



JAPAN SPECIFIED RADIO EQUIPMENT TEST REPORT

For

3Egreen Technology, INC.

5F, No. 283 Songjiang Road, Zhongshan District, Taipei, Taiwan

Main Model: CM02-01

Report Type:
Original Report

Product Type:
Smart Energy Meter

Report Producer : Kaylee Chiang

Kaylee Chiang

Report Number : RXZ190215002-05B

Report Date : 2019-03-08

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
1.0	RXZ190215002	RXZ190215002-05B	2019-03-08	Original Report	Kaylee Chiang

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1. TEST RESULT CERTIFICATION

Applicant	3Egreen Technology, INC.
	5F, No. 283 Songjiang Road, Zhongshan District, Taipei, Taiwan
Manufacturer	3Egreen Technology, INC.
	5F, No. 283 Songjiang Road, Zhongshan District, Taipei, Taiwan
Equipment Under Test	Smart Energy Meter
Main Model Name	CM02-01
Detailed EUT Description	See Item 3 of this report
Received Date	Feb 15, 2019
Date of Test	Feb 15, 2019 ~ Feb 18, 2019

APPLICABLE STANDARDS	
CLASSIFICATION	TEST RESULT
MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	No non-compliance noted

The above equipment was tested by Bay Area Compliance Laboratories Corp. (Taiwan) for compliance with the requirements set forth in Article 2, Paragraph 1, Item 19 Rules Section. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

2. SUMMARY OF TEST RESULTS

2.1 BLUETOOTH BLE (CH0~CH39) (2402~2480MHz)

MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	Description of Test	Result
3	Frequency Error	Compliance
4	Occupied Bandwidth and Spreading Bandwidth	Compliance
5	Transmitter Spurious Emission and Unwanted Emission Intensity	Compliance
6	Antenna Output Power and Output Power Tolerance	Compliance
7	Receiver Spurious Emission and Unwanted Emission Intensity	Compliance
8	Transmission Antenna Gain	Not Applicable*
9	Transmission Radiation Angle Width	Not Applicable*
10	Carrier Sense Capability	Not Applicable**
11	Frequency Hopping Dwell Time	Not Applicable
12	Interference Prevention Function	Compliance
Note 1	Construction Protection Confirmation	Compliance

Not Applicable: Testing is only required for FHSS system devices.

Not Applicable*: This test item will not be applied to the Antenna power (EIRP) of 12.14dBm or less.

Not Applicable**: The test only required for bandwidth more than 26MHz and less than 38MHz.

Test Report

					Test Date	2019/2/15 ~ 2019/02/18
					Test Location	Bay Area Compliance Laboratories Corp.(Taiwan) 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.
Specified Radio Equipment	Class	Article 2 Paragraph 1 Item 19	Model	CM02-01	Temp. / Humid.	24.7℃ / 66%
	Type of Emission	F1D	Serial No.		Test Conducted By	
	Modulation Type	GFSK	Antenna Power	4[mW]	Name	Andy Shih
	Frequency	2402MHz~2480MHz （2MHz separation, 40channels）			Department	RF Testing Department

2. Test Results

Testing for Electrical Specification	Test Voltage		V	Normal Voltage (3V)			High Voltage + 10 % (3.3 V)			Low Voltage - 10 % (2.7 V)			Remarks
	Test Frequency		MHz	2402.00	2440.00	2480.00							
	Measured Frequency		MHz	2402.00192	2440.00289	2480.00144							
	Frequency Error		ppm	0.80	1.18	0.58							±50 ppm within
	Occupied Bandwidth		MHz	1.04	1.06	1.06							26 MHz or below
	Spread-spectrum Bandwidth		MHz										500 kHz or more
	Spreading Factor		---										
	Spurious Emission Intensity	※1	μW/100kHz	0.03206	0.02891	0.03388							0.25 μW/100kHz or below
		※2	μW/MHz	0.19861	0.16711	0.18493							2.5 μW/MHz or below
		※3	μW/MHz	19.54339	0.19320	0.18323							25 μW/MHz or below
		※4	μW/MHz	0.19861	0.19055	0.20512							25 μW/MHz or below
		※5	μW/MHz	0.81470	0.57677	0.62951							2.5 μW/MHz or below
	Antenna Power (EIRP)		dBm/MHz	8.97000	8.81000	8.60000							Antenna Gain = 3.3[dBi] Limit 12.14dBm/MHz
	Antenna Power (Conductive)		mW	3.68978	3.55631	3.38844							10 mW or below
	Antenna Power Error		mW	-0.31022	-0.44369	-0.61156							
			%	-7.76	-11.09	-15.29							+ 20 , - 80 % within
	Limitation of Collateral Emission of Receiver	※6	nW	0.35318									4 nW or below
		※7	nW	6.09537									20 nW or below
	Hopping Frequency Dwell Time		sec										
	Radio Interference Prevention Function	ID Code	MAC Address (A4:34:F1:89:B2:C5)										
		Carrier Sense											

※ 1 : Frequency Band 1 (30MHz ~ less than 1000MHz)

※ 4 : Frequency Band 4 (more than 2,483.5MHz ~ 2,496.5GHz)

※ 7 : Frequency Band 2 (1,000MHz ~ 12.5GHz)

※ 2 : Frequency Band 2 (1000MHz ~ less than 2387MHz)

※ 5 : Frequency Band 5 (2,496.5MHz ~ less than 12.5GHz)

※ 3 : Frequency Band 3 (2387MHz ~ 2400MHz)

※ 6 : Frequency Band 1 (30MHz ~ 1,000GHz)

3. EUT DESCRIPTION

Product (Equipment)	Smart Energy Meter
Brand(Trade) Name	3Egreen
Main Model Name	CM02-01
Frequency Range	2402 ~ 2480 MHz
Rated Antenna Power	4mW
Measured Antenna Power	3.68978mW
Modulation Technique	BLE Mode: GFSK
Number of Channels	BLE Mode: 40 Channels
Antenna Specification	PCB Antenna / 3.3 dBi
Power Operation (Voltage Range)	<input type="checkbox"/> AC 120V/60Hz <input type="checkbox"/> Adapter <input type="checkbox"/> By AC Power Cord <input type="checkbox"/> PoE
	<input checked="" type="checkbox"/> DC Type <input checked="" type="checkbox"/> Battery: 3Vdc <input type="checkbox"/> DC Power Supply <input type="checkbox"/> External from USB Cable <input type="checkbox"/> External DC Adapter
	<input type="checkbox"/> Host System
Hardware Version	CM02-charge-DVT2
Software Version	CM02-01-00YD

Remark: for more details, please refer to the User's manual of the EUT.

