



Neutron Engineering Inc.

Radio Test Report

FCC ID: H8GG10770HL

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

Issued Date : Feb. 09, 2012
Project No. : 1201068
Equipment : 2.4G RF Mouse
Model Name : G10-770HL; G10-770FL; G10-770H;
G10-770F
Applicant : A-FOUR TECH CO., LTD.
Address : 6F, No.108, Min-Chuan Rd., Hsin-Tien,
Taipei, Taiwan, R.O.C.

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: Jan. 16, 2012
Date of Test: Jan. 16, 2012 ~ Jan. 30, 2012

Testing Engineer: Rush Kao
(Rush Kao)

Technical Manager: Jeff Yang
(Jeff Yang)

Authorized Signatory: Andy Chiu
(Andy Chiu)

Neutron Engineering Inc.
B1, No. 37, Lane 365, YangGuang St.,
NeiHu District 114, Taipei, Taiwan.
TEL: +886-2-2657-3299
FAX: +886-2-2657-3331





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.**

Neutron's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **Neutron** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **Neutron** issued reports.

Neutron's reports must not be used by the client to claim product endorsement by the authorities or any agency of the Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **Neutron-self**, extracts from the test report shall not be reproduced except in full with **Neutron's** authorized written approval.

Neutron's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

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.



Table of Contents	Page
1 . CERTIFICATION	5
2 . SUMMARY OF TEST RESULTS	6
2.1 TEST FACILITY	7
2.2 MEASUREMENT UNCERTAINTY	7
3 . GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	10
3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
3.4 DESCRIPTION OF SUPPORT UNITS	12
4 . EMC EMISSION TEST	13
4.1 RADIATED EMISSION MEASUREMENT	13
4.1.1 RADIATED EMISSION LIMITS	13
4.1.2 MEASUREMENT INSTRUMENTS LIST	14
4.1.3 TEST PROCEDURE	15
4.1.4 DEVIATION FROM TEST STANDARD	16
4.1.5 TEST SETUP	16
4.1.6 EUT OPERATING CONDITIONS	16
4.1.7 TEST RESULTS-BETWEEN 30MHz – 1000MHz	17
4.1.8 TEST RESULTS-ABOVE 1000MHz	19
4.1.9 TEST RESULTS-RESTRICTED BANDS REQUIREMENTS	31
5 . BANDWIDTH TEST	37
5.1 APPLIED PROCEDURES / LIMIT	37
5.1.1 MEASUREMENT INSTRUMENTS LIST	37
5.1.2 TEST PROCEDURE	37
5.1.3 DEVIATION FROM STANDARD	37
5.1.4 TEST SETUP	37
5.1.5 EUT OPERATION CONDITIONS	37
5.1.6 TEST RESULTS	38
6 . PEAK OUTPUT POWER TEST	40
6.1 APPLIED PROCEDURES / LIMIT	40
6.1.1 MEASUREMENT INSTRUMENTS LIST	40
6.1.2 TEST PROCEDURE	40
6.1.3 DEVIATION FROM STANDARD	40
6.1.4 TEST SETUP	40
6.1.5 EUT OPERATION CONDITIONS	40
6.1.6 TEST RESULTS	41



Table of Contents	Page
7 . ANTENNA CONDUCTED SPURIOUS EMISSION	42
7.1 APPLIED PROCEDURES / LIMIT	42
7.1.1 MEASUREMENT INSTRUMENTS LIST	42
7.1.2 TEST PROCEDURE	42
7.1.3 DEVIATION FROM STANDARD	42
7.1.4 TEST SETUP	42
7.1.5 EUT OPERATION CONDITIONS	42
7.1.6 TEST RESULTS	43
8 . POWER SPECTRAL DENSITY TEST	47
8.1 APPLIED PROCEDURES / LIMIT	47
8.1.1 MEASUREMENT INSTRUMENTS LIST	47
8.1.2 TEST PROCEDURE	47
8.1.3 DEVIATION FROM STANDARD	47
8.1.4 TEST SETUP	47
8.1.5 EUT OPERATION CONDITIONS	47
8.1.6 TEST RESULTS	48
9 . RF EXPOSURE TEST	50
9.1 APPLIED PROCEDURES / LIMIT	50
9.1.1 MEASUREMENT INSTRUMENTS LIST	50
9.1.2 MPE CALCULATION METHOD & TEST RESULTS	50
10 . EUT TEST PHOTO	51



1. CERTIFICATION

Equipment : 2.4G RF Mouse
Brand Name : A4TECH
Model Name : G10-770HL; G10-770FL; G10-770H; G10-770F
Applicant : A-FOUR TECH CO., LTD.
Date of Test : Jan. 16, 2012 ~ Jan. 30, 2012
Standards : FCC Part15, Subpart C(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-1-1201068) 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			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
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:

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.

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	2.4G RF Mouse
Brand Name	A4TECH
Model Name	G10-770HL; G10-770FL; G10-770H; G10-770F
OEM Brand/Model Name	N/A
Model Difference	Please refer to Note 2.
Product Description	The EUT is a 2.4G RF Mouse.
	Operation Frequency: 2407~2473MHz
	Modulation Type: GFSK
	Number Of Channel 14CH (Note 3)
	Antenna Designat on: Please refer to the Note 4.
	Antenna Gain(Peak) Please refer to the Note 4.
	Output Power: -7.53dBm (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	Battery supplied
Power Rating	DC 1.5V
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. All models are based on similar electrical circuit except the difference of list below:

Model Name	Lens Type	Laser
G10-770HL	Holeless	YES
G10-770FL	V-Track	YES
G10-770H	Holeless	NONE
G10-770F	V-Track	NONE

Note:

- (1) Holeless: Sealed lens, completely closed bottom, without any sensor opening.
- (2) V-Track: Vertical reinforced light, tiny lens hole.

The EUT has two optional sets of Boost IC+Schottky Diode:

No.	Boost IC+Schottky Diode
1	Schottky Diode is in the Boost IC (U3) and nothing on PCB location D2.
2	Schottky Diode is not in the Boost IC (U3) but on PCB location D2.

All the above models were tested, and the model:

G10-770HL (No. 2) was found to be the worst case during the pre-scanning test. This model of the worst case was used for final testing and collecting test data included in this report.



3. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2407	06	2430	11	2456
02	2411	07	2434	12	2460
03	2415	08	2437	13	2468
04	2422	09	2445	14	2473
05	2426	10	2451		

4. Table of Filed Antenna:

Antenna	Brand	Model Name	Type	Connector Type	Gain (dBi)
1	N/A	N/A	Ant. On PCB	N/A	1.54



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.

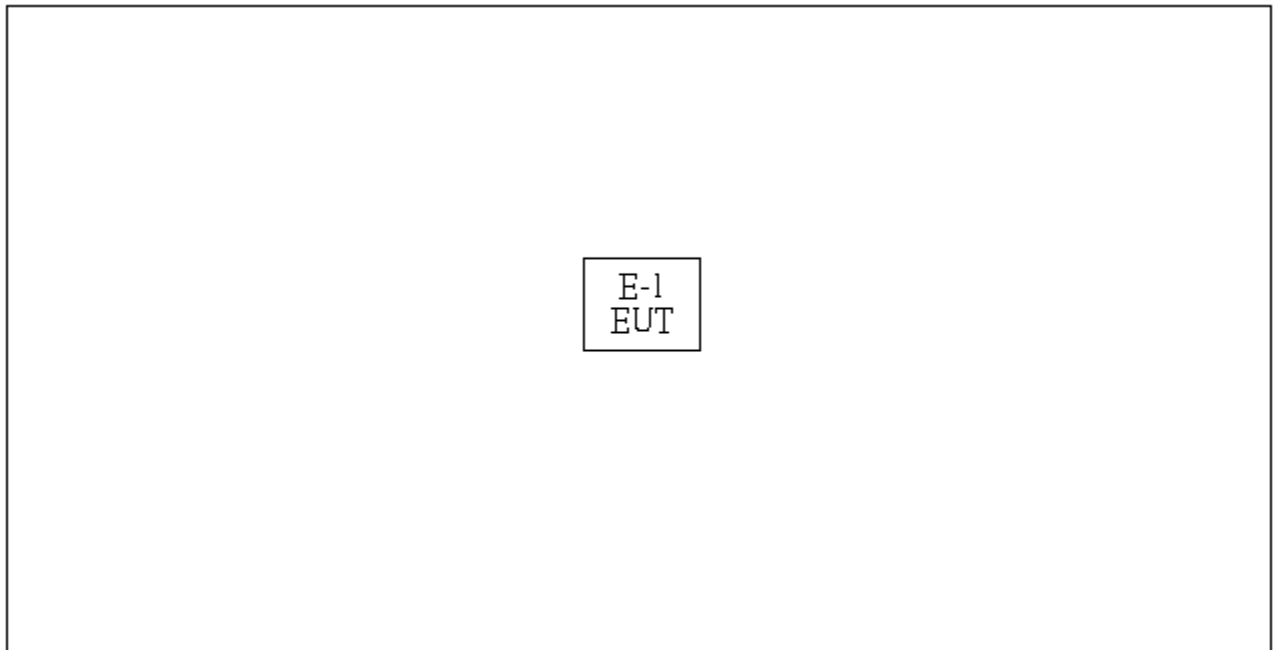
Pretest Test Mode	Description
Mode 1	2407MHz
Mode 2	2437MHz
Mode 3	2473MHz

For Radiated Test (30 -1000MHz)	
Final Test Mode	Description
Mode 2	2437MHz

For Radiated Test (Above 1000MHz)	
Final Test Mode	Description
Mode 1	2407MHz
Mode 2	2437MHz
Mode 3	2473MHz



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	2.4G RF Mouse	A4TECH	G10-770HL	H8GG10770HL	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 RADIATED EMISSION MEASUREMENT

4.1.1 RADIATED EMISSION 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 (micorvolts/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



4.1.2 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	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Apr. 18, 2012
3	Microflex Cable	N/A	N/A	1m	May. 18, 2012
4	Microflex Cable	AISI	S104-SMAP-1	10m	Aug. 22, 2012
5	Microflex Cable	N/A	N/A	3m	Aug. 22, 2012
6	Test Cable	N/A	LMR-400	966_12m	Jun. 16, 2012
7	Test Cable	N/A	LMR-400	966_3m	Jun. 16, 2012
8	Pre-Amplifier	EMC	EMC-330	980001	Jun. 02, 2012
9	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 16, 2012
10	Horn Antenna	Schwarzbeck	BBHA 9120	D-546	Jun. 15, 2012

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



4.1.3 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)

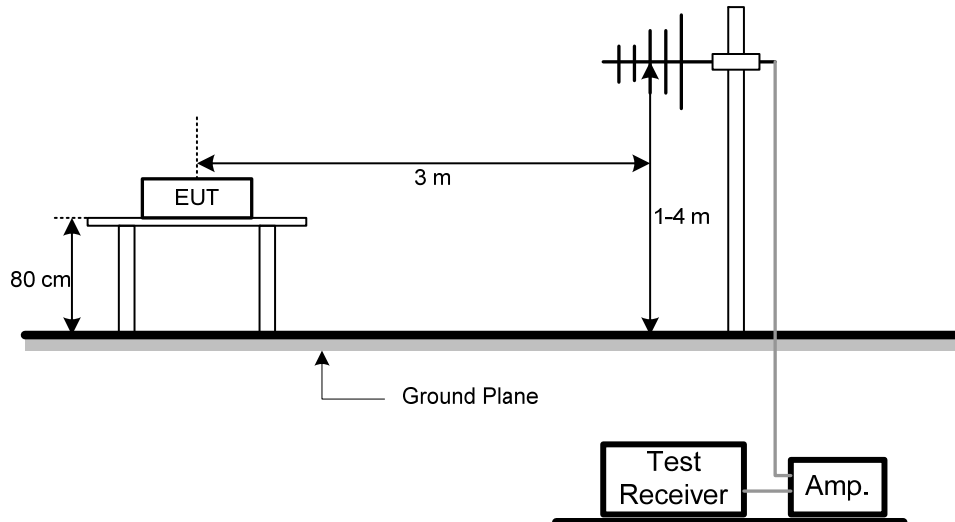
- a. Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW= 1 MHz, VBW= 1 MHz, Swp. Time = Auto.
Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW= 1 MHz, VBW= 10 Hz, Swp. Time = Auto.
- b. All 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.

