



Neutron Engineering Inc.

FCC Radio Test Report

FCC ID: TW5GD7615

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

Issued Date : Aug. 30, 2010
Project No. : 1006C257A
Equipment : 2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit
Model Name : GD7615
Applicant : ShenZhen Gospell Smarthome Electronic Co., Ltd.
Address : 5Floor/Block 2,Vision(SZ) Park,Hi-Tech Industrial Park, Shenzhen China
Manufacturer : ShenZhen Gospell Smarthome Electronic Co., Ltd.
Address : F01-04/Block A,fenghuanggang first industrial park,south 1st road of baotian,xixiang street,baoan district,shenzhen city,P.R.china

Tested by:

Neutron Engineering Inc. EMC Laboratory

Date of Receipt: Aug. 10, 2010


Date of Test:

Aug. 10, 2010 ~ Aug. 29, 2010


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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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1. CERTIFICATION

Equipment : 2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit
Brand Name : GOSCAM
Model Name : GD7615
Applicant : ShenZhen Gospell Smarthome Electronic Co., Ltd.
Factory : ShenZhen Gospell Smarthome Electronic Co., Ltd.
Address : F01-04/Block A, fenghuanggang first industrial park, south 1st road of
baotian, xixiang street, baoan district, shenzhen city, P.R. china
Date of Test : Aug. 10, 2010 ~ Aug. 29, 2010
Test Item : ENGINEERING SAMPLE
Standards : FCC Part15, Subpart C(15.247) / ANSI C63.4 : 2003

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-2-1006C257A) 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).

Test result included in this report is only for the Monitor Sample part of the product.



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (d)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	Hopping Channel Separation	PASS	
15.247 (b)(1)	Peak Output Power	PASS	
15.209/15.247 (d)	Radiated Spurious Emission	PASS	
15.247 (a)(1)(iii)	Number of Hopping Frequency	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205	Restricted Bands	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 applicable in this Test Report
- (2) The EUT used new battery.



2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **DG-C03/CB03** at the location of No.3,Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792
Neutron's test firm number is 319330

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C03	CISPR	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
CB03	CISPR	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	
Trade Name	GOSCAM	
Model Name	GD7615	
OEM Brand/Model Name	N/A	
Model Difference	N/A	
Product Description	The EUT is a 2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	
	Operation Frequency:	2417.625~2464.875 MHz
	Modulation Type:	GFSK
	Number Of Channel	15 CH Please see Note 2.
	Antenna Designation:	Please see Note 3.
	Antenna Gain(Peak)	Please see Note 3.
	Output Power:	14.72 dBm
	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.	
Channel List	Please refer to the Note 2.	
Power Source	# DC Voltage supplied from 4*AAA size battery	
	# DC Voltage supplied from AC/DC adapter Brand name: Gospell; Model name:GP006AE	
Power Rating	# DC 6.0V (Battery)	
	# I/P AC 100-240V~ 50/60Hz, 0.15A O/P AC 120V/60Hz, 1A 5VA	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	N/A	

Note:

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

2.

	TX Frequency	RX Frequency
Channel	Frequency (MHz)	Frequency (MHz)
00	2417.625	2413.125
01	2421	2416.5
02	2424.375	2419.875
03	2427.75	2423.25
04	2431.125	2426.625
05	2434.5	2430
06	2437.875	2433.375
07	2441.25	2436.75
08	2444.625	2440.125
09	2448	2443.5
10	2451.375	2446.875
11	2454.75	2450.25
12	2458.125	2453.625
13	2461.5	2457
14	2464.875	2460.375

Receiver's frequency shall be applicable to the receiver's frequency which is in the transmitter's Channel.

3. Table for Filed Antenna

Ant.	Brand name	Model Name	Antenna Type	Connector	Gain (dBi)
1	Goscam	2.4GHZ antenna	Integral ANT	N/A	0



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 possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX CH00
Mode 2	TX CH07
Mode 3	TX CH14

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX CH00
Mode 2	TX CH07
Mode 3	TX CH14

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT use new battery.
- (3) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

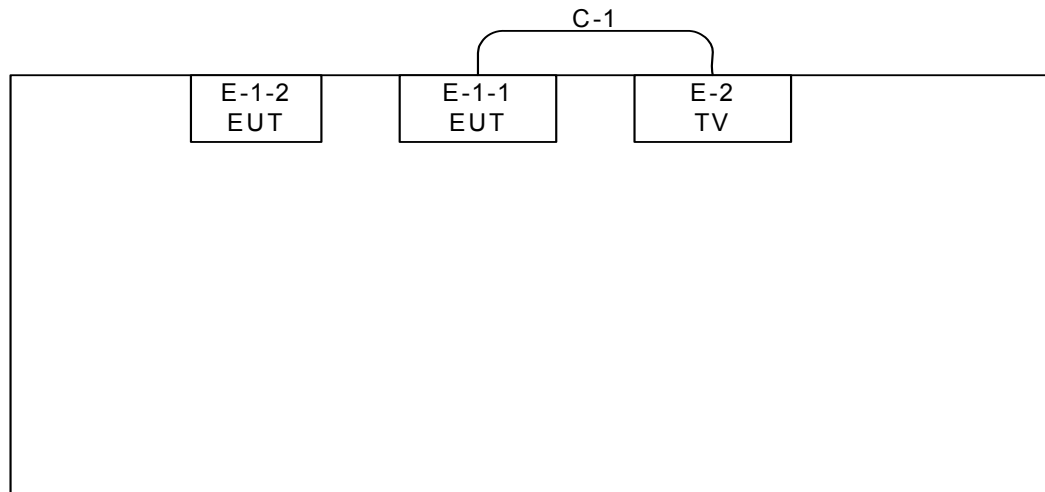
3.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: Hardware control		
Frequency	2417.625MHz	2441.25MHz	2464.875MHz
Parameters	N/A	N/A	N/A



3.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1: AV Cable



3.1 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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-1-1	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	GOSCAM	GD8229	TW5GD8229	N/A	
E-1-2	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	GOSCAM	GD7615	TW5GD7615	N/A	
E-2	TV	OLYMP	IDDHDII	DOC	N/A	

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) 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 Limits (Frequency Range 150KHz-30MHz)

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

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

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.

