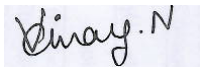
TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**02422686 001**	**Seite 1 von 48** *Page 1 of 48*
Auftraggeber: *Client:*	**Atmel Norway AS** **Vestre Rosten 79** **7075 Tiller** **Norway**	
Gegenstand der Prüfung: *Test item:*	**Zigbit**	
Bezeichnung: *Identification:*	**ATZB-24-A2**	**Serien-Nr.:** *Serial No.* **Engineering Sample**
Wareneingangs-Nr.: *Receipt No.:*	**1403010455**	**Eingangsdatum:** *Date of receipt:* **2010-06-09**
Prüfort: *Testing location:*	**Refer Page 4 of 48 for test facilities**	
Prüfgrundlage: *Test specification:*	**FCC 15, Subpart C**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** Alpha Tower, Sigma Soft Tech Park, # 7, Whitefield Main Road, Varthur Kodi, Bangalore – 560066, India	

geprüft / *tested by:*			**kontrolliert** / *reviewed by:*		
2010-10-12	Vinay.N Test Engineer		2010-10-12	G Kalyan Varma Project Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges /*Other Aspects:* **FCC ID : VW4A090664**

Abkürzungen:				***Abbreviations:***			
P(ass)	=	***entspricht Prüfgrundlage***		***P(ass)***	=	***passed***	
F(ail)	=	***entspricht nicht Prüfgrundlage***		***F(ail)***	=	***failed***	
N/A	=	***nicht anwendbar***		***N/A***	=	***not applicable***	
N/T	=	***nicht getestet***		***N/T***	=	***not tested***	

Test Result Summary

Clause	Test Item	Result
15.247(b) (3)	Conducted Peak RF Output Power Test	Pass
15.247 (a) (2)	6Db Bandwidth	Pass
15.247 (e)	Power Spectral Density	Pass
15.247 (d)	Band-edge Compliance	Pass
15.209	Spurious Radiated Emissions	Pass

Content

List of Test and Measurement Instruments

HCL Technologies, Chennai

List of Test and Measurements

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Receiver	R&S	ESIB26	100360	14/09/2010
Log Periodic Antenna	ETS LINDGREN	--	00104828	08/03/2011
Biconical antenna	ETS LINDGREN	3104C	00101516	11/01/2011

Wipro Technologies, Bangalore

List of Test and Measurements

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB40	100306	24.07.2011
Hybrid Log Periodic Antenna	TDK	HLP3003C	130334	17.02.2011
Broadband Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9170	9170-344,2007	14.02.2011
Double Ridged Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9120D	2008	14.08.2011
Pre-Amplifier	TDK-RFSolution	PA-02	100008	15.02.2011

SAMEER-Center for Electromagnetics, Chennai

List of Test and Measurements

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Receiver	Rohde & Schwarz	ESIB7	100319	06.03.2011
Loop Antenna	ETS Lingdren	6507	1484	12.10.2011

Testing Facilities

1) HCL Technologies Limited
   73-74, Ground Floor,South Phase,
   Ambattur Industrial Estate, Ambattur
   Chennai - 600058

2) Wipro Technologies
   Survey No. 70, 77, 78 / 8A, Dodda Kannelli,
   Sarjapur Road, Bangalore – 560 035
   India

3) SAMEER-Center for Electromagnetics
   C.I.T.Campus, Taramani,
   2nd Main Road, Chennai – 600113
   India

General Product Information

Product Function and Intended Use

ZigBit is based on the industry leading Atmel Z-link hardware platform. The powerful ATmega 1281v MCU features 128kb of flash memory and 8kb of RAM. The transceiver boasts -101dBm of Rx sensitivity and up to +3dBm of Tx power. A link budget of 104 dB gives the ZigBit a much longer range than competitive modules with lower link budgets.

Ratings and System Details

Operating Frequency	2400 – 2483.5 Hz
No. of channel	16
Channel Spacing	5MHz
Transmitted Power	+3.0 dBm
Modulation	DSSS
Data Rate	250Kbps
Antenna Type	Dual Chip Antenna
Number of antenna	Two
Antenna Gain	0 dBi
Supply Voltage	1.8V to 3.6V DC
Dimensions	24.0 x 13.5 x 2.0 mm
Environmental	Operating : -20°C to +70°C Relative Humidity : - Not more than 80%

Test Conditions:

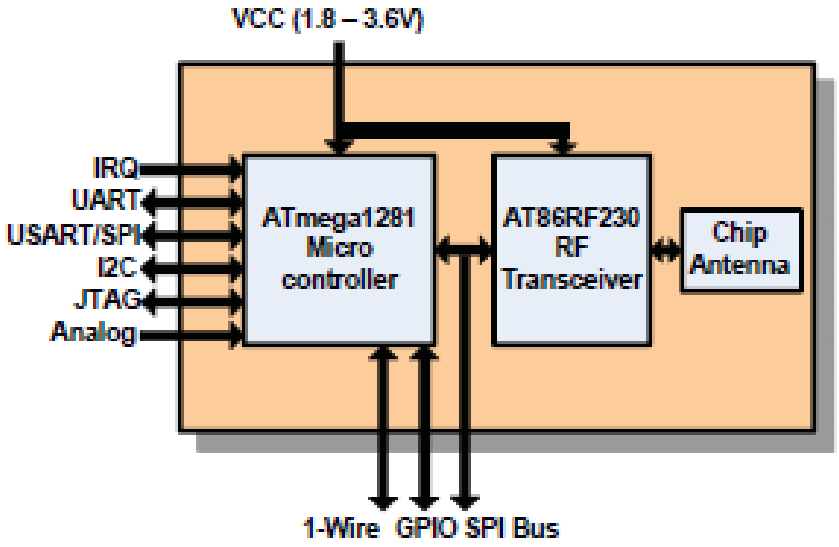
Supply Voltage from USB

Environmental conditions:

Temperature: +23 ° C **RH:** 62%

Operation Descriptions

The ZigBit module ships with robust IEEE 802.15.4/ZigBee stack that supports a self-healing, self-organizing mesh network, while optimizing network traffic and minimizing power consumption. Mesh Netics offers three stack configurations: Bit Cloud, Serial Net and Open MAC. Bit Cloud is a certified, ZigBee PRO software development platform supporting reliable, scalable, and secure wireless applications running on MeshNetics ZigBit modules. SerialNet allows programming of the module via serial AT-command interface. Open MAC is MeshNetics' open source implementation of IEEE802.15.4 MAC layer intended for embedded software experts and enthusiasts.



Frequencies of Operation

Channel No.	Frequency (MHz)	Channel	Frequency (MHz)
Channel 11	2405	Channel 19	2445
Channel 12	2410	Channel 20	2450
Channel 13	2415	Channel 21	2455
Channel 14	2420	Channel 22	2460
Channel 15	2425	Channel 23	2465
Channel 16	2430	Channel 24	2470
Channel 17	2435	Channel 25	2475
Channel 18	2440	Channel 26	2480

Test Set-up and Operation Mode

Principle of Configuration Selection

The test was performed under continuous transmission to obtain the maximum emissions.

Test Operation and Test Software

A keypad embedded on PCB was used to enable the continuous transmission and changing channels (low/mid/high) on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment

The EUT was tested together with the following additional accessory:

- Notebook computer used to power the device through USB cable, and display the configuration (channel and power level)

Countermeasures to achieve EMC Compliance

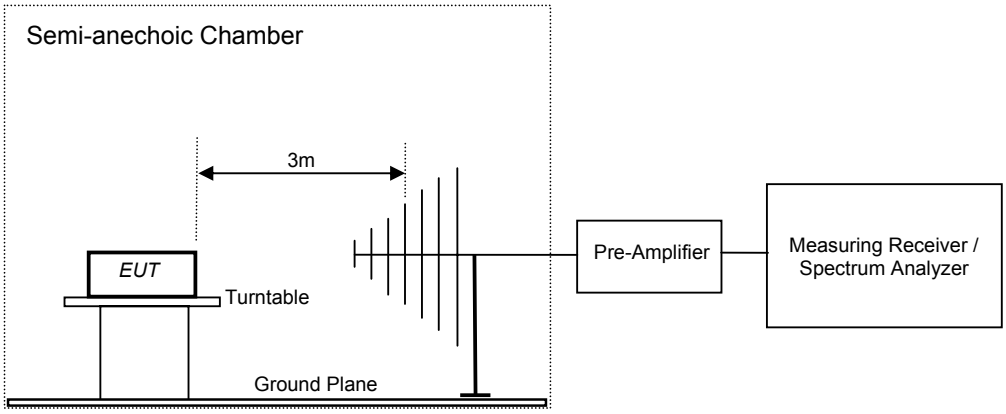
- None

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.

The EUT Was rotated in X, Y and Z axes and the worst case results are recorded in this report.



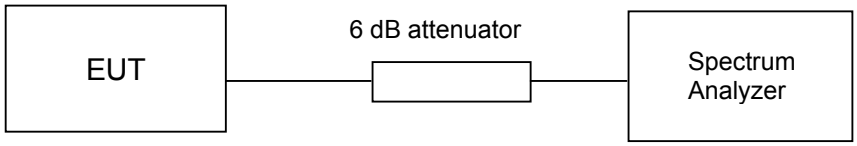
Test Results

Conducted Peak Output Power **Section 15.247(b)(3)**

Result **Pass**

Test Specification	FCC 15.247 (b)(3)
Measurement Bandwidth (RBW)	1 MHz
Detector	Peak
Requirement	<1 watt (30dBm) for system employing at least 50 hopping channels

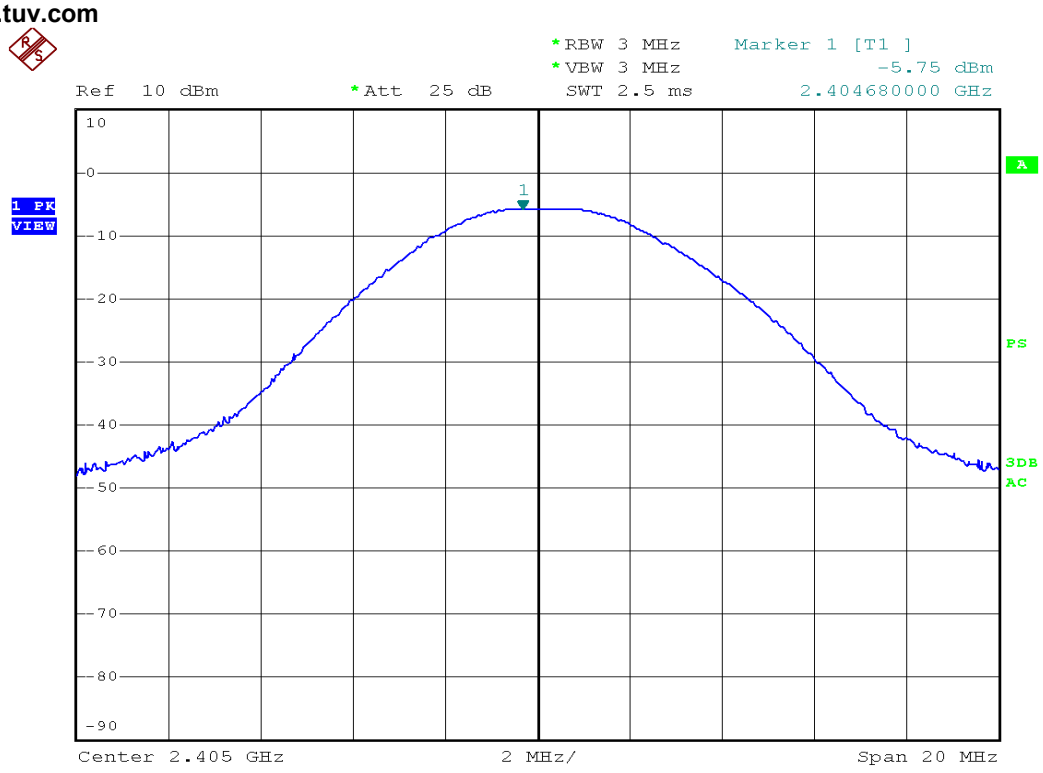
Test Method:



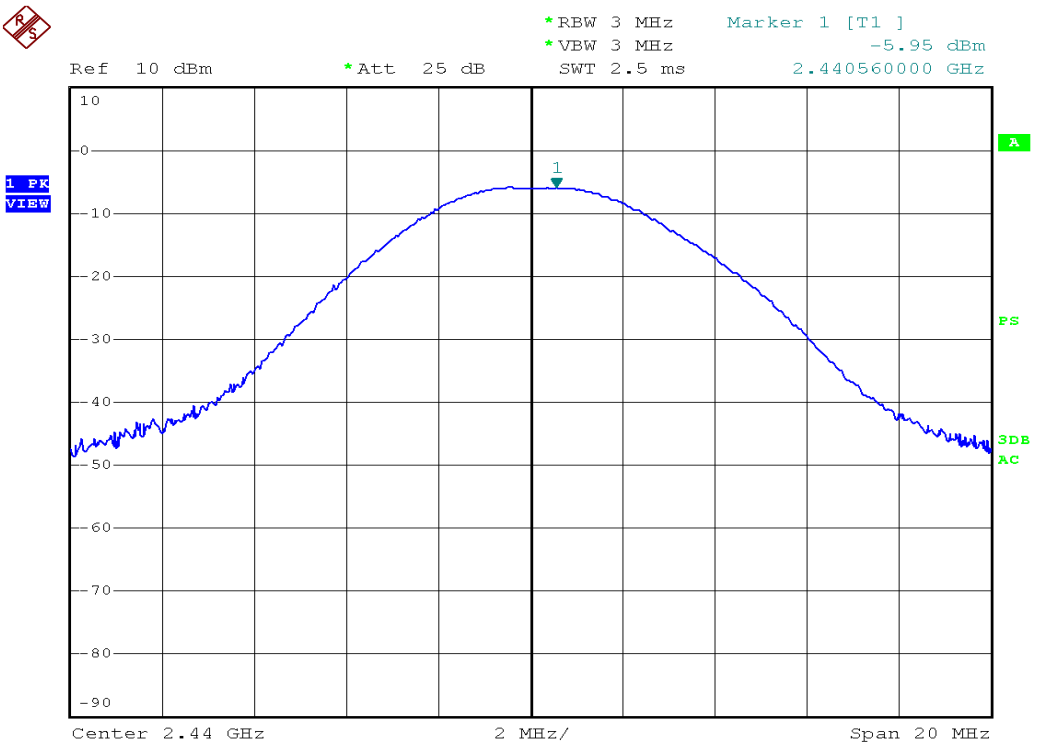
Test Result:

Antenna 1
Cable Loss : 1.28dB

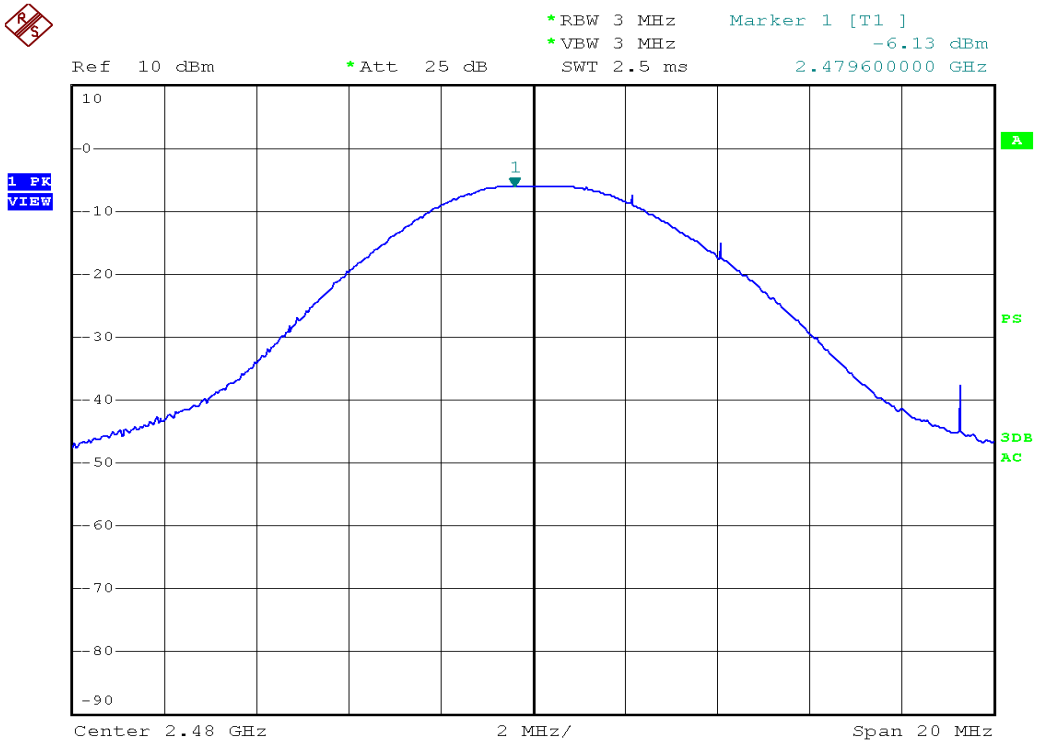
Channel	Frequency (MHz)	Measured RF Output power (dBm)	Attenuator + Cable Loss (dB)	Total Output power (dBm)	Limit (dBm)	Remarks
Low	2405	-5.75	7.28	1.53	30	Pass
Mid	2440	-5.95	7.28	1.33	30	Pass
High	2480	-6.13	7.28	1.15	30	Pass



