



**Neutron Engineering Inc.**

# Radio Test Report

## FCC ID: FKD46AR13

This report concerns (check one) : ☒ Original Grant ☐ Class I Change

**Issued Date** : Jul. 02, 2012  
**Project No.** : 1206118  
**Equipment** : 2.4GHz Dongle  
**Model Name** : R13

**Applicant** : MONTEREY International Corp.  
**Address** : No. 28, Wu-Chun 6th Rd. Wu-Ku Ind.  
Park, Taipei Hsien Taiwan, R.O.C.

**Tested by:** Neutron Engineering Inc. EMC Laboratory  
**Date of Receipt:** Jun. 18, 2012  
**Date of Test:** Jun. 18, 2012 ~ Jun. 28, 2012

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### **Declaration**

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



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## **1. CERTIFICATION**

Equipment : 2.4GHz Dongle

Model Name : R13

Applicant : MONTEREY International Corp.

Date of Test : Jun. 18, 2012 ~ Jun. 28, 2012

Standards : FCC Part15, Subpart C: 2010(15.247) / ANCI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1206118) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C: 2010			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (c)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	PASS	

**NOTE:**

(1) "N/A" denotes test is not applical in this Test Report



## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report:

- C02:** (VCCI RN: C-3477; FCC RN: 614388; FCC DN: TW1054)  
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)
- CB08:** (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054;  
IC Assigned Code: 4428C-1)  
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

## 2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95%**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
C01	ANSI	150 kHz ~ 30 MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
CB08	ANSI	30MHz ~ 200MHz	V	3.22	
		30MHz ~ 200MHz	H	3.35	
		200MHz ~ 1,000MHz	V	3.24	
		200MHz ~ 1,000MHz	H	3.11	
		1000MHz ~ 18000MHz	V	4.05	
		1000MHz ~ 18000MHz	H	3.97	
		18000MHz ~ 40000MHz	V	4.04	
		18000MHz ~ 40000MHz	H	4.01	

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{lab}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{CISPR}$ , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our  $U_{lab}$  values are smaller than  $U_{CISPR}$ .

**3. GENERAL INFORMATION****3.1 GENERAL DESCRIPTION OF EUT**

Equipment	2.4GHz Dongle	
Model Name	R13	
OEM Brand/Model Name	N/A	
Model Difference	N/A	
Product Description	The EUT is a 2.4GHz Dongle.	
	Operation Frequency:	2408~2474 MHz
	Modulation Type:	GFSK
	Number Of Channel	34CH (Note 2)
	Antenna Designation:	Please refer to the Note 3.
	Antenna Gain(Peak)	Please refer to the Note 3.
	Output Power:	-8.14dBm (Max.)
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Power Source	Supplied from PC USB port.	
Power Rating	I/P: DC 5V 100mA	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	NA	

**Note:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.





2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2408	13	2432	25	2456
02	2410	14	2434	26	2458
03	2412	15	2436	27	2460
04	2414	16	2438	28	2462
05	2416	17	2440	31	2468
06	2418	18	2442	32	2470
07	2420	19	2444	33	2472
08	2422	20	2446	34	2474
09	2424	21	2448		
10	2426	22	2450		
11	2428	23	2452		
12	2430	24	2454		

3. Table of Filed Antenna:

Antenna	Brand	Model Name	Type	Connector Type	Gain (dBi)
1	N/A	N/A	Ant. On PCB	N/A	-11.72



### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Test Mode	Description
Mode 1	2408 MHz
Mode 2	2440 MHz
Mode 3	2474 MHz

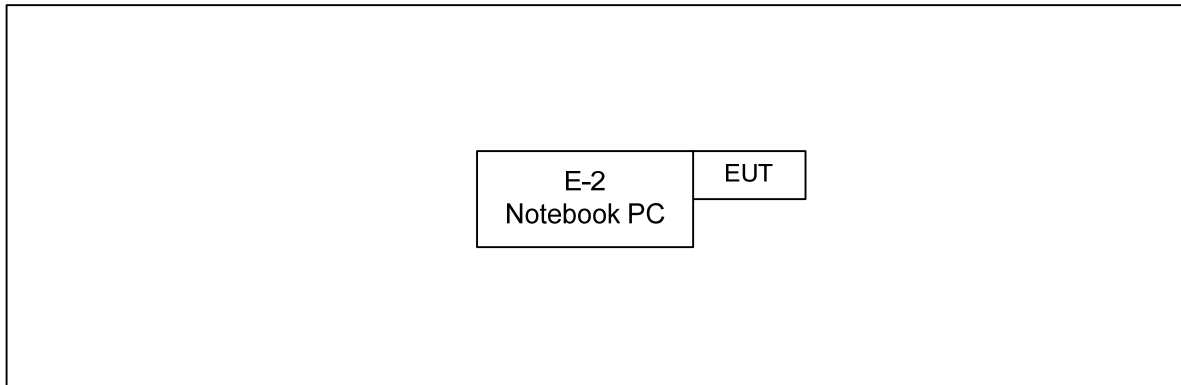
For Conducted Test	
Final Test Mode	Description
Mode 2	2440 MHz

Radiated Test (Bellow 1 GHz)	
Final Test Mode	Description
Mode 2	2440 MHz

Radiated Test (Above 1 GHz)	
Final Test Mode	Description
Mode 1	2408 MHz
Mode 2	2440 MHz
Mode 3	2474 MHz



### 3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	2.4GHz Dongle	N/A	R13	FKD46AR13	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
N/A	-	-	-	-

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



#### 4. EMC EMISSION TEST

##### 4.1 CONDUCTED EMISSION MEASUREMENT

##### 4.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)  
 Margin Level = Measurement Value – Limit Value

##### 4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	Apr. 16, 2013
2	LISN	EMCO	3816/2	00066528	Mar. 26, 2013
3	Test Cable	TIMES	CFD300-NL	130	Jun. 14, 2013
4	EMI Test Receiver	Agilent	N9038A	MY51210215	Jan. 26, 2013

Remark: " N/A" denotes No Model Name , Serial No. or No Calibration specified.



#### 4.1.3 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

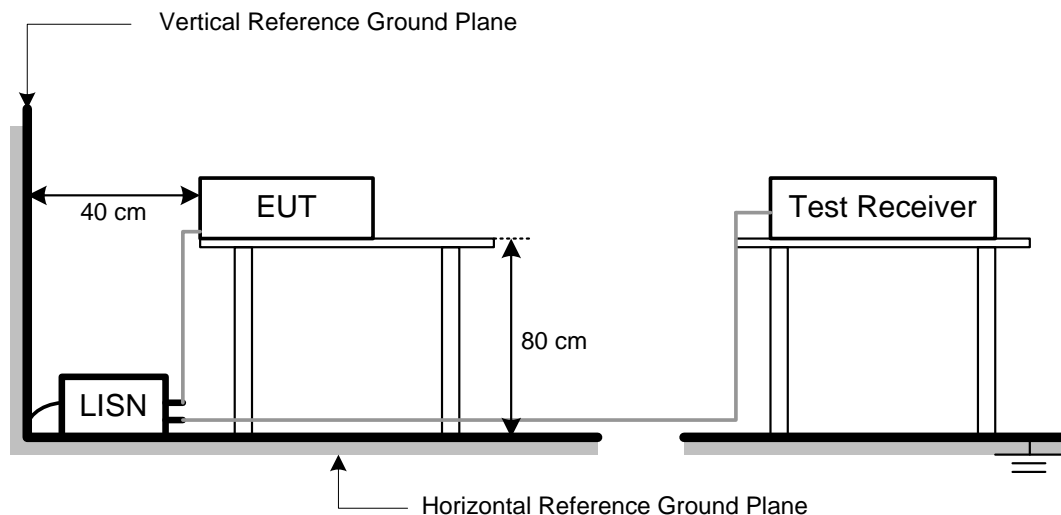
#### NOTE:

- Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz; SPA setting in RBW=10 kHz, VBW =10 kHz, Swp. Time = 0.2 sec./ MHz.
- All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only Peak or QP Mode was measured, but AVG Mode didn't perform.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP





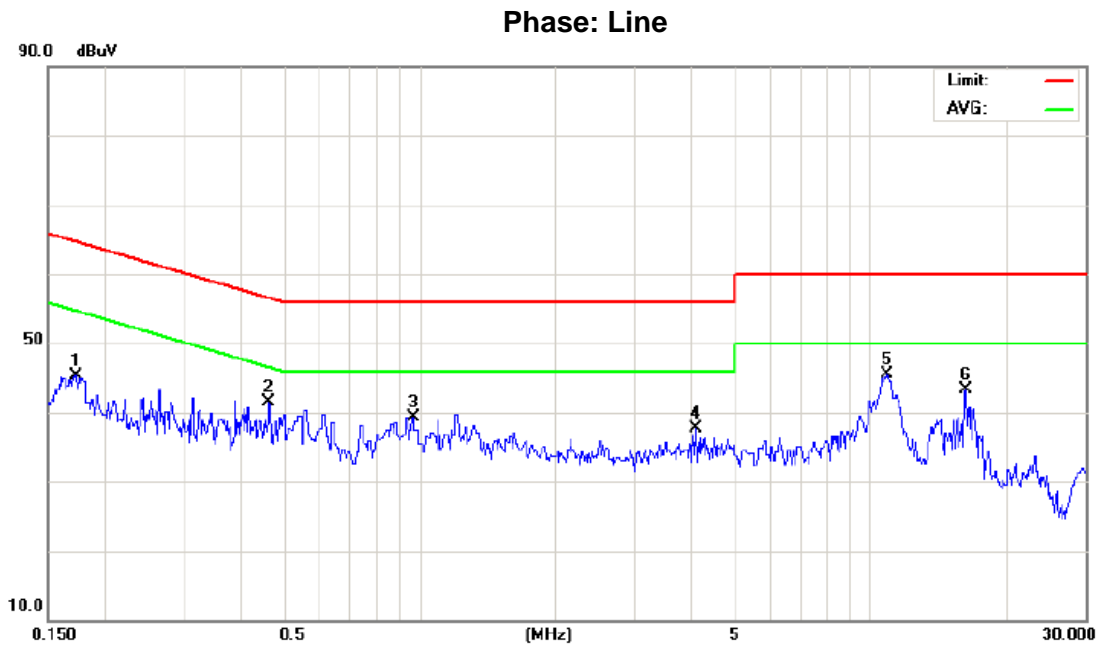
#### **4.1.6 EUT OPERATING CONDITIONS**

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



#### 4.1.7 TEST RESULTS

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26° C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

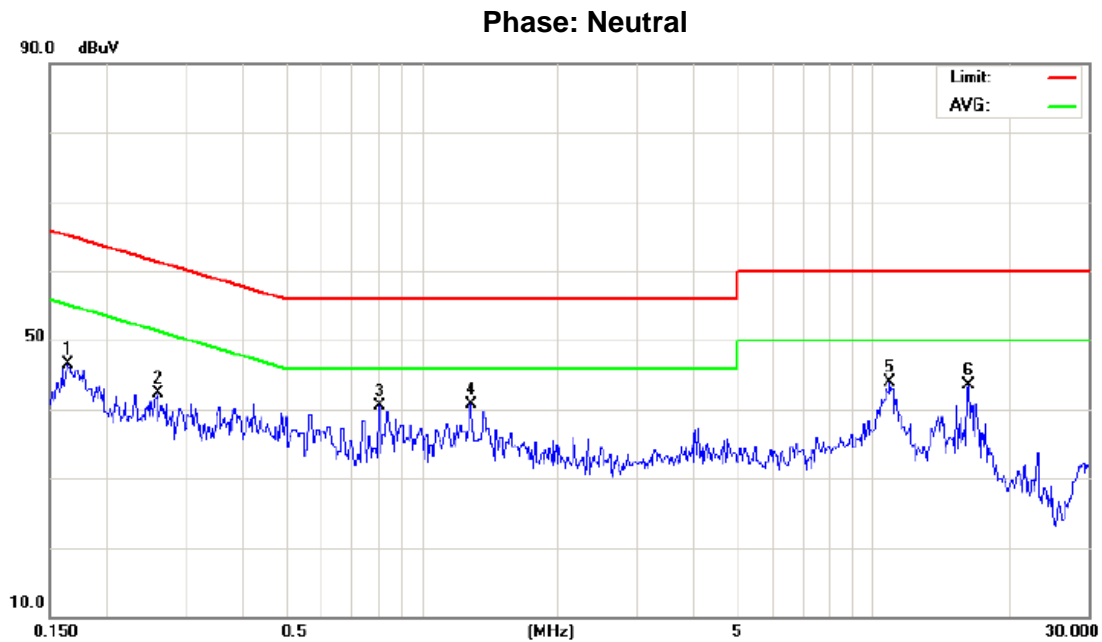


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1723	35.77	9.59	45.36	64.85	-19.49	peak	
2	0.4635	31.88	9.62	41.50	56.63	-15.13	peak	
3	0.9680	29.67	9.61	39.28	56.00	-16.72	peak	
4	4.1000	27.97	9.68	37.65	56.00	-18.35	peak	
5 *	10.9000	35.71	9.81	45.52	60.00	-14.48	peak	
6	16.2500	33.40	9.88	43.28	60.00	-16.72	peak	





EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1646	36.82	9.59	46.41	65.23	-18.82	peak	
2		0.2598	32.64	9.59	42.23	61.44	-19.21	peak	
3		0.8059	30.81	9.60	40.41	56.00	-15.59	peak	
4	*	1.2829	31.02	9.61	40.63	56.00	-15.37	peak	
5		10.9000	34.08	9.82	43.90	60.00	-16.10	peak	
6		16.2500	33.53	9.90	43.43	60.00	-16.57	peak	



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microrvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

#### Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain(if use)  
 Margin Level = Measurement Value – Limit Value

**4.2.2 MEASUREMENT INSTRUMENTS LIST**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012
2	Horn Antenna	Schwarzbeck	BBHA 9120	D-325	Apr. 16, 2013
3	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 17, 2013
4	Microflex Cable	N/A	N/A	1m	Apr. 14, 2013
5	Microflex Cable	AISI	S104-SMAP-1	10m	Apr. 14, 2013
6	Microflex Cable	N/A	N/A	3m	Apr. 14, 2013
7	Test Cable	N/A	LMR-400	966_12m	May. 15, 2013
8	Test Cable	N/A	LMR-400	966_3m	May. 15, 2013
9	Pre-Amplifier	EMC	EMC-330	980088	Jul. 13, 2012
10	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 12, 2013

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.



#### **4.2.3 TEST PROCEDURE**

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- g. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- h. EUT Orthogonal Axis :  
“X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- i. During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

#### **NOTE: (30-1000MHz)**

- a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz; SPA setting in RBW=120 kHz, VBW =120 kHz, Swp. Time = 0.3 sec./ MHz.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

#### **NOTE: (Above 1000MHz)**

- a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.  
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
- b. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform.

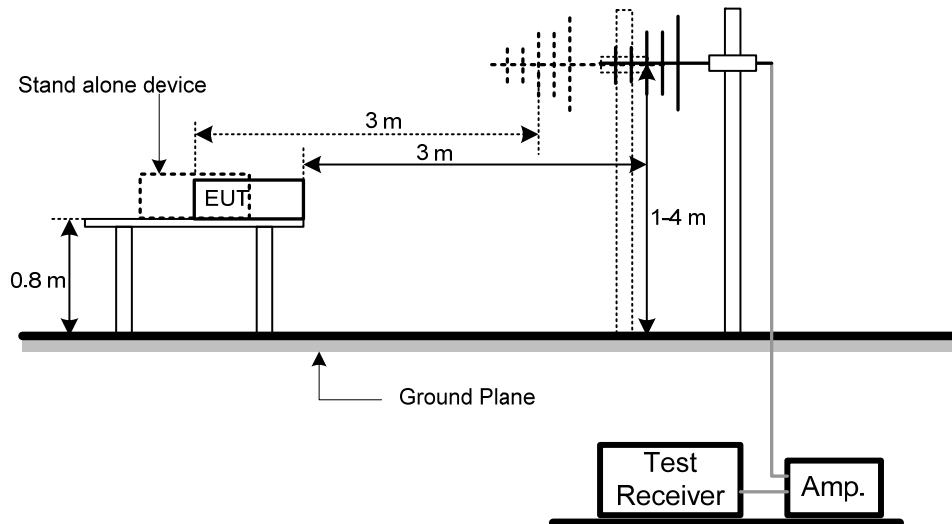


#### 4.2.4 DEVIATION FROM TEST STANDARD

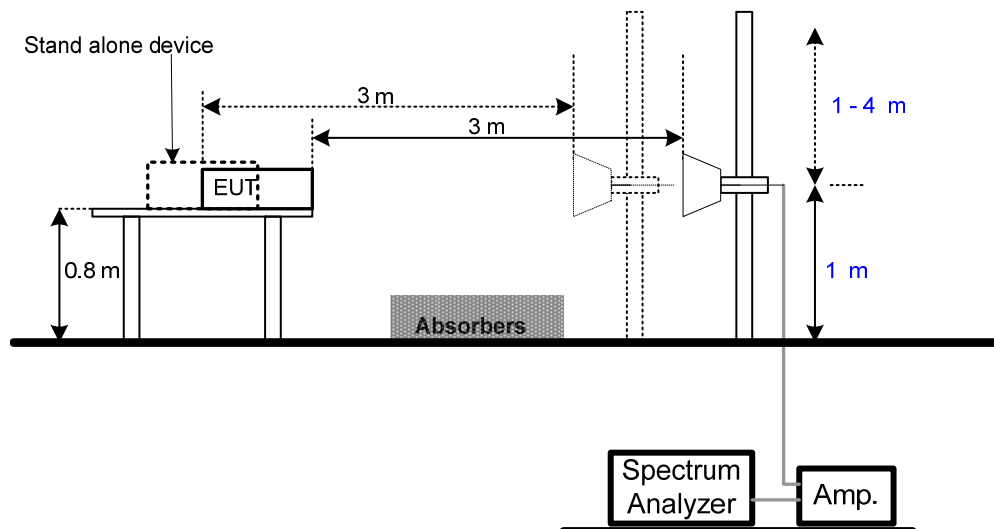
No deviation

#### 4.2.5 TEST SETUP

##### Below 1 GHz



##### Above 1 GHz



#### 4.2.6 EUT OPERATING CONDITIONS

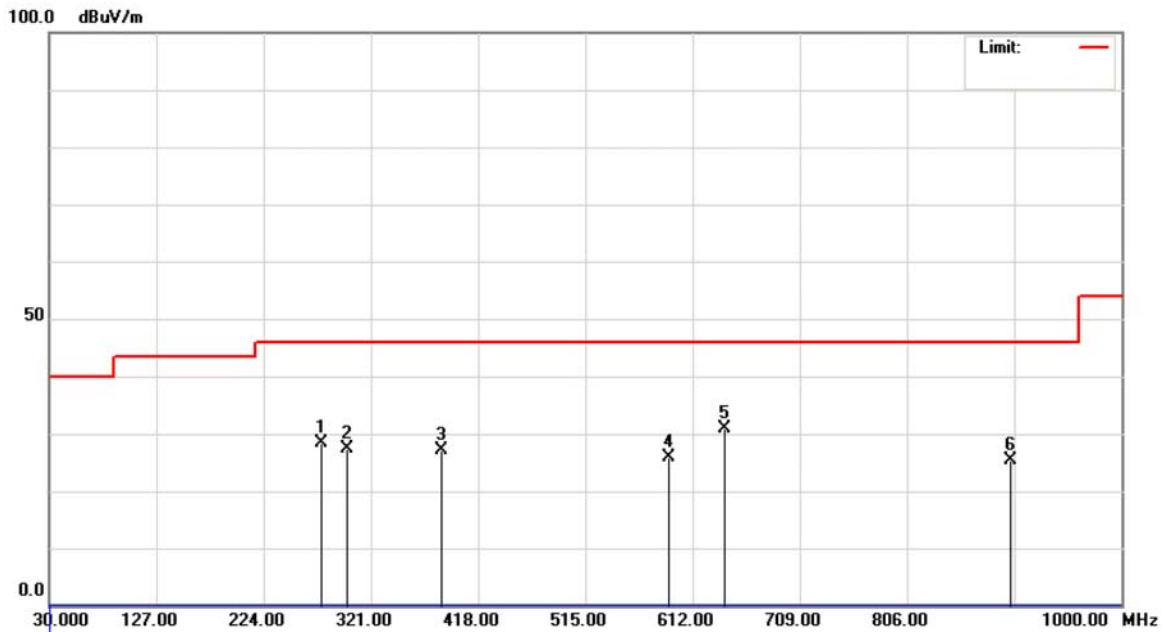
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operation condition was tested and used to collect the included data.



#### 4.2.7 TEST RESULTS-BELLOW 1 GHZ

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Vertical**

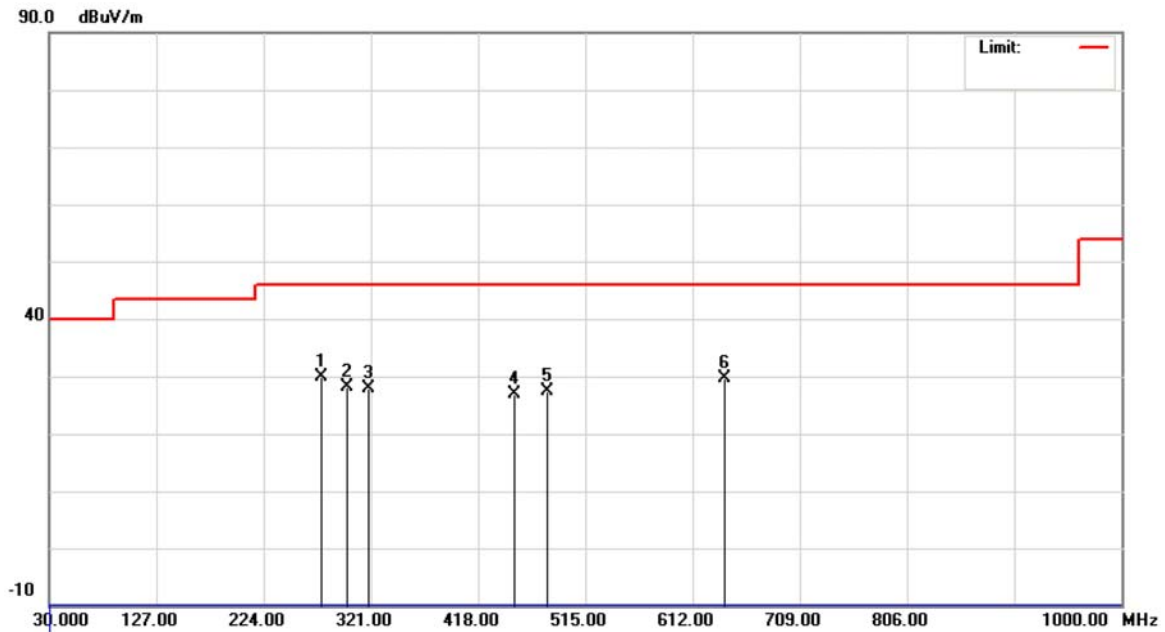


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	276.3800	47.28	-18.82	28.46	46.00	-17.54	peak	
2	299.6600	45.64	-18.15	27.49	46.00	-18.51	peak	
3	385.0200	42.94	-15.86	27.08	46.00	-18.92	peak	
4	590.6599	36.99	-11.06	25.93	46.00	-20.07	peak	
5 *	641.1000	41.26	-10.35	30.91	46.00	-15.09	peak	
6	899.1200	32.78	-7.47	25.31	46.00	-20.69	peak	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Horizontal**