4.1.2 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2011
2	LISN	Rolf Heine	NNB-2-16Z	99044	May.26.2011
3	50Ω Terminator	SHX	TF2-3G-A	08122901	May.26.2011
4	Transient Limiter	Agilent	11947A	3107A03668	May.26.2011
5	Test Cable	N/A	C-06_C03	N/A	Nov.16.2010
6	EMI TEST RECEIVER	R&S	ESCS30	8333641017	May.26.2011

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

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

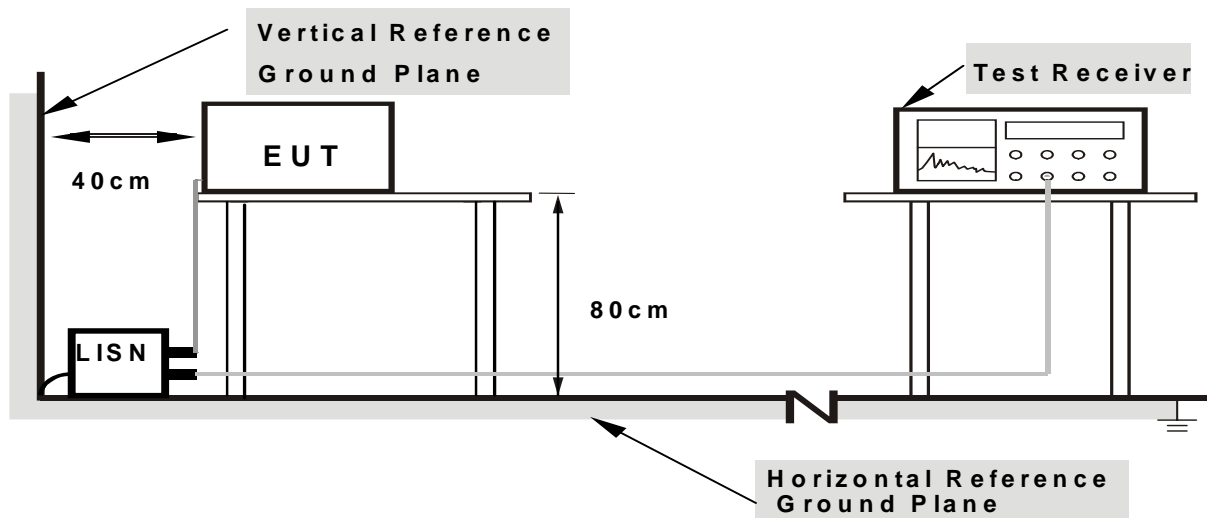
4.1.3 TEST PROCEDURE

- 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.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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.



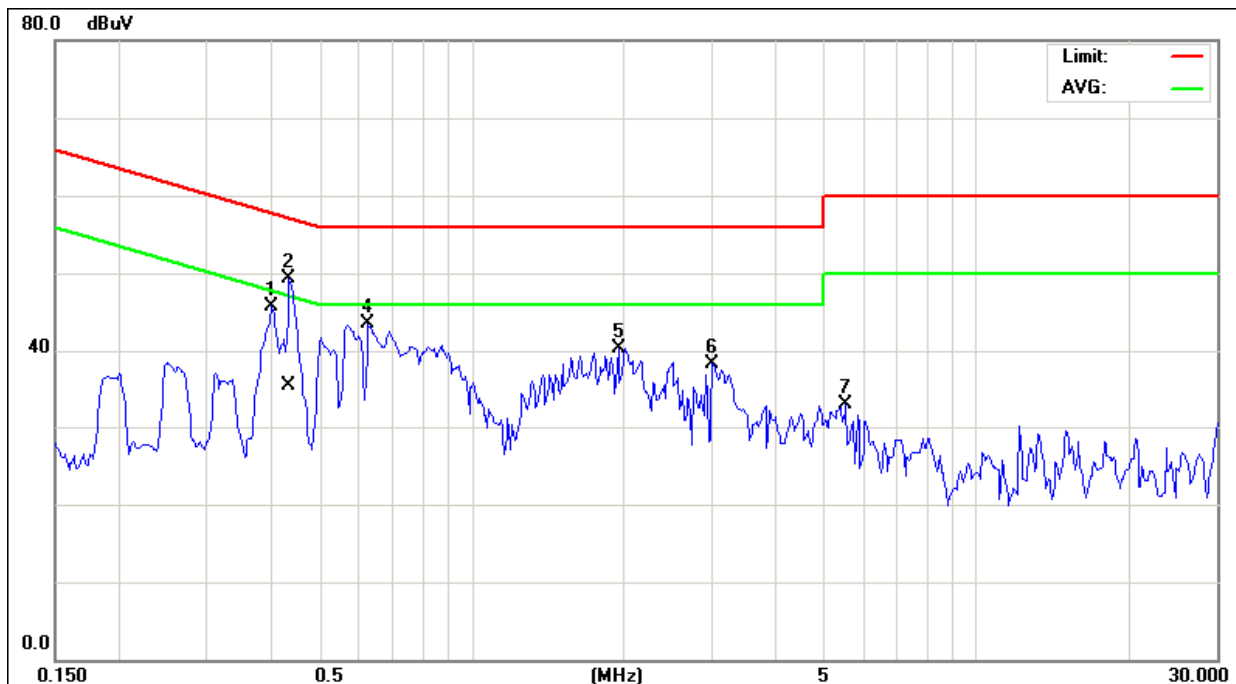
4.1.7 TEST RESULTS

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX Mode -2417.625MHz		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.40	Line	45.62	*	57.79	47.79	-12.17	(QP)
0.44	Line	49.26	35.31	57.13	47.13	-7.87	(QP)
0.62	Line	43.46	*	56.00	46.00	-12.54	(QP)
1.95	Line	40.38	*	56.00	46.00	-15.62	(QP)
3.03	Line	38.34	*	56.00	46.00	-17.66	(QP)
5.54	Line	32.91	*	60.00	50.00	-27.09	(QP)

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of Note. If the 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 QP Mode was measured, but AVG Mode didn't perform. In this case, a “*” marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) “N/A” denotes test is not applicable in this Test Report



