	PASS

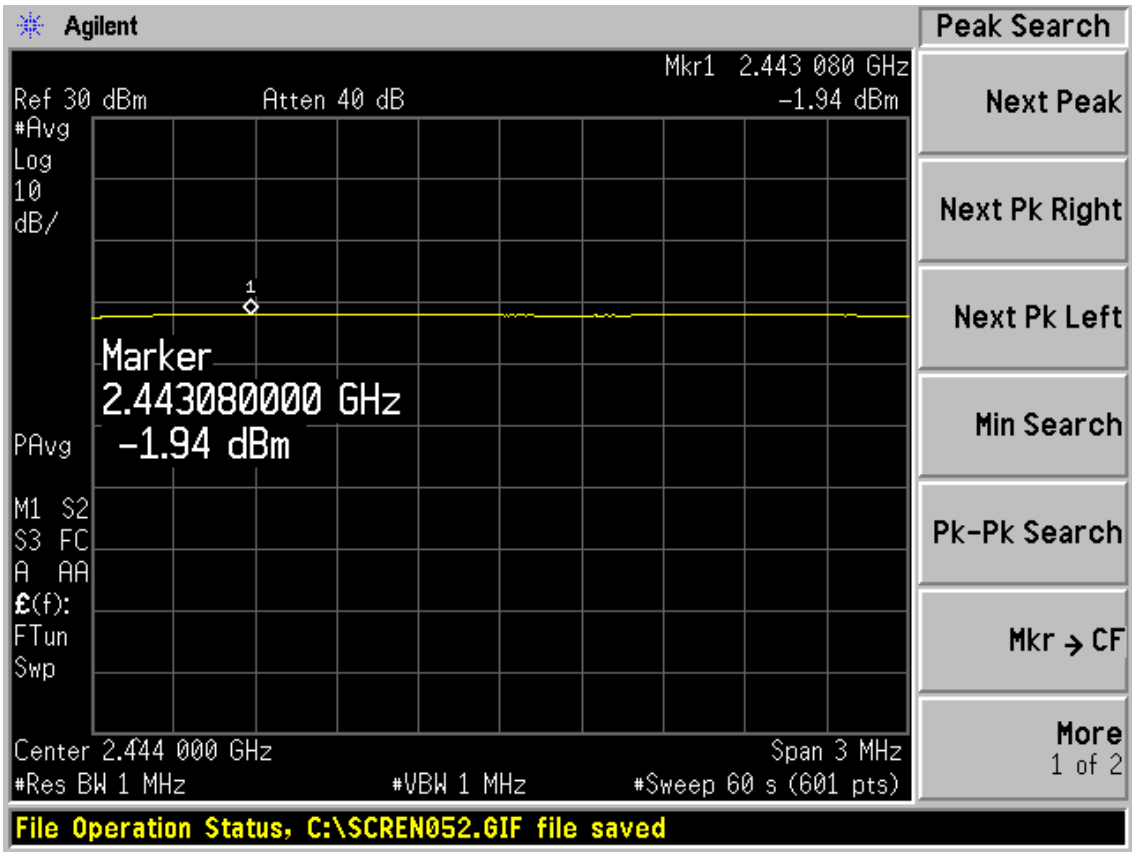
Note: PD = D + G + 10 log (1/x), X=1(802.11n HT20)

G=0.8dBi (Channel 1)/ 0.8dBi (Channel 7)/ 0.8dBi (Channel 13)

Other information please refers to the method of measurement in Chapter 2.3 of this report.



Channel 1, Carrier frequency (MHz):2412



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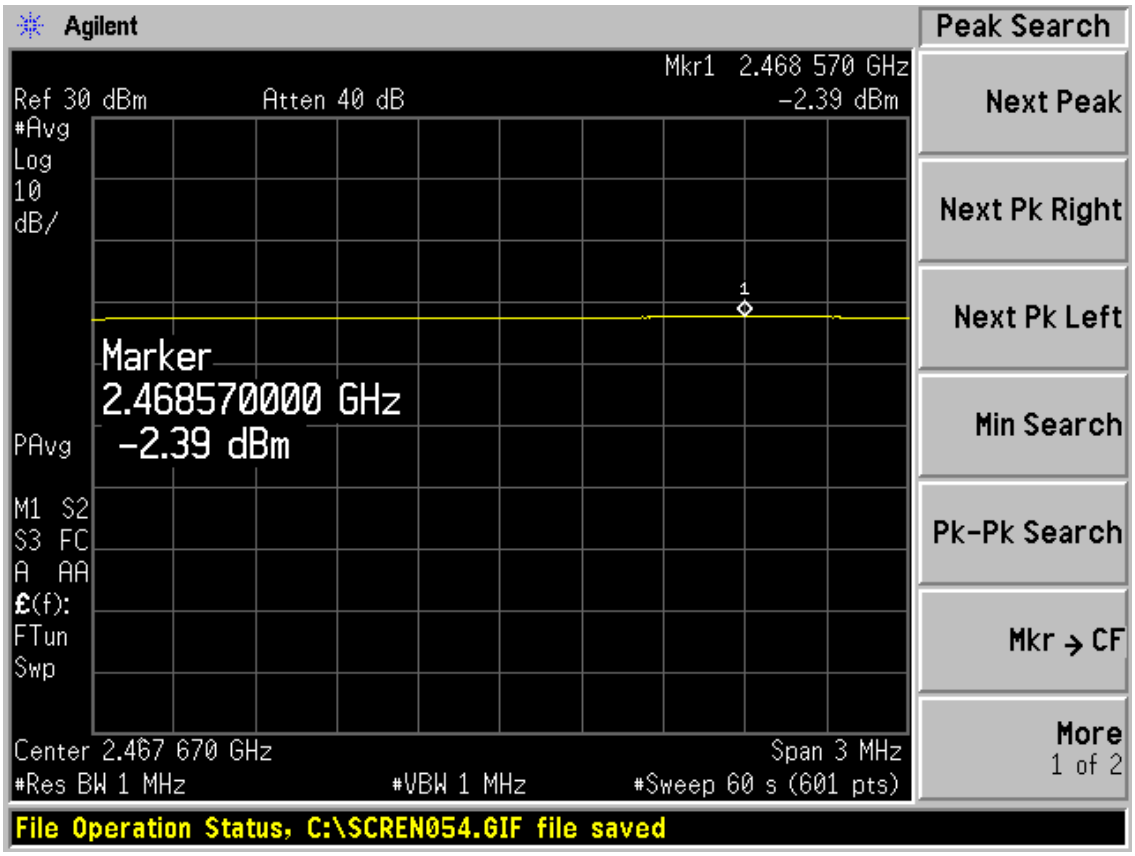


Channel 13, Carrier frequency (MHz):2472

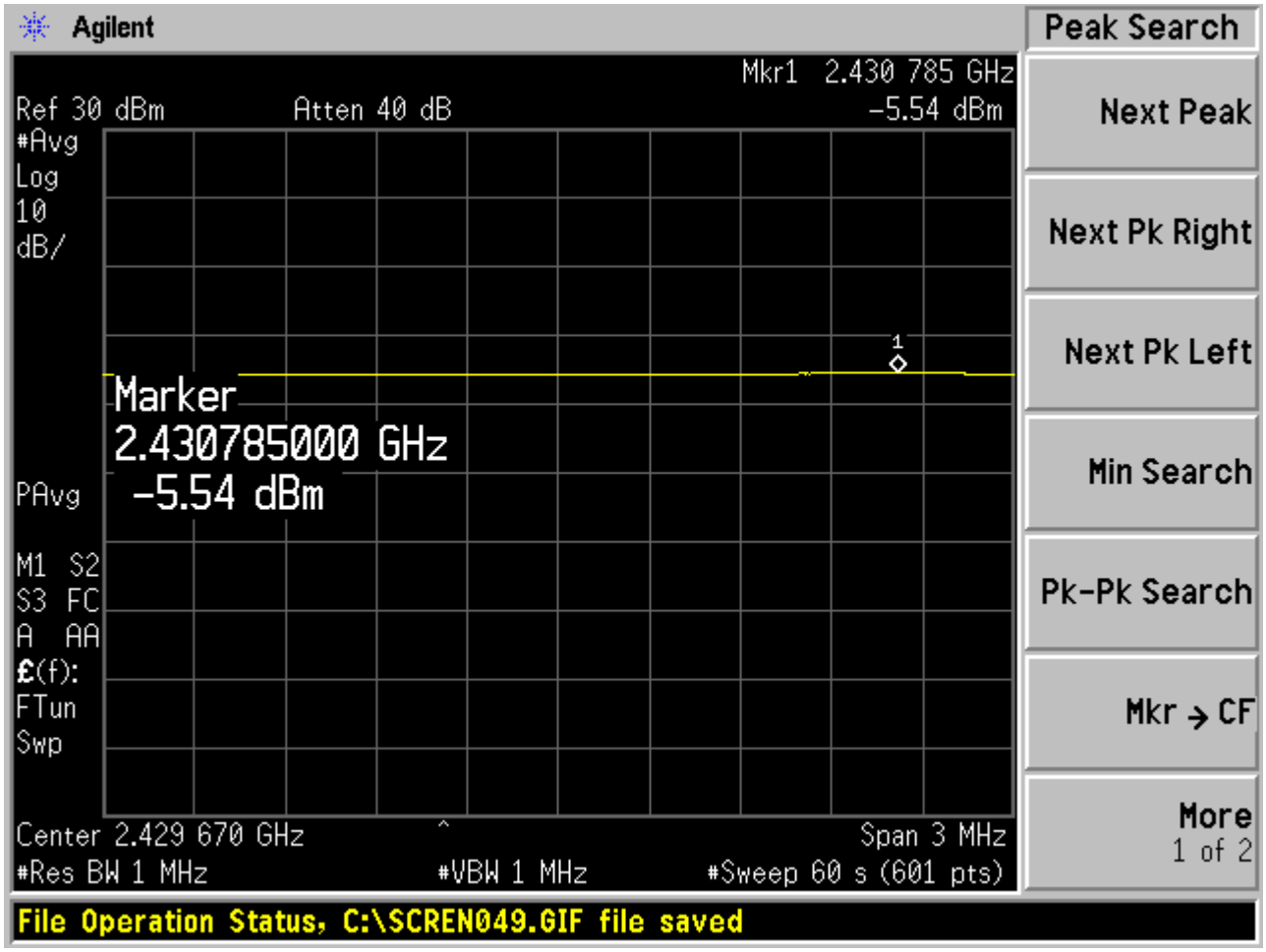
802.11n HT40

Channel	Conducted Power Density (dBm/MHz)	E.I.R.P. Spectral Density (dBm/MHz)	Conclusion
3	-5.54	-4.74	PASS
7	-5.45	-4.65	PASS
11	-5.55	-4.75	PASS

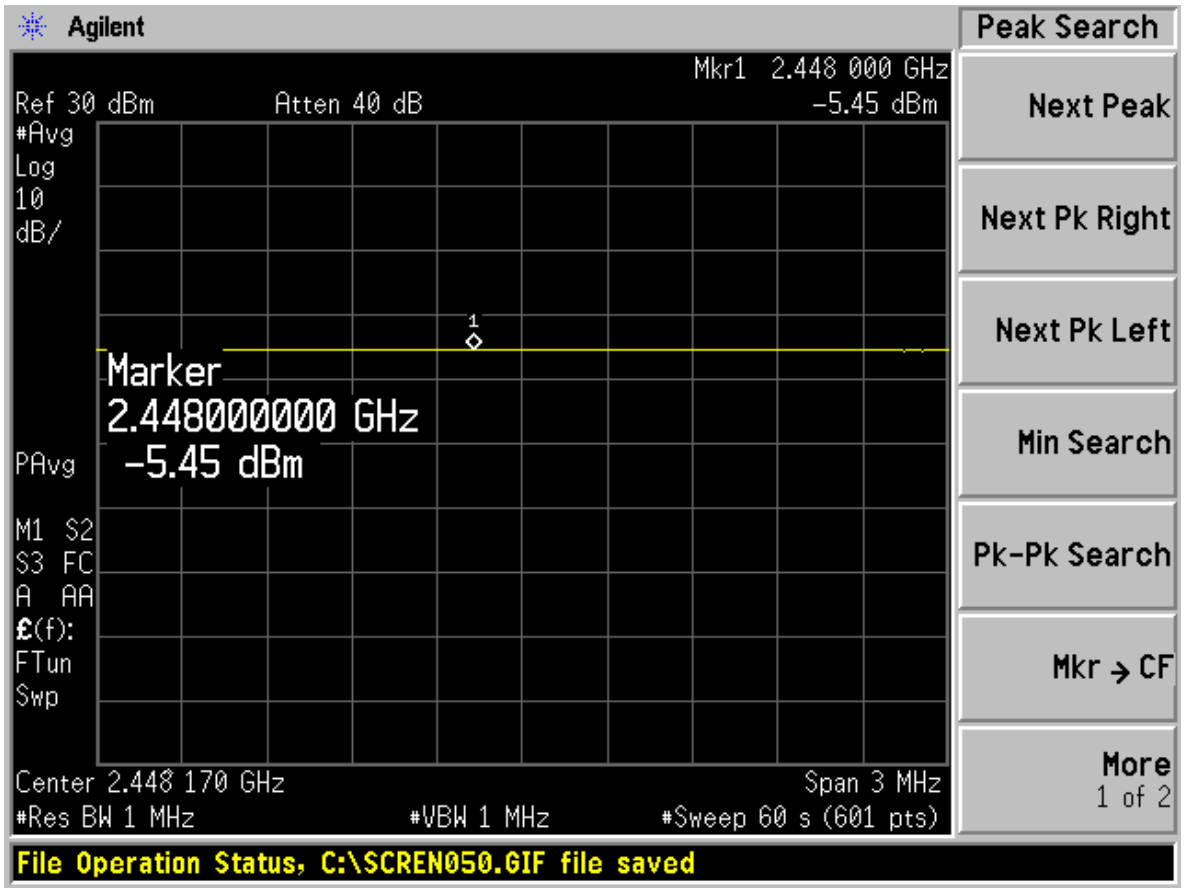
Note: PD = D + G + 10 log (1/x), X=0.95(802.11n)

G=0.8dBi (Channel 3)0.8dBi (Channel 7)/0.8dBi (Channel 11)

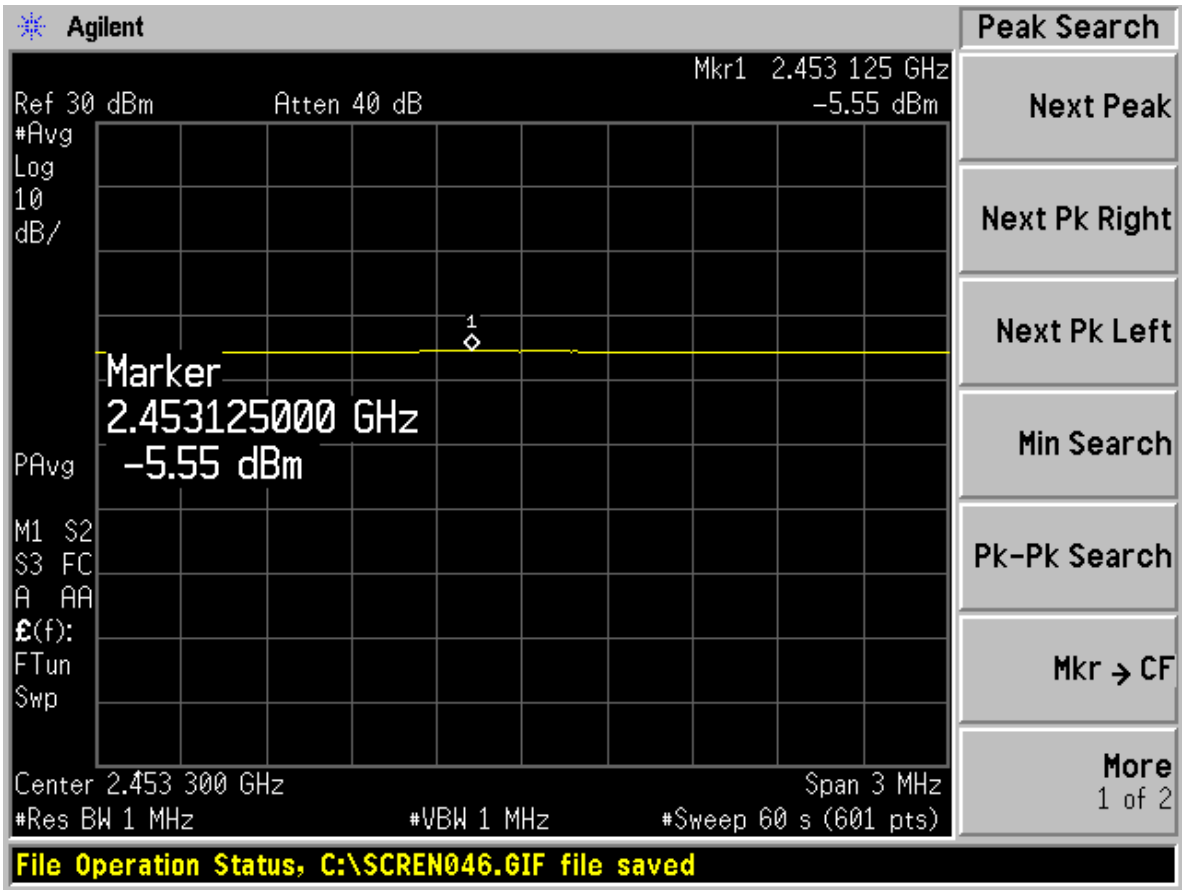
Other information please refers to the method of measurement in Chapter 2.3 of this report.



Channel 3, Carrier frequency (MHz):2422



Channel 7, Carrier frequency (MHz):2442



Channel 11, Carrier frequency (MHz):2462

2.4. Frequency Range

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope. These measurements shall be performed at normal and extreme test conditions.

The test procedure shall be as follows:

Step 1

Select the lowest operating frequency of the equipment under test. Connect the EUT to the spectrum analyzer. RBW and VBW are set as 100 KHz. The detector type is average detector and Max Hold is used. The sweep time is at least1 min. The span is wide enough to capture the complete power envelope, including all sidebands.

Step 2

Using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level of -80 dBm/Hz (or -30 dBm if measured in a 100 kHz bandwidth).. This frequency shall be recorded as f_L.

Step 3

Select the highest operating frequency of the equipment under test. Using the marker of the spectrum analyser, find the highest frequency above the operating frequency at which the spectral power density drops below the level of -80 dBm/Hz (or -30 dBm if measured in a 100 kHz bandwidth).. This frequency shall be recorded as f_H.

Step 4

The difference between the frequencies measured (f_H - f_L) is the frequency range which shall be recorded.

The Antenna G=0.8dBi (Channel 1)/ 0.8dBi (Channel 3)/0.8dBi (Channel 7)/ 0.8dBi (Channel 11)/0.8dBi (Channel 13), the result of frequency range in E.I.R.P measurement is lower than the result in conducted power measurement.

Limit

Limits(MHz)	$f_L > 2400.0$
	$f_H < 2483.5$

Measurement Uncertainty

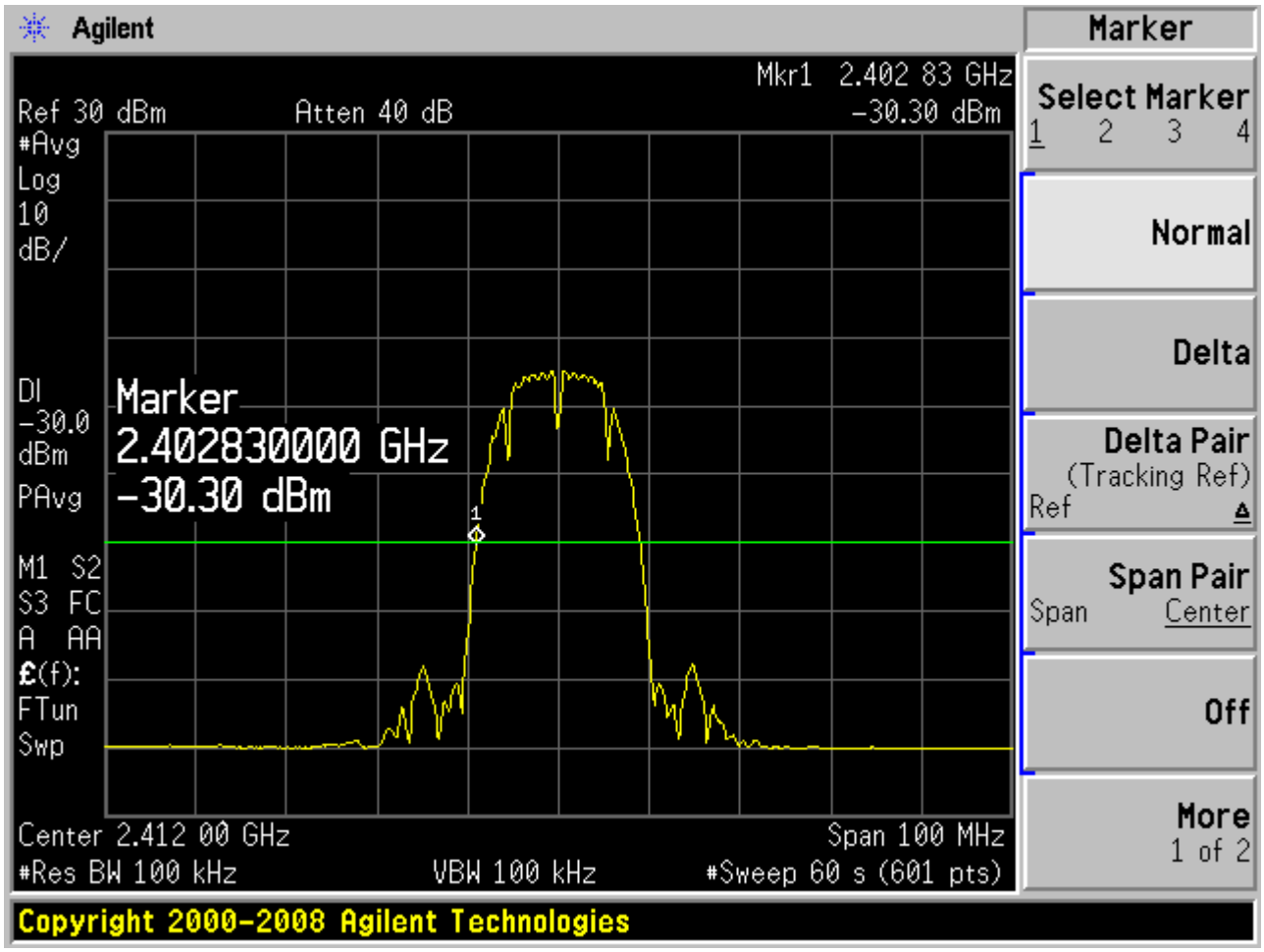
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936Hz

Test Results

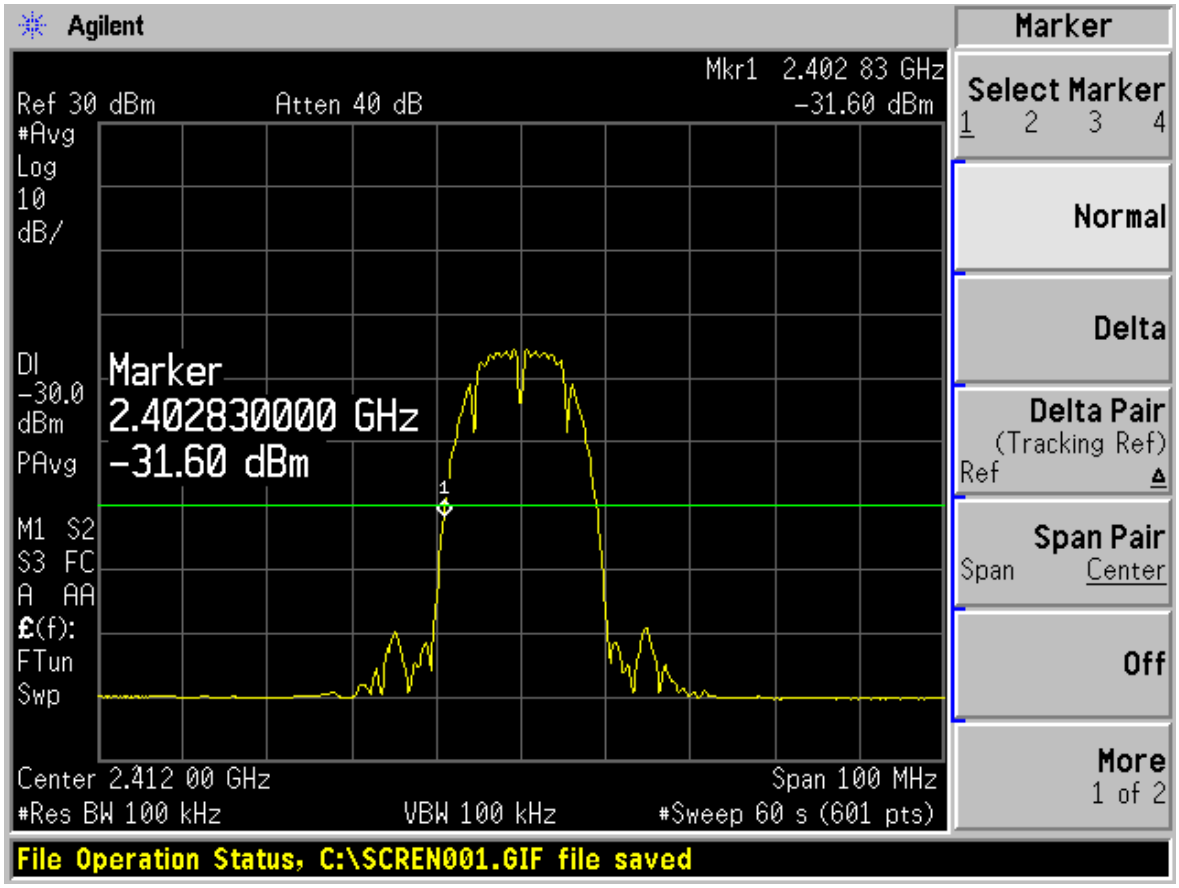
802.11b

Test Condition		Test Results(MHz)	
		CH1	CH13
Tnom=25℃	Vnom= 3.3V	2402.83	2480.83
Tmax=55℃	Vmax= 3.465V	2402.83	2480.83
	Vmin= 3.135V	2403	2480.83
Tmin= -20℃	Vmax= 3.465V	2403	2480.83
	Vmin= 3.135V	2403	2480.83