Channel Frequency: 2405 MHz



Channel Frequency: 2440 MHz

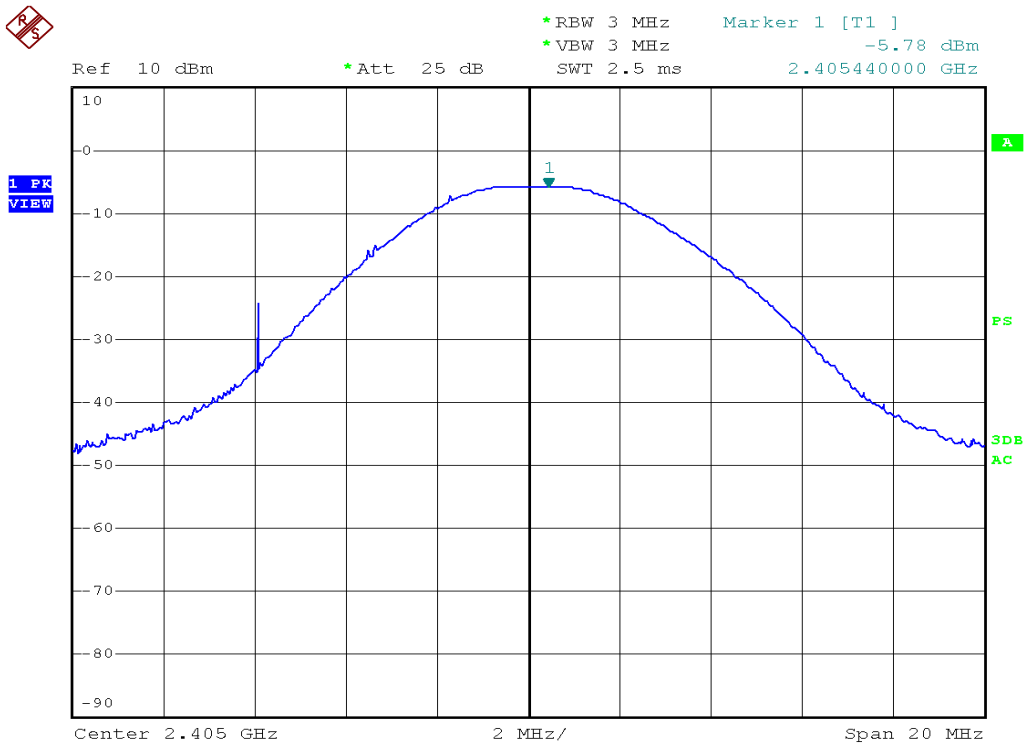


Channel Frequency: 2480 MHz

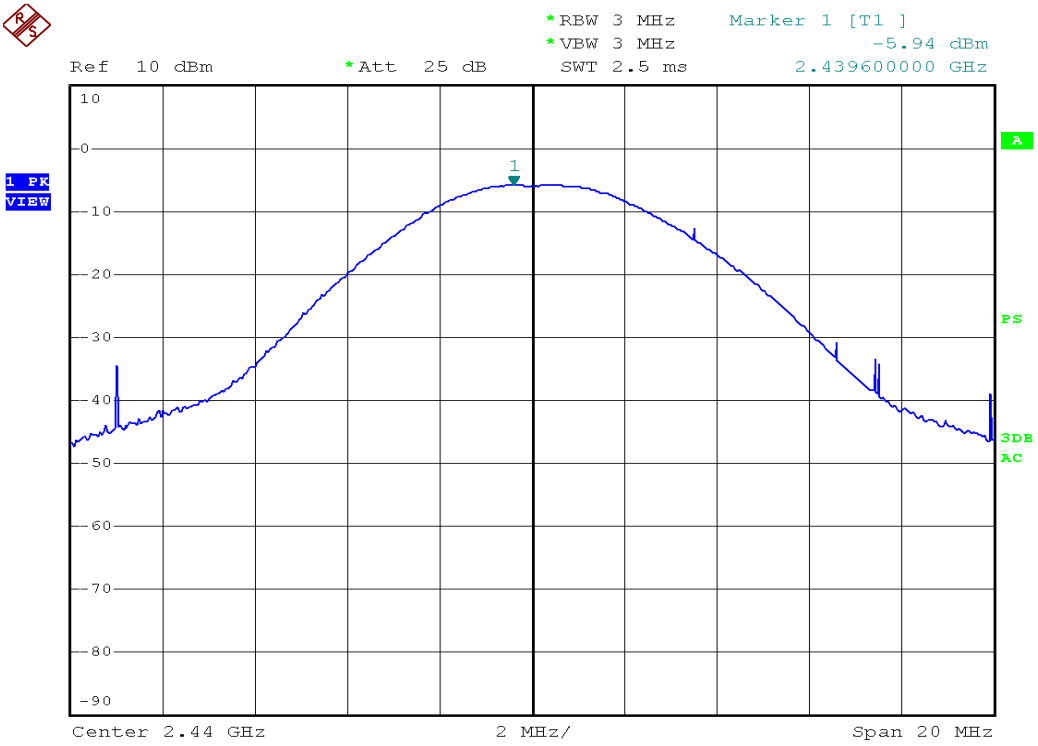
Antenna 2

Test Results:
Cable Loss: 1.28dB

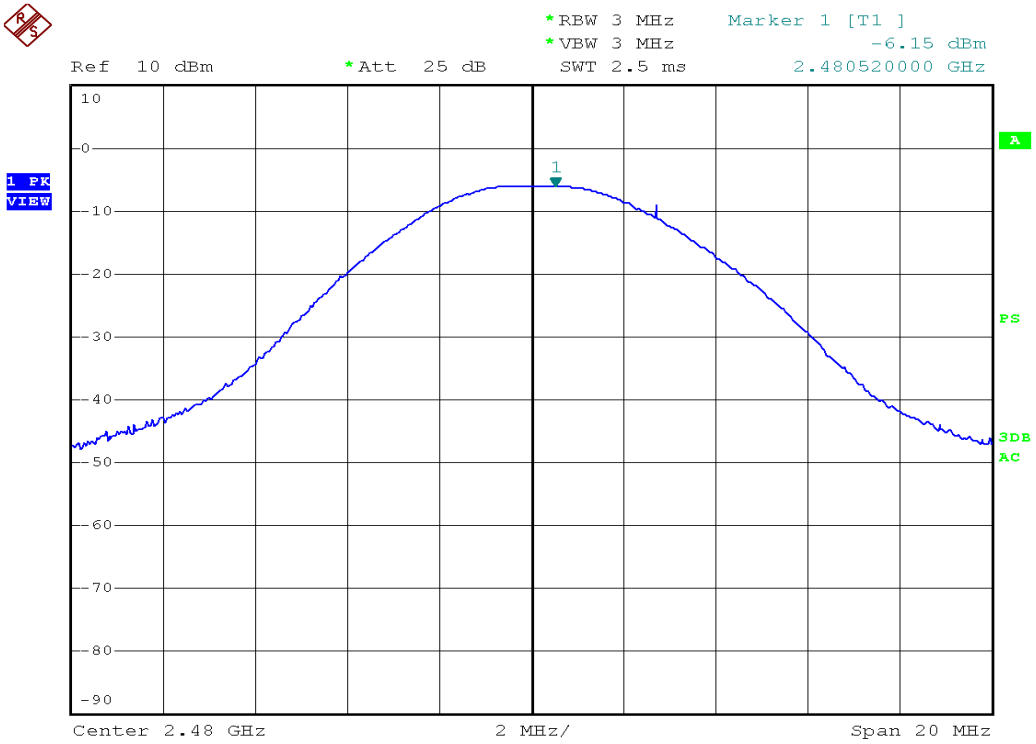
Channel	Frequency (MHz)	Measured RF Output power (dBm)	Attenuator + Cable Loss(dB)	Total Output power (dBm)	Limit (dBm)	Remarks
Low	2405	-5.78	7.28	1.50	30	Pass
Mid	2440	-5.94	7.28	1.34	30	Pass
High	2480	-6.15	7.28	1.13	30	Pass



Channel Frequency: 2405 MHz



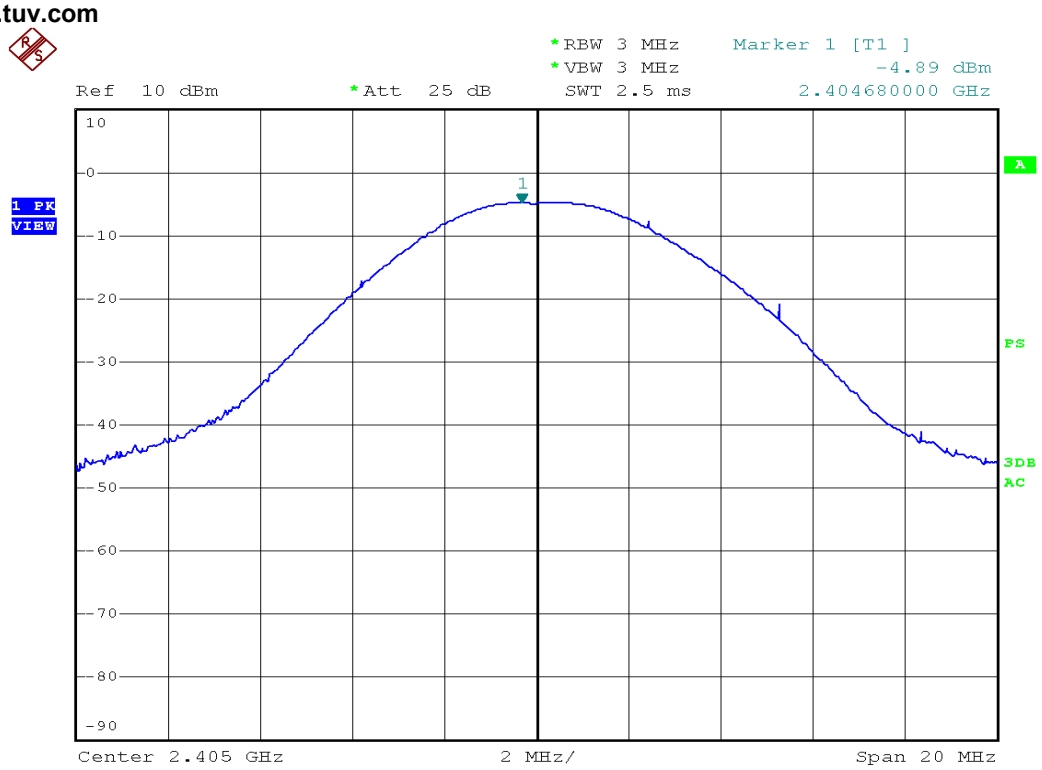
Channel Frequency: 2440 MHz



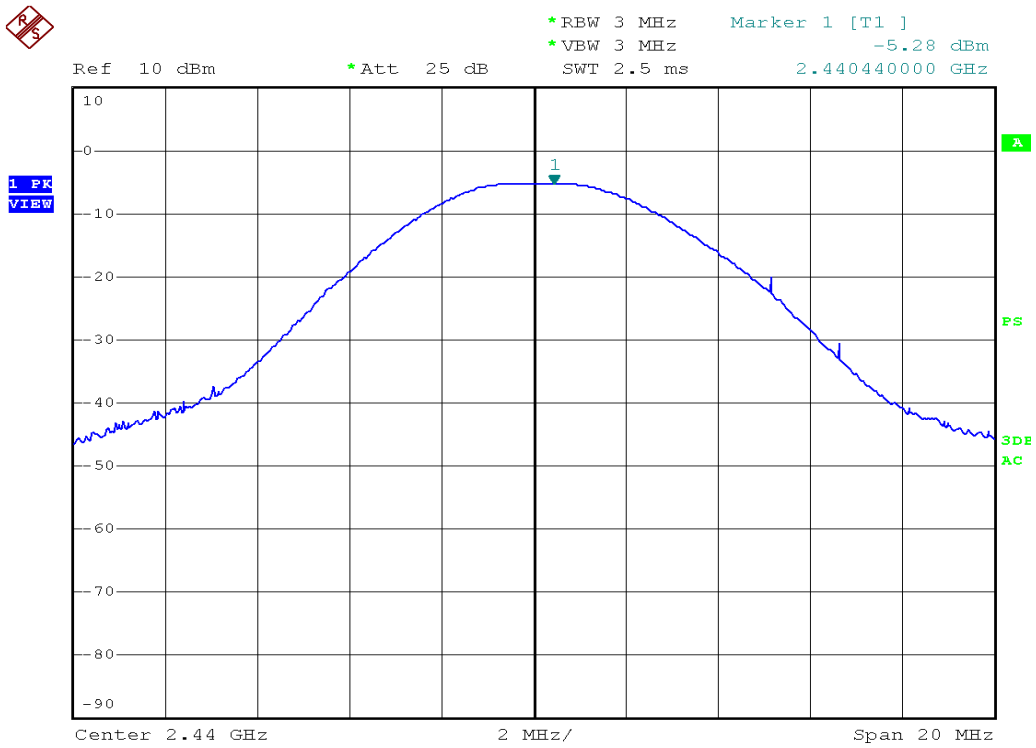
Channel Frequency: 2480 MHz

Antenna 1+2
Cable Loss: 1.28dB

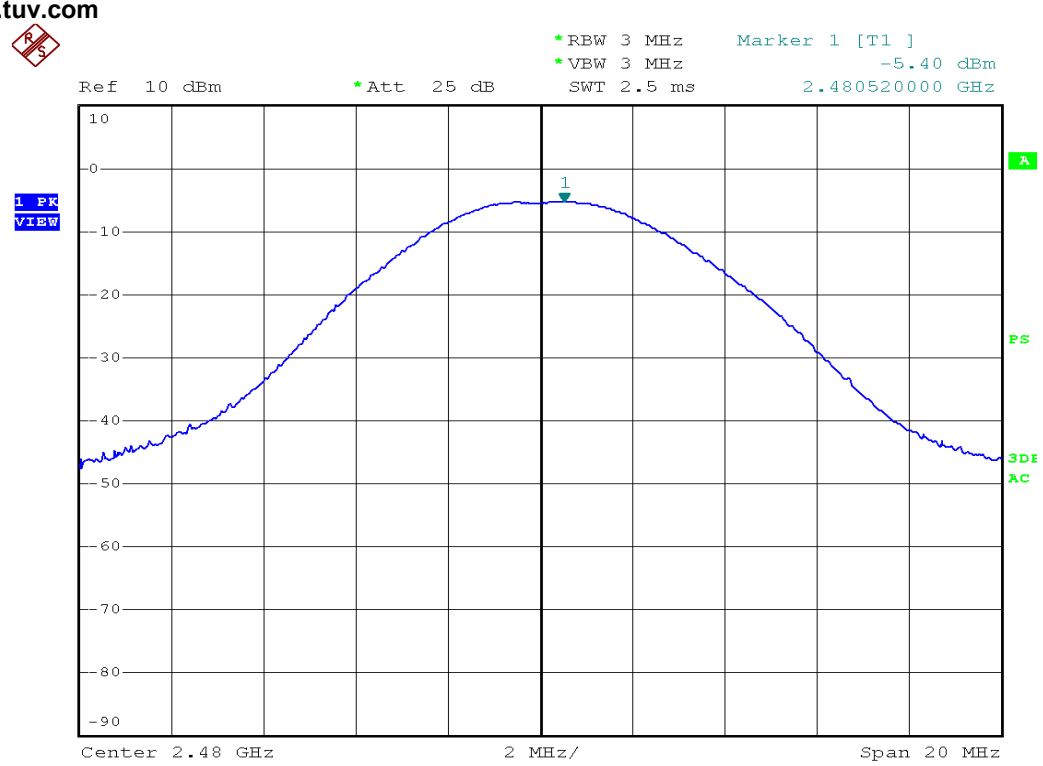
Channel	Frequency (MHz)	Measured RF Output power (dBm)	Attenuator (dB)	Total Output power (dBm)	Limit (dBm)	Remarks
Low	2405	-4.89	7.28	2.39	30	Pass
Mid	2440	-5.28	7.28	2.00	30	Pass
High	2480	-5.40	7.28	1.88	30	Pass



Channel Frequency: 2405 MHz



Channel Frequency: 2440 MHz



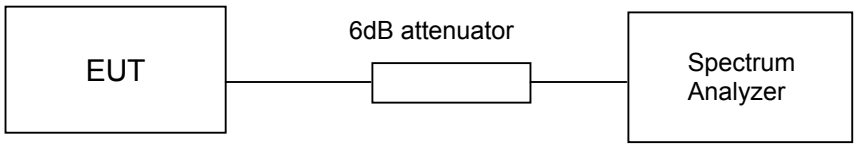
Channel Frequency: 2480 MHz

6 dB Bandwidth **Section 15.247(a)(2)**

Result **Pass**

Test Specification FCC Part 15 Section 15.247 (a) (2)
Detector Function Peak
Requirement The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Method:

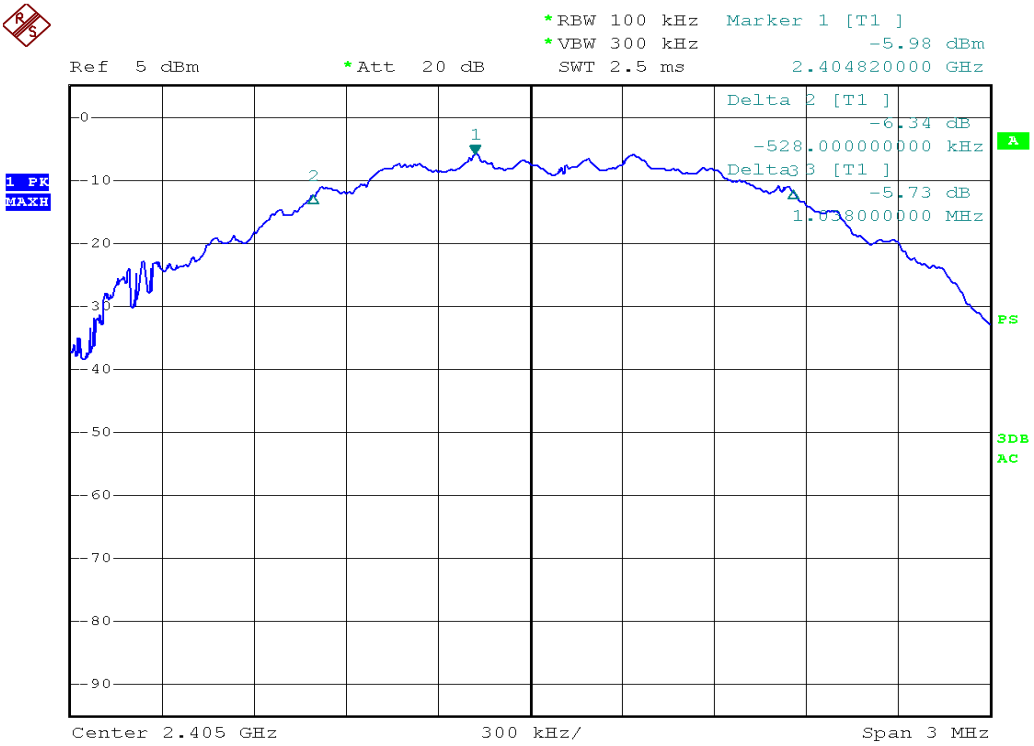


Test Result:

