

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT
CLASS II PC REPORT**

OF

Applicant: Raytac Corporation
5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City ,
23586, Taiwan

Product Name: BLE Module

Brand Name: Raytac

Model No.: MDBT42Q-U

Model Difference: N/A

Report Number: T190422W01-RP

FCC ID: SH6MDBT42Q

FCC Rule Part: §15.247, Cat: DTS

Issue Date: May 17, 2019

Date of Test: Apr. 17, 2019 ~ May 10, 2019

Date of EUT Received: Apr. 17, 2019

Issued by: Compliance Certification Services Inc. Wugu Lab.
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891,
Taiwan. (R.O.C.)
service@ccsrf.com

Note: The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Tested By:

Jerry Lu

Jerry Lu / Sr. Engineer

Approved By:

Kevin Tsai

Kevin Tsai / Deputy Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190422W01-RP	Rev.00	Initial creation of document	All	May 17, 2019	Violetta Tang

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	BLE Module
Brand Name:	Raytac
Model No.:	MDBT42Q-U
Model Difference:	N/A
Hardware Version:	1
Software Version:	1
Class II & Class IV Permissive Change:	1. Add model number MDBT42Q-U and three type external antenna 2. There is no change in hardware or in existing RF relevant portion.
Power Supply:	3Vdc

Bluetooth Low Energy:

Bluetooth Version:	Bluetooth V4.2 & 5.0 LE mode
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	BT V4.2 Mode: 3.55 dBm BT V5.0 Mode: 3.45 dBm
Frequency Range:	2.402GHz – 2.480GHz
Antenna Designation:	1. External Antenna Part no.: ANT-X100ETHAB24553, Supplier: YAGEO, Gain: 2.0dBi 2. PCB Antenna Part no.: ANT-X100P111B24003, Supplier: YAGEO, Gain: 3.3dBi 3. PCB Antenna Part no.: ANT-X200P001B24003, Supplier: YAGEO, Gain: 4.4dBi

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 v05r01 DTS Meas. Guidance

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd.,

Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1309)

FCC Designation number: TW1309

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted (Antenna Port) Configuration

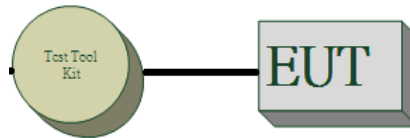


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Test Kit	N/A	N/A	N/A	N/A	N/A

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.247(b) (3)	Peak Output Power	Compliant
§15.205 §15.209 §15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

40 channels are provided for Bluetooth LE

ITEM	FREQUENCY	ITEM	FREQUENCY	ITEM	FREQUENCY
1	2402 MHz	15	2430 MHz	29	2458 MHz
2	2404 MHz	16	2432 MHz	30	2460 MHz
3	2406 MHz	17	2434 MHz	31	2462 MHz
4	2408 MHz	18	2436 MHz	32	2464 MHz
5	2410 MHz	19	2438 MHz	33	2466 MHz
6	2412 MHz	20	2440 MHz	34	2468 MHz
7	2414 MHz	21	2442 MHz	35	2470 MHz
8	2416MHz	22	2444 MHz	36	2472 MHz
9	2418 MHz	23	2446 MHz	37	2474 MHz
10	2420 MHz	24	2448 MHz	38	2476 MHz
11	2422 MHz	25	2450 MHz	39	2478 MHz
12	2424 MHz	26	2452 MHz	40	2480 MHz
13	2426 MHz	27	2454 MHz		
14	2428 MHz	28	2456 MHz		

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

RADIATED EMISSION TEST:

MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
RADIATED BAND EDGE EMISSION TEST				
Bluetooth LE	2402 to 2480	2402, 2480	GFSK	1
Bluetooth LE	2402 to 2480	2402, 2480	GFSK	2
RADIATED EMISSION TEST (BELOW 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	1
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	2
RADIATED EMISSION TEST (ABOVE 1 GHz)				
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	1
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	2
Note: The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE Transmitter for channel Low, Mid and High, the worst case H position was reported.				

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	1
Bluetooth LE	2402 to 2480	2402, 2442, 2480	GFSK	2

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5 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
Peak Output Power	+/- 1.92 dB
6dB Bandwidth	+/- 61.248 Hz
100 kHz Bandwidth of Frequency Band Edges	+/- 1.92 dB
Peak Power Density	+/- 1.996 dB
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.
2. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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6 PEAK OUTPUT POWER MEASUREMENT

6.1 Standard Applicable:

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

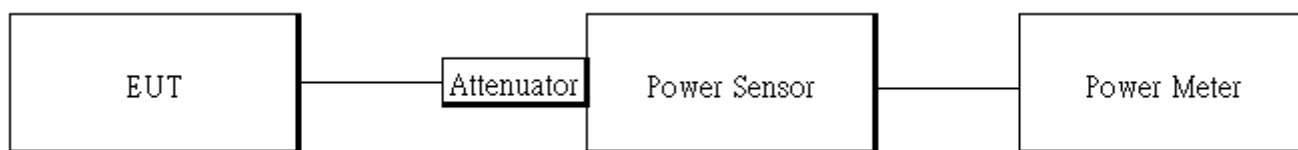
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1242004	10/23/2018	10/22/2019
Power Sensor	Anritsu	MA2411B	1207365	10/23/2018	10/22/2019
Power Sensor	Anritsu	MA2411B	1207368	10/24/2018	10/23/2019
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020

6.3 Test Set-up:



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6.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance & ANSI C63.10.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

Power Meter:

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Power Meter.
5. Repeat above procedures until all test default channel measured was complete.

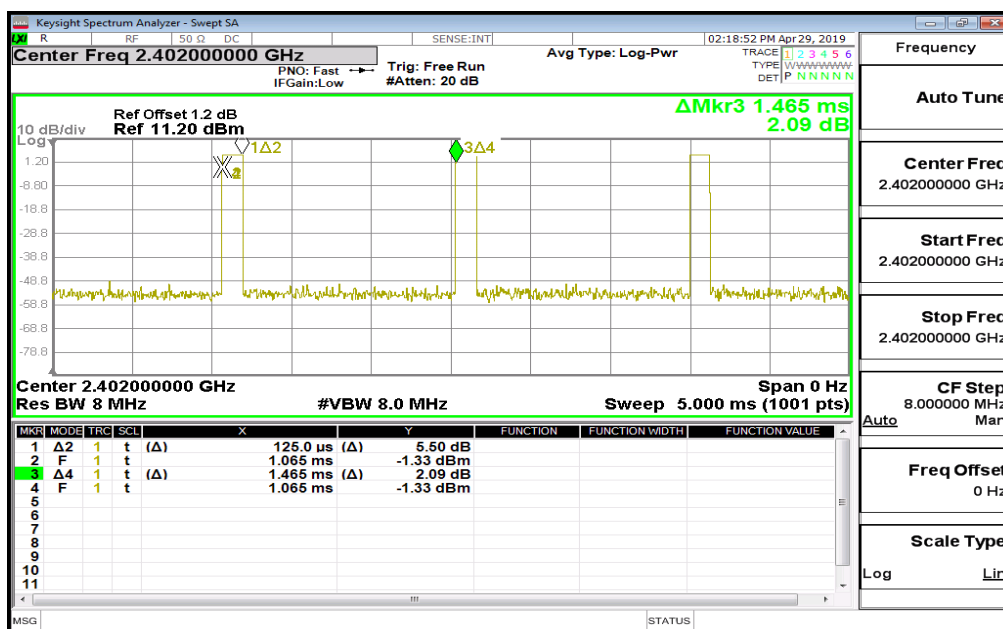
Formula:

$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

Duty Factor:

DATA RATE 1 Mbps:

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
BLE	9.00	10.46	8.00	8.00



$$\text{Duty Cycle Factor: } 10 * \log(1/(9/100)) = 10.46$$

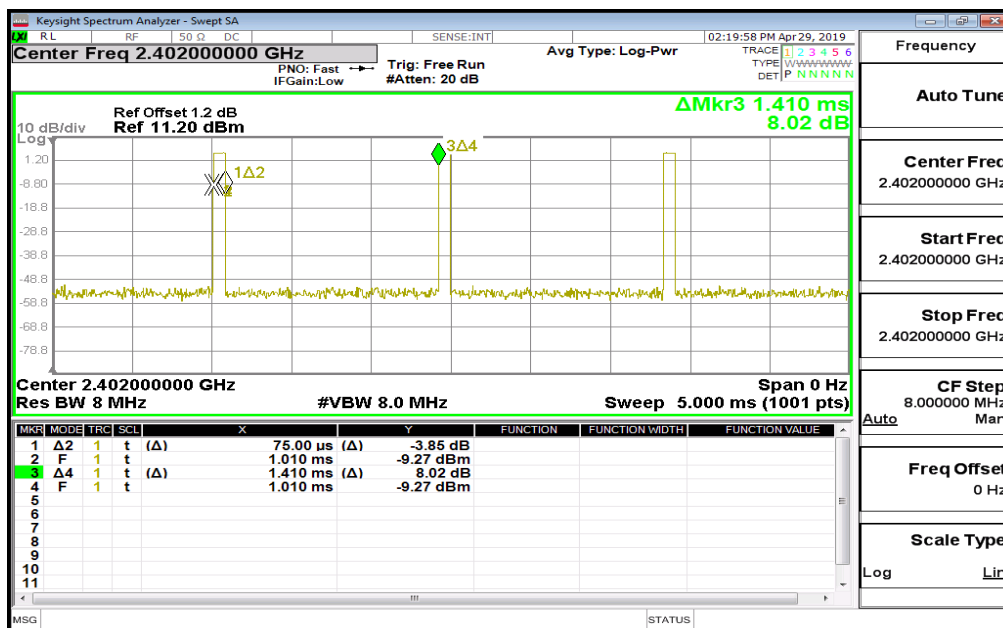
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DATA RATE 2 Mbps (BT 5.0):

	Duty Cycle (%)	Duty Factor (dB)	1/T (kHz)	VBW setting (kHz)
BLE	5.00	13.01	13.33	14.00



Duty Cycle Factor: $10 \cdot \log(1/(5/100)) = 13.01$

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6.5 Measurement Result:

DATA RATE 1 Mbps:

BLE mode:

CH	Frequency (MHz)	Peak Power Output (dBm)	Required Limit
Low	2402	3.55	1 Watt = 30 dBm
Mid	2442	3.45	1 Watt = 30 dBm
High	2480	3.33	1 Watt = 30 dBm
BLE mode:			
CH	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	3.28	1 Watt = 30 dBm
Mid	2442	3.21	1 Watt = 30 dBm
High	2480	3.12	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss as 1.2 dB that offsets on the power meter in Peak

*Note: Measured by power meter, **as cable loss+ Duty cycle factor that offsets on the power meter**

*Note: Max. Output include tune up tolerance Power is average power

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DATA RATE 2 Mbps:

BLE mode:

CH	Frequency (MHz)	Peak Power Output (dBm)	Required Limit
Low	2402	3.31	1 Watt = 30 dBm
Mid	2442	3.45	1 Watt = 30 dBm
High	2480	3.37	1 Watt = 30 dBm
BLE mode:			
CH	Frequency (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Required Limit
Low	2402	3.00	1 Watt = 30 dBm
Mid	2442	3.24	1 Watt = 30 dBm
High	2480	3.13	1 Watt = 30 dBm

*Note: Measured by power meter, cable loss as 1.2 dB that offsets on the power meter in Peak

*Note: Measured by power meter, **as cable loss+ Duty cycle factor that offsets on the power meter**

*Note: Max. Output include tune up tolerance Power is average power

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7 RADIATED SPURIOUS EMISSION MEASUREMENT

7.1 Standard Applicable

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. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (dBμV/m)

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7.2 Measurement Equipment Used

966A Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Band Reject Filters	MICRO TRON-ICS	BRM 50702	120	02/26/2019	02/25/2020
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SU-HNER	SUCOFLEX 104PEA	25157	02/26/2019	02/25/2020
Cable	HUBER SU-HNER	SUCOFLEX 104PEA	20995	02/26/2019	02/25/2020
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019
Loop Antenna	COM-POWER	AL-130	121051	03/22/2019	03/21/2020
Pre-Amplifier	EMEC	EM330	060609	02/26/2019	02/25/2020
Pre-Amplifier	HP	8449B	3008A00965	02/26/2019	02/25/2020
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 V6.11-20180413				

NOTE: N.C.R refers to Not Calibrated Required.

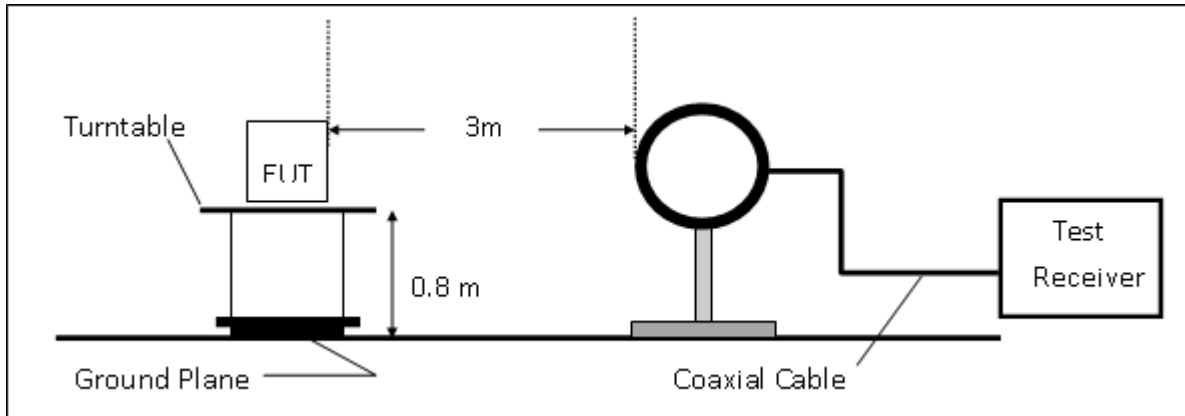
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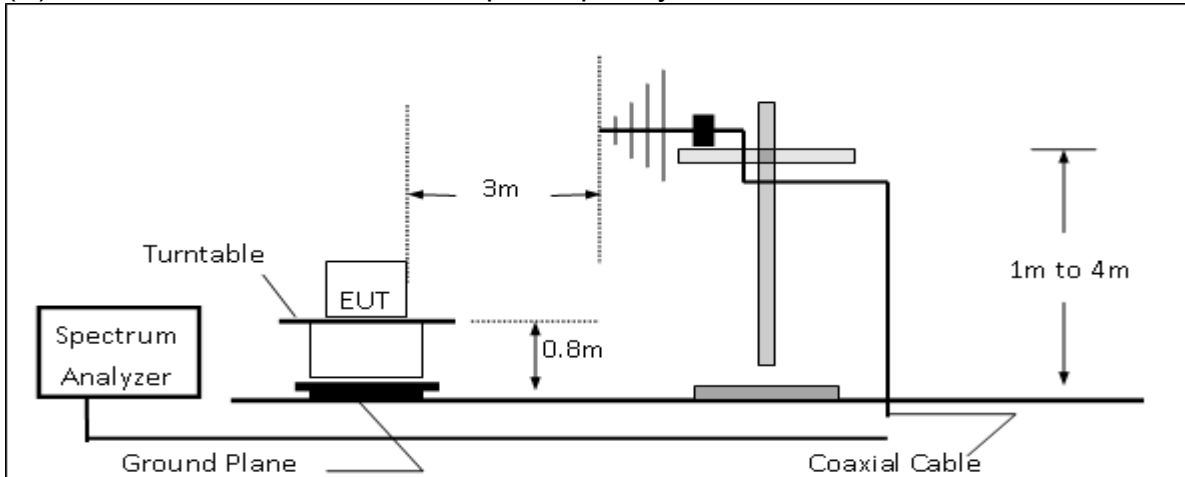
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7.3 Test SET-UP

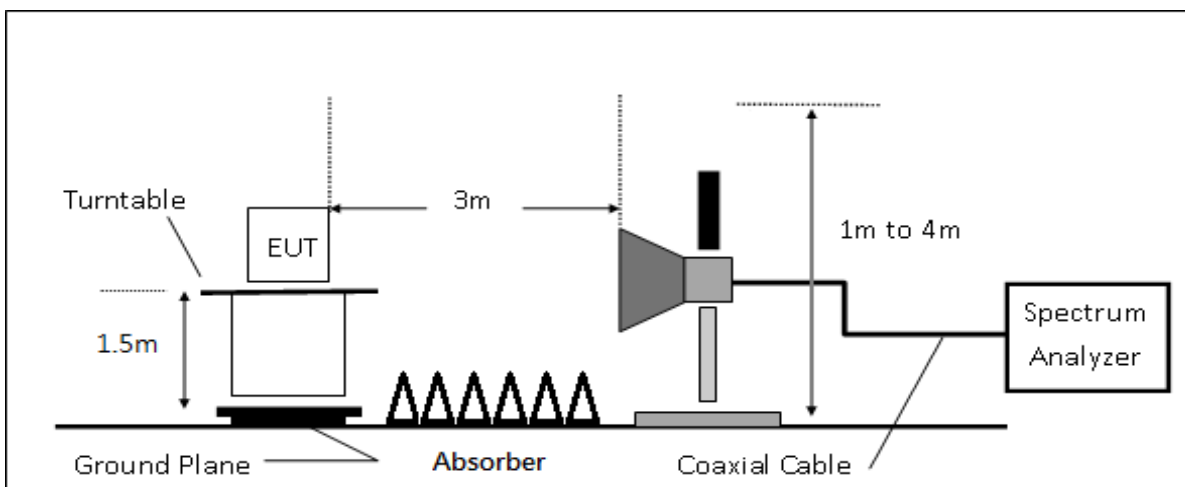
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-UP, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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7.4 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance & ANSI C63.10.
2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plan.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
8. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
11. Repeat above procedures until all default test channel measured were complete.

7.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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7.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

7.7 Measurement Result:

Note: Refer to next page for tabular data sheets.

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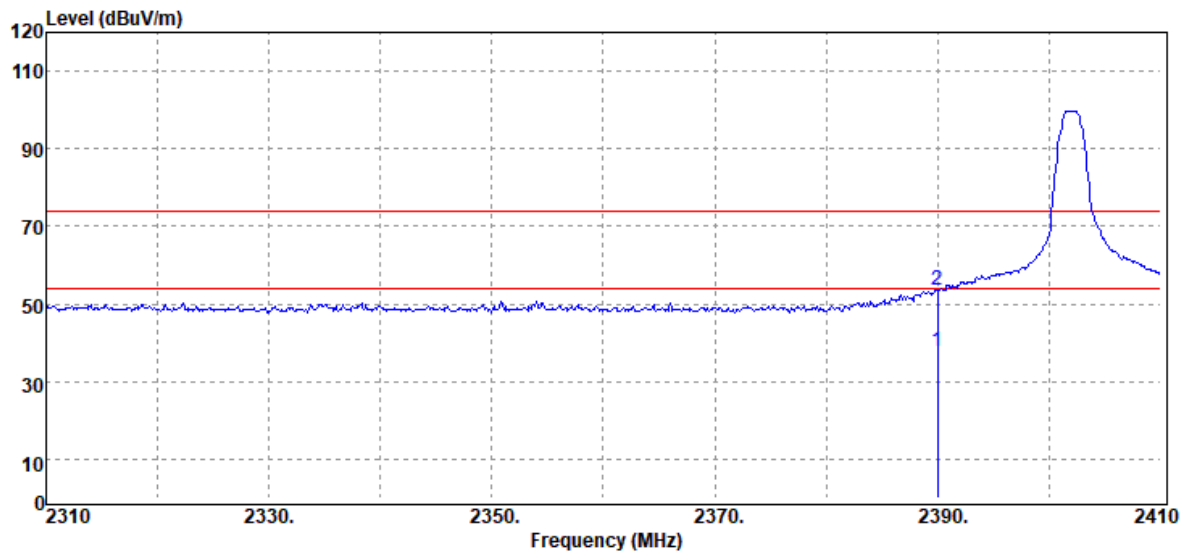
Radiated Band Edge Measurement Result:

DATA RATE 1 Mbps:

External Antenna, Part no.: ANT-X100ETHAB24553

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
2390.00	Average	41.00	-3.38	37.62	54.00	-16.38
2390.00	Peak	57.03	-3.38	53.65	74.00	-20.35

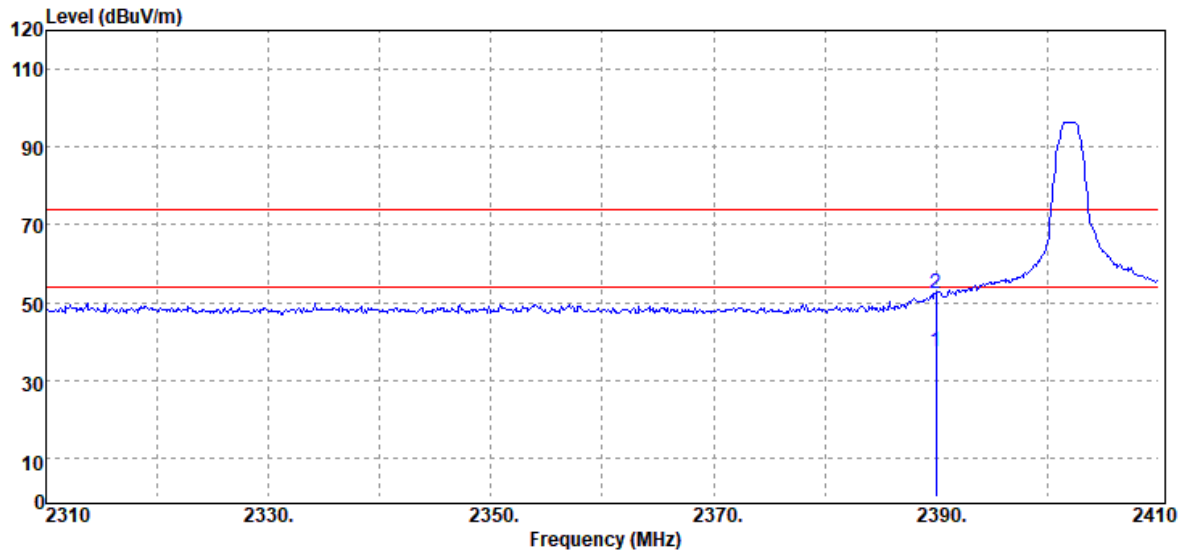
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2402 MHz
 Operation Mode : BE CH Low
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.87	-3.38	37.49	54.00	-16.51
2390.00	Peak	55.66	-3.38	52.28	74.00	-21.72