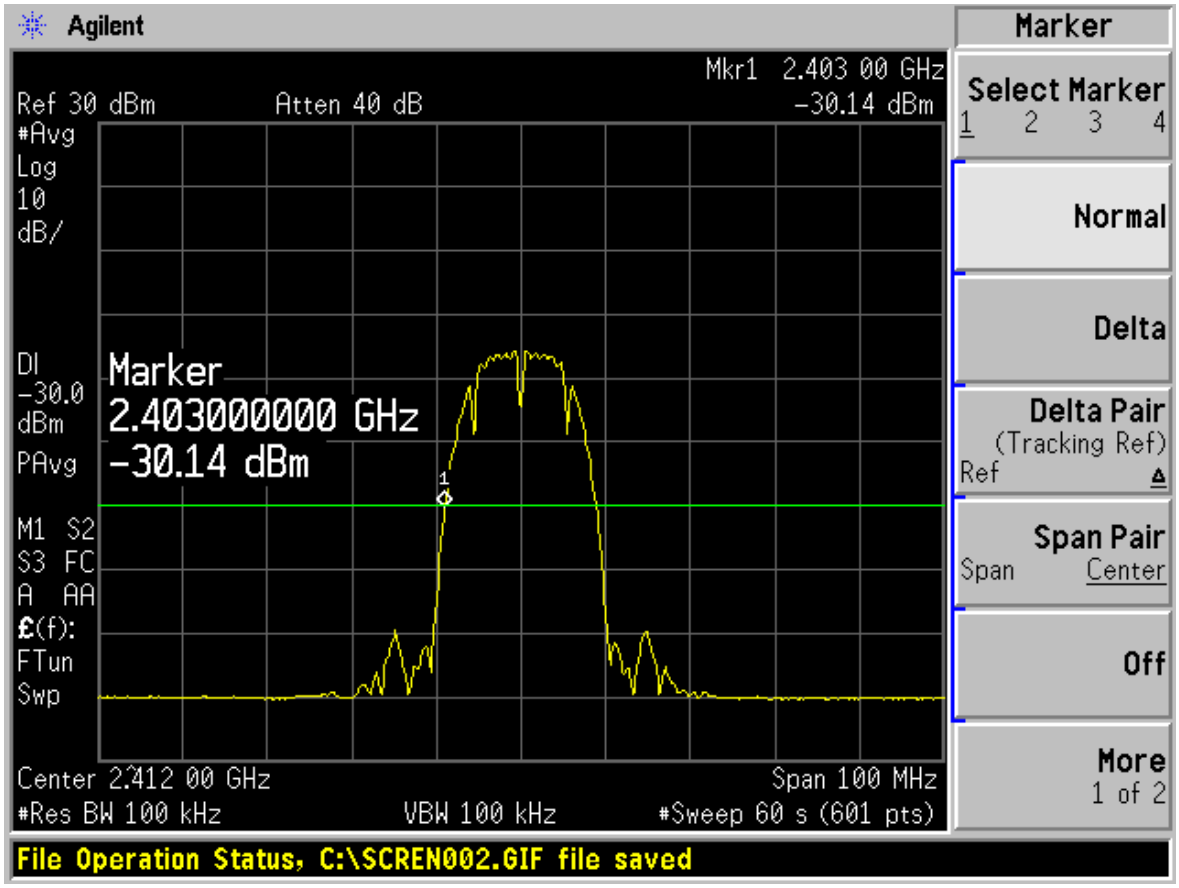
25℃ 3.3V CH1



55℃ 3.465V CH1



55℃ 3.135V CH1



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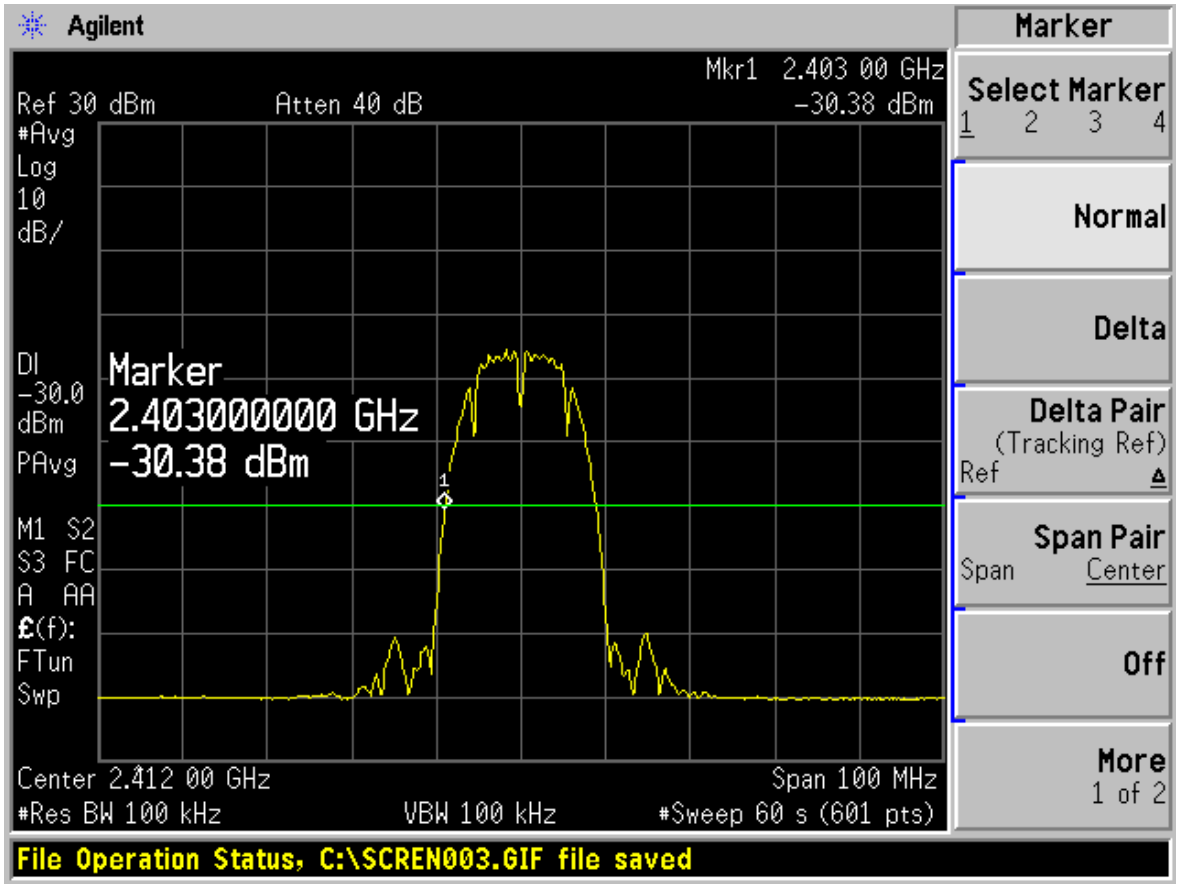
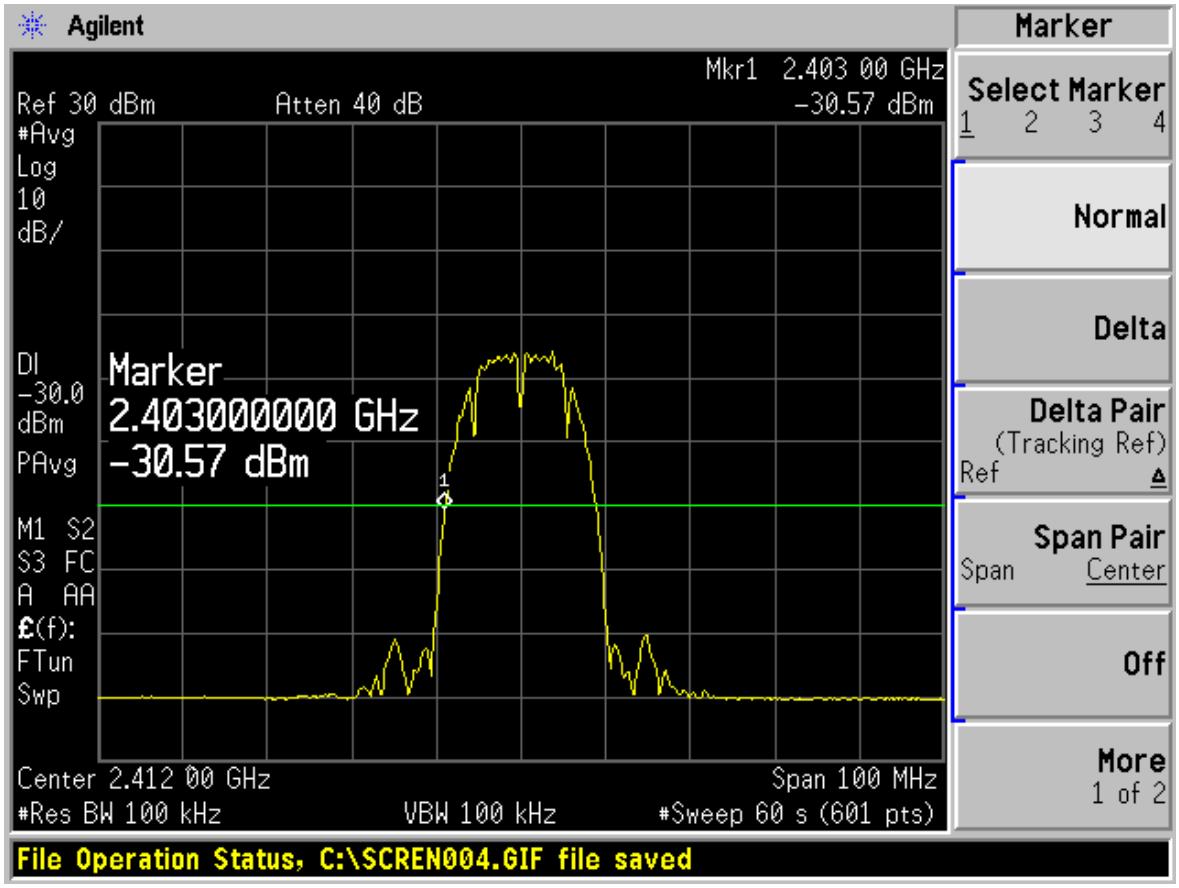
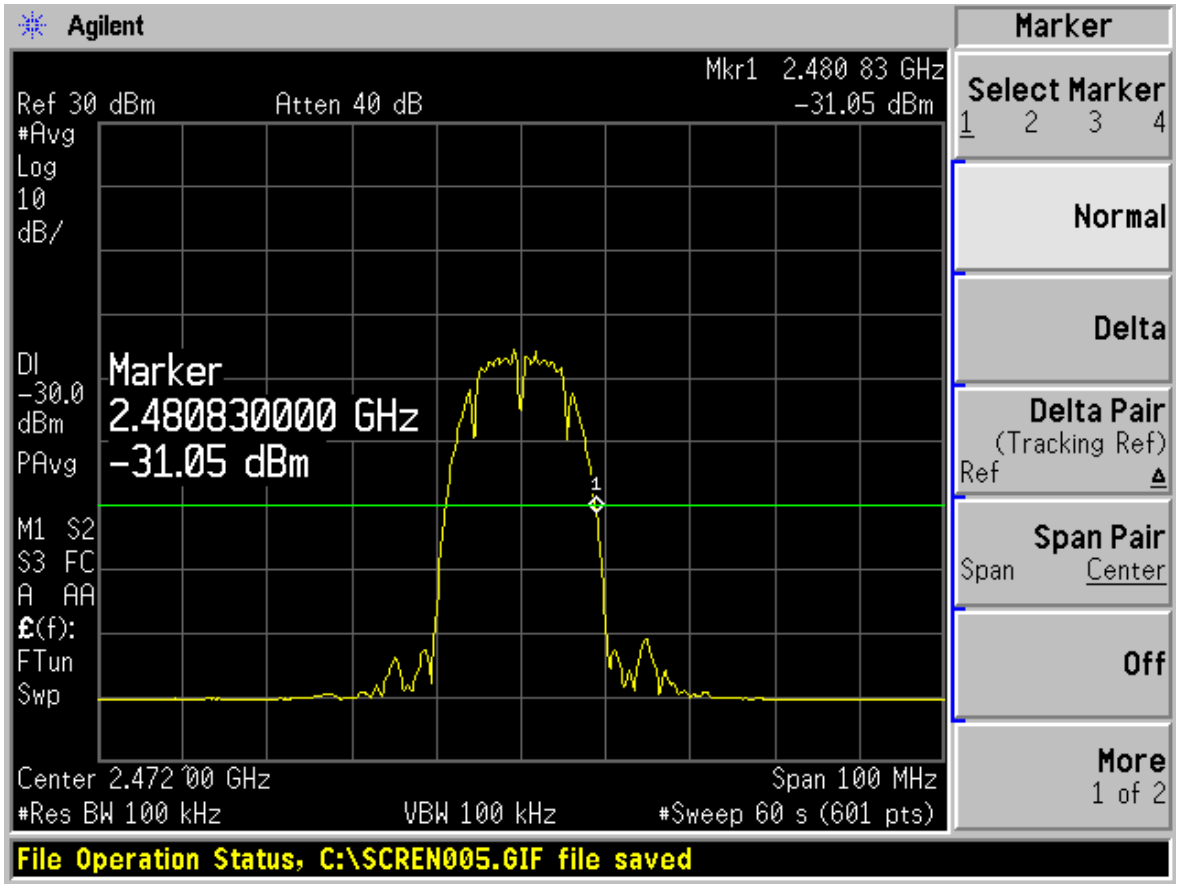


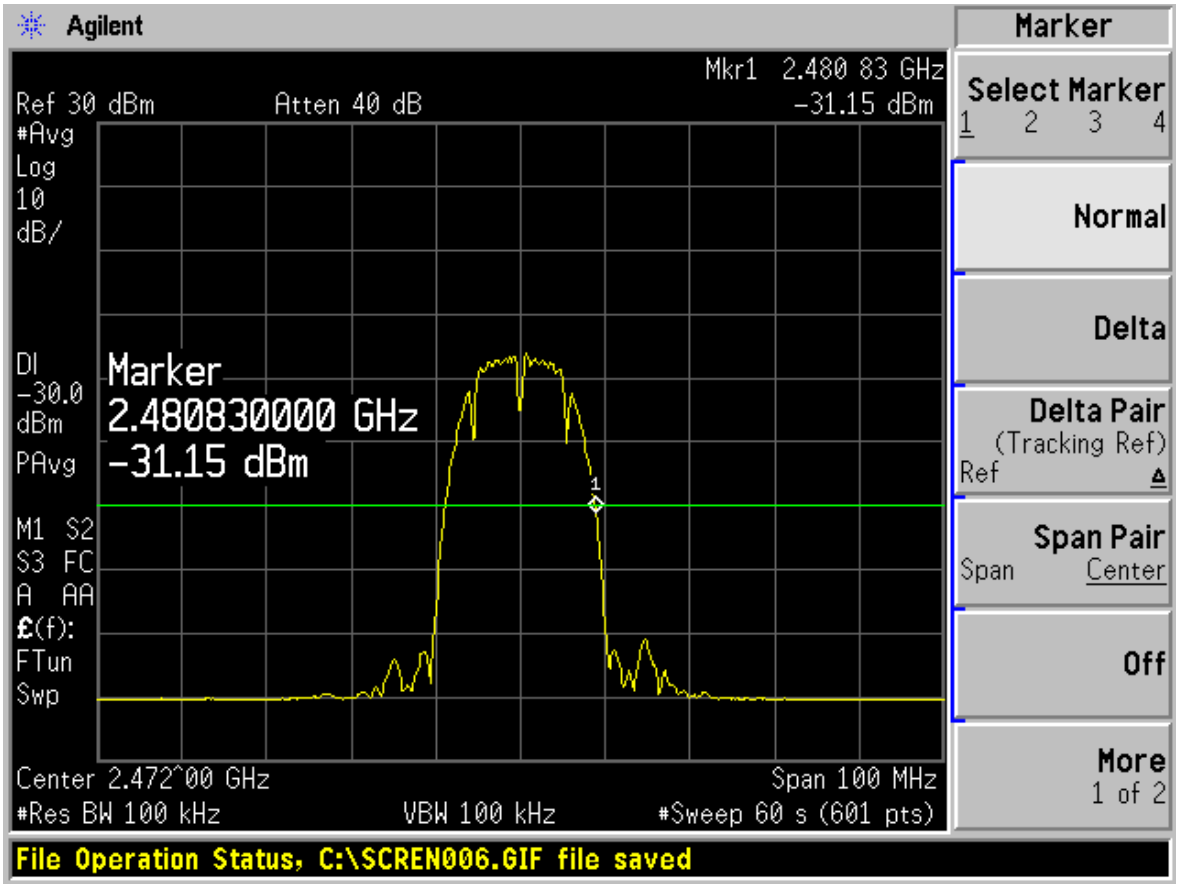
-20℃ 3.135V CH1



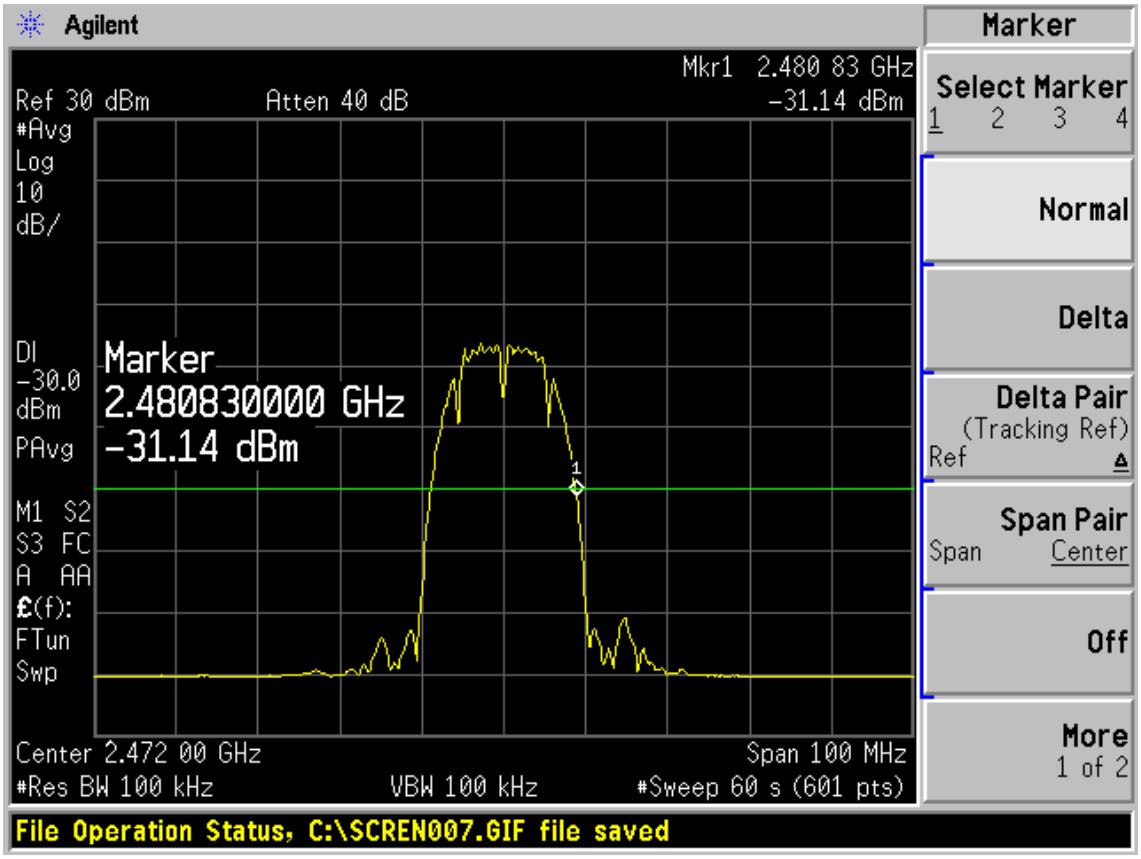
25℃ 3.3V CH13



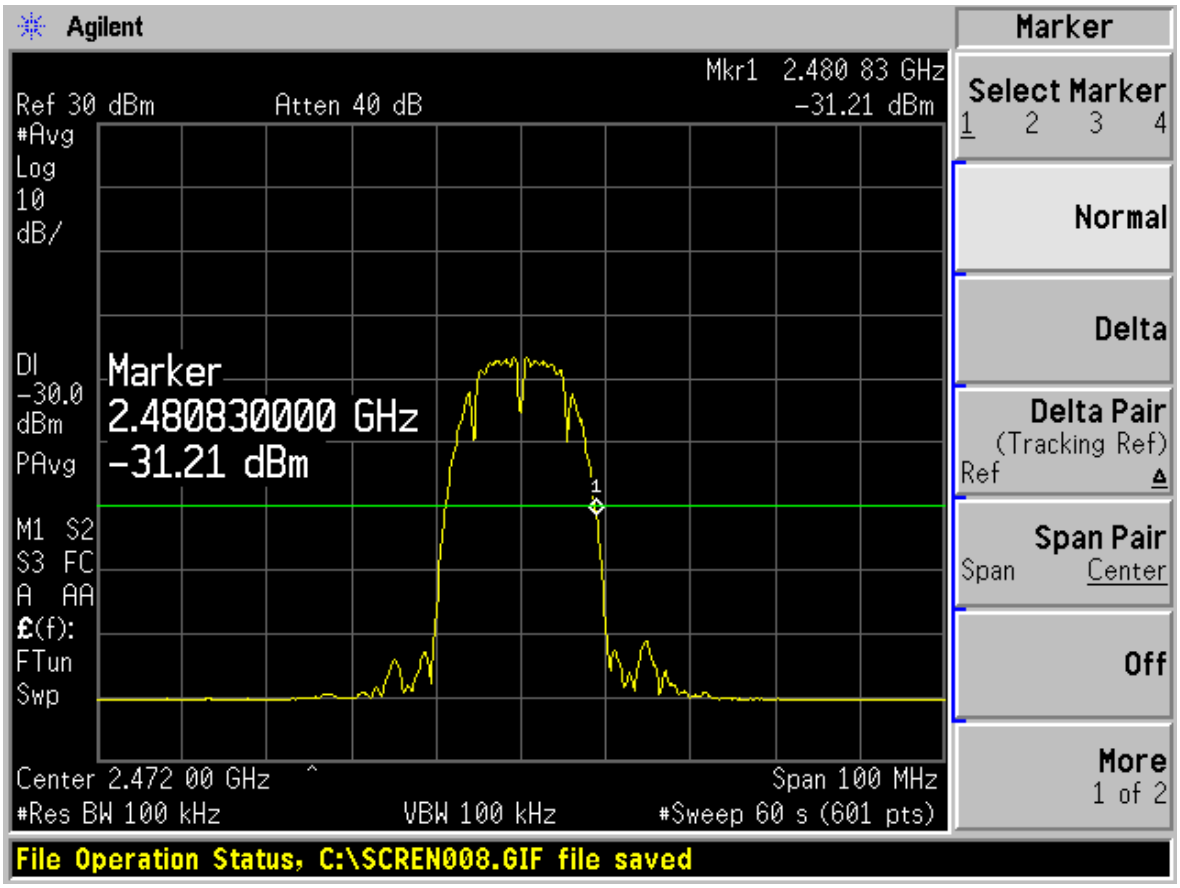
55℃ 3.465V CH13



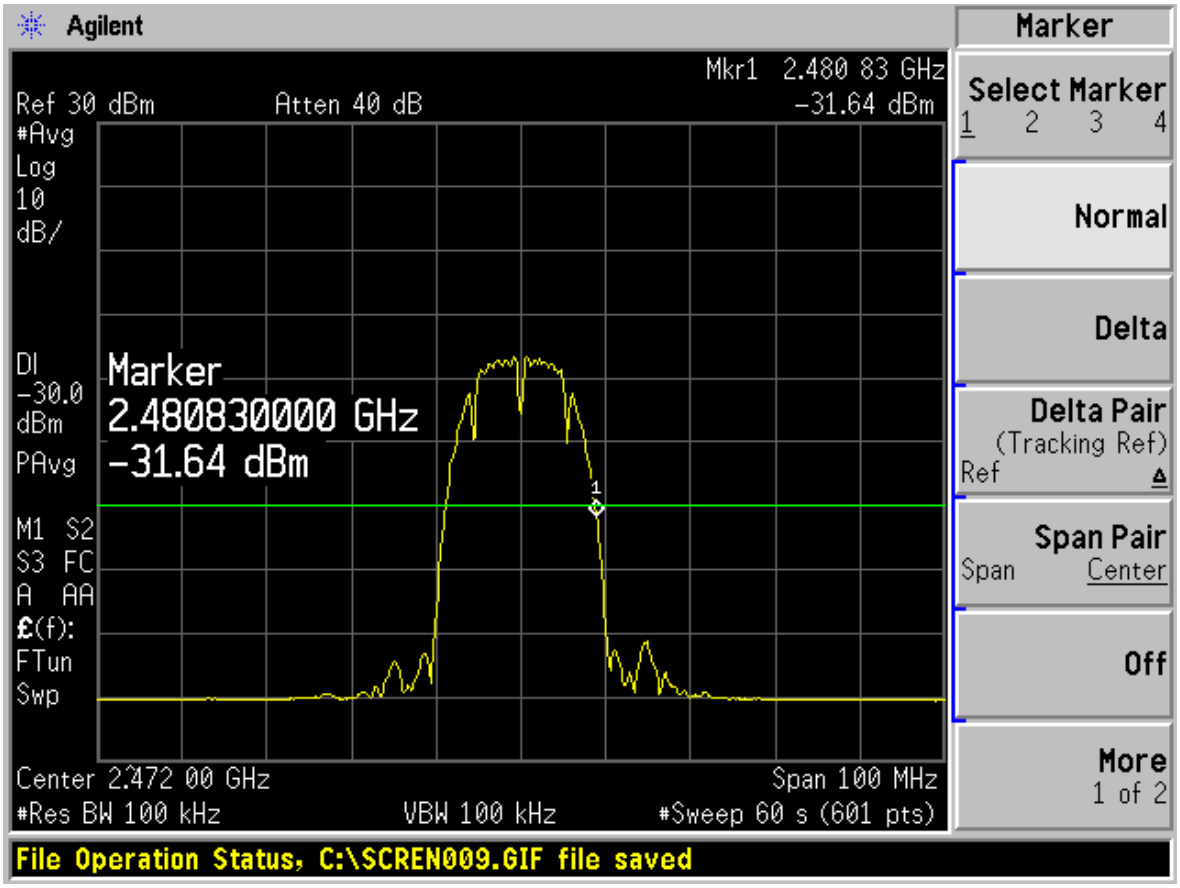
55℃ 3.135V CH13



-20℃ 3.465V CH13



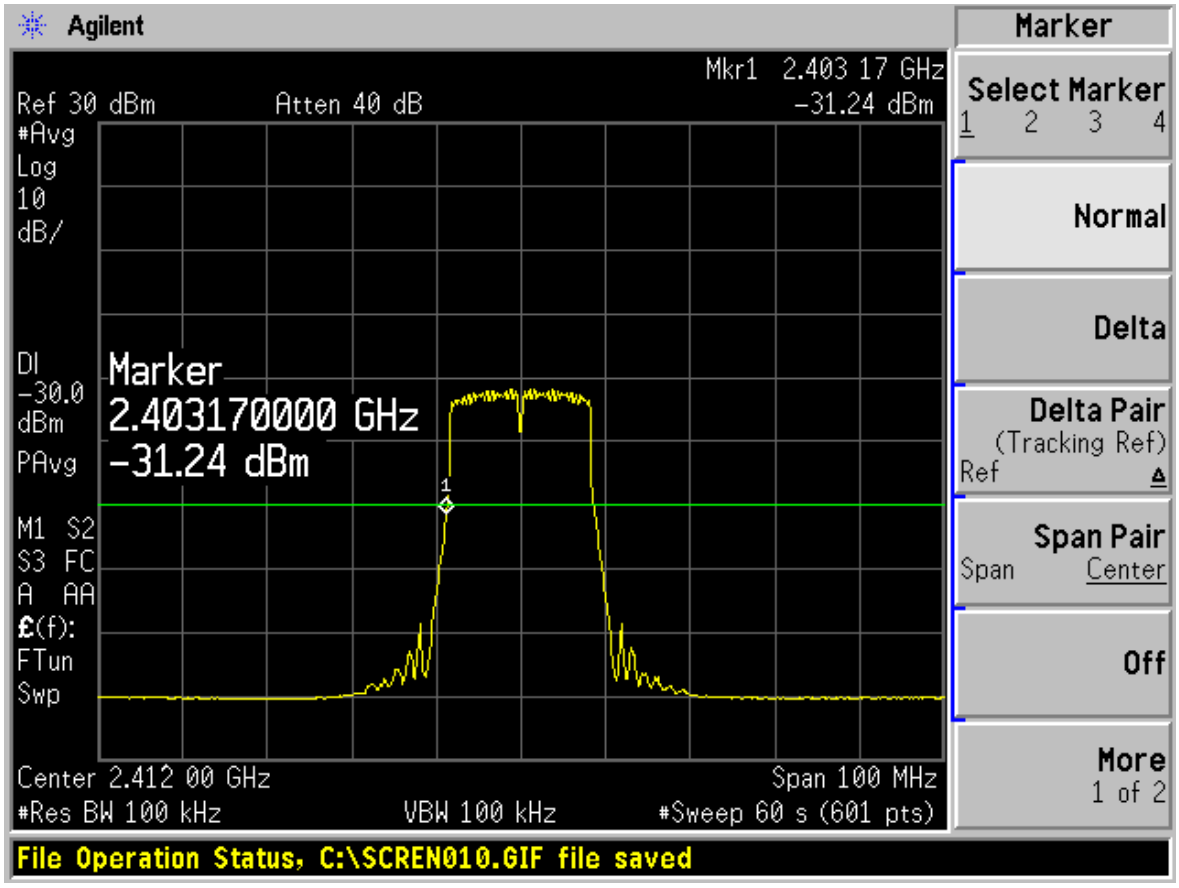
-20℃ 3.135V CH13



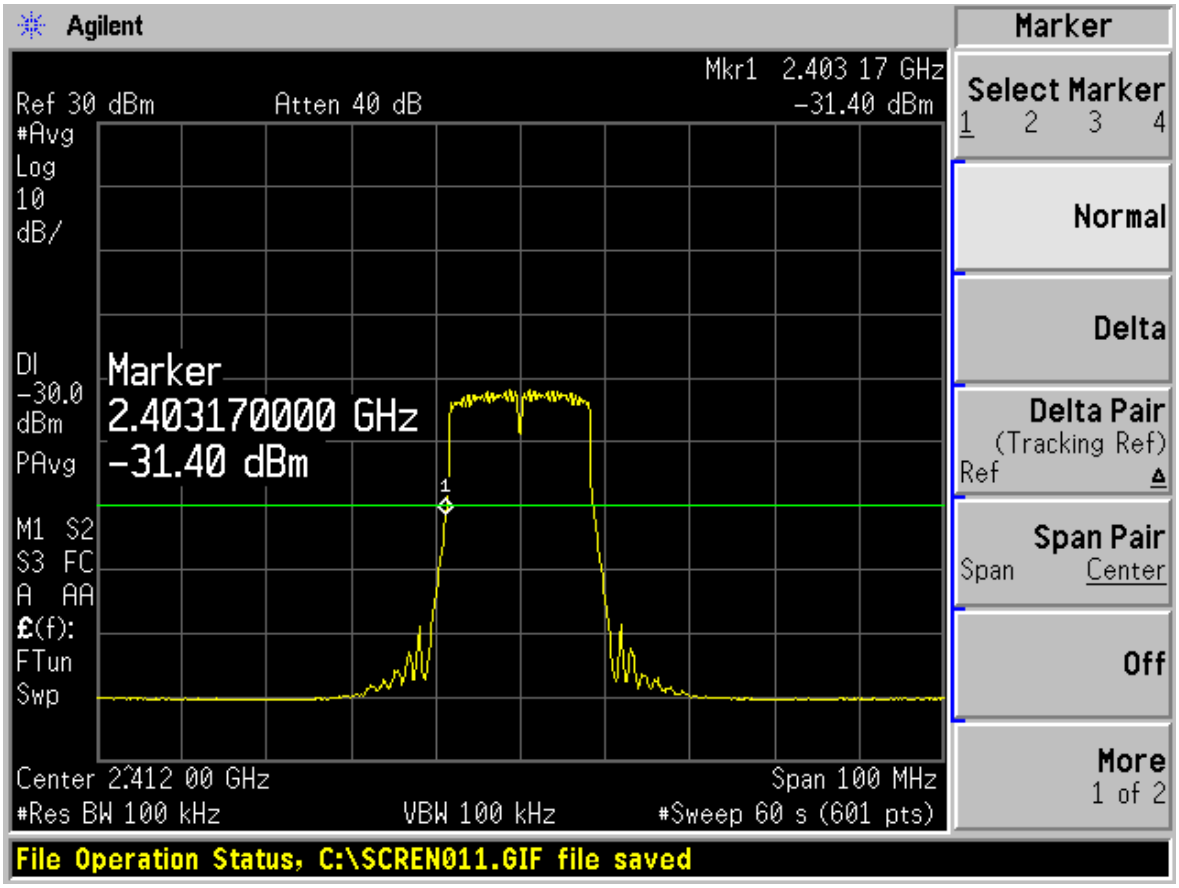
802.11g

Test Condition		Test Results(MHz)	
		CH1	CH13
Tnom=25℃	Vnom= 3.3V	2403.17	2480.67
Tmax=55℃	Vmax= 3.465V	2403.17	2480.67
	Vmin= 3.135V	2403.17	2480.67
Tmin= -20℃	Vmax= 3.465V	2403.17	2480.67
	Vmin= 3.135V	2403.17	2480.67