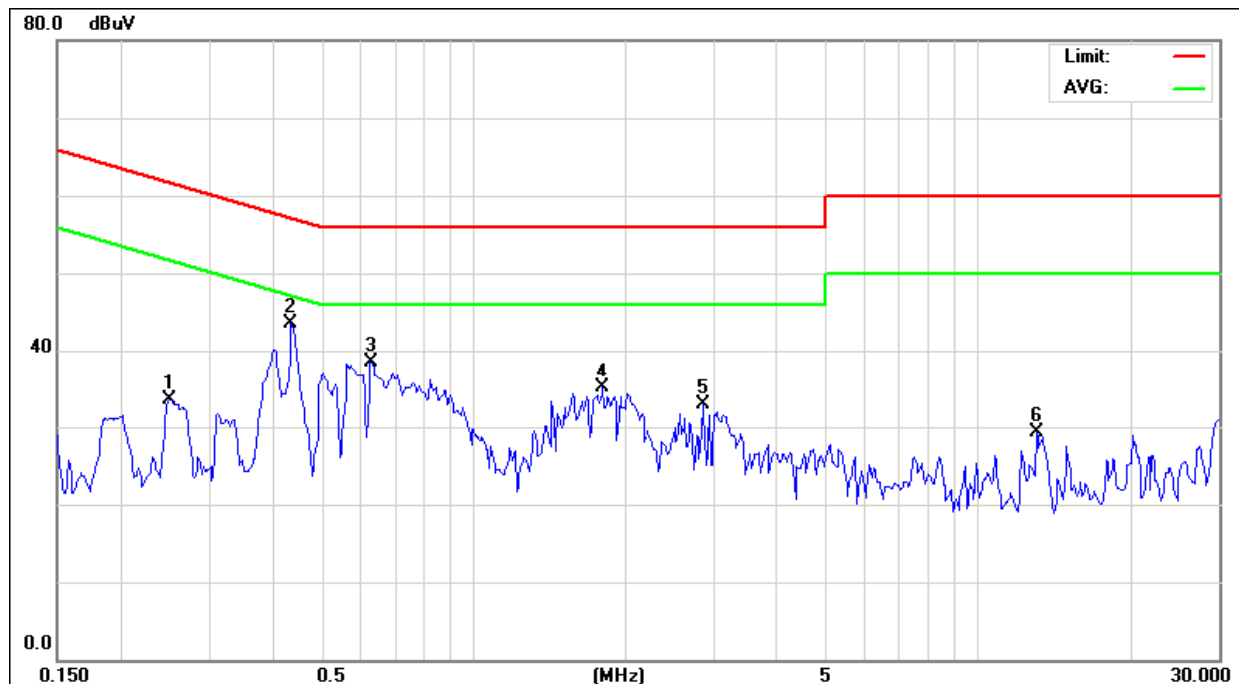


EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX Mode -2417.625MHz		

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Margin (dB)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.25	Neutral	33.52	*	61.70	51.70	-28.18	(QP)
0.44	Neutral	43.57	*	57.13	47.13	-13.56	(QP)
0.63	Neutral	38.53	*	56.00	46.00	-17.47	(QP)
1.80	Neutral	35.08	*	56.00	46.00	-20.92	(QP)
2.86	Neutral	32.96	*	56.00	46.00	-23.04	(QP)
13.11	Neutral	29.29	*	60.00	50.00	-30.71	(QP)

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of Note. If the 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 QP Mode was measured, but AVG Mode didn't perform. In this case, a " * " marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.
- (3) "N/A" denotes test is not applicable in this Test Report





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 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 (microvolt/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)	(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).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower



4.2.2 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Horn Antenna	ETS	3115	00075789	May.12.2011
2	Amplifier	Agilent	8449B	3008A02274	May.26.2011
3	Spectrum	Agilent	E4408B	US39240143	Nov.16.2010
4	Test Cable	HUBER+SUHNER	CB03 High Fre	N/A	May.03.2011
5	Bi-log Antenna	Schwarbeck	VULB9160	9160-3232	May.26.2011
6	Amplifier	HP	8447D	2944A09673	May.26.2011
7	Test Receiver	R&S	ESCI	100895	May.26.2011
8	Test Cable	N/A	C-01_CB03	N/A	Jul.05.2011
9	Controller	CT	SC100	N/A	N/A
10	Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	May.12.2011

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



4.2.3 TEST PROCEDURE

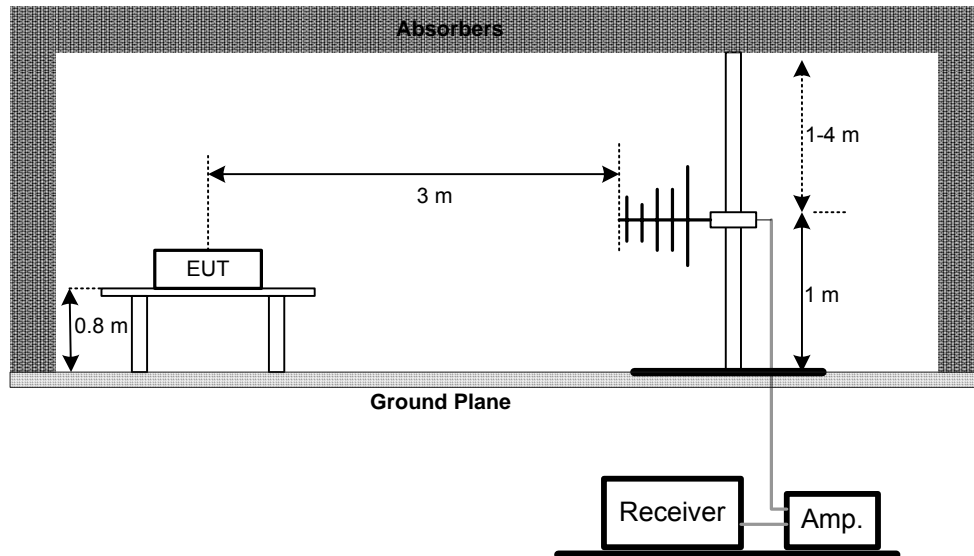
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 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 conducted 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.