4.1.4 DEVIATION FROM TEST STANDARD

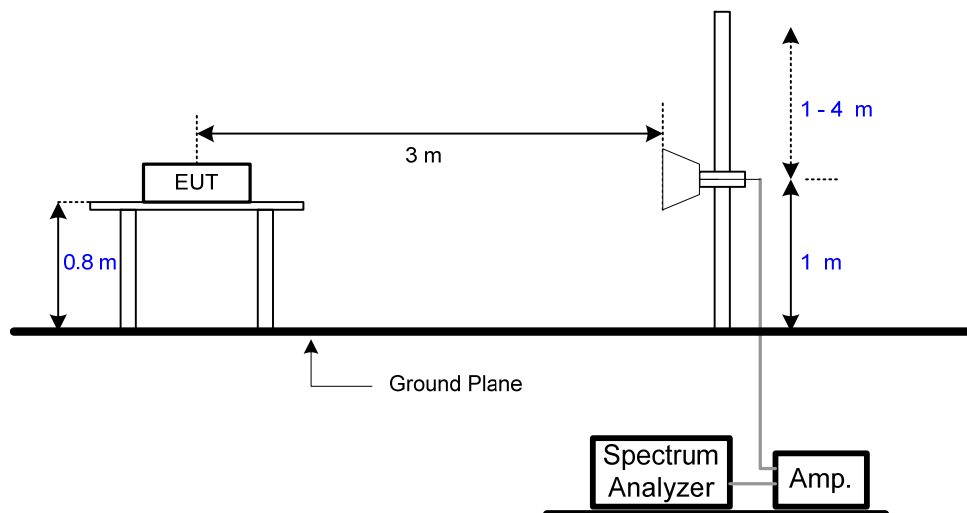
No deviation

4.1.5 TEST SETUP

Radiated Emission Test Set-Up Frequency 30 - 1000MHz



Radiated Emission Test Set-Up Frequency Above 1 GHz



4.1.6 EUT OPERATING CONDITIONS

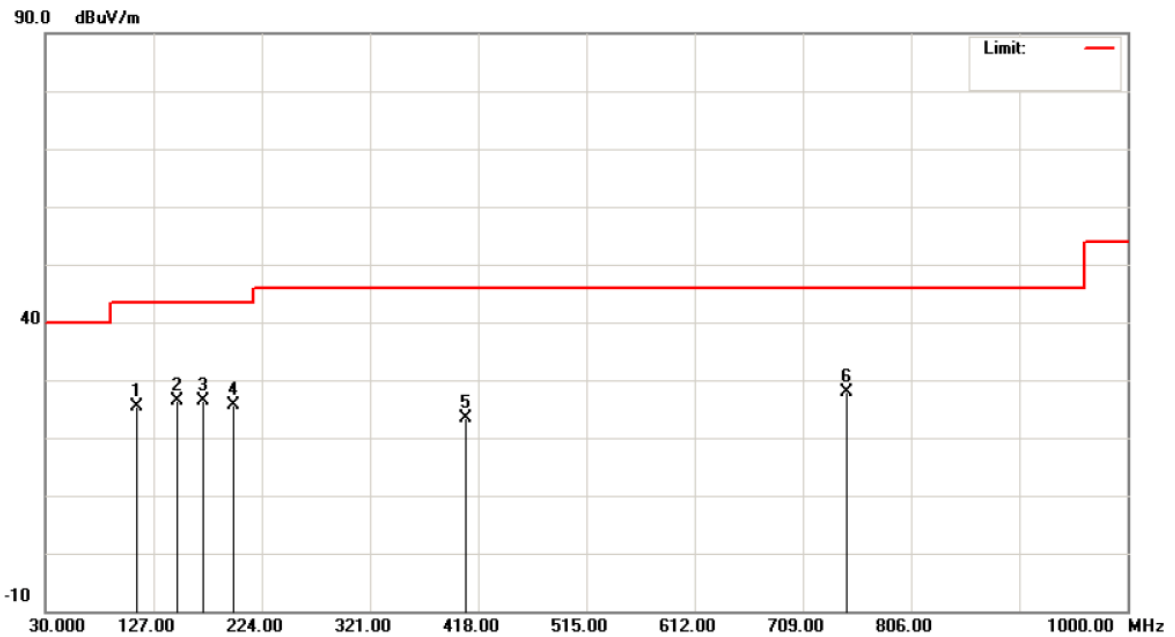
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operation condition was tested and used to collect the included data.



4.1.7 TEST RESULTS-BETWEEN 30MHz – 1000MHz

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Vertical

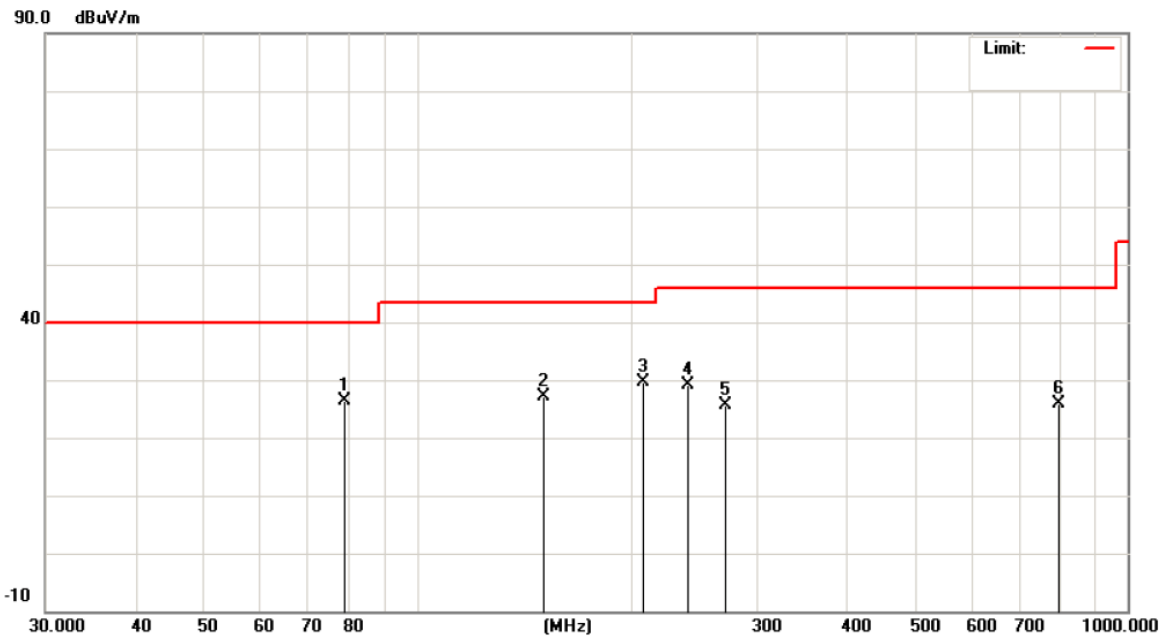


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		111.4800	41.32	-15.98	25.34	43.50	-18.16	peak	
2	*	148.3398	39.58	-13.10	26.48	43.50	-17.02	peak	
3		171.6199	40.21	-13.86	26.35	43.50	-17.15	peak	
4		198.7799	41.95	-16.28	25.67	43.50	-17.83	peak	
5		406.3598	33.21	-9.89	23.32	46.00	-22.68	peak	
6		747.7999	31.39	-3.50	27.89	46.00	-18.11	peak	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Horizontal



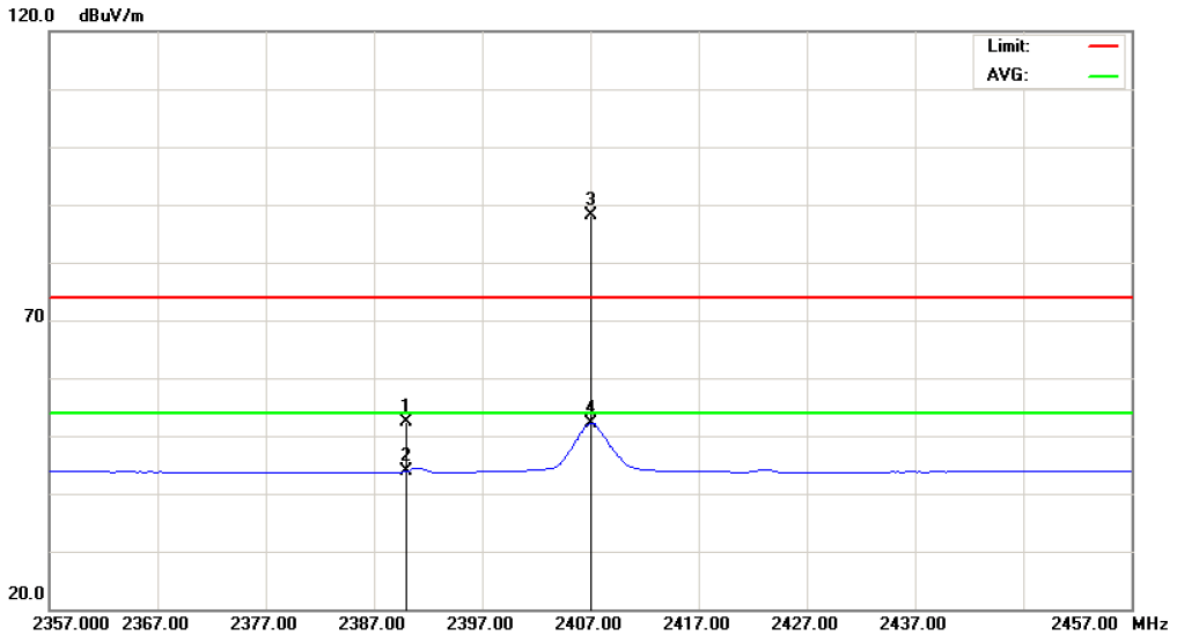
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	78.5000	42.83	-16.53	26.30	40.00	-13.70	peak	
2		150.2799	40.17	-13.05	27.12	43.50	-16.38	peak	
3		206.5399	45.69	-15.99	29.70	43.50	-13.80	peak	
4		239.5200	43.65	-14.42	29.23	46.00	-16.77	peak	
5		270.5599	39.04	-13.41	25.63	46.00	-20.37	peak	
6		794.3599	28.87	-2.90	25.97	46.00	-20.03	peak	