4. TEST METHODOLOGY & CONDITIONS

4.1 TEST CONDITIONS

Voltage Fluctuation Test	Normal Voltage	High Voltage + 10% of Normal Voltage	Low Voltage - 10% of Normal Voltage
Input DC Power	3.0	3.3	2.7
Output DC Power	1.8	1.8	1.8
Voltage Variation (%)	-	+0%	-0%

Regulator IC: CC2640

The main board has voltage regulator

Voltage Variation (%) = (Output High or Low Voltage - Output Normal Voltage) / Output Normal Voltage * 100

During the input supply voltage to the EUT from the external power source is varied by +/- 10%, if output voltage had been confirmed that the fluctuation of power supply to the RF circuit of EUT (excluding power source) is equal to or less than +/- 1%.Exempt extremely high and low supply voltage condition tests, EUT only operated in normal voltage to test all regulations.

4.2 DESCRIPTION OF TEST MODES

The EUT (model: CM02-01) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low (2402MHz), Channel Mid (2440MHz) and Channel High (2480MHz) were chosen for full testing.

Output power (mW) = $10^{((\text{power meter (dBm)} + \text{Duty Factor} + \text{System Factor})/10)}$

4.3 RF SHIELDING METHOD

The RF part of WLAN modules are not easy accessible because the oscillators are shielded using resin coating. Please refer to internal photos.

4.4 SETUP OF EQUIPMENT UNDER TEST

Setup Diagram

See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Support Equipment

No.	Equipment	Trade Name	Model	Serial No.
1	NB	DELL	E6410	N/A
2	Debug Board	3Egreen	CM02-01	N/A

5. INSTRUMENT AND CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2 TEST AND MEASUREMENT EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and other equivalent standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manual.

Equipment Used for Emission Measurement

Conducted Emission Test Site						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Measurement Lab	Proposed Calibration Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2018/05/04	ETC	2019/05/03
Power Meter	HEWLETT PACKARD	E4418B	US39402167	2018/05/17	ETC	2019/05/16
Power Sensor	HEWLETT PACKARD	E9300A	US39210953	2018/05/17	ETC	2019/05/16
Multimeter	Fluke	114	28810152WS	2019/02/11	ETC	2020/02/10
Regulated DC Power Supply	KIKUSUI	PMC35-2	MK002127	N.C.R	N/A	N.C.R

Remark: Each piece of equipment is scheduled for calibration once a year.

5.3 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [2] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 6 is based on such expansion factors.

Table: Maximum measurement uncertainty

Parameter	Uncertainty
RF frequency	+/-4.67 ppm
Total RF power conducted	+/- 0.61 dB
RF power density, conducted	+/- 1.74 dB
Spurious emissions, conducted	+/- 0.61 dB
All emissions, radiated	+/- 4.88 dB
Humidity	+/- 5 %
Temperature	+/- 1 °C
DC and low frequency voltages	+/- 3%

6. TEST RESULT FOR BLUETOOTH BLE (CH0~CH39)

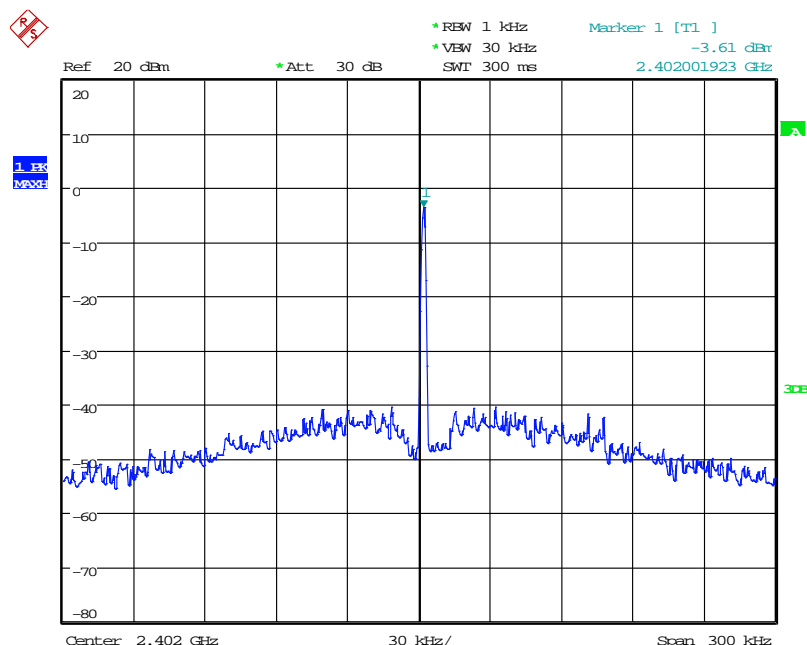
6.1 FREQUENCY ERROR

TEST RESULT

Frequency (MHz)	Reading (MHz)	Deviation (Hz)	Tolerance (ppm)	Remark
2402.0000	2402.001923	1923	0.8006	Normal Voltage : DC3V
2440.0000	2440.002885	2885	1.1824	
2480.0000	2480.001442	1442	0.5815	