4.2.4 DEVIATION FROM TEST STANDARD

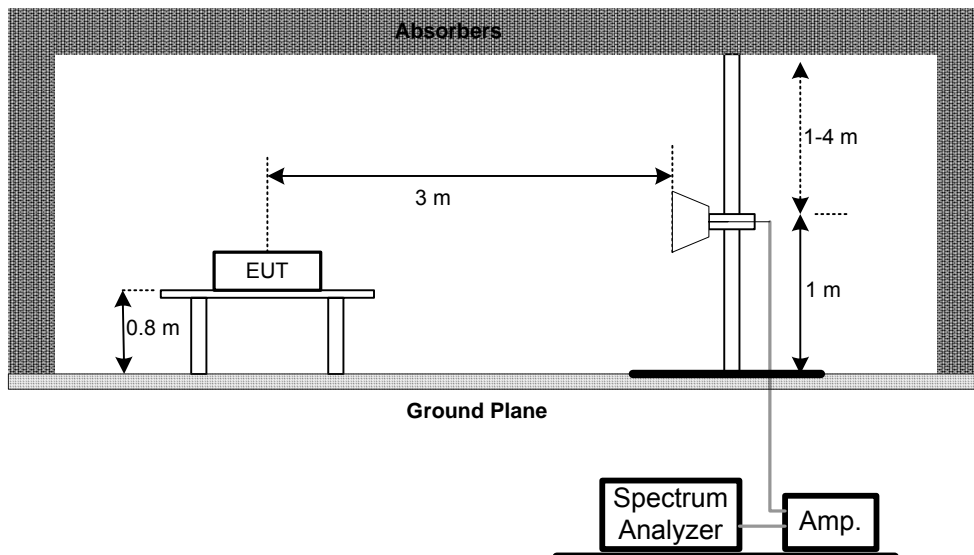
No deviation

4.2.5 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



4.2.6 EUT OPERATING 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.



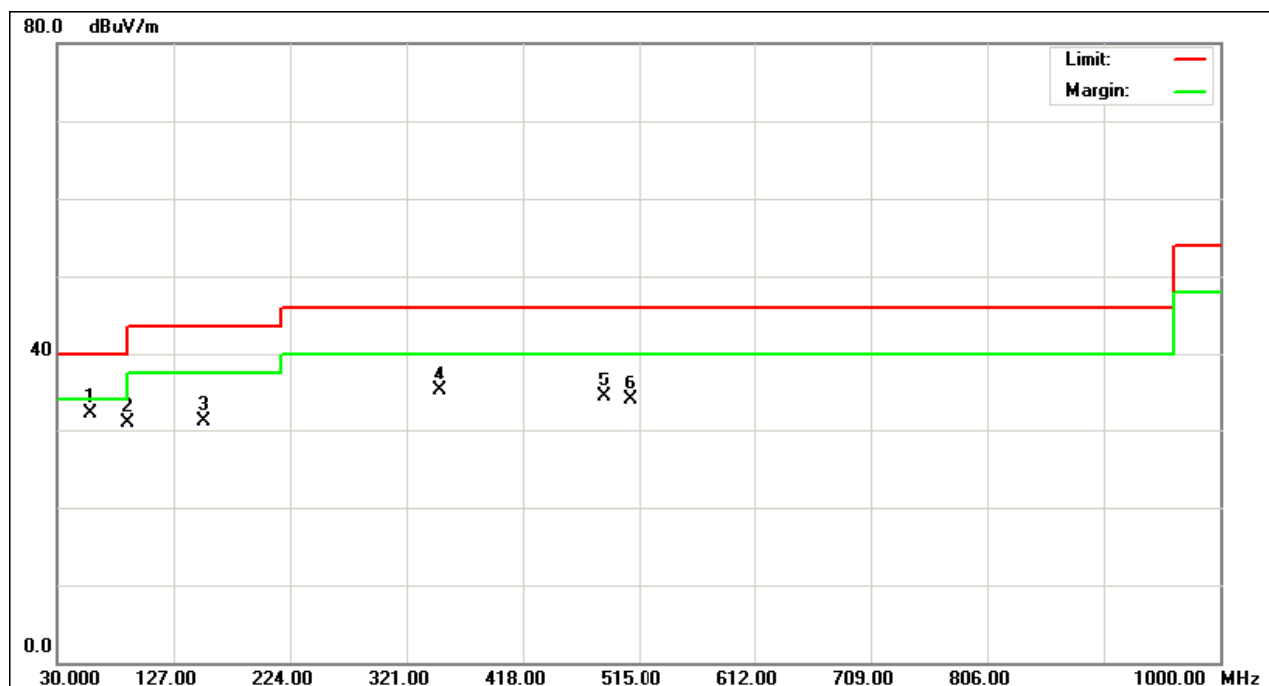
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHZ)

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2417.625MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
57.13	V	54.48	-22.33	32.15	40.00	- 7.85	
86.32	V	51.15	-20.29	30.86	40.00	- 9.14	
150.42	V	48.70	-17.60	31.10	43.50	- 12.40	
347.86	V	47.59	-12.43	35.16	46.00	- 10.84	
485.77	V	42.45	-8.23	34.22	46.00	- 11.78	
506.03	V	41.44	-7.57	33.87	46.00	- 12.13	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (2) 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 .
- (3) Measuring frequency range from 30MHz to 1000MHz .
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table .