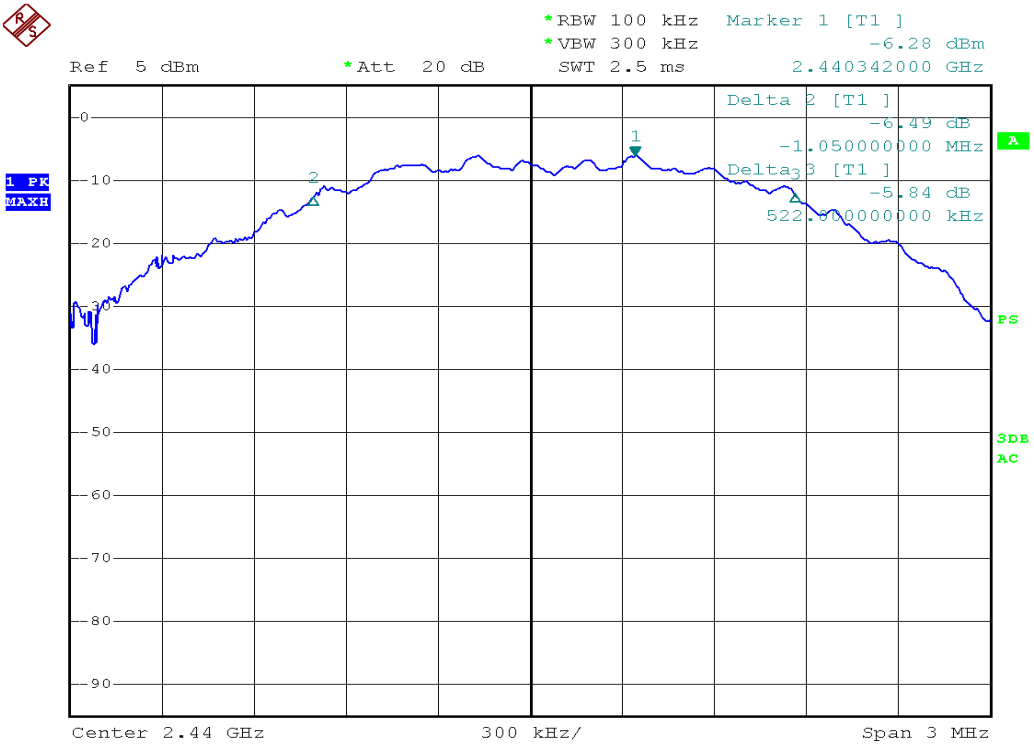
Antenna 1

Cable Loss: 1.28dB

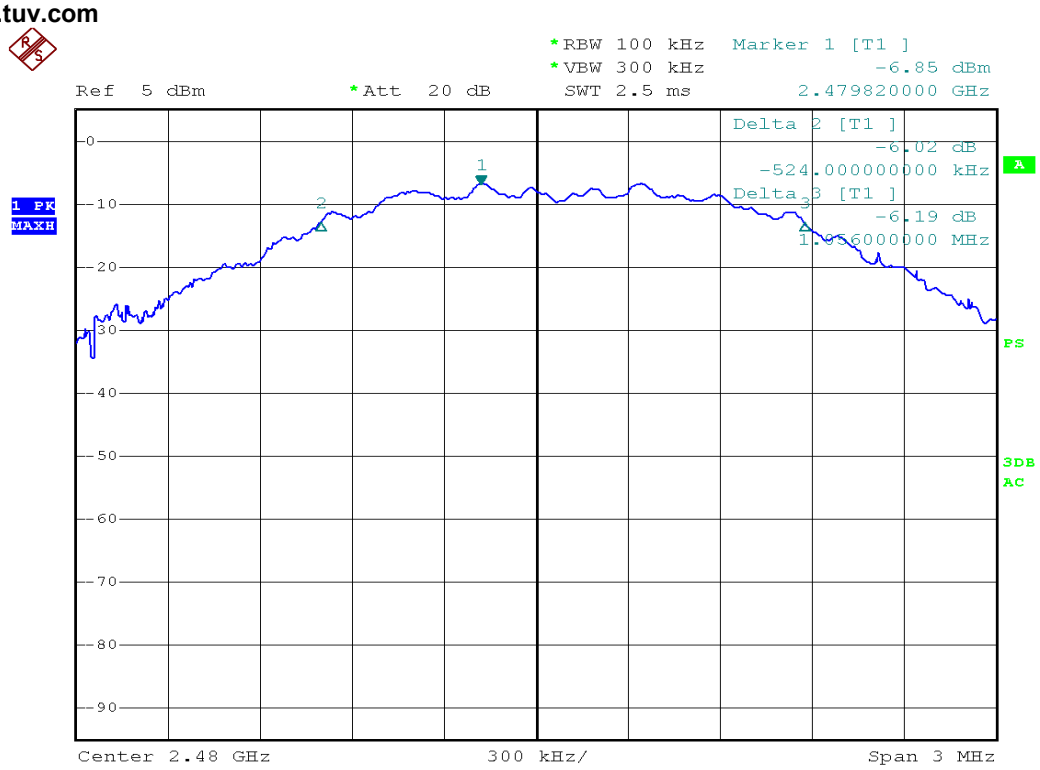
Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2405	0.528	1.038	1.566	2.40
2440	1.050	0.522	1.572	2.52
2480	0.524	1.056	1.580	2.58



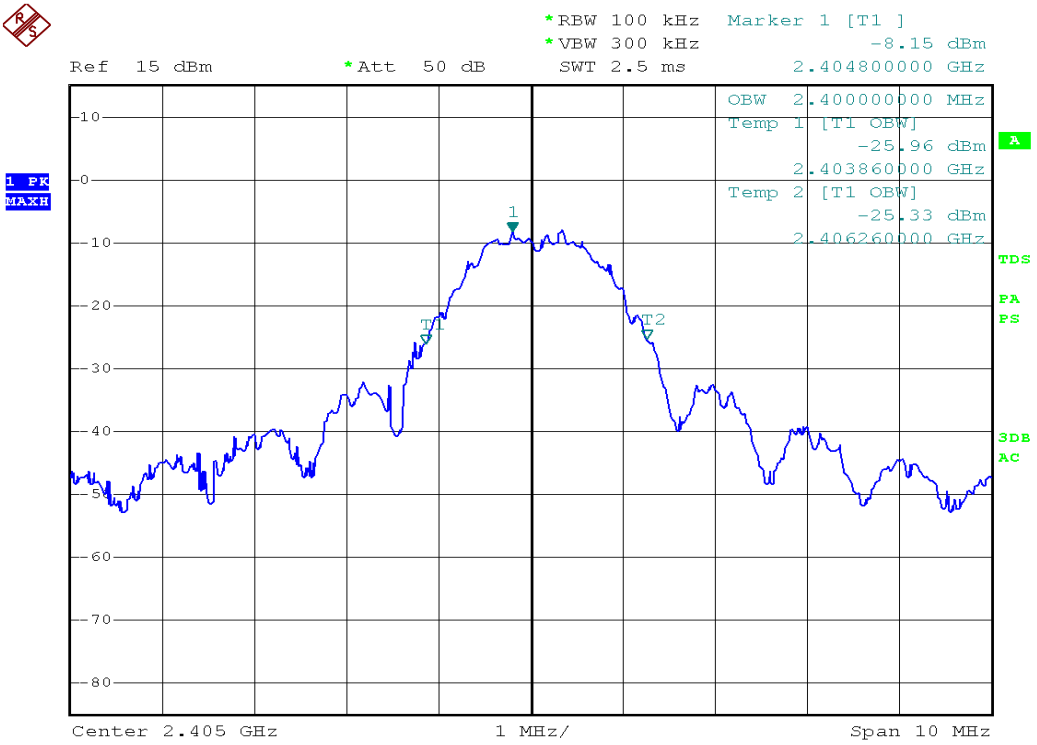
Channel Frequency 2405 MHz



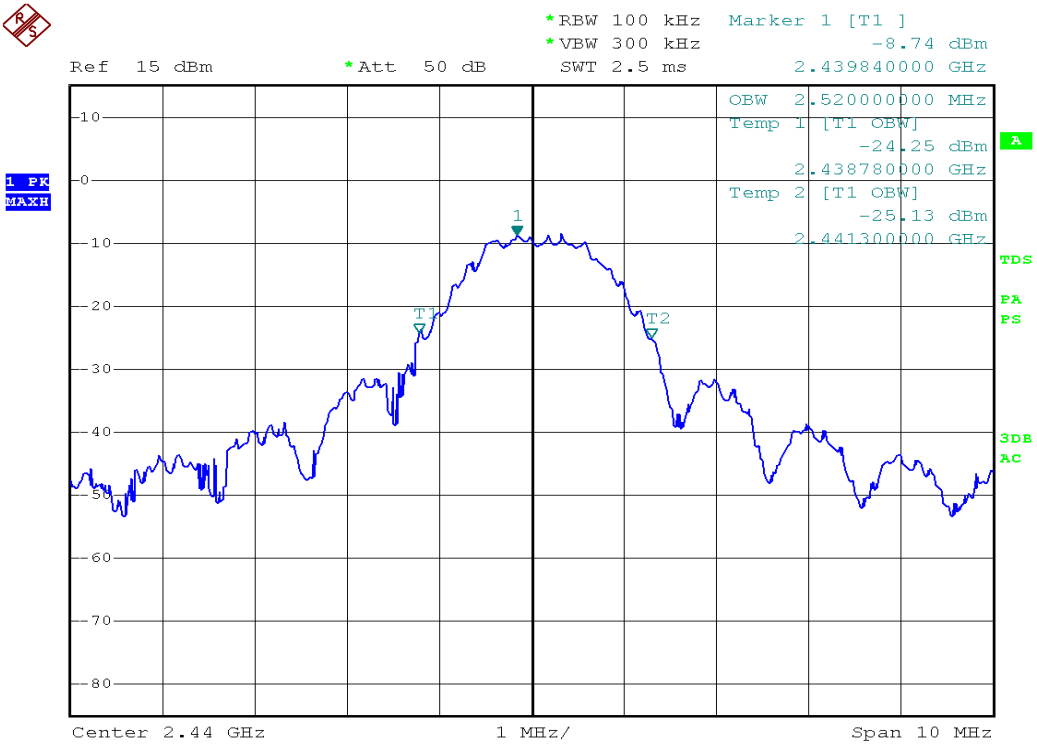
Channel Frequency 2440 MHz



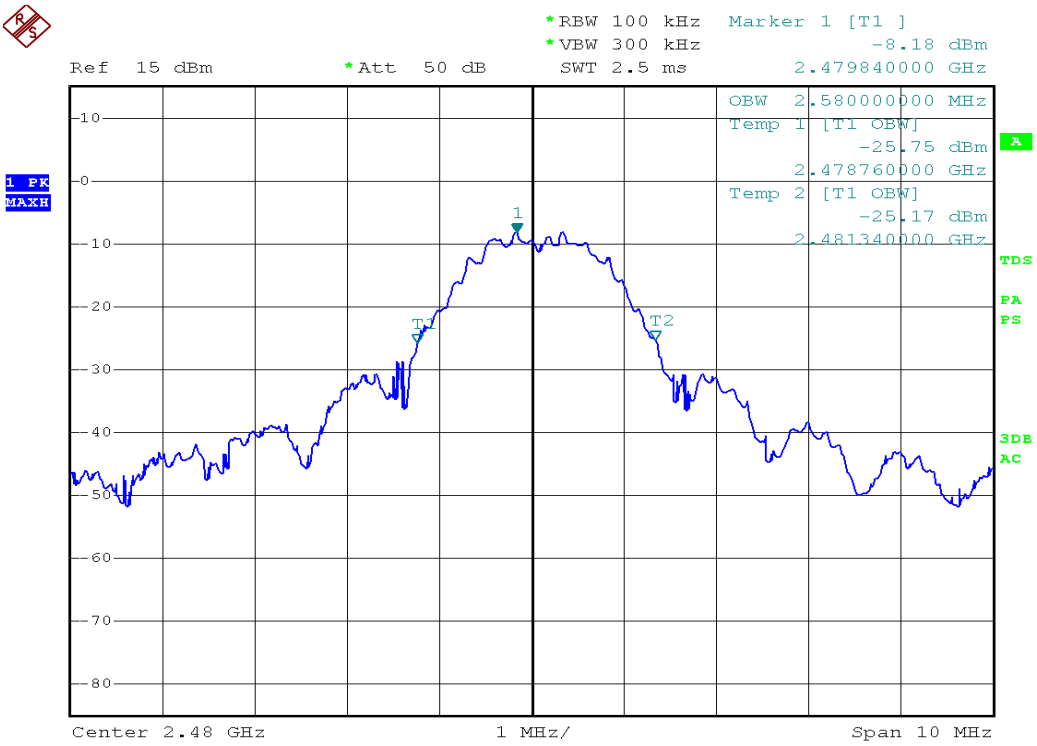
Channel Frequency 2480 MHz



OBW: Channel Low



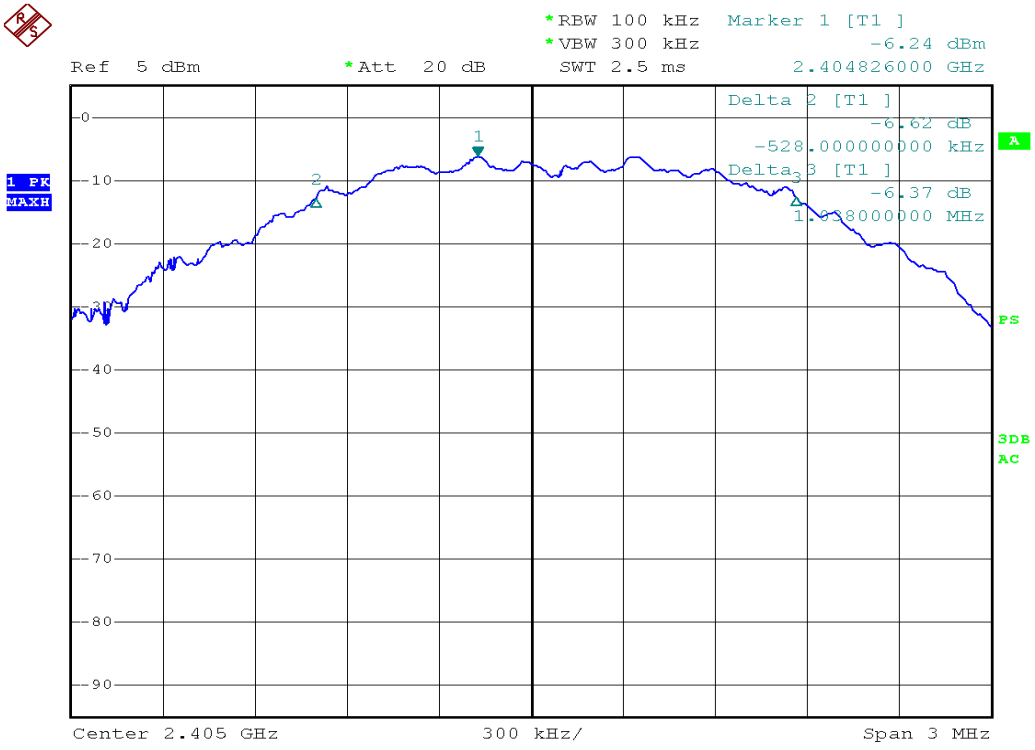
OBW: Channel Mid



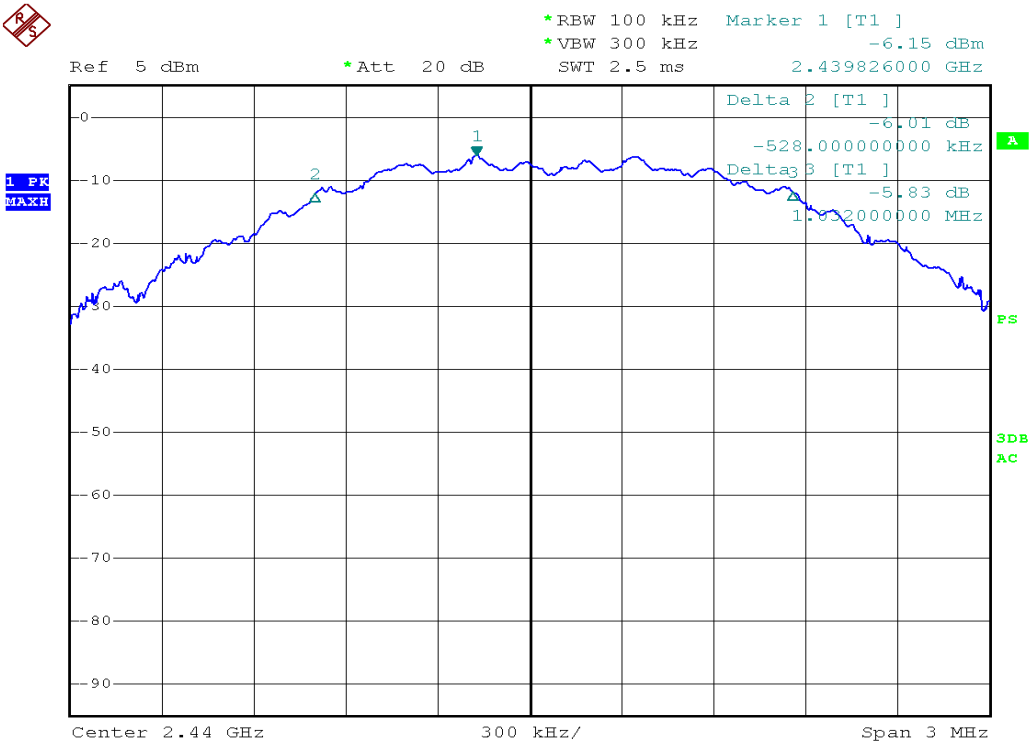
OBW: Channel High

Antenna 2

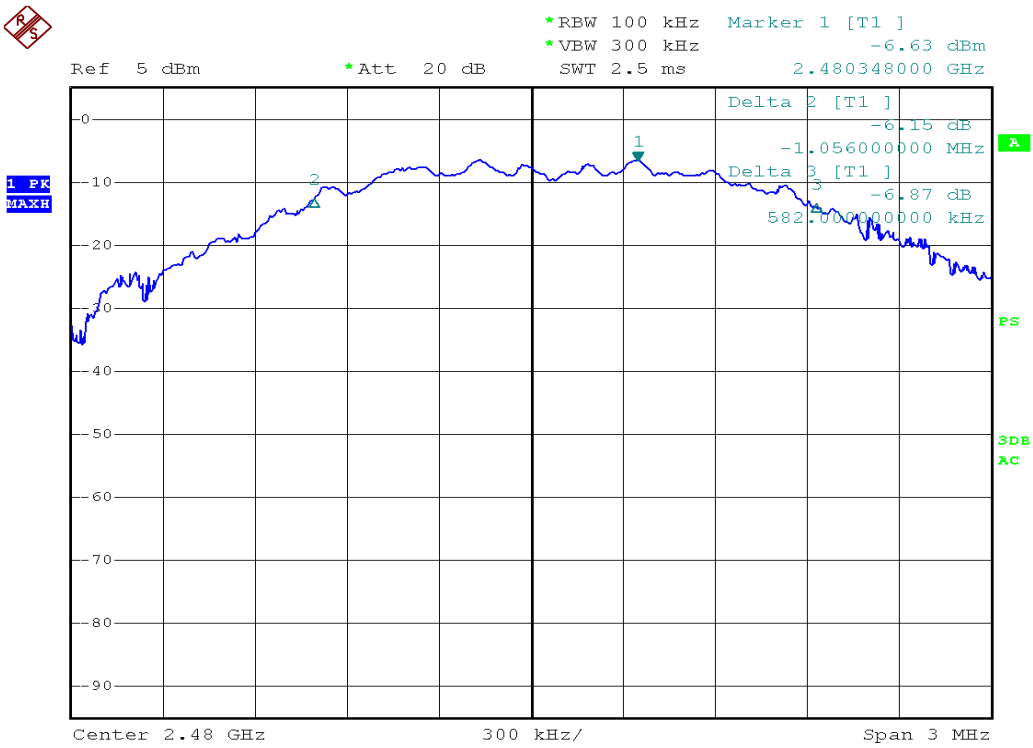
Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2405	0.528	1.038	1.566	2.40
2440	0.528	1.032	1.560	2.50
2480	1.056	0.582	1.638	2.54