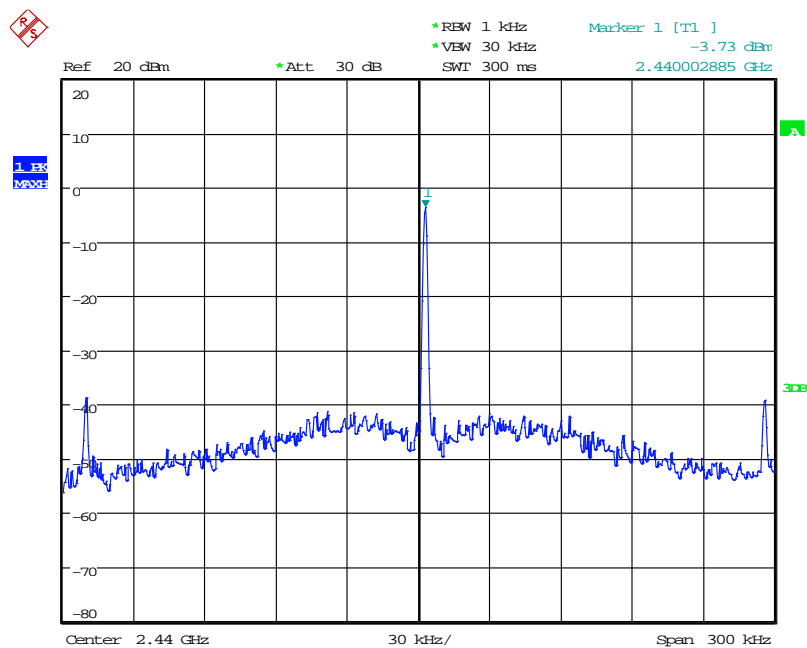
TEST PLOTS

CH Low



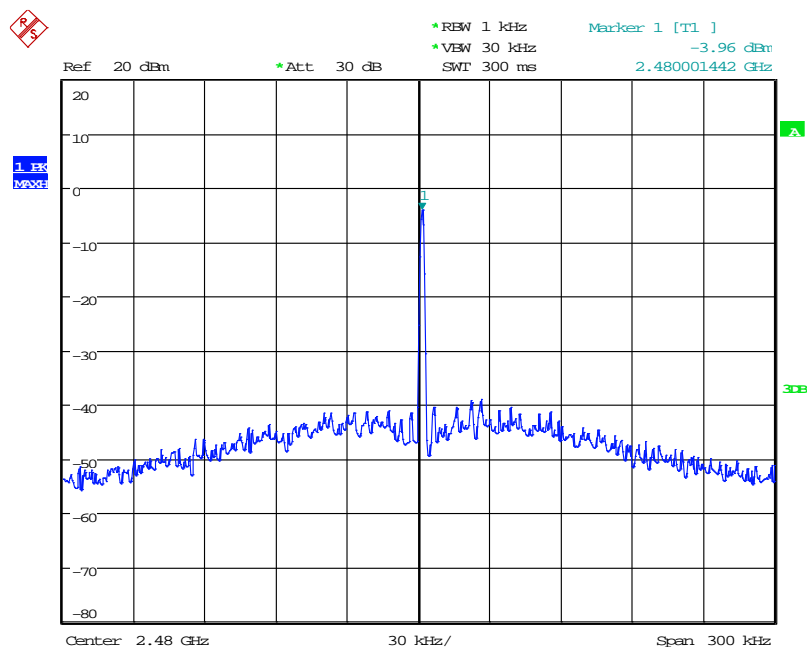
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CH Mid



Date: 15.FEB.2019 10:41:42

CH High



Date: 15.FEB.2019 10:43:18

6.2 ANTENNA POWER

TEST RESULT

Frequency (MHz)	Power Meter (dBm)	System Factor (dB)	Output Power (dBm)	Output Power (mW)	Remark
2402.0000	4.87	0.80	5.67	3.68978	Normal Voltage : DC3V
2440.0000	4.71	0.80	5.51	3.55631	
2480.0000	4.50	0.80	5.30	3.38844	

(Duty)

Frequency (MHz)	ON time (ms)	OFF time (ms)	Duty Factor (dB)	Remark
2402.0000	1.0000	0.0000	0.00	Normal Voltage : DC3V
2440.0000	1.0000	0.0000	0.00	
2480.0000	1.0000	0.0000	0.00	

6.3 SPURIOUS EMISSIONS INTENSITY

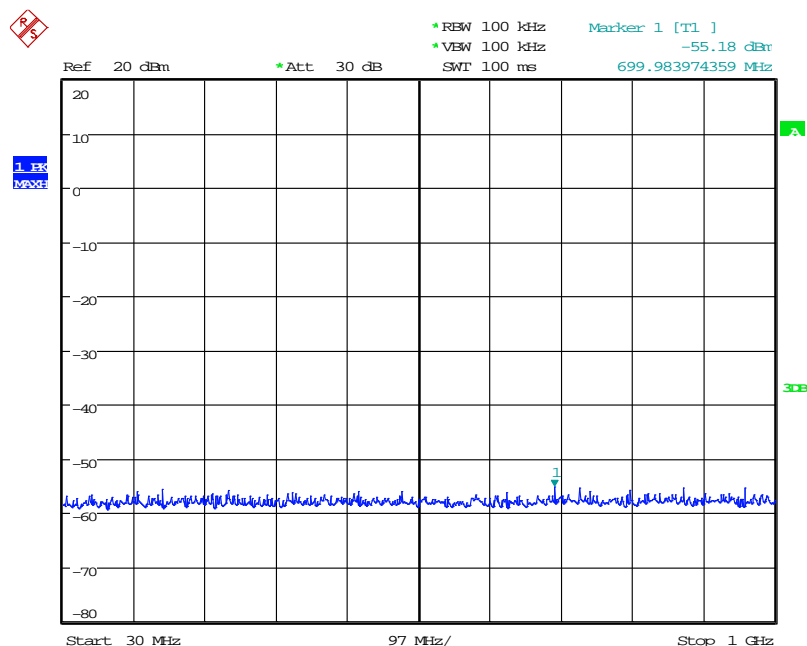
TEST RESULT

30MHz~1000MHz

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Cable Factor (dB)	Result ($\mu\text{W}/100\text{kHz}$)	Remark
2402.0000	699.9840	-55.18	10.24	0.03206	Normal Voltage : DC3V
2440.0000	250.7372	-55.63	10.24	0.02891	
2480.0000	617.5962	-54.94	10.24	0.03388	