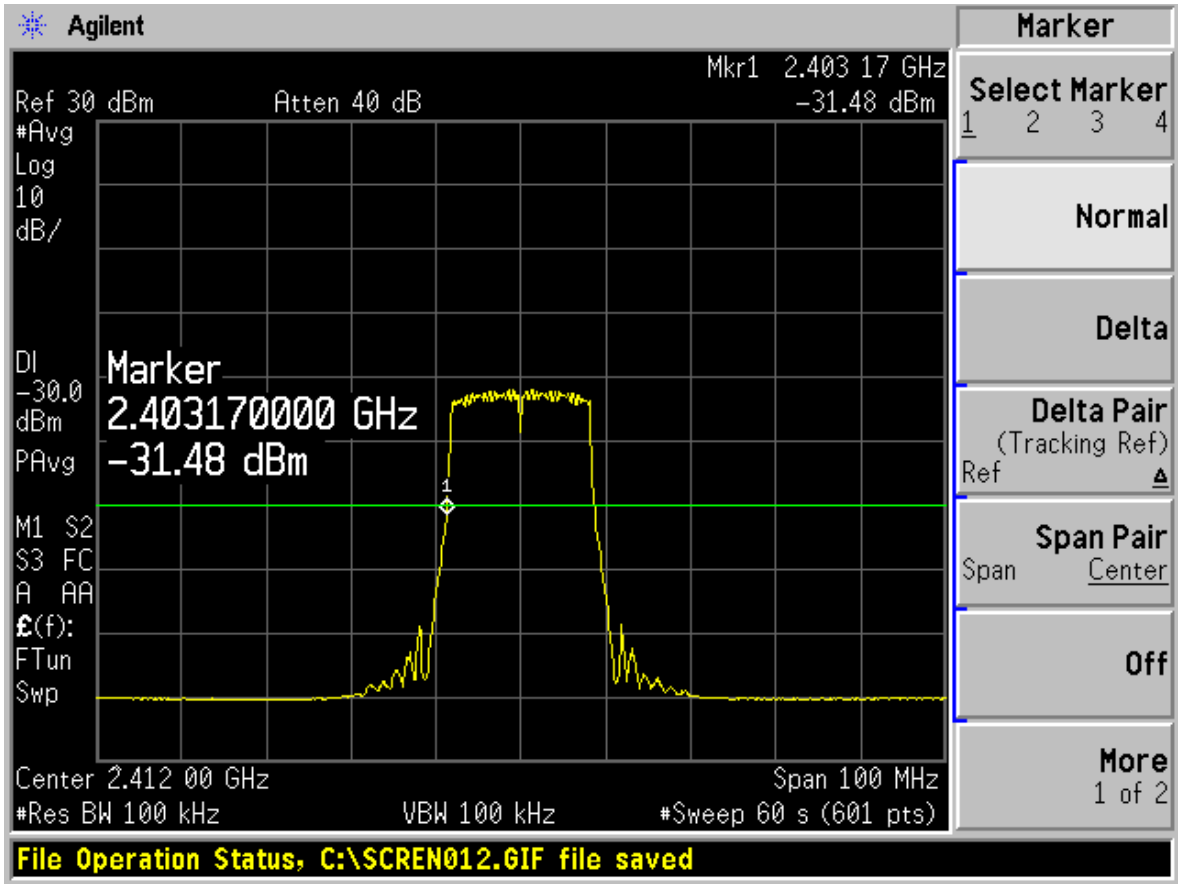
25℃ 3.3V CH1



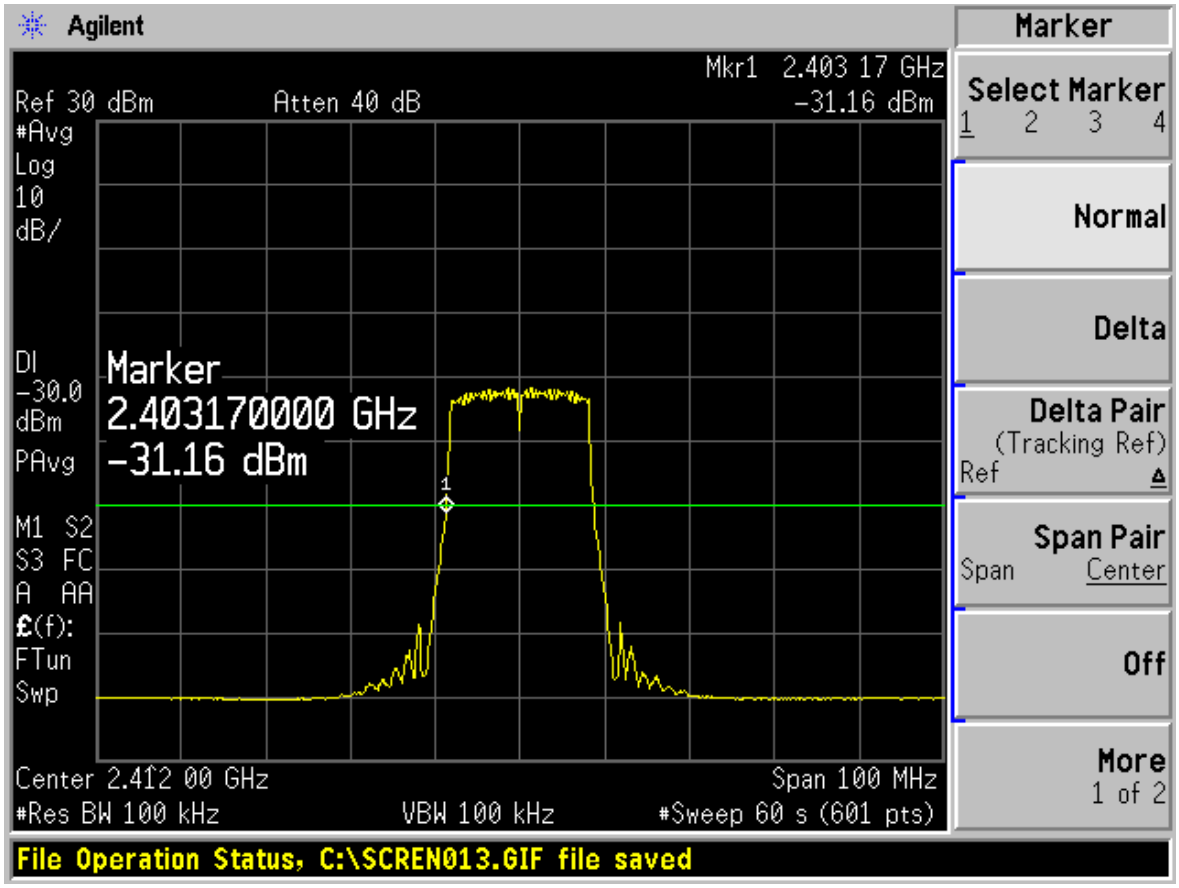
55℃ 3.465V CH1



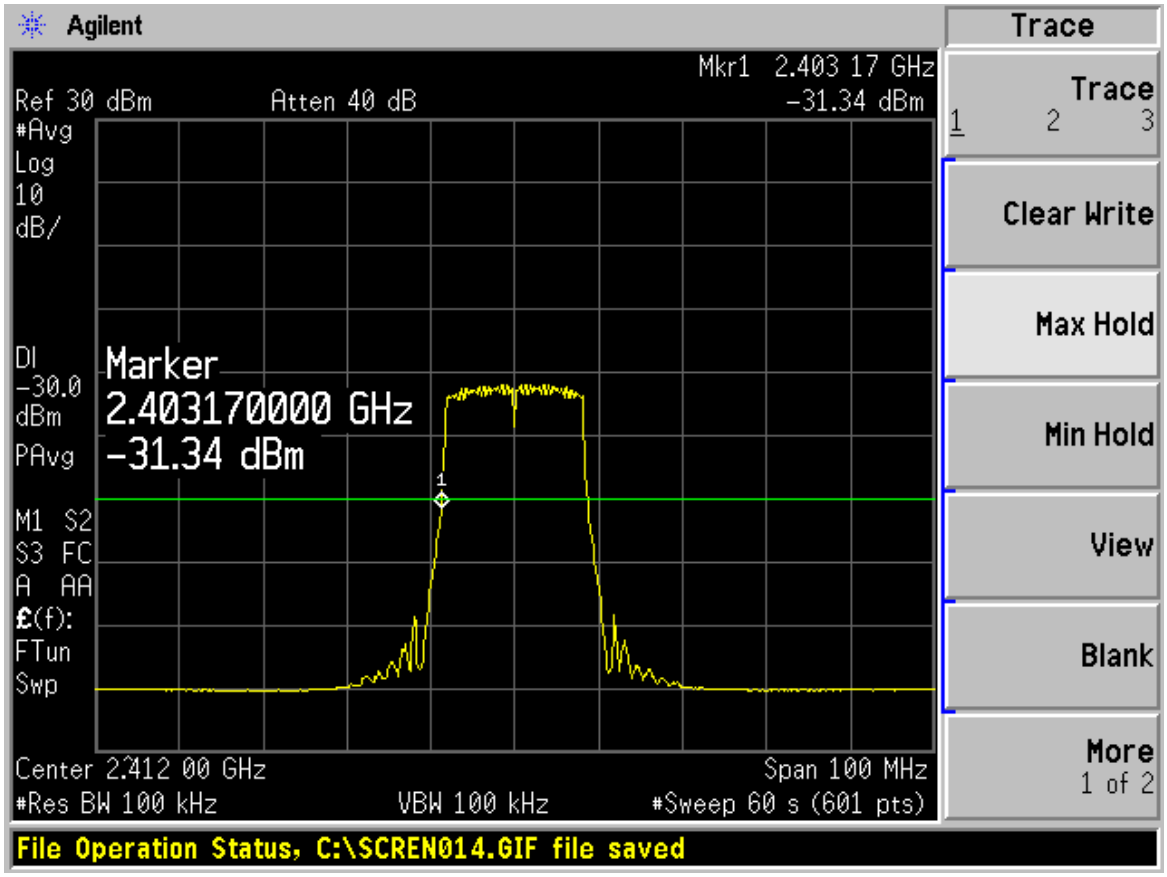
55℃ 3.135V CH1



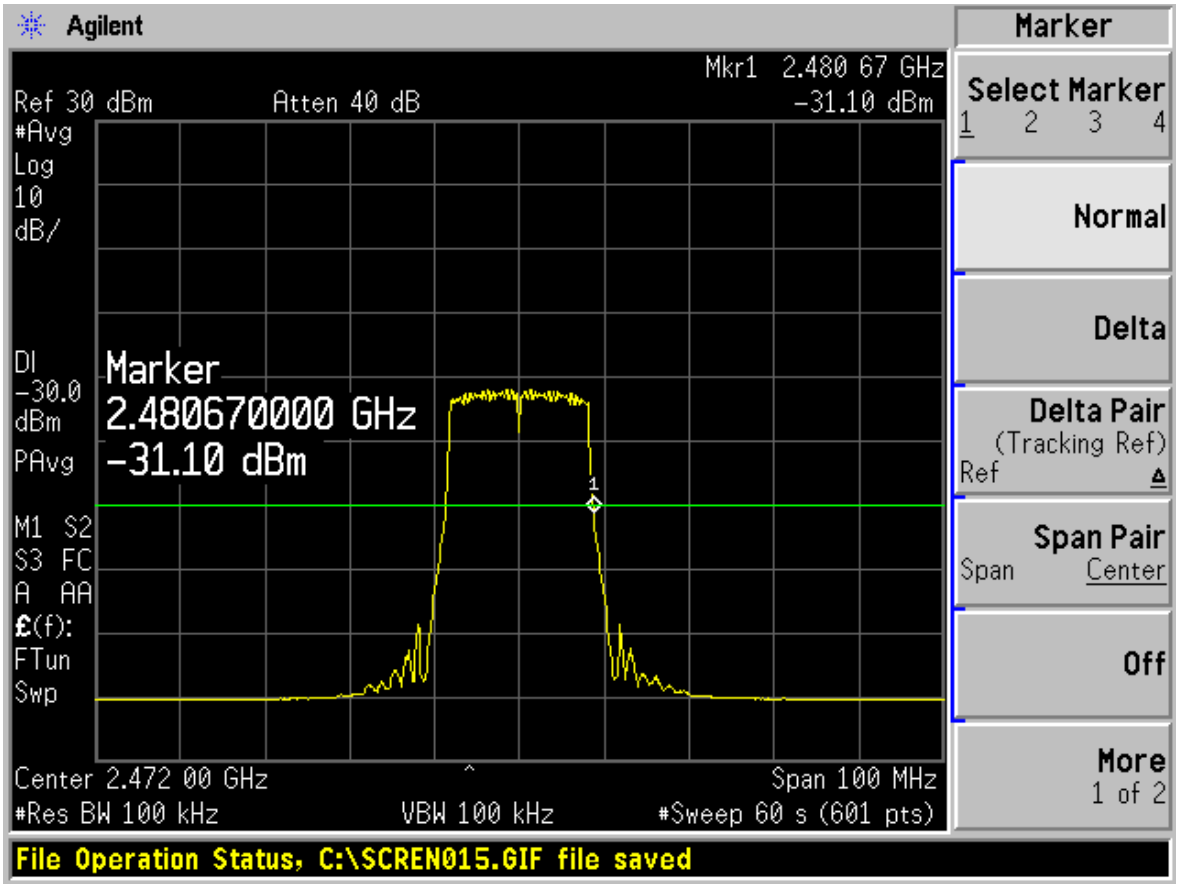
-20℃ 3.465V CH1



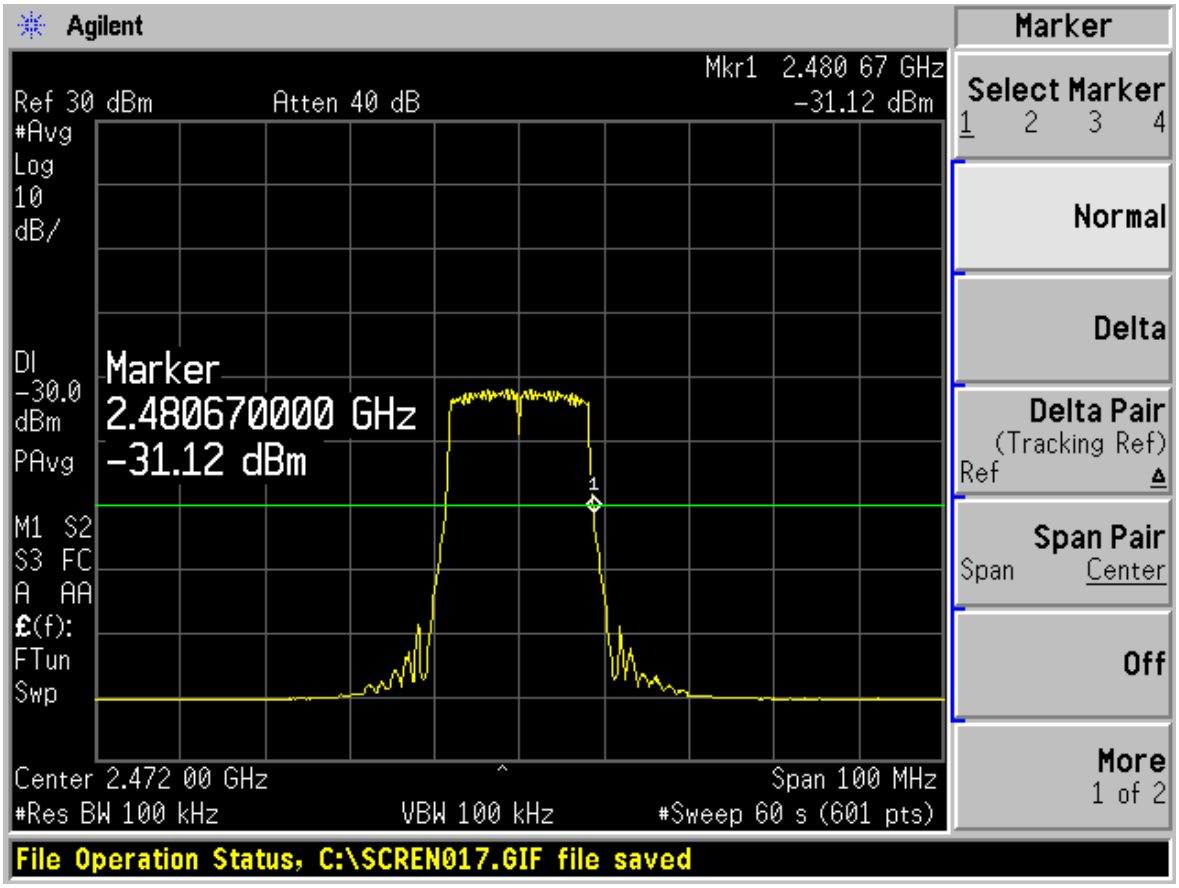
-20℃ 3.135V CH1



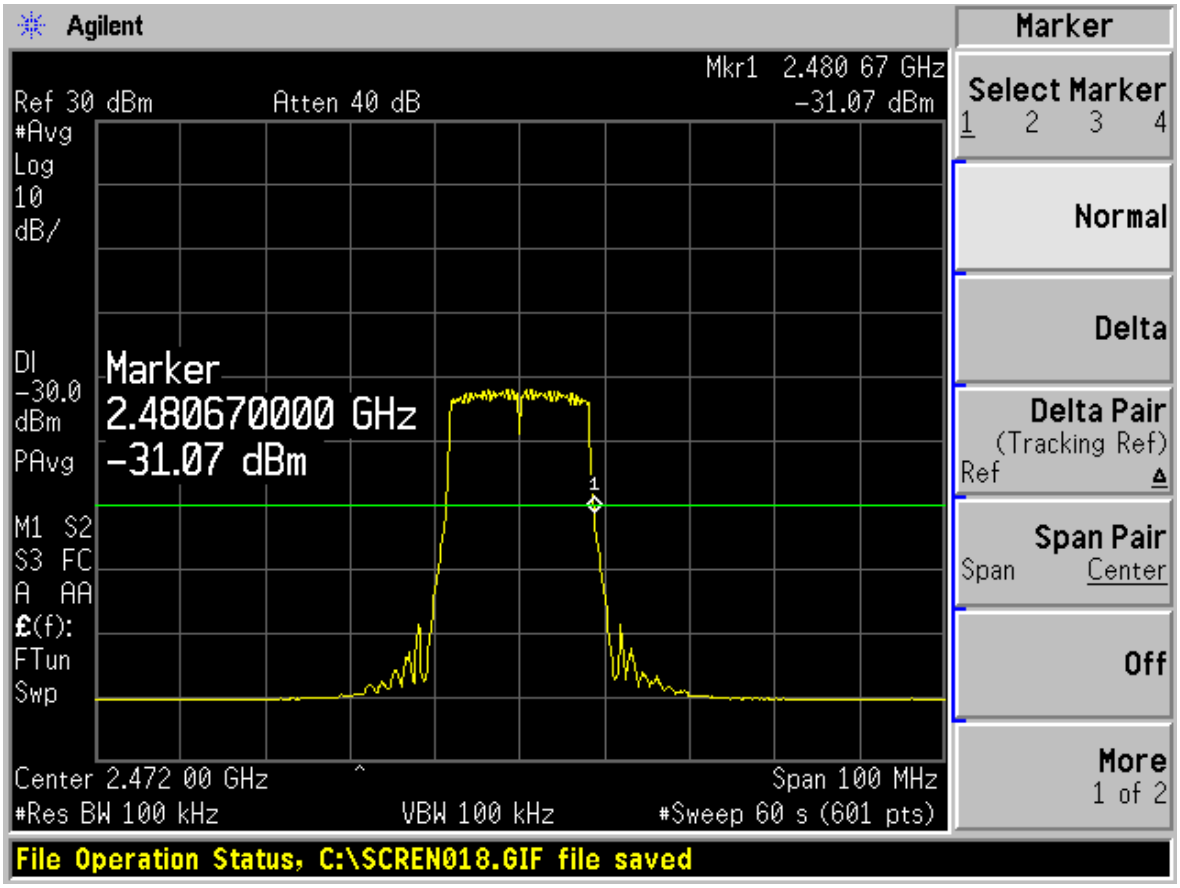
25℃ 3.3V CH13



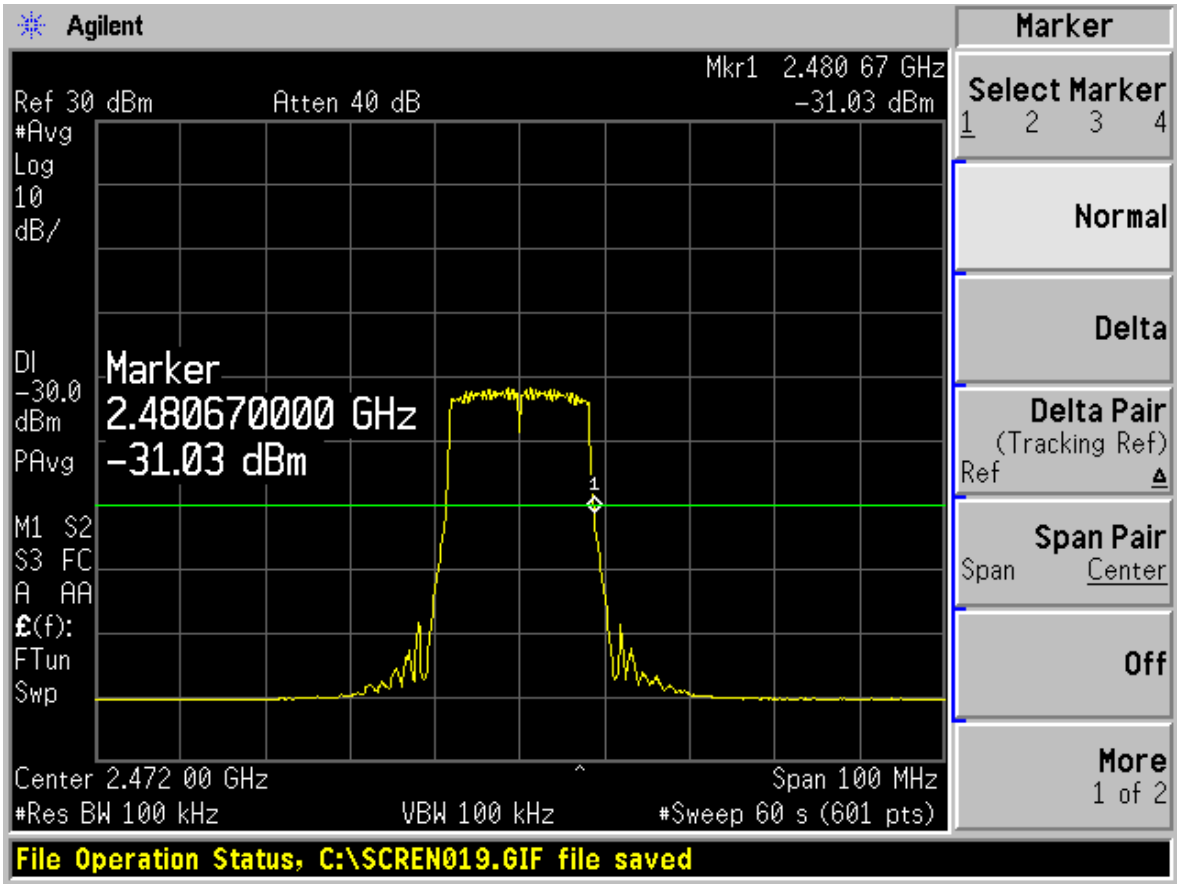
55℃ 3.465V CH13



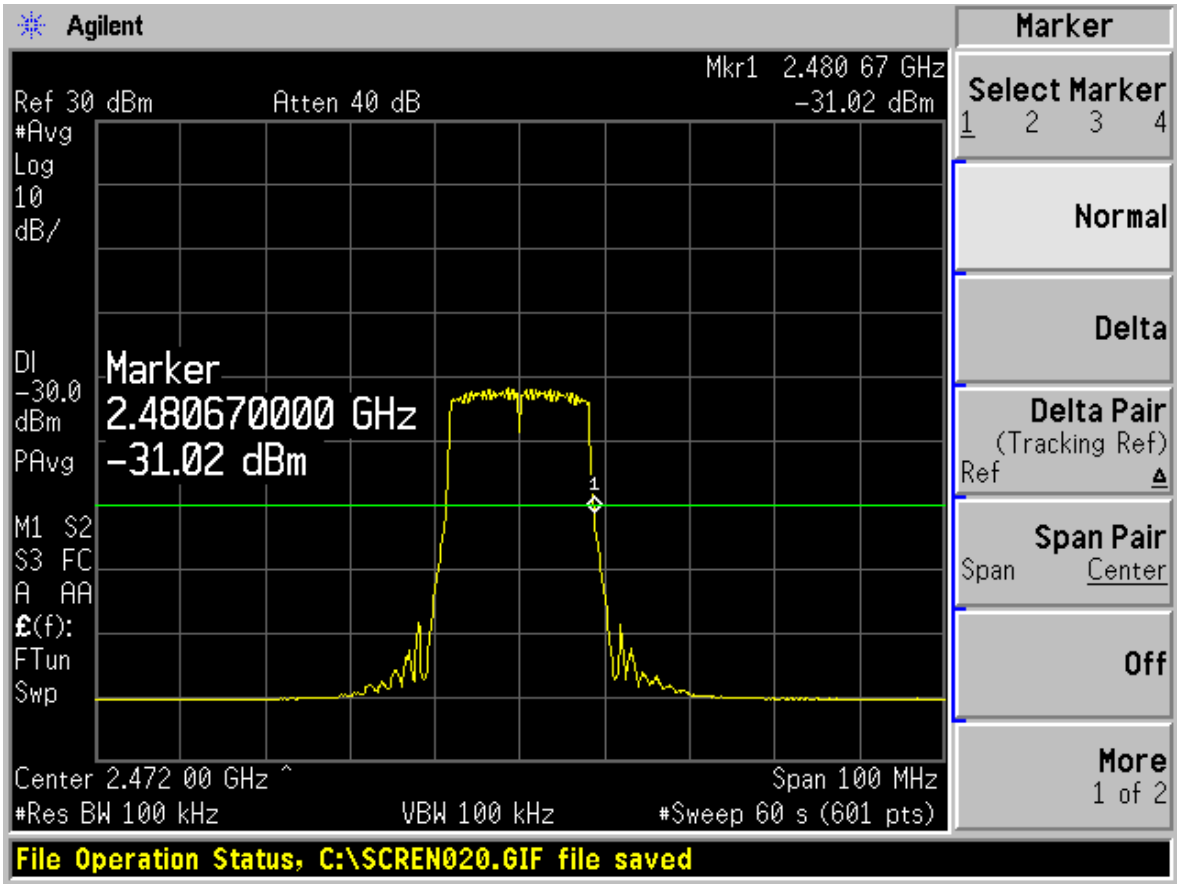
55℃ 3.135V CH13



-20℃ 3.465V CH13



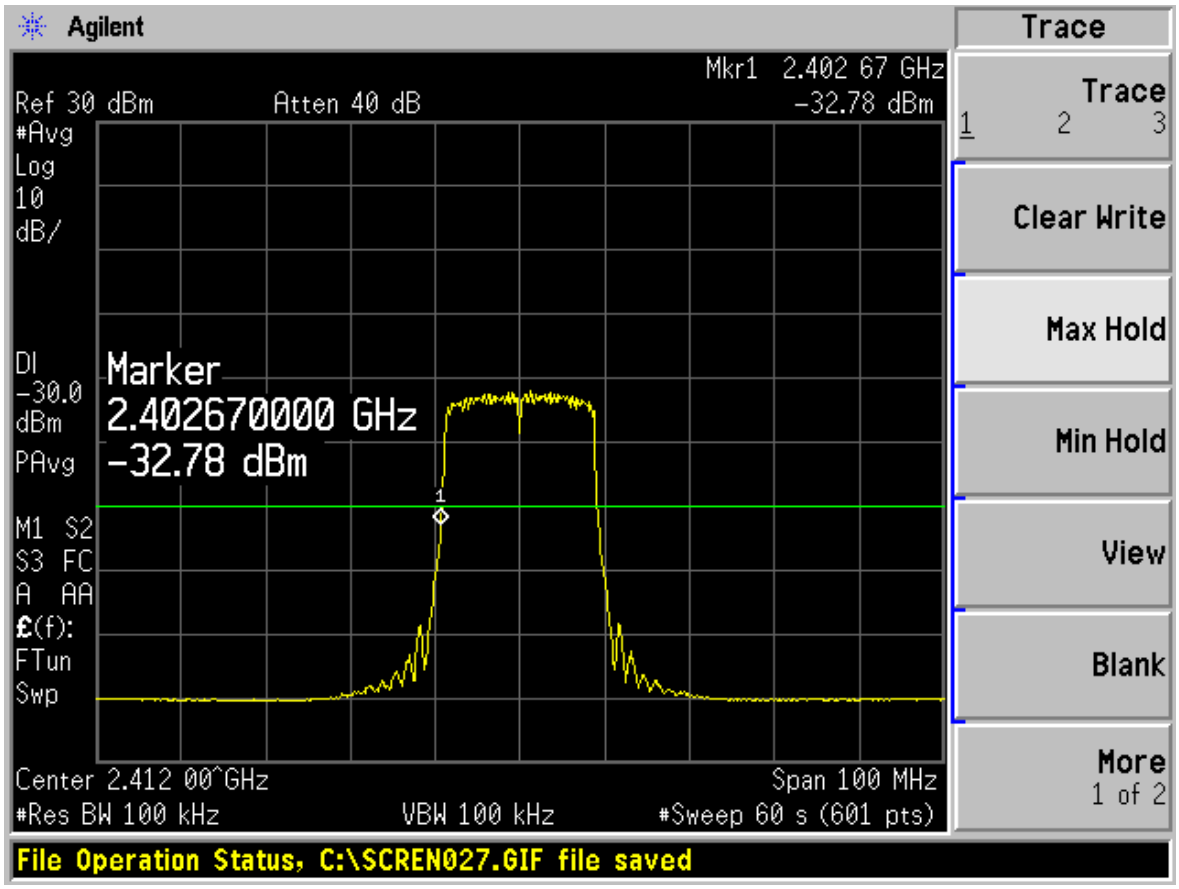
-20℃ 3.135V CH13



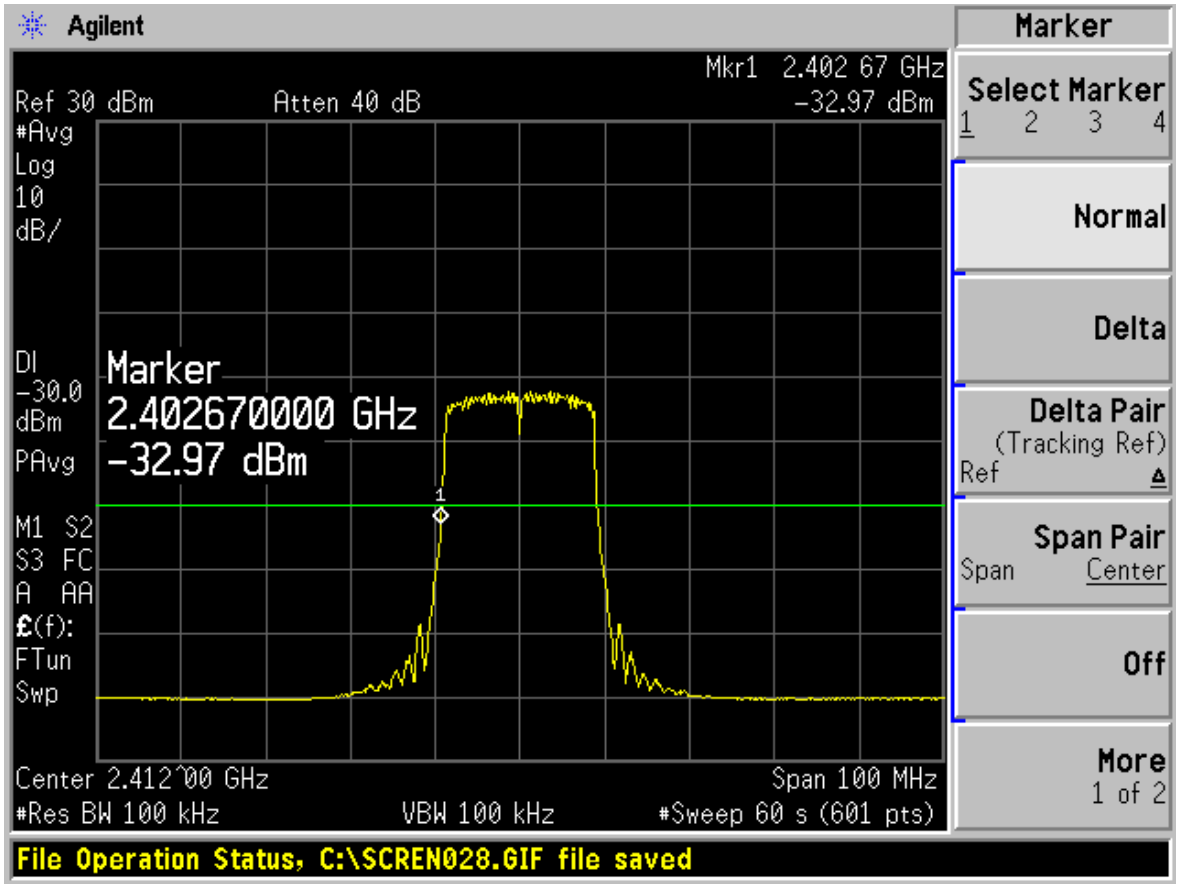
802.11n HT20

Test Condition		Test Results(MHz)	
		CH1	CH13
Tnom=25℃	Vnom= 3.3V	2402.67	2481.17
Tmax=55℃	Vmax= 3.465V	2402.67	2481.17
	Vmin= 3.135V	2402.67	2481.17
Tmin= -20℃	Vmax= 3.465V	2402.67	2481.17
	Vmin= 3.135V	2402.67	2481.17