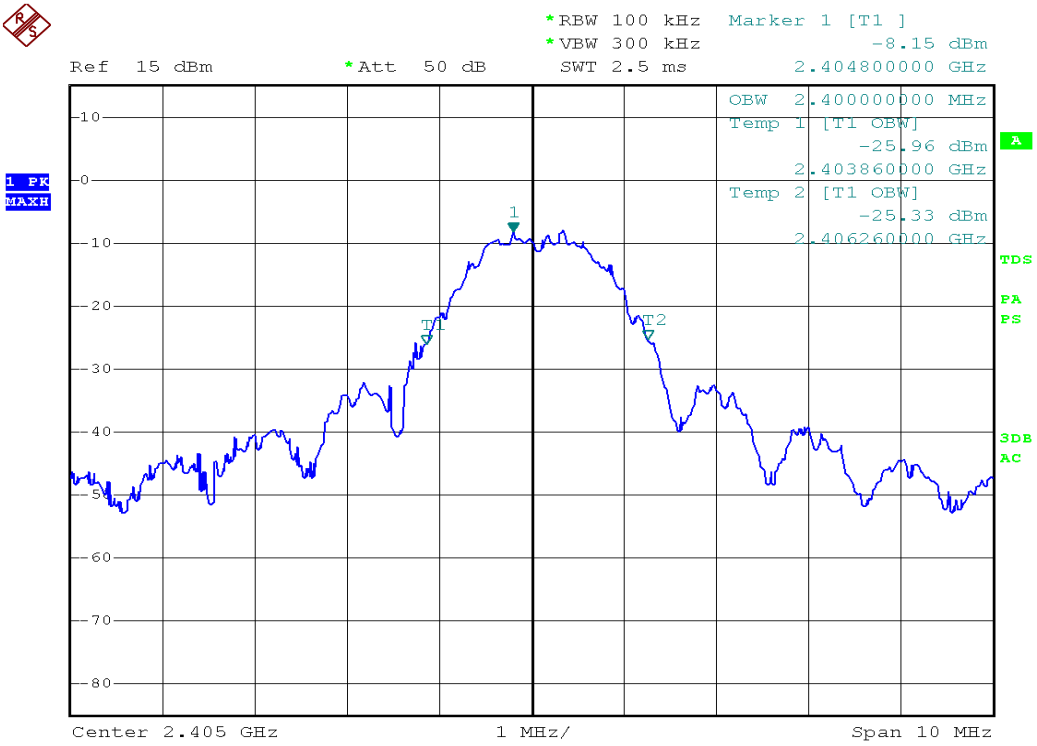
Channel Frequency 2405 MHz



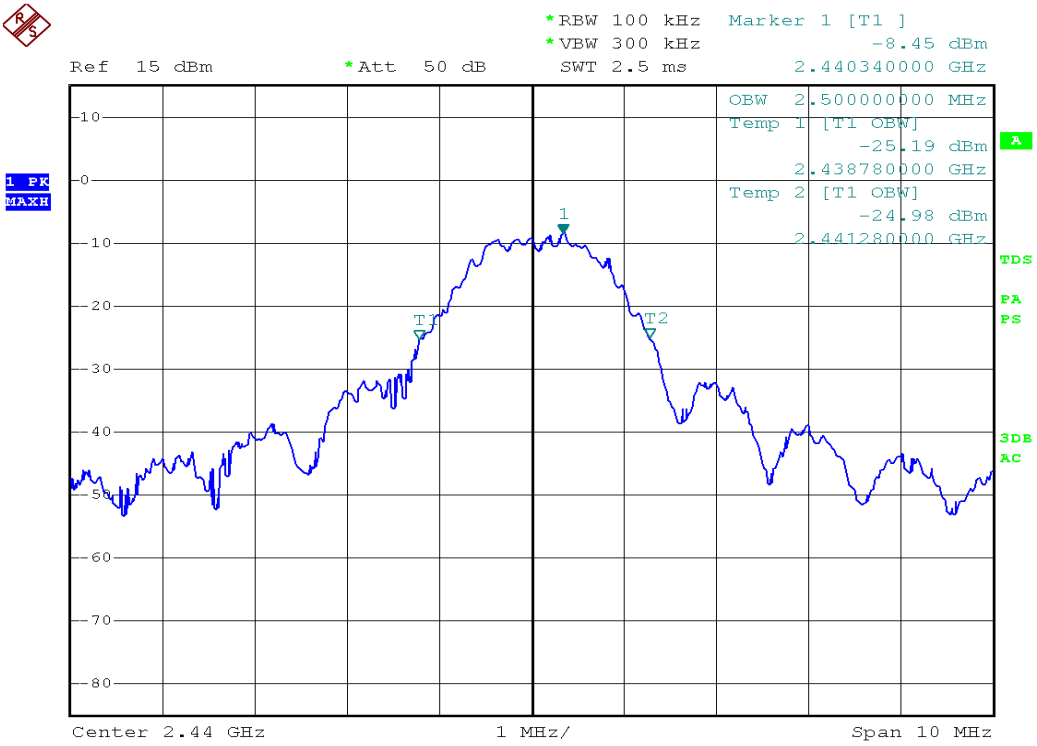
Channel Frequency 2440 MHz



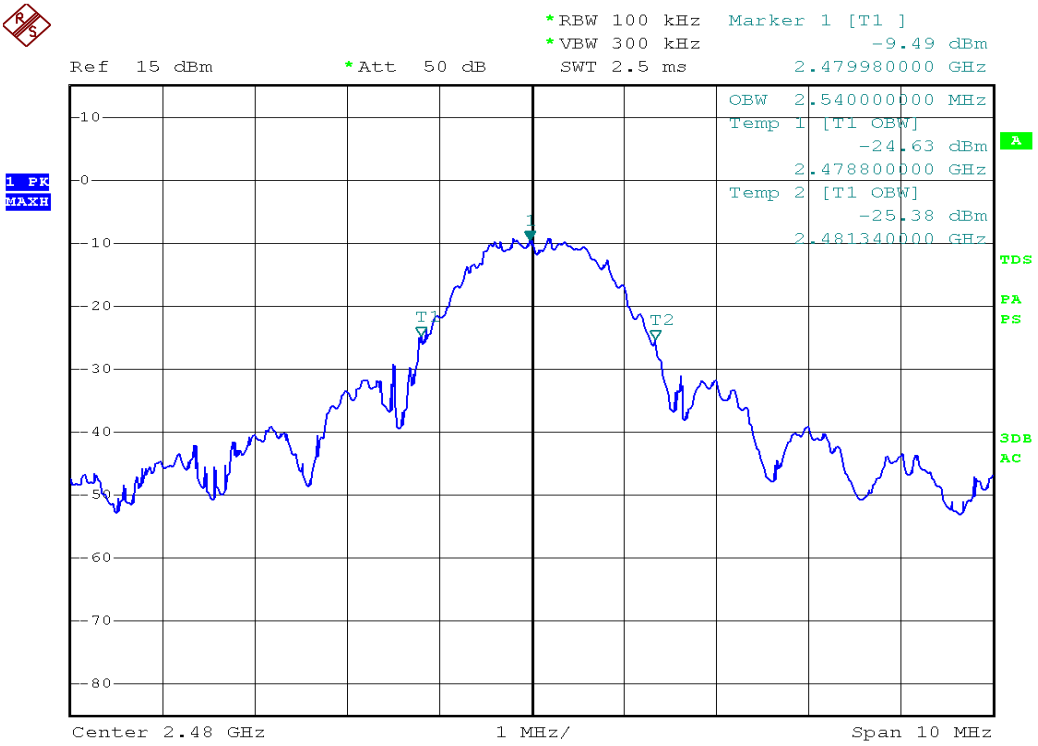
Channel Frequency: 2480 MHz



OBW: Channel Low



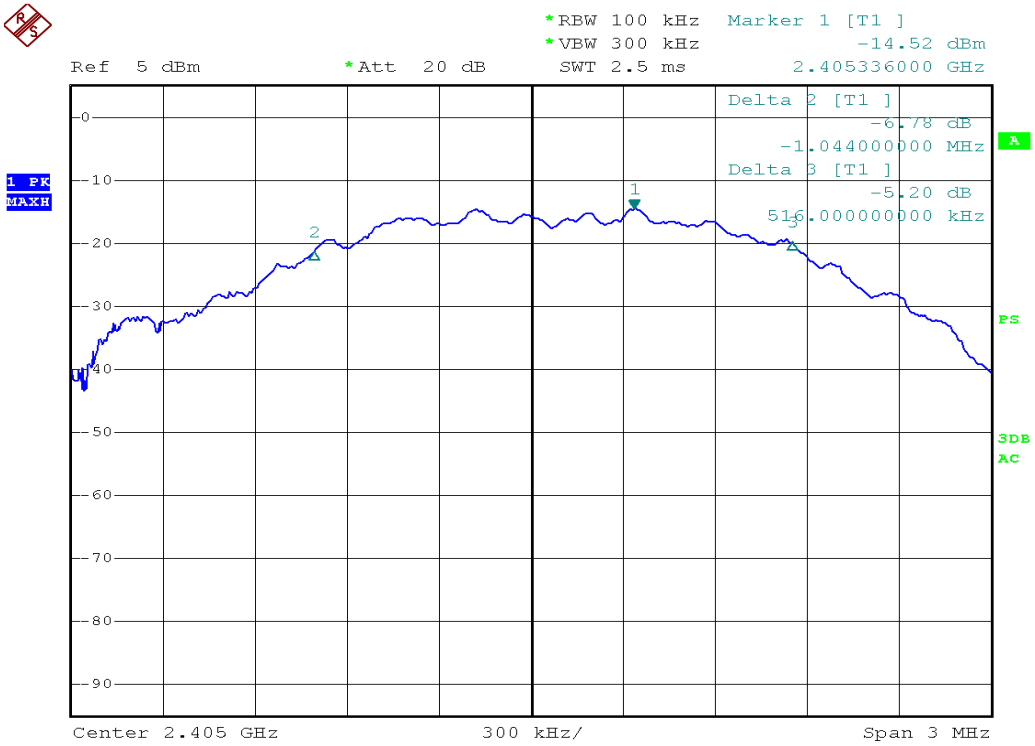
OBW: Channel Mid



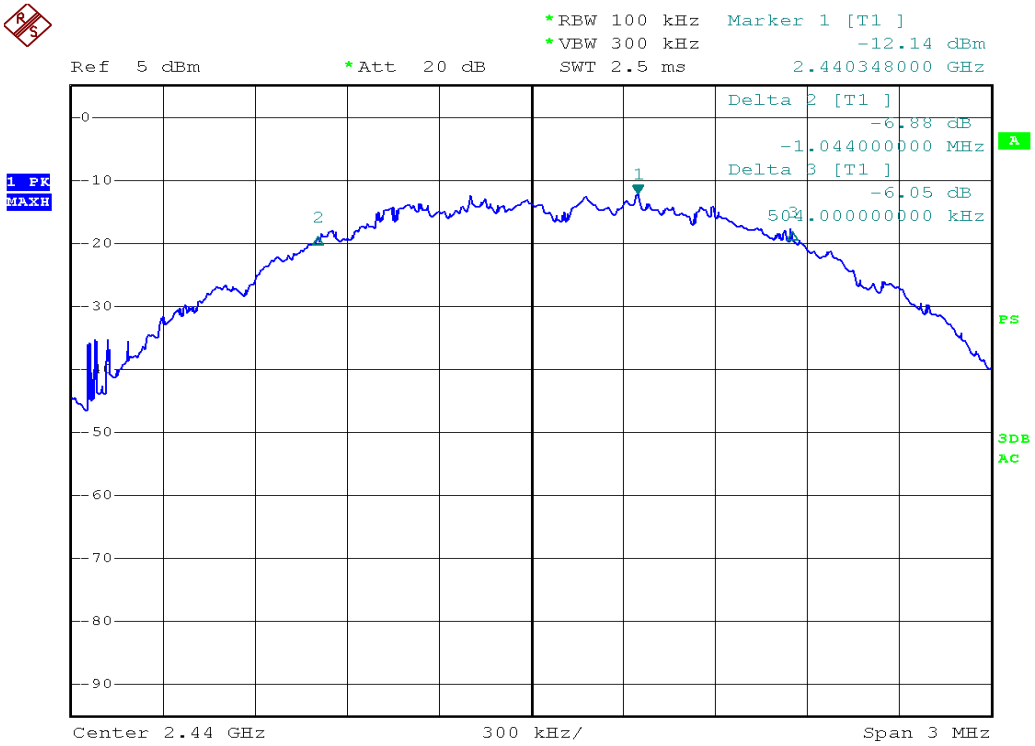
OBW: Channel High

Antenna 1+2
Cable Loss: 1.28dB

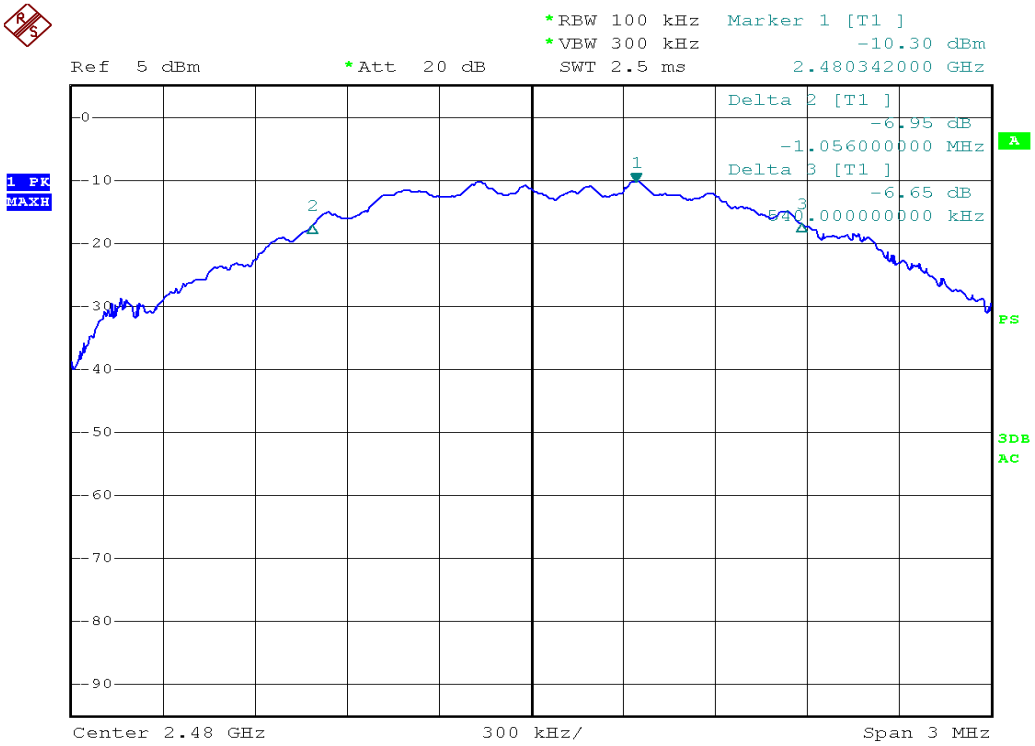
Carrier Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2405	1.044	0.516	1.560	2.52
2440	1.044	0.504	1.548	2.46
2480	1.056	0.540	1.596	2.44