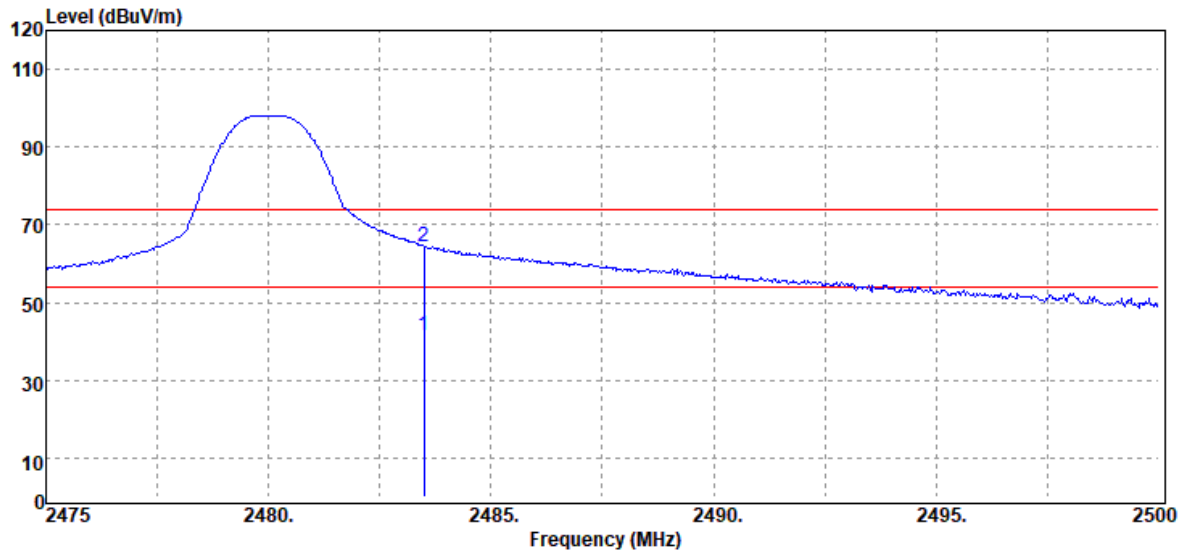
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	44.32	-2.83	41.49	54.00	-12.51
2483.50	Peak	67.39	-2.83	64.56	74.00	-9.44

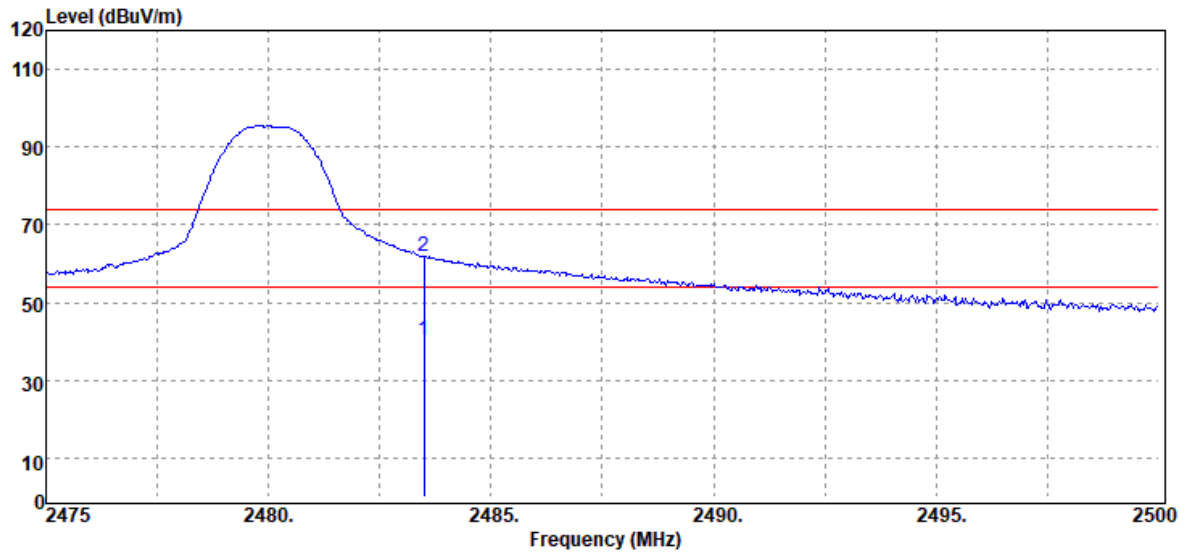
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : BE CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	43.10	-2.83	40.27	54.00	-13.73
2483.50	Peak	64.87	-2.83	62.04	74.00	-11.96

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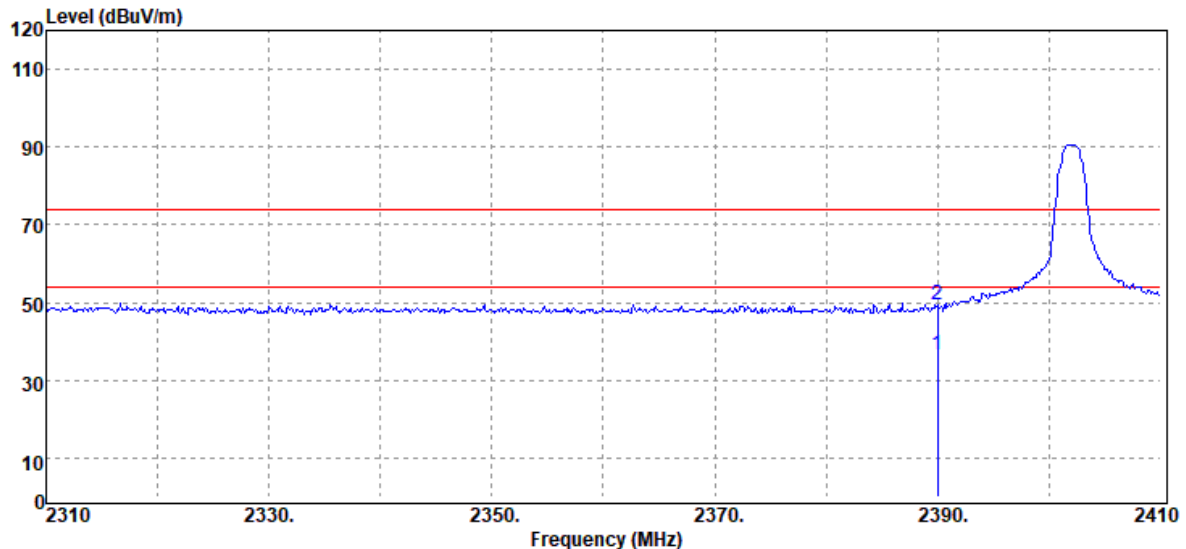
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
2390.00	Average	40.02	-3.38	36.64	54.00	-17.36
2390.00	Peak	52.95	-3.38	49.57	74.00	-24.43

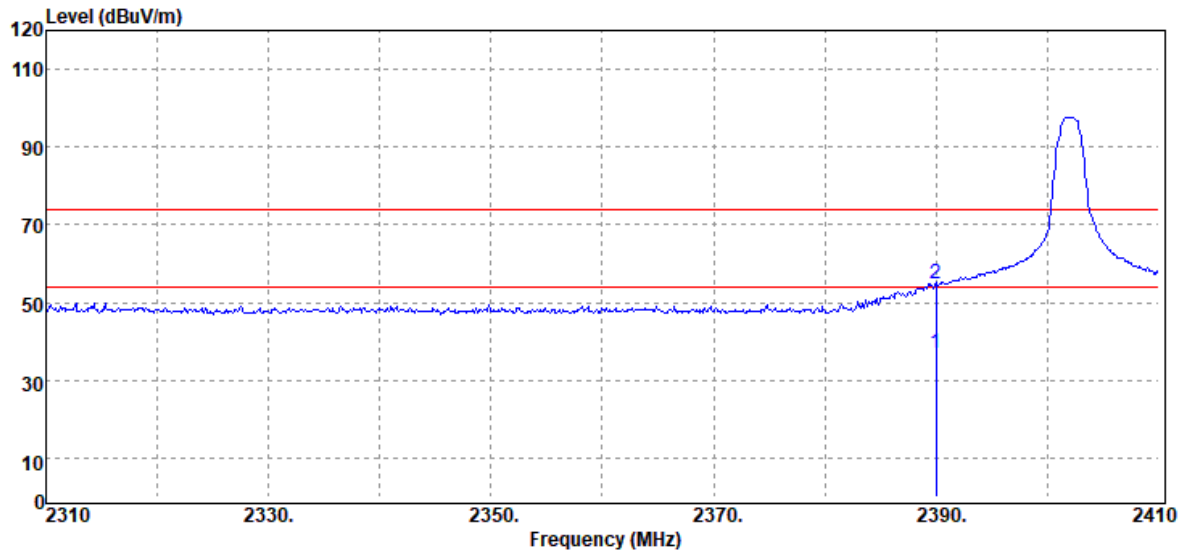
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2402 MHz
 Operation Mode : BE CH Low
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.52	-3.38	37.14	54.00	-16.86
2390.00	Peak	58.35	-3.38	54.97	74.00	-19.03

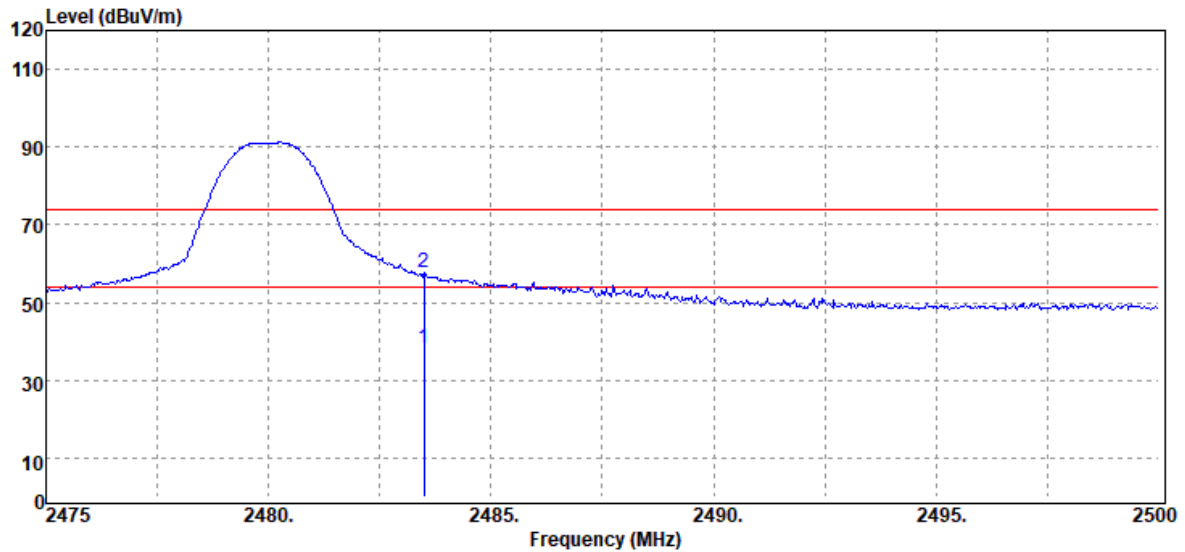
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : BE CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	41.15	-2.83	38.32	54.00	-15.68
2483.50	Peak	60.39	-2.83	57.56	74.00	-16.44

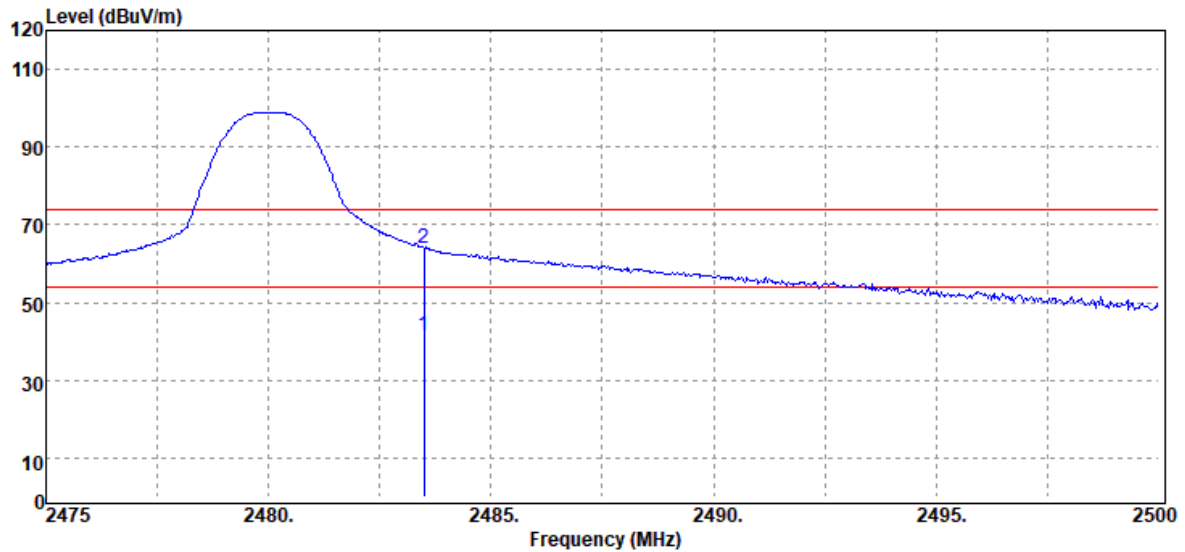
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	44.35	-2.83	41.52	54.00	-12.48
2483.50	Peak	66.94	-2.83	64.11	74.00	-9.89

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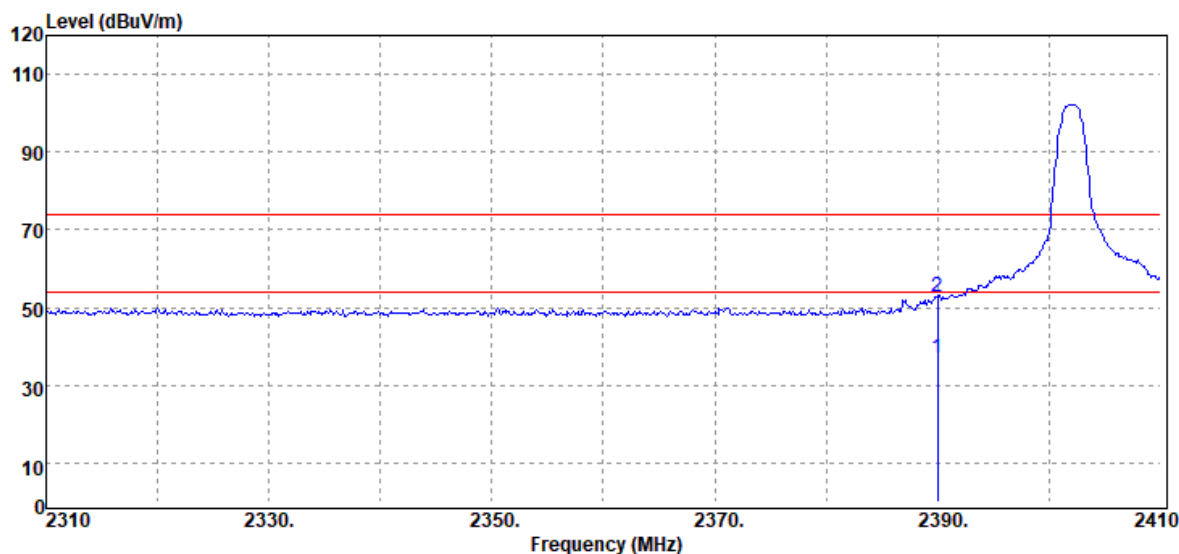
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PCB Antenna, Part no.: ANT-X200P001B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
2390.00	Average	40.38	-3.38	37.00	54.00	-17.00
2390.00	Peak	56.21	-3.38	52.83	74.00	-21.17

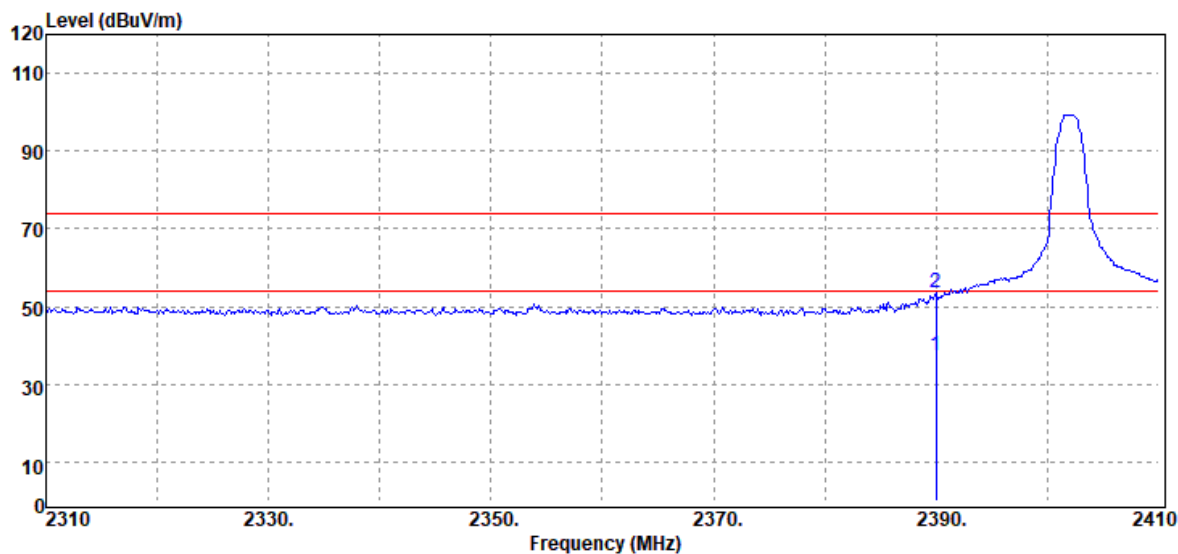
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2402 MHz
 Operation Mode : BE CH Low
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.66	-3.38	37.28	54.00	-16.72
2390.00	Peak	56.91	-3.38	53.53	74.00	-20.47

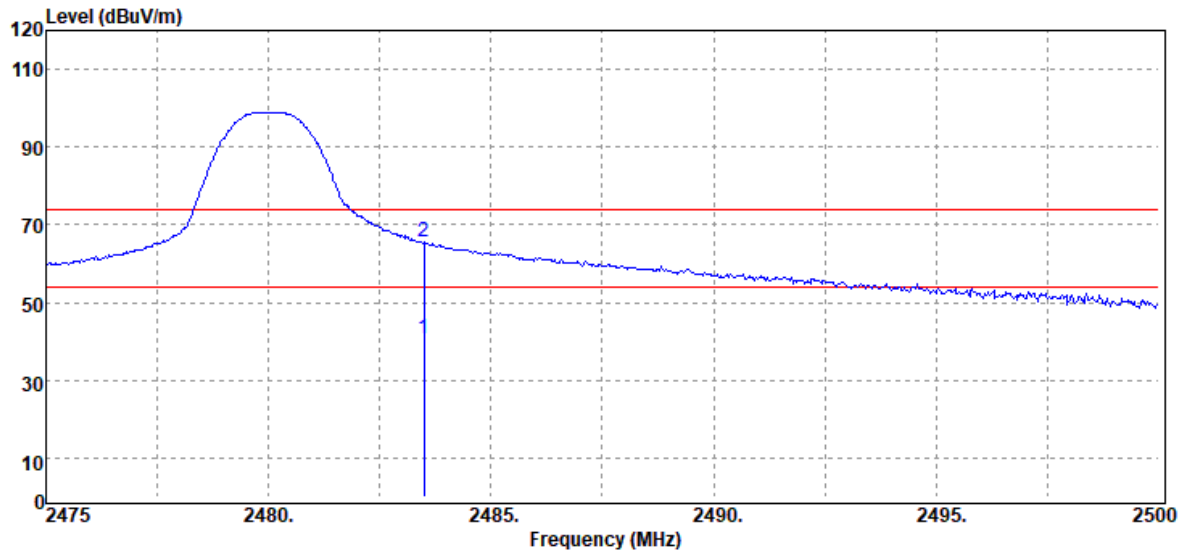
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : BE CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	43.55	-2.83	40.72	54.00	-13.28
2483.50	Peak	68.30	-2.83	65.47	74.00	-8.53

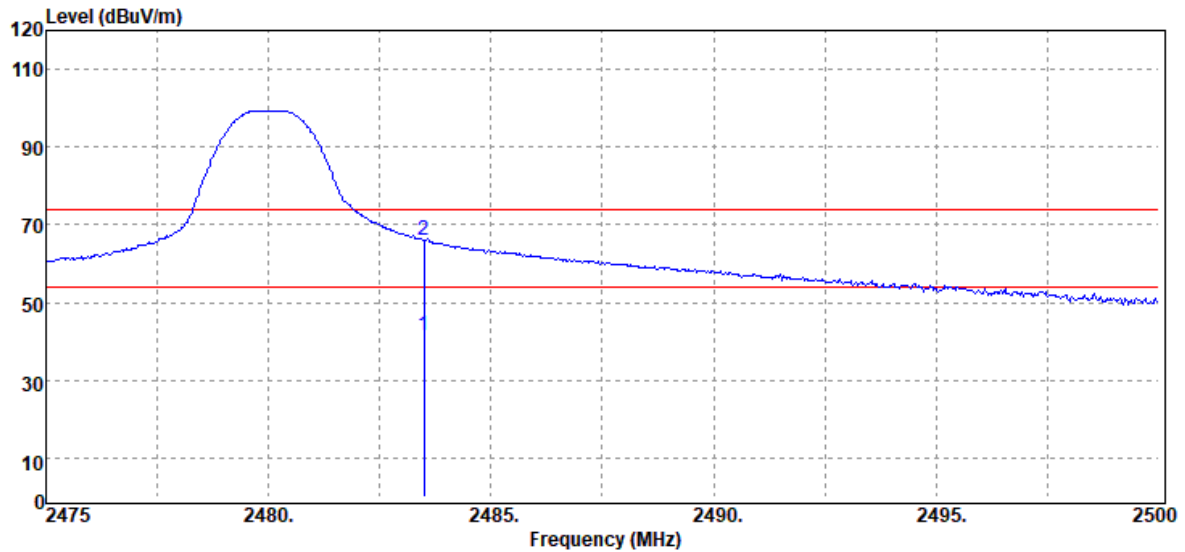
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	44.55	-2.83	41.72	54.00	-12.28
2483.50	Peak	68.71	-2.83	65.88	74.00	-8.12

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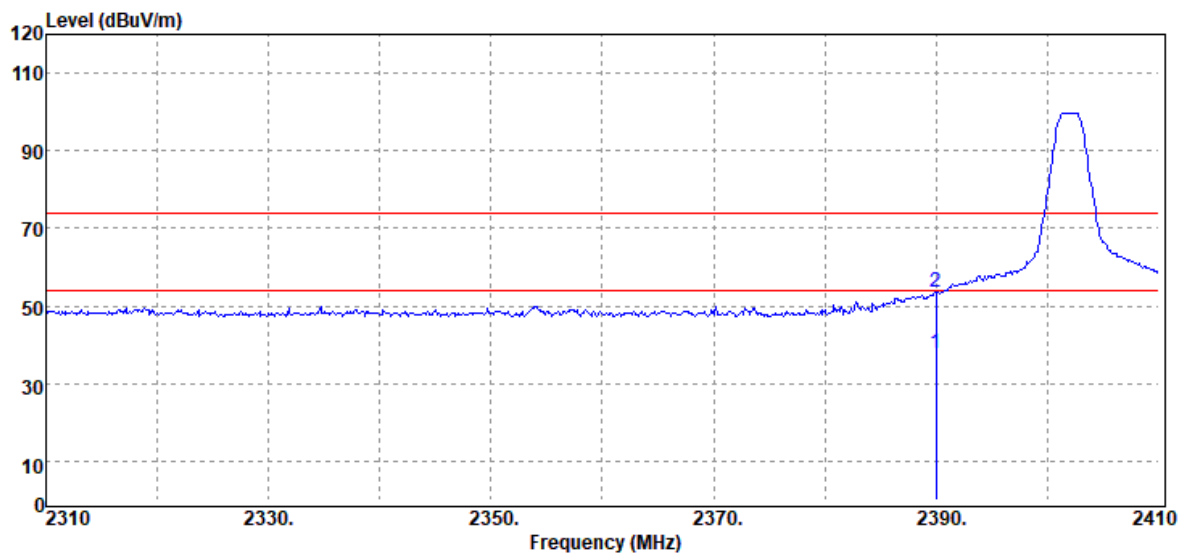
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DATA RATE 2 Mbps (BT 5.0):