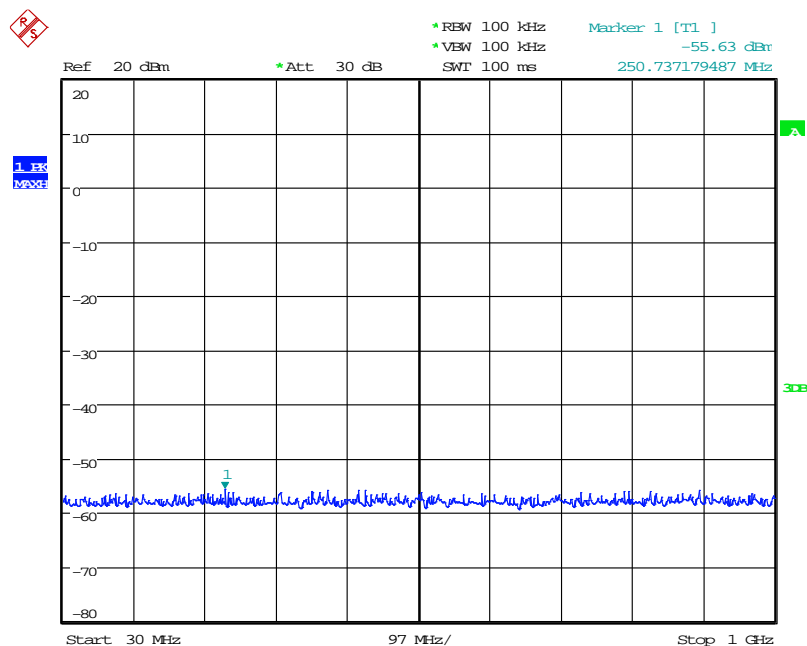
TEST PLOTS

CH Low



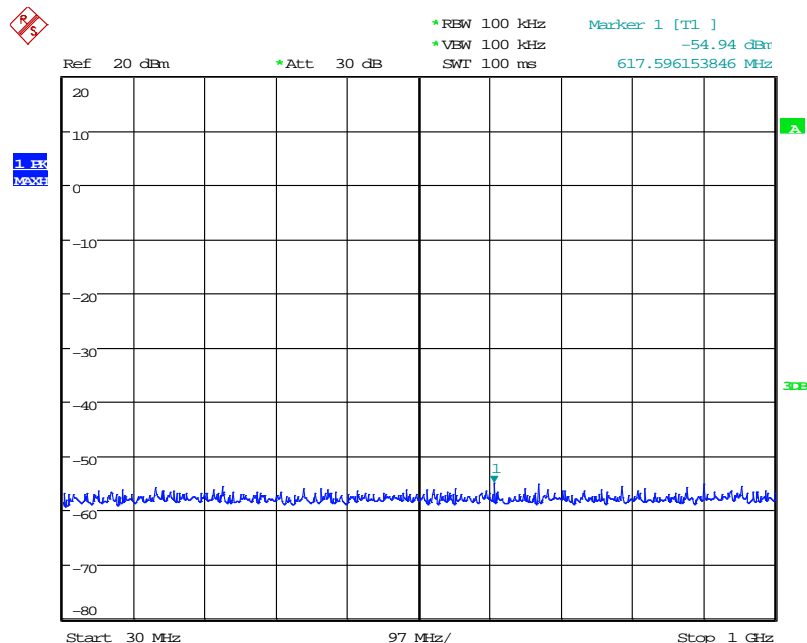
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CH Mid



Date: 15.FEB.2019 11:22:09

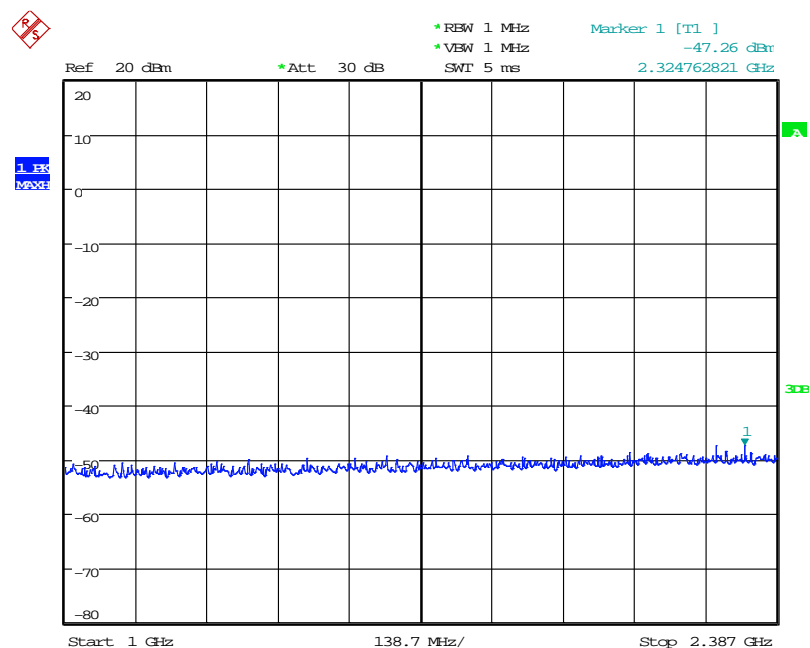
CH High



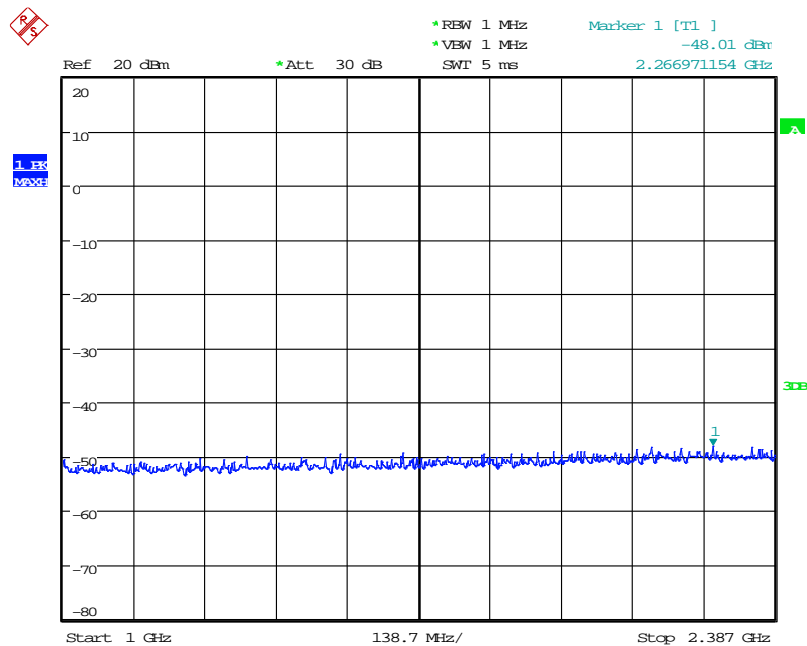
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TEST RESULT**1000MHz~2387MHz**

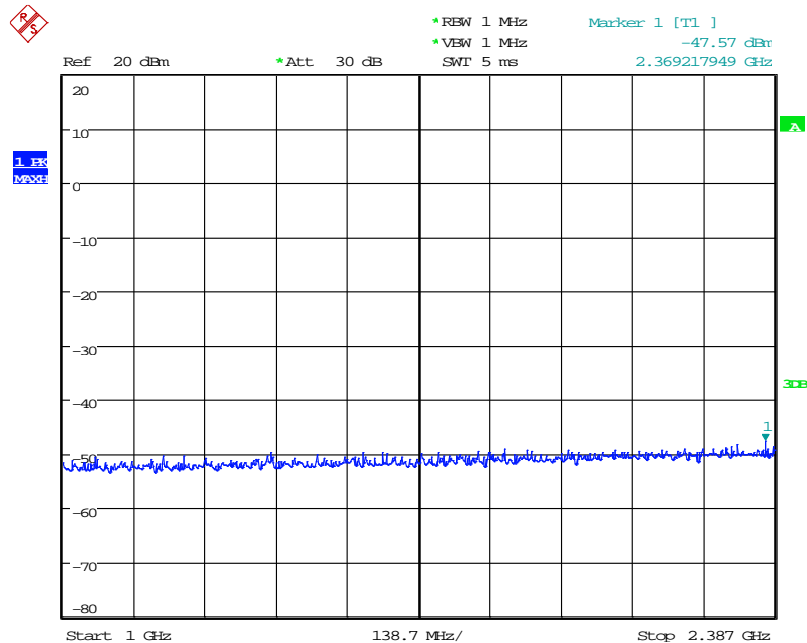
Frequency (MHz)	Reading (MHz)	Reading (dBm)	Cable Factor (dB)	Result (μ W/MHz)	Remark
2402.0000	2324.7628	-47.26	10.24	0.19861	Normal Voltage : DC3V
2440.0000	2266.9712	-48.01	10.24	0.16711	
2480.0000	2369.2179	-47.57	10.24	0.18493	