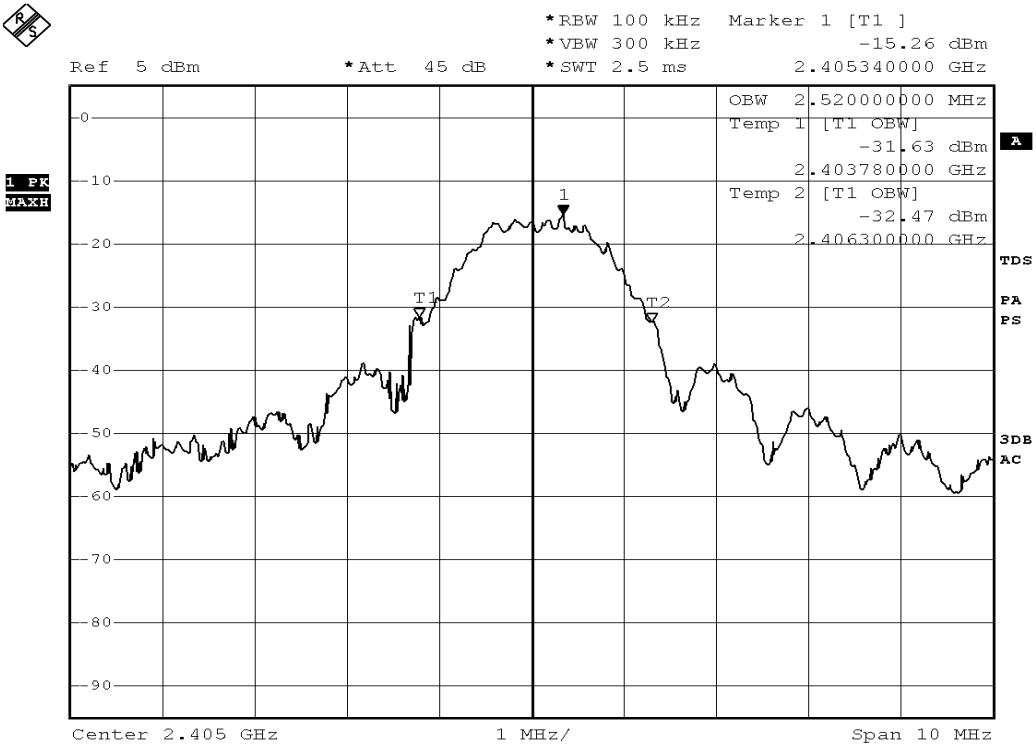
Channel Frequency 2405 MHz



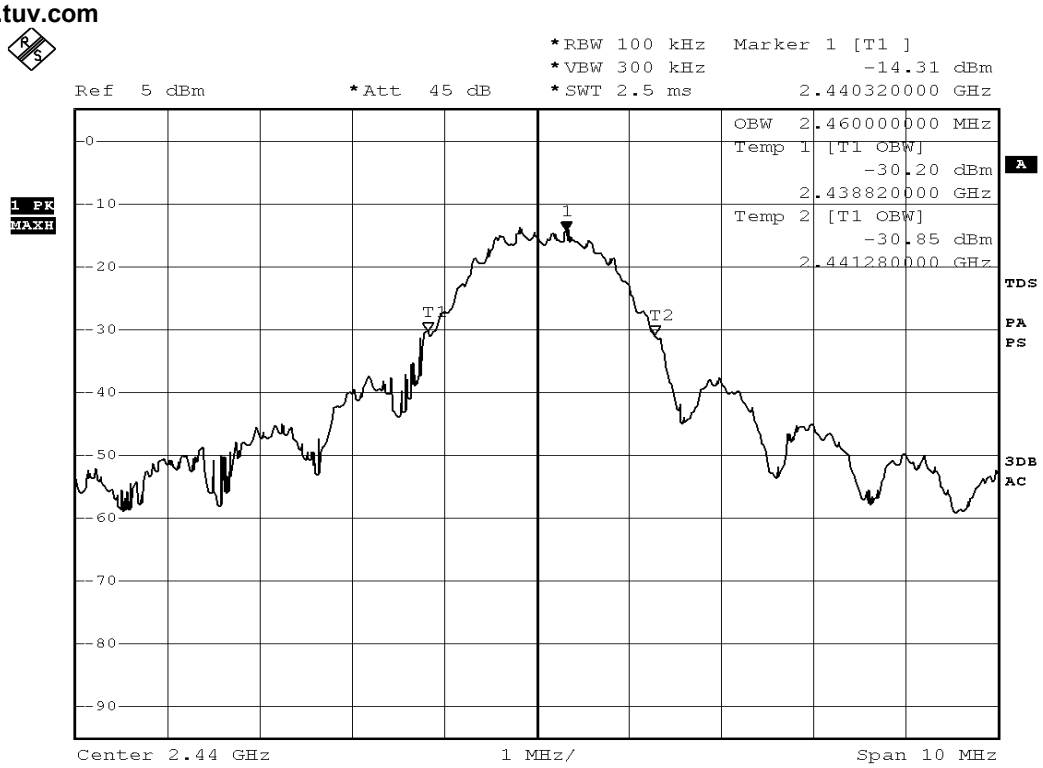
Channel Frequency 2440 MHz



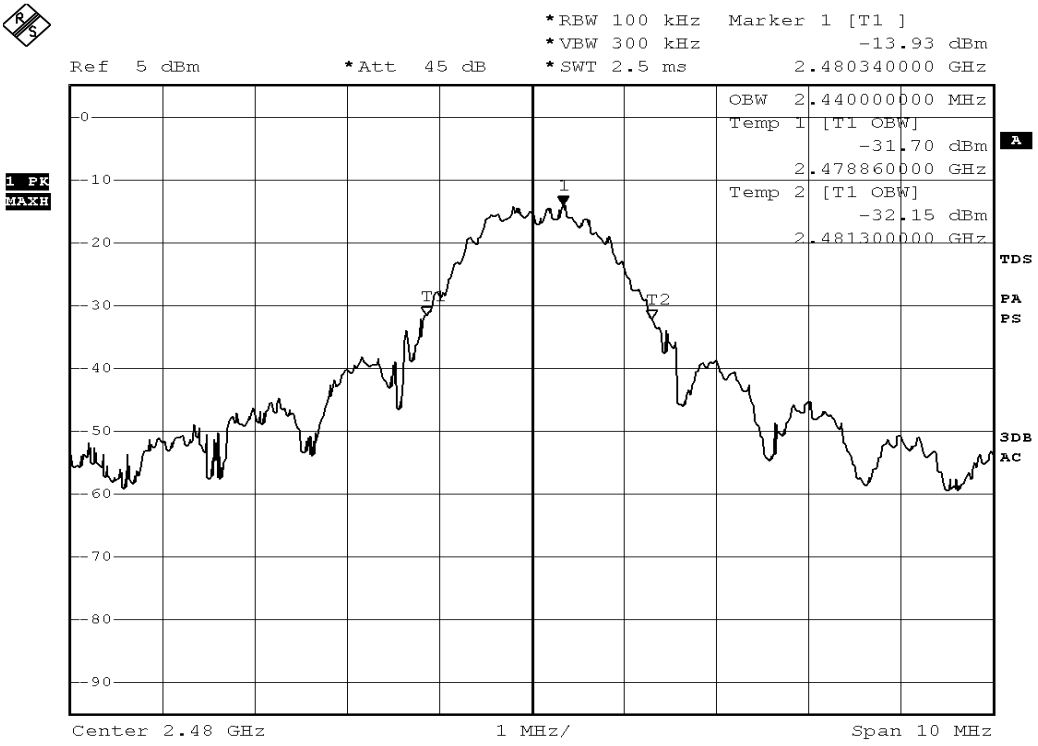
Channel Frequency 2480 MHz



OBW: Channel Low



OBW: Channel Mid



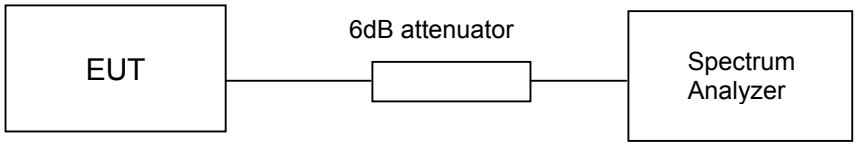
OBW: Channel High

Power Spectral Density **Section 15.247(e)**

Result **Pass**

Test Specification	FCC Part 15 Section 15.247 (e)
Detector Function	Peak
Requirement	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

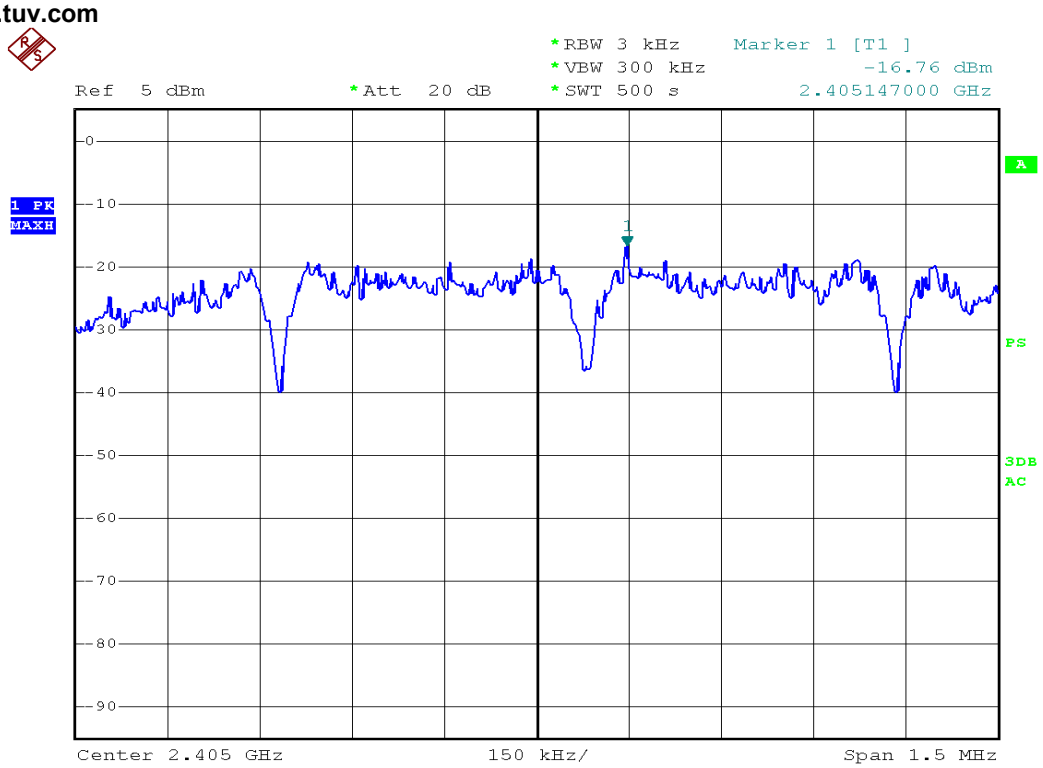
Test Method:



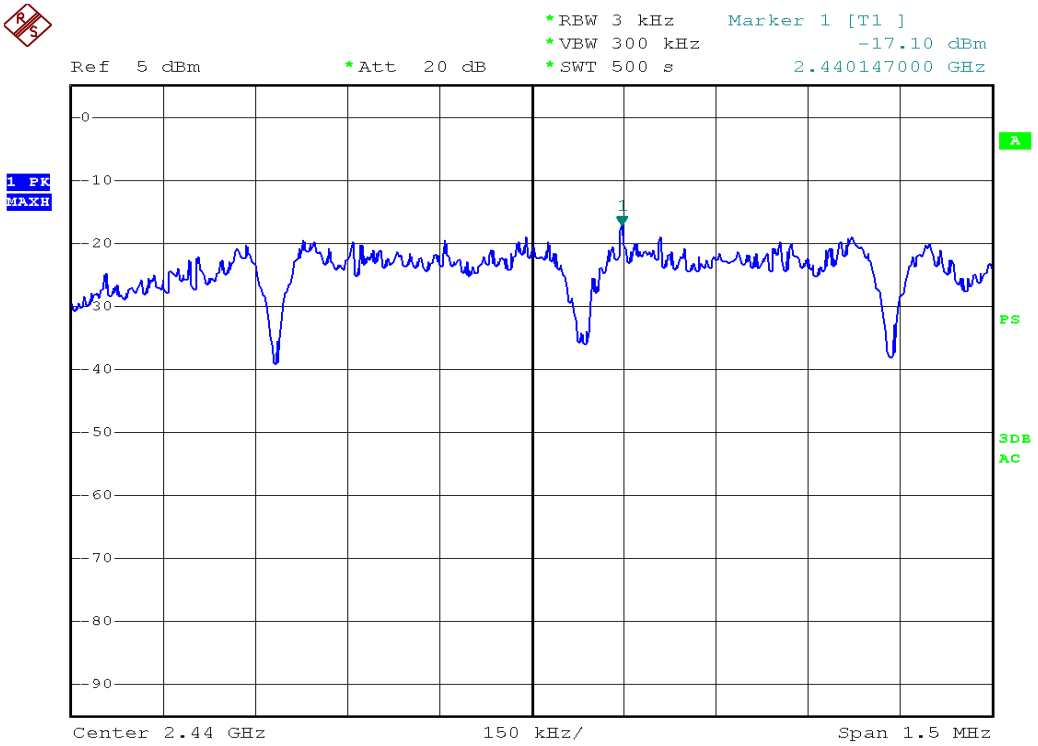
Test Result:

Antenna 1
Cable Loss: 1.28dB

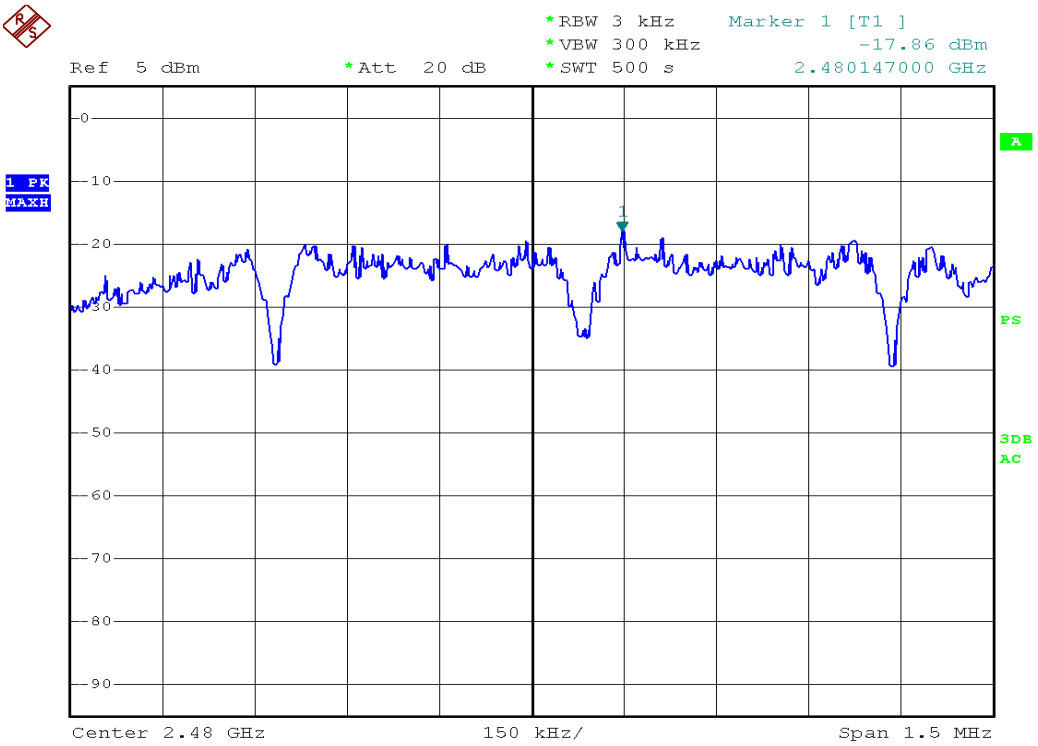
Frequency (MHz)	Measured RF Output power (dBm)	Attenuator + Cable Loss (dB)	PSD (dBm)	Limit (dBm)	Verdict
2405	-16.76	7.28	-09.48	8.00	Pass
2440	-17.10	7.28	-09.82	8.00	Pass
2480	-17.86	7.28	-10.58	8.00	Pass



Channel Frequency 2405 MHz



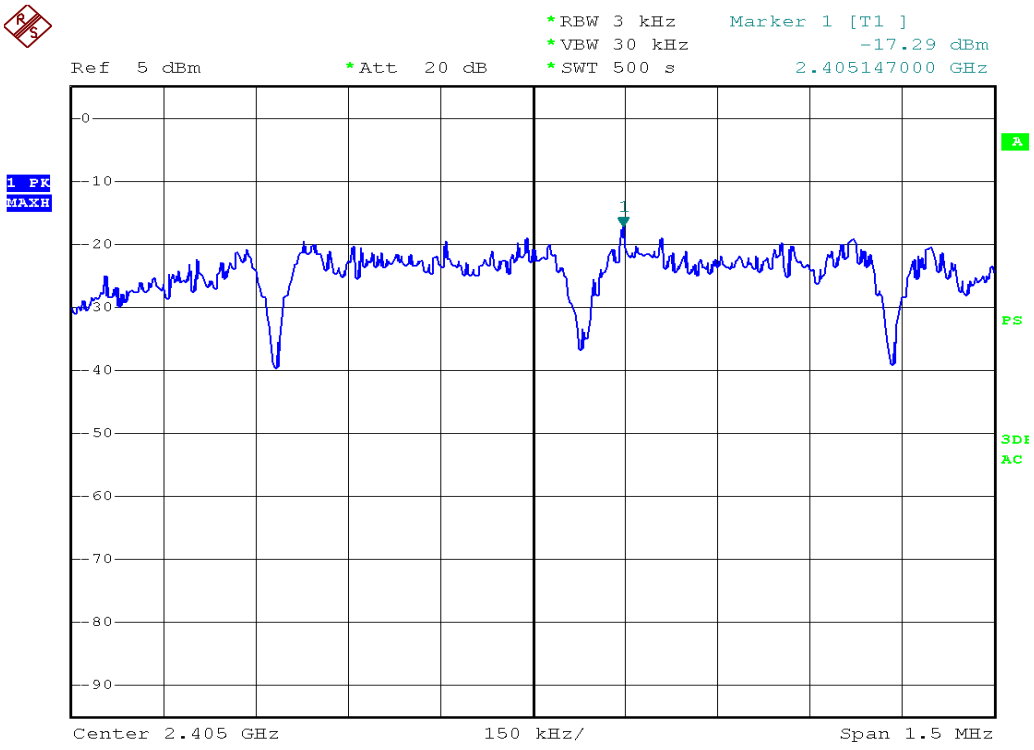
Channel Frequency 2440 MHz



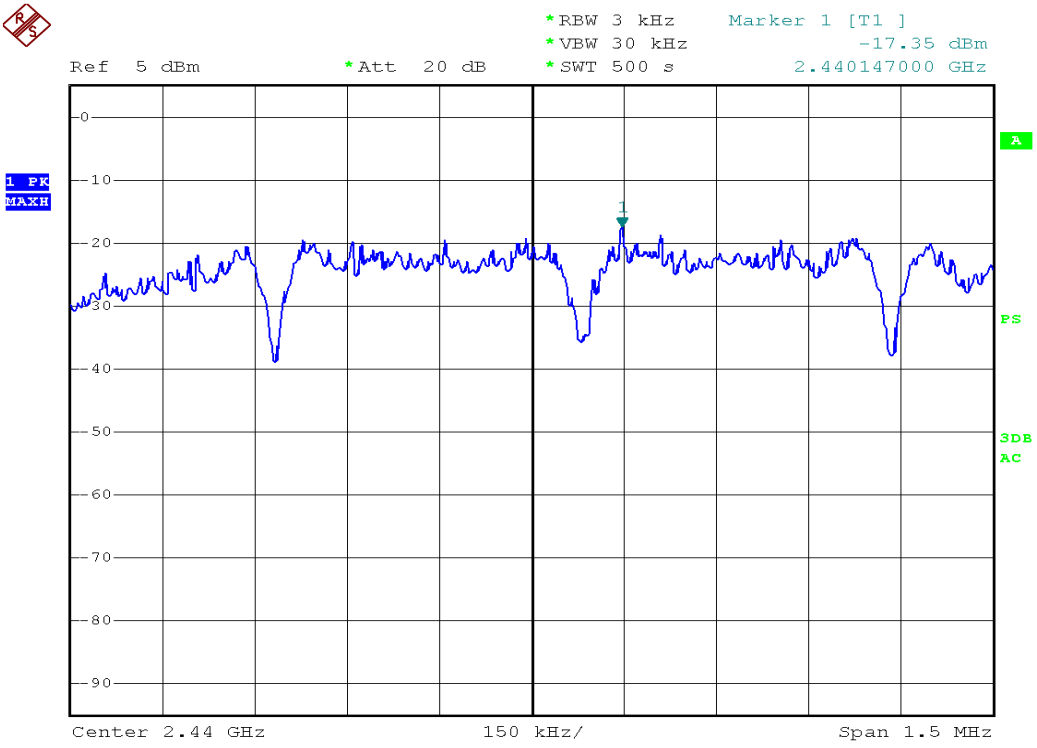
Channel Frequency 2480 MHz

Antenna 2
Cable Loss: 1.28dB

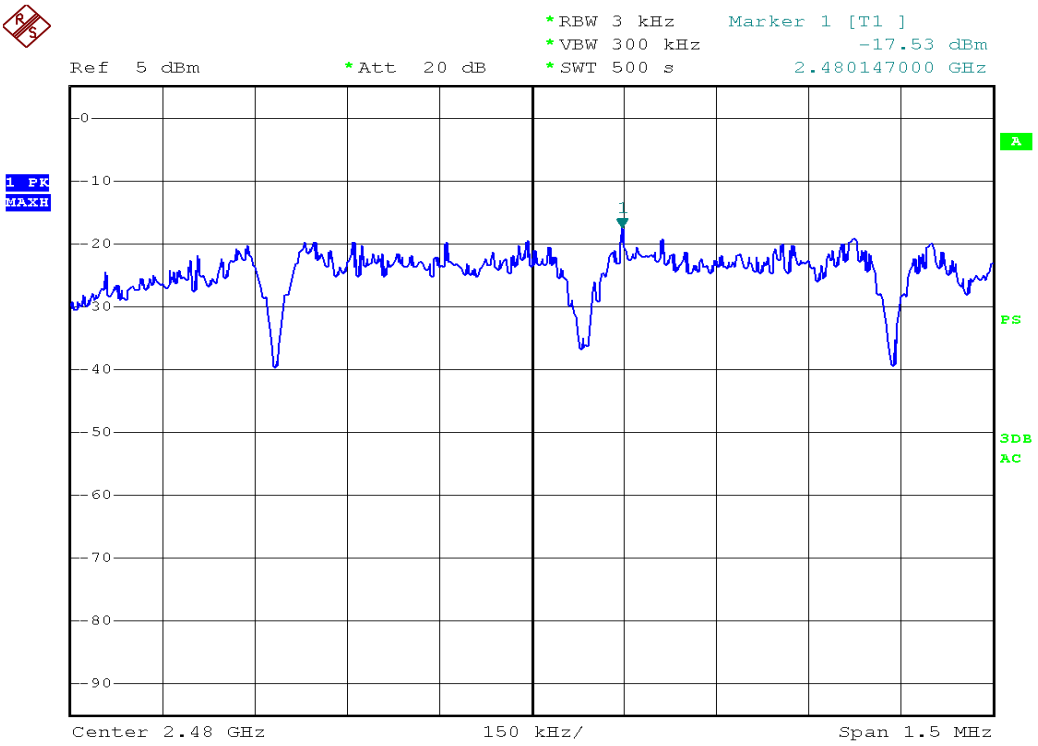
Frequency (MHz)	Measured RF Output power (dBm)	Attenuator + Cable Loss (dB)	PSD (dBm)	Limit (dBm)	Verdict
2405	-17.29	7.28	-10.01	8.00	Pass
2440	-17.35	7.28	-10.07	8.00	Pass
2480	-17.53	7.28	-10.28	8.00	Pass