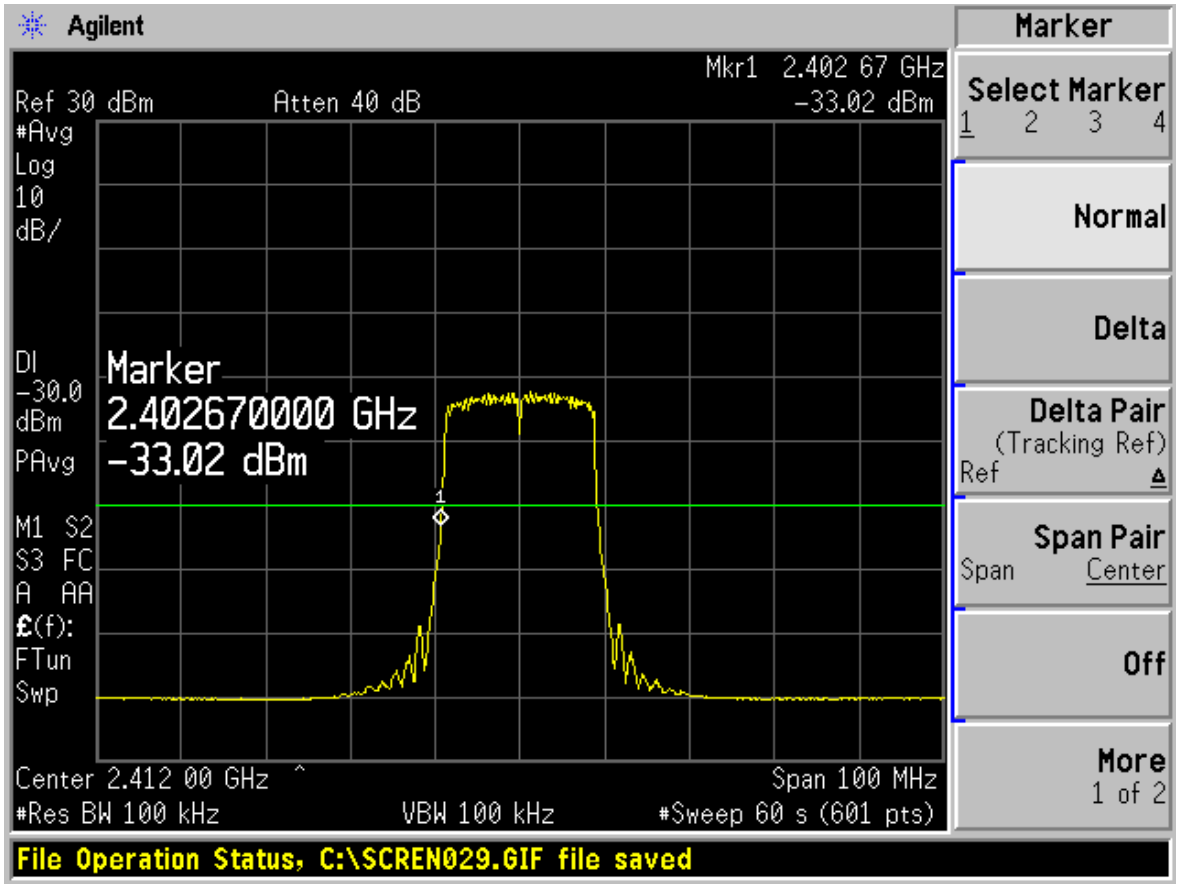
25℃ 3.3V CH1



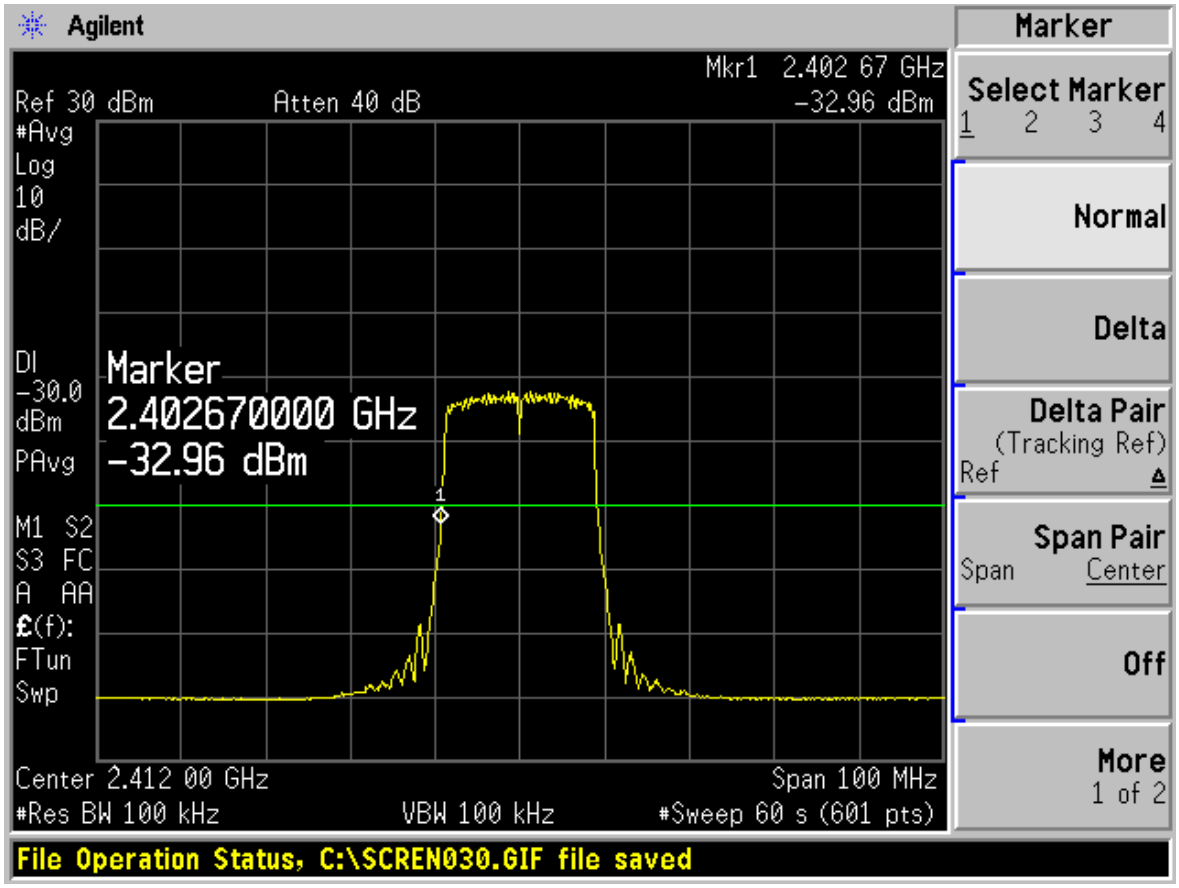
55℃ 3.465V CH1



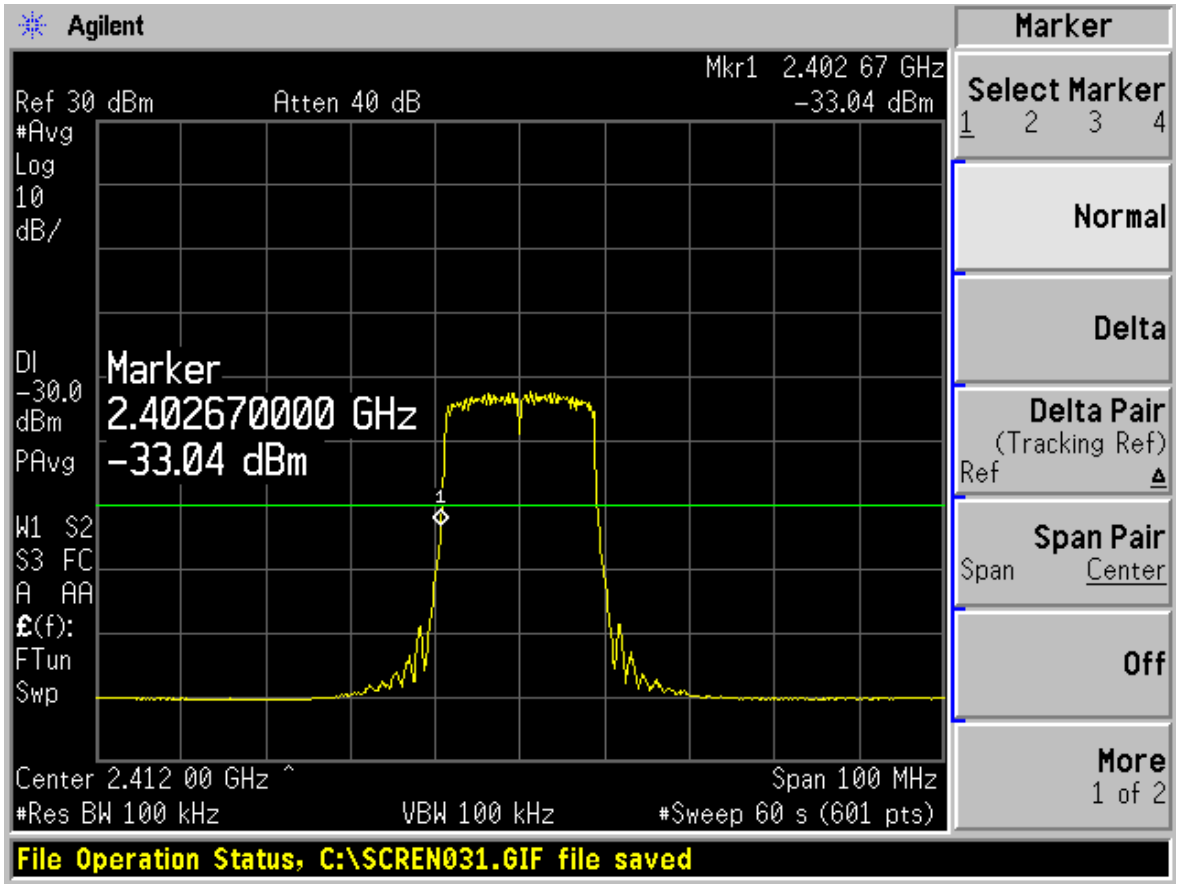
55℃ 3.135V CH1



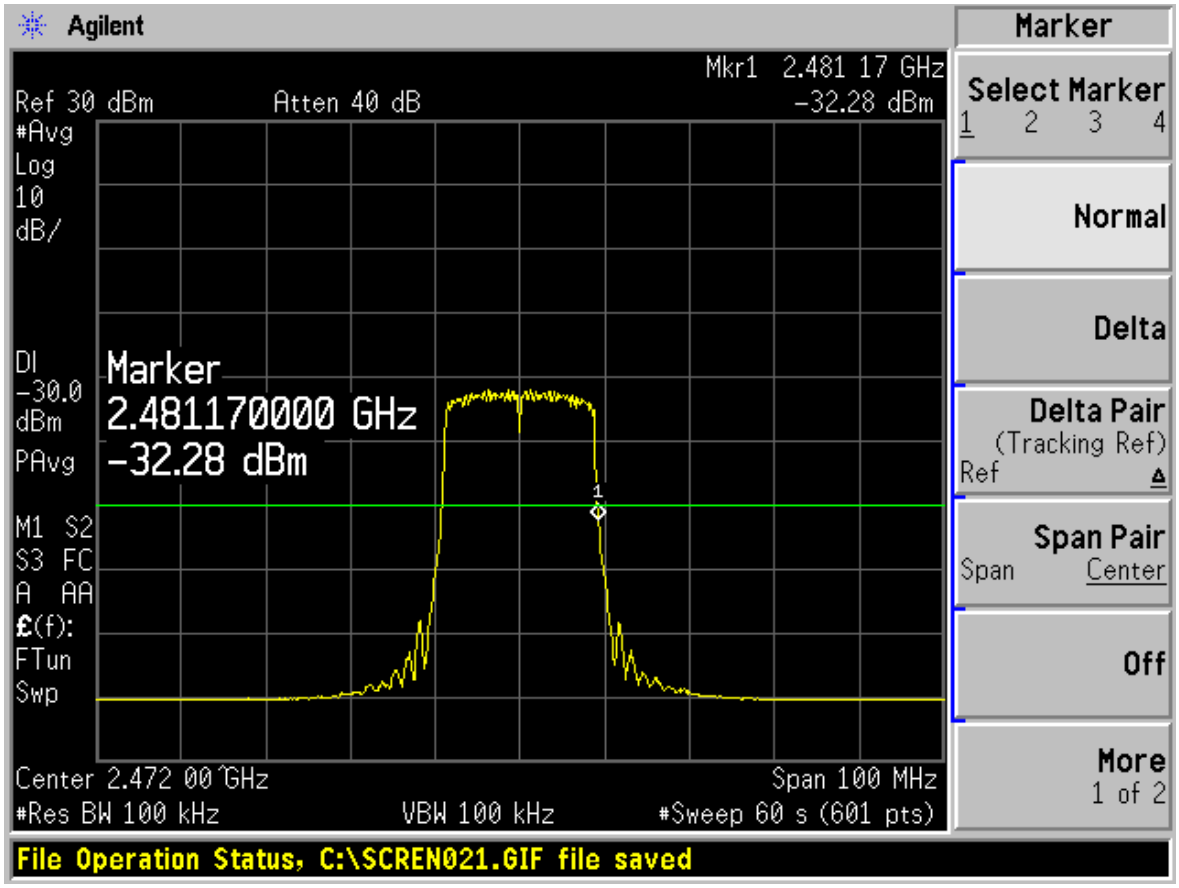
-20℃ 3.465V CH1



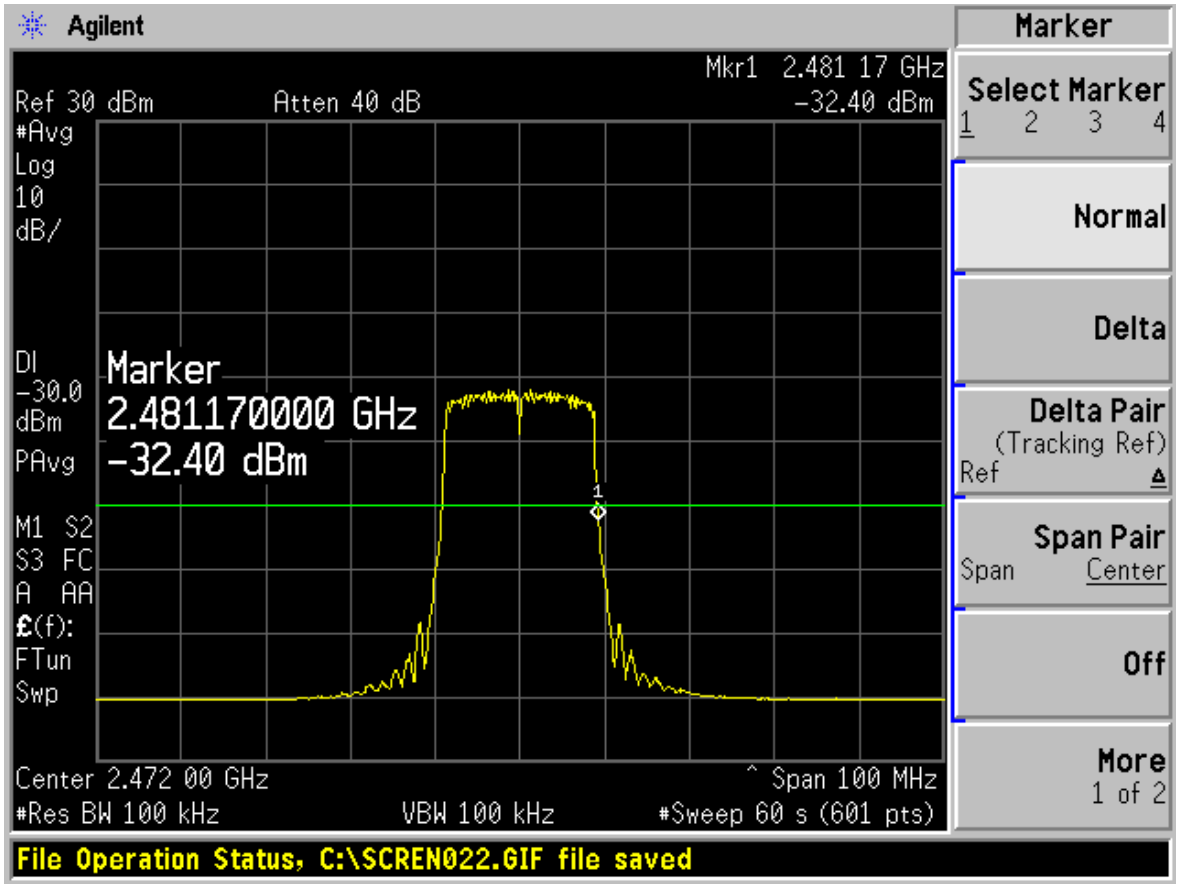
-20℃ 3.135V CH1



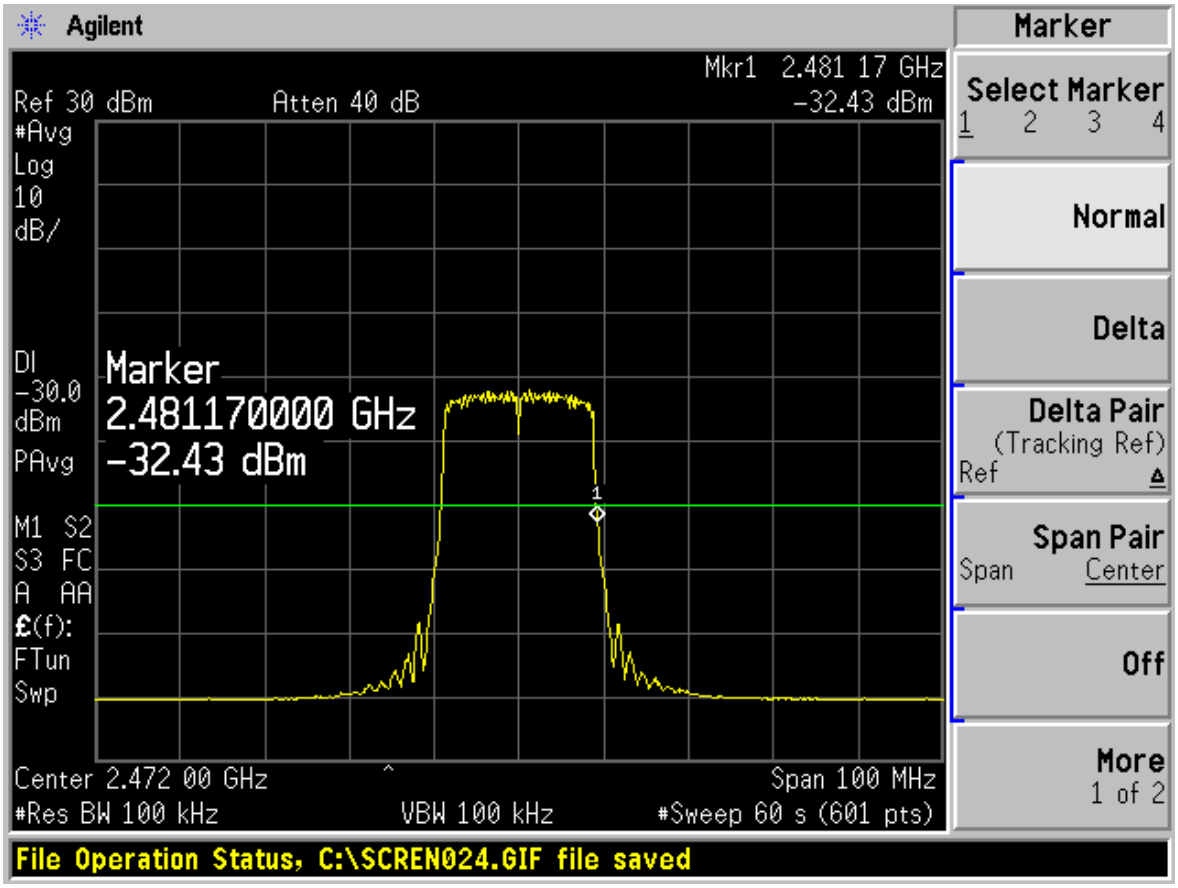
25℃ 3.3V CH13



55℃ 3.465V CH13



55℃ 3.135V CH13



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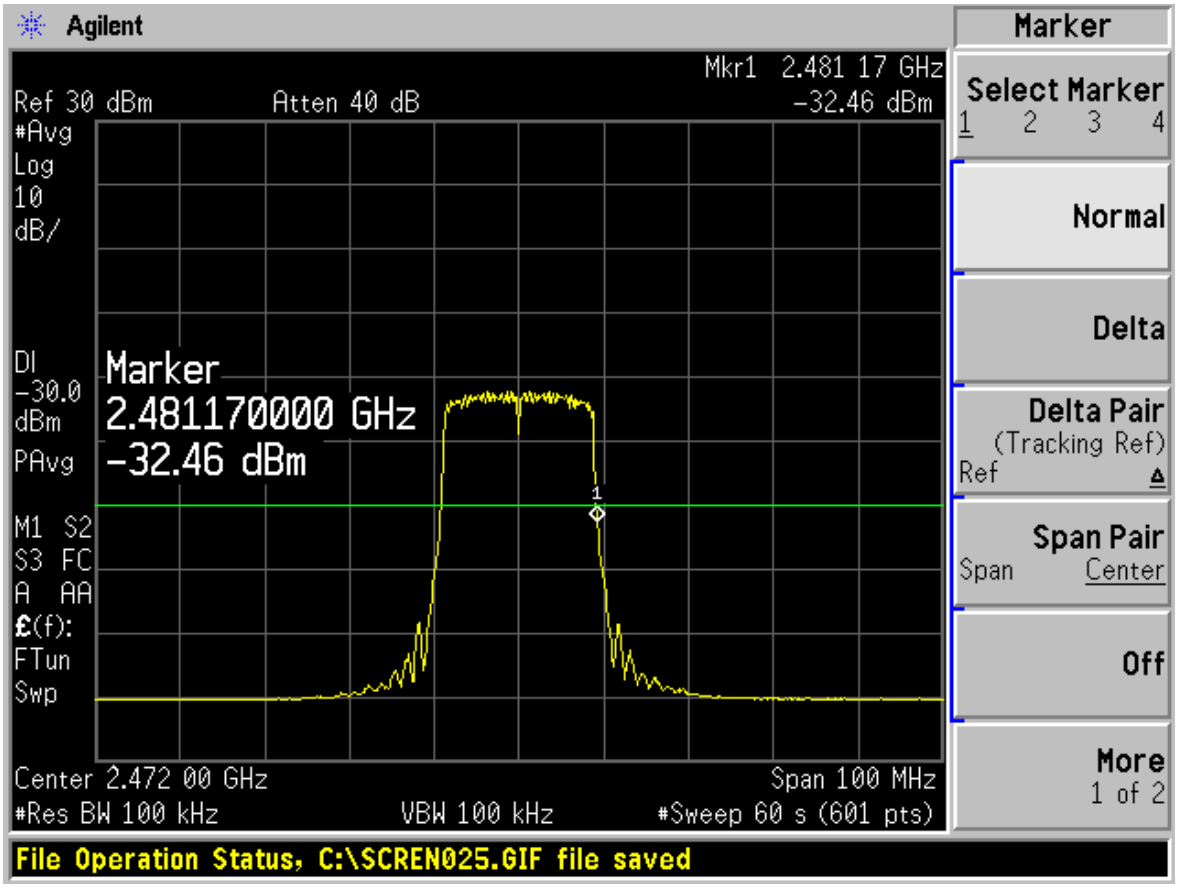

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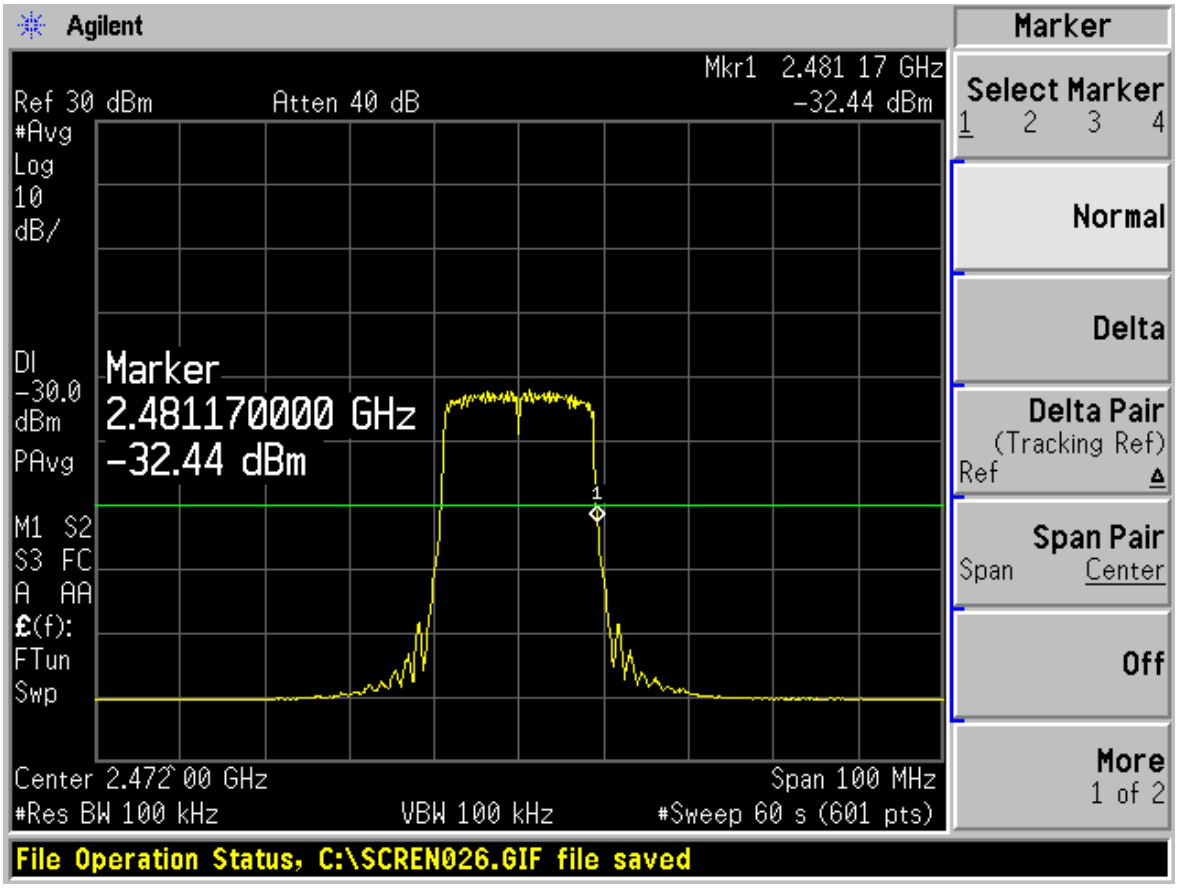
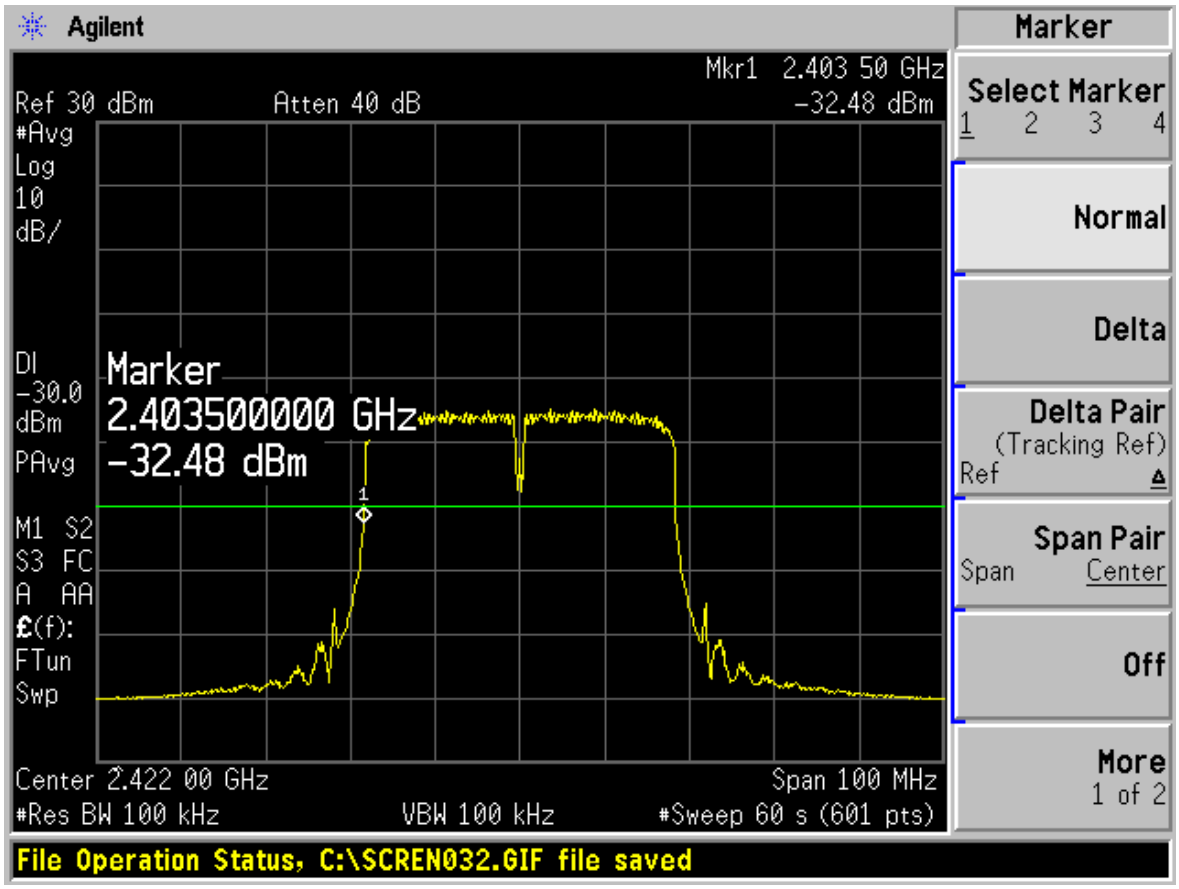