TEST PLOTS**CH Low**

Date: 15.FEB.2019 11:16:31

CH Mid

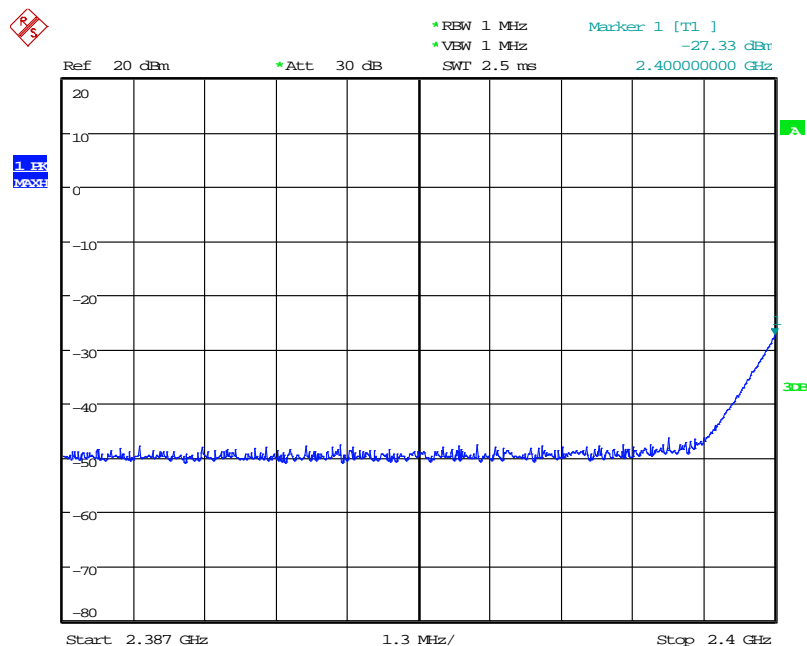
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CH High

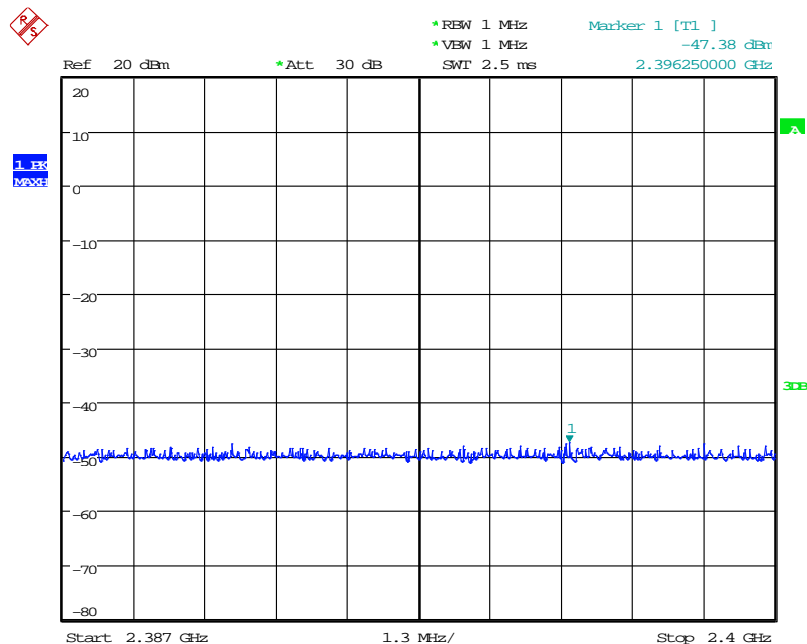
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TEST RESULT**2387MHz~2400MHz**

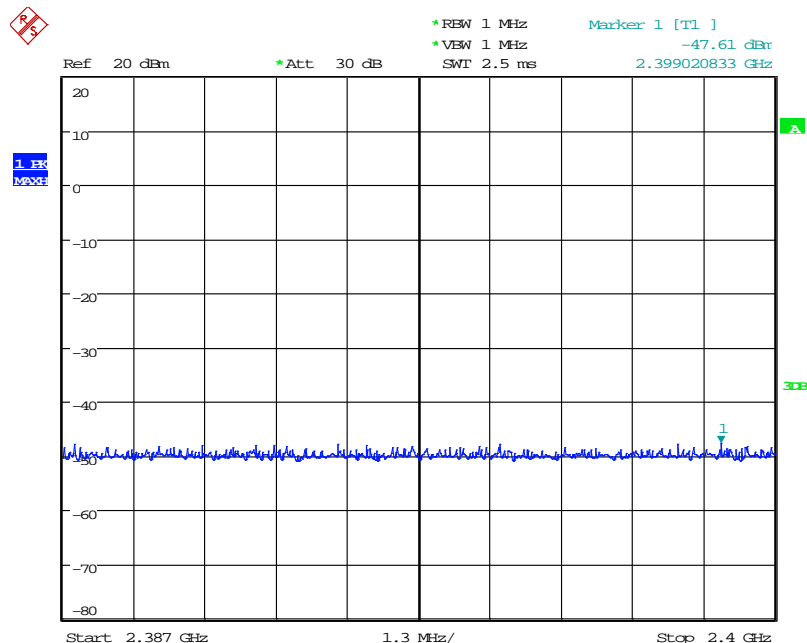
Frequency (MHz)	Reading (MHz)	Reading (dBm)	Cable Factor (dB)	Result (μW/MHz)	Remark
2402.0000	2400.0000	-27.33	10.24	19.54339	Normal Voltage : DC3V
2440.0000	2396.2500	-47.38	10.24	0.19320	
2480.0000	2399.0208	-47.61	10.24	0.18323	

TEST PLOTS**CH Low**

Date: 15.FEB.2019 11:16:41

CH Mid

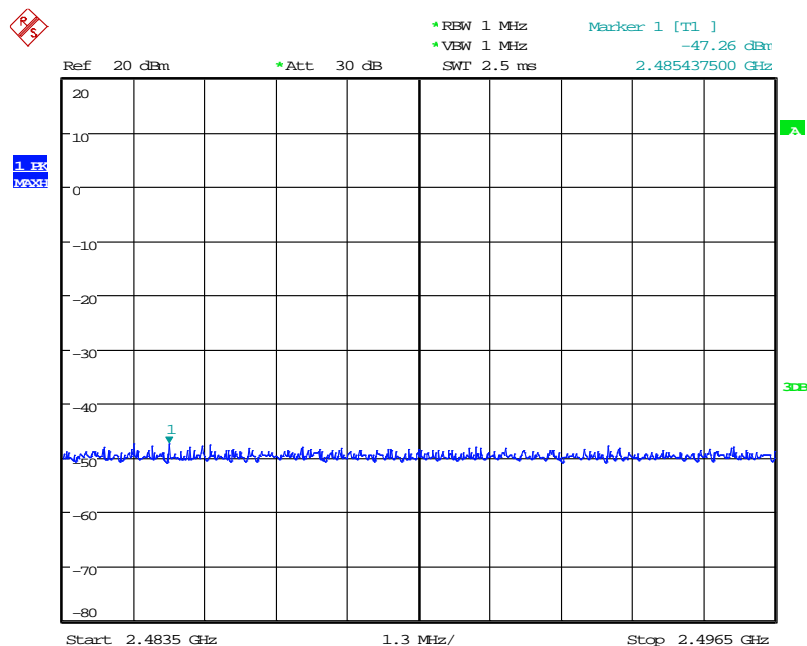
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CH High