External Antenna, Part no.: ANT100ETHAB24553

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
2390.00	Average	41.02	-3.38	37.64	54.00	-16.36
2390.00	Peak	57.06	-3.38	53.68	74.00	-20.32

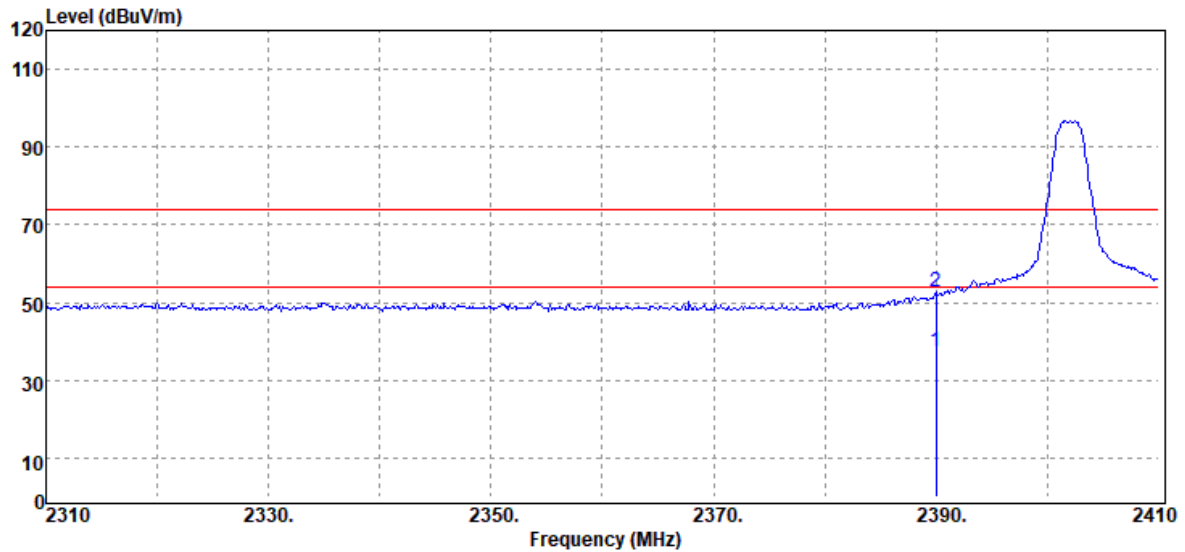
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.85	-3.38	37.47	54.00	-16.53
2390.00	Peak	55.94	-3.38	52.56	74.00	-21.44

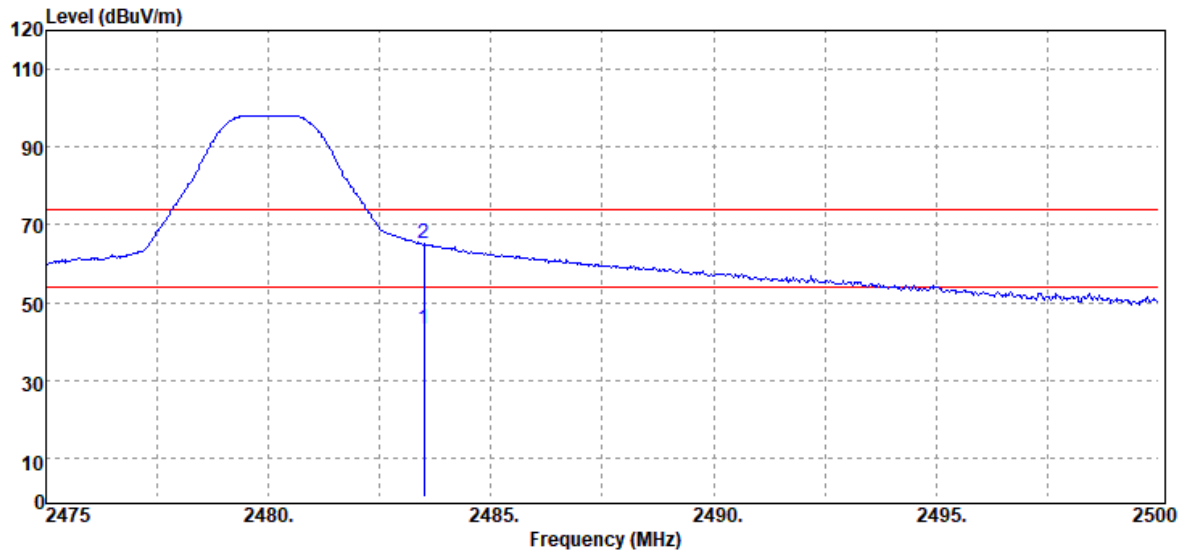
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	46.18	-2.83	43.35	54.00	-10.65
2483.50	Peak	67.81	-2.83	64.98	74.00	-9.02

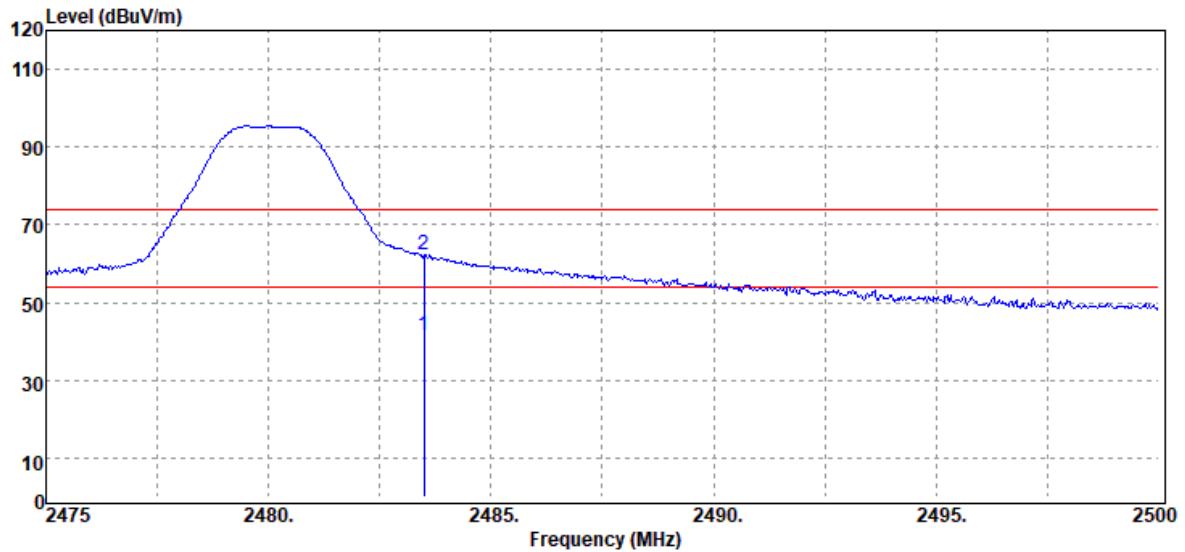
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : BE CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	44.26	-2.83	41.43	54.00	-12.57
2483.50	Peak	64.96	-2.83	62.13	74.00	-11.87

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

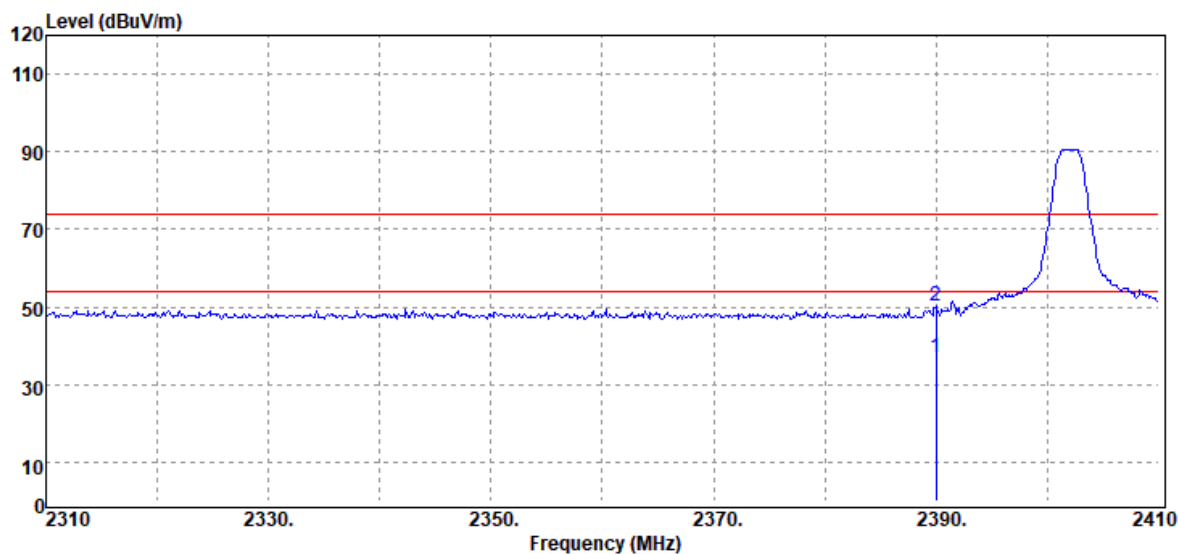
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2390.00	Average	40.18	-3.38	36.80	54.00	-17.20
2390.00	Peak	53.71	-3.38	50.33	74.00	-23.67

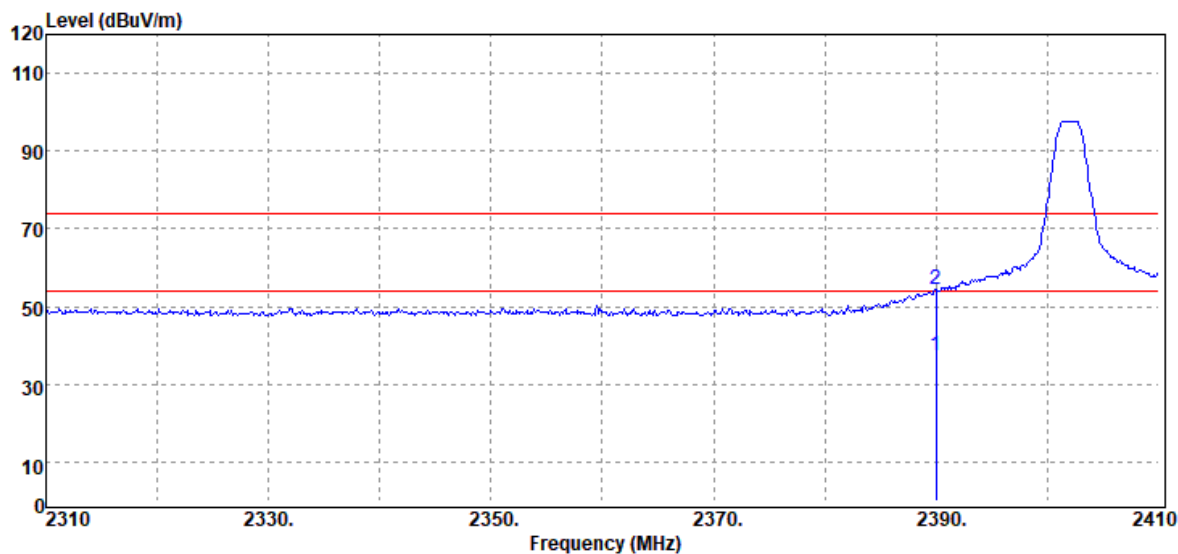
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	40.86	-3.38	37.48	54.00	-16.52
2390.00	Peak	57.88	-3.38	54.50	74.00	-19.50

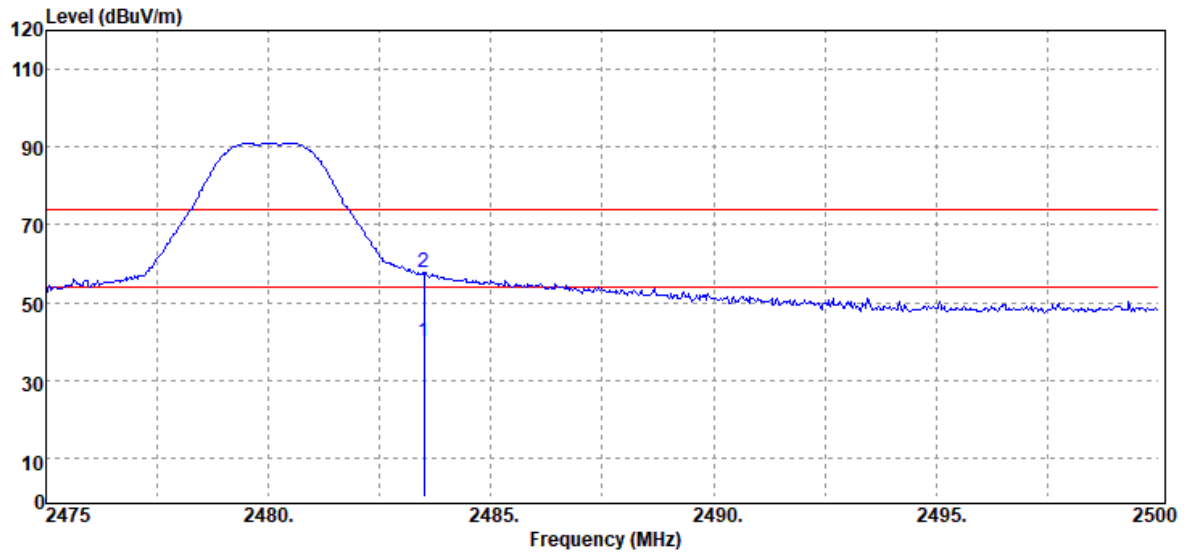
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	42.50	-2.83	39.67	54.00	-14.33
2483.50	Peak	60.57	-2.83	57.74	74.00	-16.26

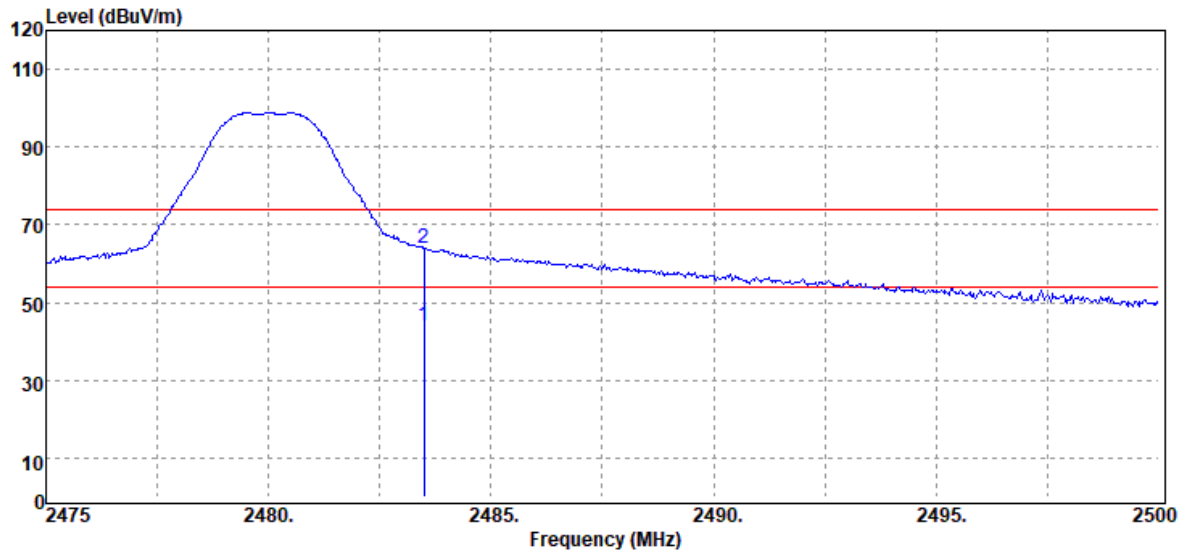
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : BE CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	46.71	-2.83	43.88	54.00	-10.12
2483.50	Peak	66.90	-2.83	64.07	74.00	-9.93

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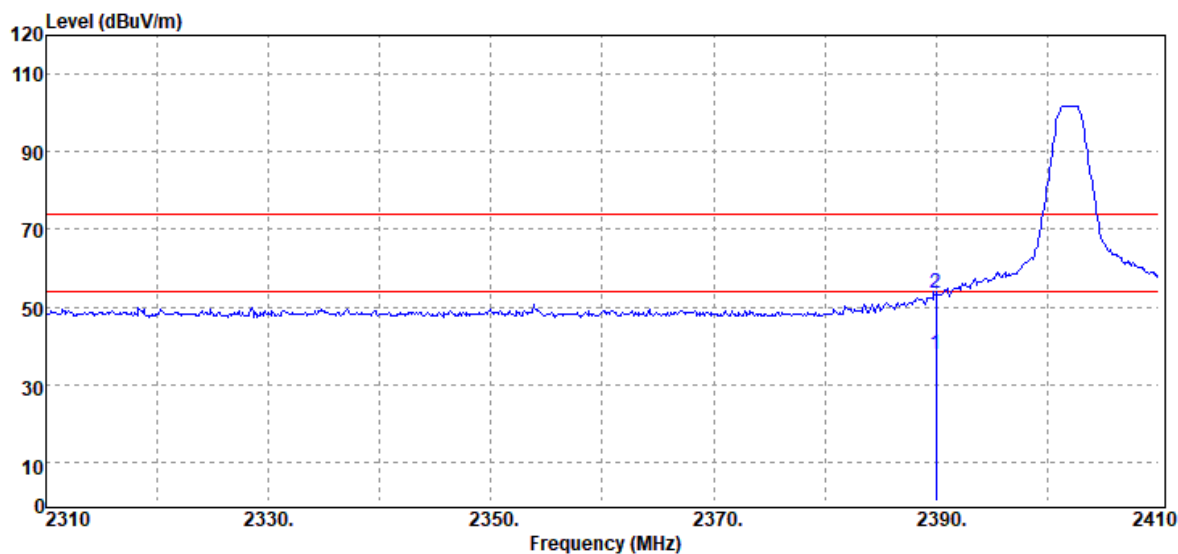
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PCB Antenna, Part no.: ANT-X200P001B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : BE CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
2390.00	Average	41.27	-3.38	37.89	54.00	-16.11
2390.00	Peak	56.94	-3.38	53.56	74.00	-20.44

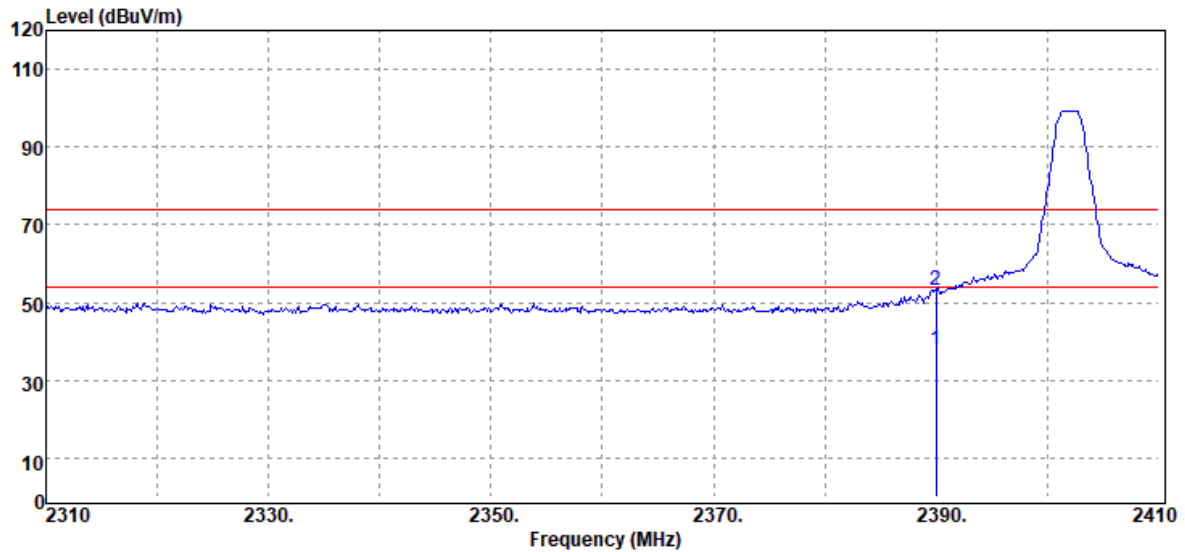
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2402 MHz
 Operation Mode : BE CH Low
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2390.00	Average	41.28	-3.38	37.90	54.00	-16.10
2390.00	Peak	56.73	-3.38	53.35	74.00	-20.65

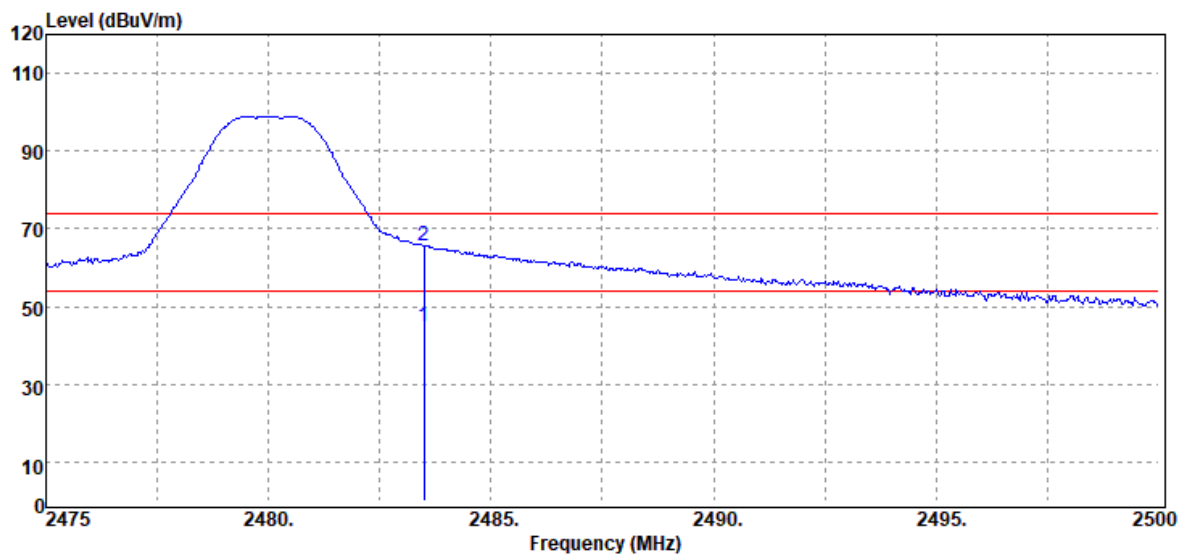
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	47.56	-2.83	44.73	54.00	-9.27
2483.50	Peak	68.47	-2.83	65.64	74.00	-8.36