4.1.8 TEST RESULTS-ABOVE 1000MHz

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz		

Polarization: Vertical

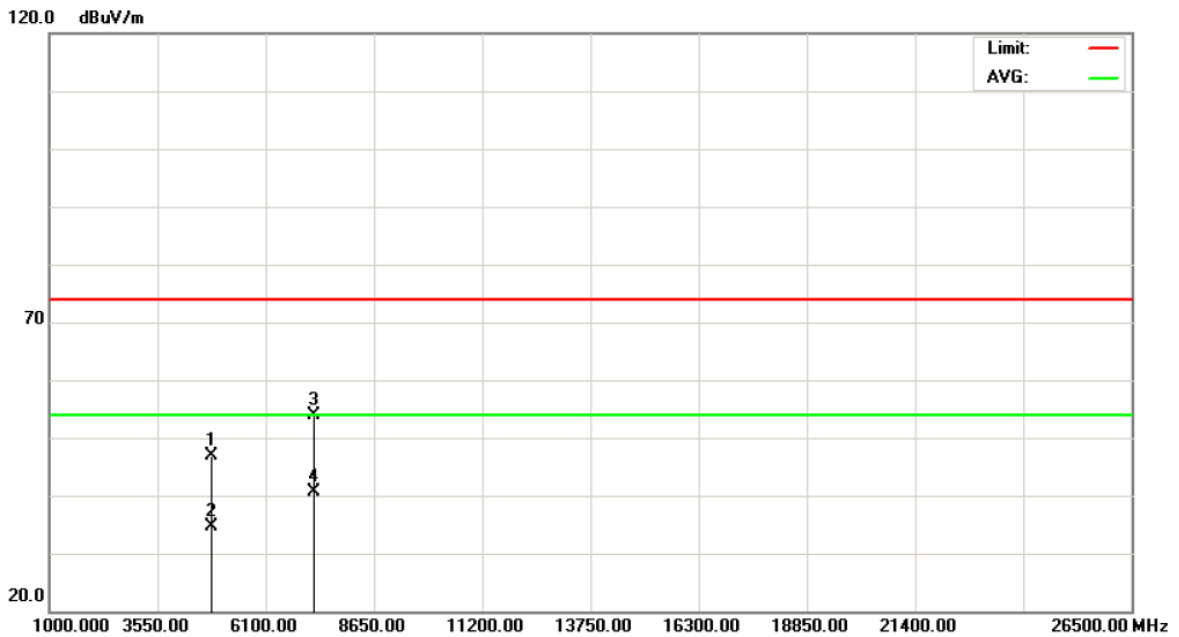


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	19.84	32.59	52.43	74.00	-21.57	peak	
2		2390.000	11.27	32.59	43.86	54.00	-10.14	AVG	
3	*	2407.000	55.50	32.66	88.16	74.00	14.16	peak	
4		2407.000	19.49	32.66	52.15	54.00	-1.85	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz		

Polarization: Vertical

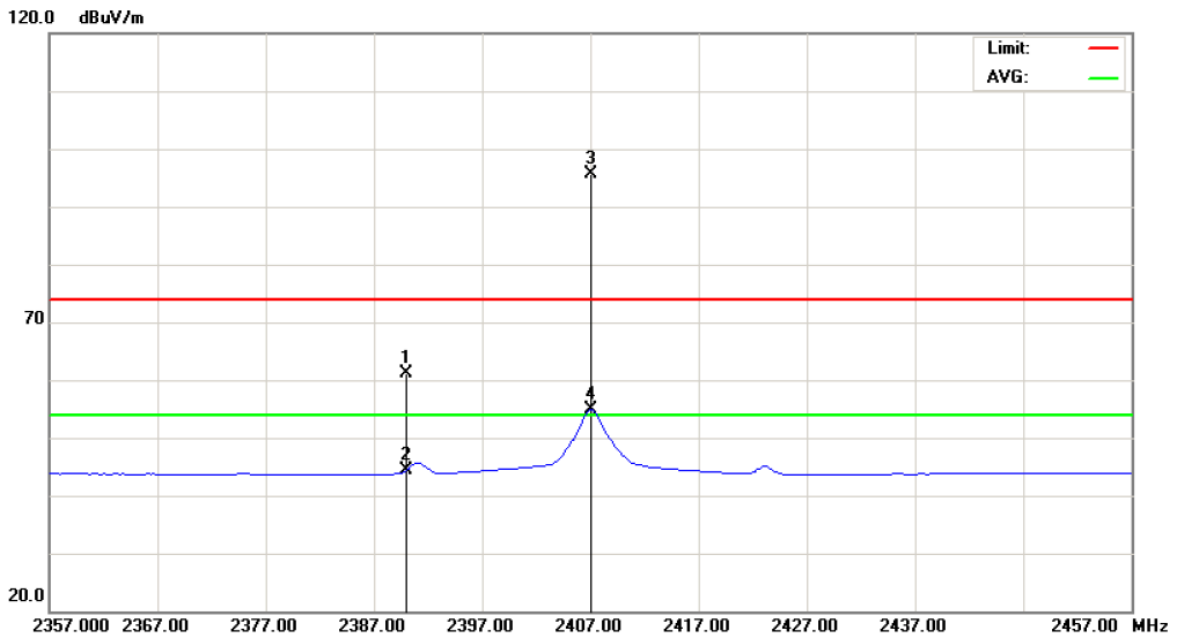


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4813.990	43.32	3.49	46.81	74.00	-27.19	peak	
2		4813.990	31.09	3.49	34.58	54.00	-19.42	AVG	
3		7221.090	43.93	9.97	53.90	74.00	-20.10	peak	
4	*	7221.090	30.70	9.97	40.67	54.00	-13.33	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz		

Polarization: Horizontal

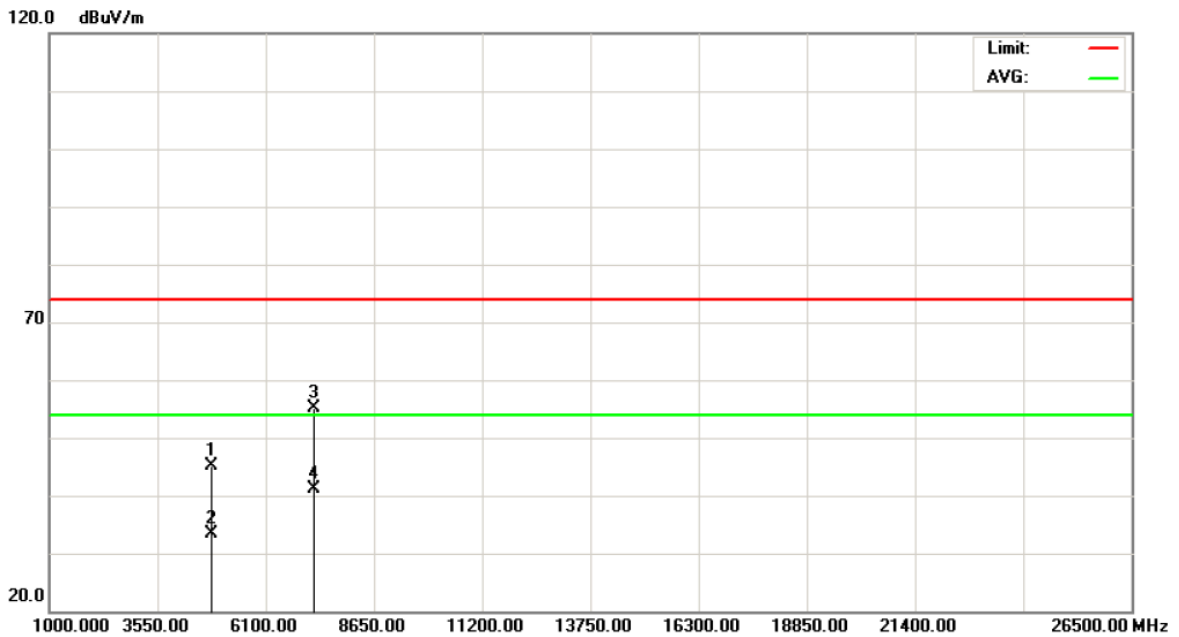


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	28.43	32.59	61.02	74.00	-12.98	peak	
2		2390.000	11.82	32.59	44.41	54.00	-9.59	AVG	
3	*	2407.000	62.93	32.66	95.59	74.00	21.59	peak	
4	X	2407.000	22.26	32.66	54.92	54.00	0.92	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz		

Polarization: Horizontal

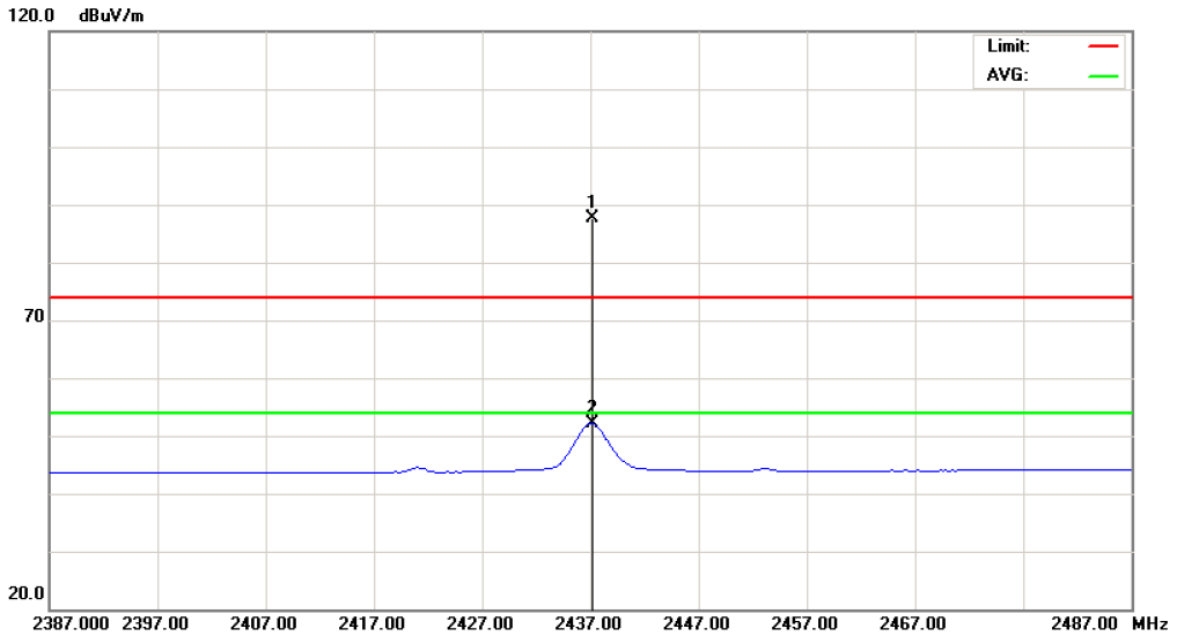


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4814.130	41.54	3.49	45.03	74.00	-28.97	peak	
2		4814.130	29.91	3.49	33.40	54.00	-20.60	AVG	
3		7220.990	45.09	9.97	55.06	74.00	-18.94	peak	
4	*	7220.990	31.16	9.97	41.13	54.00	-12.87	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Vertical

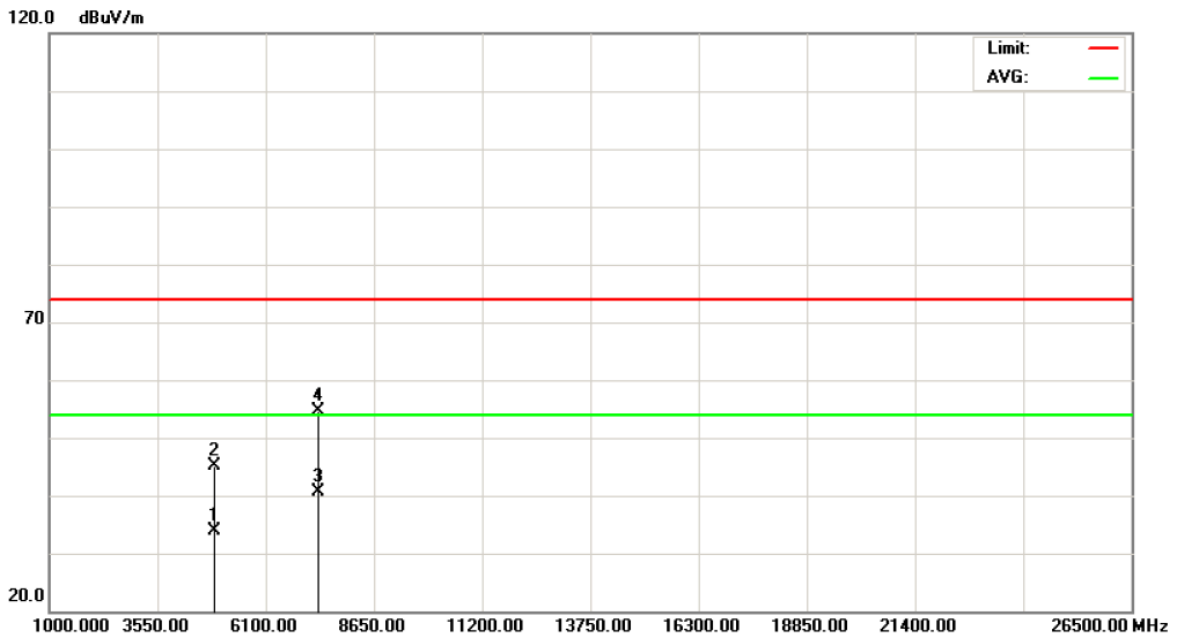


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2437.200	54.95	32.80	87.75	74.00	13.75	peak	
2		2437.200	19.42	32.80	52.22	54.00	-1.78	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Vertical