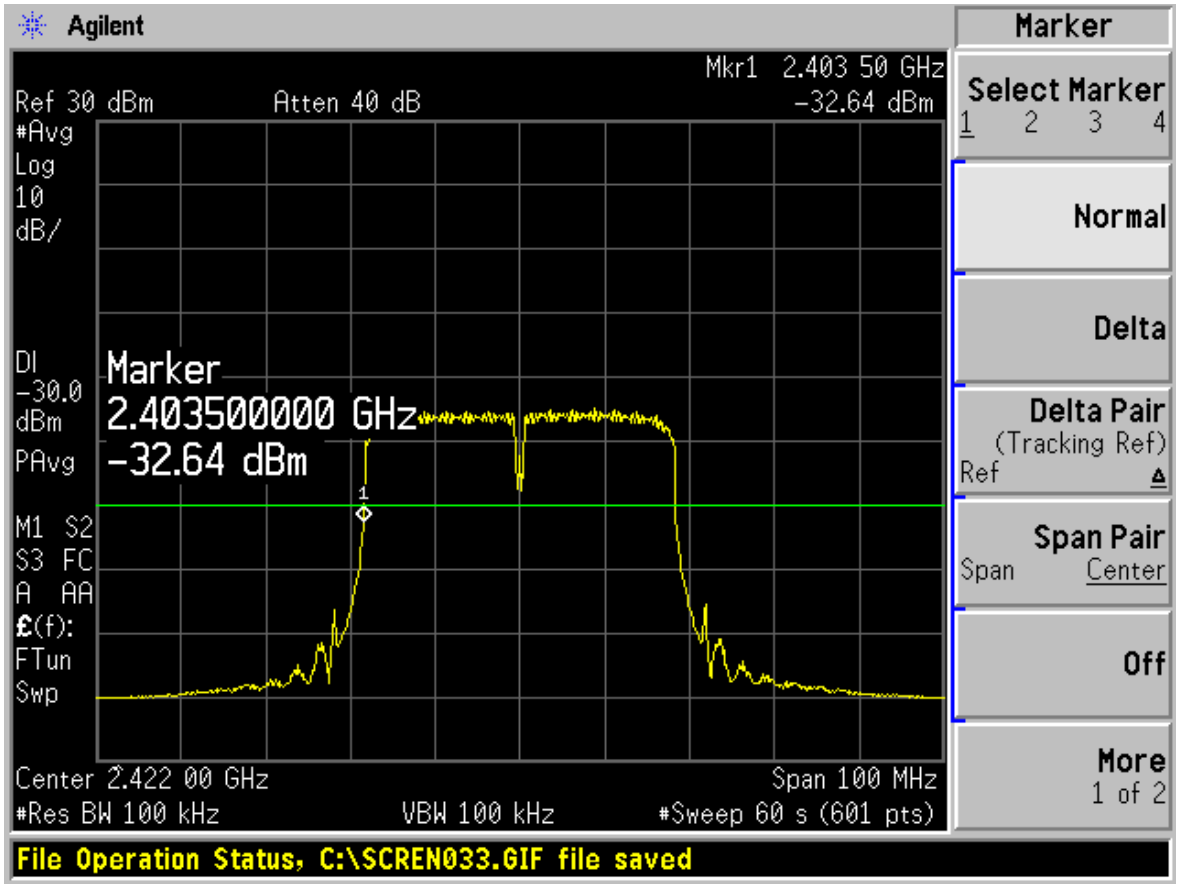
802.11n HT40

Test Condition		Test Results(MHz)	
		CH3	CH11
Tnom=25℃	Vnom= 3.3V	2403.5	2480.33
Tmax=55℃	Vmax= 3.465V	2403.5	2480.33
	Vmin= 3.135V	2403.5	2480.33
Tmin= -20℃	Vmax= 3.465V	2403.5	2480.33
	Vmin= 3.135V	2403.5	2480.33

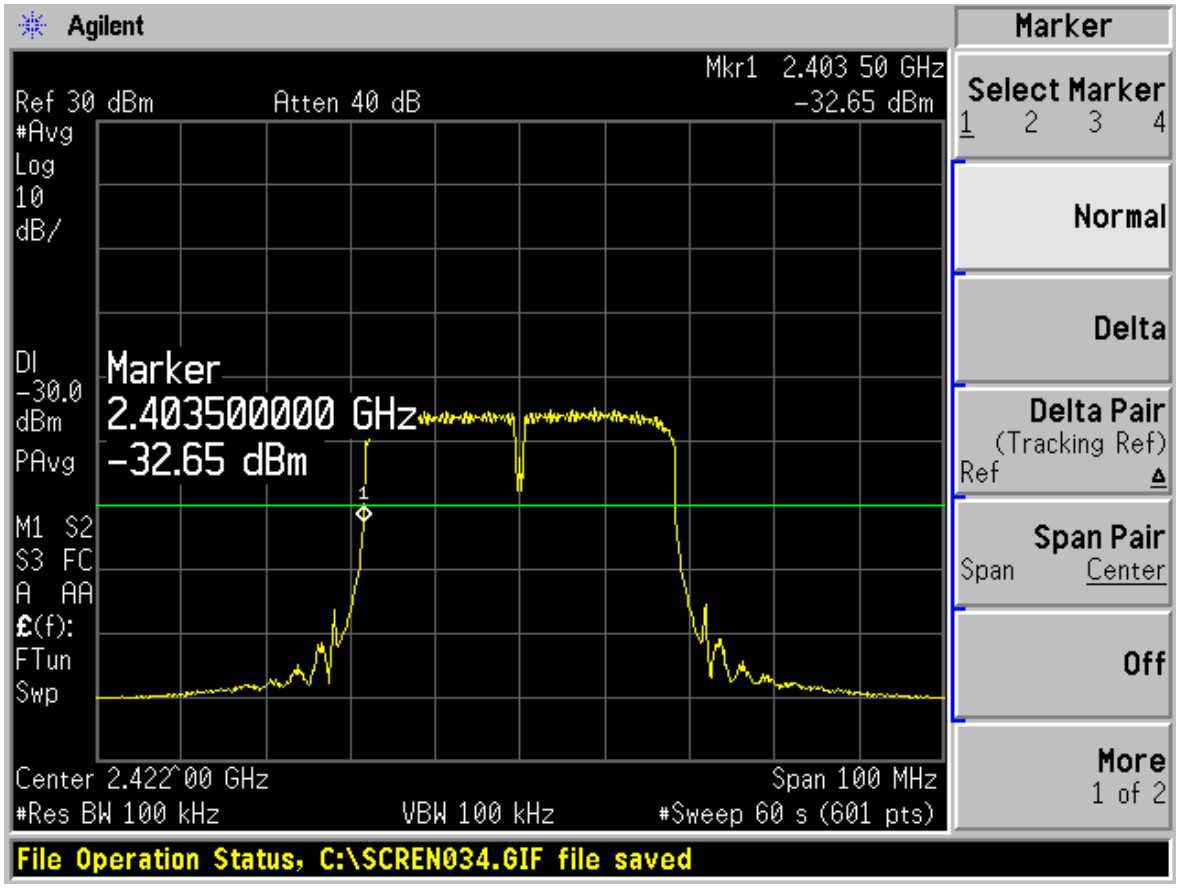
25℃ 3.3V CH3



55℃ 3.465V CH3



55℃ 3.135V CH3



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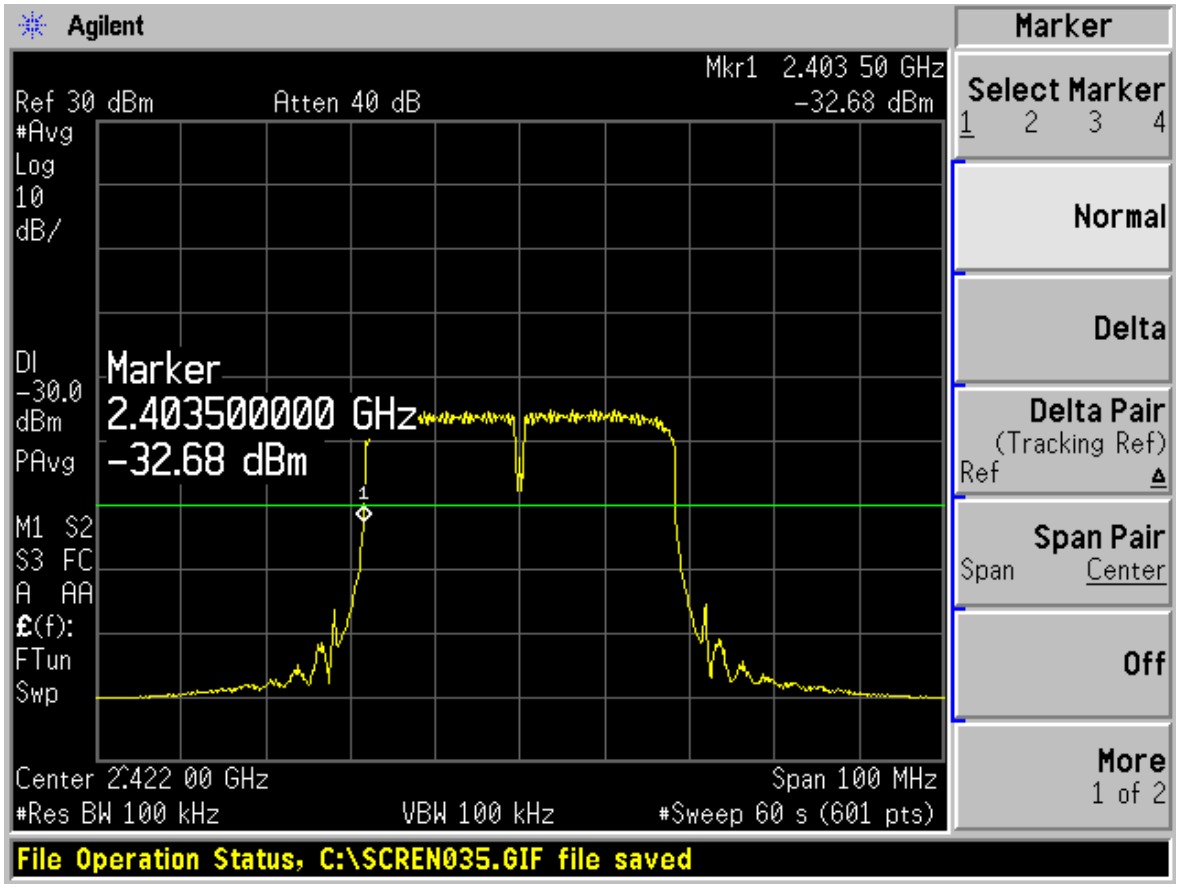

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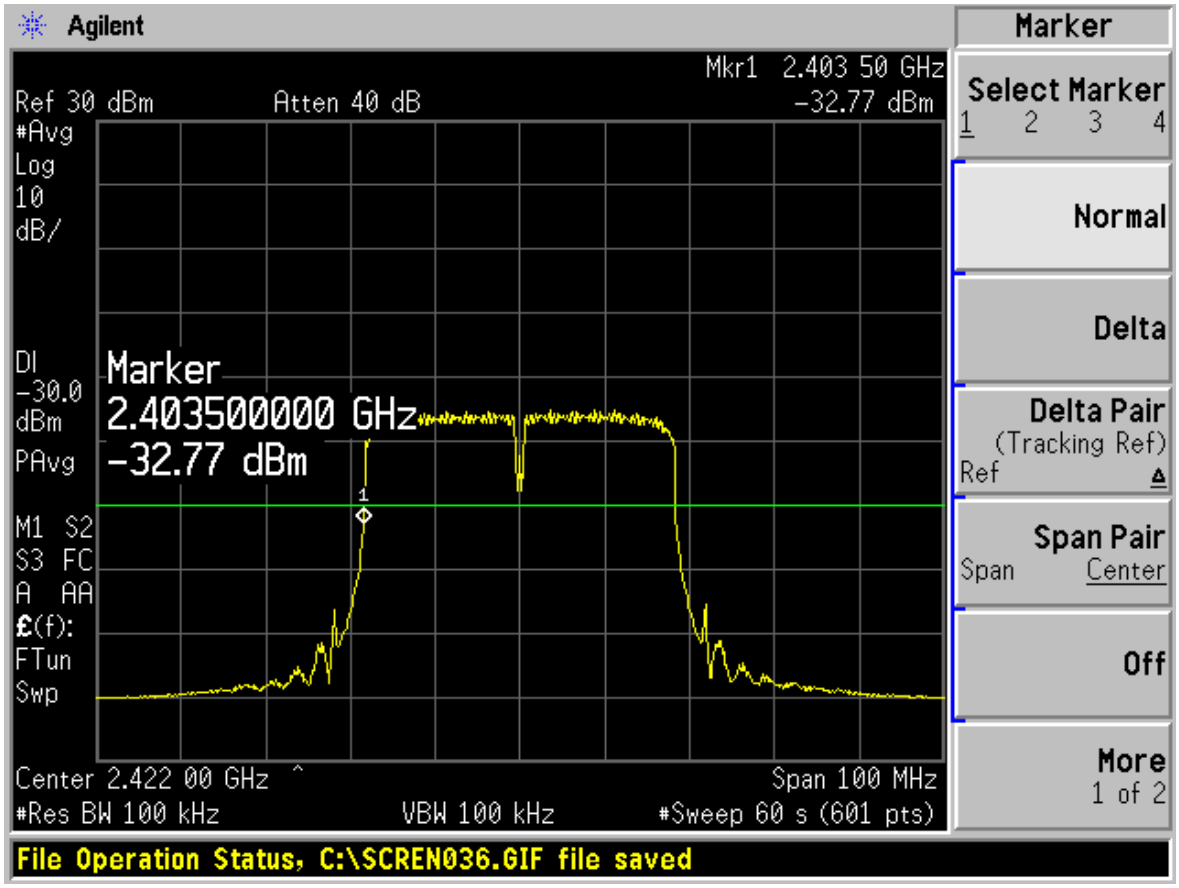
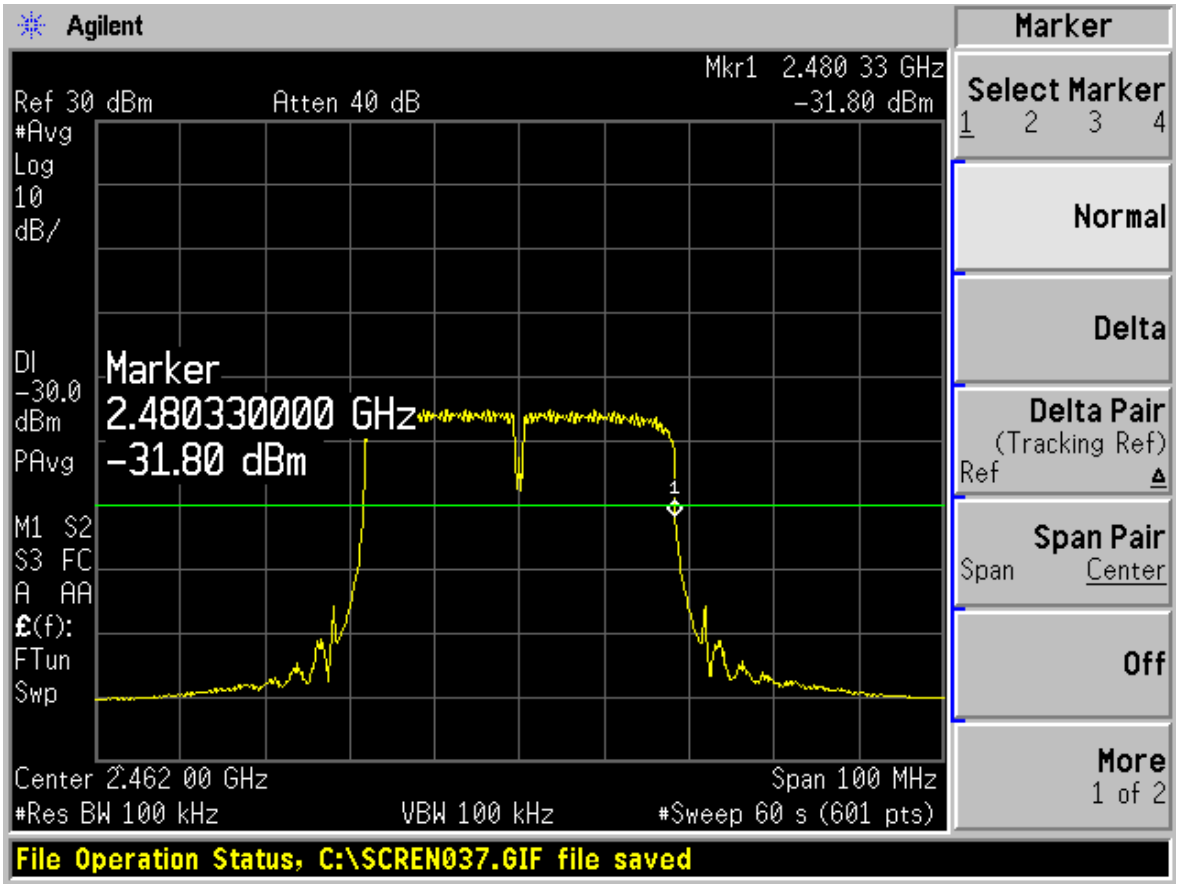
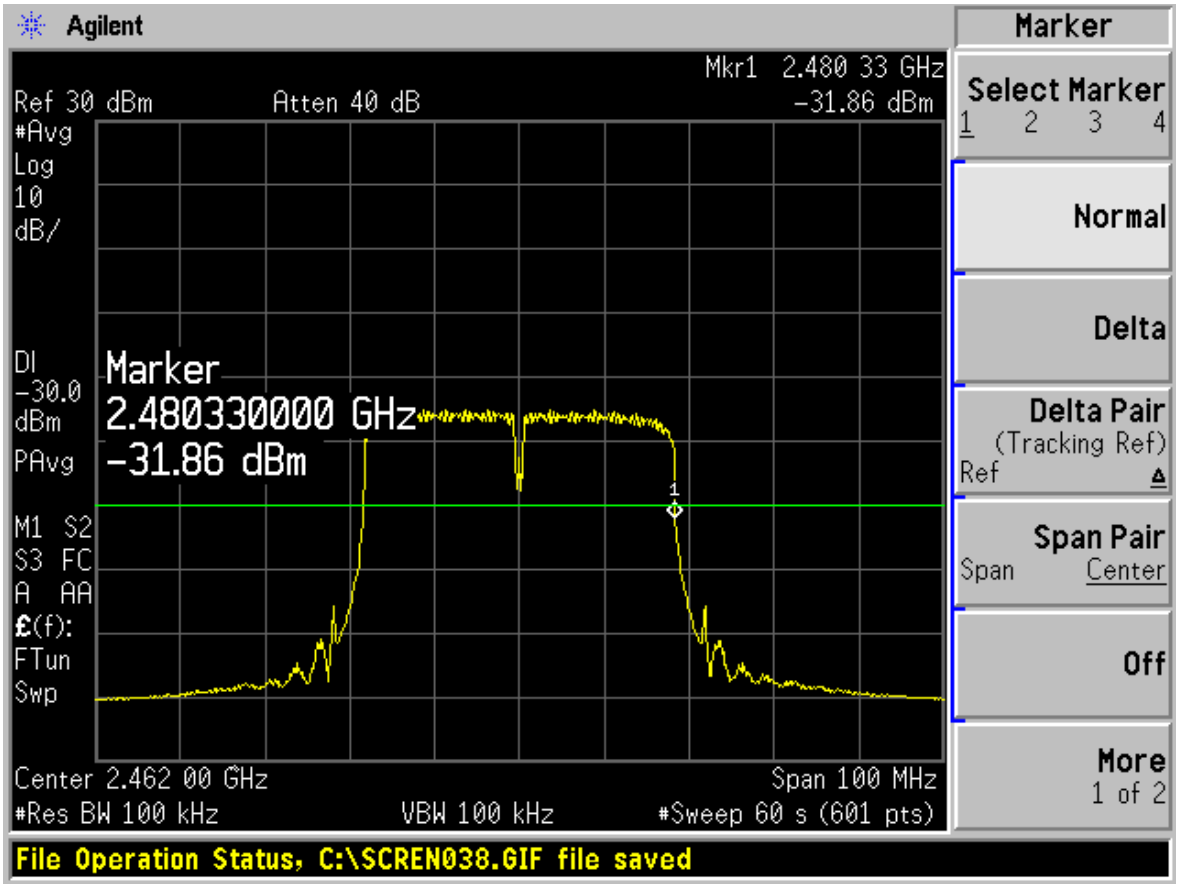


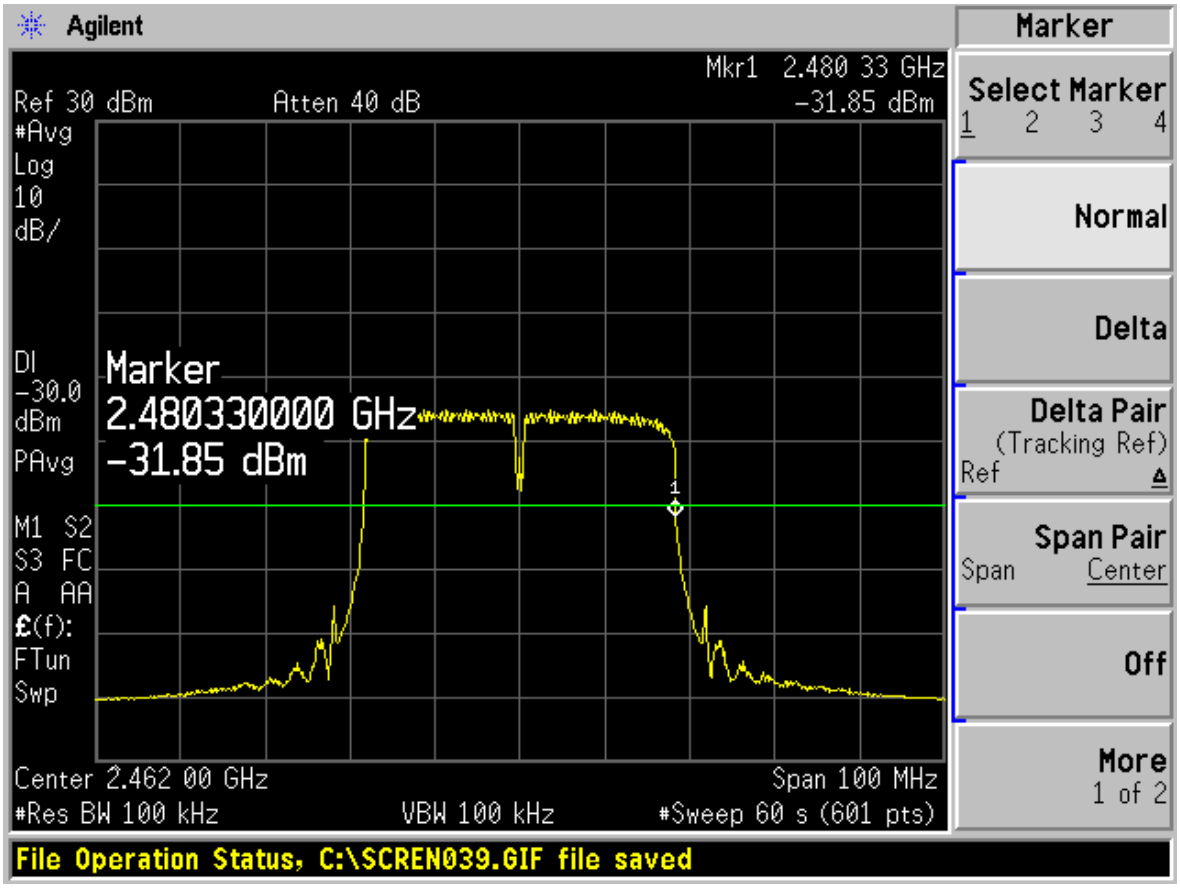
25℃ 3.3V CH11



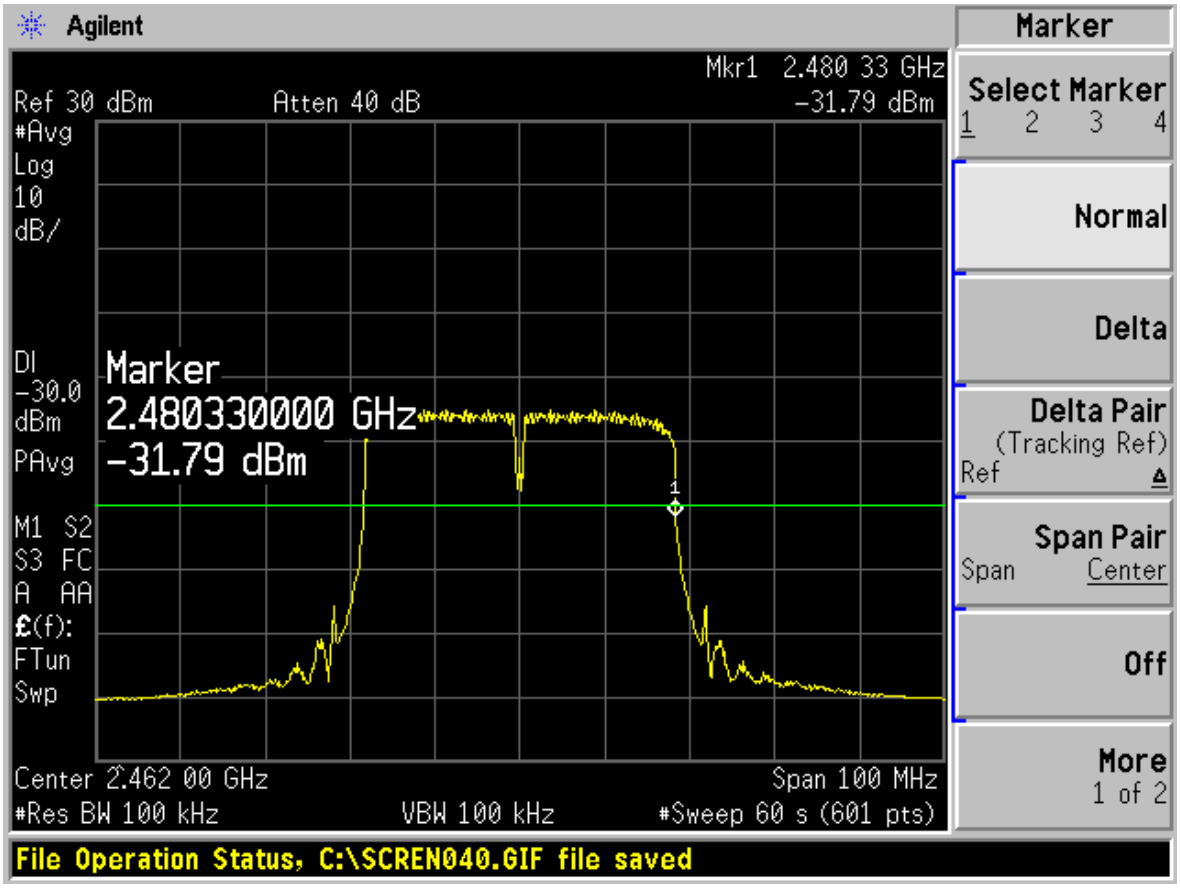
55℃ 3.465V CH11



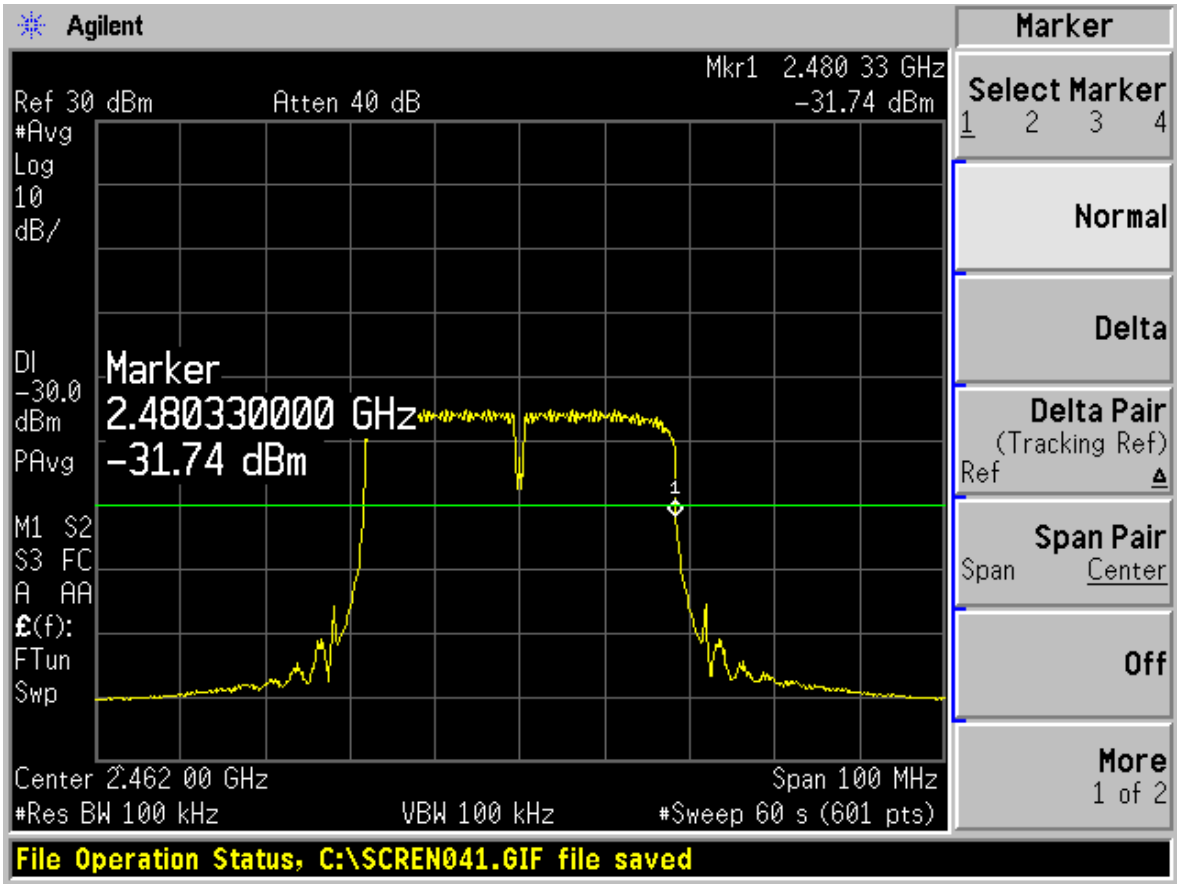
55℃ 3.135V CH11



-20℃ 3.465V CH11



-20℃ 3.135V CH11



2.5. Medium Access Protocol

Standard: ETSI EN300328-Clause 4.3.5

A Medium Access Protocol is implemented by the manufacture.