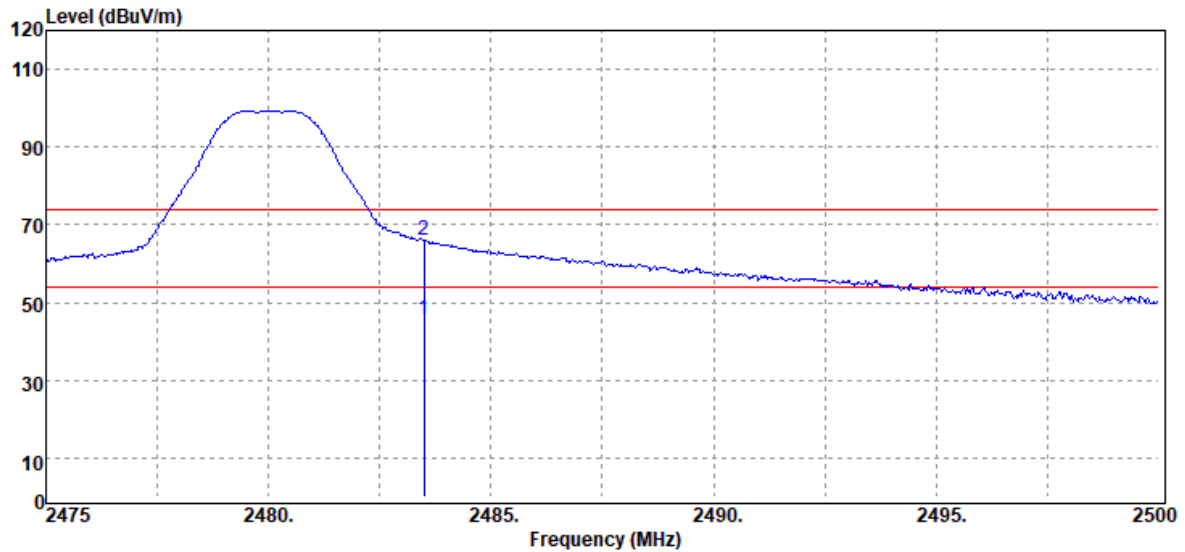
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2480 MHz
 Operation Mode : BE CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
2483.50	Average	48.31	-2.83	45.48	54.00	-8.52
2483.50	Peak	68.78	-2.83	65.95	74.00	-8.05

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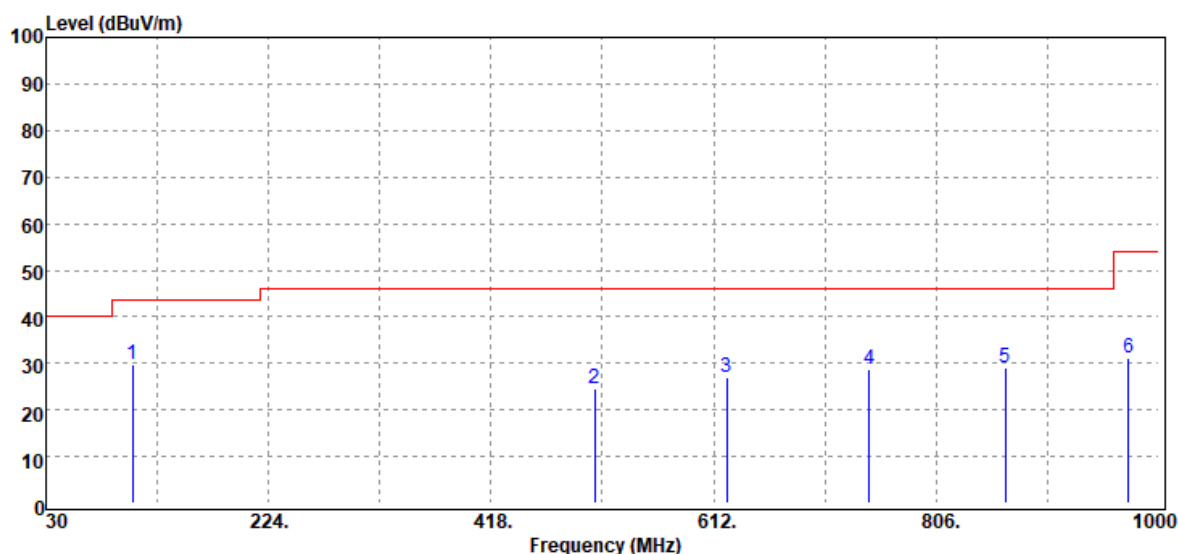
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Radiated Spurious Emission Measurement Result (Below 1GHz)

DATA RATE 1 Mbps:

External Antenna, Part no.: ANT-X100ETHAB24553

Project Number	: T190422W01	Test Date	: 2019-04-29
Operation Band	: BLE 1M	Temp./Humi.	: 23/52
Fundamental Frequency	: 2442 MHz	Engineer	: Jerry
Operation Mode	: Tx CH Mid	Measurement Antenna Pol.	: VERTICAL
EUT Pol.	: H Plan		



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
105.66	Peak	40.78	-11.02	29.76	43.50	-13.74
508.21	Peak	27.23	-2.81	24.42	46.00	-21.58
623.64	Peak	27.69	-0.66	27.03	46.00	-18.97
747.80	Peak	26.83	1.93	28.76	46.00	-17.24
866.14	Peak	26.39	2.80	29.19	46.00	-16.81
973.81	Peak	25.61	5.63	31.24	54.00	-22.76

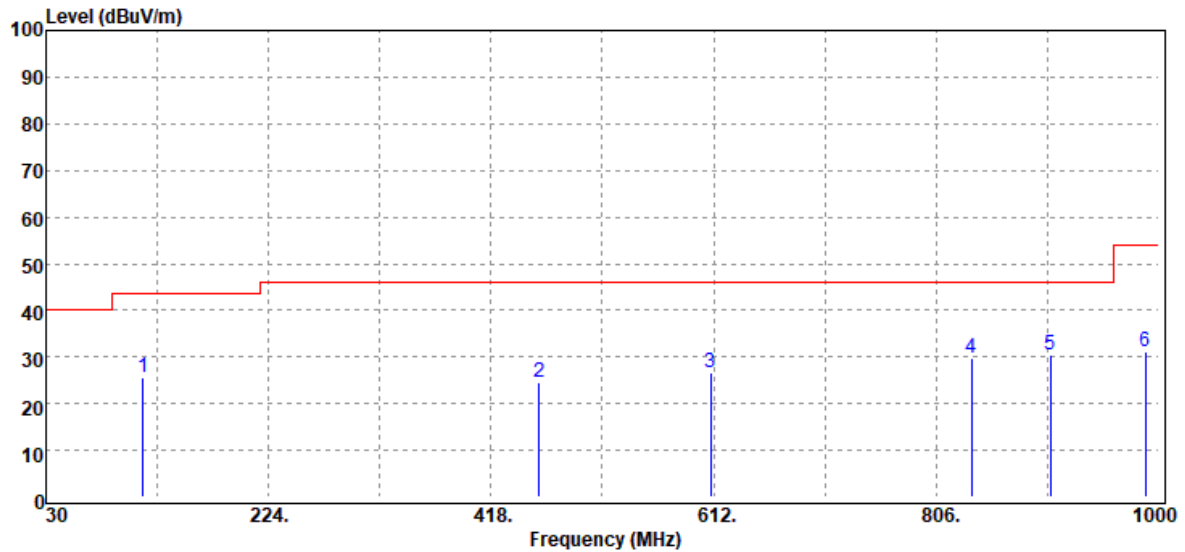
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
114.39	Peak	34.84	-9.35	25.49	43.50	-18.01
459.71	Peak	28.42	-3.81	24.61	46.00	-21.39
609.09	Peak	27.69	-1.21	26.48	46.00	-19.52
837.04	Peak	26.28	3.38	29.66	46.00	-16.34
905.91	Peak	26.39	4.12	30.51	46.00	-15.49
988.36	Peak	25.85	5.46	31.31	54.00	-22.69

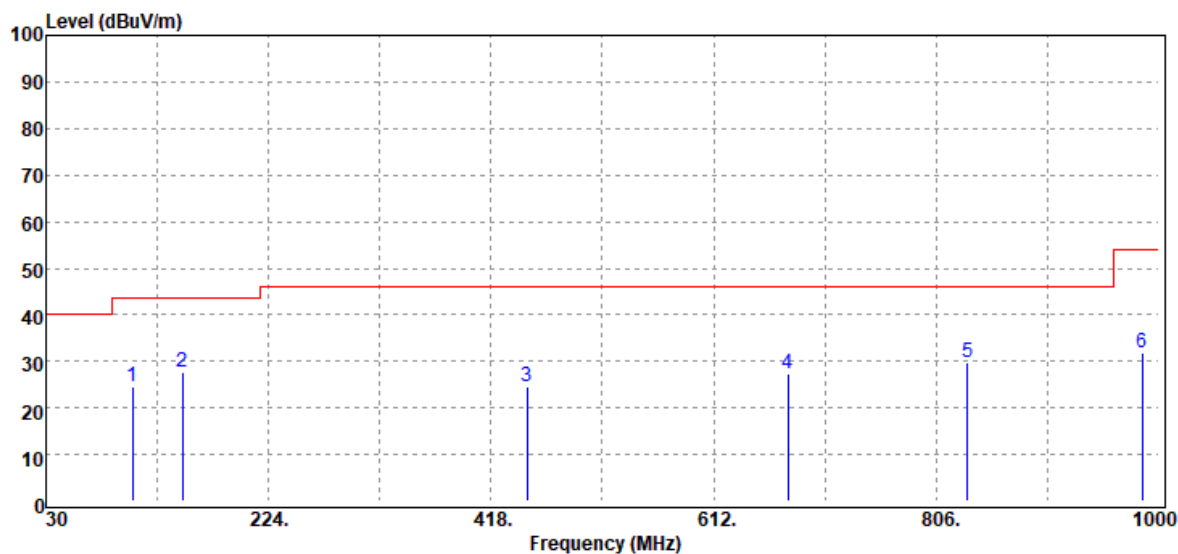
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL


Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
105.66	Peak	35.49	-11.02	24.47	43.50	-19.03
149.31	Peak	37.89	-10.10	27.79	43.50	-15.71
449.04	Peak	28.48	-3.88	24.60	46.00	-21.40
676.99	Peak	27.30	-0.10	27.20	46.00	-18.80
833.16	Peak	26.20	3.51	29.71	46.00	-16.29
985.45	Peak	26.51	5.38	31.89	54.00	-22.11

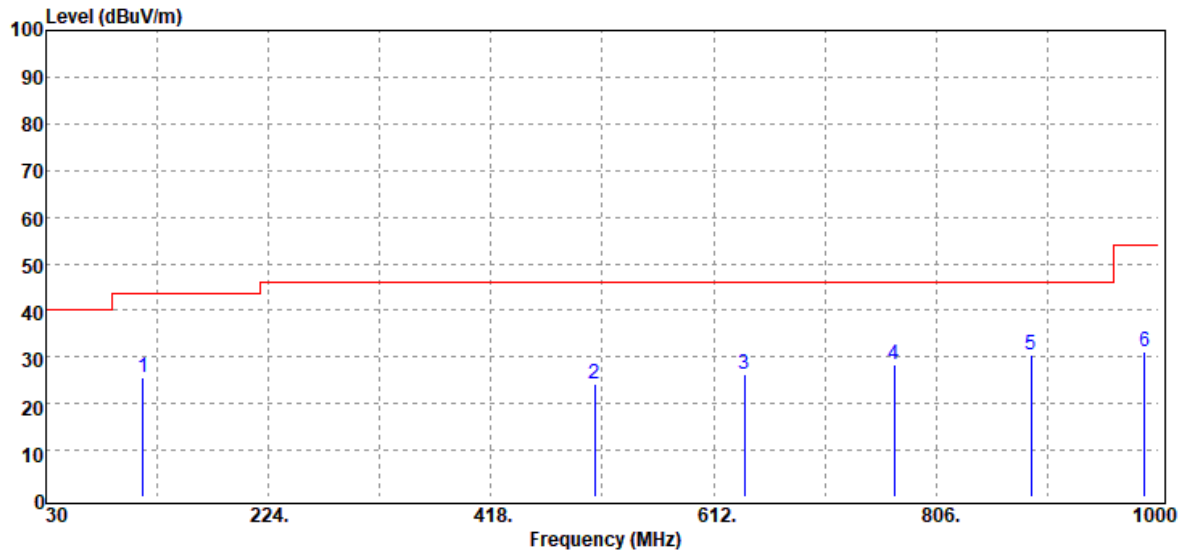
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
114.39	Peak	34.90	-9.35	25.55	43.50	-17.95
508.21	Peak	27.18	-2.81	24.37	46.00	-21.63
639.16	Peak	26.54	-0.28	26.26	46.00	-19.74
769.14	Peak	26.89	1.59	28.48	46.00	-17.52
888.45	Peak	26.48	3.85	30.33	46.00	-15.67
987.39	Peak	25.80	5.46	31.26	54.00	-22.74

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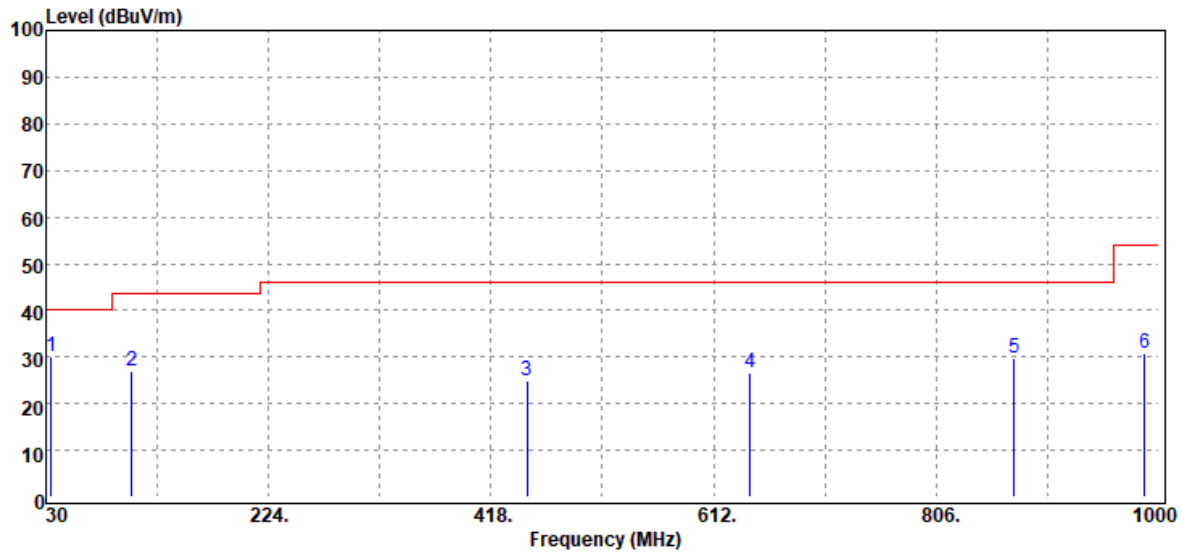
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PCB Antenna, Part no.: ANT-X200P001B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
34.85	Peak	35.76	-5.51	30.25	40.00	-9.75
104.69	Peak	38.33	-11.18	27.15	43.50	-16.35
449.04	Peak	28.89	-3.88	25.01	46.00	-20.99
644.01	Peak	27.13	-0.39	26.74	46.00	-19.26
873.90	Peak	26.71	3.10	29.81	46.00	-16.19
987.39	Peak	25.31	5.46	30.77	54.00	-23.23

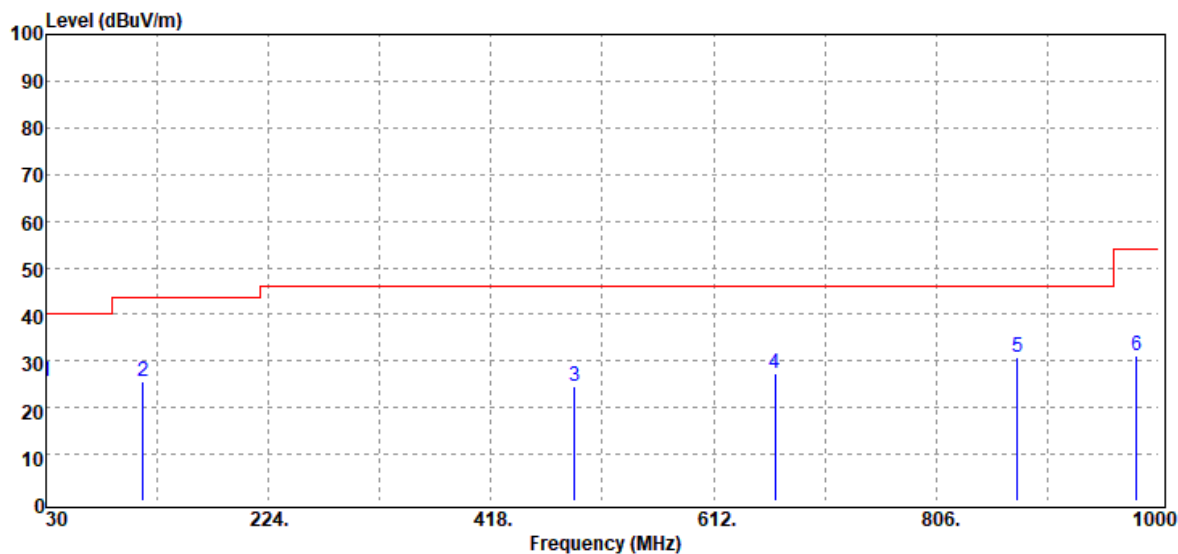
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-30
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
30.00	Peak	27.03	-1.51	25.52	40.00	-14.48
114.39	Peak	34.87	-9.35	25.52	43.50	-17.98
490.75	Peak	27.49	-3.09	24.40	46.00	-21.60
665.35	Peak	27.26	-0.09	27.17	46.00	-18.83
876.81	Peak	27.37	3.37	30.74	46.00	-15.26
980.60	Peak	25.30	5.72	31.02	54.00	-22.98

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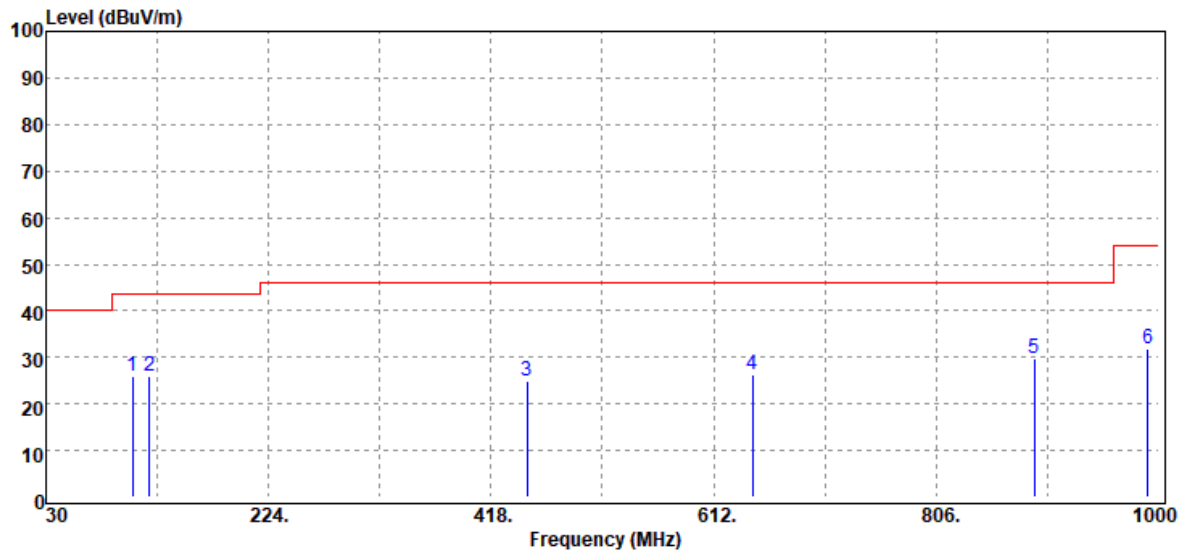
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DATA RATE 2 Mbps (BT5.0):

External Antenna, Part no.: ANT100ETHAB24553

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
105.66	Peak	37.11	-11.02	26.09	43.50	-17.41
120.21	Peak	34.70	-8.88	25.82	43.50	-17.68
449.04	Peak	28.88	-3.88	25.00	46.00	-21.00
645.95	Peak	26.61	-0.31	26.30	46.00	-19.70
891.36	Peak	25.76	4.06	29.82	46.00	-16.18
990.30	Peak	26.63	5.31	31.94	54.00	-22.06

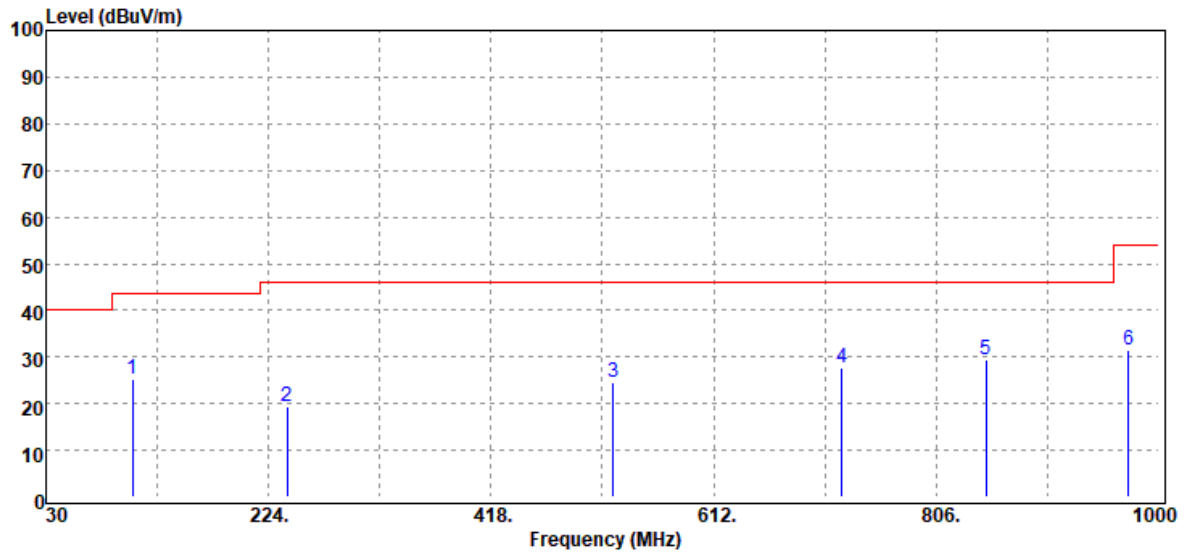
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
105.66	Peak	36.13	-11.02	25.11	43.50	-18.39
240.49	Peak	29.69	-10.25	19.44	46.00	-26.56
524.70	Peak	27.10	-2.41	24.69	46.00	-21.31
723.55	Peak	26.99	0.86	27.85	46.00	-18.15
849.65	Peak	26.54	3.01	29.55	46.00	-16.45
973.81	Peak	25.77	5.63	31.40	54.00	-22.60