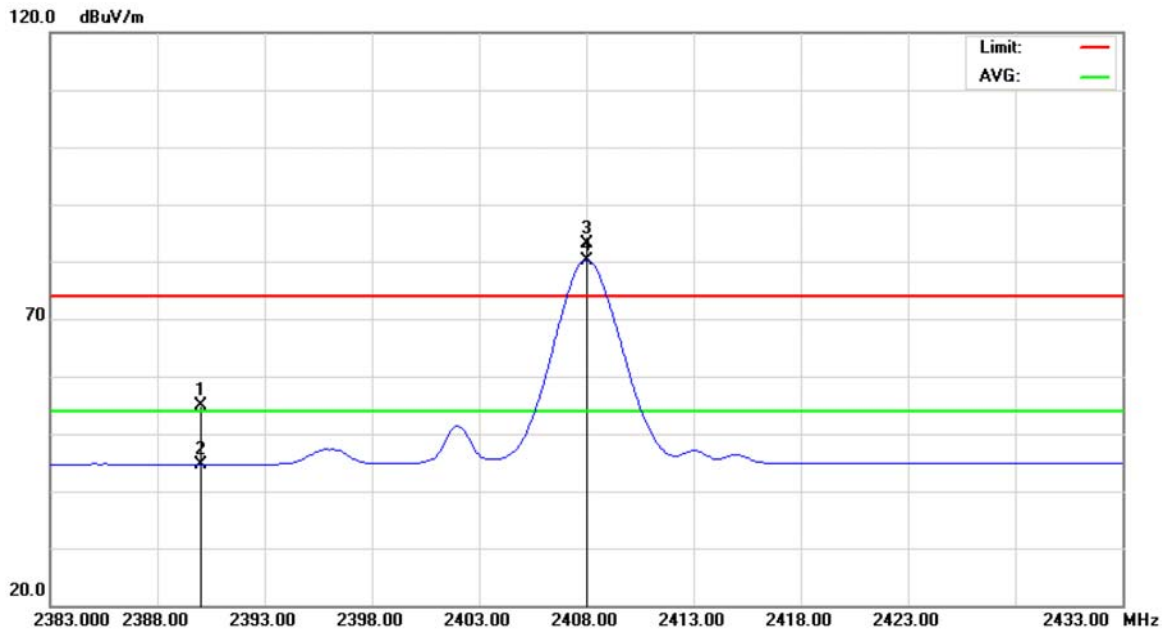
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	276.3800	48.78	-18.82	29.96	46.00	-16.04	peak	
2		299.6600	46.36	-18.15	28.21	46.00	-17.79	peak	
3		319.0600	45.63	-17.70	27.93	46.00	-18.07	peak	
4		450.9800	40.83	-13.92	26.91	46.00	-19.09	peak	
5		480.0800	40.68	-13.40	27.28	46.00	-18.72	peak	
6		641.1000	40.04	-10.35	29.69	46.00	-16.31	peak	



#### 4.2.8 TEST RESULTS-ABOVE 1 GHZ

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz		

**Polarization: Vertical**



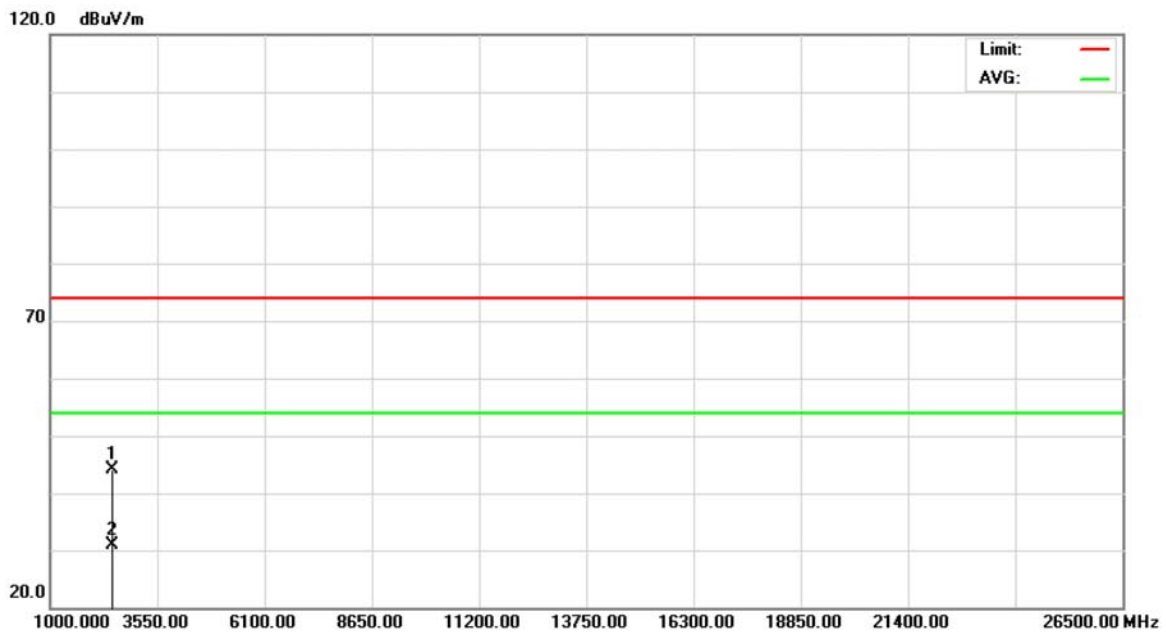
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	21.36	33.42	54.78	74.00	-19.22	peak	
2		2390.000	11.20	33.42	44.62	54.00	-9.38	AVG	
3	X	2408.000	49.67	33.52	83.19	74.00	9.19	peak	
4	*	2408.000	46.64	33.52	80.16	54.00	26.16	AVG	





EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz		

**Polarization: Vertical**

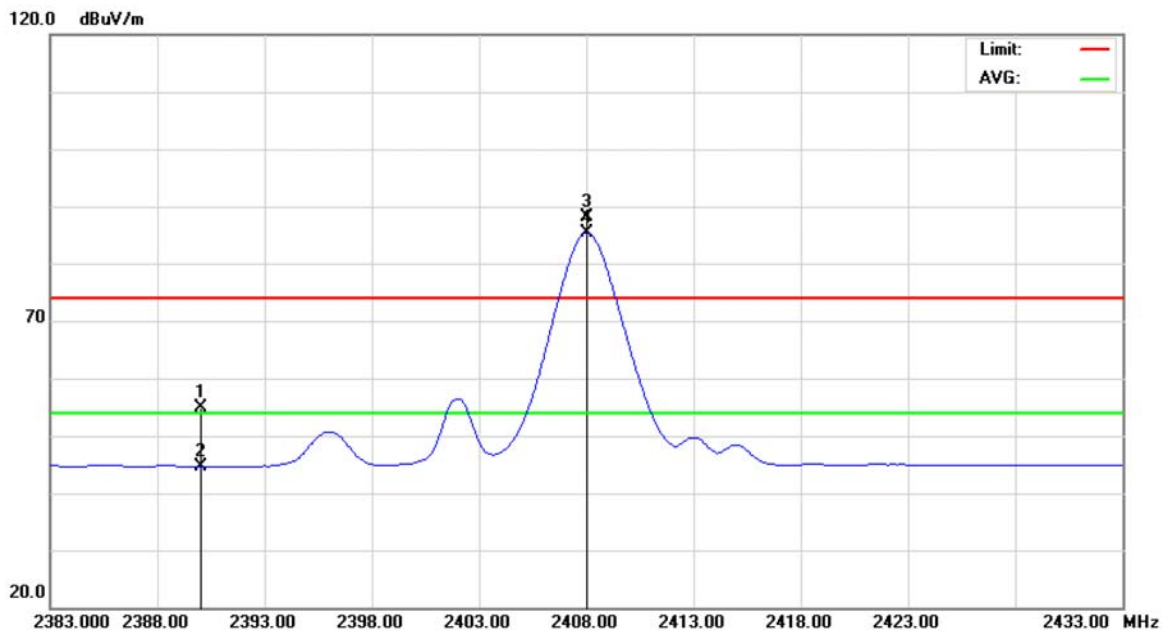


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2440.000	44.32	-0.31	44.01	74.00	-29.99	peak	
2	*	2440.000	31.08	-0.31	30.77	54.00	-23.23	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz		

**Polarization: Horizontal**

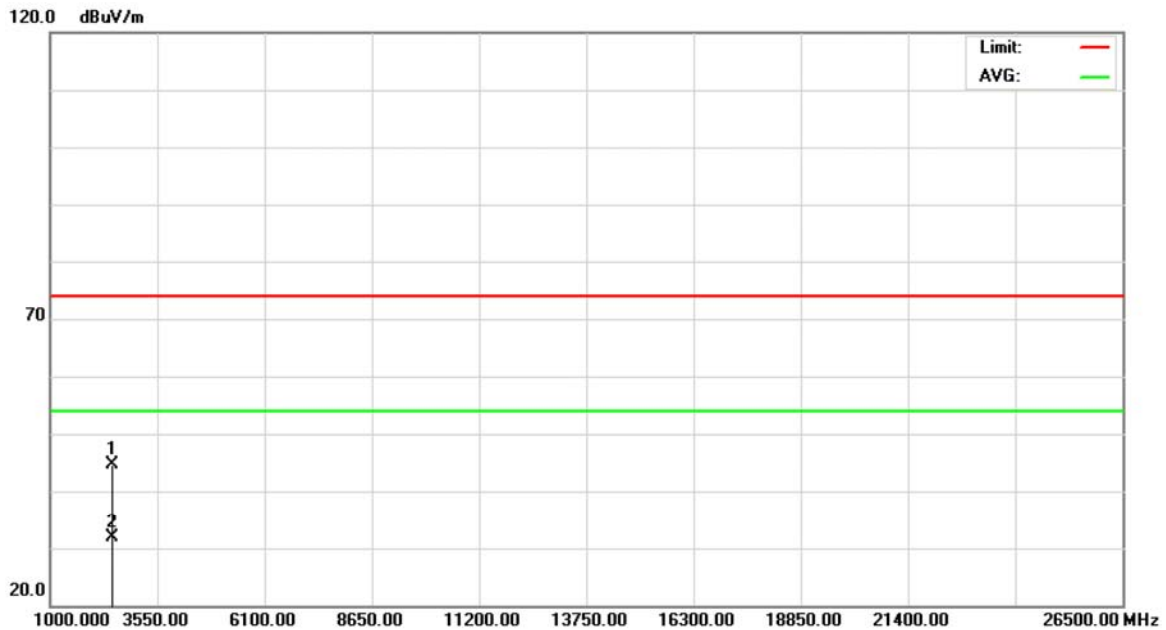


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	21.44	33.42	54.86	74.00	-19.14	peak	
2		2390.000	11.28	33.42	44.70	54.00	-9.30	AVG	
3	X	2408.000	54.73	33.52	88.25	74.00	14.25	peak	
4	*	2408.000	51.79	33.52	85.31	54.00	31.31	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz		

**Polarization: Horizontal**

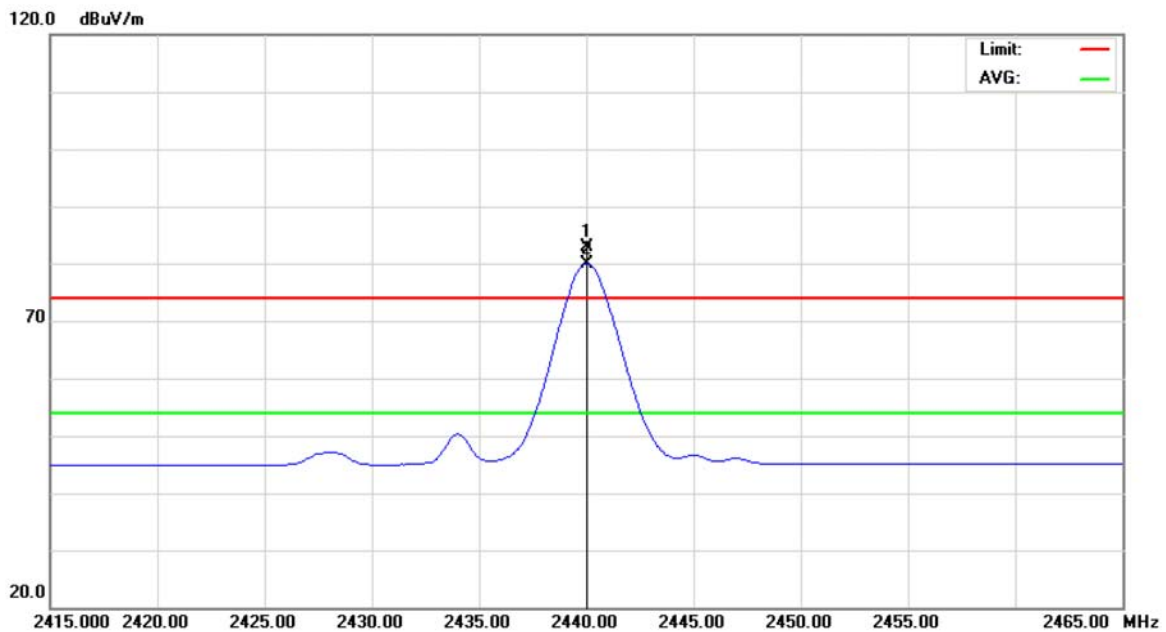


No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	2440.064	45.00	-0.31	44.69	74.00	-29.31	peak	
2 *	2440.064	32.16	-0.31	31.85	54.00	-22.15	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Vertical**