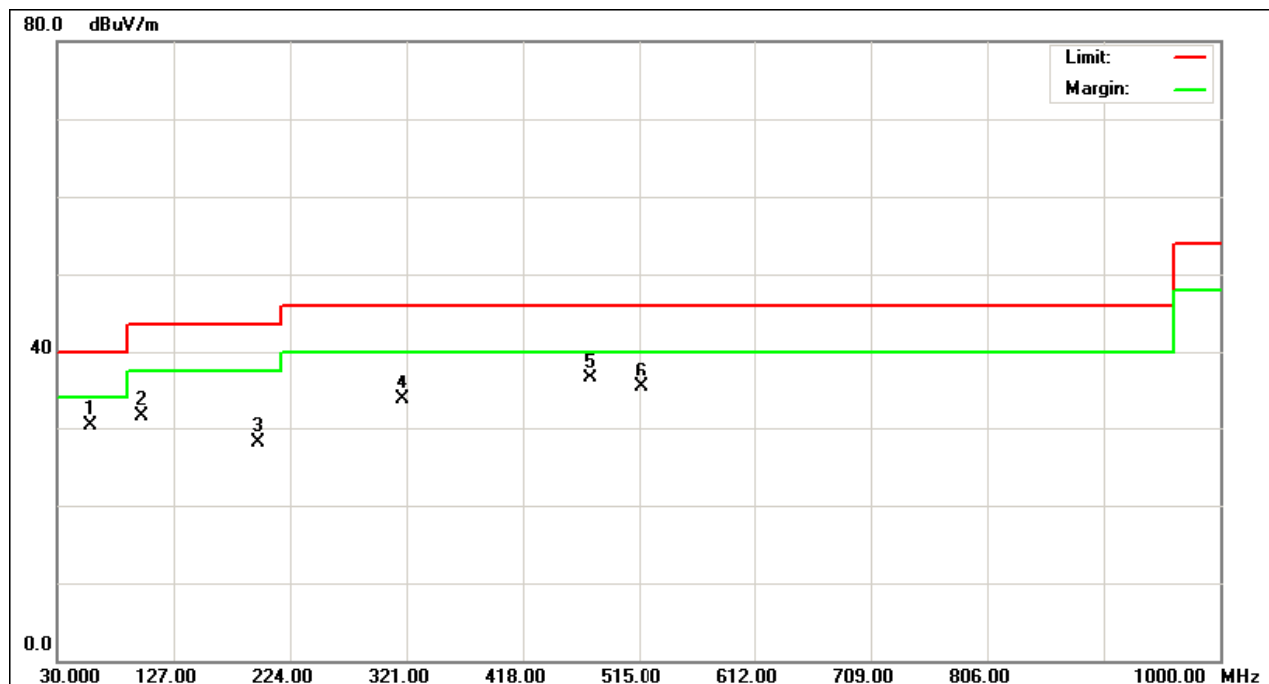


EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	23 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2417.625MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
56.32	H	52.89	-22.67	30.22	40.00	- 9.78	
98.74	H	50.33	-18.88	31.45	43.50	- 12.05	
196.35	H	47.22	-19.06	28.16	46.00	- 17.84	
315.62	H	46.06	-12.32	33.74	46.00	- 12.26	
473.21	H	45.22	-8.64	36.58	46.00	- 9.42	
515.66	H	42.51	-7.27	35.24	46.00	- 10.76	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (2) 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 .
- (3) Measuring frequency range from 30MHz to 1000MHz .
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table .





4.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2417.625MHz		

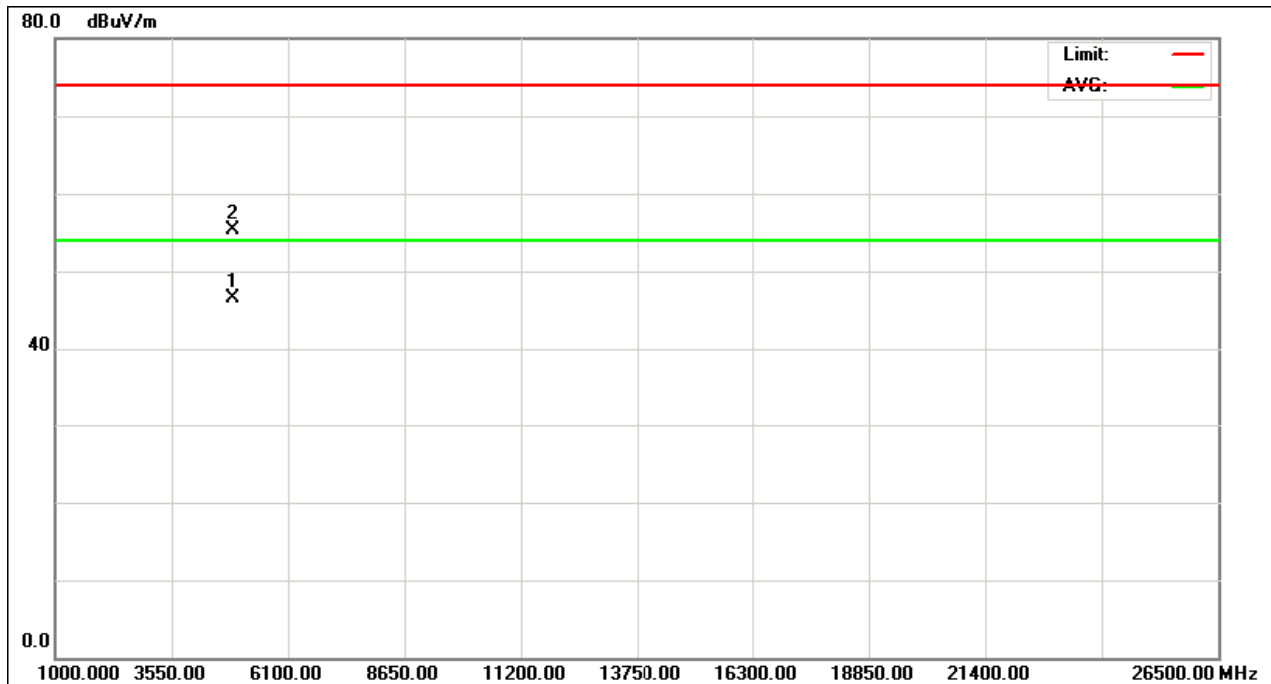
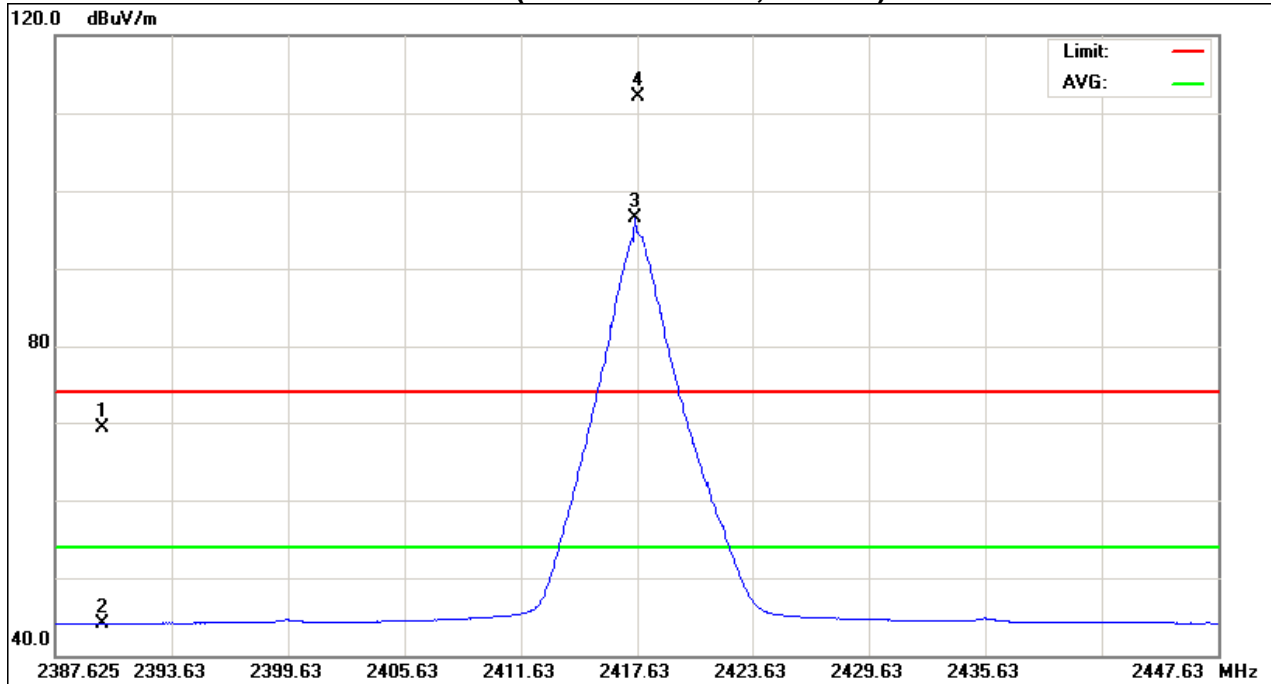
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	V	37.73	12.65	31.54	69.27	44.19	74.00	54.00	X/E
2417.51	V	80.57	64.96	31.58	112.15	96.54			X/F
4835.27	V	49.99	41.26	5.34	55.33	46.60	74.00	54.00	X/H