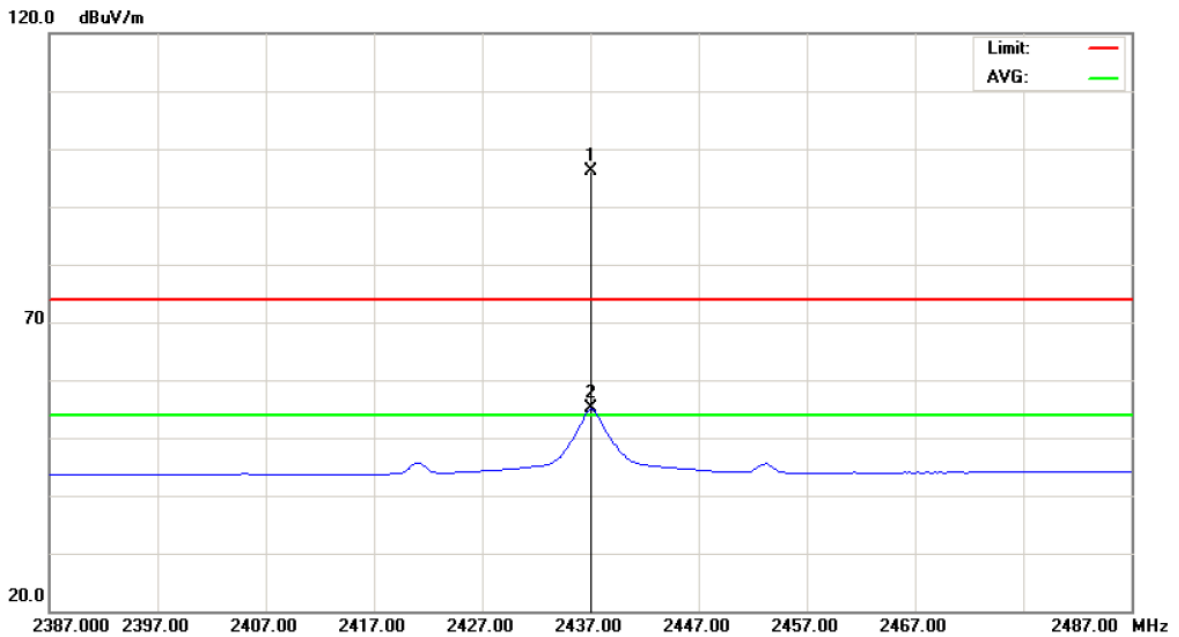


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4874.050	30.20	3.64	33.84	54.00	-20.16	AVG	
2		4874.050	41.39	3.64	45.03	74.00	-28.97	peak	
3	*	7311.110	30.49	10.09	40.58	54.00	-13.42	AVG	
4		7311.110	44.48	10.09	54.57	74.00	-19.43	peak	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Horizontal

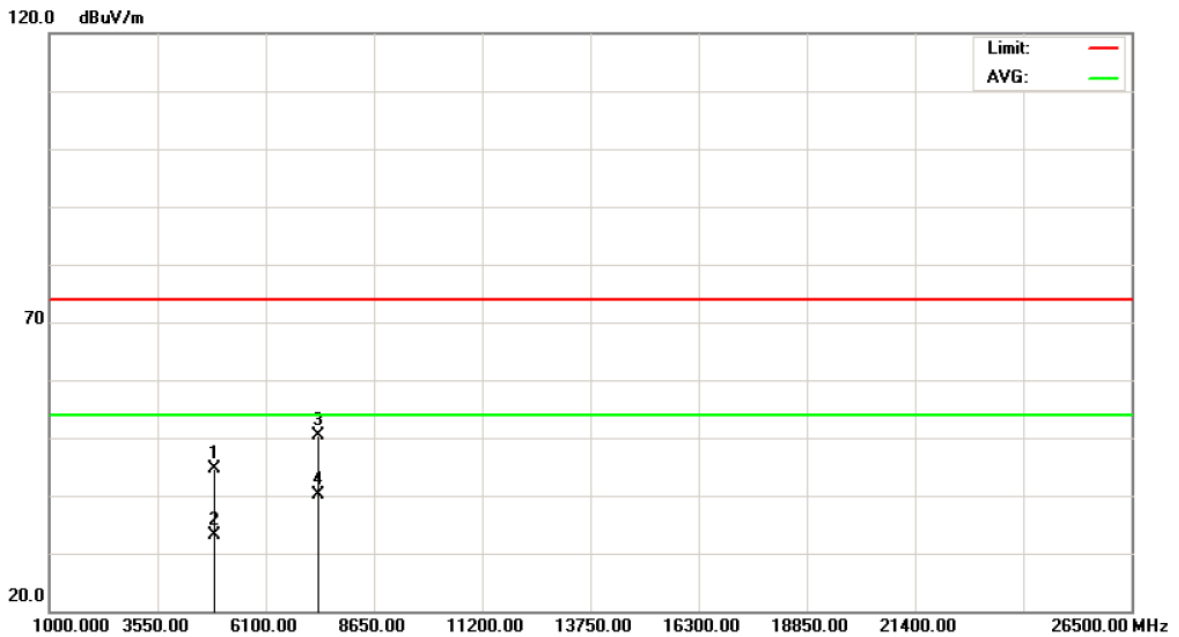


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2437.000	63.45	32.80	96.25	74.00	22.25	peak	
2	X	2437.000	22.28	32.80	55.08	54.00	1.08	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2437MHz		

Polarization: Horizontal

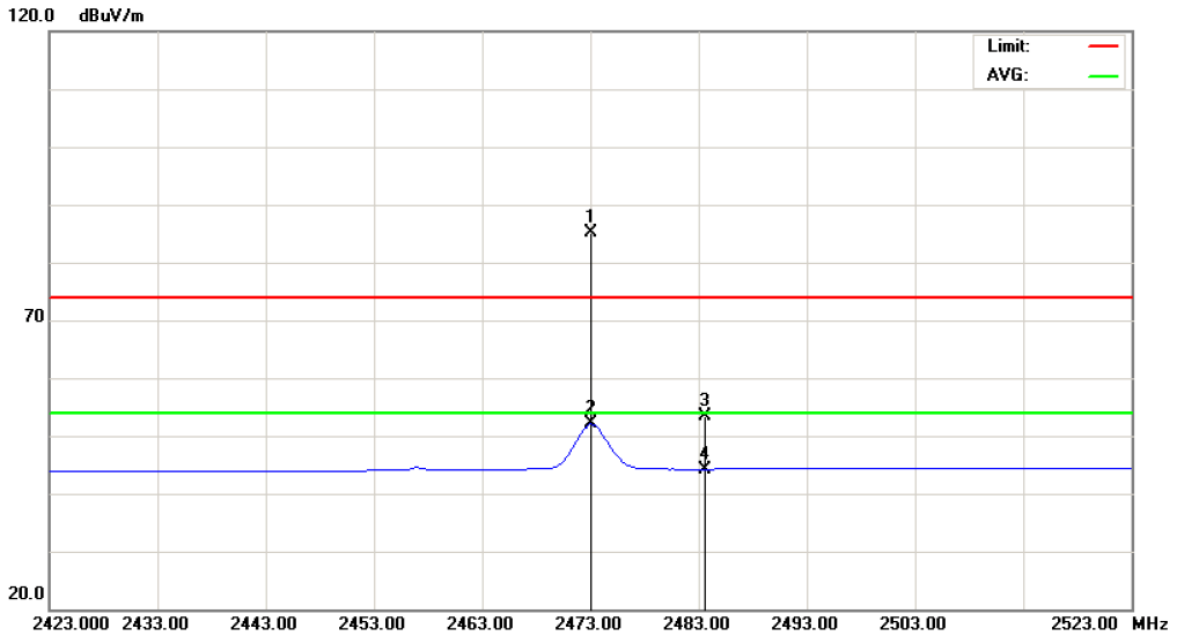


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4874.020	41.08	3.64	44.72	74.00	-29.28	peak	
2		4874.020	29.44	3.64	33.08	54.00	-20.92	AVG	
3		7310.870	40.21	10.09	50.30	74.00	-23.70	peak	
4	*	7310.870	29.97	10.09	40.06	54.00	-13.94	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2473MHz		

Polarization: Vertical

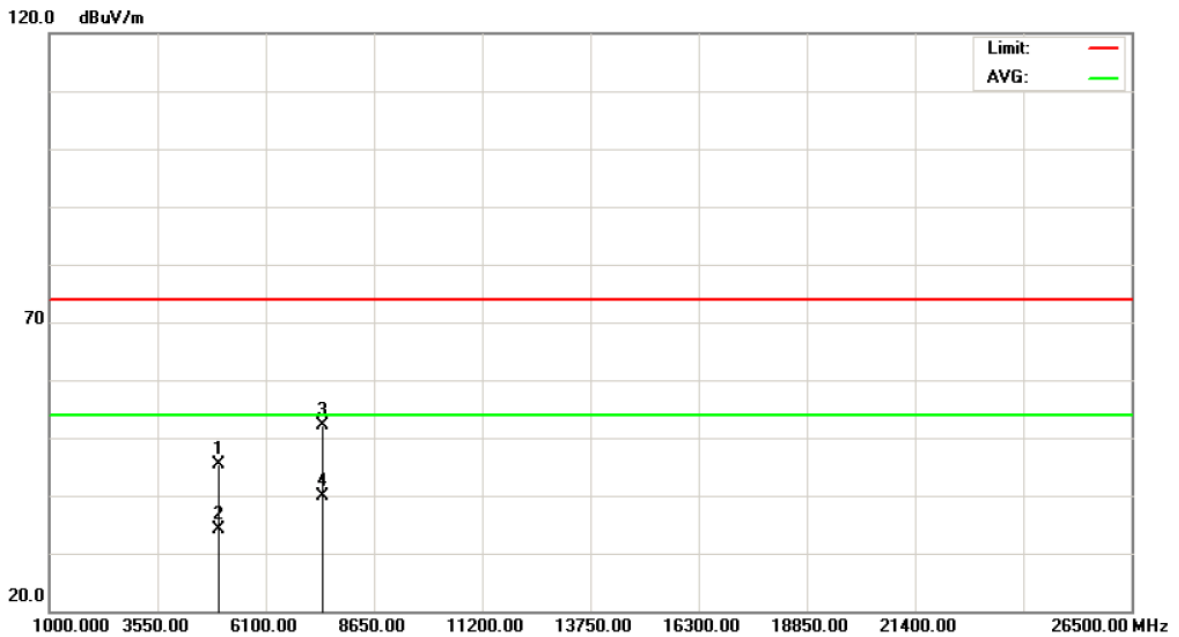


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2473.000	52.10	32.95	85.05	74.00	11.05	peak	
2		2473.000	19.06	32.95	52.01	54.00	-1.99	AVG	
3		2483.500	20.44	33.00	53.44	74.00	-20.56	peak	
4		2483.500	11.24	33.00	44.24	54.00	-9.76	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2473MHz		