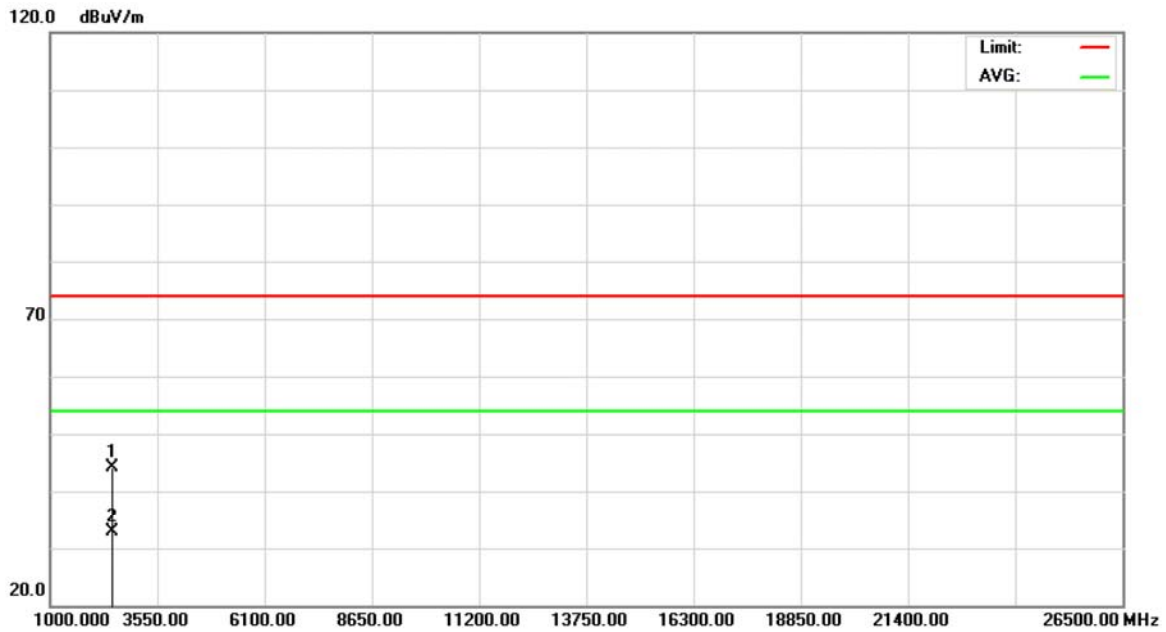


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2440.000	49.25	33.69	82.94	74.00	8.94	peak	
2	*	2440.000	46.18	33.69	79.87	54.00	25.87	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Vertical**

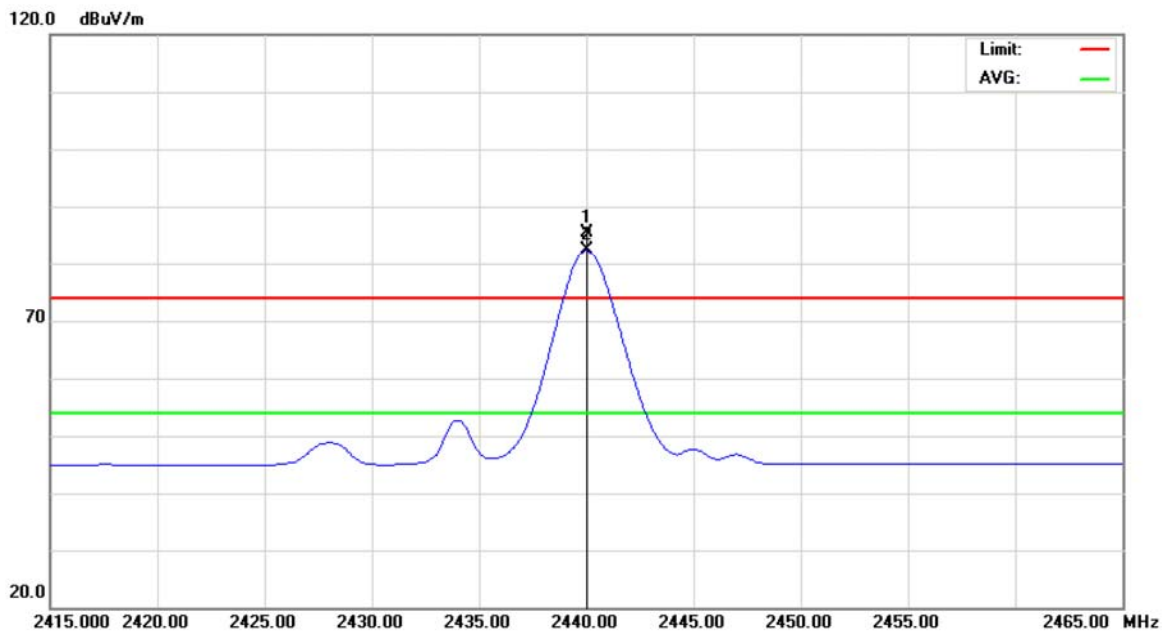


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2439.172	44.51	-0.31	44.20	74.00	-29.80	peak	
2	*	2439.172	33.09	-0.31	32.78	54.00	-21.22	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Horizontal**

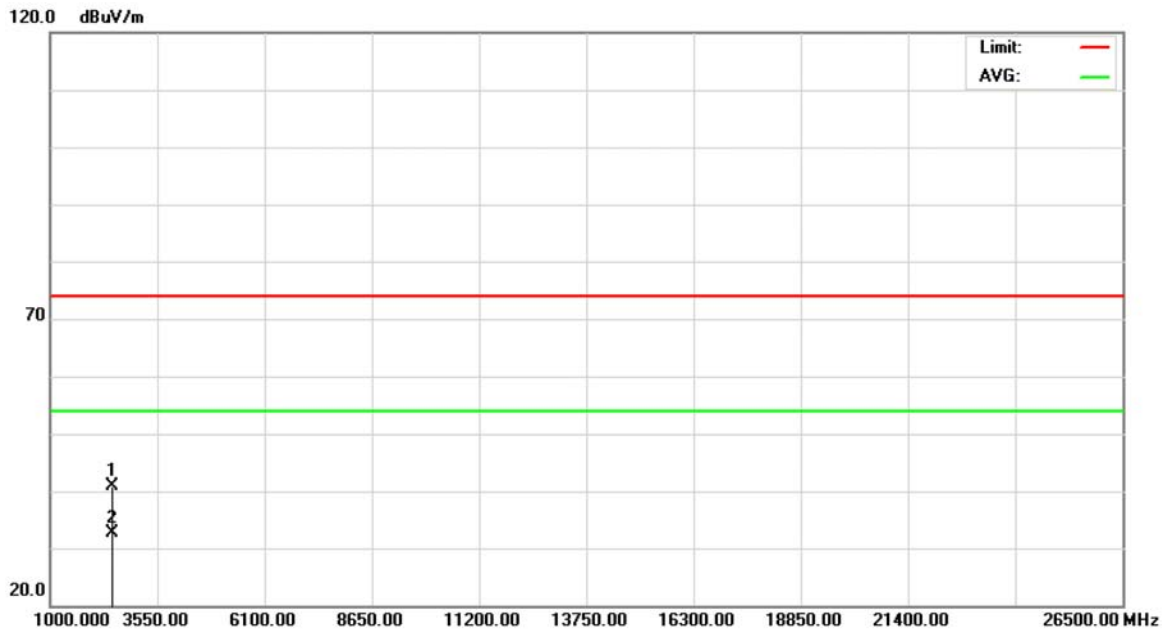


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2440.000	51.60	33.69	85.29	74.00	11.29	peak	
2	*	2440.000	48.58	33.69	82.27	54.00	28.27	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2440 MHz		

**Polarization: Horizontal**

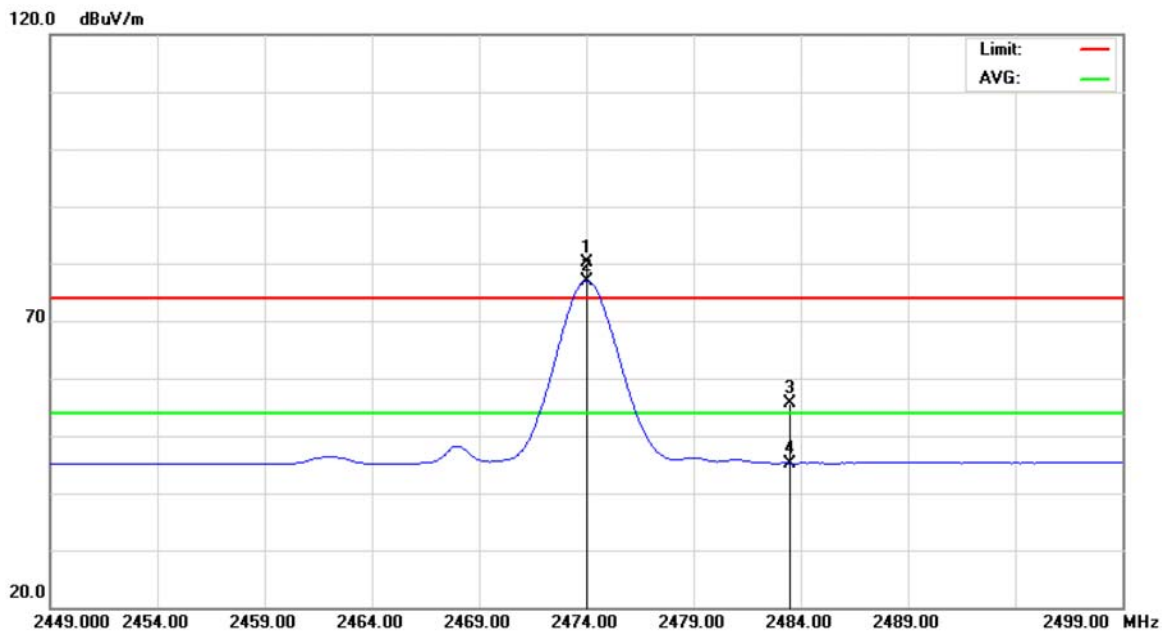


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2439.324	41.23	-0.31	40.92	74.00	-33.08	peak	
2	*	2439.324	32.96	-0.31	32.65	54.00	-21.35	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2474 MHz		