Remark :

- (1) 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 .
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH00(Above 1000 MHz, Vertical)





EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2417.625MHz		

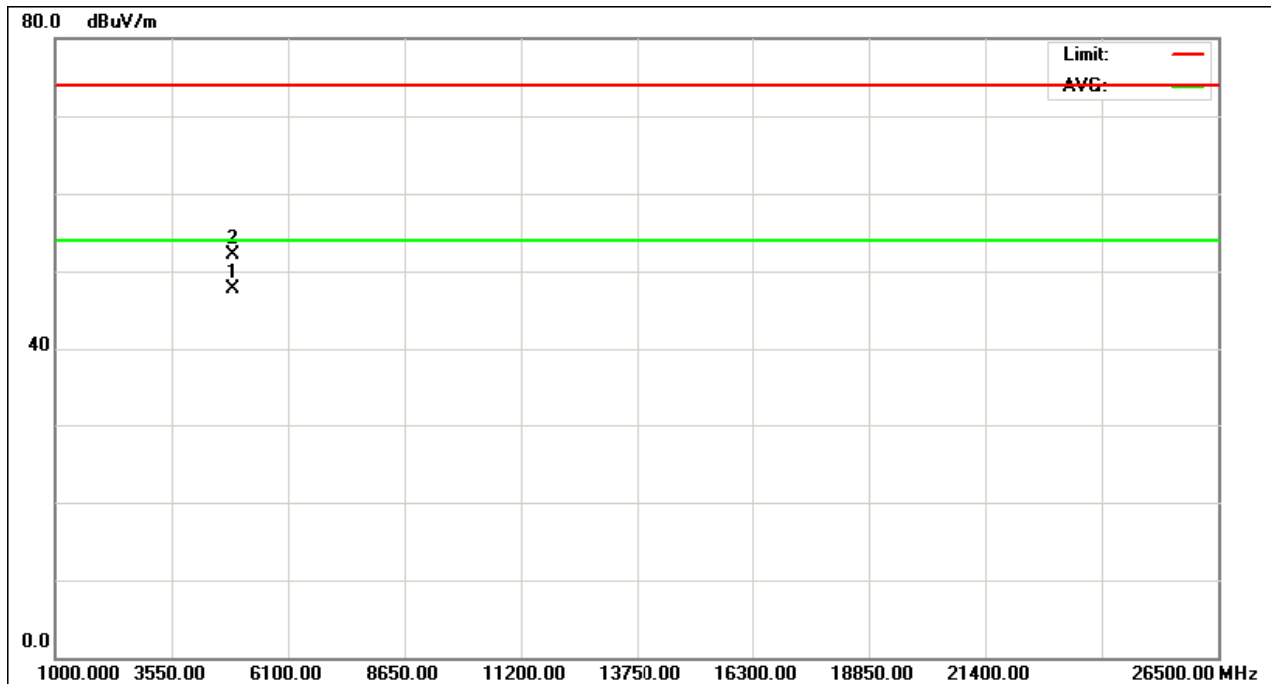
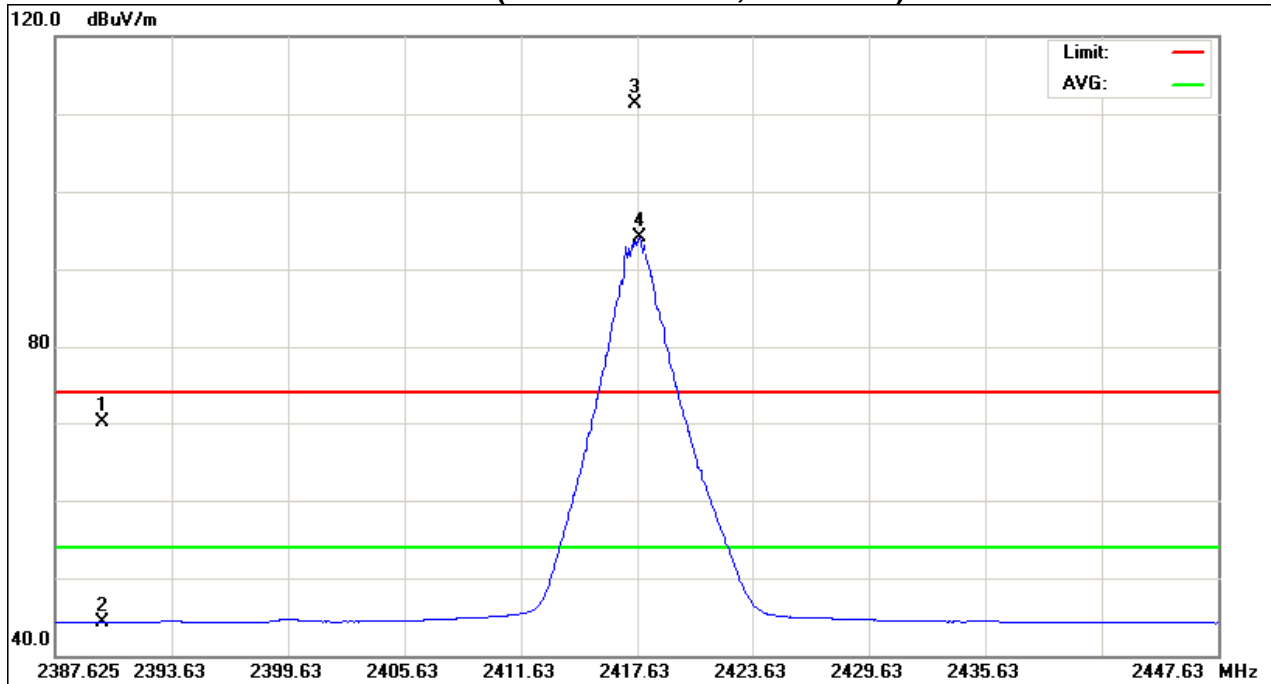
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	H	38.59	12.77	31.54	70.13	44.31	74.00	54.00	X/E
2417.51	H	79.75	62.54	31.58	111.33	94.12			X/F
4835.11	H	46.84	42.32	5.34	52.18	47.66	74.00	54.00	X/H