Channel Frequency 2405 MHz



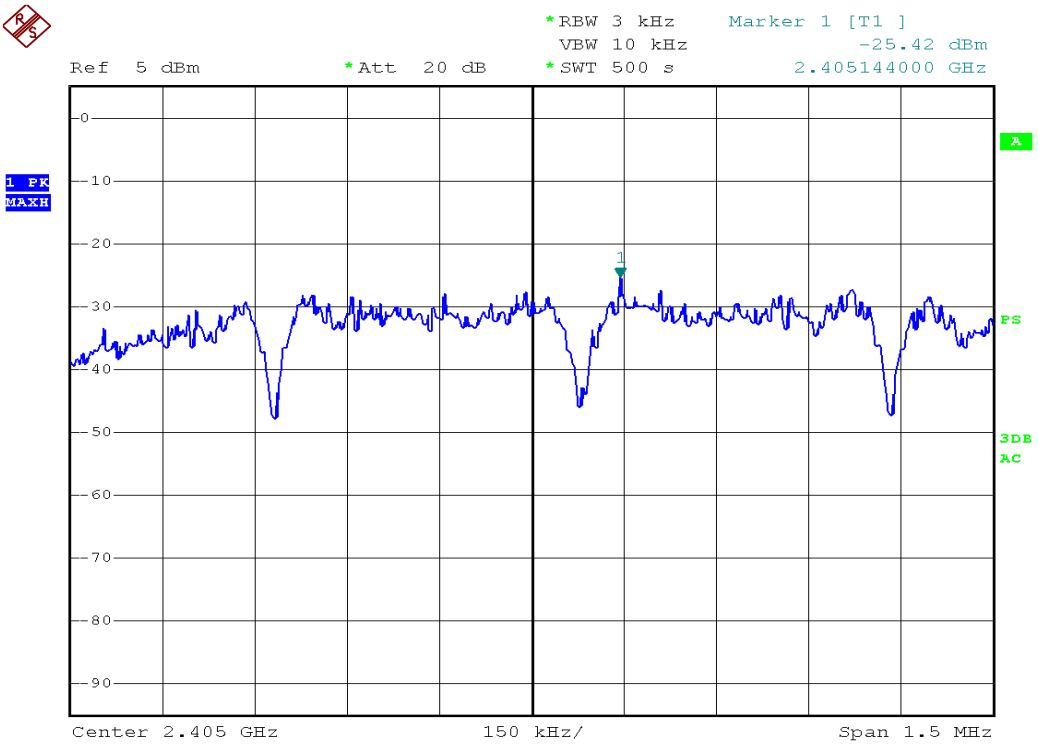
Channel Frequency 2440 MHz



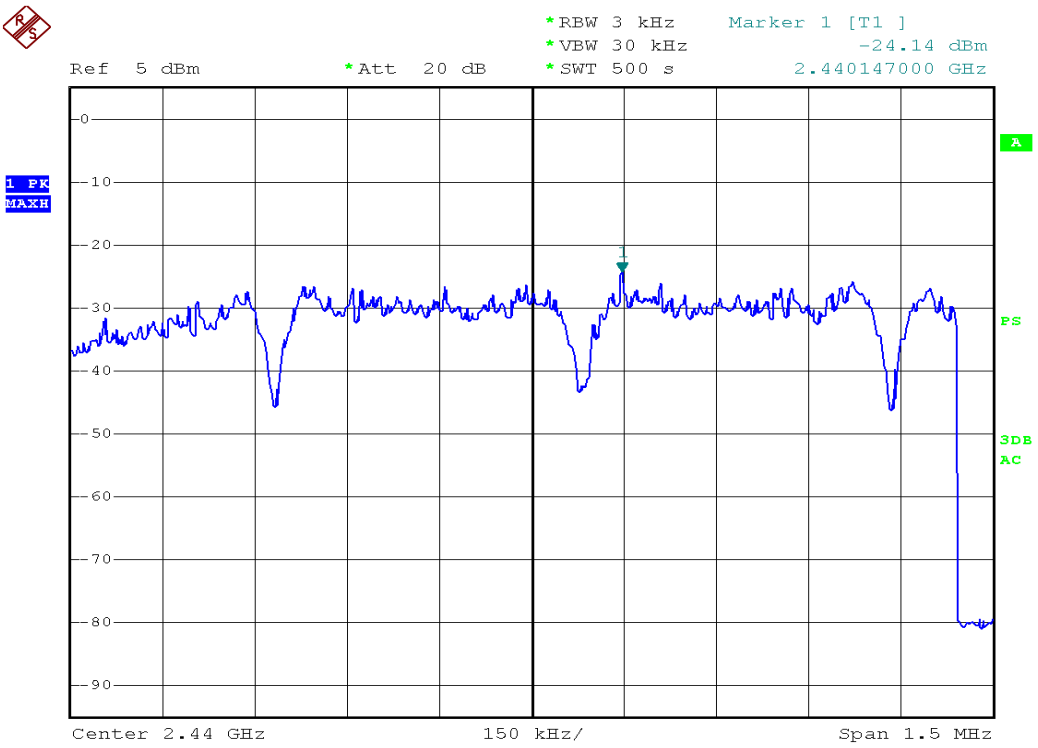
Channel Frequency 2480 MHz

Antenna 1+2
Cable Loss: 1.28dB

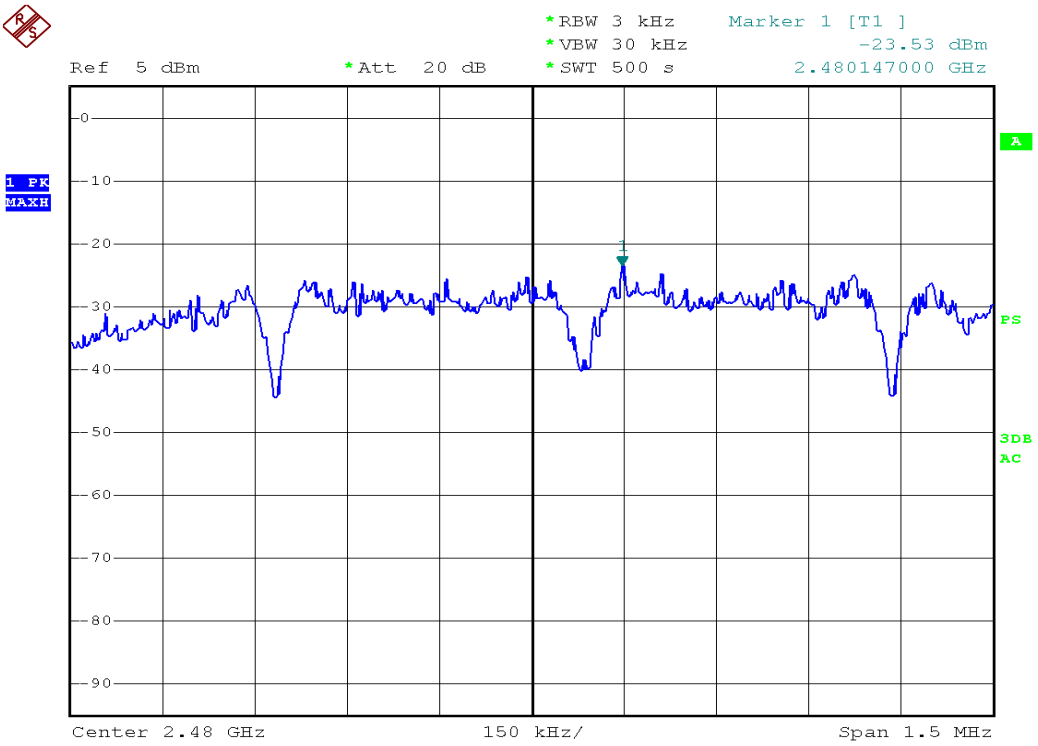
Frequency (MHz)	Measured RF Output power (dBm)	Attenuator + Cable Loss (dB)	PSD (dBm)	Limit (dBm)	Verdict
2405	-25.42	13.78	-11.64	8.00	Pass
2440	-24.14	13.78	-10.36	8.00	Pass
2480	-23.53	13.78	-09.75	8.00	Pass



Channel Frequency 2405 MHz



Channel Frequency 2440 MHz



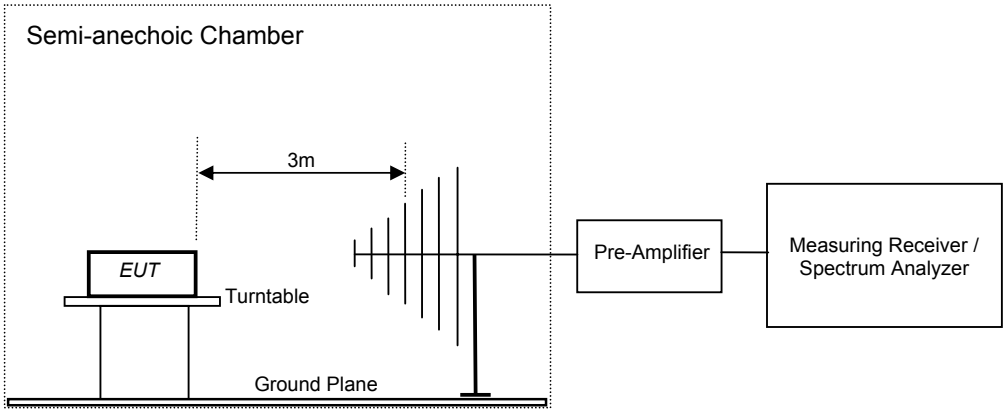
Channel Frequency 2480 MHz

Band-edge Compliance **Section 15.247 (d)**

Result **Pass**

Test Specification	FCC Part 15, Subpart C
Detector Function	Peak
Requirement	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

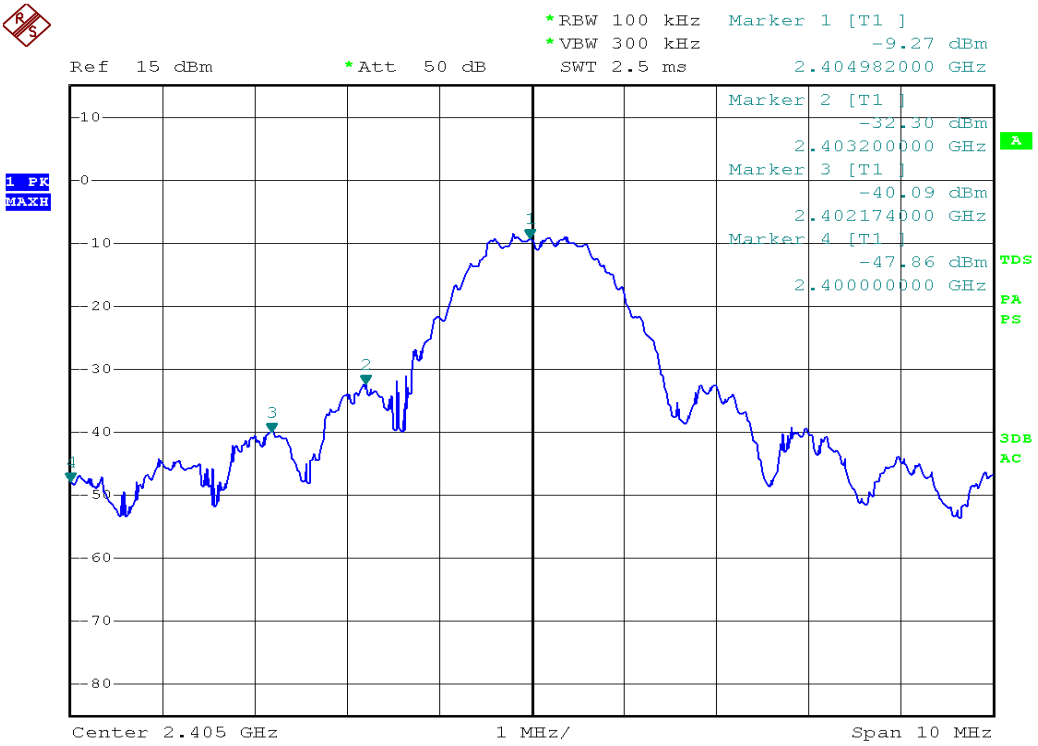
Test Method:



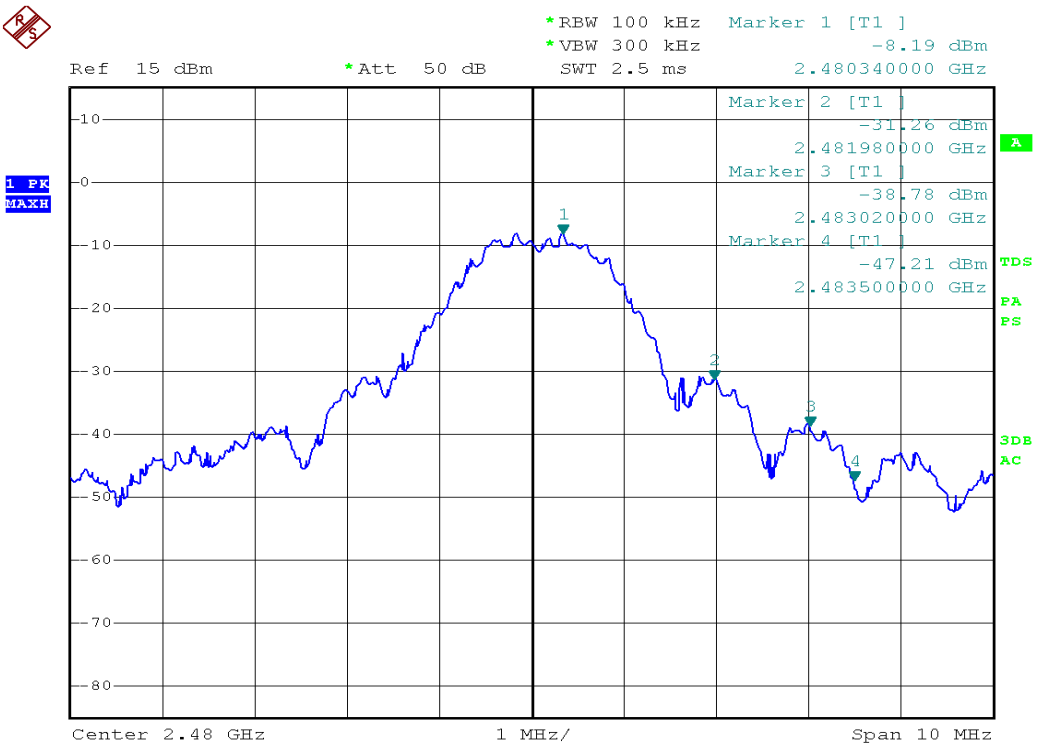
Test Result:

Antenna 1

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)	Remarks
		Frequency (MHz)	Value (dB)		
Low	2405	2400.0	-47.86	-20	Pass
High	2480	2483.5	-47.21	-20	Pass