**Polarization: Vertical**



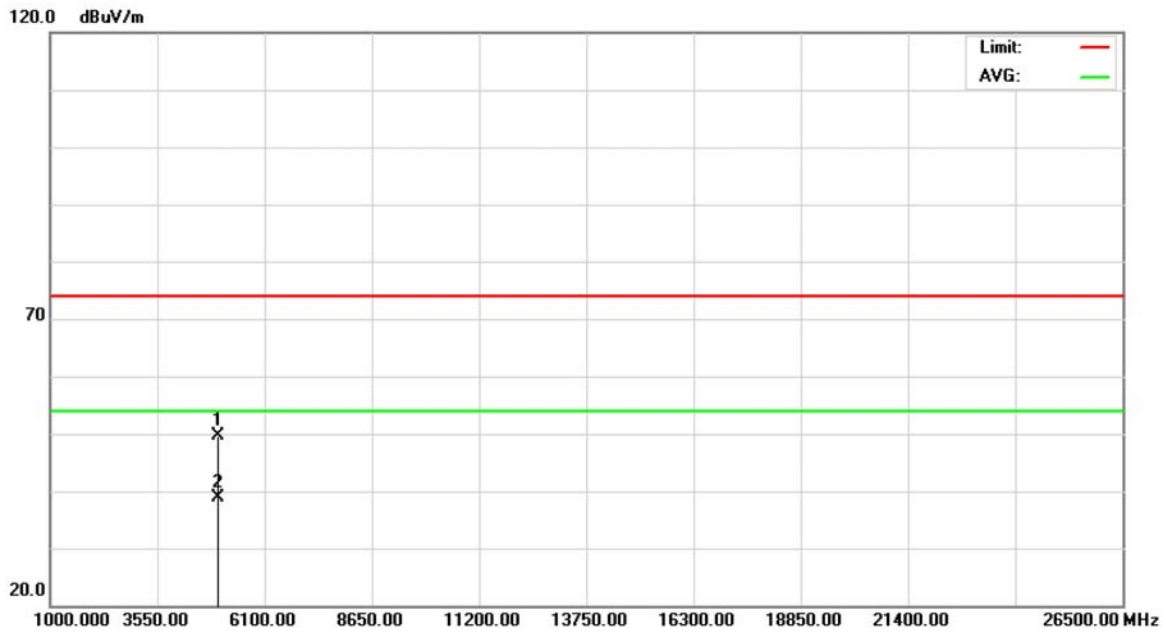
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2474.000	46.25	33.87	80.12	74.00	6.12	peak	
2	*	2474.000	43.01	33.87	76.88	54.00	22.88	AVG	
3		2483.500	21.80	33.92	55.72	74.00	-18.28	peak	
4		2483.500	11.31	33.92	45.23	54.00	-8.77	AVG	





EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2474 MHz		

**Polarization: Vertical**

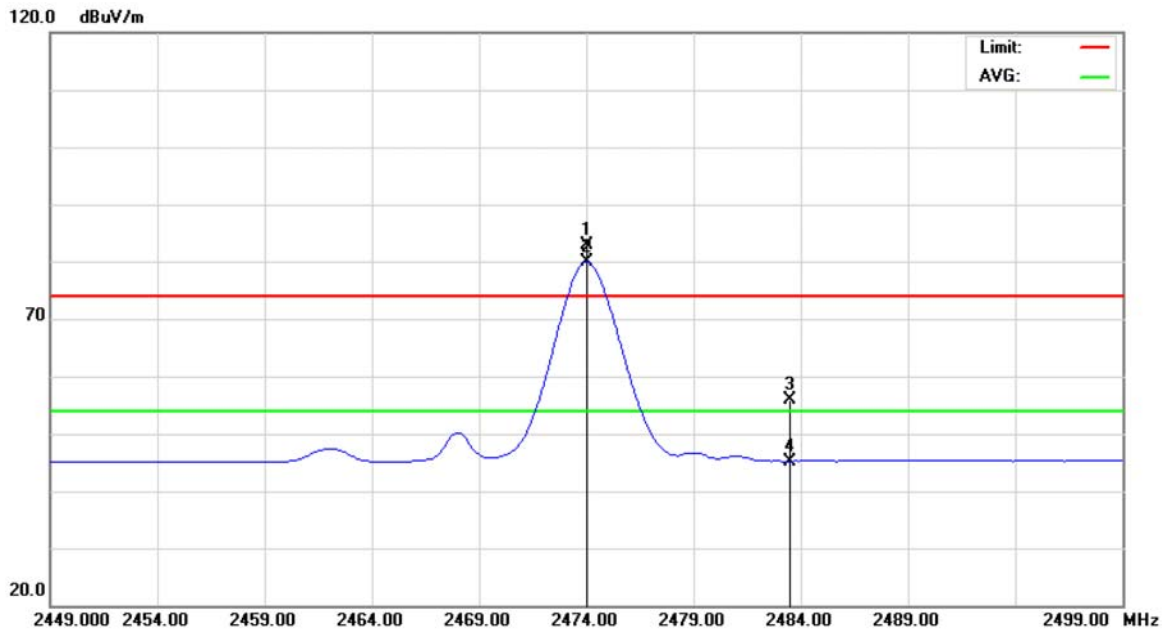


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4948.388	41.66	7.93	49.59	74.00	-24.41	peak	
2	*	4948.388	31.03	7.93	38.96	54.00	-15.04	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2474 MHz		

**Polarization: Horizontal**

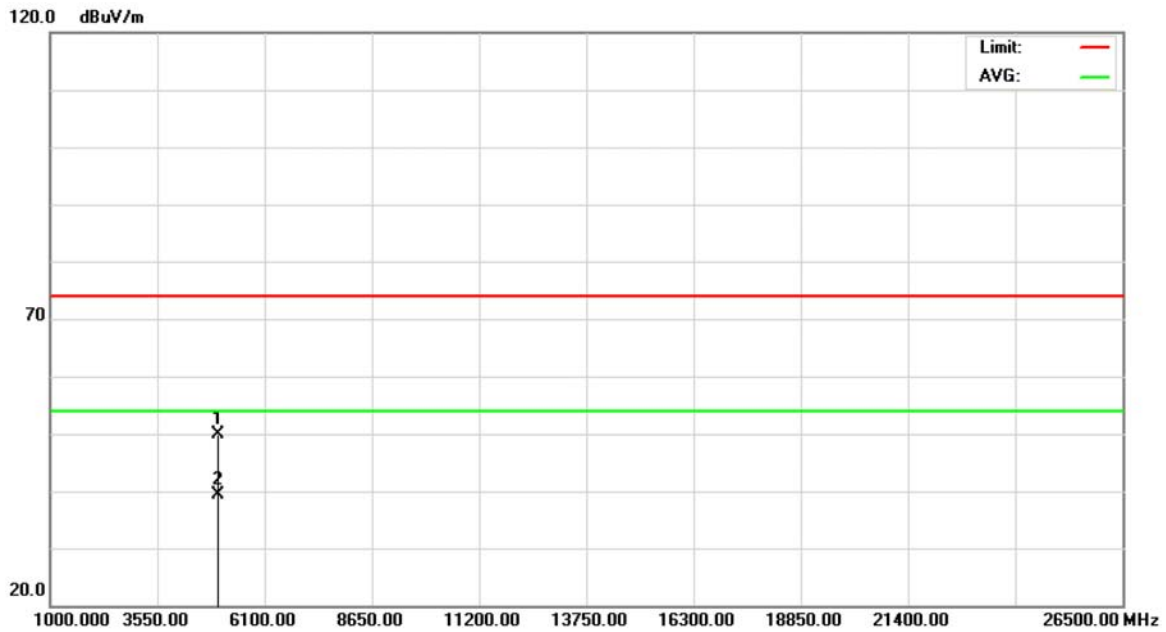


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	X	2474.000	49.06	33.87	82.93	74.00	8.93	peak	
2	*	2474.000	45.93	33.87	79.80	54.00	25.80	AVG	
3		2483.500	21.84	33.92	55.76	74.00	-18.24	peak	
4		2483.500	11.32	33.92	45.24	54.00	-8.76	AVG	



EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2474 MHz		

**Polarization: Horizontal**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4948.388	42.03	7.93	49.96	74.00	-24.04	peak	
2	*	4948.388	31.34	7.93	39.27	54.00	-14.73	AVG	



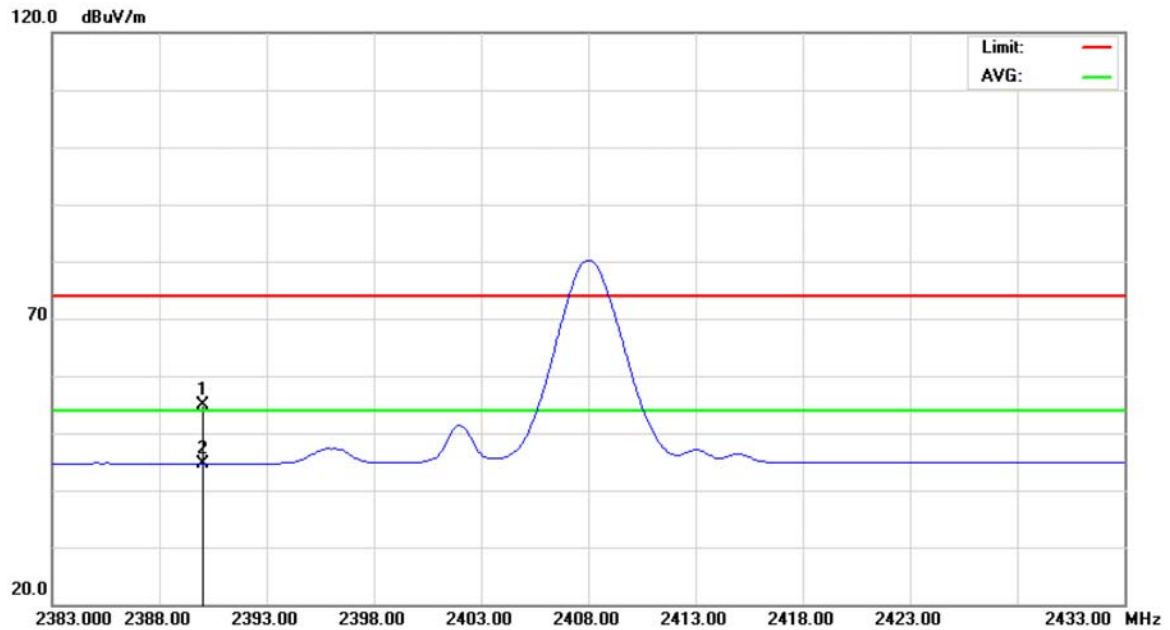
#### **4.2.9 TEST RESULTS-RESTRICTED BANDS REQUIREMENTS**

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	TX CH 2408 MHz/2474 MHz(Vertical)		
Note :	<p>The emission of the carrier radiated field strength is measured for (Peak and AV) as following:</p> <ol style="list-style-type: none"><li>1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (2408 MHz). Then the field strength was measured at 2310-2390 MHz.</li><li>2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (2474 MHz). Then the field strength was measured at 2483.5-2500 MHz.</li></ol>		



2408 MHz/ Orthogonal Axes: X

Polarization: Vertical

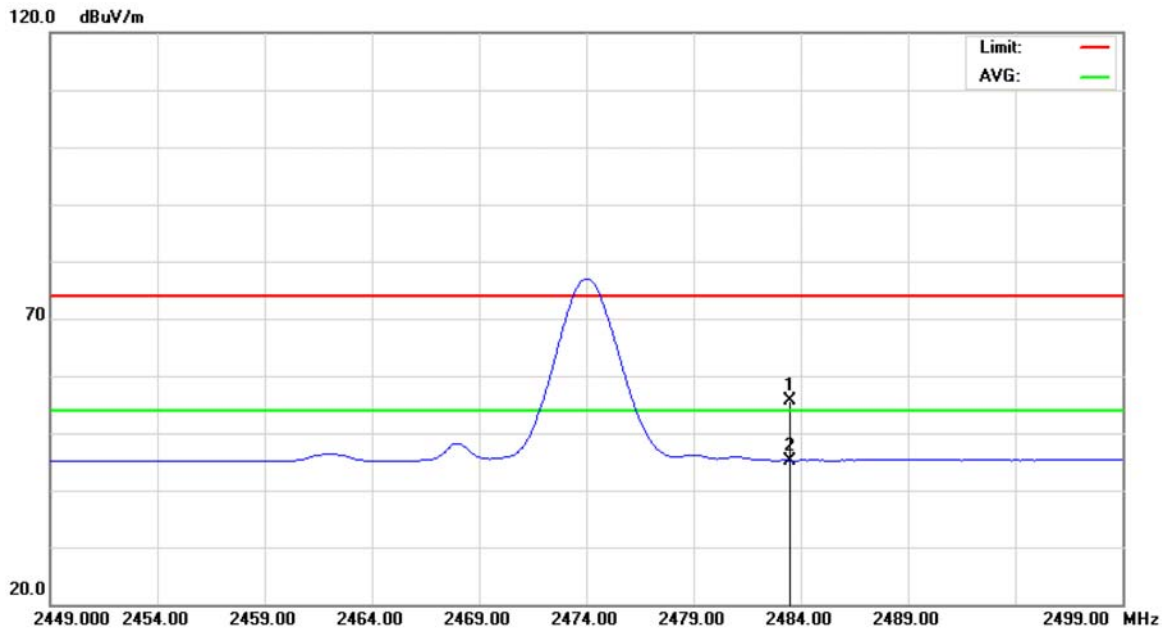


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	21.36	33.42	54.78	74.00	-19.22	peak	
2	*	2390.000	11.20	33.42	44.62	54.00	-9.38	AVG	