Remark :

- (1) 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 .
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH00(Above 1000 MHz, Horizontal)





EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2441.25MHz		

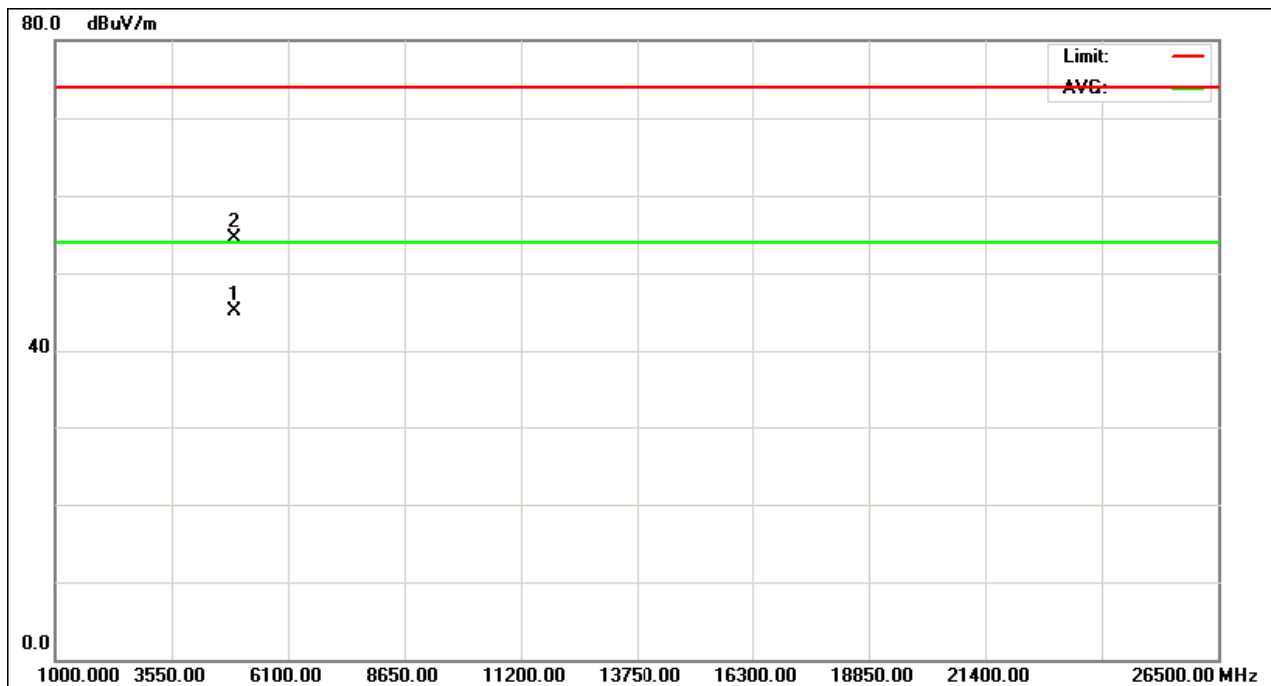
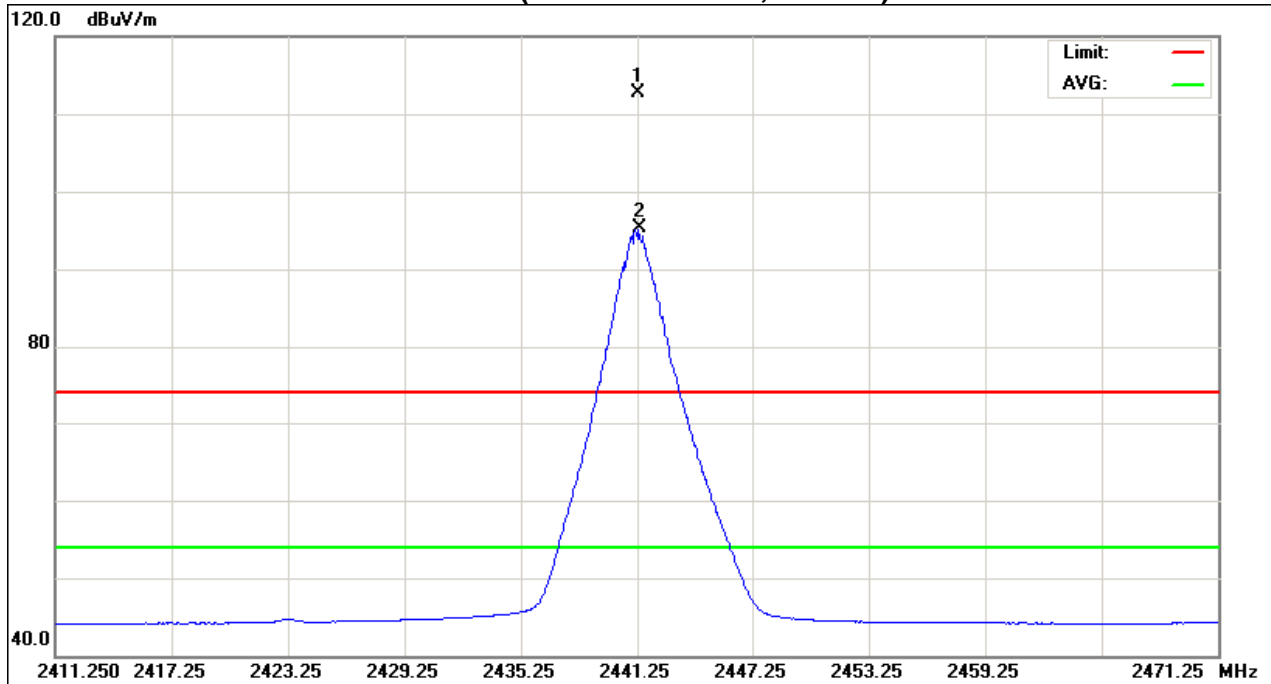
Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2441.25	V	81.00	63.71	31.63	112.63	95.34			X/F
4882.43	V	48.87	39.63	5.56	54.43	45.19	74.00	54.00	X/H