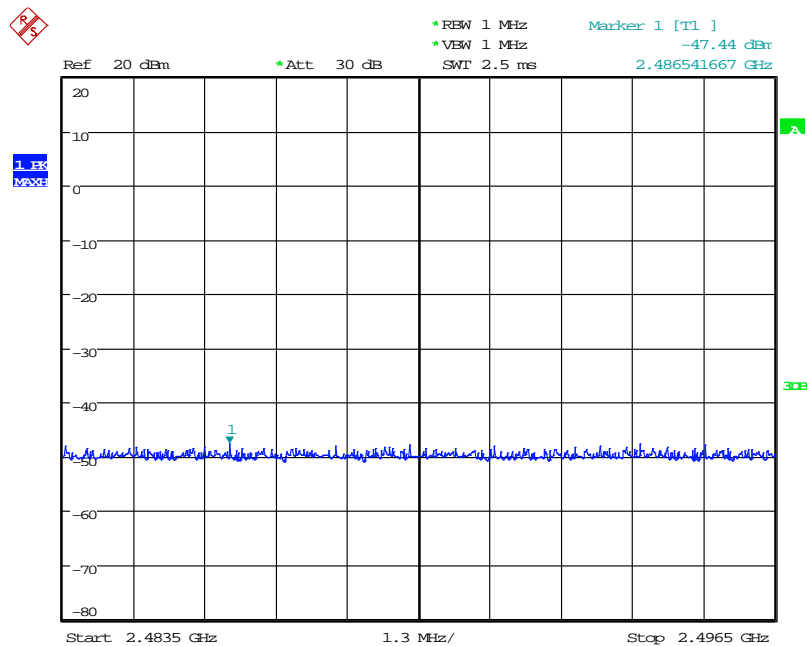
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TEST RESULT**2483.5MHz~2496.5MHz**

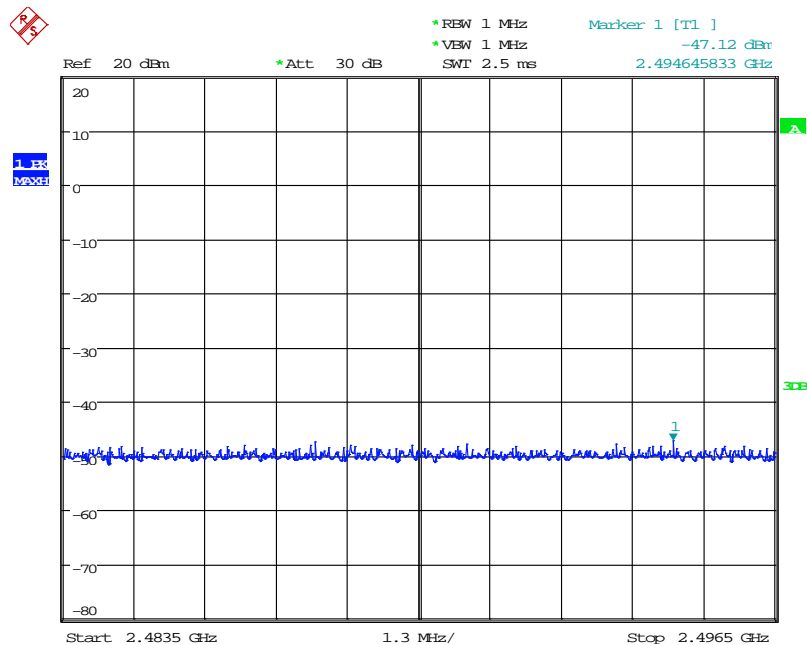
Frequency (MHz)	Reading (MHz)	Reading (dBm)	Cable Factor (dB)	Result (μW/MHz)	Remark
2402.0000	2485.4375	-47.26	10.24	0.19861	Normal Voltage : DC3V
2440.0000	2486.5417	-47.44	10.24	0.19055	
2480.0000	2494.6458	-47.12	10.24	0.20512	