2474 MHz/ Orthogonal Axes: X

Polarization: Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2483.500	21.80	33.92	55.72	74.00	-18.28	peak	
2	*	2483.500	11.31	33.92	45.23	54.00	-8.77	AVG	

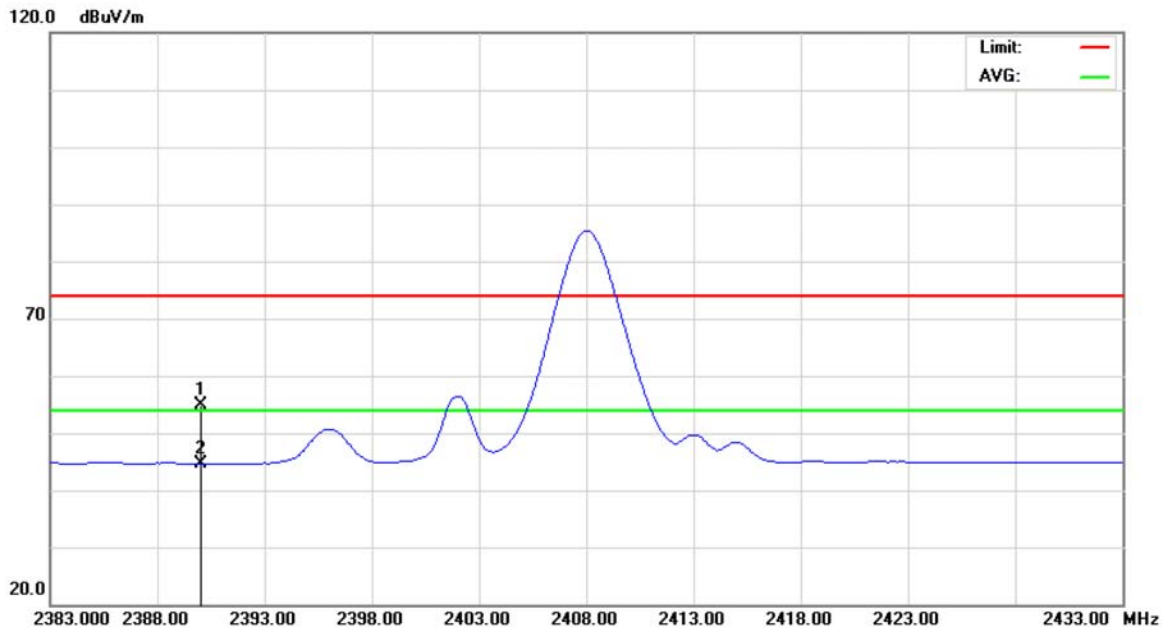


EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 ° C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	TX CH 2408 MHz/2474 MHz (Horizontal)		
Note :	<p>The emission of the carrier radiated field strength is measured for (Peak and AV) as following:</p> <ol style="list-style-type: none"><li>1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (2408 MHz). Then the field strength was measured at 2310-2390 MHz.</li><li>2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (2474 MHz). Then the field strength was measured at 2483.5-2500 MHz.</li></ol>		



2408 MHz/ Orthogonal Axes: X

Polarization: Horizontal



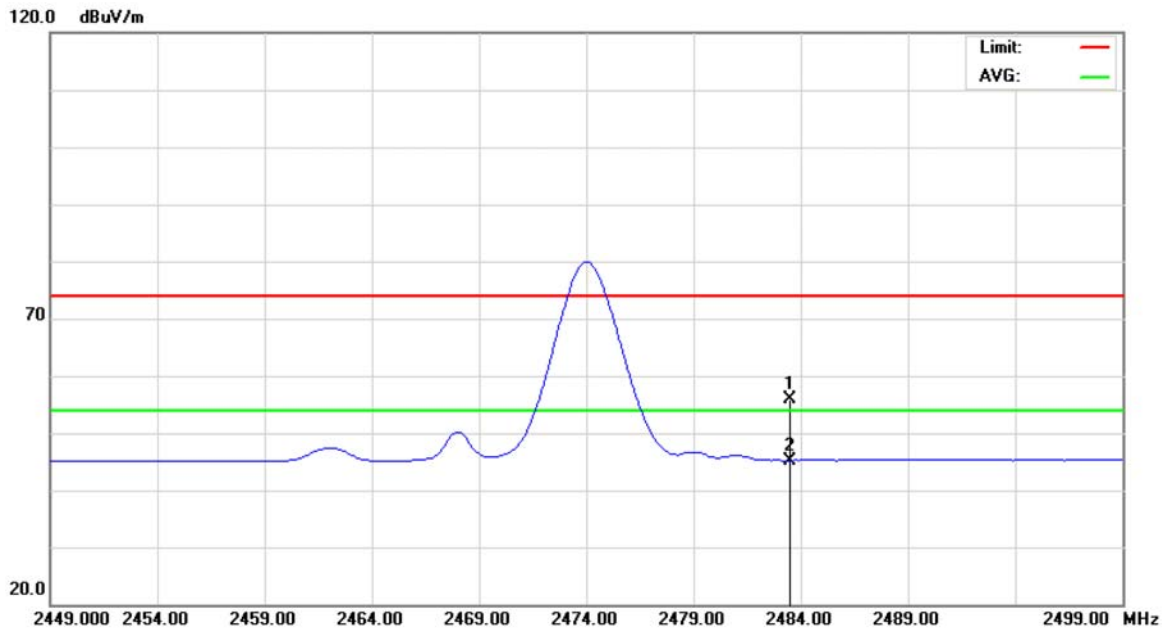
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	21.44	33.42	54.86	74.00	-19.14	peak	
2	*	2390.000	11.28	33.42	44.70	54.00	-9.30	AVG	





2474 MHz/ Orthogonal Axes: X

Polarization: Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2483.500	21.84	33.92	55.76	74.00	-18.24	peak	
2	*	2483.500	11.32	33.92	45.24	54.00	-8.76	AVG	



## 5. BANDWIDTH TEST

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C: 2010			
Test Item	Limit	Frequency Range (MHz)	Result
Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

#### 5.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

#### 5.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

#### 5.1.3 DEVIATION FROM STANDARD

No deviation.

#### 5.1.4 TEST SETUP



#### 5.1.5 EUT OPERATION CONDITIONS

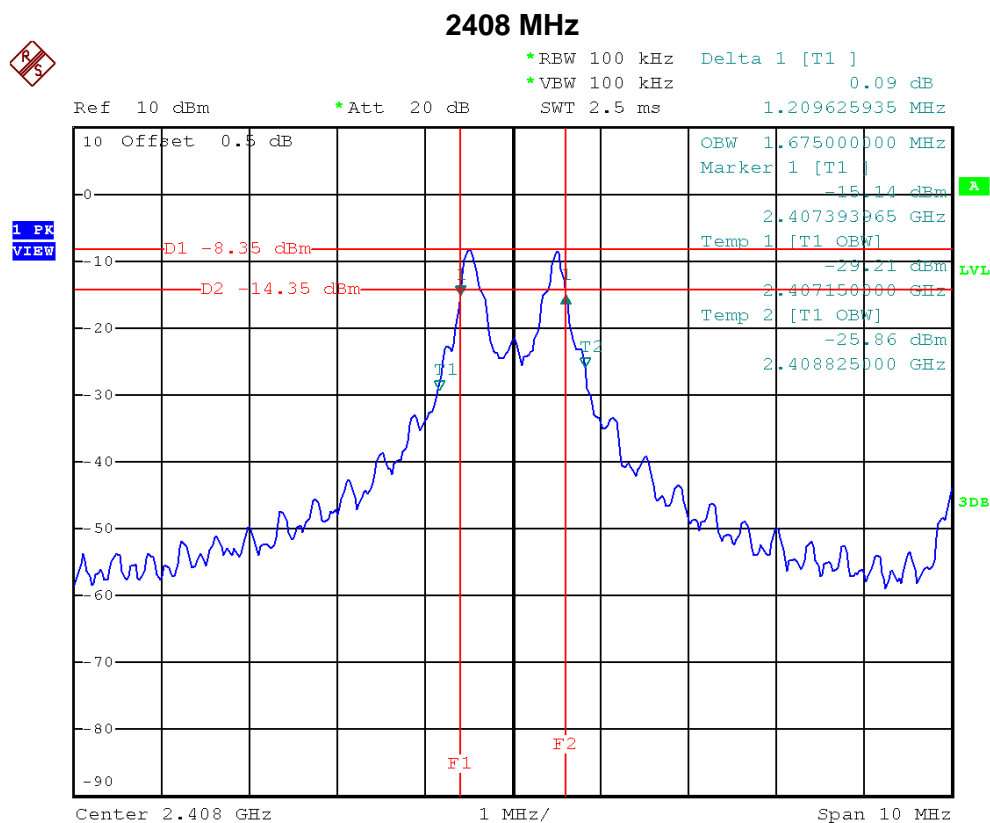
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



### 5.1.6 TEST RESULTS

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz/2440 MHz/2474 MHz		

Frequency	Bandwidth (MHz)	99% Occupied BW (MHz)	LIMIT (MHz)
2408 MHz	1.21	1.68	>=500KHz
2440 MHz	1.22	1.68	>=500KHz
2474 MHz	1.20	1.70	>=500KHz



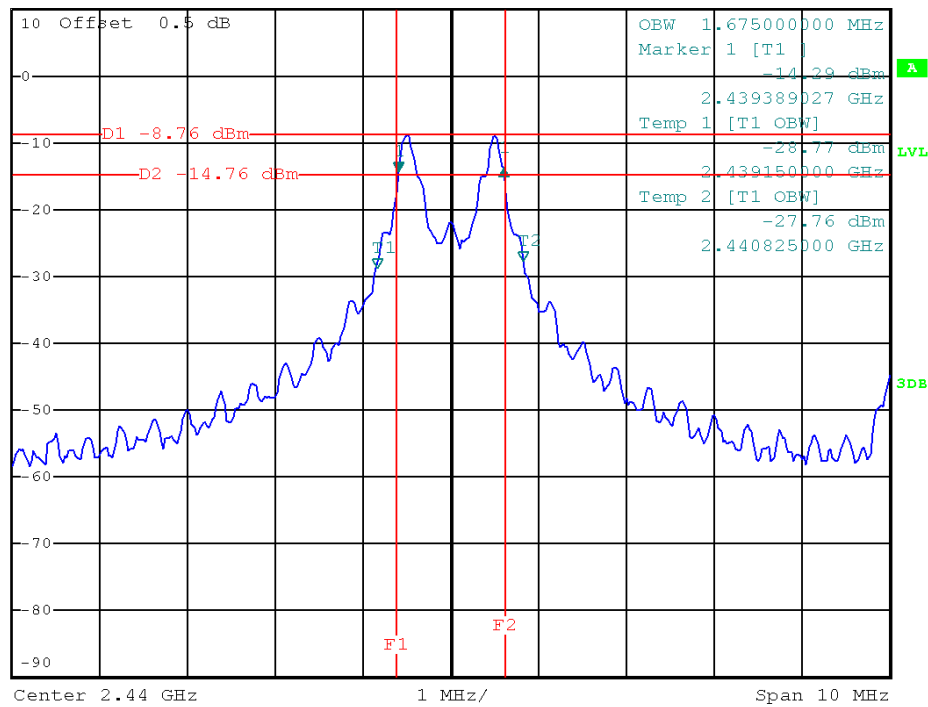


### 2440 MHz



\*RBW 100 kHz Delta 1 [T1 ]  
\*VBW 100 kHz 0.49 dB  
Ref 10 dBm \*Att 20 dB SWT 2.5 ms 1.221945137 MHz