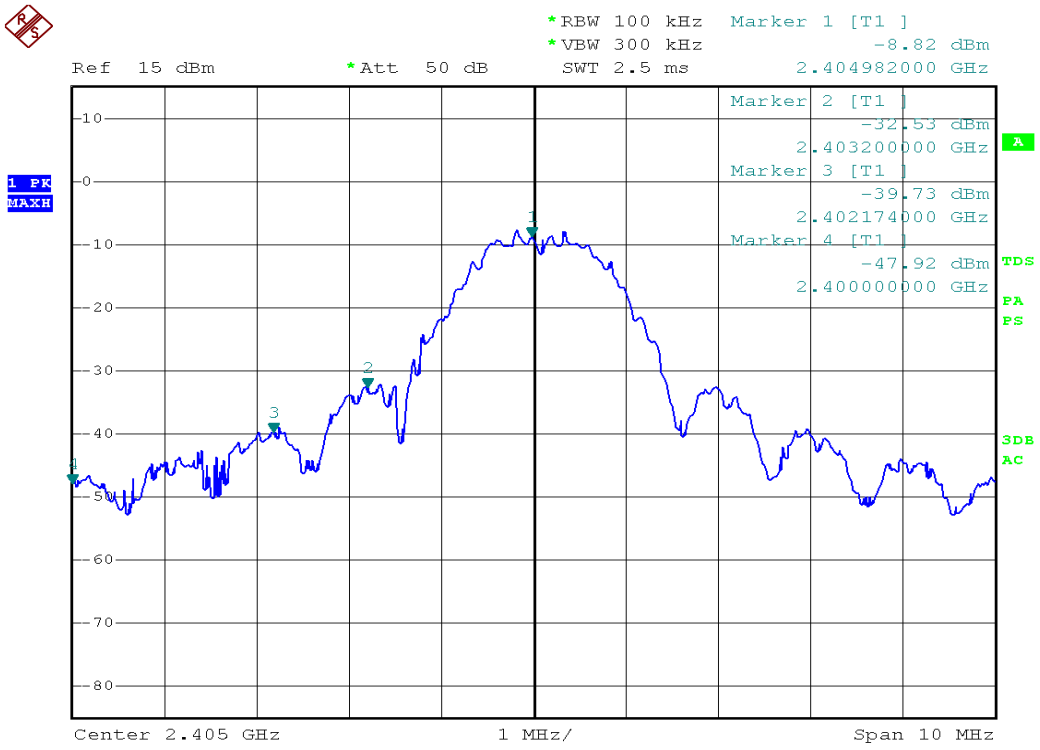
Channel Frequency 2405 MHz



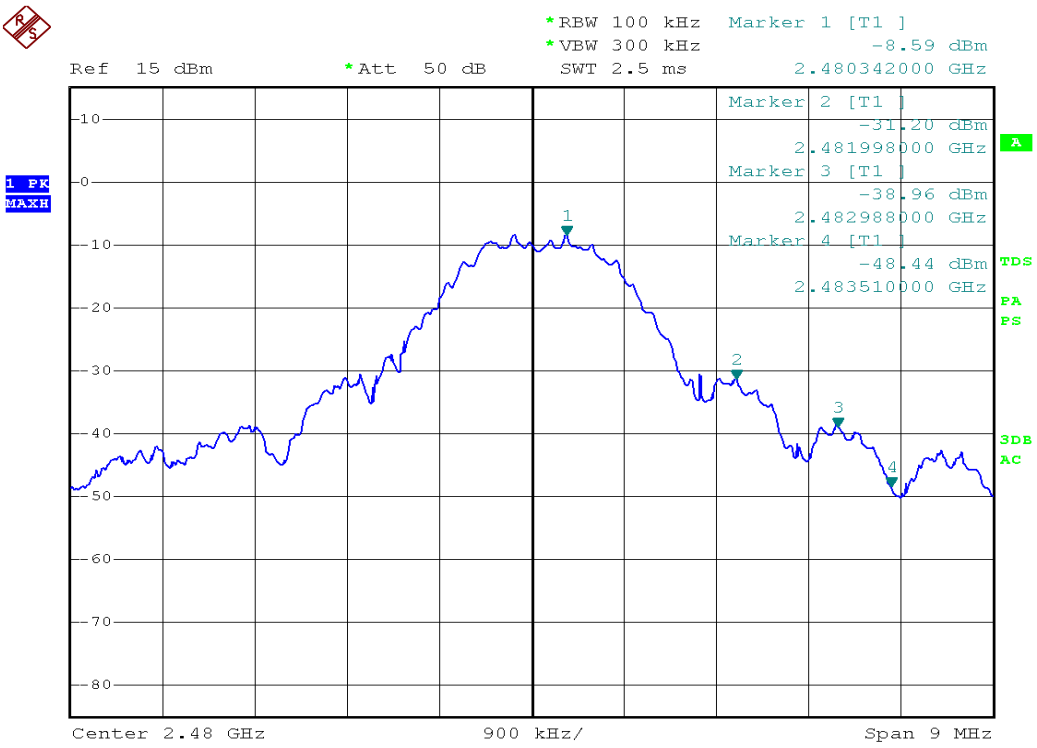
Channel Frequency 2480 MHz

Antenna 2

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)	Remarks
		Frequency (MHz)	Value (dB)		
Low	2405	2400.0	-47.92	-20	Pass
High	2480	2483.5	-48.44	-20	Pass



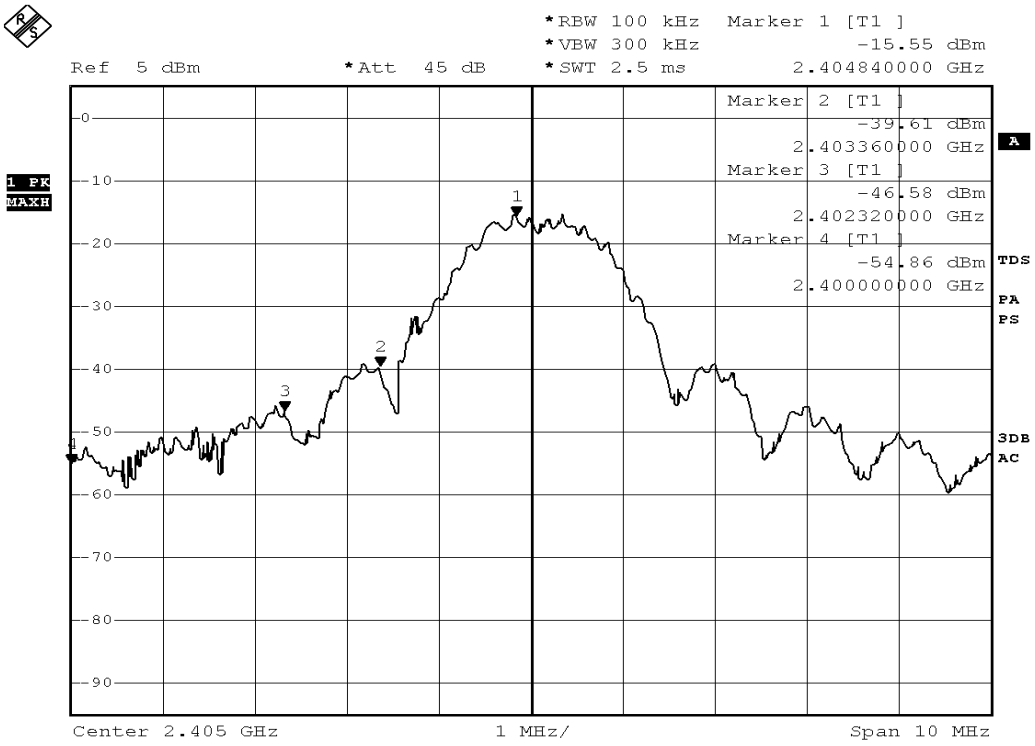
Channel Frequency 2405 MHz



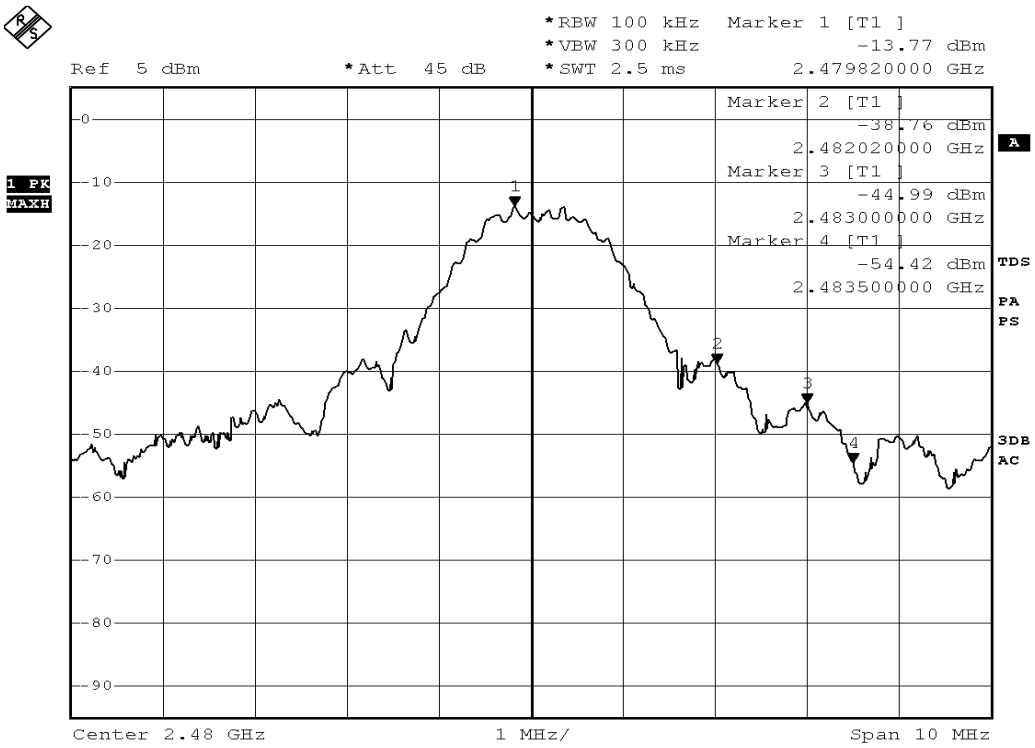
Channel Frequency 2480 MHz

Antenna 1+2

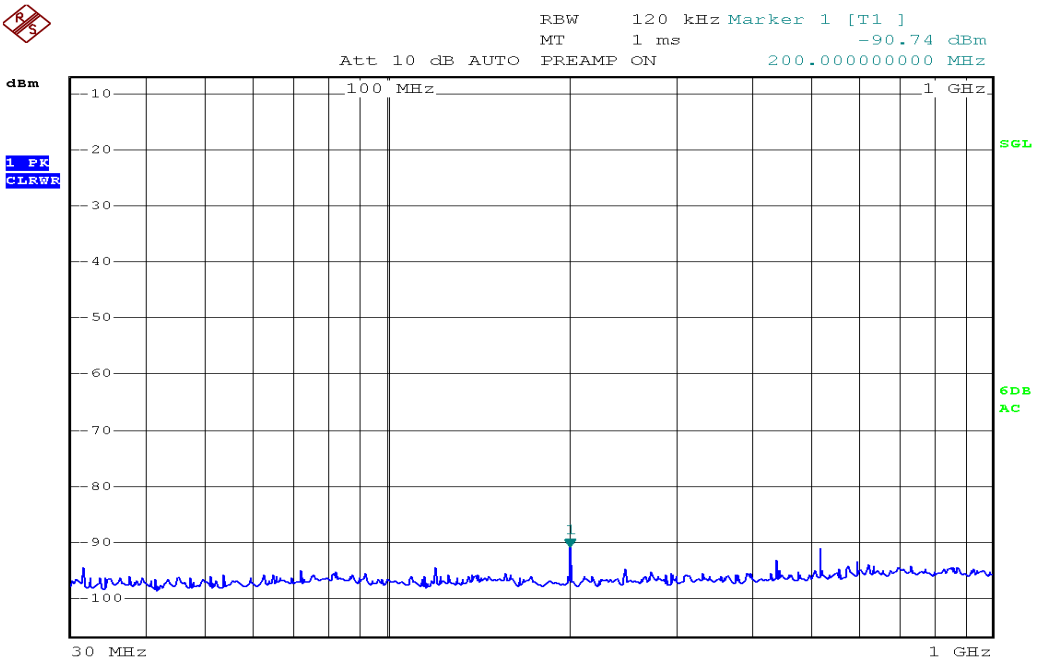
Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)	Remarks
		Frequency (MHz)	Value (dB)		
Low	2405	2400.0	-54.86	-20	Pass
High	2480	2483.5	-54.42	-20	Pass

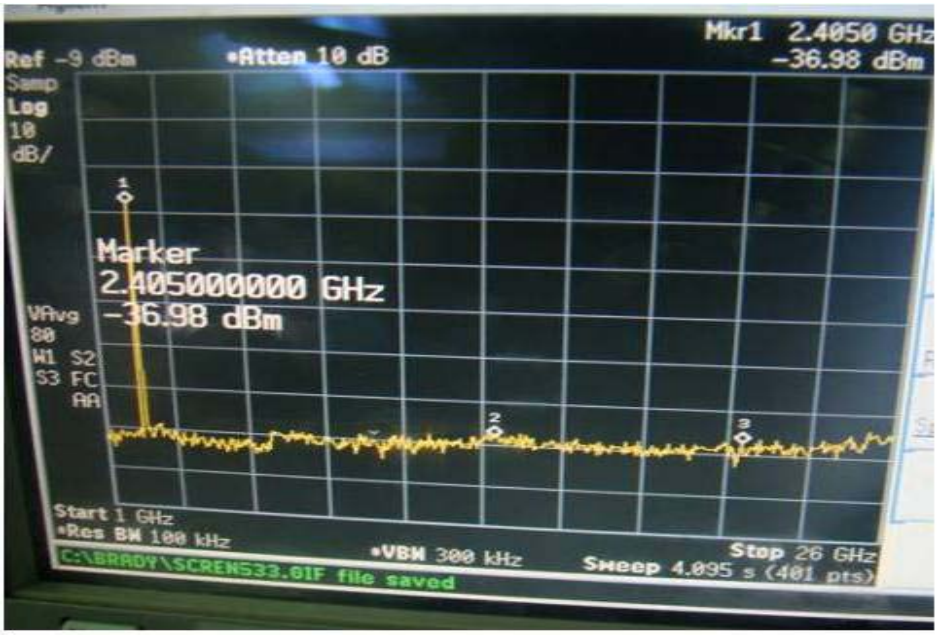


Channel Frequency 2405 MHz

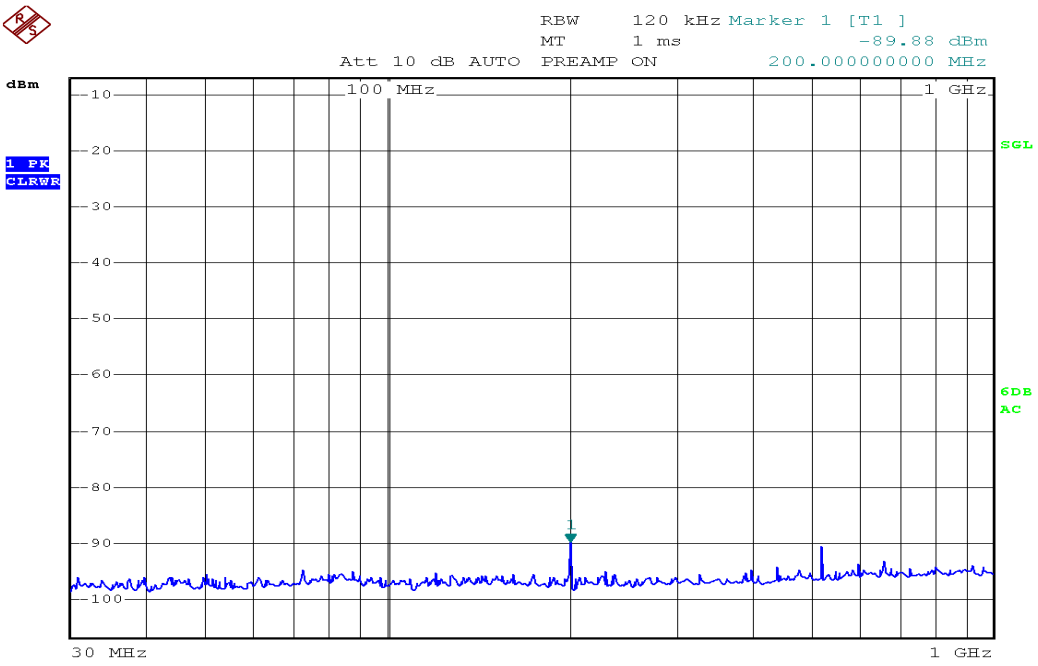


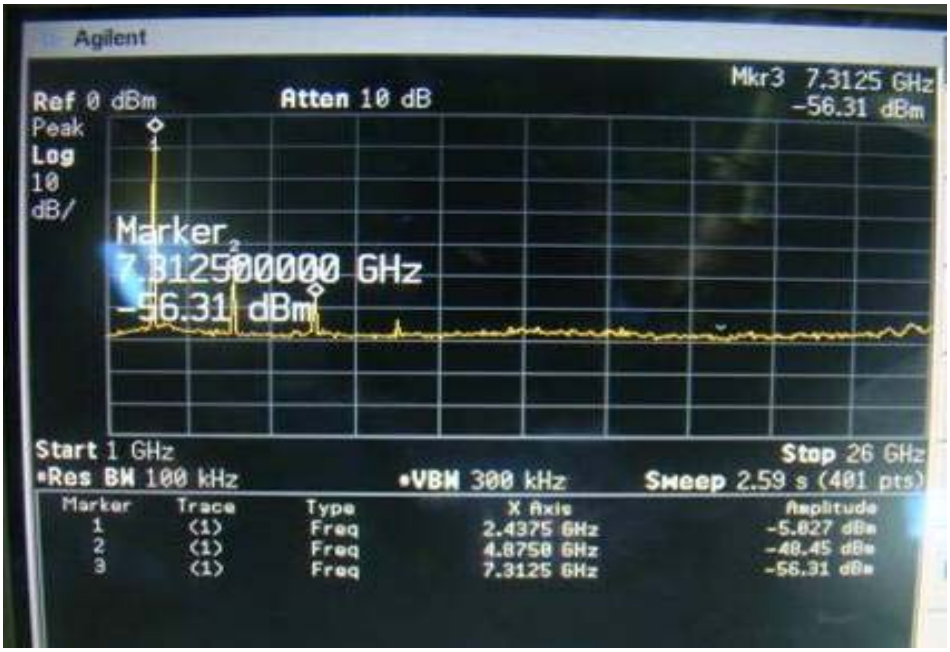
Channel Frequency 2480 MHz


RBW 120 kHz Marker 1 [T1]
MT 1 ms -90.74 dBm
Att 10 dB AUTO PREAMP ON 200.000000000 MHz
dBm
100 MHz
1 GHz
1 PK
CLRWR
SGL
6DB
AC
10
20
30
40
50
60
70
80
90
100
30 MHz
1 GHz

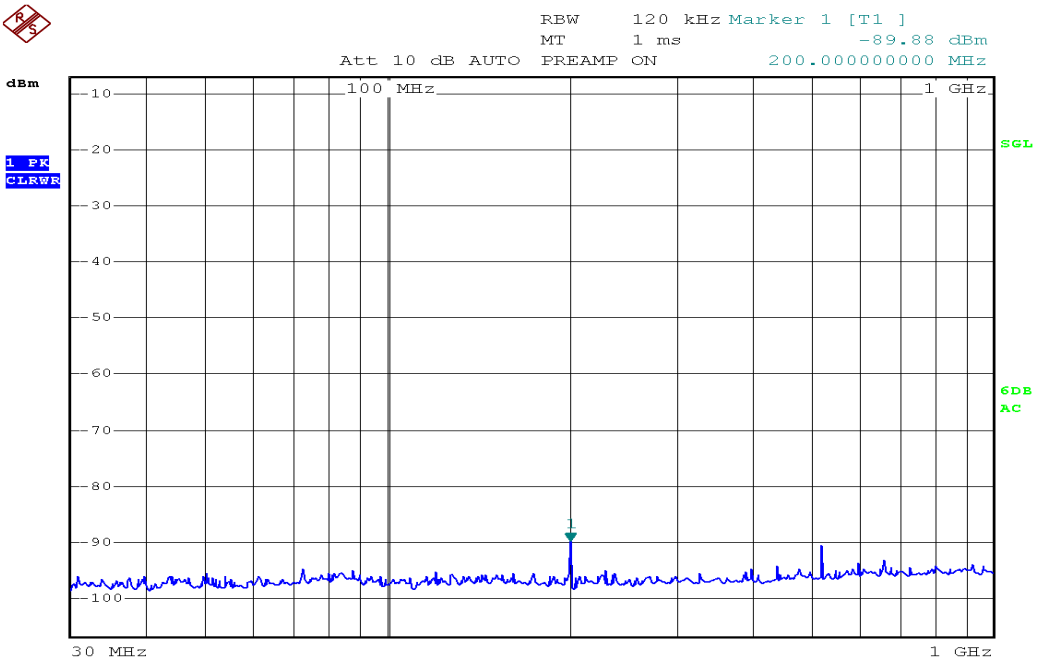

Ref -9 dBm
•Atten 10 dB
Mkr1 2.4050 GHz
-36.98 dBm
Samp
Log
10
dB/
Marker
2.405000000 GHz
-36.98 dBm
VAvg
80
W1 S2
S3 FC
AA
Start 1 GHz
•Res BW 100 kHz
•VBW 300 kHz
Stop 26 GHz
Sweep 4.095 s (401 pts)
C:\BRADY\SCREN533.01F file saved