TEST PLOTS**CH Low**

Date: 15.FEB.2019 11:16:51

CH Mid

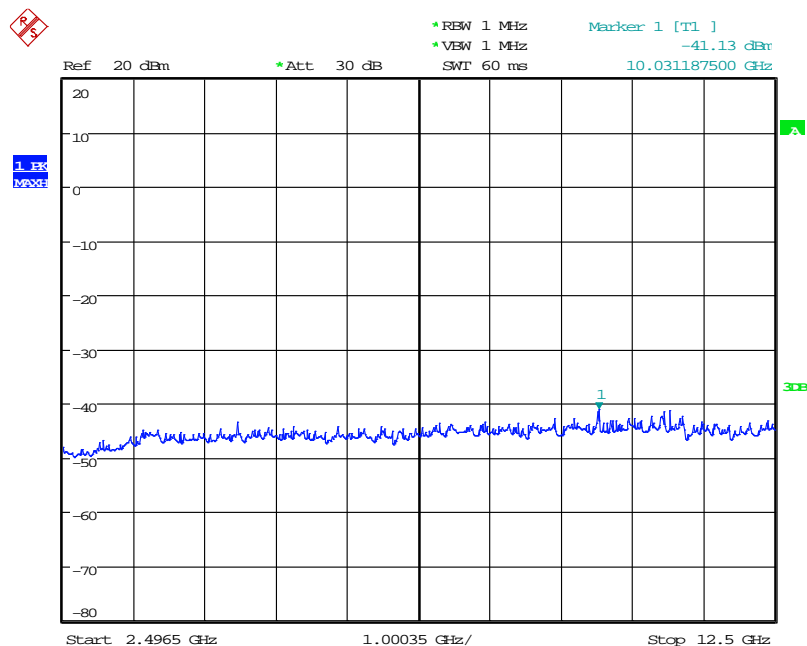
Date: 15.FEB.2019 11:22:39

CH High

Date: 15.FEB.2019 11:26:28

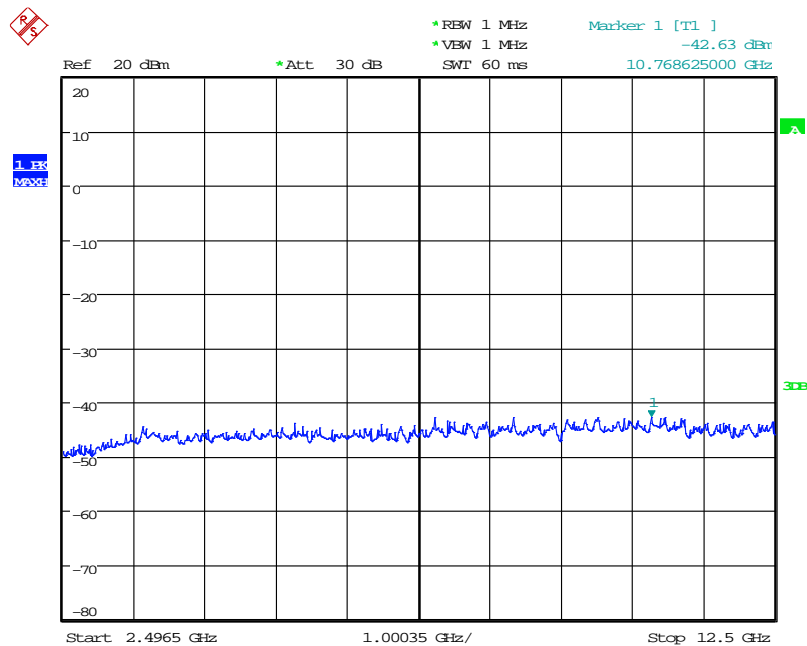
TEST RESULT**2496.5MHz~12.5GHz**

Frequency (MHz)	Reading (MHz)	Reading (dBm)	Cable Factor (dB)	Result (μW/MHz)	Remark
2402.0000	10031.1875	-41.13	10.24	0.81470	Normal Voltage : DC3V
2440.0000	10768.6250	-42.63	10.24	0.57677	
2480.0000	10768.6250	-42.25	10.24	0.62951	

TEST PLOTS**CH Low**

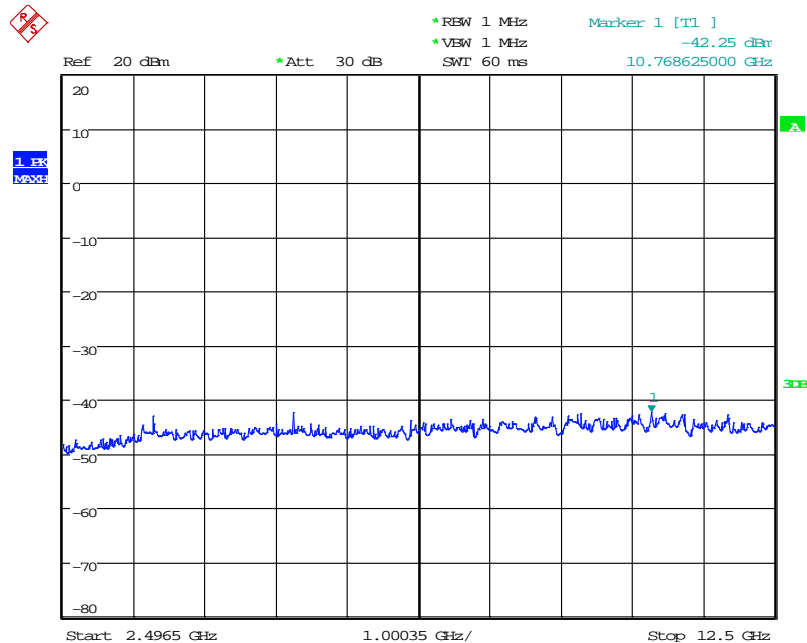
Date: 15.FEB.2019 11:17:02

CH Mid



Date: 15.FEB.2019 11:22:49

CH High



Date: 15.FEB.2019 11:24:29

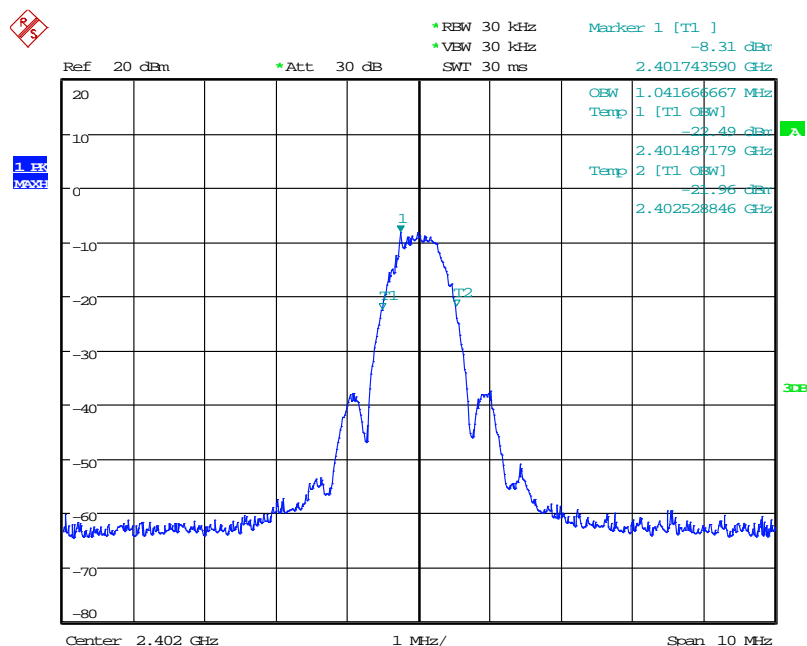
6.4 OCCUPIED BANDWIDTH (99%)

TEST RESULT

Frequency (MHz)	Center Frequency (MHz)	Bandwidth (MHz)	Remark
2402.0000	2402.0000	1.04	Normal Voltage : DC3V
2440.0000	2440.0000	1.06	
2480.0000	2480.0000	1.06	