Conclusions: PASS

2.6. Transmitter Spurious Emissions

2.6.1 Radiated Spurious Emissions

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

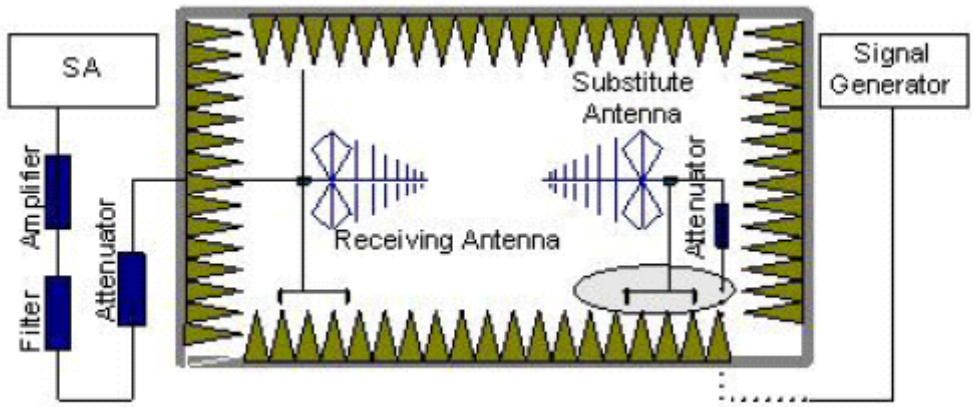
These measurements shall only be performed at normal test conditions and the EUT is in transmitting mode.

Radiated measurements shall be performed with the aid of a test antenna and measurement instruments .The following test procedure applies:

1. Pre-calibration

   In a fully anechoic chamber, A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted at a 3 meter test distance from the receive antenna. An RF signal source is connected to the dipole with a Tx cable that has been constructed to not interfere with radiation pattern of the antenna. A known (measured) power (Pin) is applied to input of dipole, and the power received (Pr) is recorded from the spectrum analyzer.

   “Reference Path loss” is established as Pin –Pr-Tx cable loss+ Substitution antenna gain.



2. EUT Test

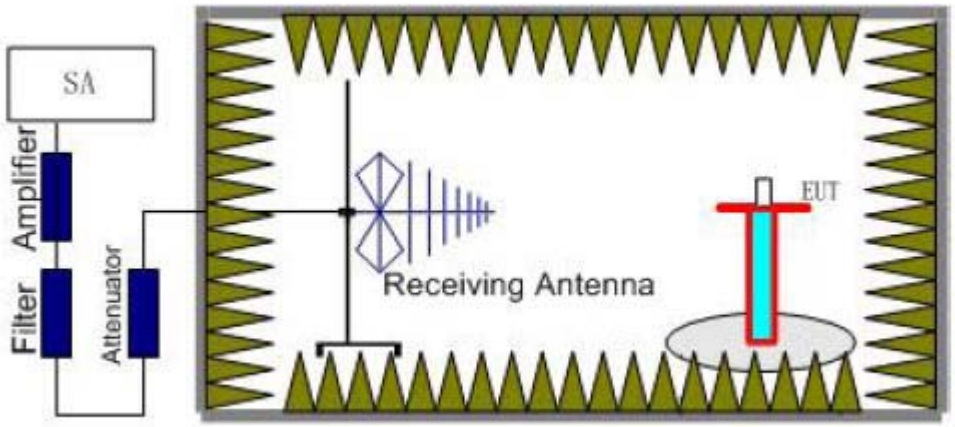
   EUT was placed on a 1.5 meter high non – conductive table at a 3 meter test distance from the receive antenna. The height of receiving antenna is 1.5 m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the table and adjusting the receiving antenna polarization. The measurement is carried out using a spectrum analyzer .The radiated emission measurements of all non-harmonic and harmonic of the transmit frequency from 30MHz to 12.75GHz were measured with peak detector. RBW is set to 100kHz and VBW is set to 300kHz for 30MHz to 1GHz. RBW is set to 100kHz,VBW is set to 30kHz for the carrier frequency, RBW is set to 1MHz and VBW is set to 3MHz for other frequency above 1GHz.A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency. If the harmonic could not be detected above the noise floor, the ambient level was recorded.

The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

Calculation procedure:

RSE = Rx (dBm) + Reference Path loss

Rx: reading of the receiver



The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis) and docking mode. The worst emission was found in lie-down position (X axis) and the worst case was recorded.

Limit

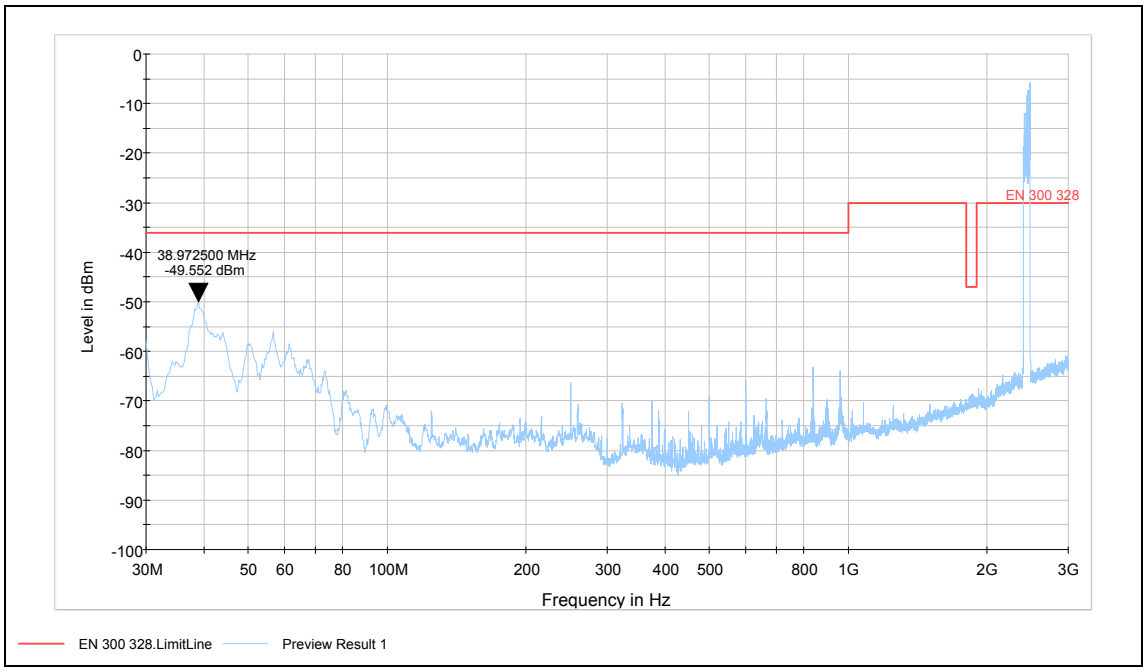
Frequency Range	Limits(dBm)
30MHz to 1GHz	-36dBm
Above 1GHz to 12.75GHz	-30dBm
1.8GHz to 1.9GHz, 5.15GHz to 5.3GHz	-47dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor k = 1.96, U= 3.55 dB.

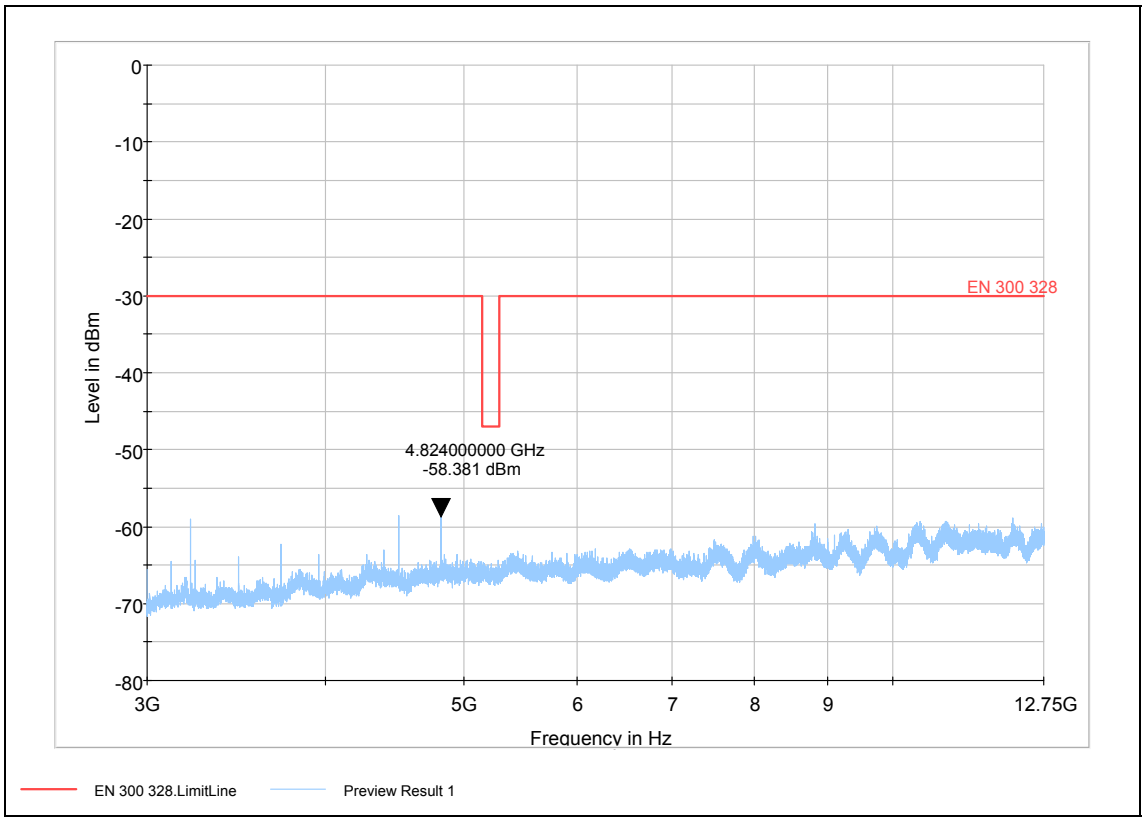
Results

802.11b- Channel 1



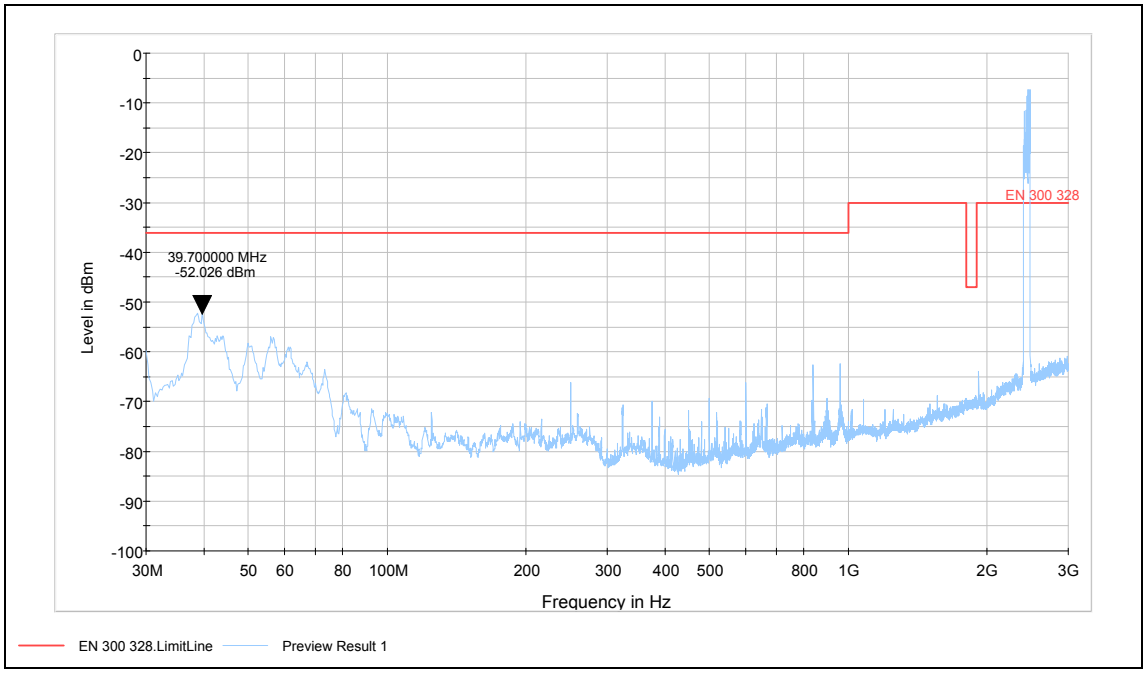
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



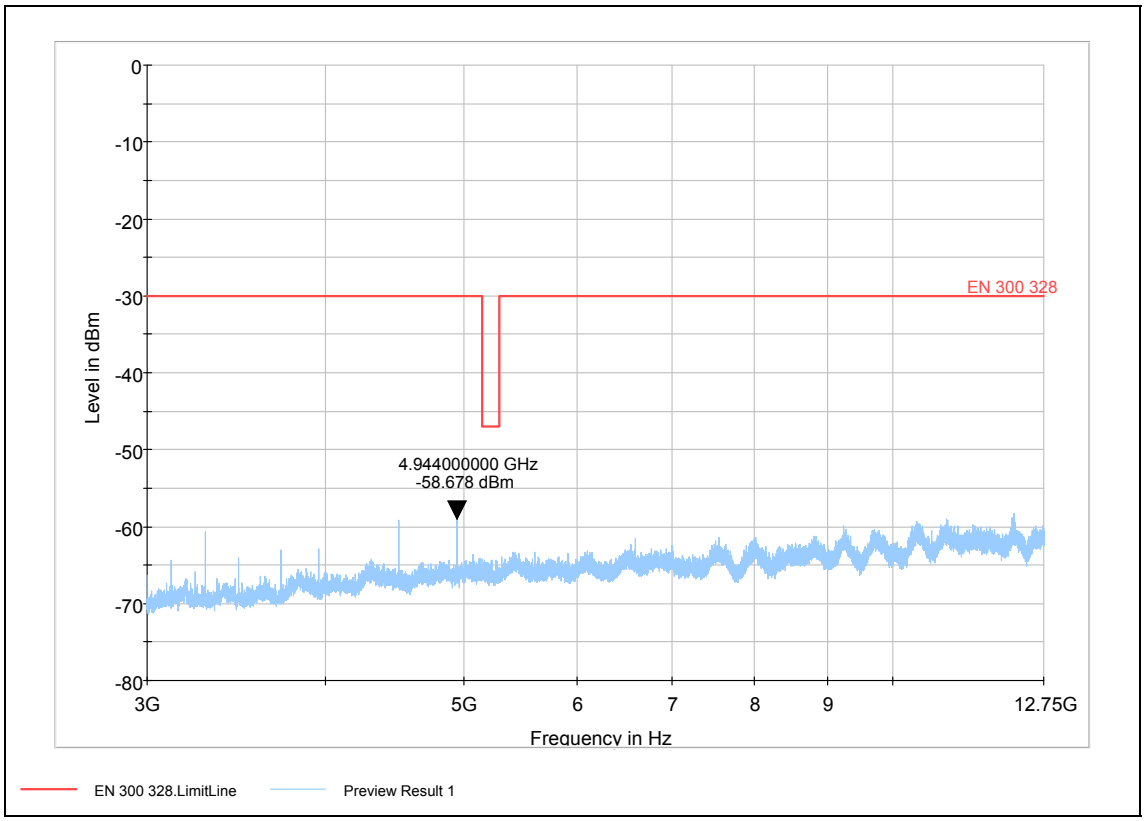
Radiated Spurious Emissions 3G-12.75GHz

802.11b- Channel 13



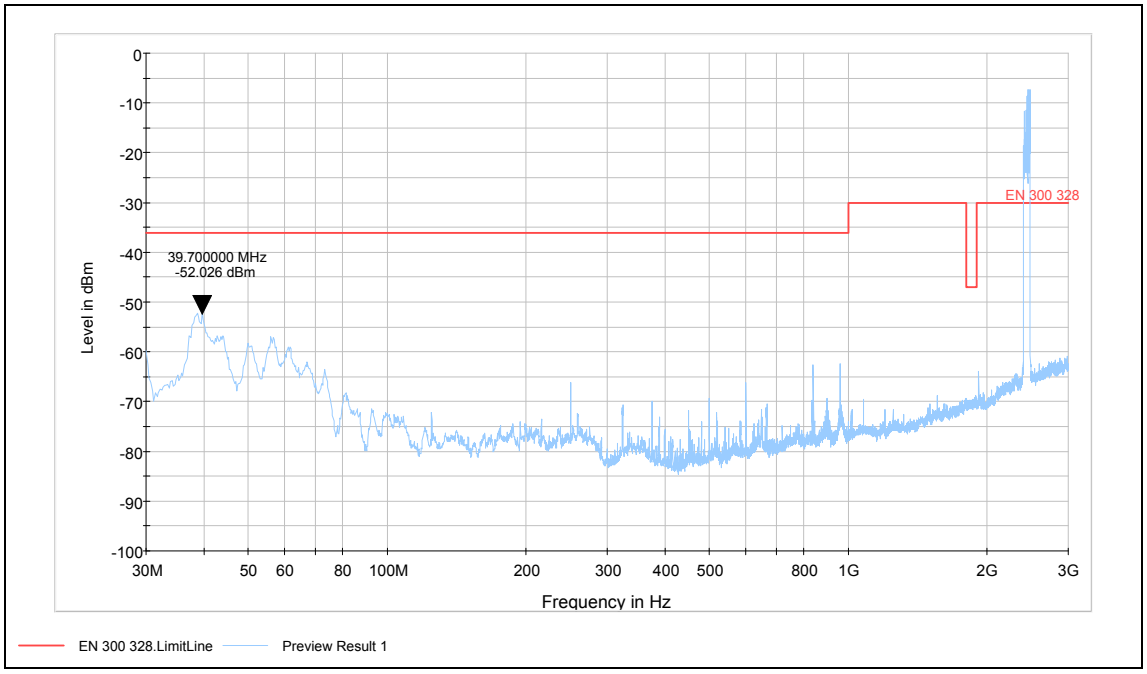
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



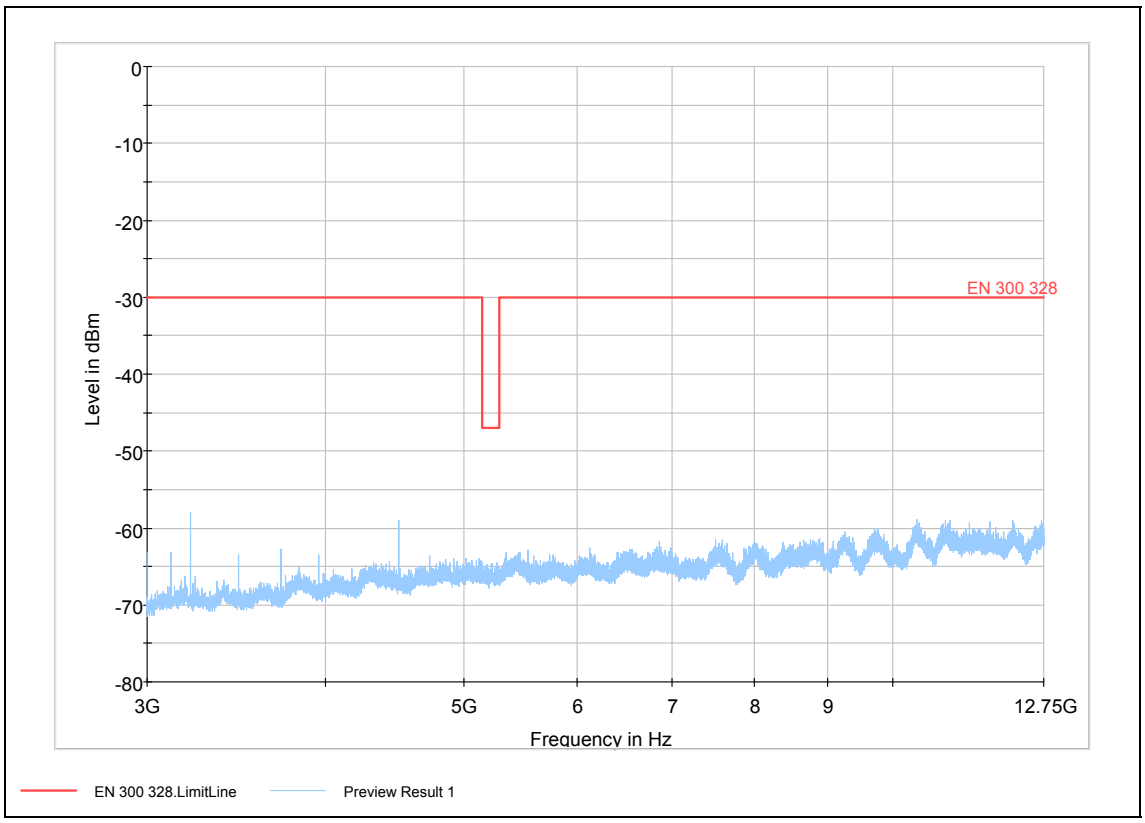
Radiated Spurious Emissions 3G-12.75GHz

802.11g- Channel 1



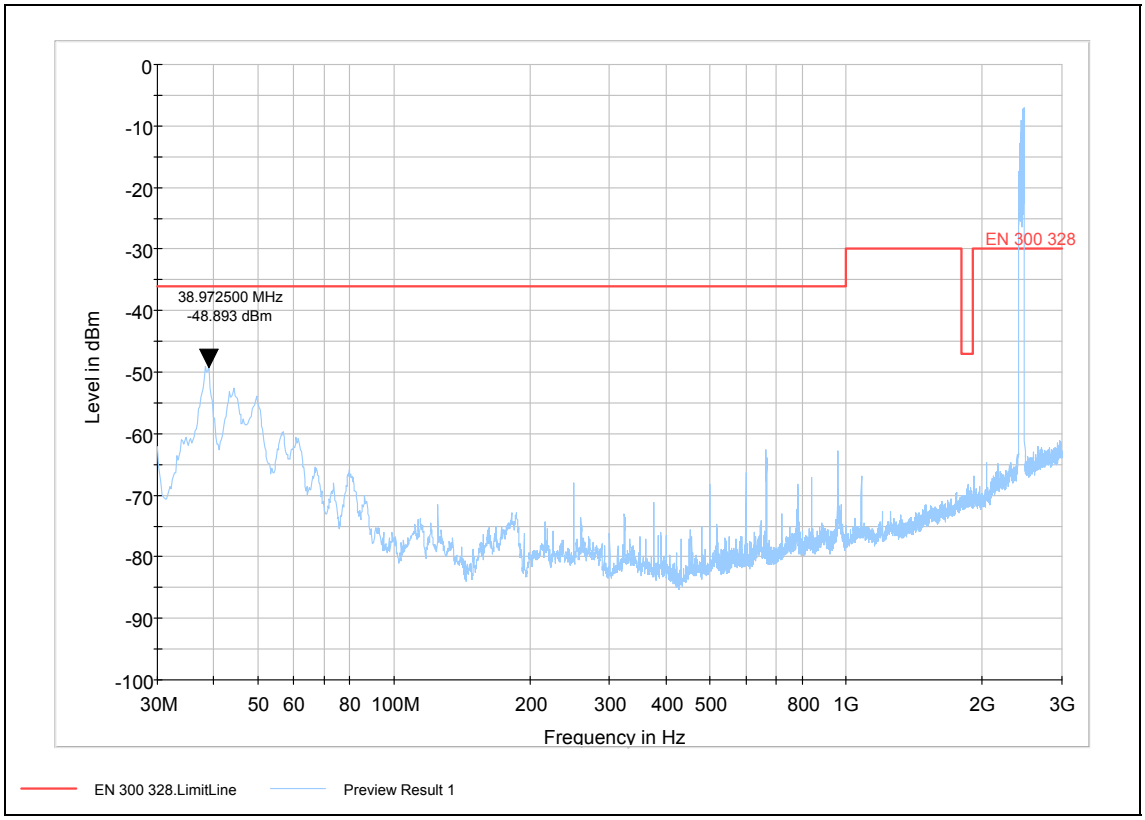
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



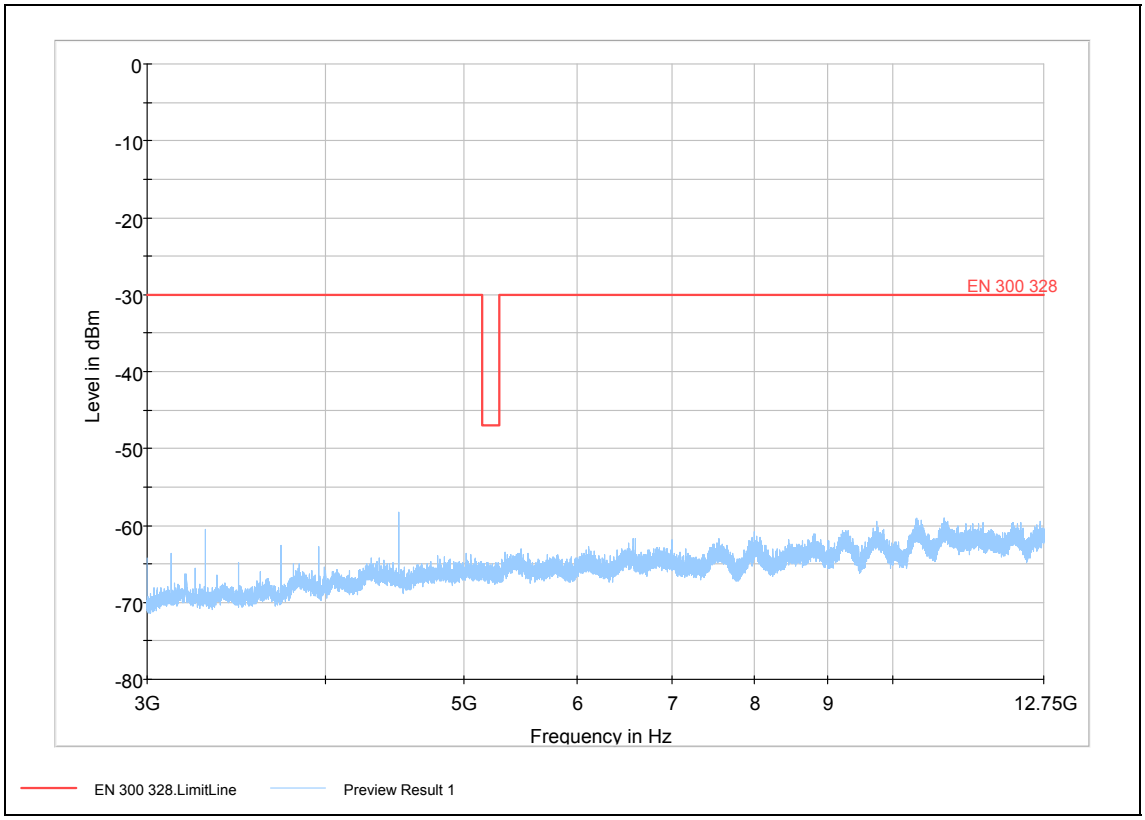
Radiated Spurious Emissions 3G-12.75GHz

802.11g- Channel 13



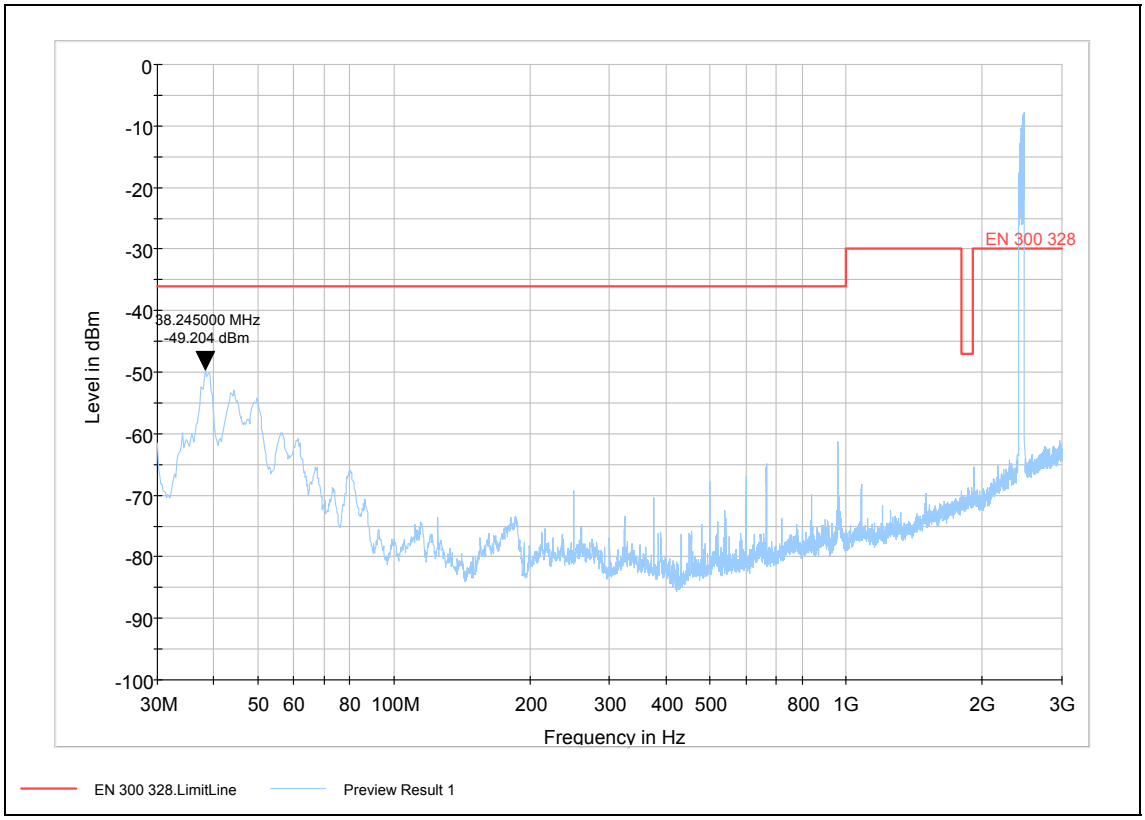
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