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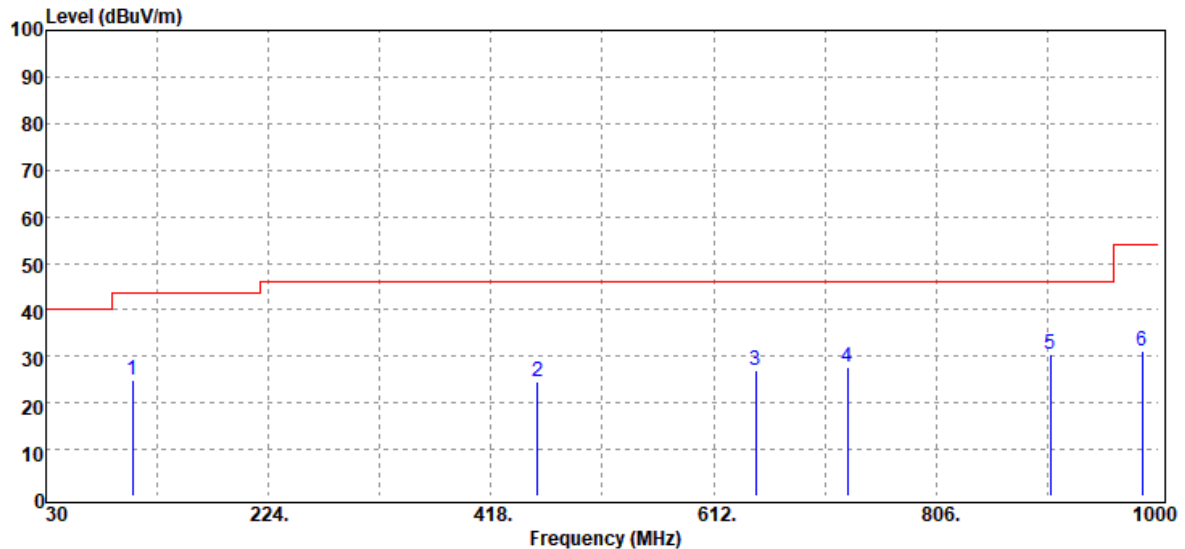
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode	Reading Level			FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
105.66	Peak	35.94	-11.02	24.92	43.50	-18.58
458.74	Peak	28.29	-3.81	24.48	46.00	-21.52
648.86	Peak	26.92	-0.08	26.84	46.00	-19.16
728.40	Peak	26.57	1.05	27.62	46.00	-18.38
905.91	Peak	26.29	4.12	30.41	46.00	-15.59
985.45	Peak	25.83	5.38	31.21	54.00	-22.79

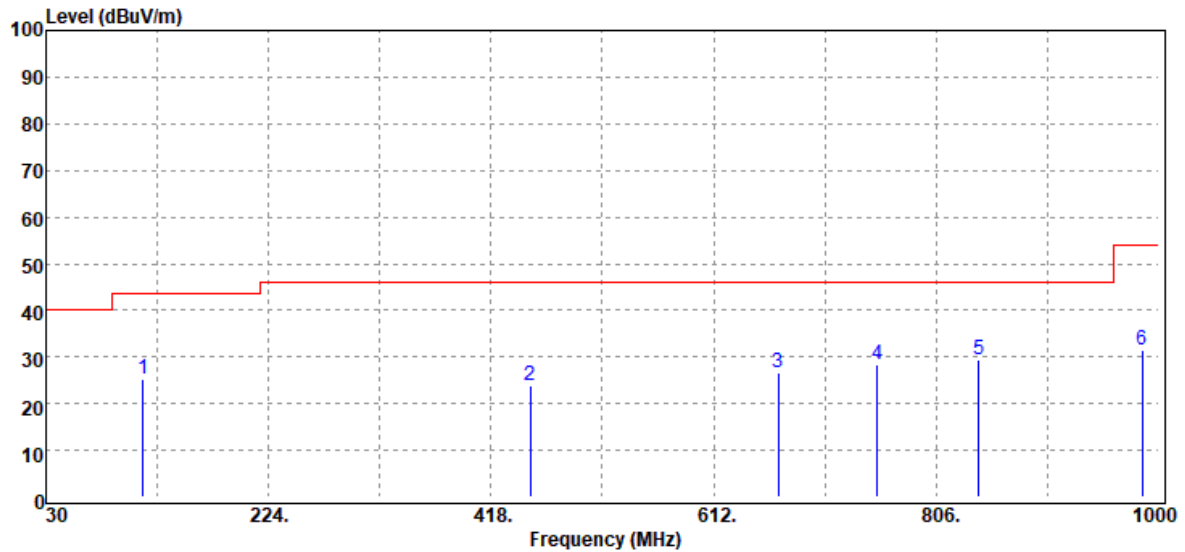
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-30
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
114.39	Peak	34.49	-9.35	25.14	43.50	-18.36
451.95	Peak	27.69	-3.94	23.75	46.00	-22.25
668.26	Peak	26.79	-0.03	26.76	46.00	-19.24
754.59	Peak	26.35	2.00	28.35	46.00	-17.65
842.86	Peak	26.04	3.35	29.39	46.00	-16.61
985.45	Peak	26.13	5.38	31.51	54.00	-22.49

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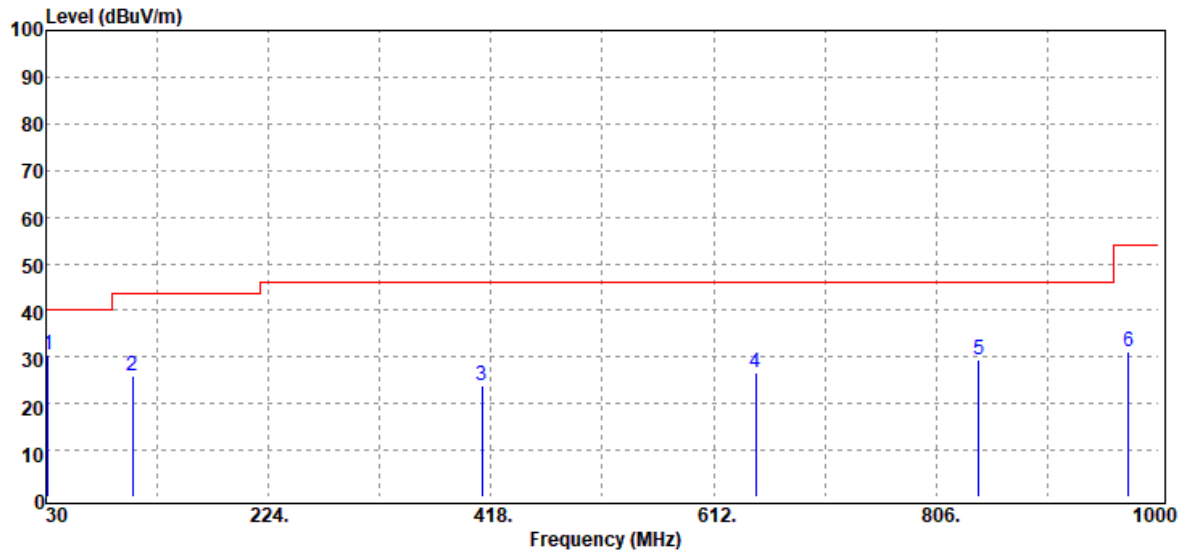
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PCB Antenna, Part no.: ANT-X200P001B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
31.94	Peak	34.01	-3.40	30.61	40.00	-9.39
105.66	Peak	37.06	-11.02	26.04	43.50	-17.46
410.24	Peak	29.09	-5.11	23.98	46.00	-22.02
648.86	Peak	26.85	-0.08	26.77	46.00	-19.23
842.86	Peak	26.20	3.35	29.55	46.00	-16.45
973.81	Peak	25.48	5.63	31.11	54.00	-22.89

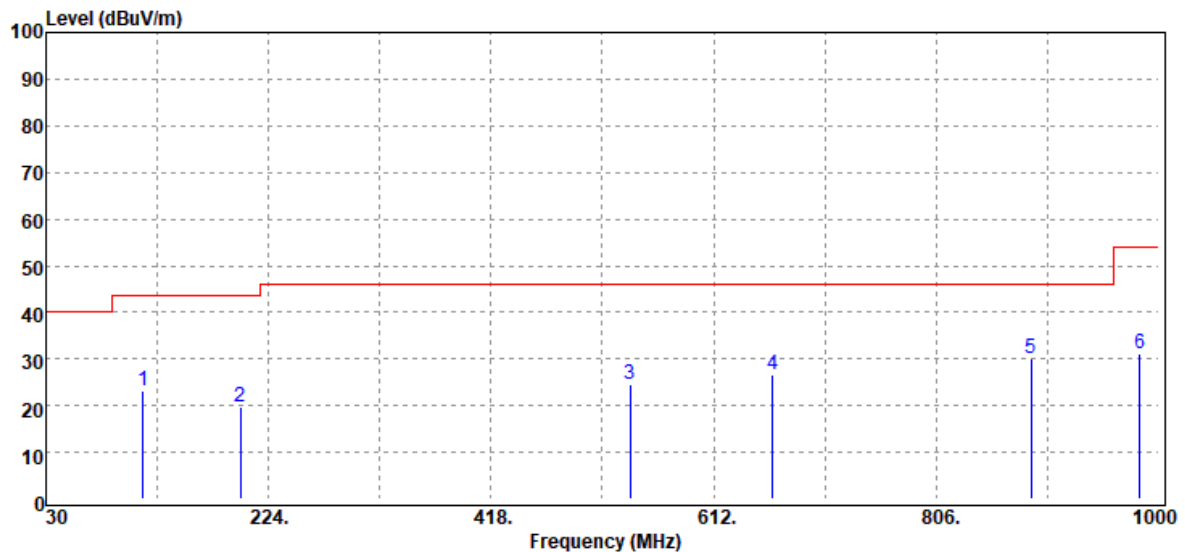
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-30
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
114.39	Peak	32.54	-9.35	23.19	43.50	-20.31
199.75	Peak	29.16	-9.29	19.87	43.50	-23.63
539.25	Peak	26.99	-2.25	24.74	46.00	-21.26
663.41	Peak	26.76	0.05	26.81	46.00	-19.19
888.45	Peak	26.18	3.85	30.03	46.00	-15.97
983.51	Peak	25.75	5.45	31.20	54.00	-22.80

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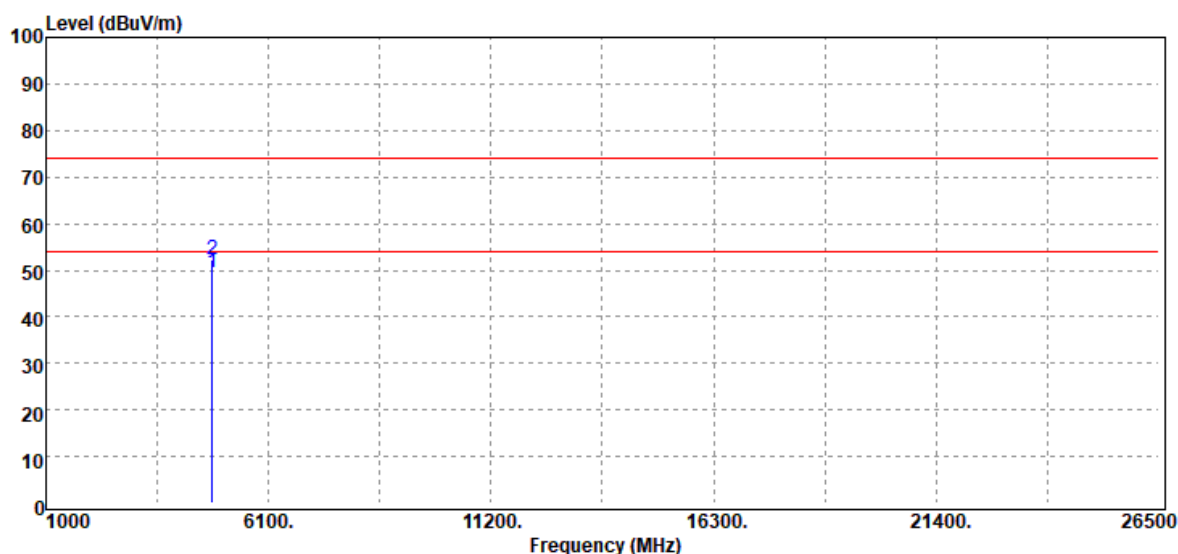
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Radiated Spurious Emission Measurement Result (Above 1GHz)

DATA RATE 1 Mbps:

External Antenna, Part no.: ANT-X100ETHAB24553

Project Number	: T190422W01	Test Date	: 2019-04-29
Operation Band	: BLE 1M	Temp./Humi.	: 23/52
Fundamental Frequency	: 2402 MHz	Engineer	: Jerry
Operation Mode	: Tx CH Low	Measurement Antenna Pol.	: VERTICAL
EUT Pol.	: H Plan		



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4804.00	Average	46.28	3.05	49.33	54.00	-4.67
4804.00	Peak	49.28	3.05	52.33	74.00	-21.67

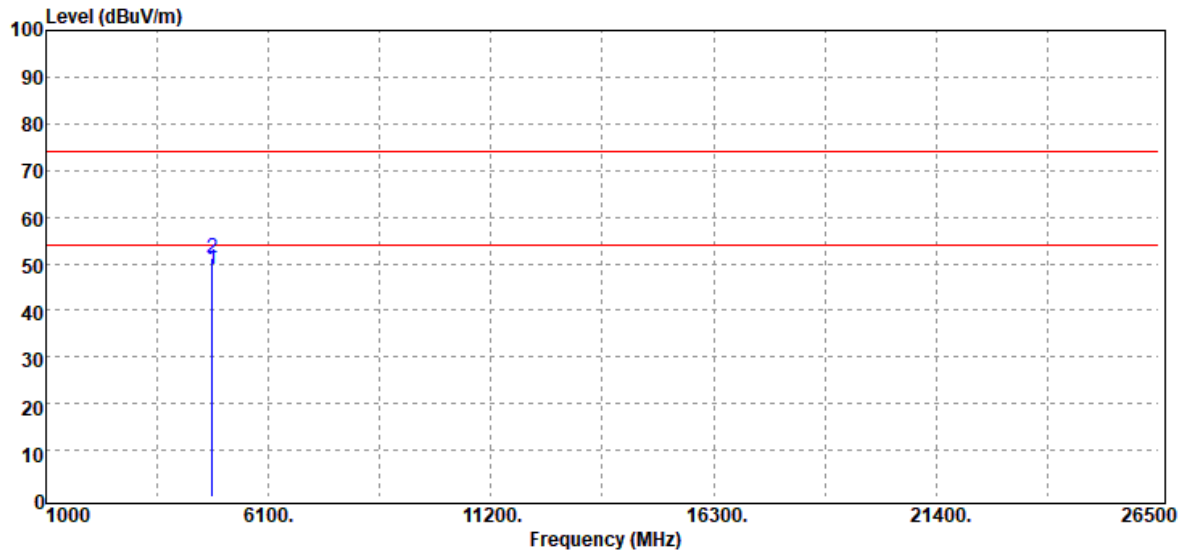
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	45.90	3.05	48.95	54.00	-5.05
4804.00	Peak	48.15	3.05	51.20	74.00	-22.80

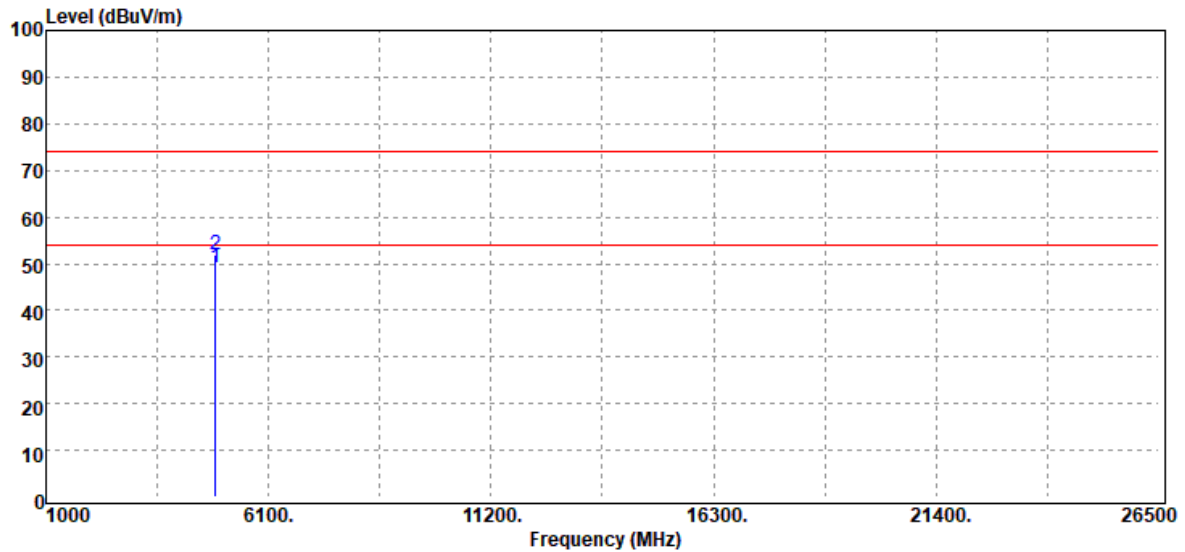
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	45.75	3.41	49.16	54.00	-4.84
4884.00	Peak	48.36	3.41	51.77	74.00	-22.23

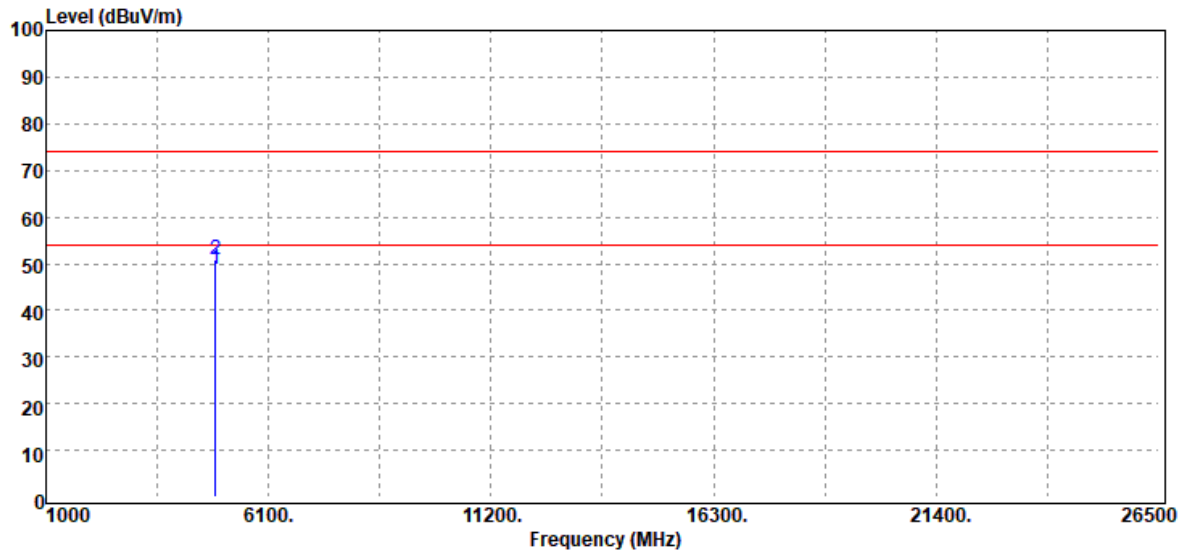
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	45.47	3.41	48.88	54.00	-5.12
4884.00	Peak	47.53	3.41	50.94	74.00	-23.06

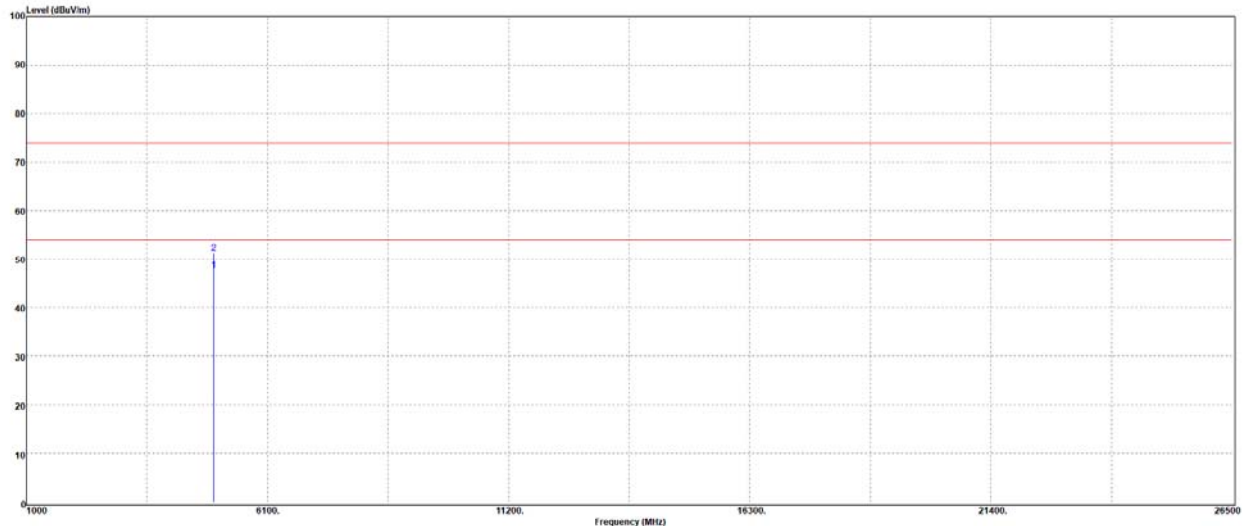
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
4960.00	Average	43.48	4.06	47.54	54.00	-6.46
4960.00	Peak	47.18	4.06	51.24	74.00	-22.76

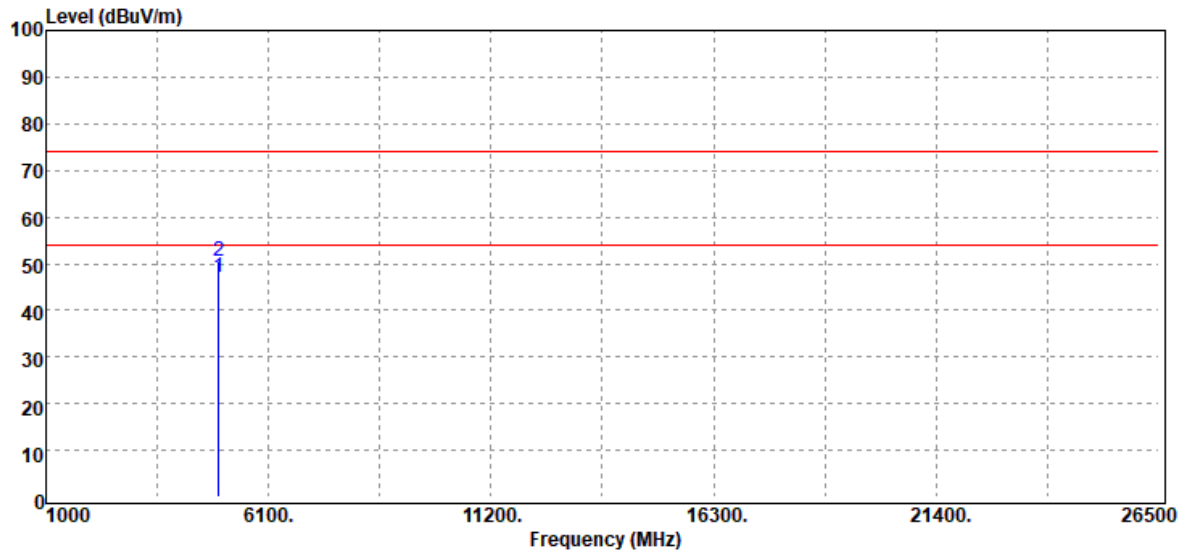
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	43.14	4.06	47.20	54.00	-6.80
4960.00	Peak	46.42	4.06	50.48	74.00	-23.52