1 PK  
VIEW

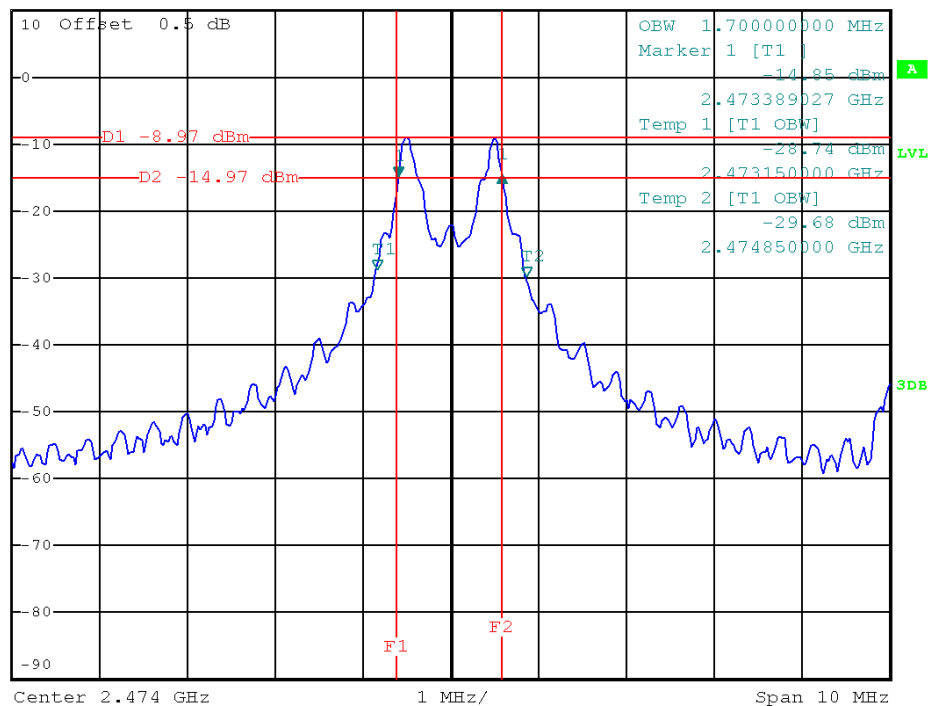


### 2474 MHz



\*RBW 100 kHz Delta 1 [T1 ]  
\*VBW 100 kHz 0.28 dB  
Ref 10 dBm \*Att 20 dB SWT 2.5 ms 1.197007481 MHz

1 PK  
VIEW





## 6. PEAK OUTPUT POWER TEST

### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C: 2010			
Test Item	Limit	Frequency Range (MHz)	Result
Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

### 6.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Feb,20,2013
2	Power Meter Sensor	Anritsu	MA2411B	1126001	Feb,20,2013

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

### 6.1.2 TEST PROCEDURE

The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,

### 6.1.3 DEVIATION FROM STANDARD

No deviation.

### 6.1.4 TEST SETUP



### 6.1.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



#### 6.1.6 TEST RESULTS

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	26 ° C	Relative Humidity :	60%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz/2440 MHz/2474 MHz		

Frequency	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
2408 MHz	-8.14	30	1
2440 MHz	-8.19	30	1
2474 MHz	-8.34	30	1



## 7. ANTENNA CONDUCTED SPURIOUS EMISSION

### 7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C: 2010			
Test Item	Limit	Frequency Range (MHz)	Result
Antenna conducted Spurious Emission	20dB less than the peak value of fundamental frequency	30-25000	PASS

#### 7.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012

Remark: " N/A" denotes No Model Name, Serial No. or No Calibration specified.

#### 7.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

#### 7.1.3 DEVIATION FROM STANDARD

No deviation.

#### 7.1.4 TEST SETUP



#### 7.1.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

**7.1.6 TEST RESULTS**

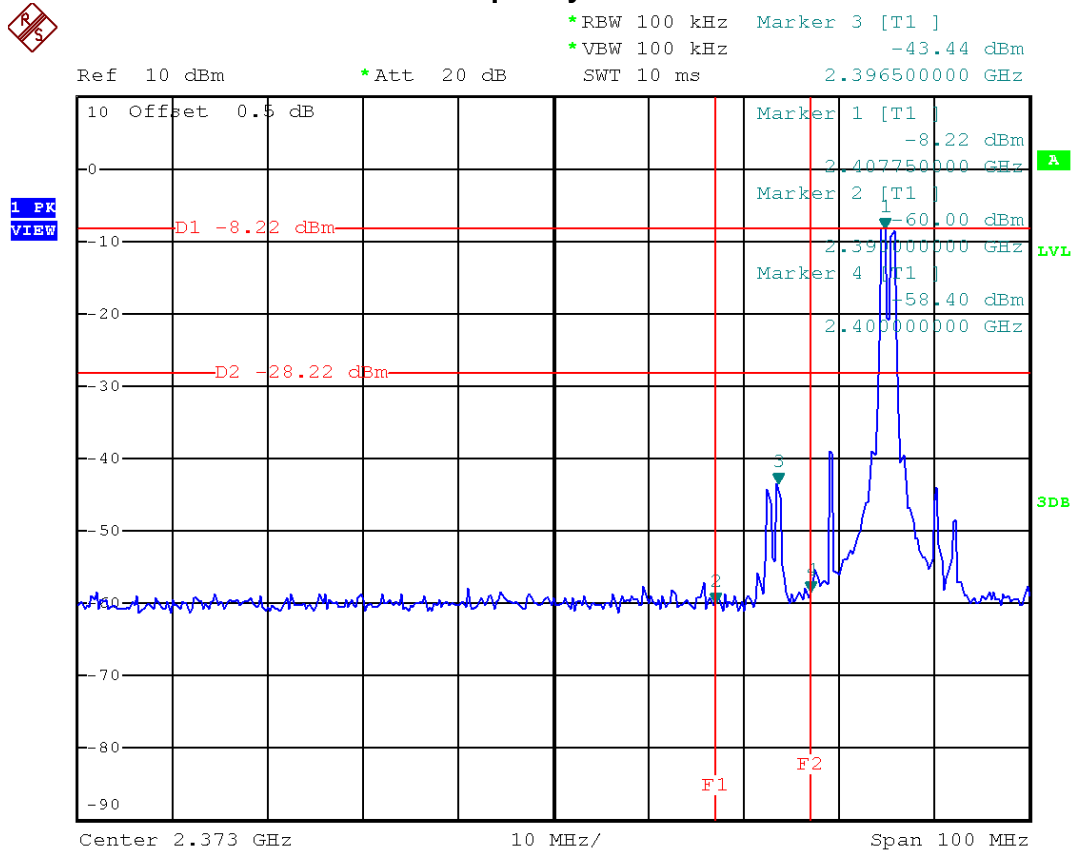
EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	24 °C	Relative Humidity :	54%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz/2474 MHz		

Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2396.5	-43.44	2488.5	-57.37
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.			

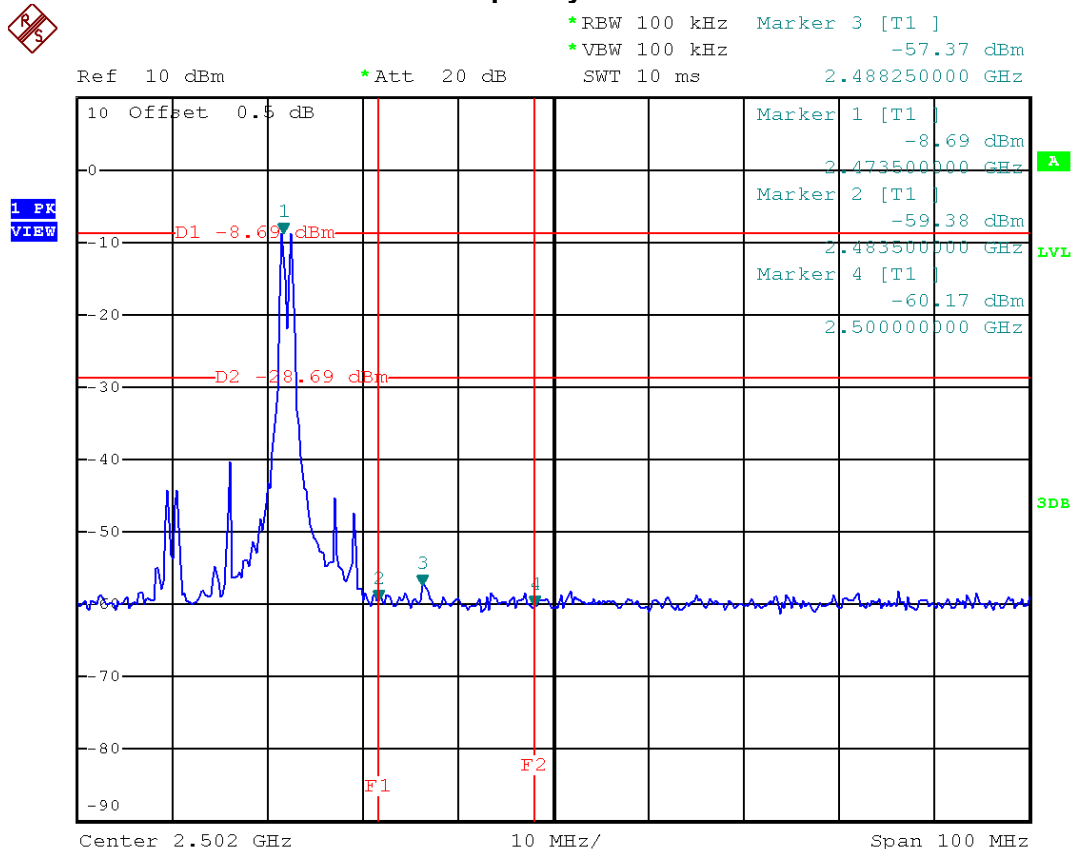




2408 MHz/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



2474 MHz/The max. radio frequency power in any 100 kHz bandwidth within the frequency band





### 2408 MHz/10 Harmonic of the frequency



\*RBW 100 kHz Marker 2 [T1 ]  
\*VBW 100 kHz -38.42 dBm  
SWT 2.5 s 92.42500000 MHz

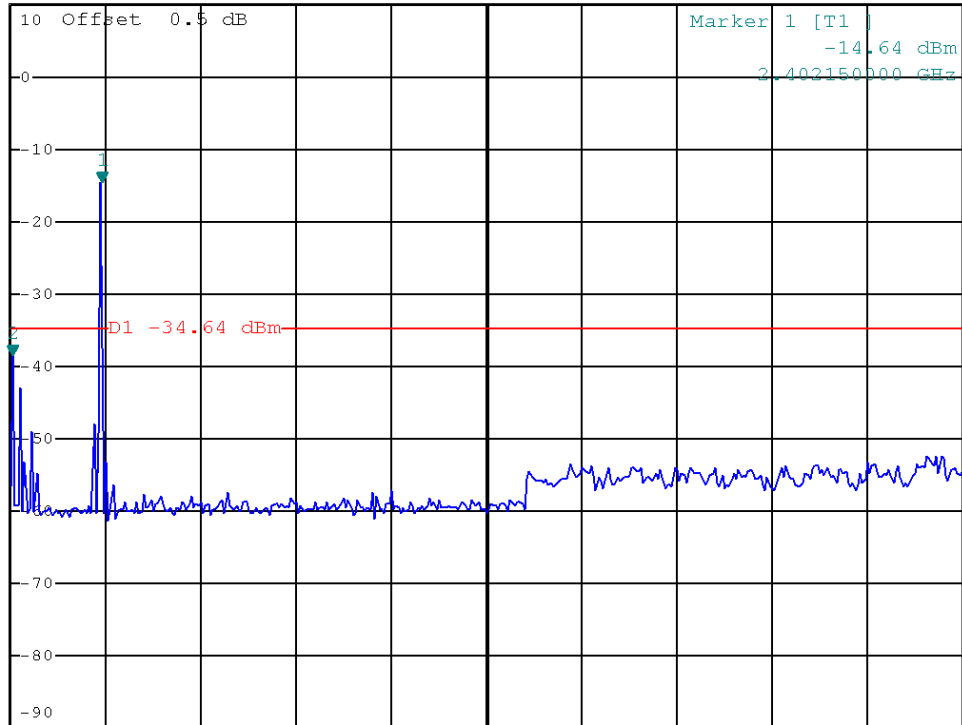
Ref 10 dBm

\*Att 20 dB

SWT 2.5 s

92.42500000 MHz

1 PK  
VIEW



Center 12.515 GHz

2.497 GHz/

Span 24.97 GHz

### 2440 MHz/10 Harmonic of the frequency



\*RBW 100 kHz Marker 2 [T1 ]  
\*VBW 100 kHz -38.86 dBm  
SWT 2.5 s 92.42500000 MHz