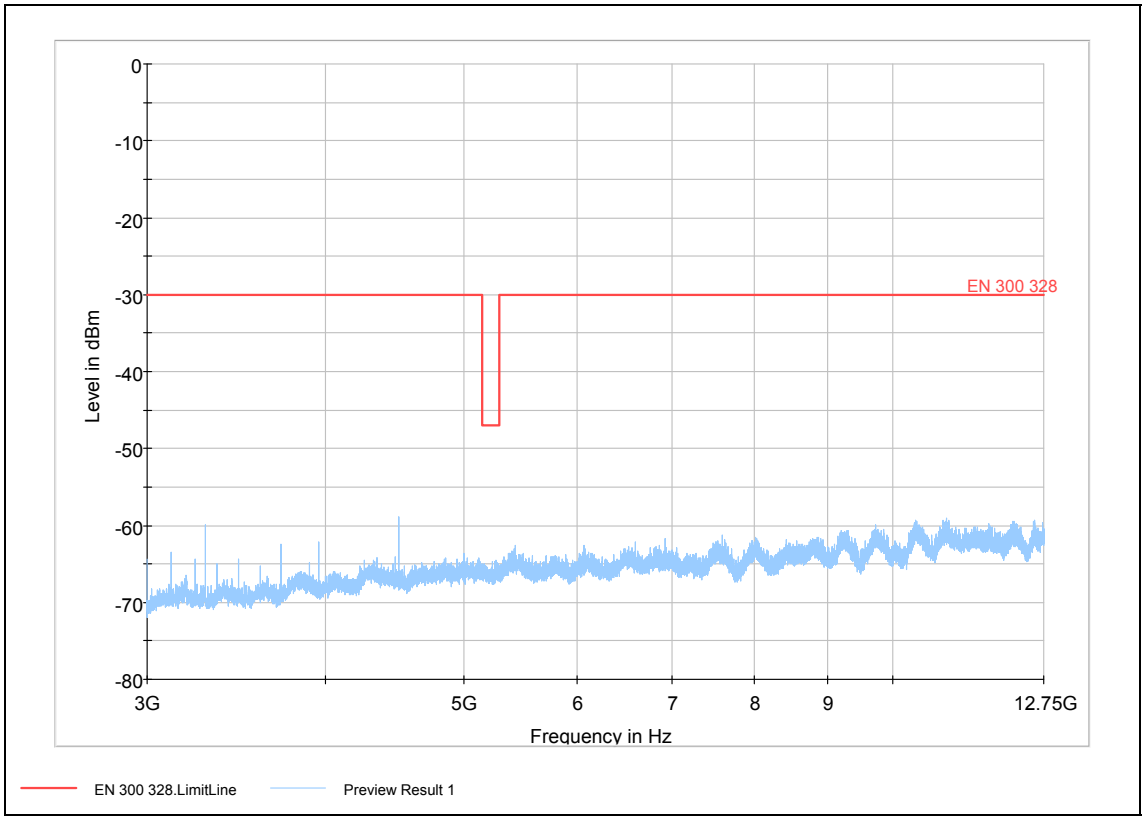
Radiated Spurious Emissions 3G-12.75GHz

802.11n HT20- Channel 1



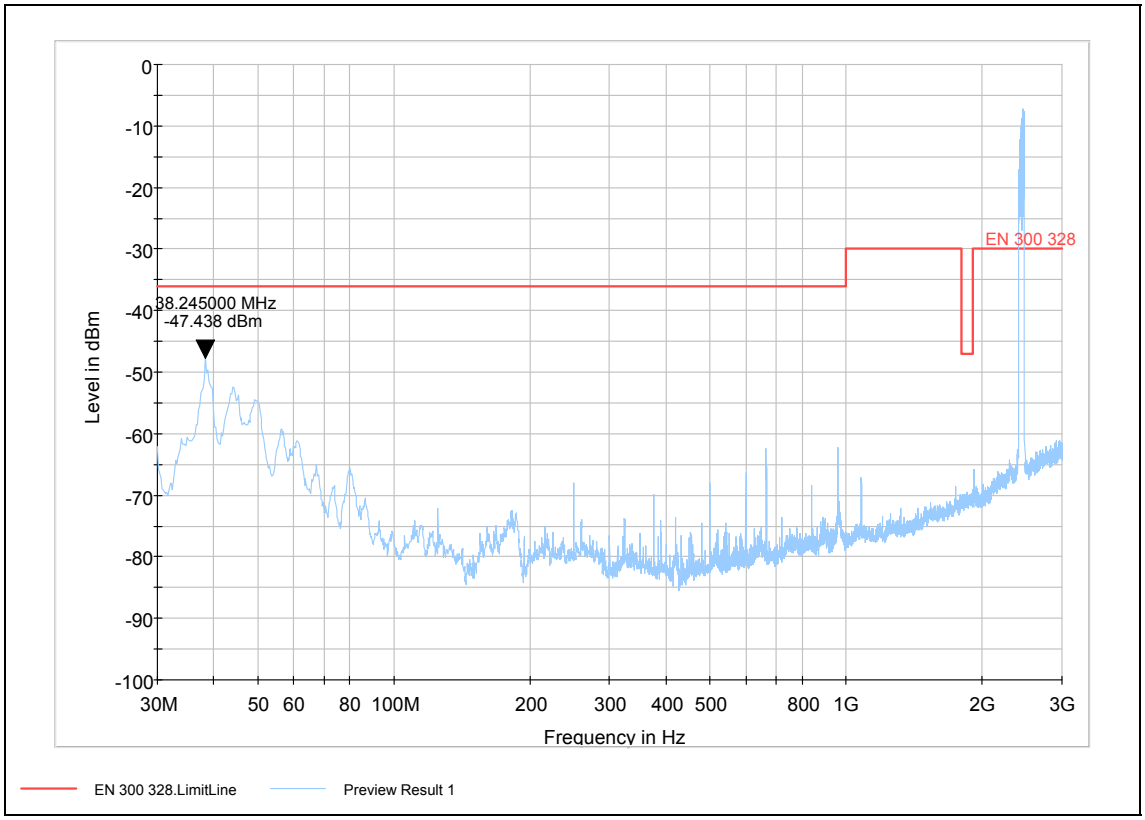
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



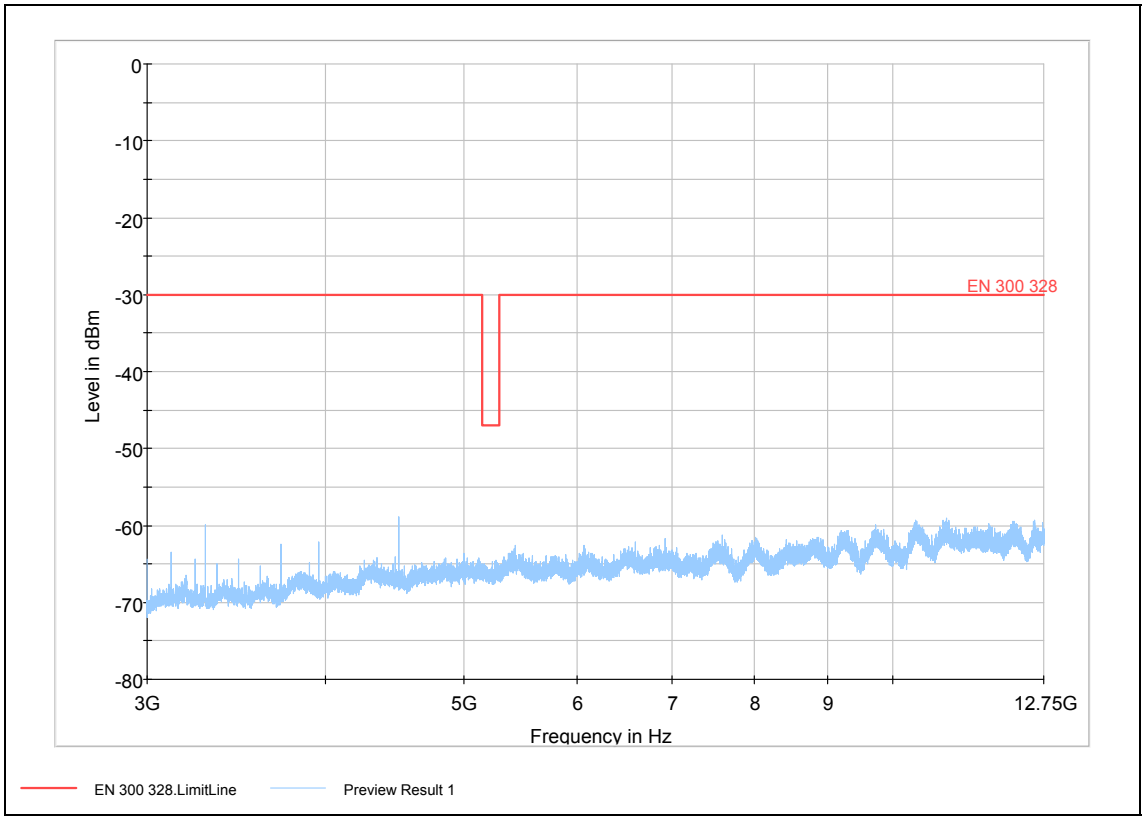
Radiated Spurious Emissions 3G-12.75GHz

802.11n HT20- Channel 13



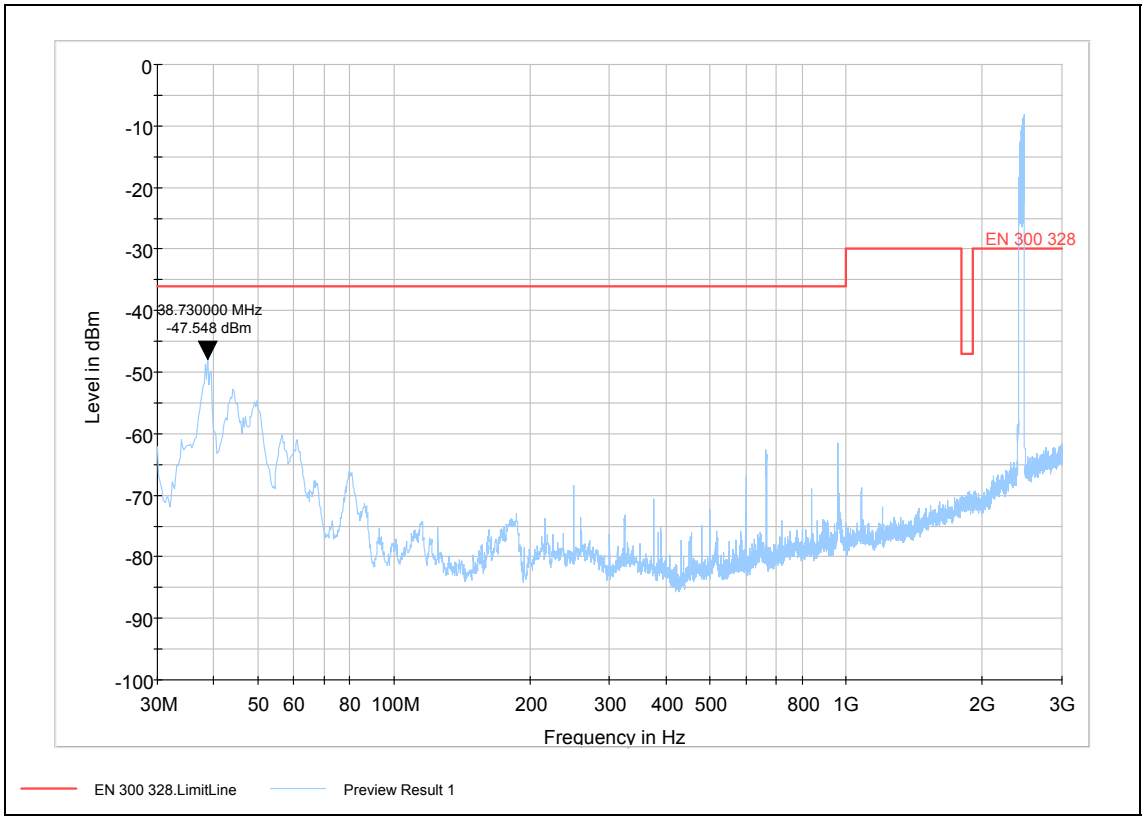
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



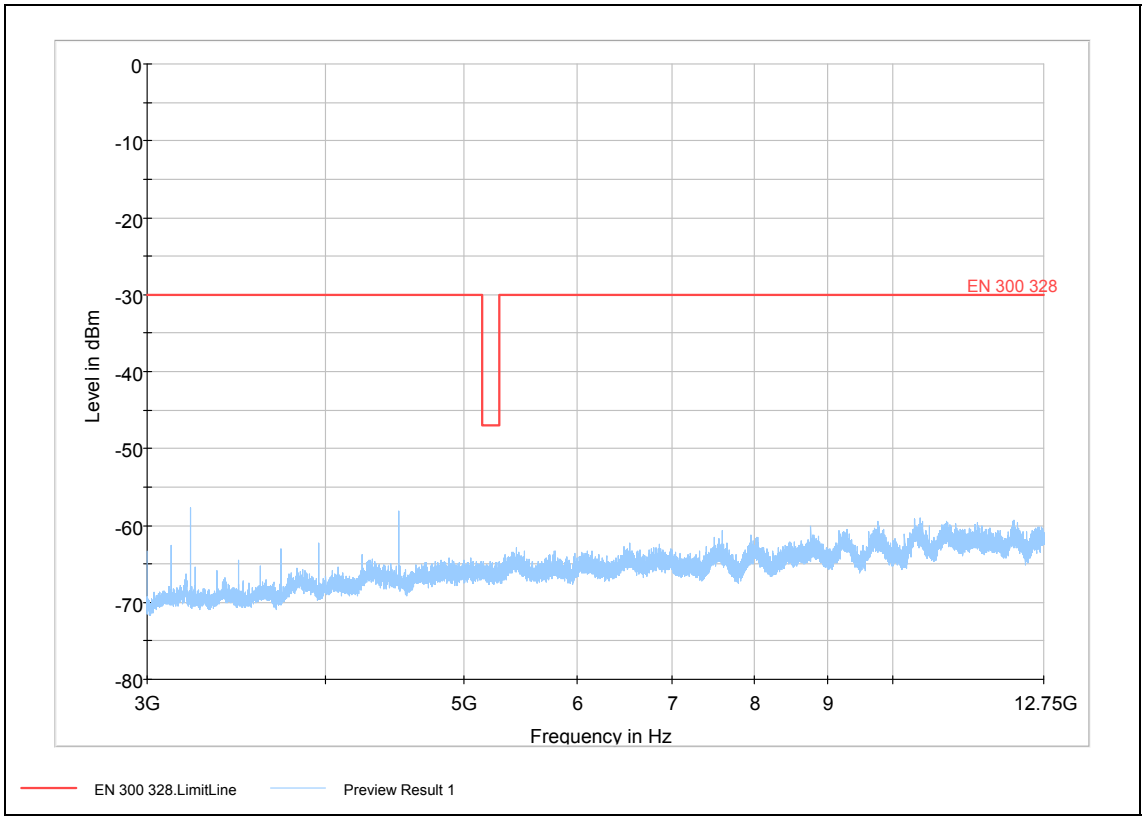
Radiated Spurious Emissions 3G-12.75GHz

802.11n HT40- Channel 3



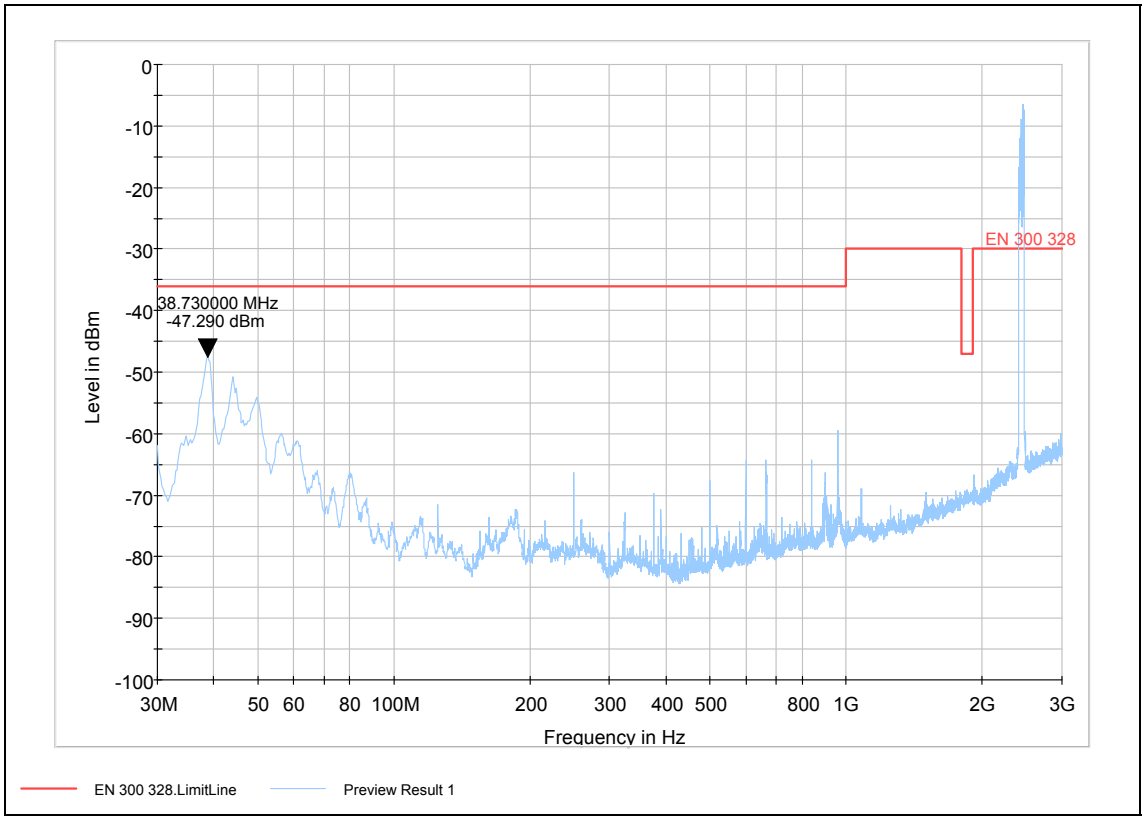
Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



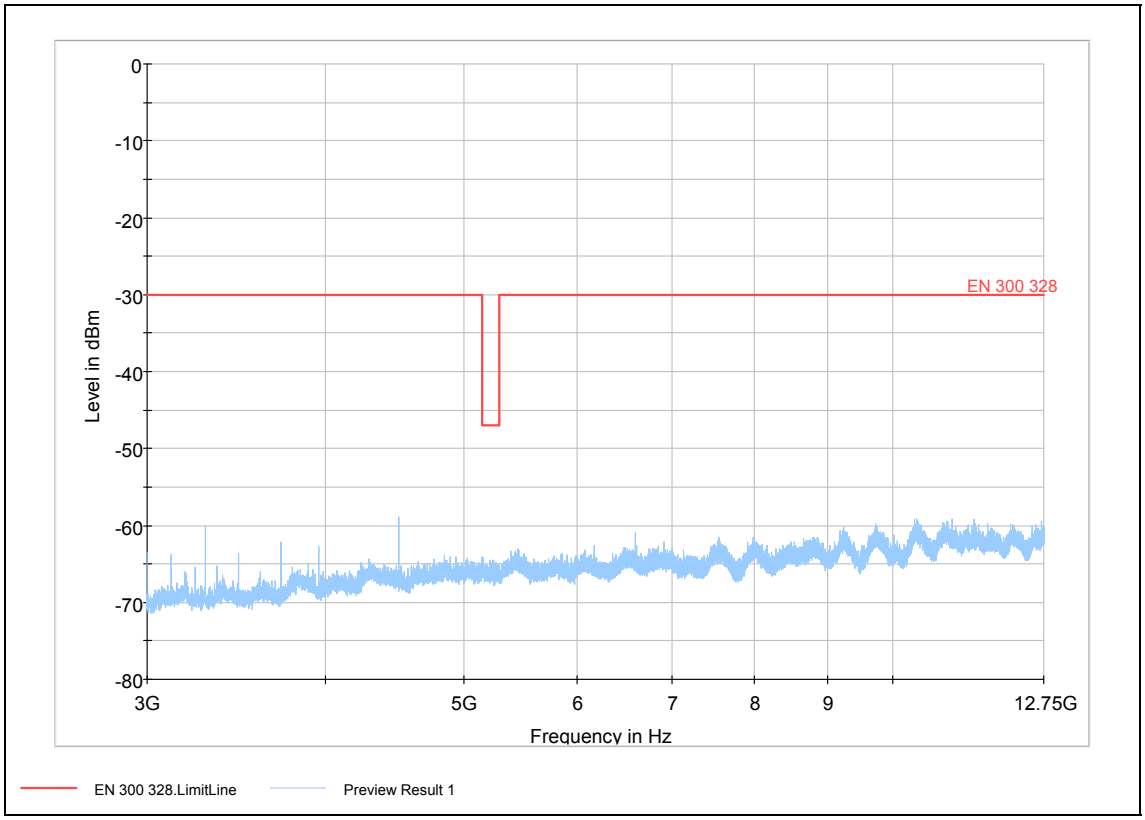
Radiated Spurious Emissions 3G-12.75GHz

802.11n HT40- Channel 11



Note: The signal beyond the limit is carrier

Radiated Spurious Emissions 30M-3GHz



Radiated Spurious Emissions 3G-12.75GHz

2.6.2 Conducted Spurious Emissions

Ambient condition

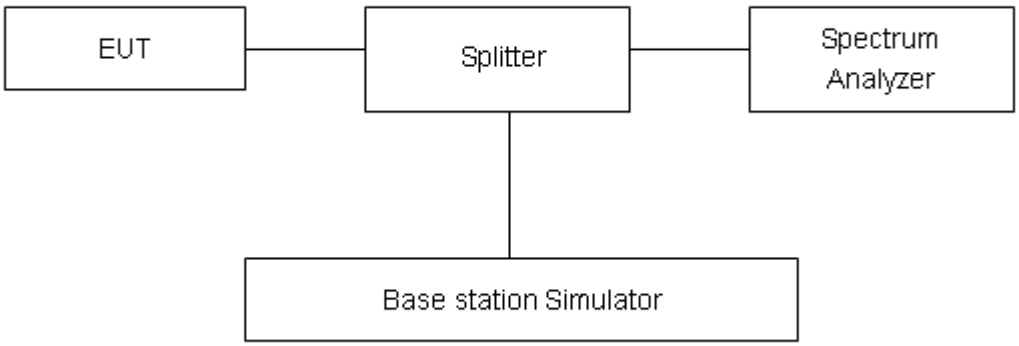
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Methods of Measurement

Measurements are made in the frequency range 30 MHz to 12.75 GHz. Spurious emissions are measured at the connector of the transceiver, as the power level of any discrete signal, higher than the requirement in the follow table minus 6 dB, delivered into a 50Ω load. RBW is set to 100kHz and VBW is set to 300kHz for 30MHz to 1GHz. RBW is set to 100kHz,VBW is set to 30kHz for the carrier frequency, RBW is set to 1MHz and VBW is set to 3MHz for other frequency above 1GHz.

Conducted Spurious Emission is tested in low and high channel, under normal voltage condition.
The test was performed as link mode.

Test Setup



Limit

Frequency Range	Limits(dBm)
30MHz to 1GHz	-36dBm
Above 1GHz to 12.75GHz	-30dBm
1.8GHz to 1.9GHz, 5.15GHz to 5.3GHz	-47dBm

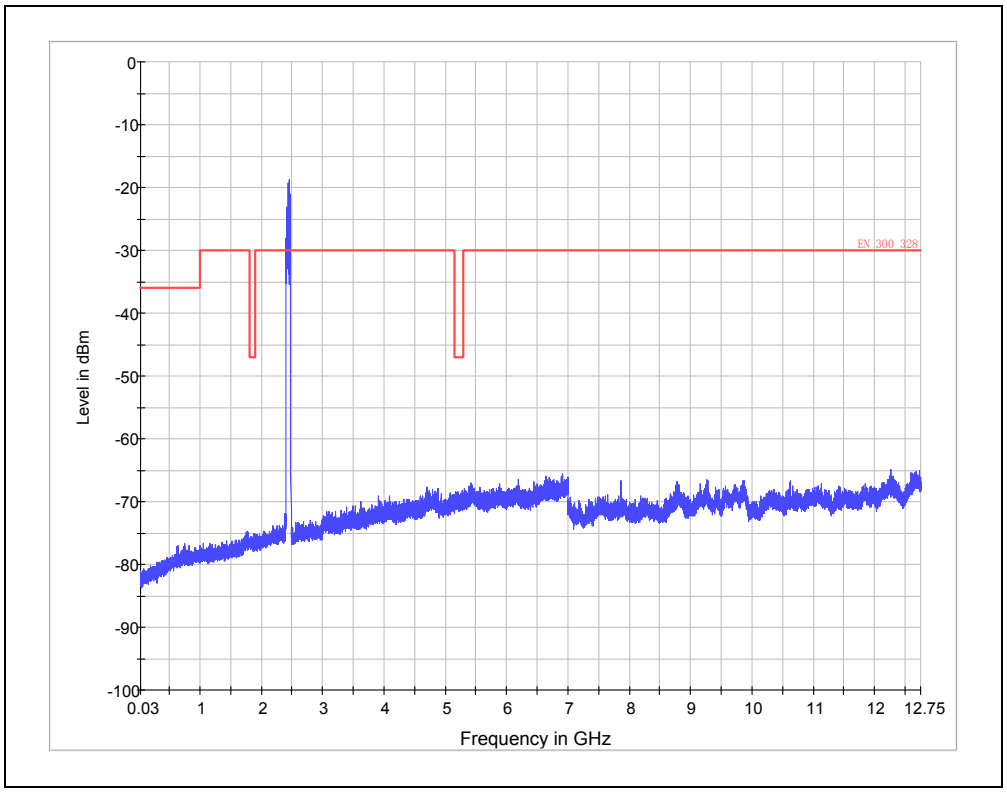
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-12.75GHz	1.407 dB