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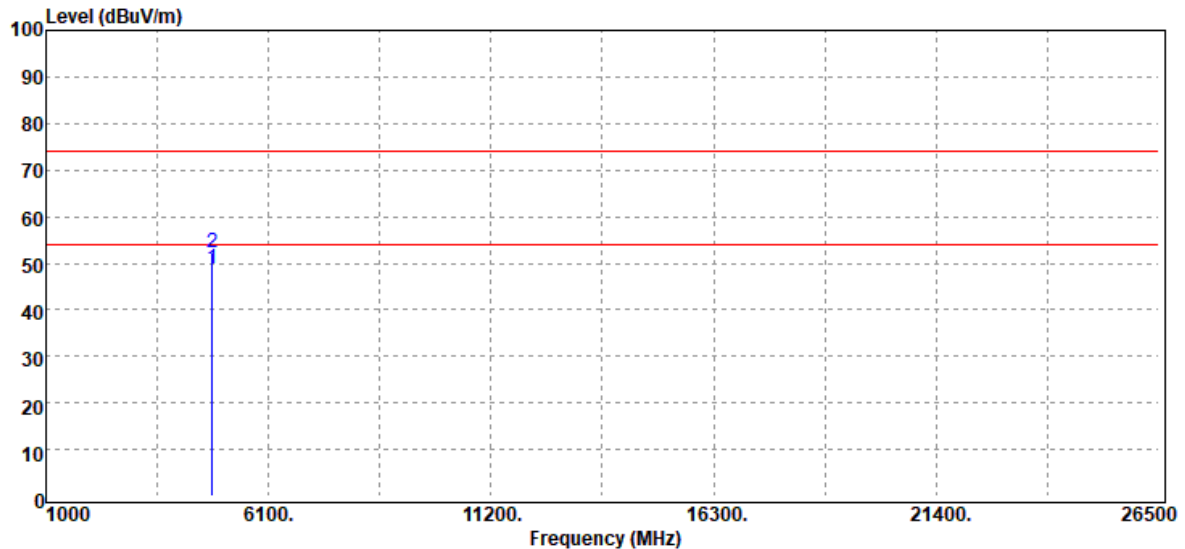
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
Mode		Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4804.00	Average	45.69	3.05	48.74	54.00	-5.26
4804.00	Peak	49.03	3.05	52.08	74.00	-21.92

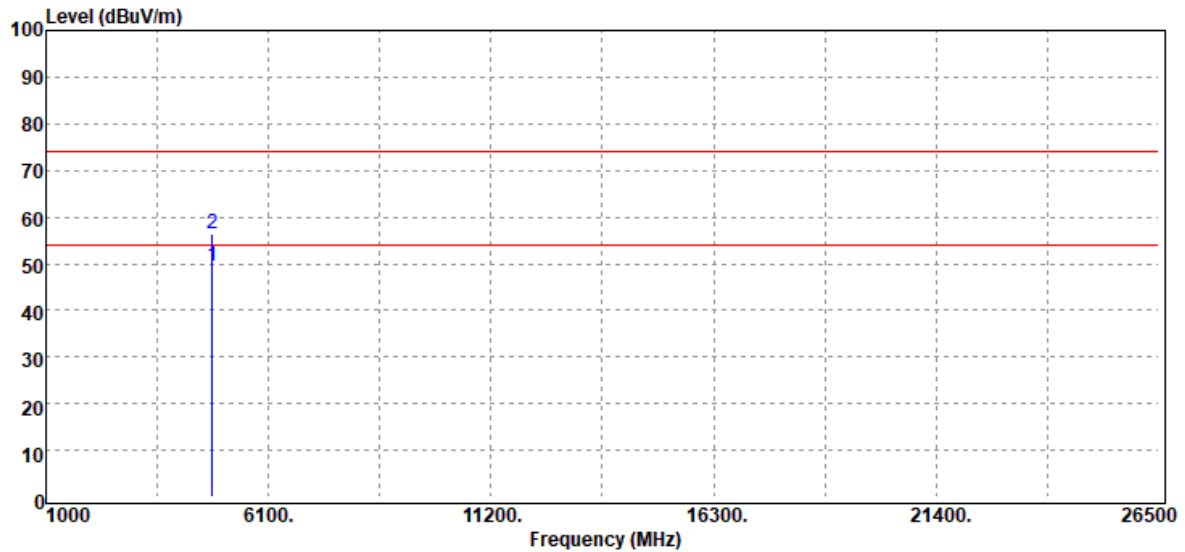
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4804.00	Average	46.36	3.05	49.41	54.00	-4.59
4804.00	Peak	53.48	3.05	56.53	74.00	-17.47

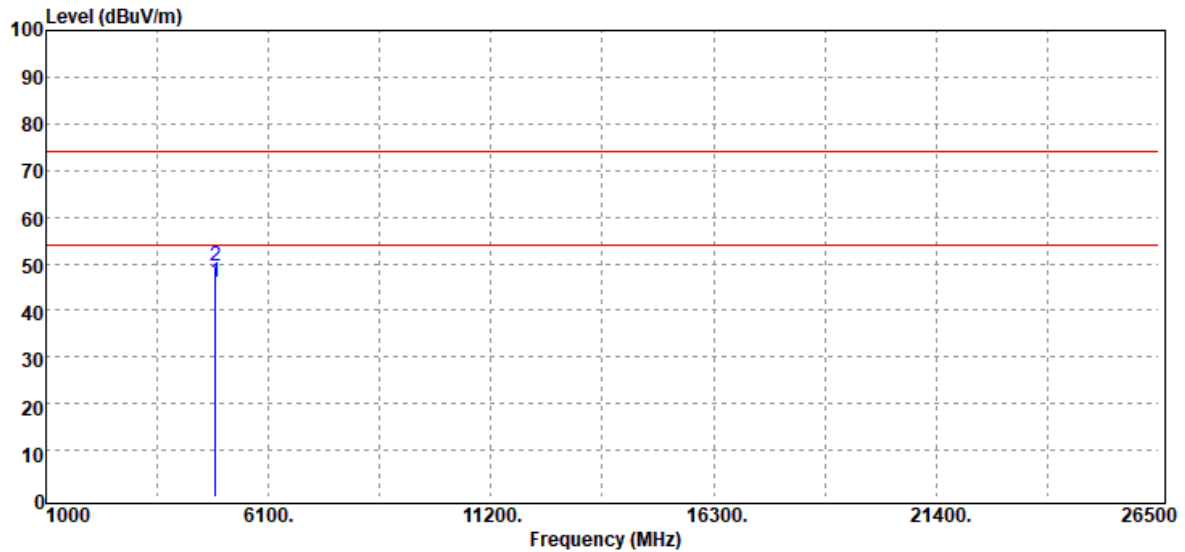
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	42.57	3.41	45.98	54.00	-8.02
4884.00	Peak	45.91	3.41	49.32	74.00	-24.68

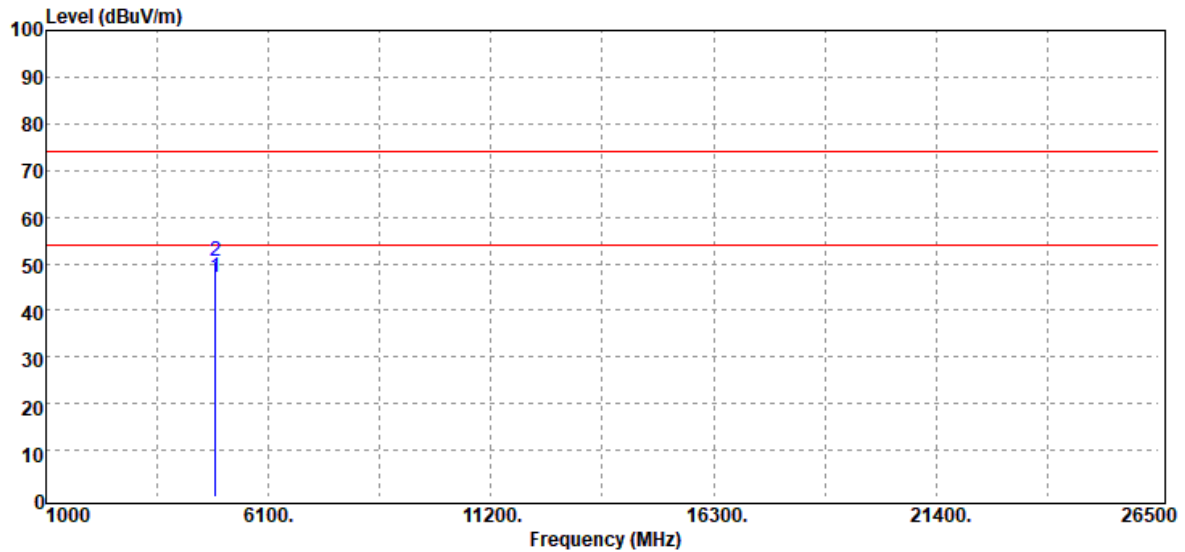
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	43.50	3.41	46.91	54.00	-7.09
4884.00	Peak	47.14	3.41	50.55	74.00	-23.45

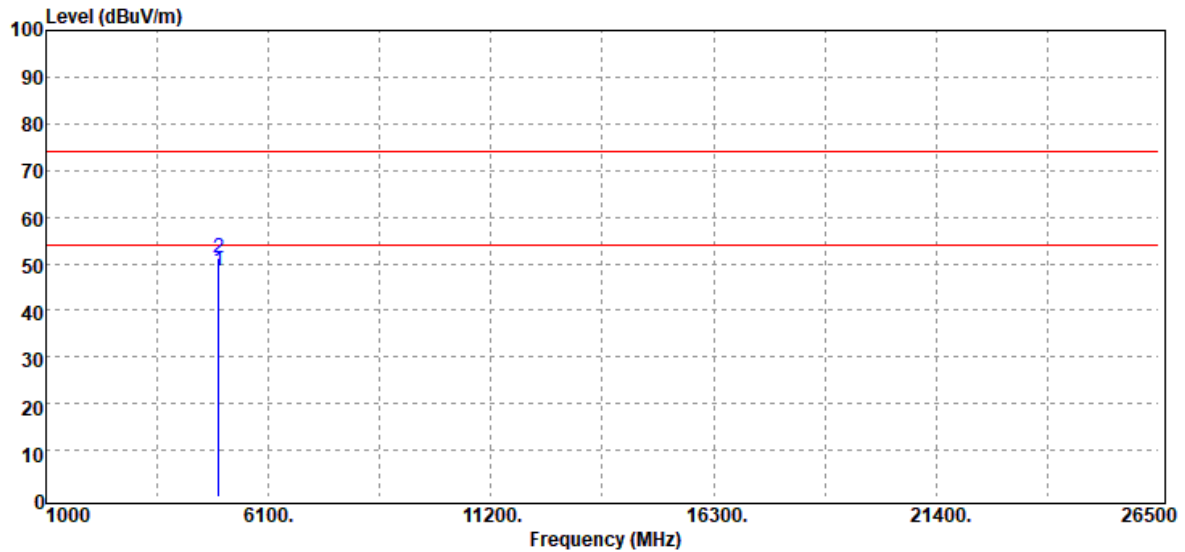
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4960.00	Average	44.37	4.06	48.43	54.00	-5.57
4960.00	Peak	47.17	4.06	51.23	74.00	-22.77

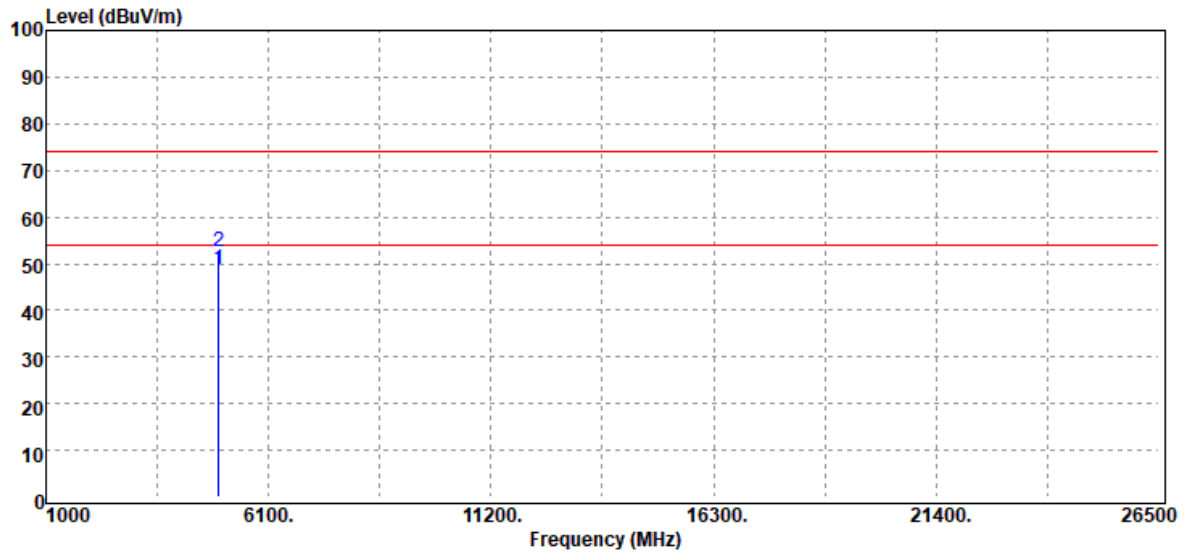
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	44.90	4.06	48.96	54.00	-5.04
4960.00	Peak	48.52	4.06	52.58	74.00	-21.42

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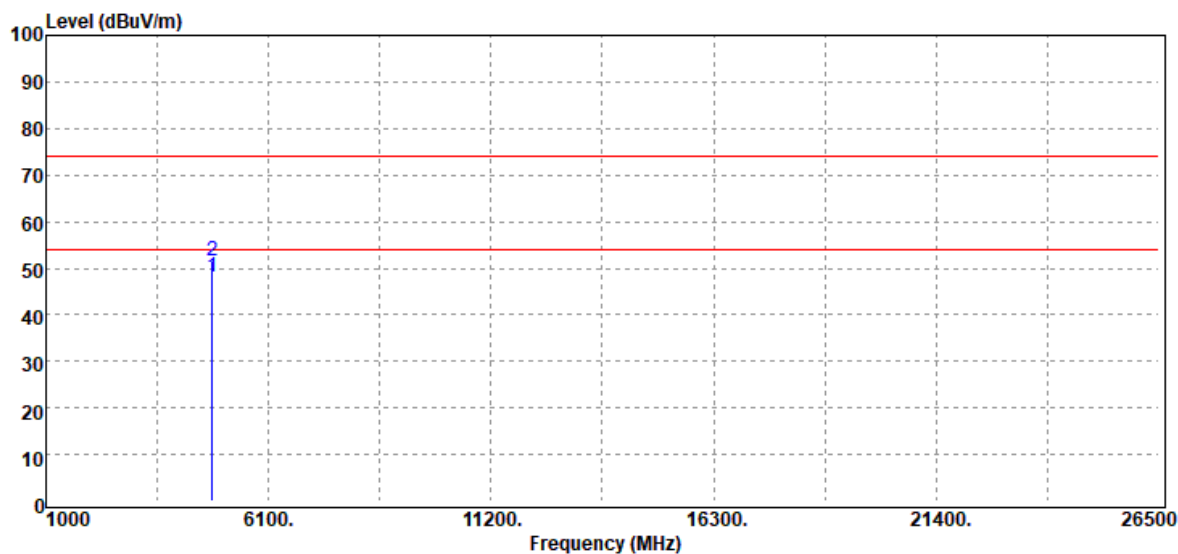
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PCB Antenna, Part no.: ANT200P001B24003

Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4804.00	Average	45.11	3.05	48.16	54.00	-5.84
4804.00	Peak	48.45	3.05	51.50	74.00	-22.50

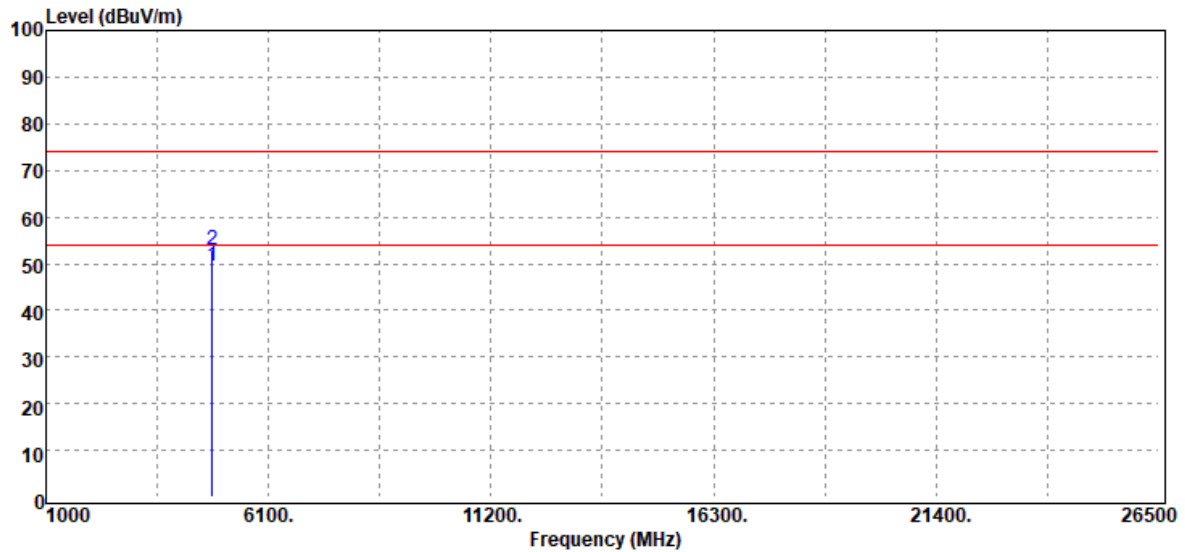
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	46.47	3.05	49.52	54.00	-4.48
4804.00	Peak	49.89	3.05	52.94	74.00	-21.06

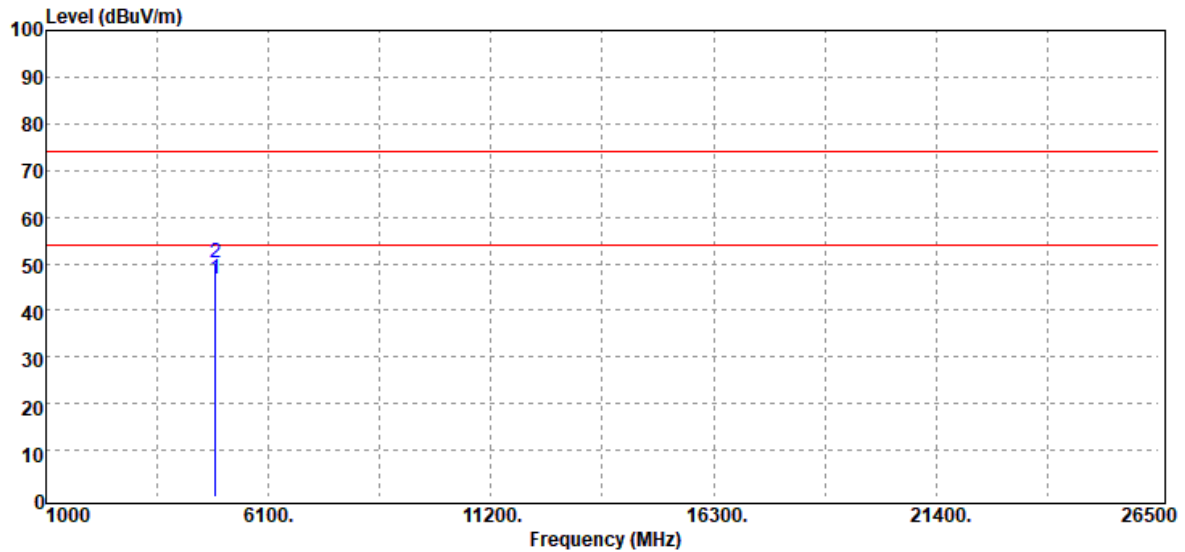
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	43.15	3.41	46.56	54.00	-7.44
4884.00	Peak	46.87	3.41	50.28	74.00	-23.72

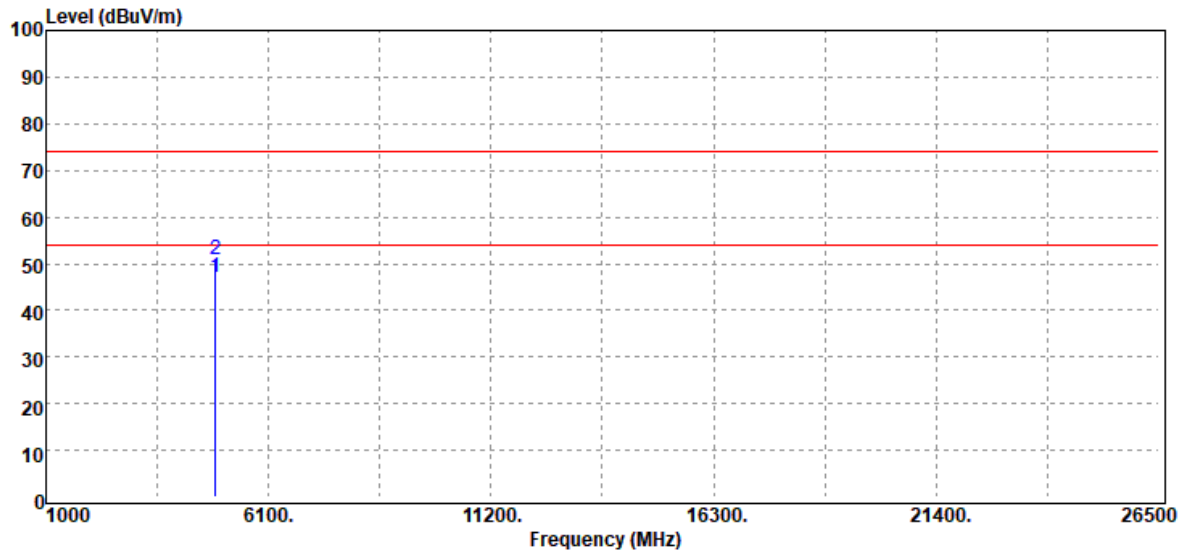
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Project Number : T190422W01
 Operation Band : BLE 1M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	43.63	3.41	47.04	54.00	-6.96
4884.00	Peak	47.59	3.41	51.00	74.00	-23.00