Polarization: Vertical

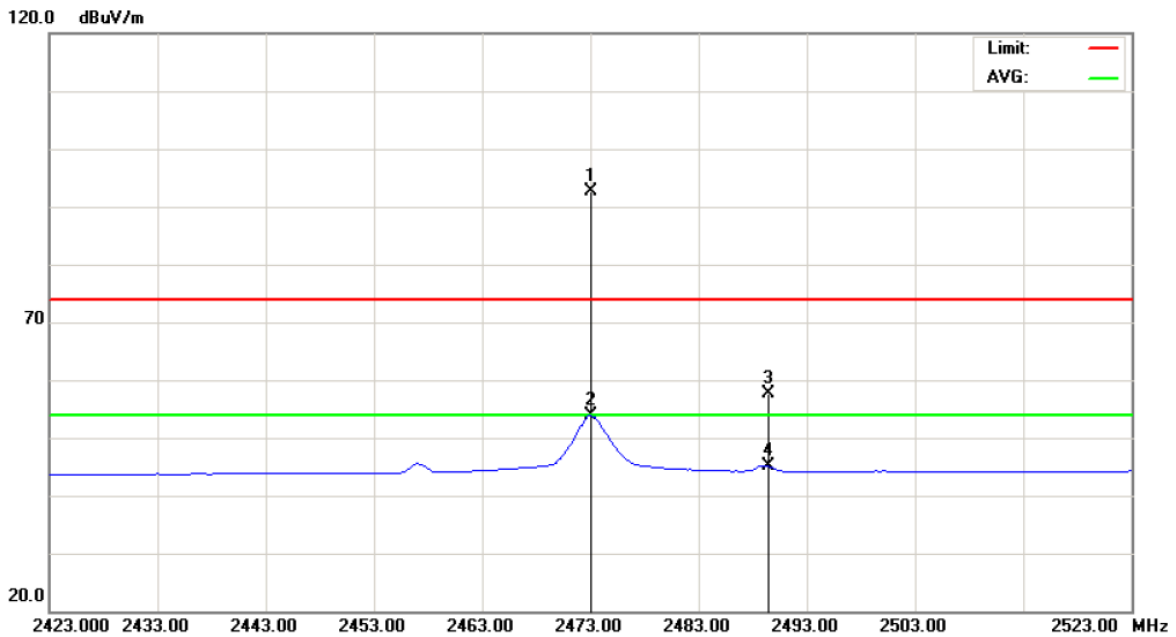


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4946.170	41.49	3.82	45.31	74.00	-28.69	peak	
2		4946.170	30.25	3.82	34.07	54.00	-19.93	AVG	
3		7418.950	42.01	10.24	52.25	74.00	-21.75	peak	
4	*	7418.950	29.54	10.24	39.78	54.00	-14.22	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2473MHz		

Polarization: Horizontal

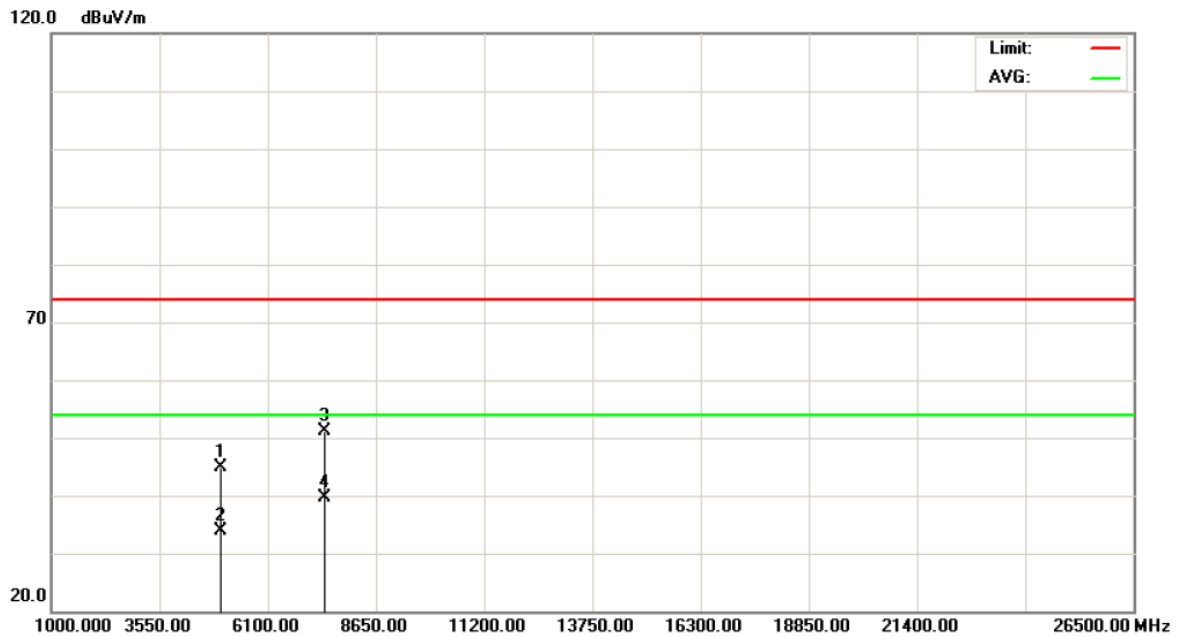


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2473.000	59.77	32.95	92.72	74.00	18.72	peak	
2		2473.000	20.98	32.95	53.93	54.00	-0.07	AVG	
3		2489.300	24.69	33.02	57.71	74.00	-16.29	peak	
4		2489.300	12.12	33.02	45.14	54.00	-8.86	AVG	



EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2473MHz		

Polarization: Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		4945.910	41.14	3.81	44.95	74.00	-29.05	peak	
2		4945.910	29.98	3.81	33.79	54.00	-20.21	AVG	
3		7418.950	40.87	10.24	51.11	74.00	-22.89	peak	
4	*	7418.950	29.30	10.24	39.54	54.00	-14.46	AVG	



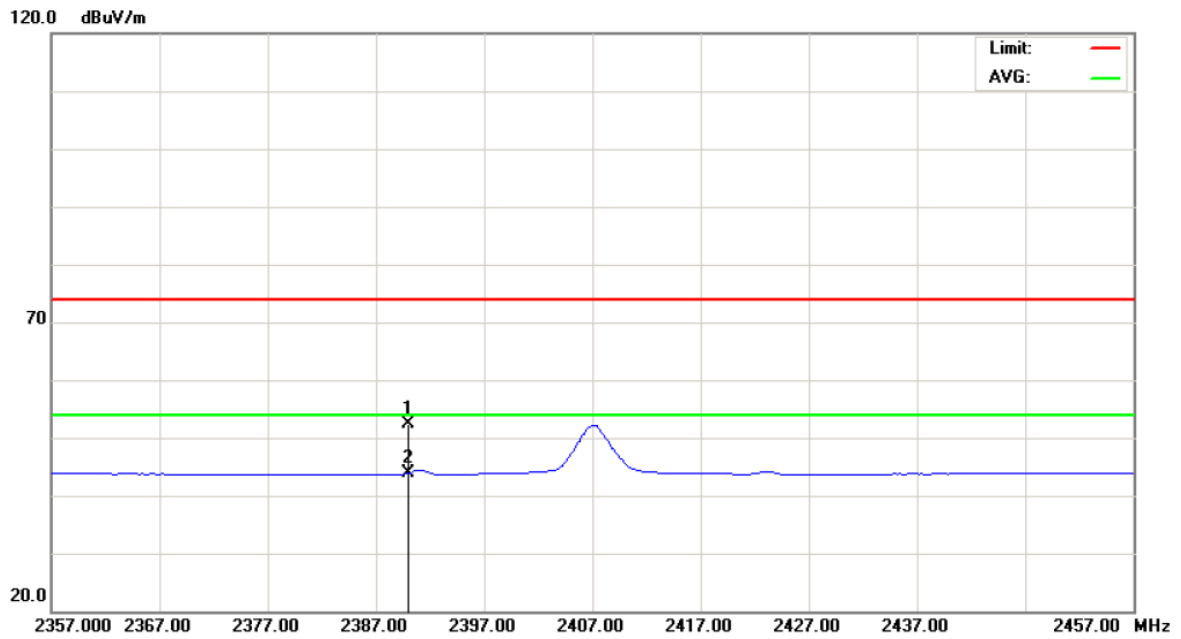
4.1.9 TEST RESULTS-RESTRICTED BANDS REQUIREMENTS

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	TX CH 2407MHz/2473MHz(Vertical)		
Note :	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (2407MHz). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (2473MHz). Then the field strength was measured at 2483.5-2500 MHz.		



2407MHz/ Orthogonal Axes: X

Polarization: Vertical

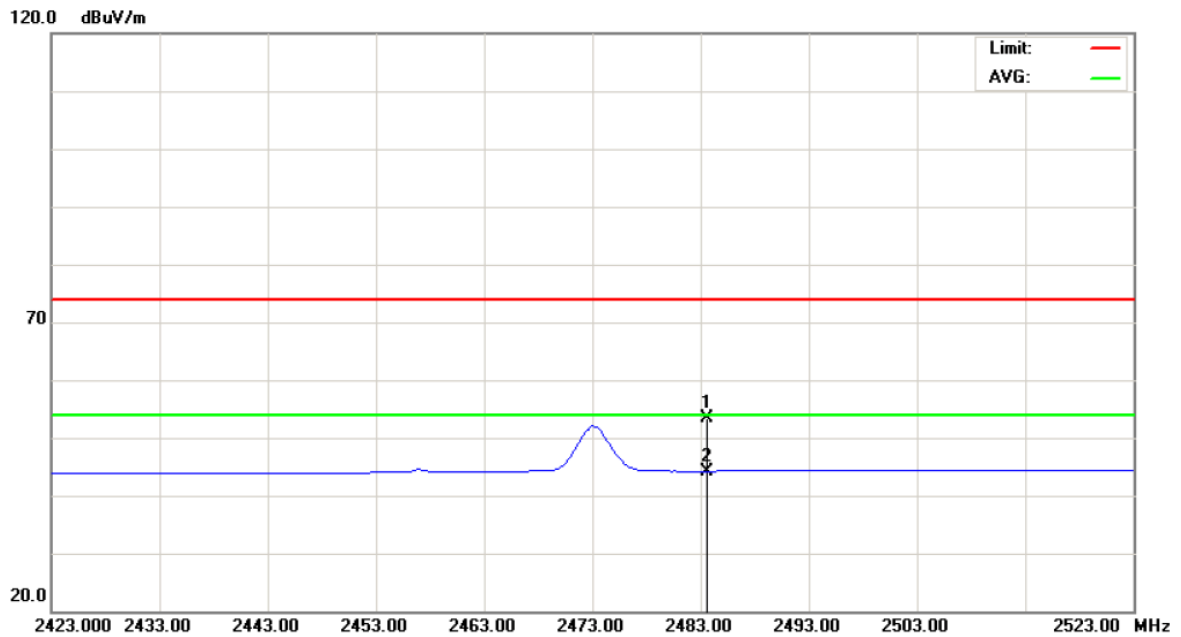


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	19.84	32.59	52.43	74.00	-21.57	peak	
2	*	2390.000	11.27	32.59	43.86	54.00	-10.14	AVG	



2473MHz/ 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	20.44	33.00	53.44	74.00	-20.56	peak	
2	*	2483.500	11.24	33.00	44.24	54.00	-9.76	AVG	

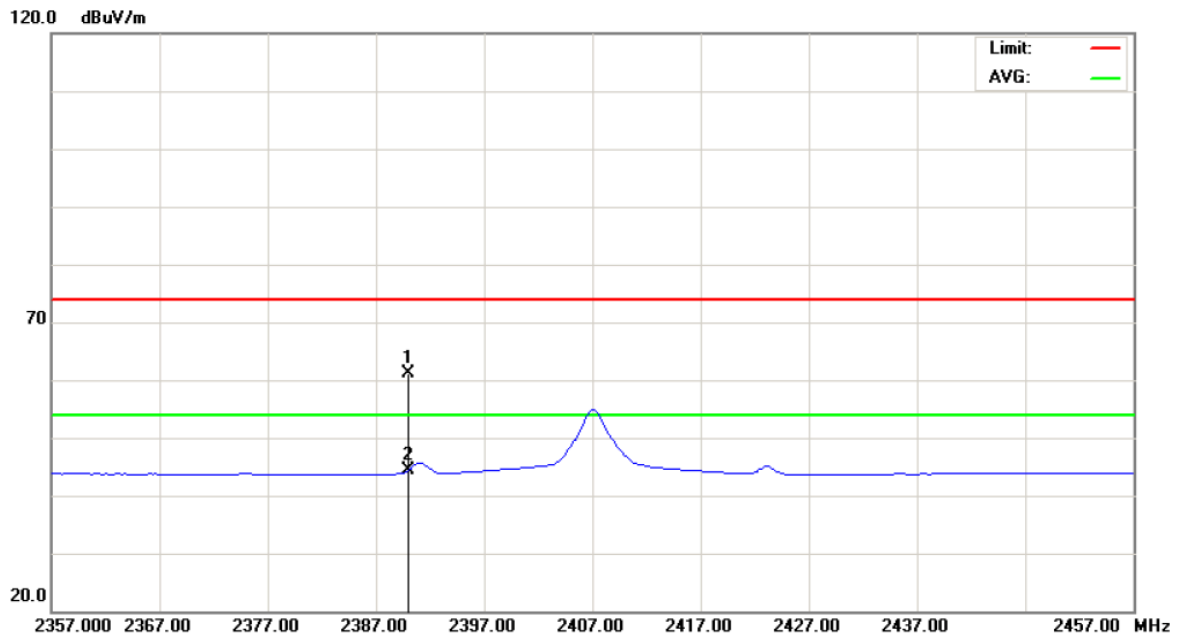


EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	TX CH 2407MHz/2473MHz (Horizontal)		
Note :	The emission of the carrier radiated field strength is measured for (Peak and AV) as following: 1. The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel (2407MHz). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was configured with the worst case antenna and setup to transmit at the highest channel (2473MHz). Then the field strength was measured at 2483.5-2500 MHz.		