Results

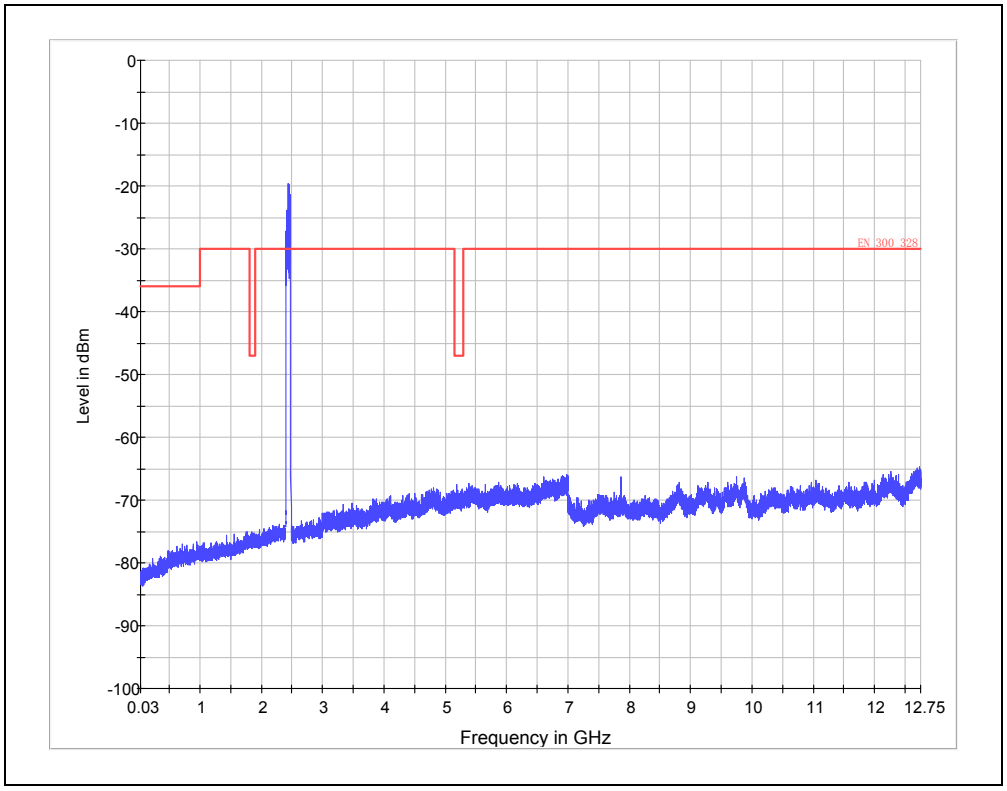
802.11b-Channel 1



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

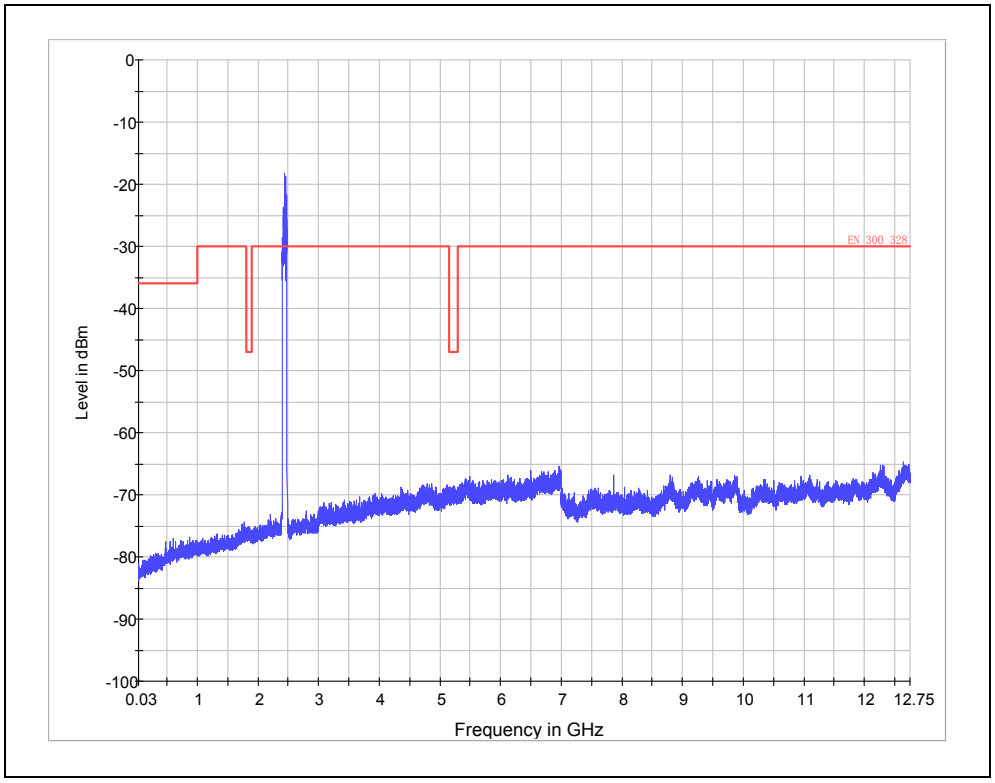
802.11b-Channel 13



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

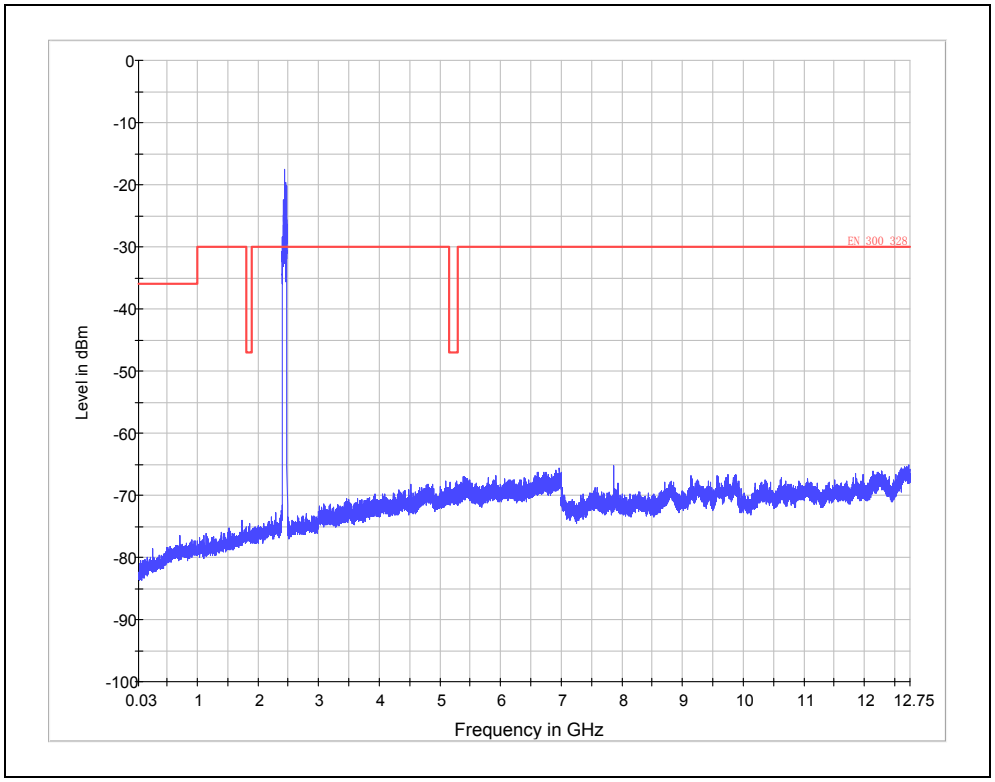
802.11g-Channel 1



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

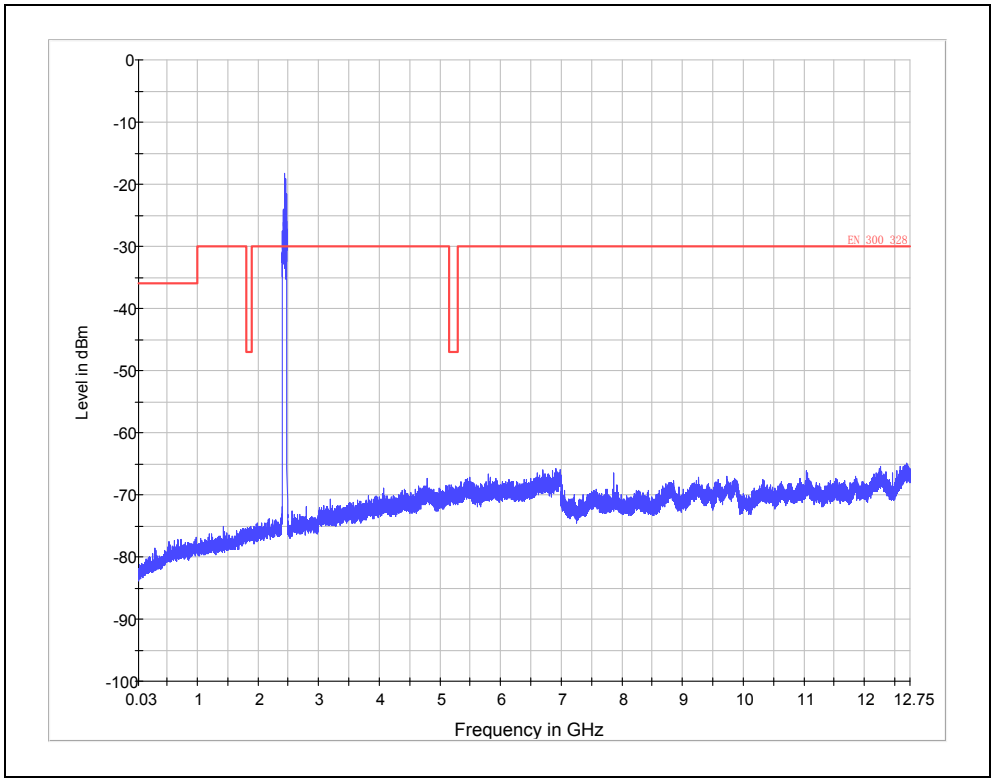
802.11g-Channel 13



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

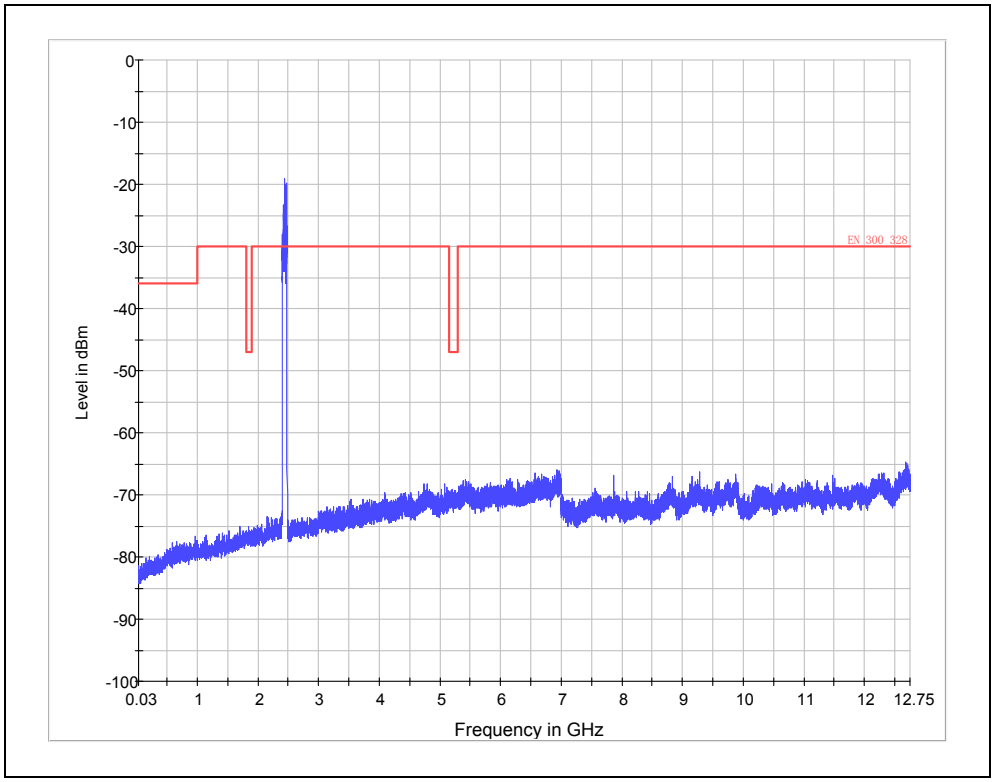
802.11n HT20-Channel 1



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

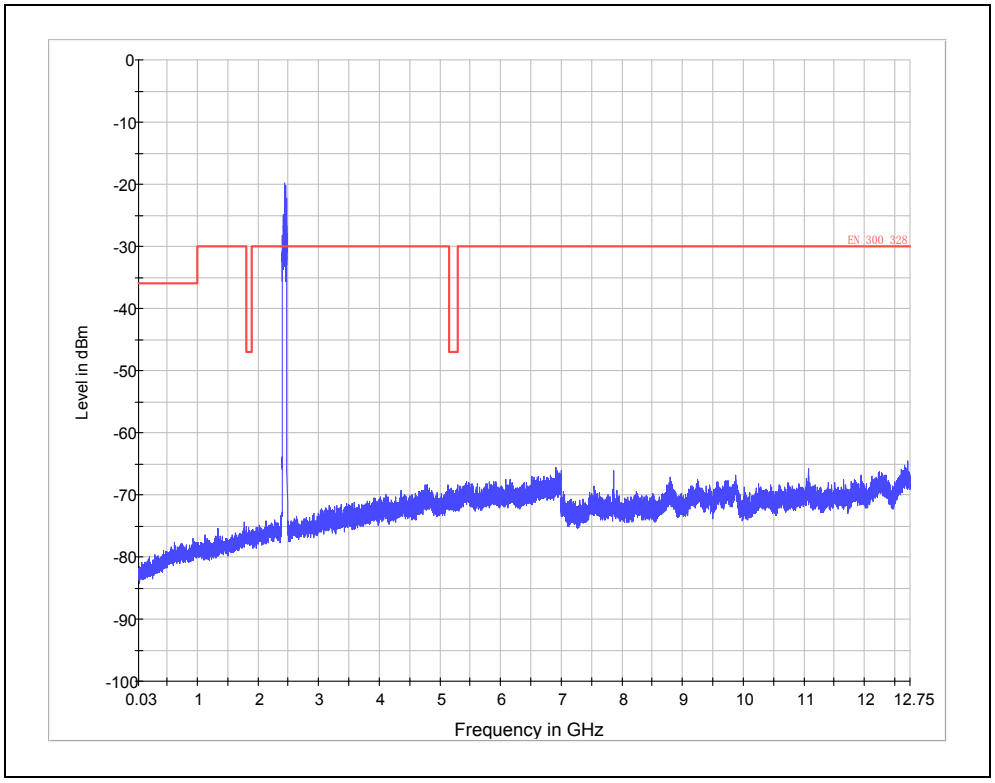
802.11n HT20-Channel 13



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

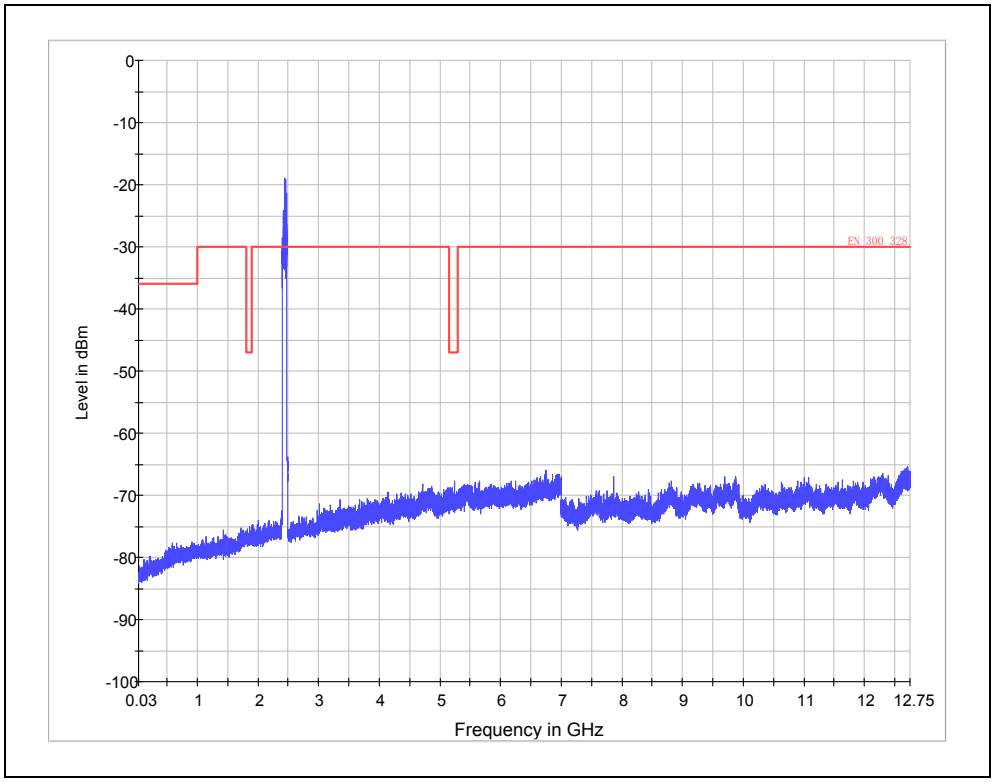
802.11n HT40-Channel 3



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

802.11n HT40-Channel 11



Note: The signal beyond the limit is carrier

Conducted Spurious Emissions 30M to 12.75GHz

2.7. Receiver Spurious Emissions

2.7.1 Radiated Spurious Emissions

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

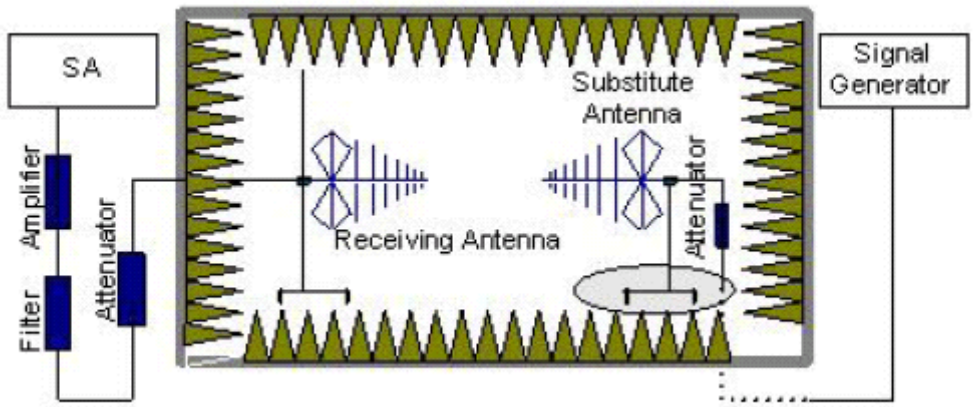
These measurements shall only be performed at normal test conditions and the EUT is in standby mode.

Radiated measurements shall be performed with the aid of a test antenna and measurement instruments .The following test procedure applies:

1. Pre-calibration

   In an fully anechoic chamber, A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted at a 3 meter test distance from the receive antenna. An RF signal source is connected to the dipole with a Tx cable that has been constructed to not interfere with radiation pattern of the antenna. A known (measured) power (Pin) is applied to input of dipole, and the power received (Pr) is recorded from the spectrum analyzer.

   “Reference Path loss” is established as Pin –Pr-Tx cable loss+ Substitution antenna gain.



2. EUT Test

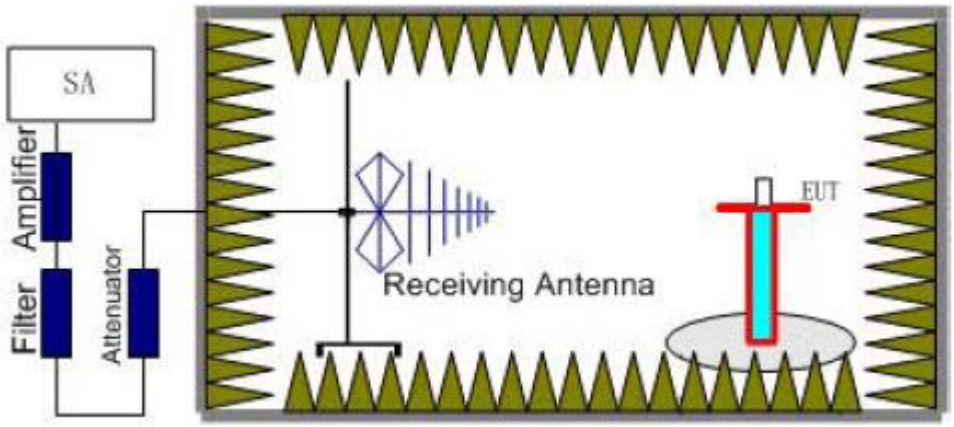
   EUT was placed on a 1.5 meter high non – conductive table at a 3 meter test distance from the receive antenna. The height of receiving antenna is 1.5 m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the table and adjusting the receiving antenna polarization. The measurement is carried out using a spectrum analyzer .The radiated emission measurements of all non-harmonic and harmonic of the transmit frequency from 30MHz to 12.75GHz were measured with peak detector. RBW is set to 100kHz and VBW is set to 300kHz for 30MHz to 1GHz. RBW is set to 100kHz,VBW is set to 30kHz for the carrier frequency, RBW is set to 1MHz and VBW is set to 3MHz for other frequency above 1GHz.A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency. If the harmonic could not be detected above the noise floor, the ambient level was recorded.

The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

Calculation procedure:

RSE = Rx (dBm) + Reference Path loss

Rx: reading of the receiver



The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis) and docking mode. The worst emission was found in lie-down position (X axis) and the worst case was recorded.

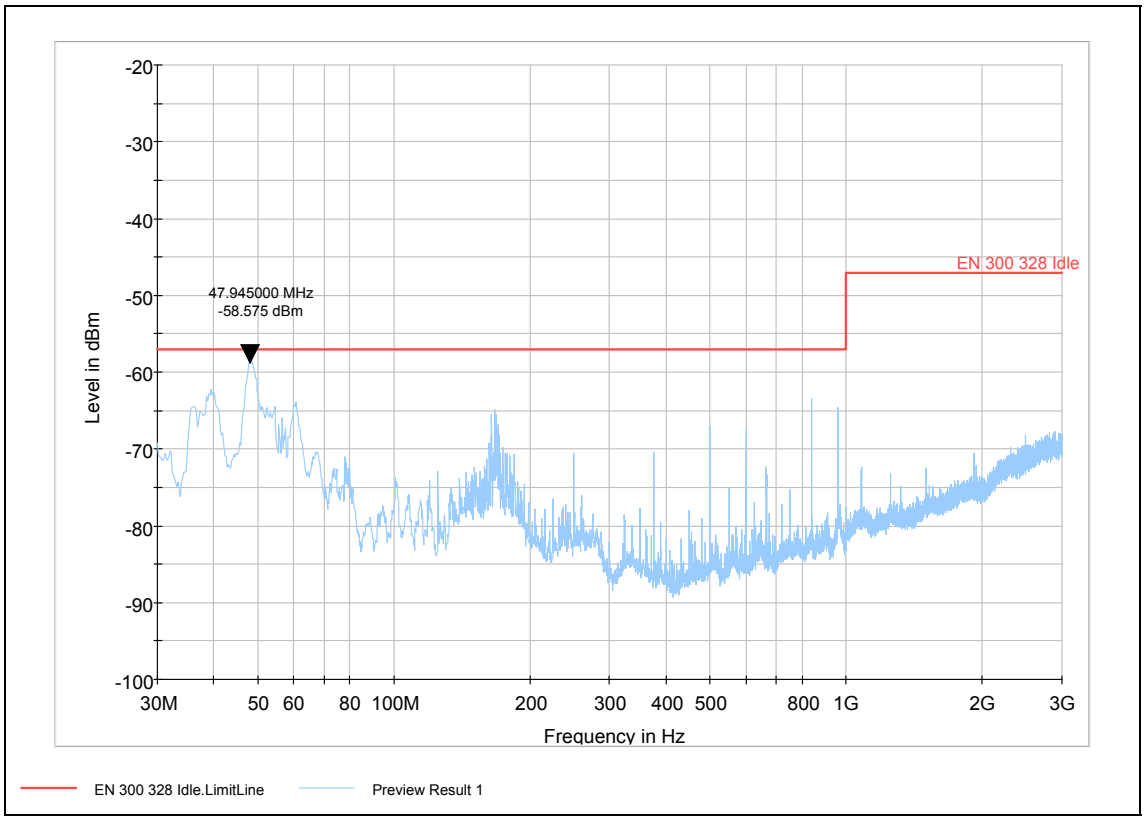
Limit

Frequency Range	Limits(dBm)
30MHz to 1GHz	-57dBm
1GHz to 12.75GHz	-47dBm

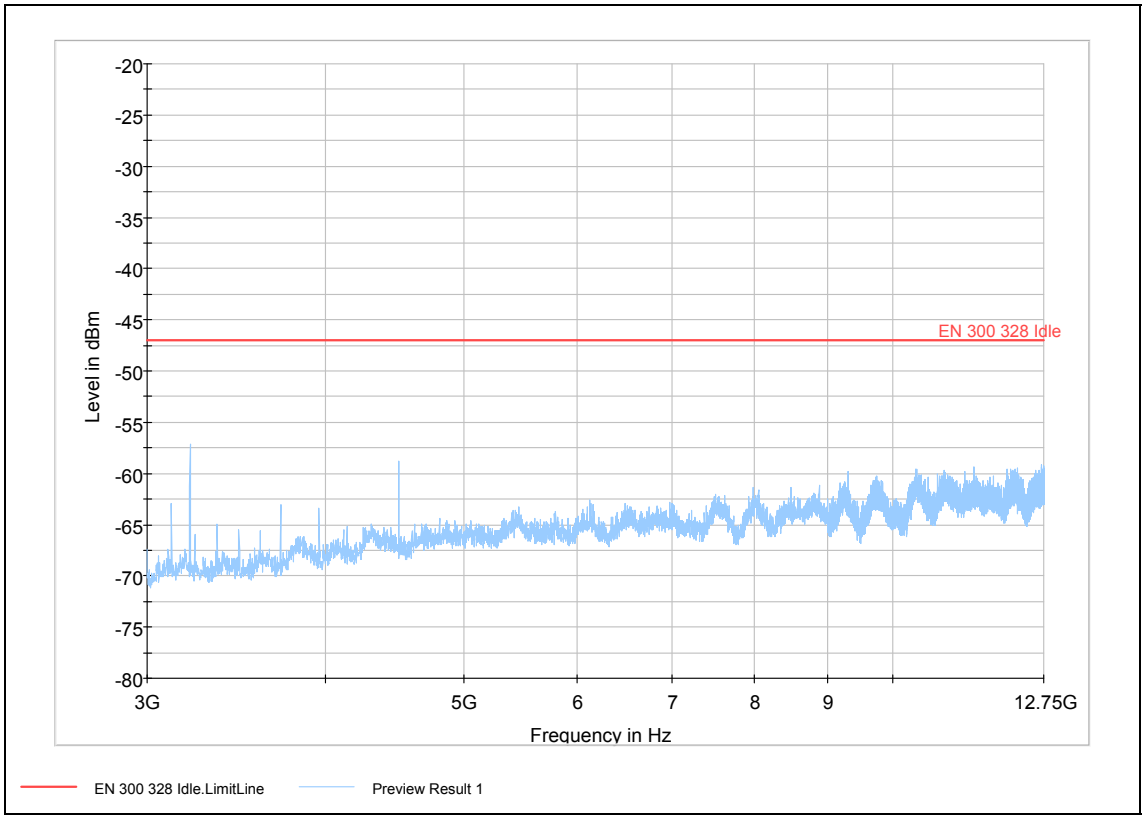
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor k = 1.96, U= 3.55 dB.

Results



Radiated Spurious Emissions 30M-3GHz



Radiated Spurious Emissions 3G-12.75GHz

Frequency (MHz)	Level (dBm)	Azimuth (deg)	Margin (dB)	Limit (dBm)
47.9	-58.57	135	1.57	-57
3216.0	-57.12	90	10.12	-47

2.7.2 Conducted Spurious Emissions

Ambient condition

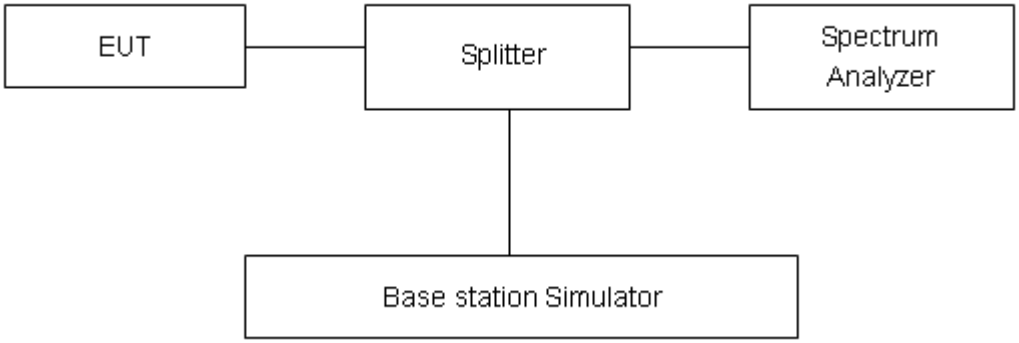
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	102.5kPa

Methods of Measurement

Measurements are made in the frequency range 30 MHz to 12.75 GHz. Spurious emissions are measured at the connector of the transceiver, as the power level of any discrete signal, higher than the requirement in the follow table minus 6 dB, delivered into a 50Ω load. RBW is set to 100kHz and VBW is set to 300kHz for 30MHz to 1GHz. RBW is set to 100kHz,VBW is set to 30kHz for the carrier frequency, RBW is set to 1MHz and VBW is set to 3MHz for other frequency above 1GHz.

Conducted Spurious Emission is tested in low and high channel, under normal voltage condition.
The test was performed as idle mode.

Test Setup



Limit

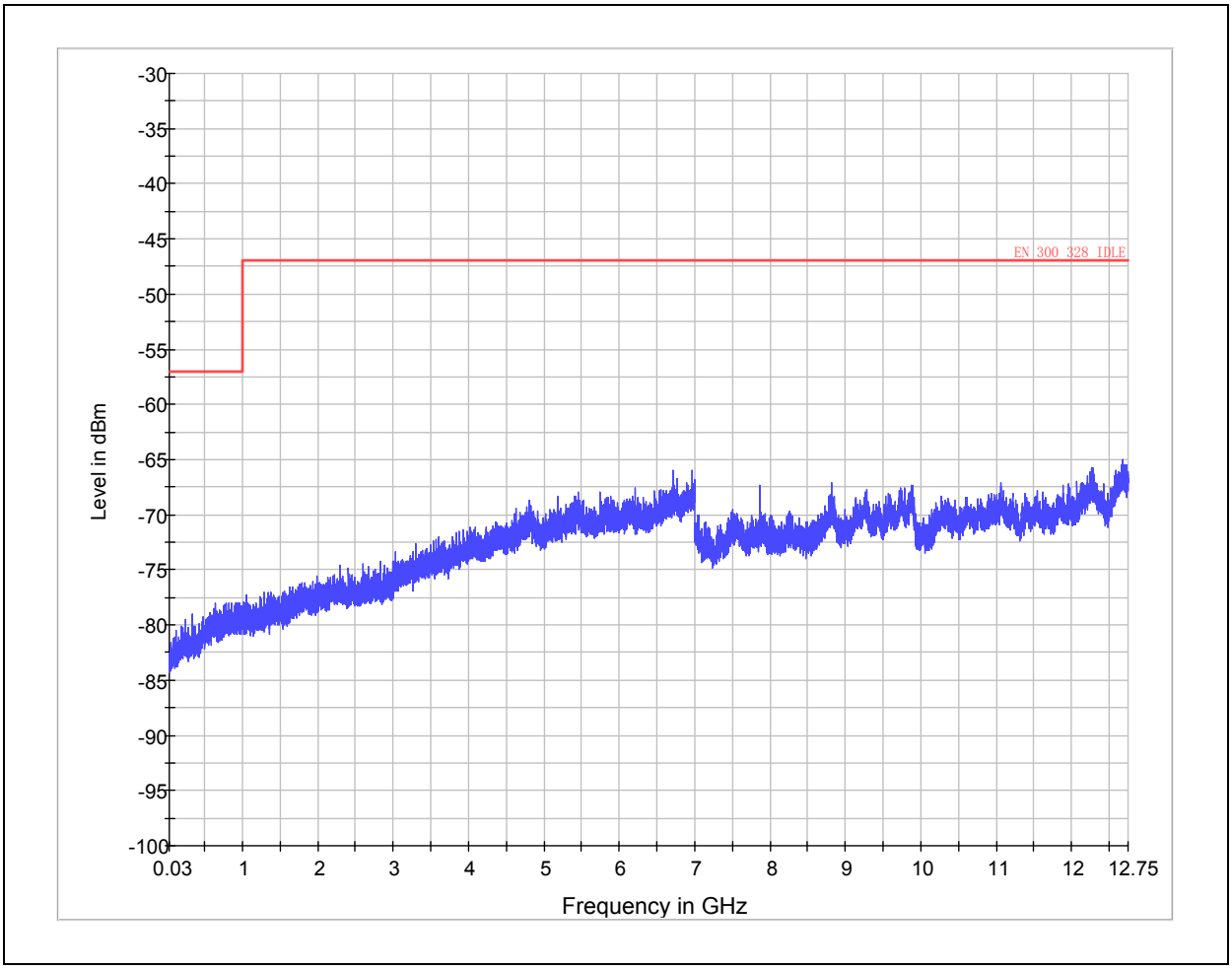
Frequency Range	Limits(dBm)
30MHz to 1GHz	-57dBm
1GHz to 12.75GHz	-47dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-12.75GHz	1.407 dB

Results



Conducted Spurious Emissions 30M to 12.75GHz

3. Main Test Instrument

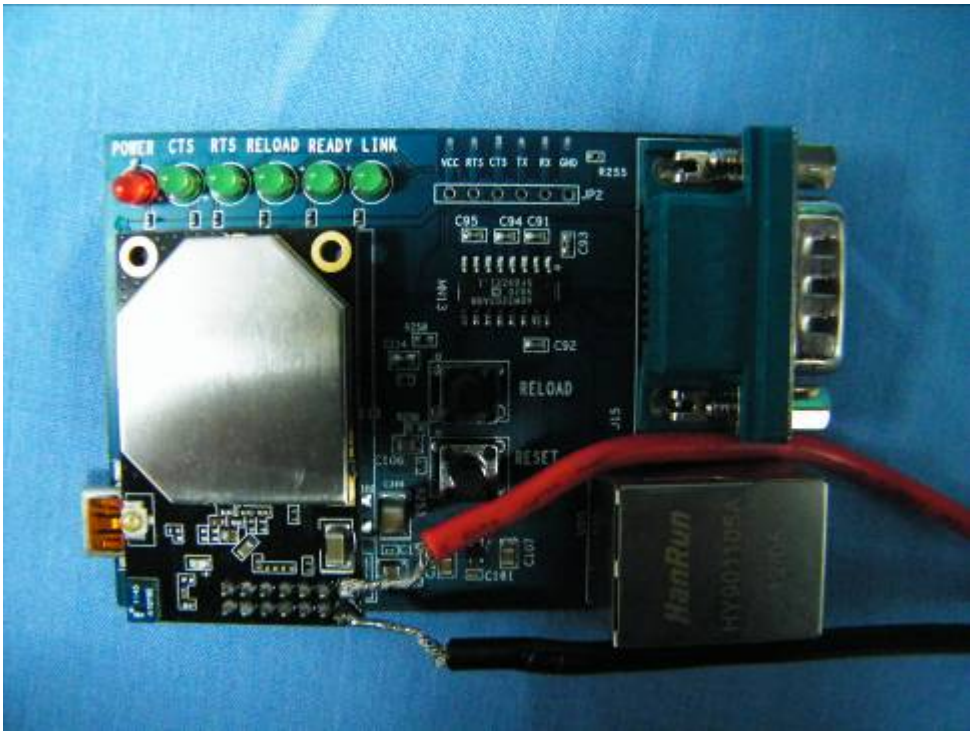
Table 1: List of Main Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Valid Period
01	Signal Analyzer	FSV	R&S	100815	2011-06-26	One year
02	Network Analyze	E5071B	Agilent	MY42404014	2011-06-07	One year
03	Signal generator	SMR27	R&S	100365	2011-06-30	One year
04	Spectrum Analyzer	E4445A	Agilent	MY46181146	2011-06-06	One year
05	Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-201	2010-06-29	Two years
06	Horn Antenna	HF907	R&S	100126	2011-07-01	Two years
07	Power Splitter	11667A	Agilent	52960	NA	NA
08	DC Power Supply	GPS-3030D	GM	E877677	NA	NA
09	Climatic Chamber	ESS-SDH401	YIN HE	2006001	2011-02-21	One year
10	Semi-Anechoic Chamber	9.6*6.7*6.6m	ETS-Lindgren	NA	NA	NA
11	EMI test software	ES-K1	R&S	NA	NA	NA

*****END OF REPORT *****

ANNEX A: The EUT Appearance and Test Configuration

A.1 EUT Appearance



Picture 1 Constituents of EUT

A.2 Test Setup

Picture 2 Radiated Spurious Emissions Test Setup