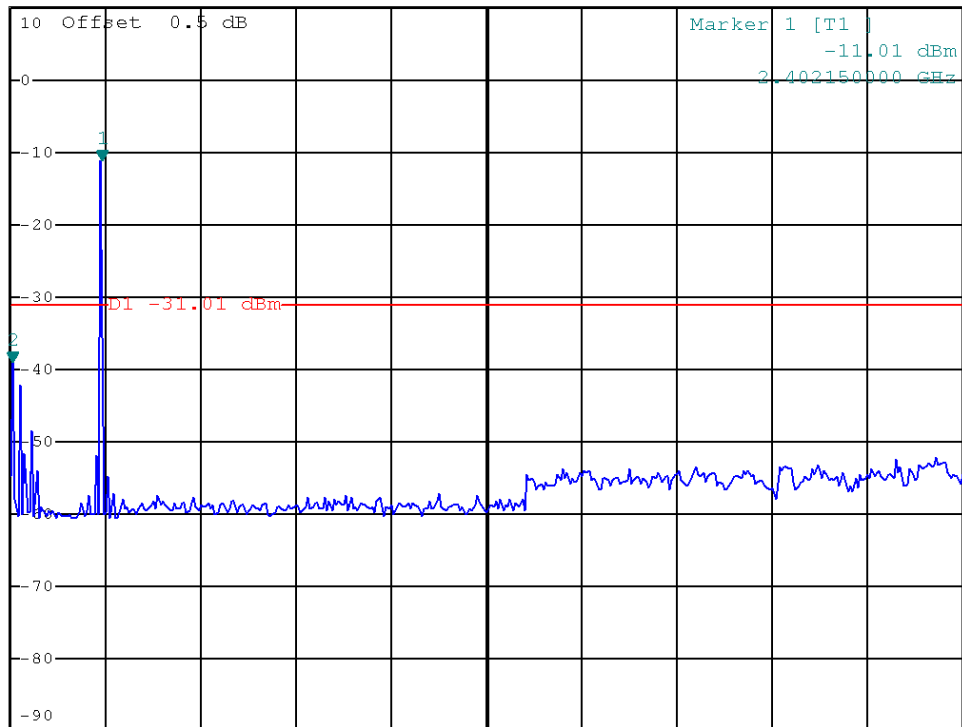
Ref 10 dBm

\*Att 20 dB

SWT 2.5 s

92.42500000 MHz

1 PK  
VIEW



Center 12.515 GHz

2.497 GHz/

Span 24.97 GHz



2474 MHz/10 Harmonic of the frequency



\*RBW 100 kHz Marker 2 [T1 ]  
\*VBW 100 kHz -38.68 dBm  
SWT 2.5 s 92.42500000 MHz

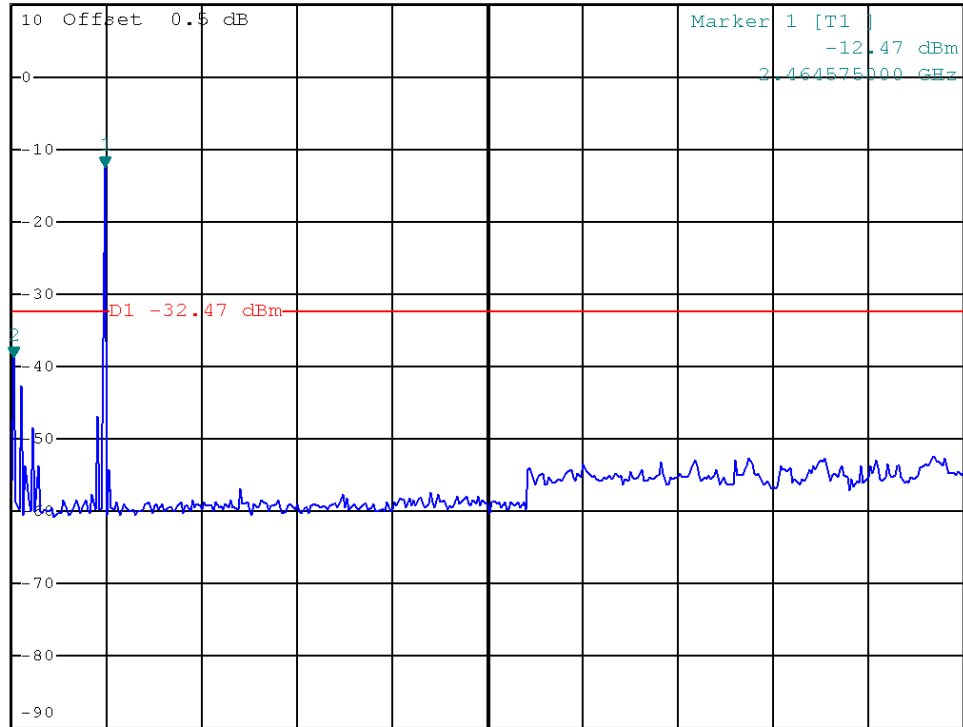
Ref 10 dBm

\*Att 20 dB

SWT 2.5 s

92.42500000 MHz

1 PK  
VIEW



Center 12.515 GHz

2.497 GHz/

Span 24.97 GHz



## 8. POWER SPECTRAL DENSITY TEST

### 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C: 2010			
Test Item	Limit	Frequency Range (MHz)	Result
Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

#### 8.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

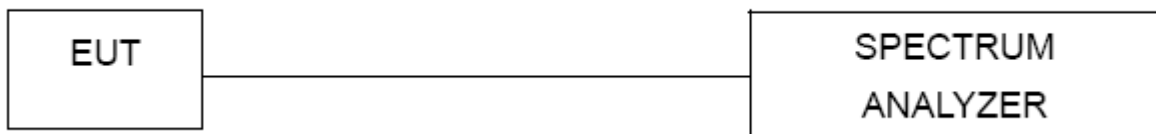
#### 8.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW=3KHz, VBW=30KHz, Sweep time = 500s.

#### 8.1.3 DEVIATION FROM STANDARD

No deviation.

#### 8.1.4 TEST SETUP



#### 8.1.5 EUT OPERATION CONDITIONS

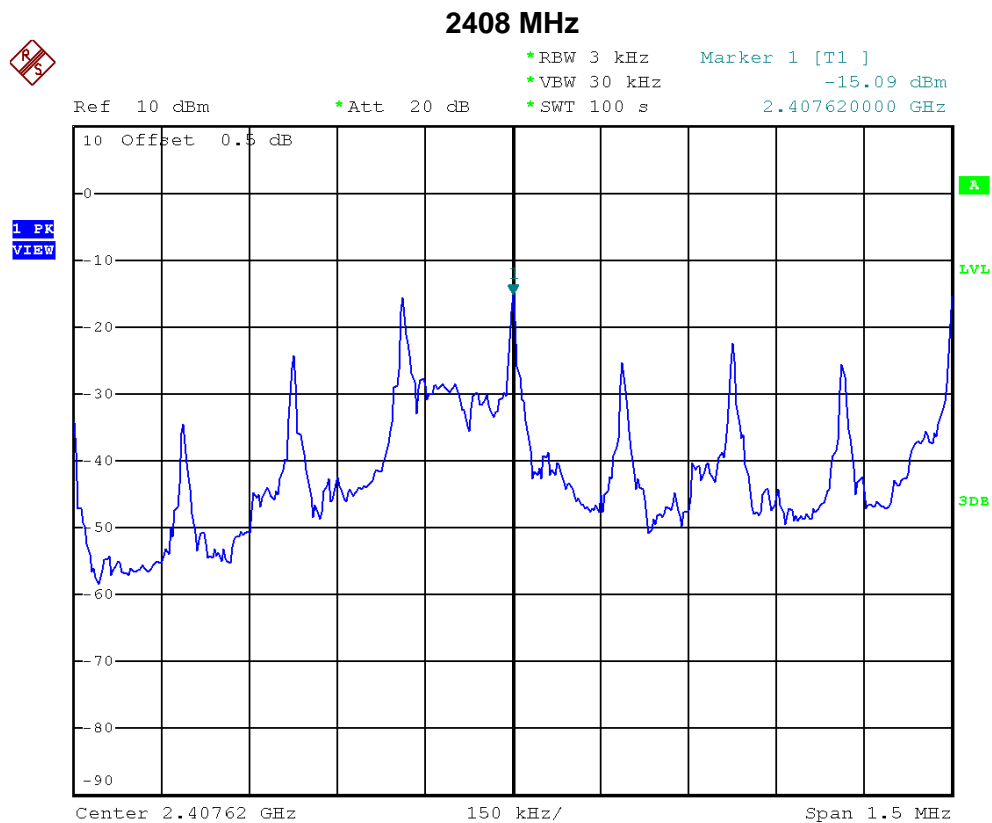
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



### 8.1.6 TEST RESULTS

EUT :	2.4GHz Dongle	Model Name :	R13
Temperature :	24 °C	Relative Humidity :	54%
Test Voltage :	DC 5V		
Test Mode :	2408 MHz/2440 MHz/2474 MHz		

Frequency	Power Density (dBm)	LIMIT (dBm)
2408 MHz	-15.09	8
2440 MHz	-15.36	8
2474 MHz	-15.51	8





### 2440 MHz

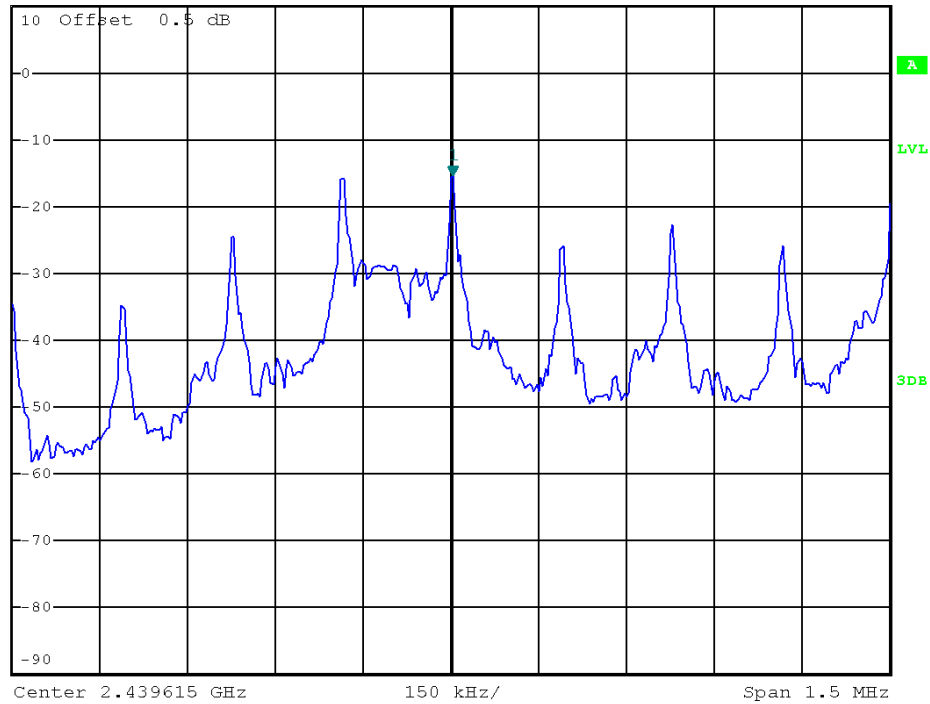


\*RBW 3 kHz      Marker 1 [T1 ]  
\*VBW 30 kHz      -15.36 dBm  
\*SWT 100 s      2.439618750 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
VIEW



### 2474 MHz



\*RBW 3 kHz      Marker 1 [T1 ]  
\*VBW 30 kHz      -15.51 dBm  
\*SWT 100 s      2.473615000 GHz

Ref 10 dBm

\*Att 20 dB

1 PK  
VIEW