2407MHz/ Orthogonal Axes: X

Polarization: Horizontal

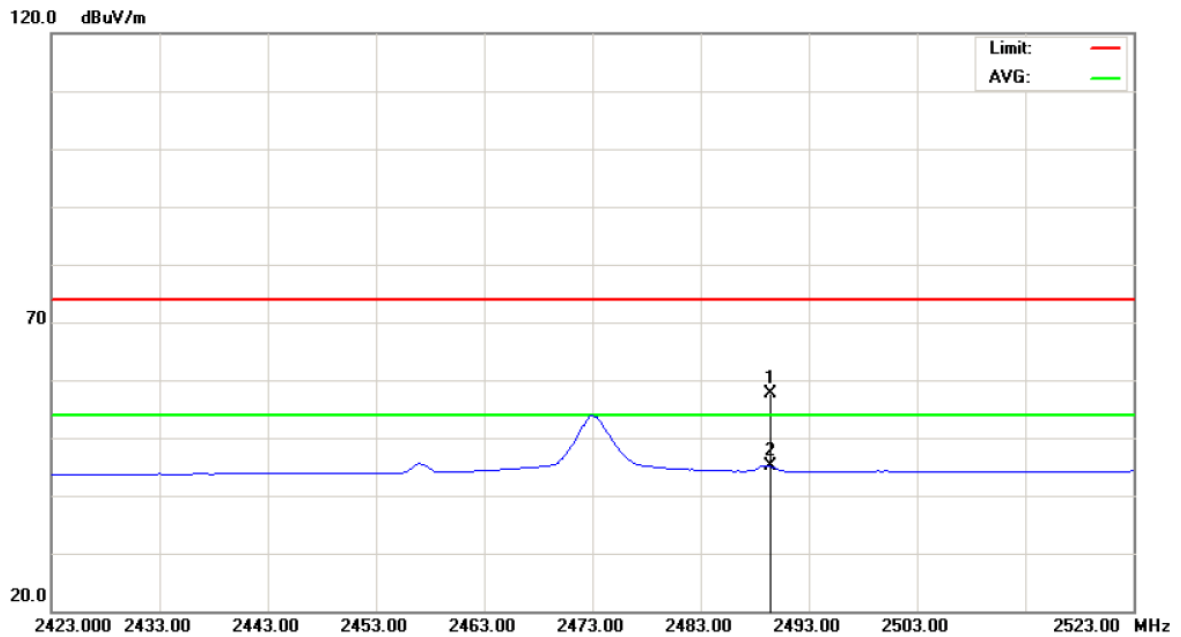


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2390.000	28.43	32.59	61.02	74.00	-12.98	peak	
2	*	2390.000	11.82	32.59	44.41	54.00	-9.59	AVG	



2473MHz/ 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		2489.300	24.69	33.02	57.71	74.00	-16.29	peak	
2	*	2489.300	12.12	33.02	45.14	54.00	-8.86	AVG	



5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
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 , 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

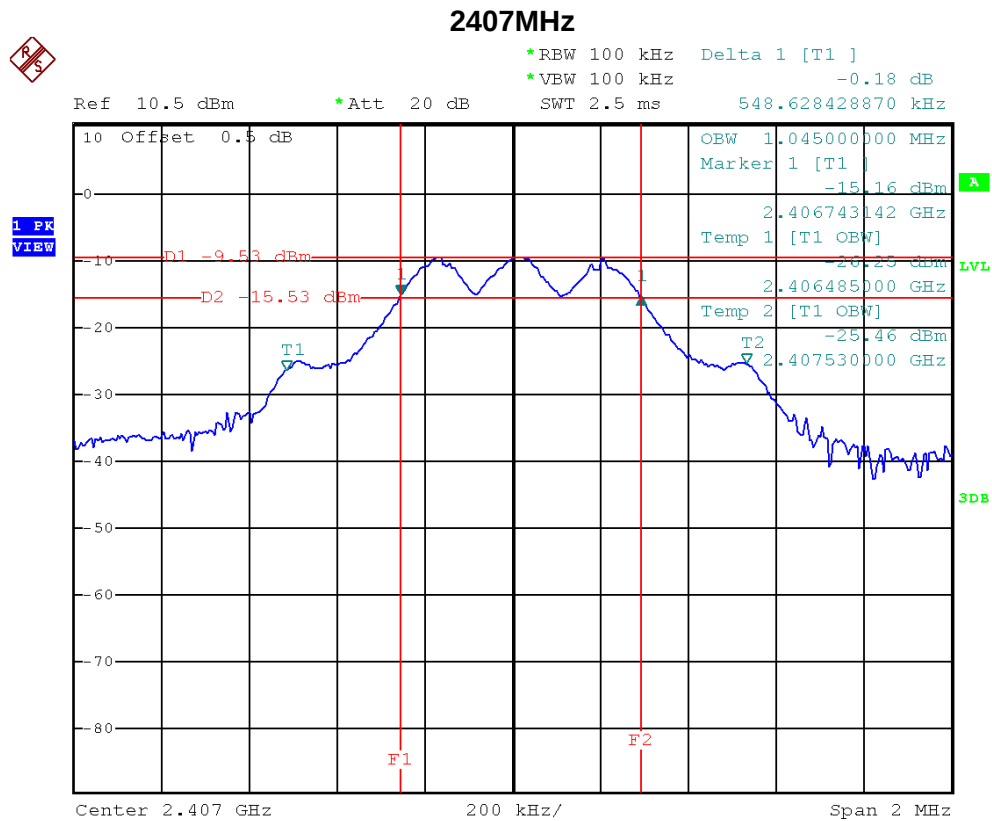
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



5.1.6 TEST RESULTS

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26° C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz/2437MHz/2473MHz		

Test Channel	Frequency (MHz)	Bandwidth (MHz)	99% Occupied BW (MHz)	LIMIT (MHz)
01	2407	0.55	1.05	>=500KHz
08	2437	0.55	1.05	>=500KHz
14	2473	0.56	1.07	>=500KHz



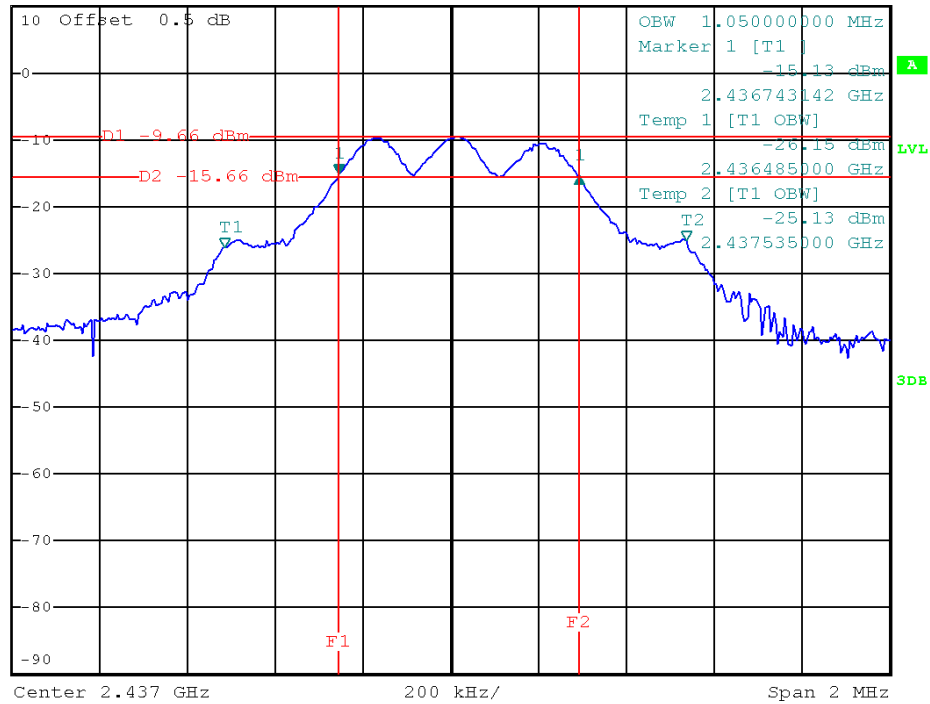


2437MHz



*RBW 100 kHz Delta 1 [T1]
*VBW 100 kHz -0.22 dB
Ref 10 dBm *Att 20 dB SWT 2.5 ms 548.628428870 kHz

1 PK
VIEW

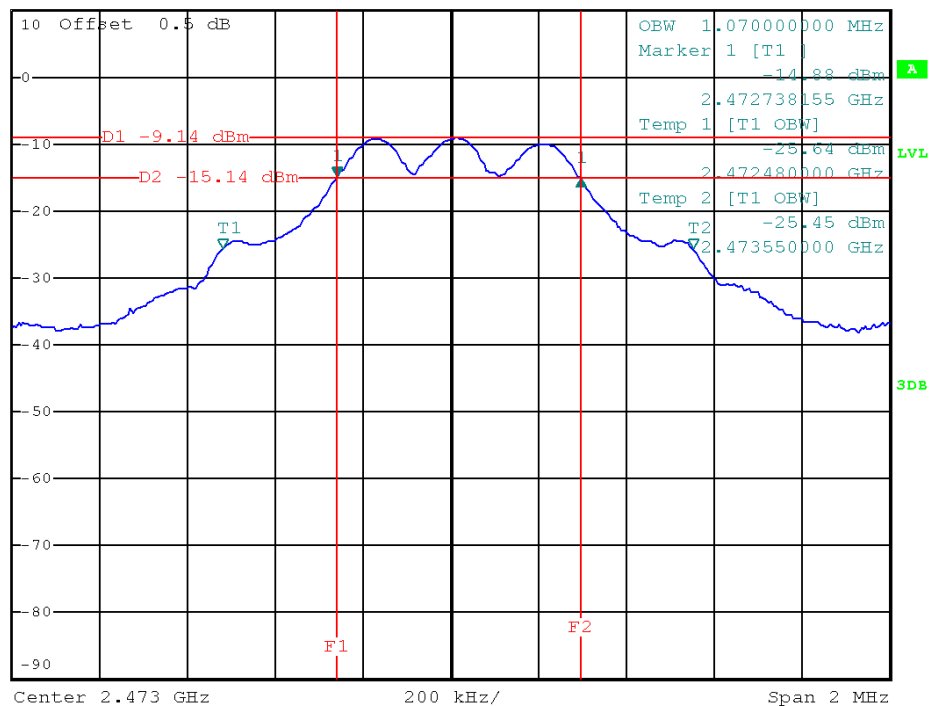


2473MHz



*RBW 100 kHz Delta 1 [T1]
*VBW 100 kHz -0.11 dB
Ref 10 dBm *Att 20 dB SWT 2.5 ms 558.603491210 kHz

1 PK
VIEW





6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
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 Sensor	Anritsu	MA2491A	34138	Feb. 17, 2012

Remark: " N/A" denotes No Model Name , 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 :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	26 °C	Relative Humidity :	60%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz/2437MHz/2473MHz		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
01	2407	-8.54	30	1
08	2437	-8.27	30	1
14	2473	-7.53	30	1



7. ANTENNA CONDUCTED SPURIOUS EMISSION

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15, Subpart C			
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.