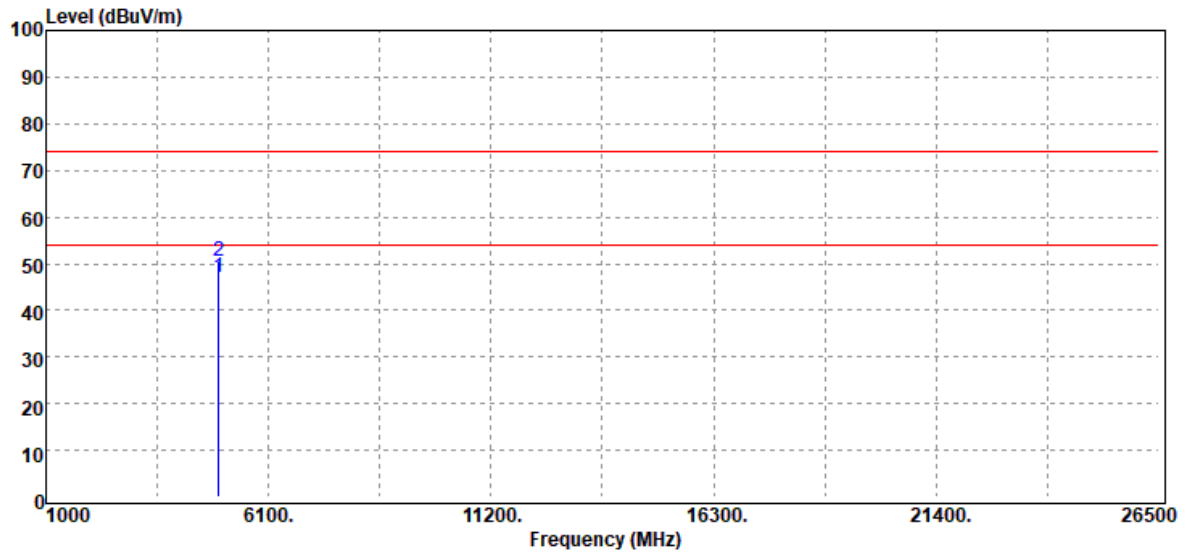
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	42.89	4.06	46.95	54.00	-7.05
4960.00	Peak	46.35	4.06	50.41	74.00	-23.59

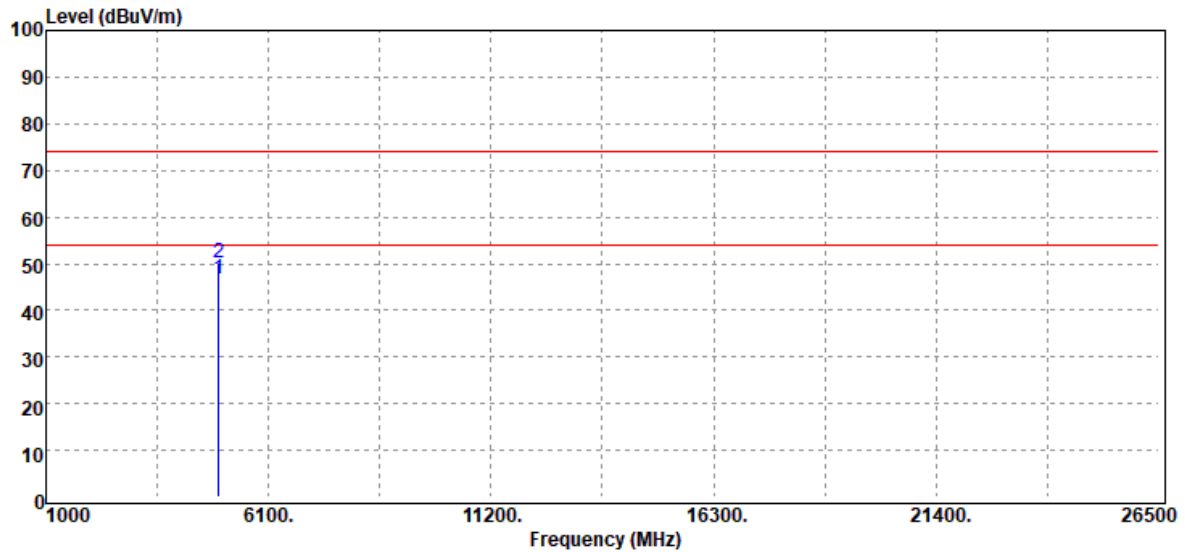
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Project Number : T190422W01
Operation Band : BLE 1M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	42.70	4.06	46.76	54.00	-7.24
4960.00	Peak	46.15	4.06	50.21	74.00	-23.79

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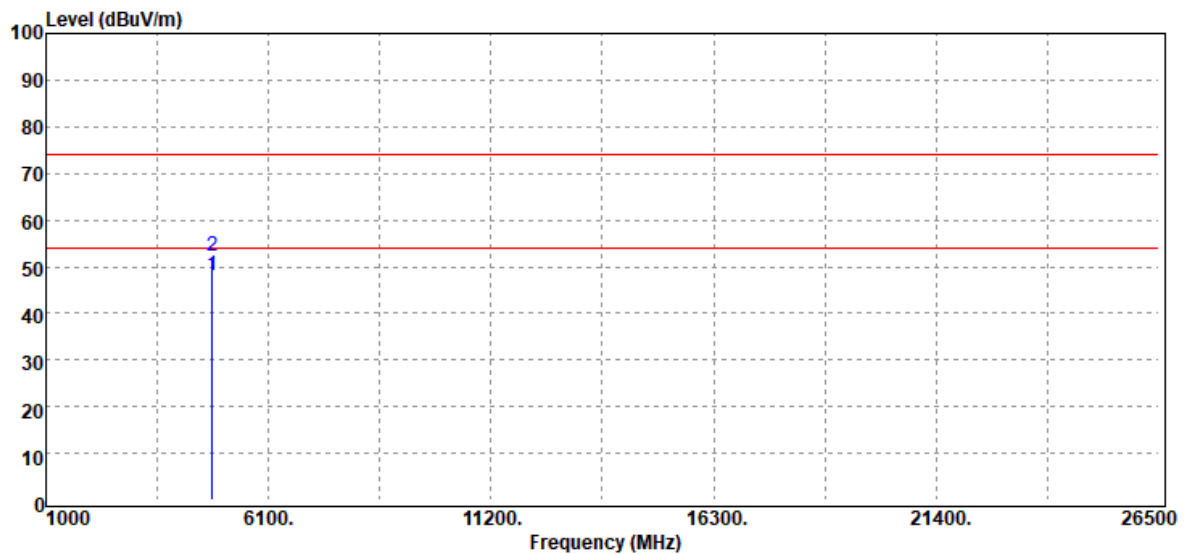
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DATA RATE 2 Mbps:

External Antenna, Part no.: ANT-X100ETHAB24553

Project Number	: T190422W01	Test Date	: 2019-04-29
Operation Band	: BLE 2M	Temp./Humi.	: 23/52
Fundamental Frequency	: 2402 MHz	Engineer	: Jerry
Operation Mode	: Tx CH Low	Measurement Antenna Pol.	: VERTICAL
EUT Pol.	: H Plan		



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4804.00	Average	44.94	3.05	47.99	54.00	-6.01
4804.00	Peak	49.30	3.05	52.35	74.00	-21.65

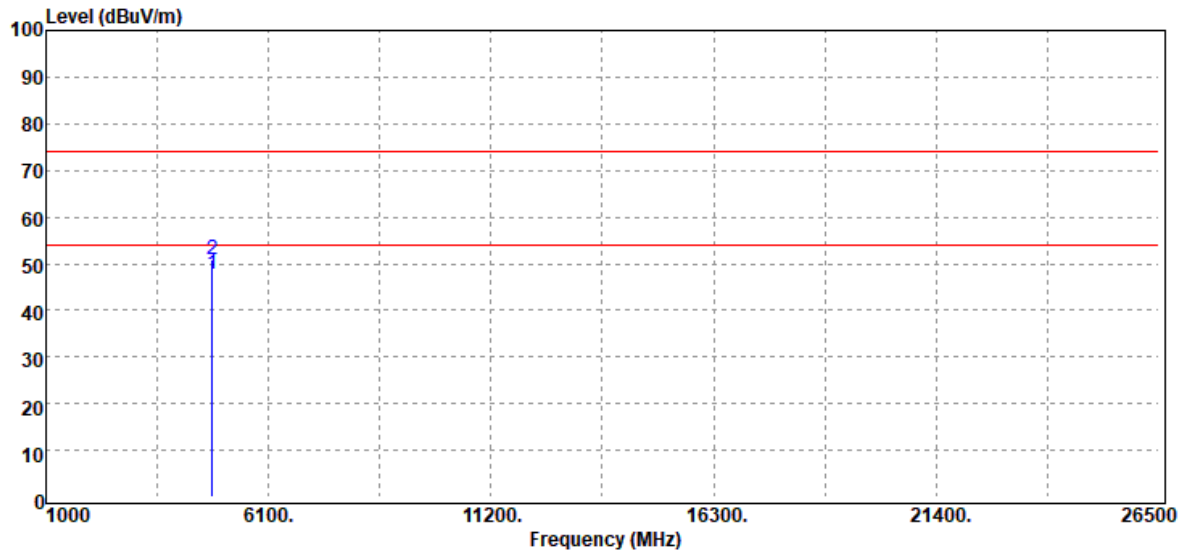
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	44.79	3.05	47.84	54.00	-6.16
4804.00	Peak	47.97	3.05	51.02	74.00	-22.98

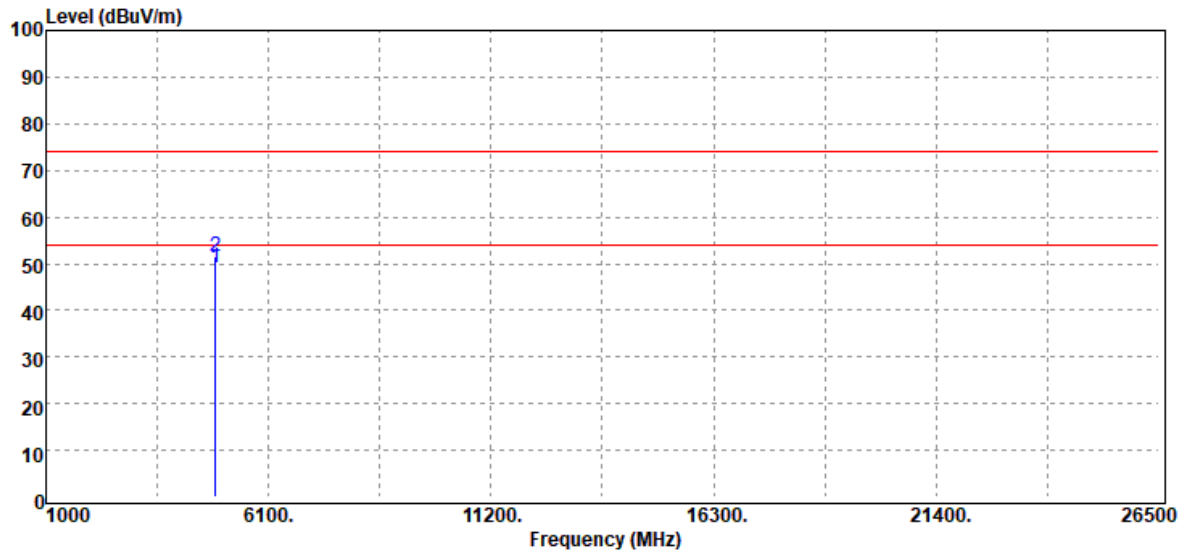
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	45.87	3.41	49.28	54.00	-4.72
4884.00	Peak	48.15	3.41	51.56	74.00	-22.44

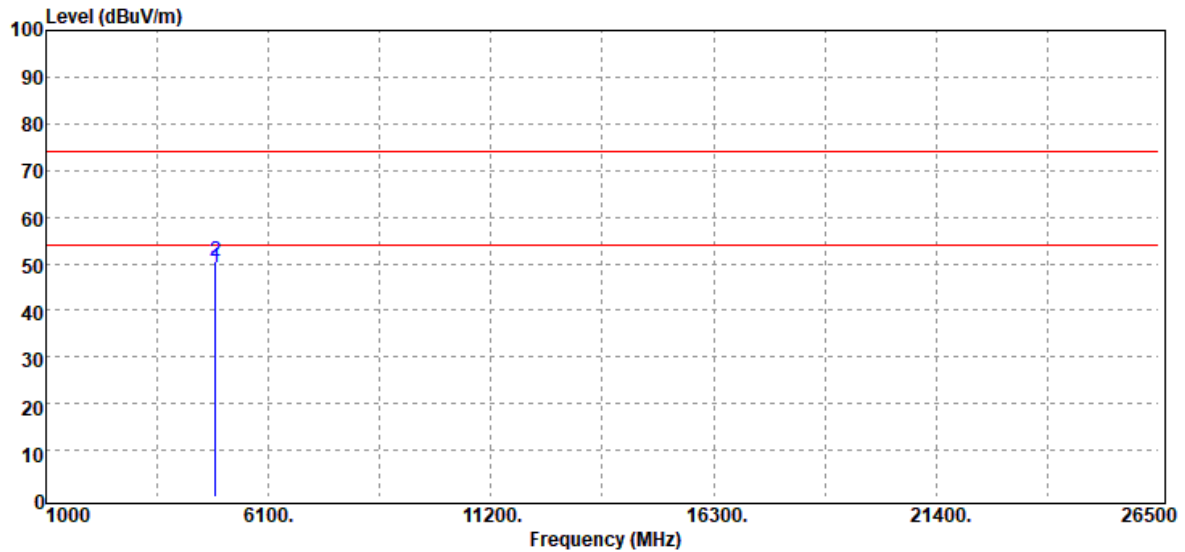
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4884.00	Average	45.62	3.41	49.03	54.00	-4.97
4884.00	Peak	47.15	3.41	50.56	74.00	-23.44

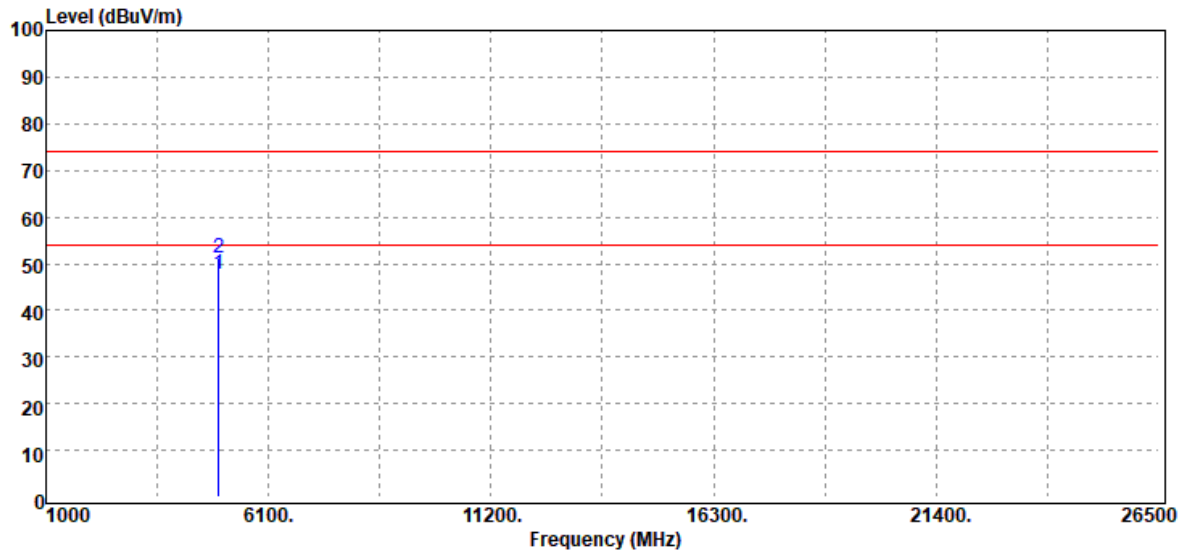
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4960.00	Average	43.52	4.06	47.58	54.00	-6.42
4960.00	Peak	47.29	4.06	51.35	74.00	-22.65

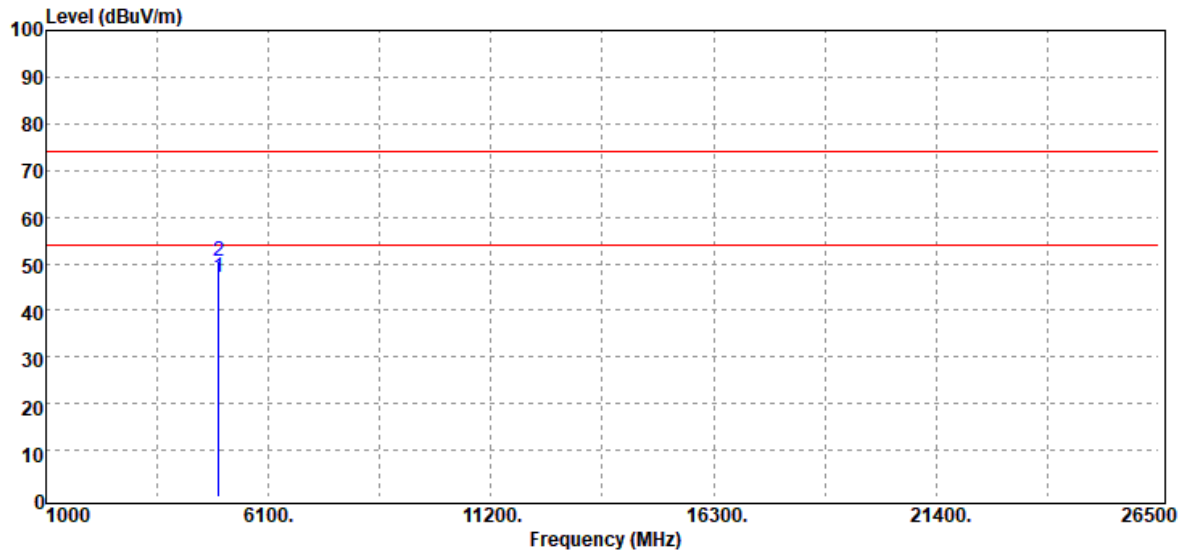
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	43.02	4.06	47.08	54.00	-6.92
4960.00	Peak	46.34	4.06	50.40	74.00	-23.60

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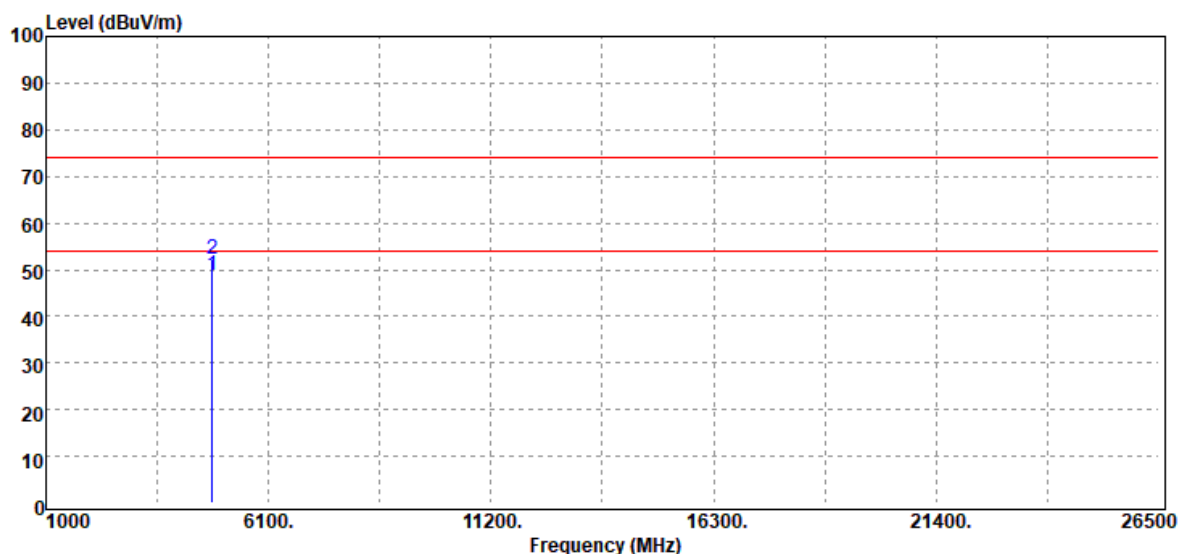
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PCB Antenna, Part no.: ANT-X100P111B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
4804.00	Average	45.89	3.05	48.94	54.00	-5.06
4804.00	Peak	49.27	3.05	52.32	74.00	-21.68

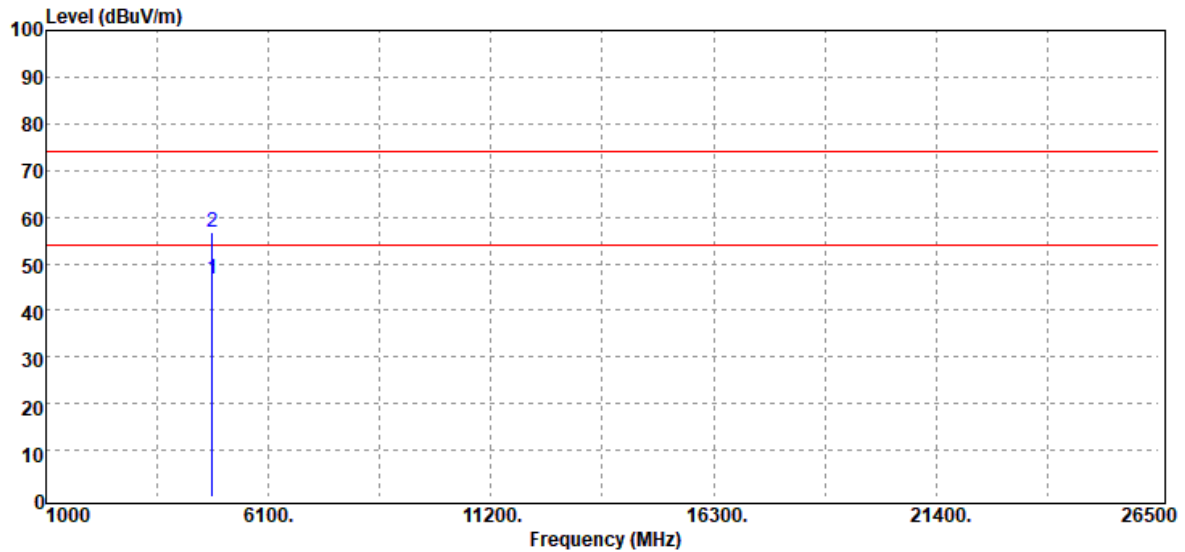
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2402 MHz
 Operation Mode : Tx CH Low
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4804.00	Average	43.68	3.05	46.73	54.00	-7.27
4804.00	Peak	53.66	3.05	56.71	74.00	-17.29