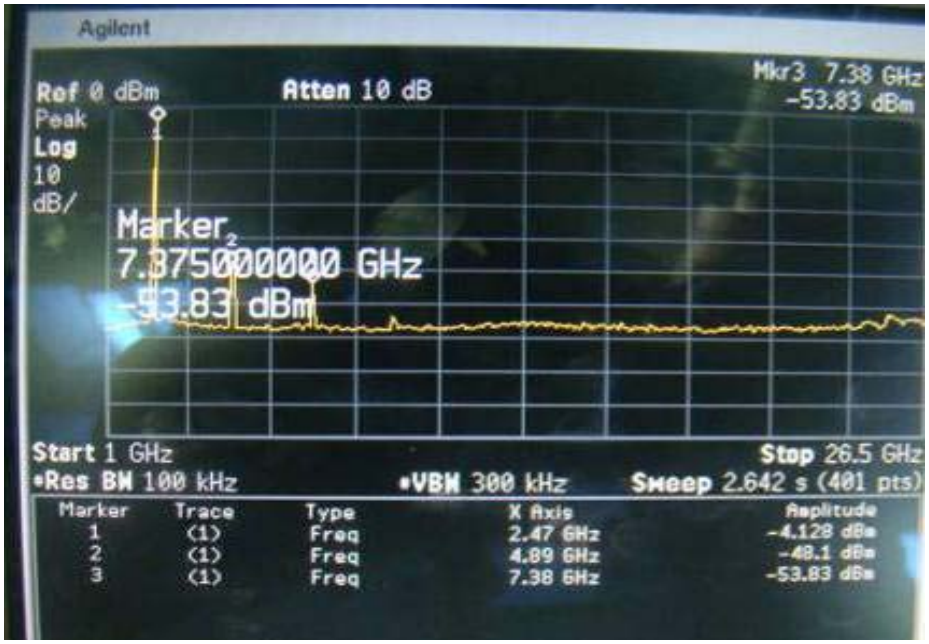
Channel Low


RBW 120 kHz Marker 1 [T1]
MT 1 ms -89.88 dBm
Att 10 dB AUTO PREAMP ON 200.000000000 MHz
dBm
100 MHz
1 GHz
1 PK
CLRWR
SGL
6DB
AC
30 MHz
1 GHz


Agilent
Ref 0 dBm
Atten 10 dB
Mkr3 7.3125 GHz
-56.31 dBm
Peak
Log
10
dB/
Marker
7.312500000 GHz
-56.31 dBm
Start 1 GHz
Stop 26 GHz
•Res BW 100 kHz
•VBW 300 kHz
Sweep 2.59 s (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4375 GHz -5.027 dBm
2 (1) Freq 4.8750 GHz -48.45 dBm
3 (1) Freq 7.3125 GHz -56.31 dBm

Channel Mid





Channel High

Spurious Radiated Emissions **Section 15.209**

Result **Pass**

Test Specification	F CC 15.207
Test Method	ANSI C63.4-2003
Measurement Location	Semi Anechoic Chamber
Supply Voltage	110 Volt 60Hz AC
Measuring Frequency Range	12MHz – 10GHz(Up to 10th harmonic of the highest fundamental frequency)
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Average for frequency above 1GHz
Requirement	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength (dBμV) at 3m range	Field strength (dBμV/m) at 3m range
1.705-30	30 (30m range)*	29.5(30m range)*
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

Remark: * the limit shows in the table above of frequency range 1.705-30MHz are at 30 meter range, which corresponds to 49.5dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shows in the table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Channel low

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2405.00	V	32.52	15.50	40.00	-24.50
		32.76	15.30	40.00	-24.70
		32.84	15.90	40.00	-24.10
		33.80	15.30	40.00	-24.70
		33.88	15.20	40.00	-24.80
		34.56	14.50	40.00	-25.50
		35.20	14.10	40.00	-25.90
		48.00	28.20	40.00	-11.80
		869.60	29.50	46.00	-16.50
		1586.00	30.20	54.00	-23.80
		2405.60 (P)	85.50	-	*
		2405.60 (Av)	85.50	-	*
		4809.20 (P)	46.00	74.00	-28.00
		4809.20	45.90	54.00	-08.10
	H	33.52	16.30	40.00	-23.70
		47.20	28.10	40.00	-11.90
		2405.60 (P)	86.60	-	*
		2405.60 (Av)	80.80	-	*
		4809.20 (P)	48.40	74.00	-25.60
		4809.20 (Av)	37.10	54.00	-16.90

*** →Operating Frequency**
P→ Peak Detector
Av→ Average Detector

Channel Mid

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2440.00	V	30.52	16.00	40.00	-24.00
		30.76	17.20	40.00	-22.80
		30.84	16.20	40.00	-23.80
		31.20	15.80	40.00	-24.20
		31.84	16.20	40.00	-23.80
		33.24	15.50	40.00	-24.50
		33.96	15.40	40.00	-24.60
		47.04	29.00	40.00	-11.00
		48.04	28.20	40.00	-11.80
		2439.60 (P)	84.90	-	*
		2439.60 (Av)	84.00	-	*
		4879.20 (P)	44.30	74.00	-29.70
		4879.20 (Av)	42.70	54.00	-11.30
	H	367.16	25.50	46.00	-20.50
		504.04	31.40	46.00	-14.60
		758.56	27.40	46.00	-18.60
		2439.60 (P)	84.50	-	*
		2439.60 (Av)	80.10	-	*
		4879.20 (P)	47.50	74.00	-26.50
		4879.20 (Av)	40.40	54.00	-13.60

*** →Operating Frequency**
P→ Peak Detector
Av→ Average Detector

Channel High

Fundamental Frequency (MHz)	Antenna Polarization	Spurious Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2480.00	V	47.00	26.00	40.00	-14.00
		48.04	28.50	40.00	-11.50
		75.08	11.40	40.00	-28.60
		91.04	28.00	43.50	-15.50
		98.24	27.00	43.50	-16.50
		488.00	30.70	46.00	-15.30
		940.24	30.40	46.00	-15.60
		2479.60 (P)	84.90	-	*
		2479.60 (Av)	81.60	-	*
		4961.20 (P)	42.50	74.00	-31.50
		4961.20 (Av)	37.80	54.00	-16.20
	H	367.16	25.50	46.00	-20.50
		504.04	31.40	46.00	-14.60
		758.56	27.40	46.00	-18.60
		2479.60 (P)	84.40	-	*
		2479.60 (Av)	78.60	-	*
		4961.20 (P)	45.80	74.00	-28.20
		4961.20 (Av)	35.30	54.00	-18.70

*** →Operating Frequency**
P→ Peak Detector
Av→ Average Detector

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Restricted Bands of Operation

Channel Low (2405MHz)

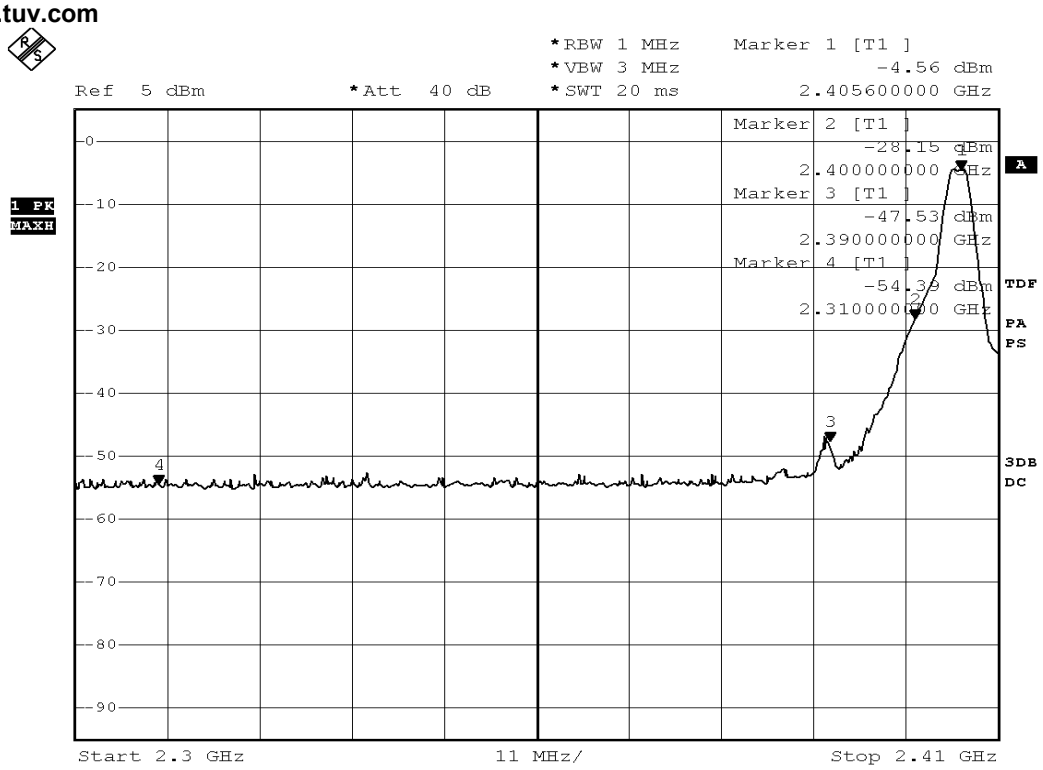
The band edge emission plot on the next page shows 42.97 dBc between carrier maximum power and the local maximum emission in the restricted band. The emission of the carrier strength list in the test result of channel Low is 85.50 dBuV/m (Peak), so the maximum field strength in the restricted band is 85.50 – 42.97 = 42.53 dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot on the next page shows 55.05 dBc between carrier maximum power and the local maximum emission in the restricted band. The emission of the carrier strength list in the test result of channel Low is 85.50 dBuV/m (average), so the maximum field strength in the restricted band is 85.50 – 55.05 = 30.45 dBuV/m which is under 54 dBuV/m limit.

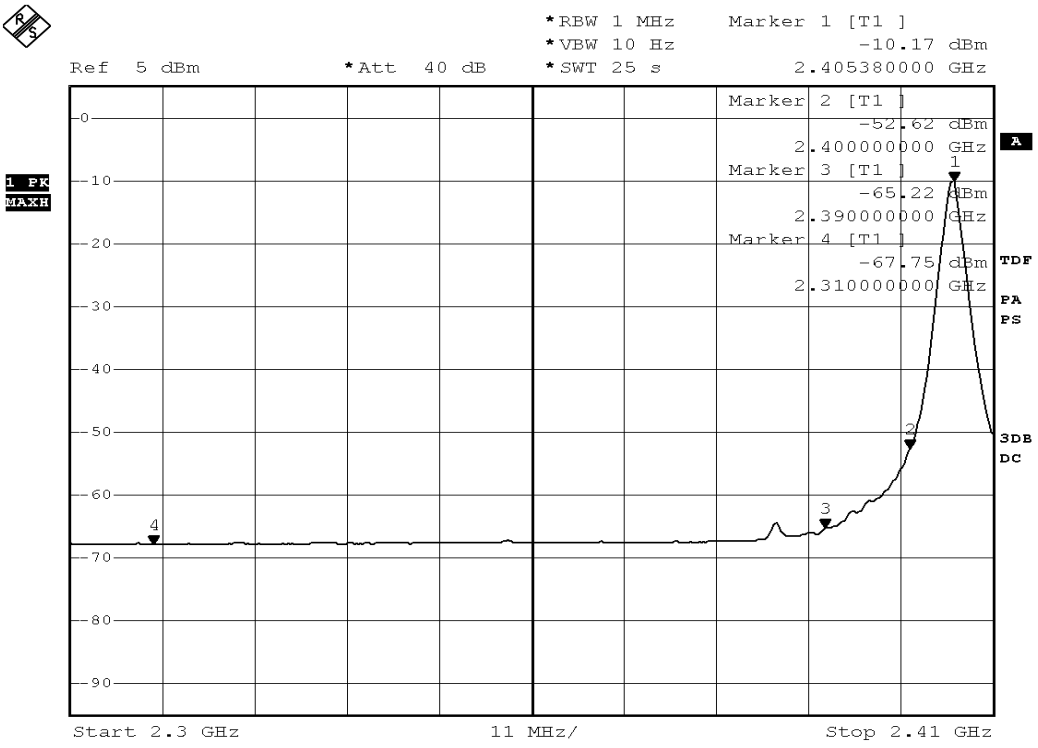
Channel High (2480MHz)

The band edge emission plot on the next second page shows 21.19 dBc between carrier maximum power and the local maximum emission in the restricted band. The emission of the carrier strength list in the test result of channel High is 84.90 (Peak), so the maximum field strength in the restricted band is 84.90 – 21.19 = 63.71 dBuV/m which is under 74 dBuV/m limit

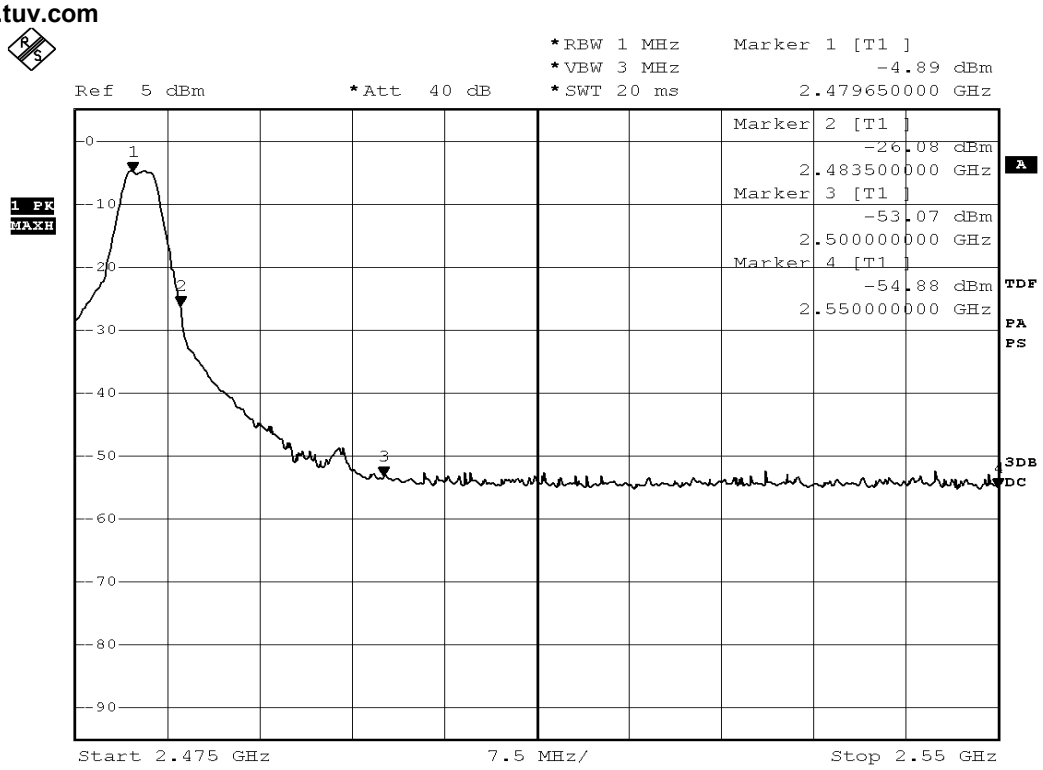
The band edge emission plot on the next page shows 32.03 dBc between carrier maximum power and the local maximum emission in the restricted band. The emission of the carrier strength list in the test result of channel High is 81.60 (average), so the maximum field strength in the restricted band is 81.60 – 32.03 = 49.57 dBuV/m which is under 54 dBuV/m limit



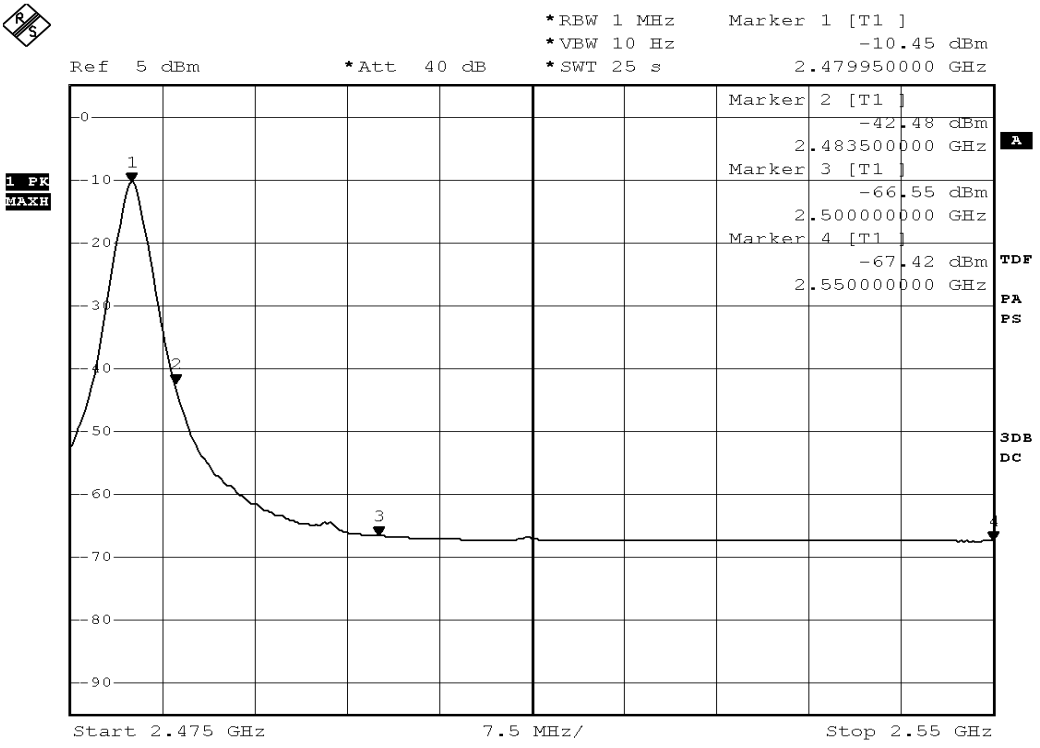
Channel Low: Peak



Channel Low: Average



Channel High: Peak



Channel High: Average