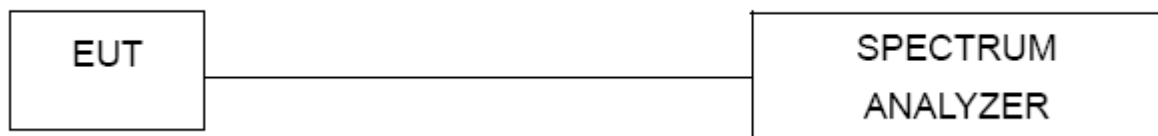
7.1.2 TEST PROCEDURE

- 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.



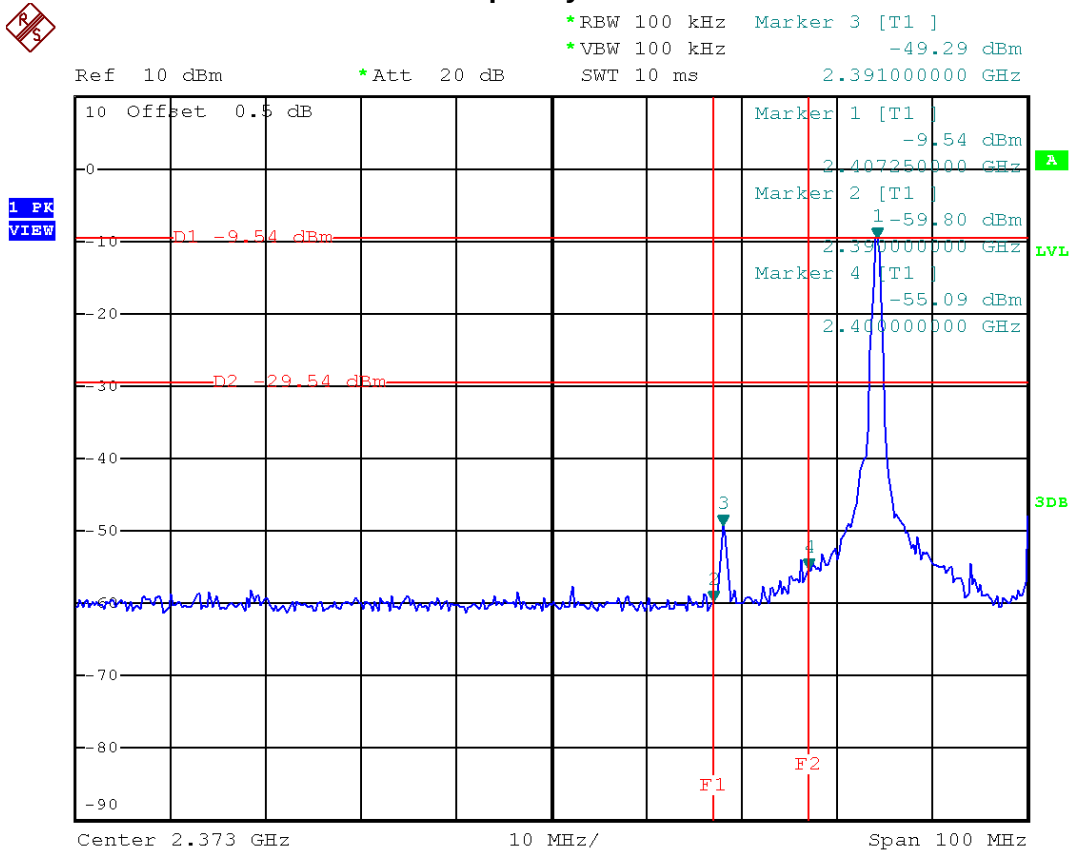
7.1.6 TEST RESULTS

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	24 °C	Relative Humidity :	54%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz/2473MHz		

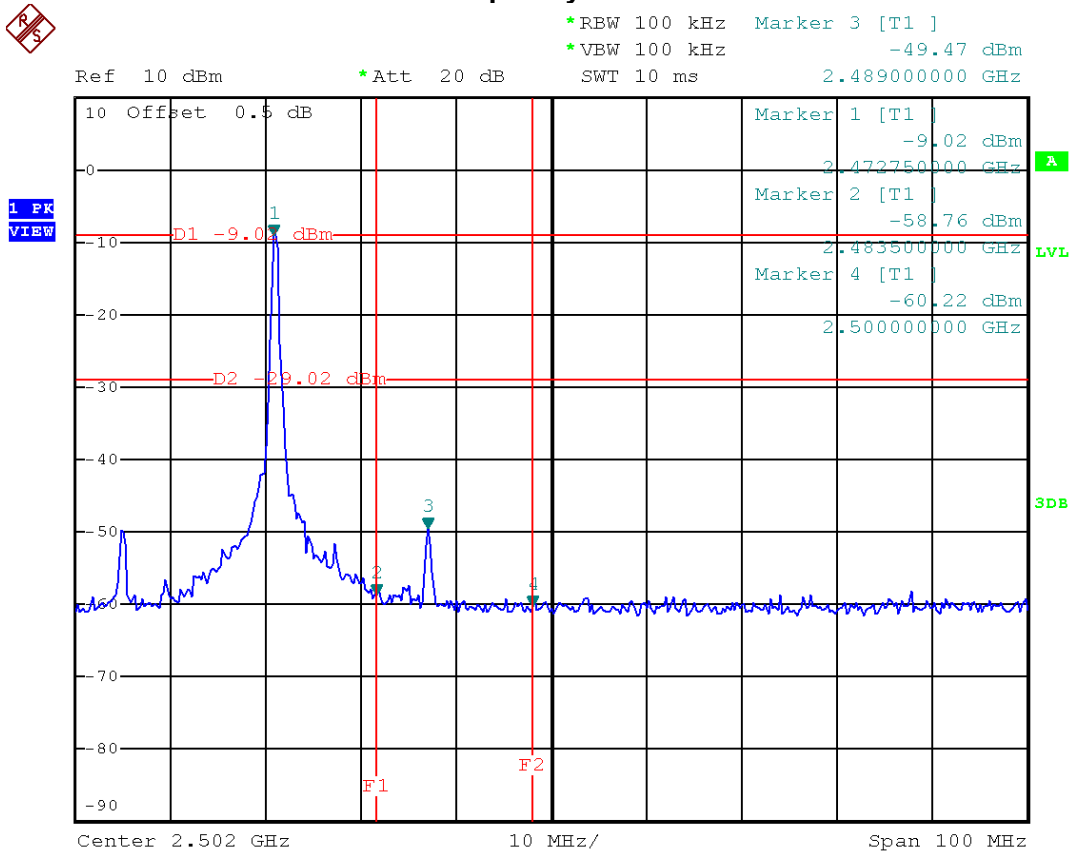
Channel of Worst Data			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2391.00	-49.29	2489.00	-49.47
Result			
In any 100kHz bandwidth 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.			



2407MHz/The max. radio frequency power in any 100kHz bandwidth outside the frequency band



2473MHz/The max. radio frequency power in any 100 kHz bandwidth within the frequency band