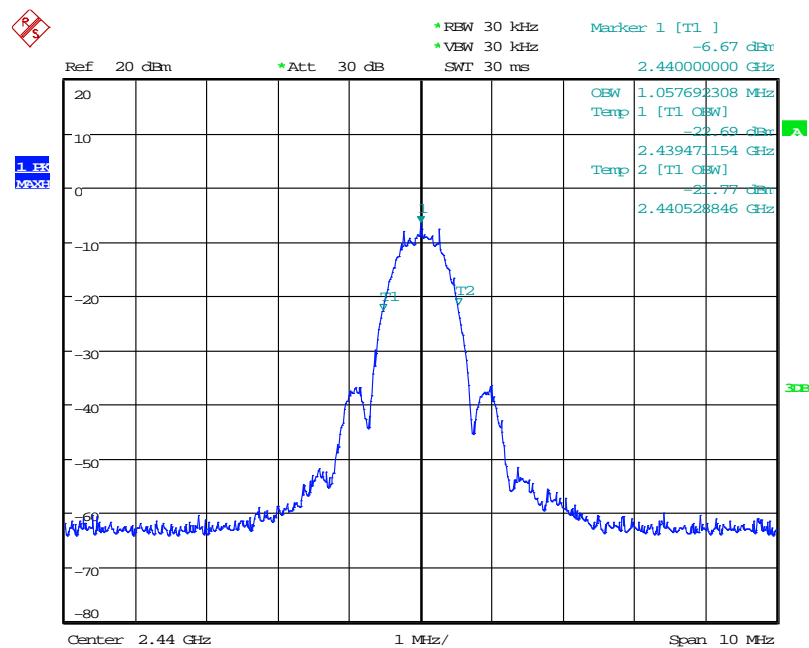
TEST PLOTS

CH Low



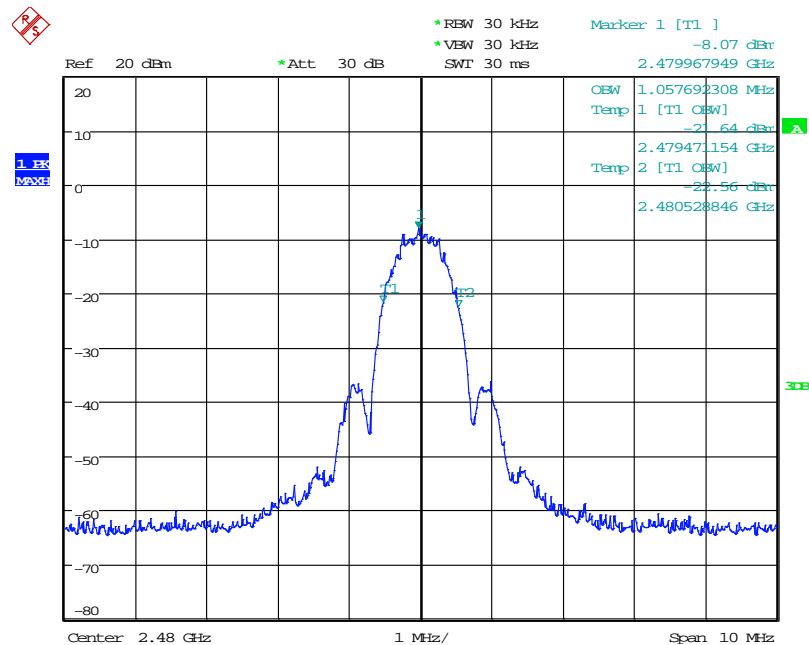
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CH Mid



Date: 15.FEB.2019 09:58:44

CH High



Date: 15.FEB.2019 10:01:23

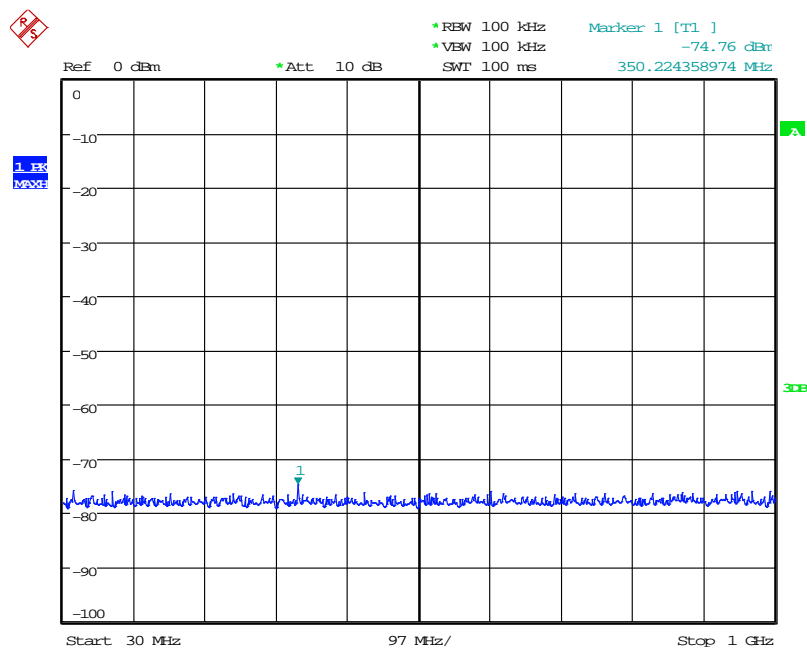
6.5 LIMITATION OF COLLATERAL EMISSION OF RECEIVER

TEST RESULT

30MHz~1GHz

	Frequency (MHz)	Reading (dBm)	Cable Factor (dB)	Result (nW)	Remark
30MHz~less than 1GHz	350.2244	-74.76	10.24	0.3532	Normal Voltage : DC3V

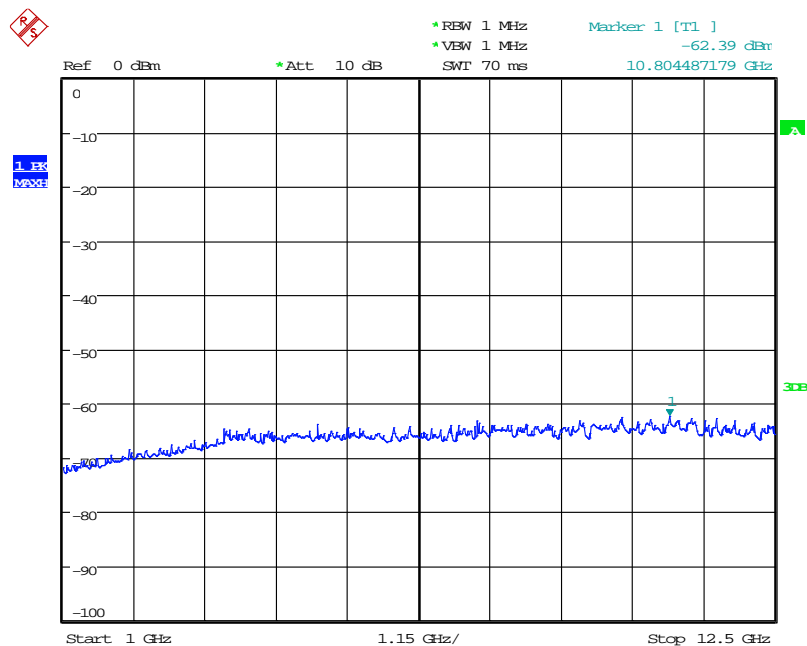
TEST PLOTS



Date: 15.FEB.2019 11:38:49

TEST RESULT**1GHz~12.5GHz**

	Frequency (MHz)	Reading (dBm)	Cable Factor (dB)	Result (nW)	Remark
1GHz~12.5GHz	10804.4872	-62.39	10.24	6.0954	Normal Voltage : DC3V

TEST PLOTS

Date: 15.FEB.2019 11:38:59

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