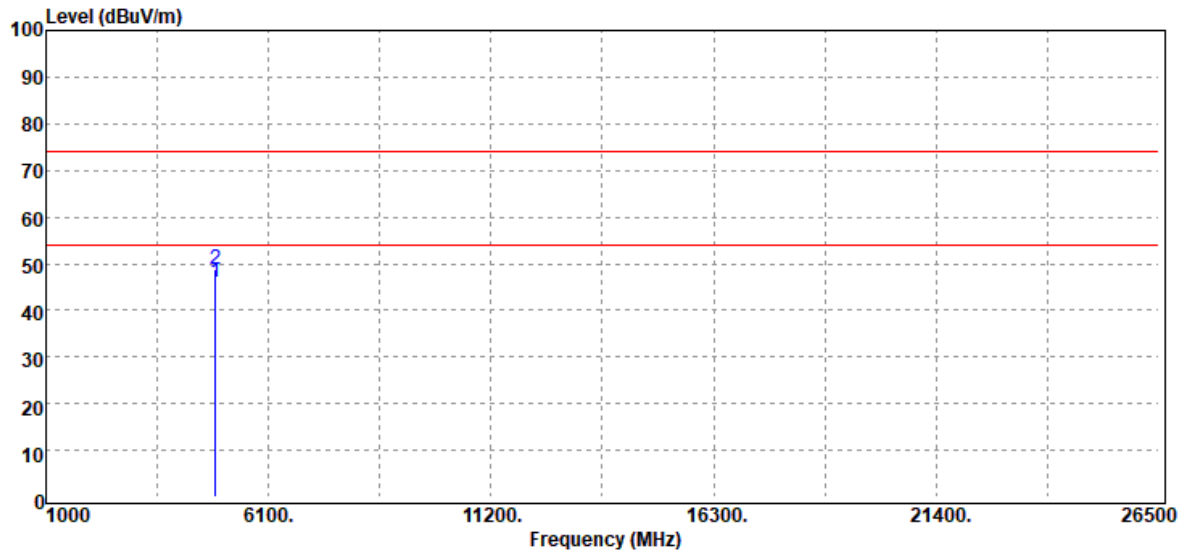
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	42.47	3.41	45.88	54.00	-8.12
4884.00	Peak	45.41	3.41	48.82	74.00	-25.18

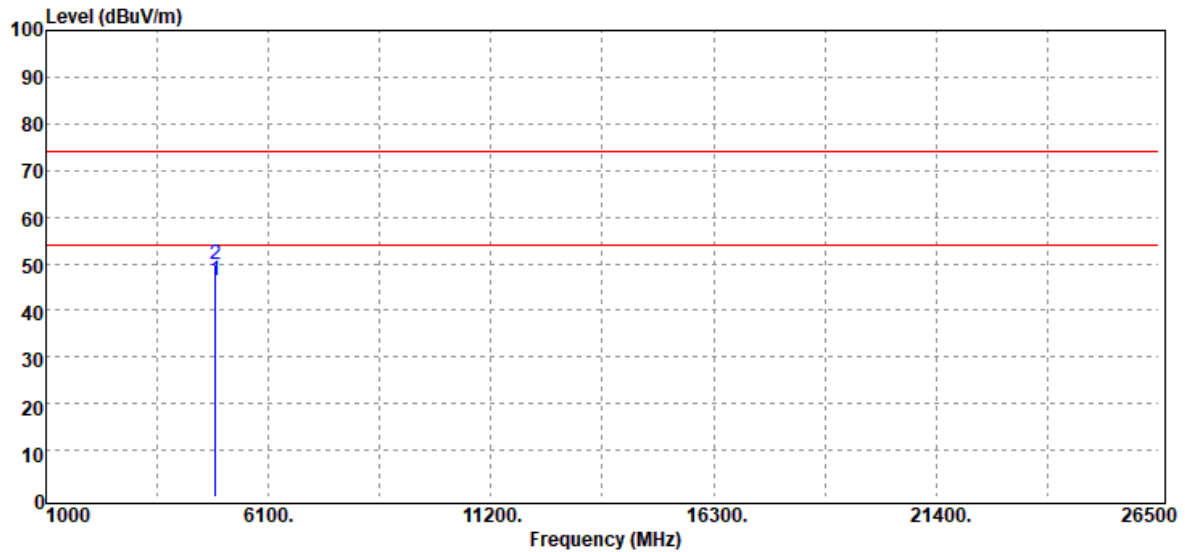
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	42.85	3.41	46.26	54.00	-7.74
4884.00	Peak	46.46	3.41	49.87	74.00	-24.13

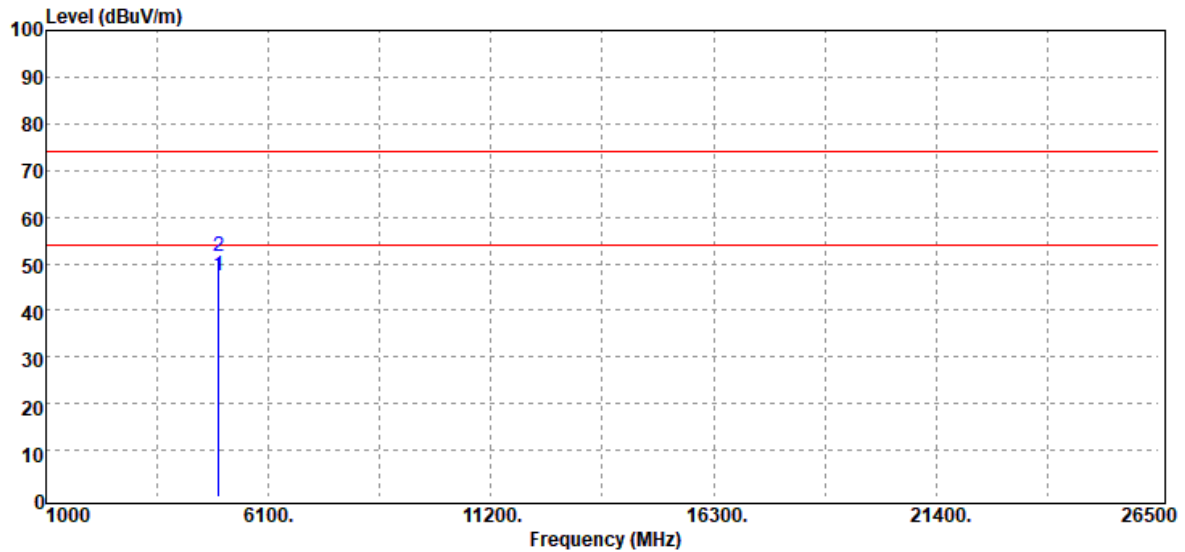
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	43.25	4.06	47.31	54.00	-6.69
4960.00	Peak	47.35	4.06	51.41	74.00	-22.59

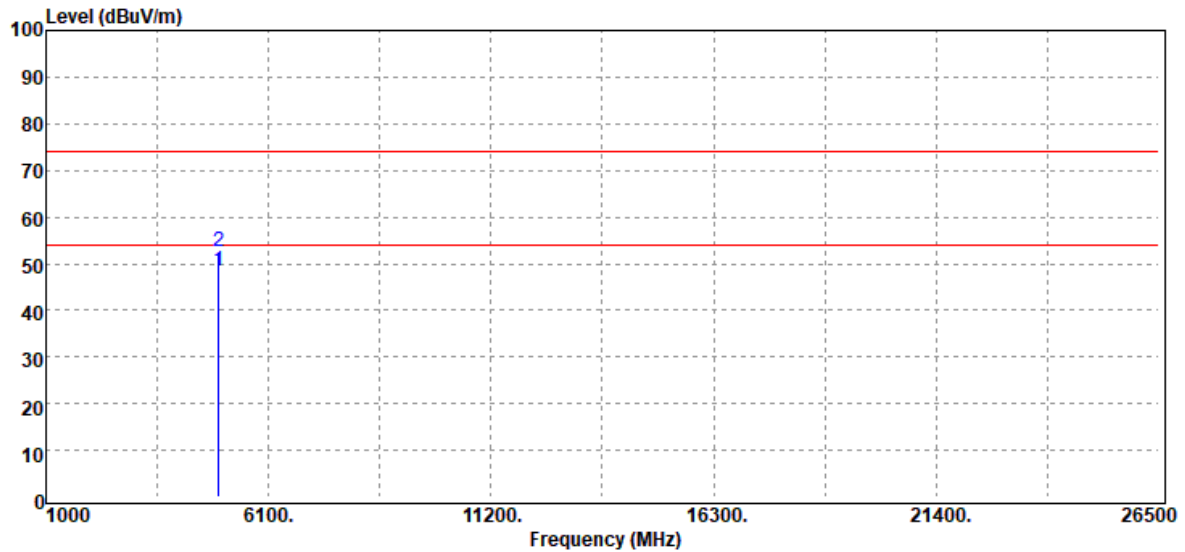
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	44.29	4.06	48.35	54.00	-5.65
4960.00	Peak	48.45	4.06	52.51	74.00	-21.49

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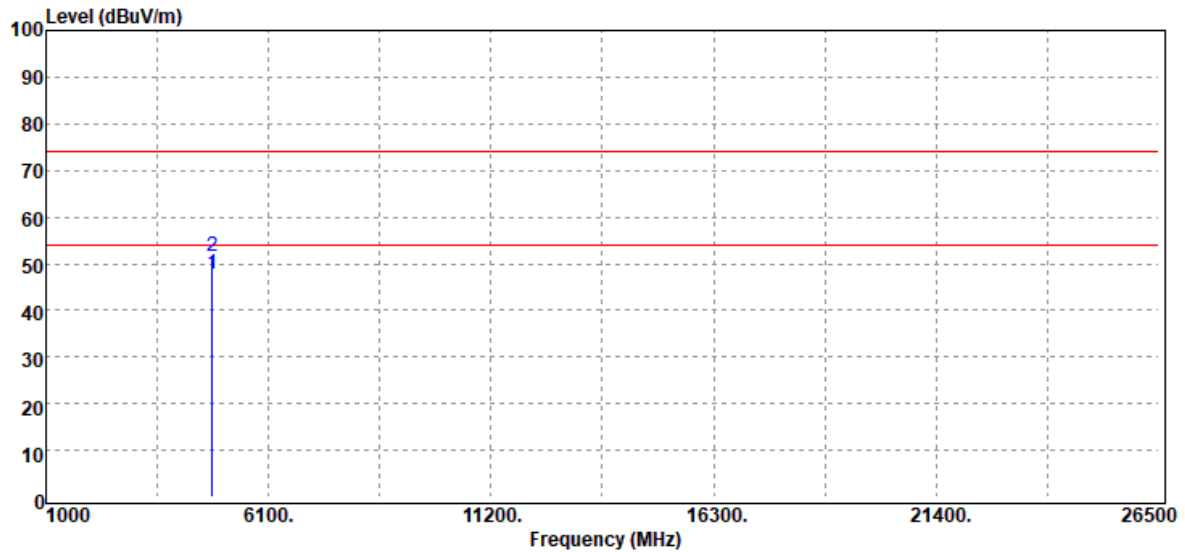
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PCB Antenna, Part no.: ANT-X200P001B24003

Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	44.83	3.05	47.88	54.00	-6.12
4804.00	Peak	48.37	3.05	51.42	74.00	-22.58

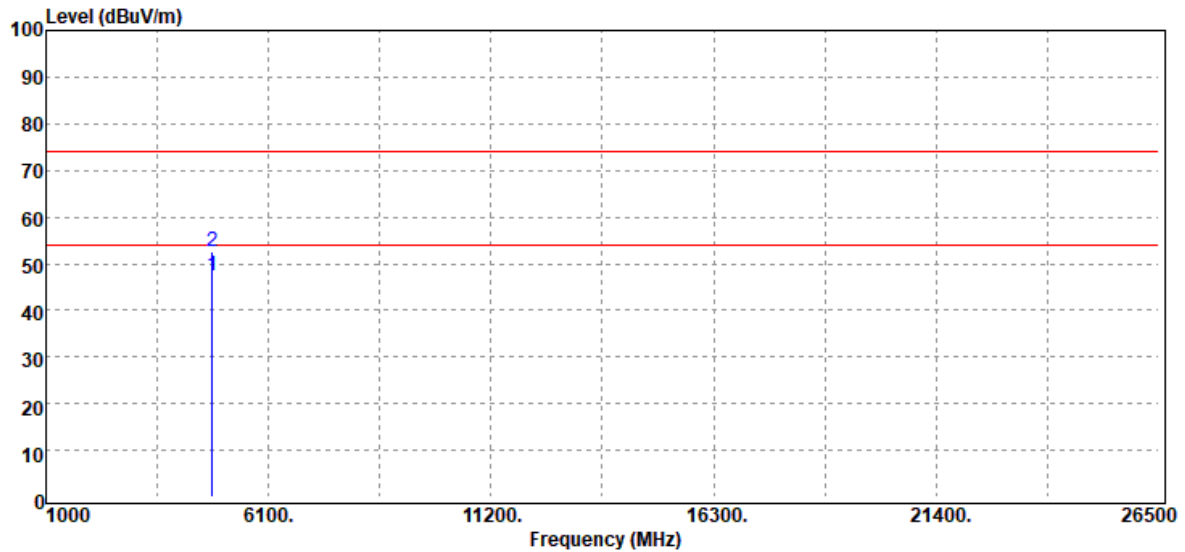
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2402 MHz
Operation Mode : Tx CH Low
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4804.00	Average	44.53	3.05	47.58	54.00	-6.42
4804.00	Peak	49.58	3.05	52.63	74.00	-21.37

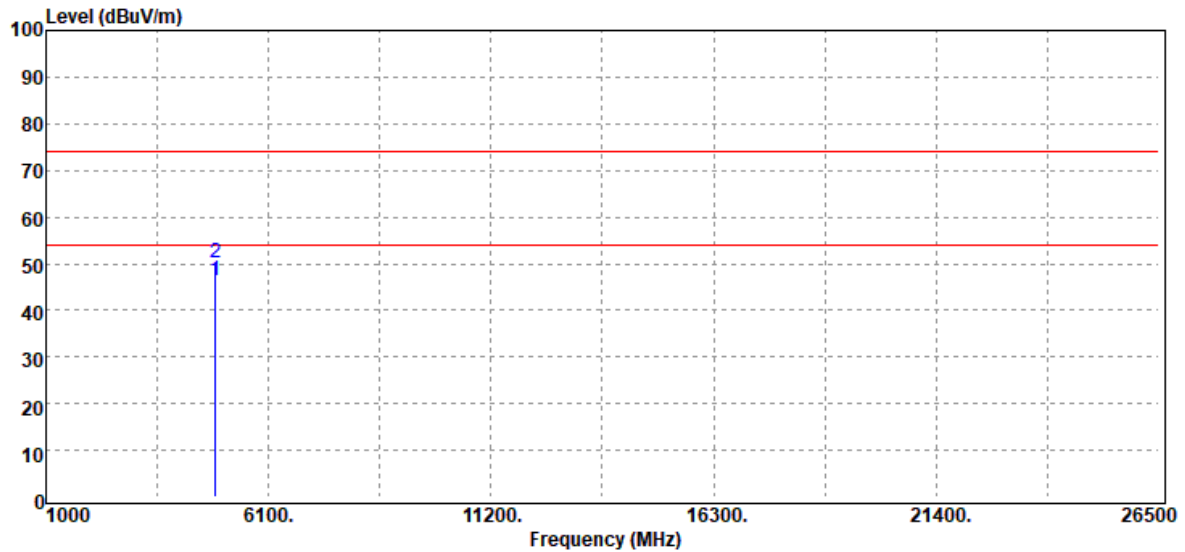
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2442 MHz
 Operation Mode : Tx CH Mid
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	42.88	3.41	46.29	54.00	-7.71
4884.00	Peak	46.73	3.41	50.14	74.00	-23.86

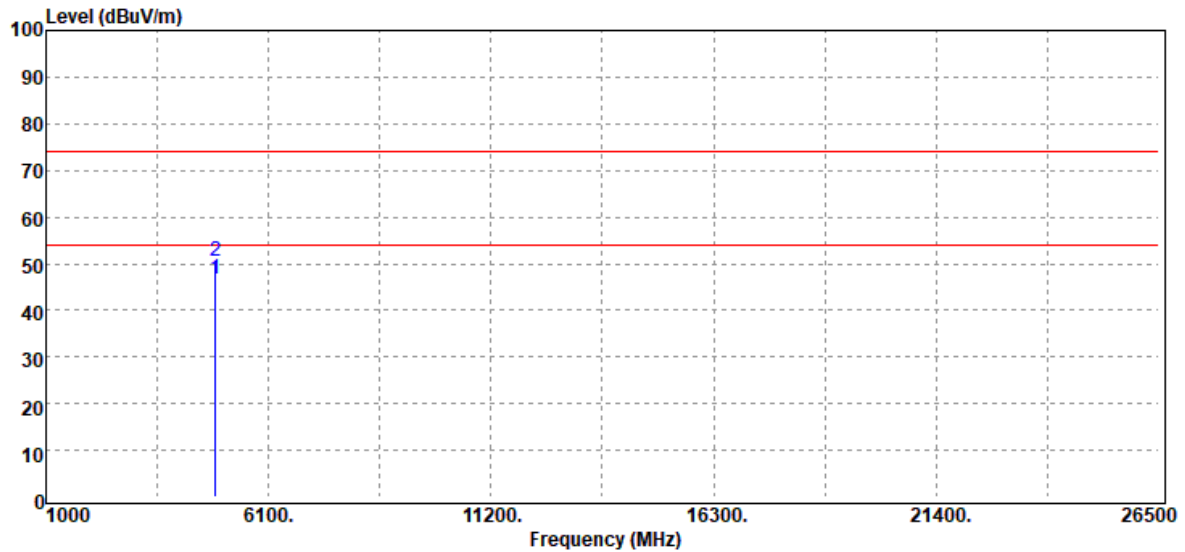
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2442 MHz
Operation Mode : Tx CH Mid
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	43.29	3.41	46.70	54.00	-7.30
4884.00	Peak	47.21	3.41	50.62	74.00	-23.38

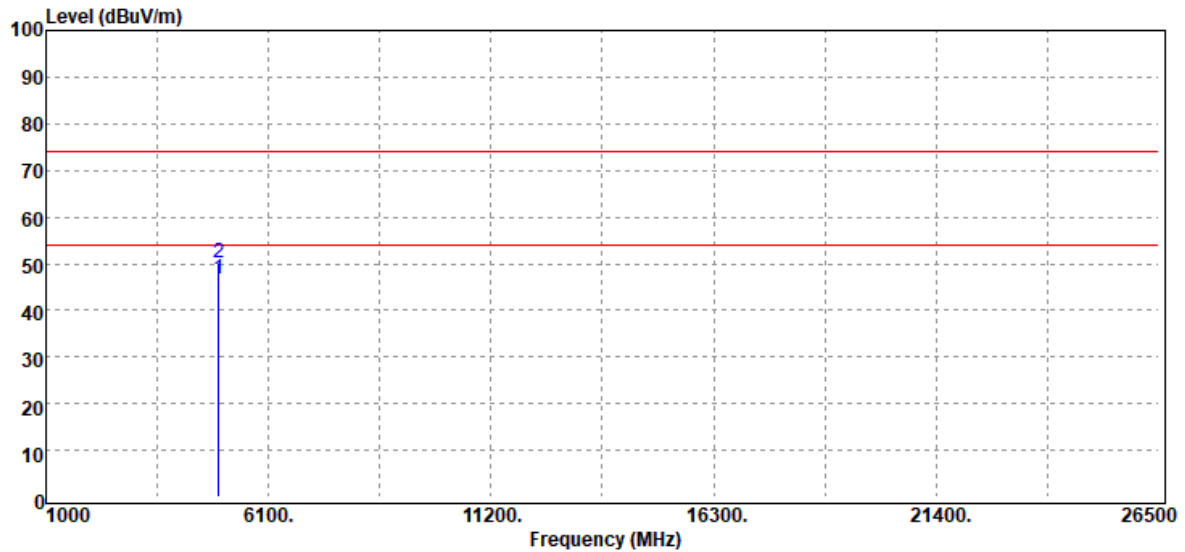
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Project Number : T190422W01
Operation Band : BLE 2M
Fundamental Frequency : 2480 MHz
Operation Mode : Tx CH High
EUT Pol. : H Plan

Test Date : 2019-04-29
Temp./Humi. : 23/52
Engineer : Jerry
Measurement Antenna Pol. : VERTICAL



Freq. MHz	Detector Mode	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
4960.00	Average	42.70	4.06	46.76	54.00	-7.24
4960.00	Peak	46.05	4.06	50.11	74.00	-23.89

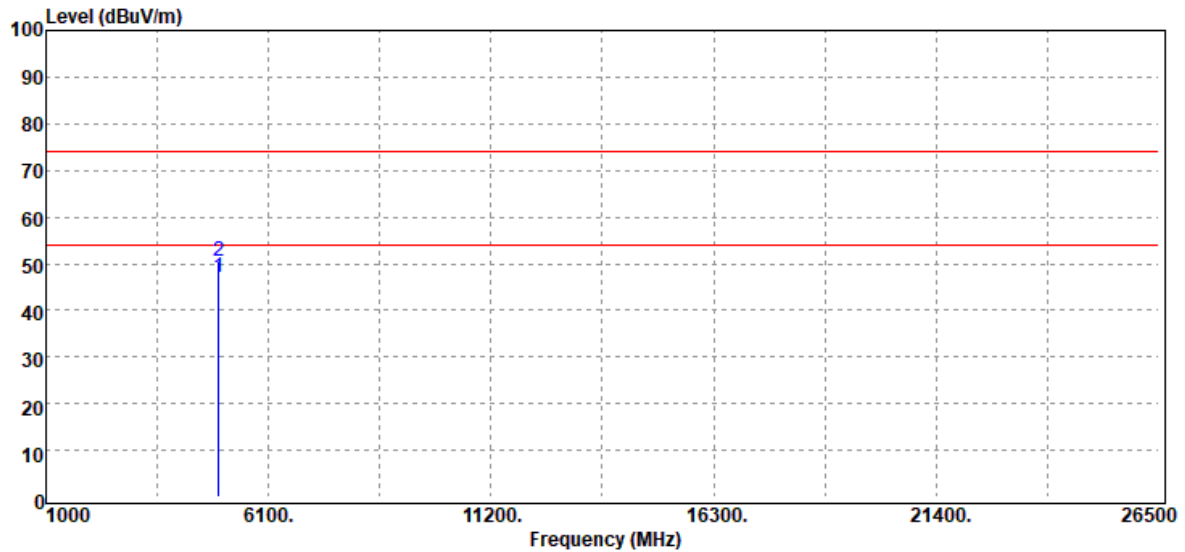
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Project Number : T190422W01
 Operation Band : BLE 2M
 Fundamental Frequency : 2480 MHz
 Operation Mode : Tx CH High
 EUT Pol. : H Plan

Test Date : 2019-04-29
 Temp./Humi. : 23/52
 Engineer : Jerry
 Measurement Antenna Pol. : HORIZONTAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4960.00	Average	42.86	4.06	46.92	54.00	-7.08
4960.00	Peak	46.55	4.06	50.61	74.00	-23.39

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8 ANTENNA REQUIREMENT

8.1 Standard Applicable:

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

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

8.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement.

Please see EUT photo for details.

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