2407MHz/10 Harmonic of the frequency



*RBW 100 kHz Marker 2 [T1]
*VBW 100 kHz -45.75 dBm
SWT 2.5 s 7.208875000 GHz

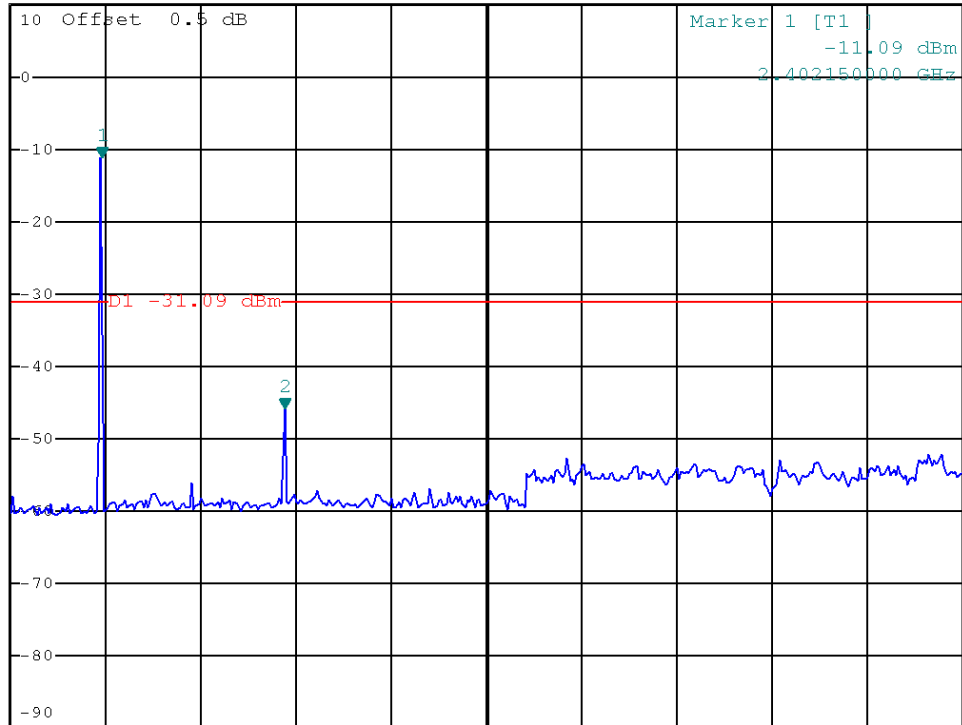
Ref 10 dBm

*Att 20 dB

SWT 2.5 s

7.208875000 GHz

1 PK
VIEW



Center 12.515 GHz

2.497 GHz/

Span 24.97 GHz

2437MHz/10 Harmonic of the frequency



*RBW 100 kHz Marker 2 [T1]
*VBW 100 kHz -49.43 dBm
SWT 2.5 s 7.321240000 GHz

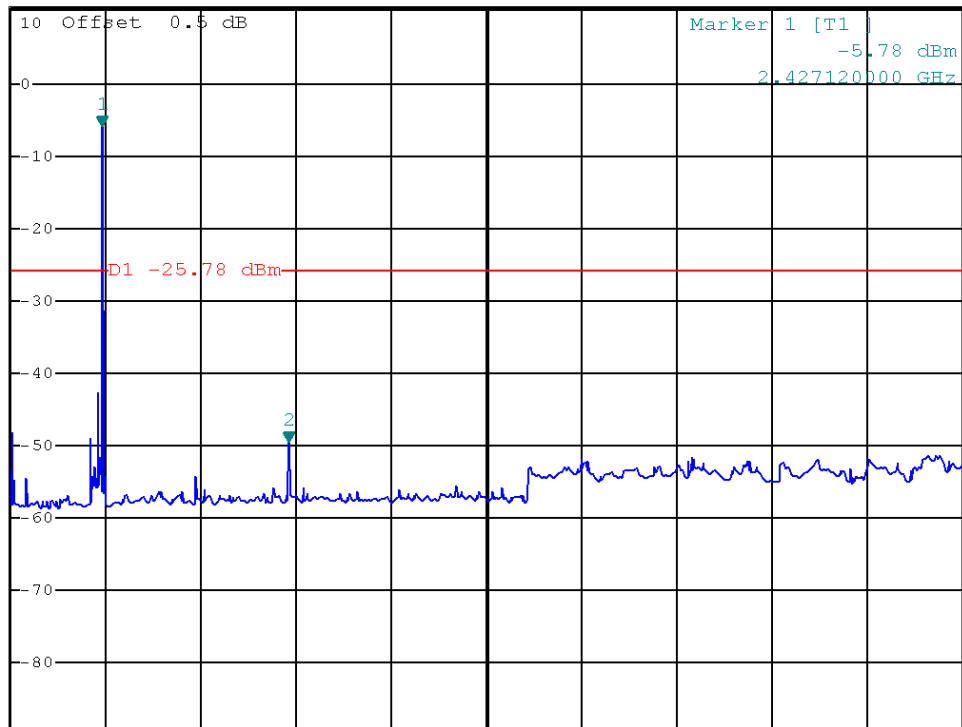
Ref 10.5 dBm

*Att 20 dB

SWT 2.5 s

7.321240000 GHz

1 PK
VIEW



Start 30 MHz

2.497 GHz/

Stop 25 GHz



2473MHz/10 Harmonic of the frequency



*RBW 100 kHz Marker 2 [T1]
*VBW 100 kHz -46.60 dBm
SWT 2.5 s 7.396150000 GHz

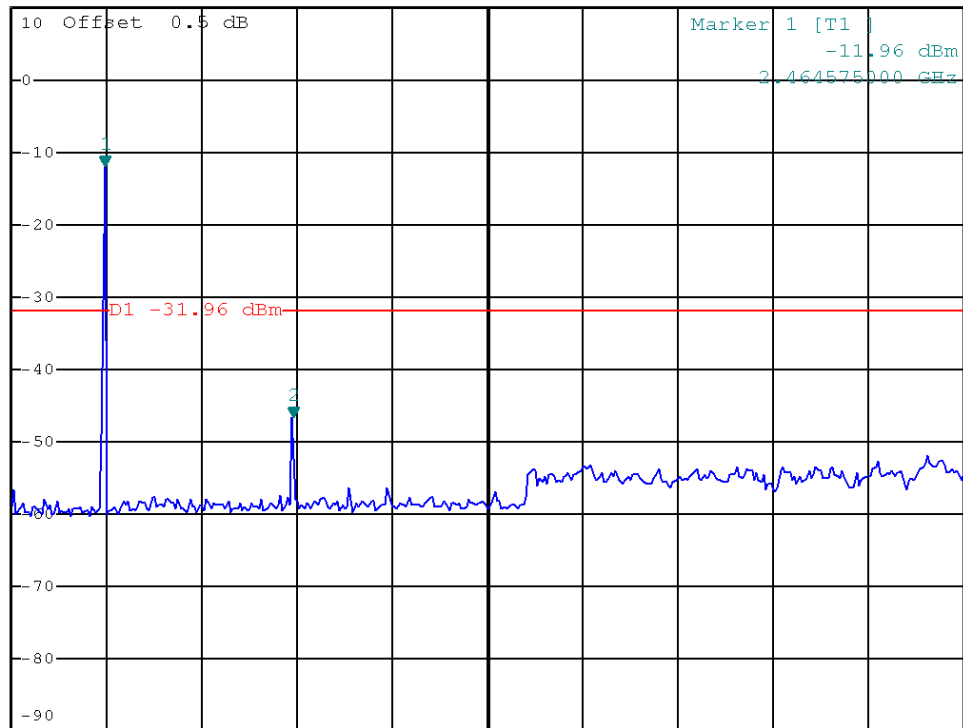
Ref 10 dBm

*Att 20 dB

SWT 2.5 s

7.396150000 GHz

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			
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 , Serial No. or No Calibration specified.

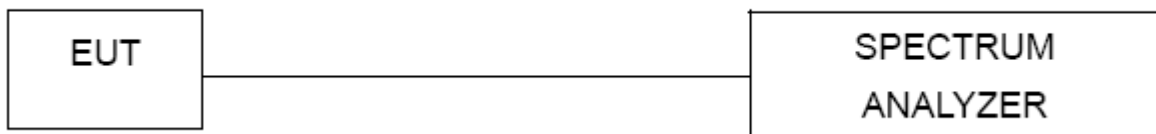
8.1.2 TEST PROCEDURE

- 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

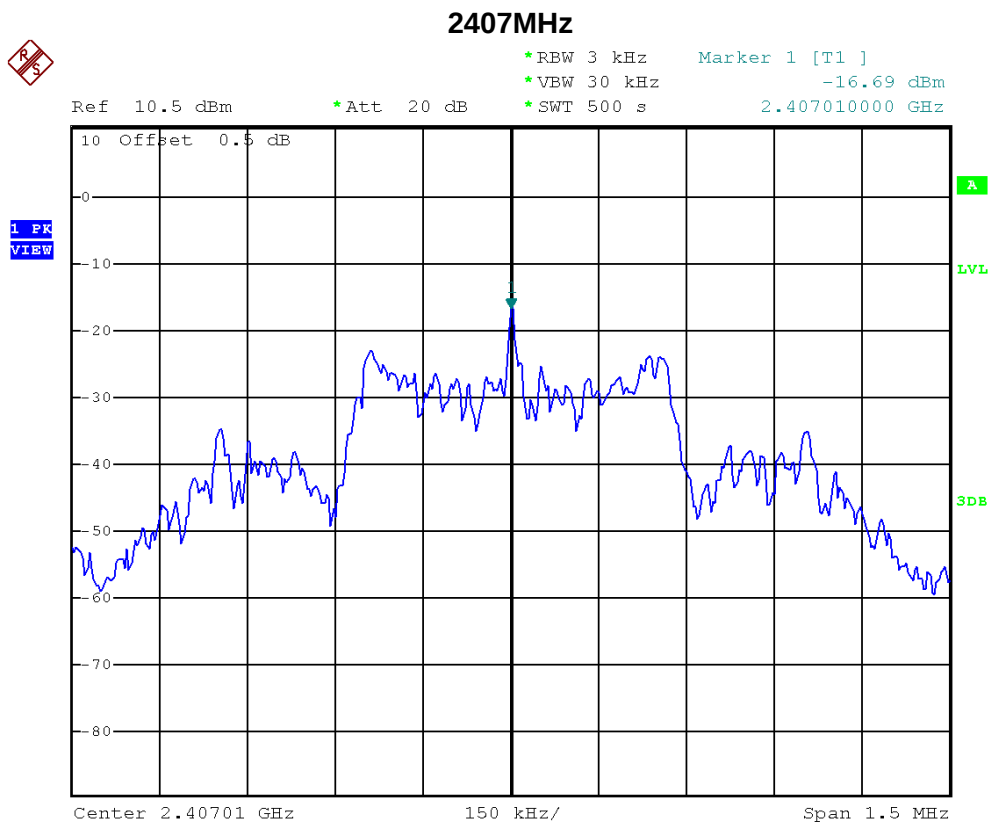
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



8.1.6 TEST RESULTS

EUT :	2.4G RF Mouse	Model Name :	G10-770HL
Temperature :	24 °C	Relative Humidity :	54%
Test Voltage :	DC 1.5V		
Test Mode :	2407MHz/2437MHz/2473MHz		

Test Channel	Frequency (MHz)	Power Density (dBm)	LIMIT (dBm)
01	2407	-16.69	8
08	2437	-16.76	8
14	2473	-16.23	8





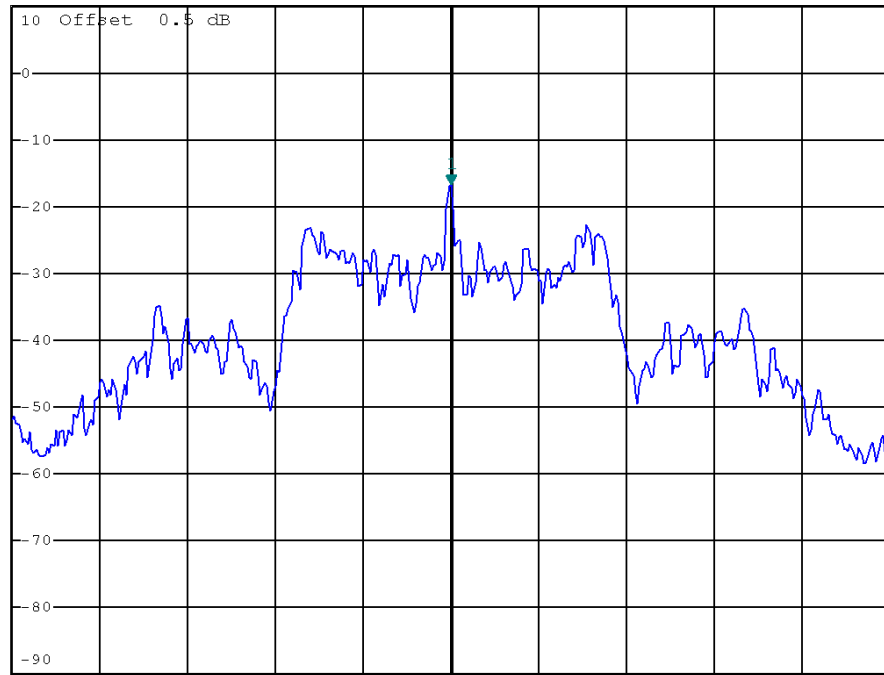
2437MHz

*RBW 3 kHz Marker 1 [T1]
*VBW 30 kHz -16.76 dBm
*SWT 500 s 2.437012500 GHz

Ref 10 dBm

*Att 20 dB

1 PK
VIEW



Center 2.4370125 GHz

150 kHz/

Span 1.5 MHz

2473MHz

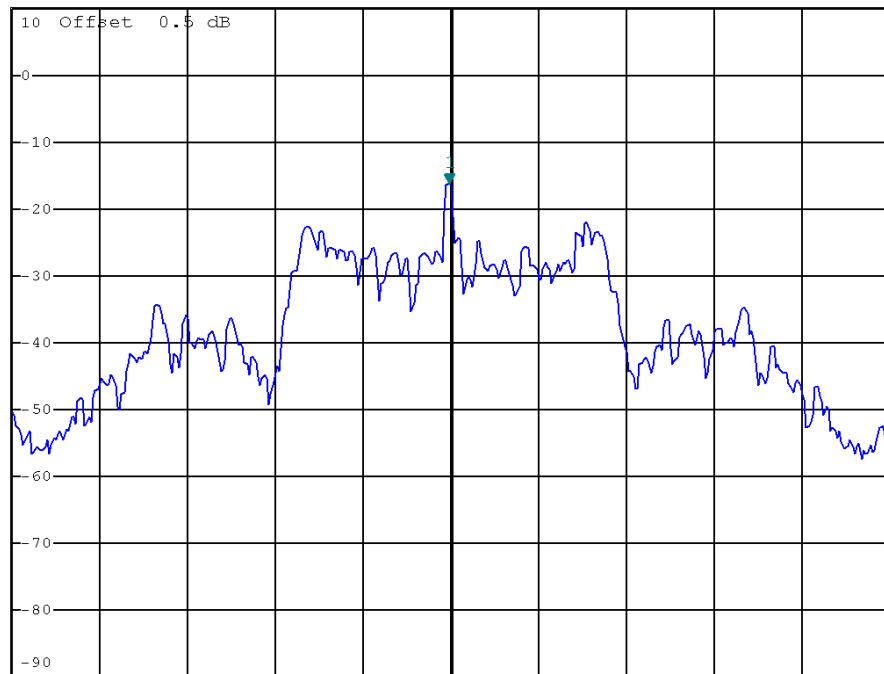
*RBW 3 kHz Marker 1 [T1]
*VBW 30 kHz -16.23 dBm
*SWT 500 s 2.473008750 GHz

Ref 10 dBm

*Att 20 dB



1 PK
VIEW



Center 2.4730125 GHz

150 kHz/

Span 1.5 MHz