Remark :

- (1) 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 .
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency . "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH07 (Above 1000 MHz, Vertical)





EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2441.25MHz		

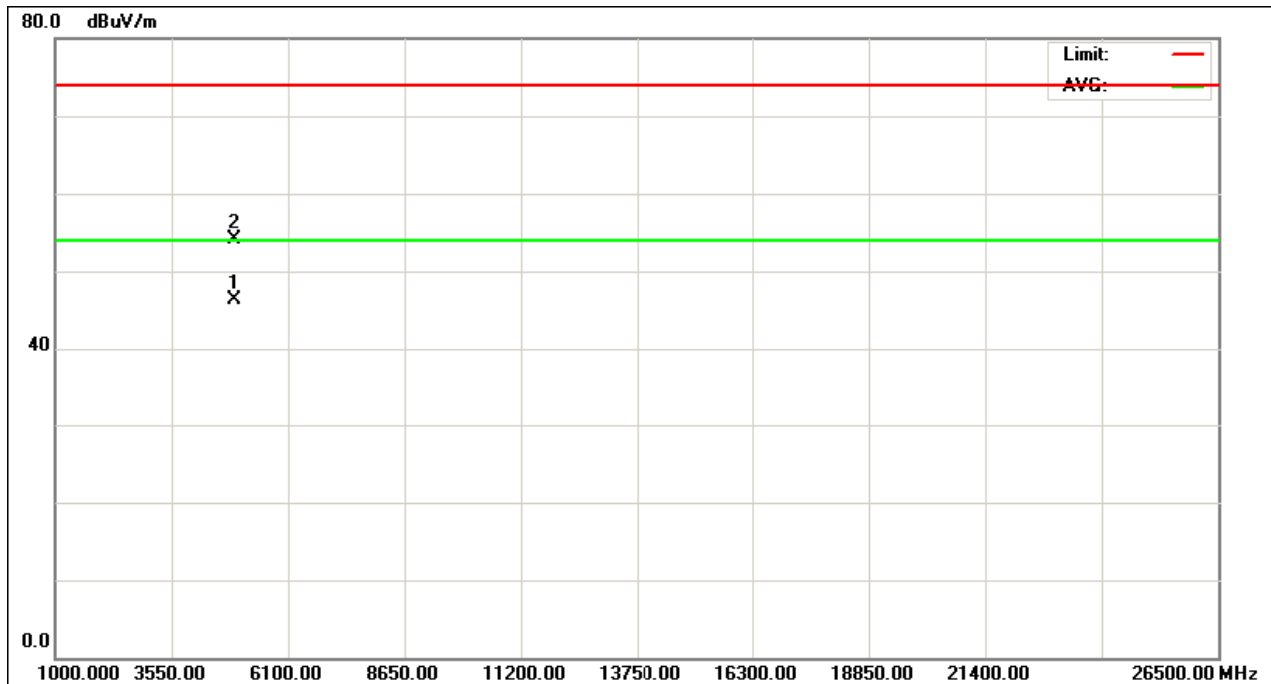
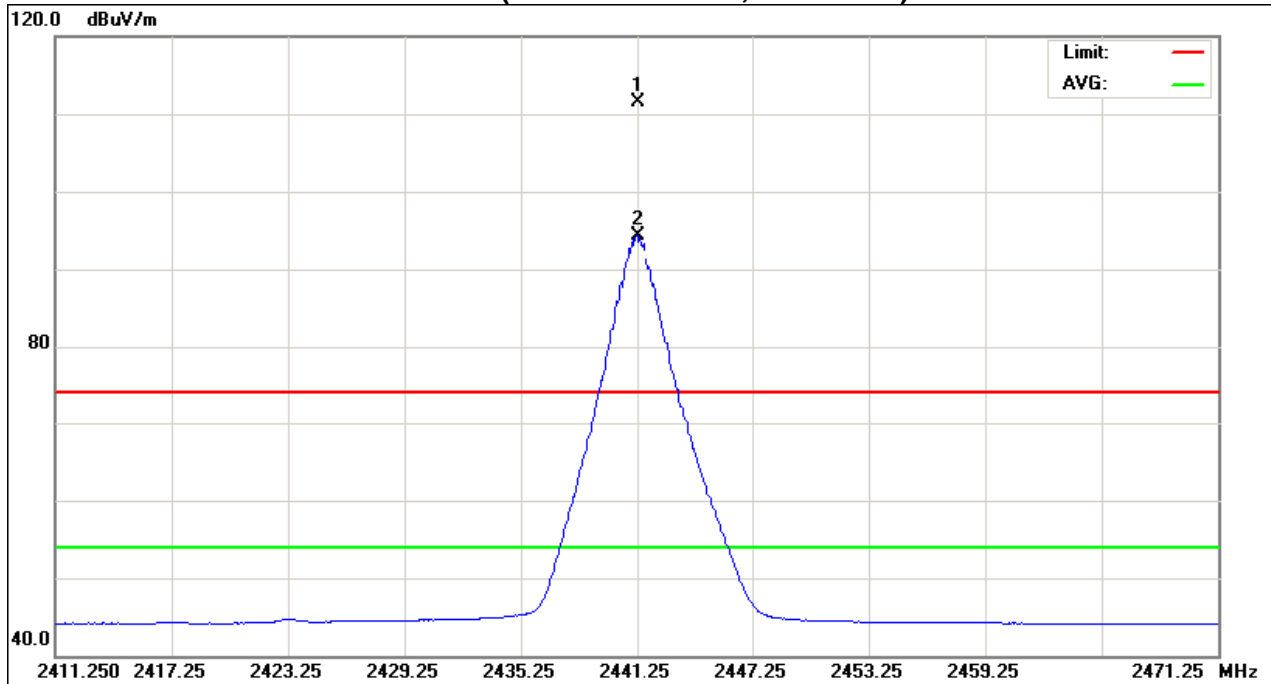
Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2441.25	H	79.85	62.66	31.63	111.48	94.29			X/F
4882.26	H	48.62	40.79	5.56	54.18	46.35	74.00	54.00	X/H

Remark :

- (1) 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.
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission.
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH07 (Above 1000 MHz, Horizontal)





EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2464.875MHz		

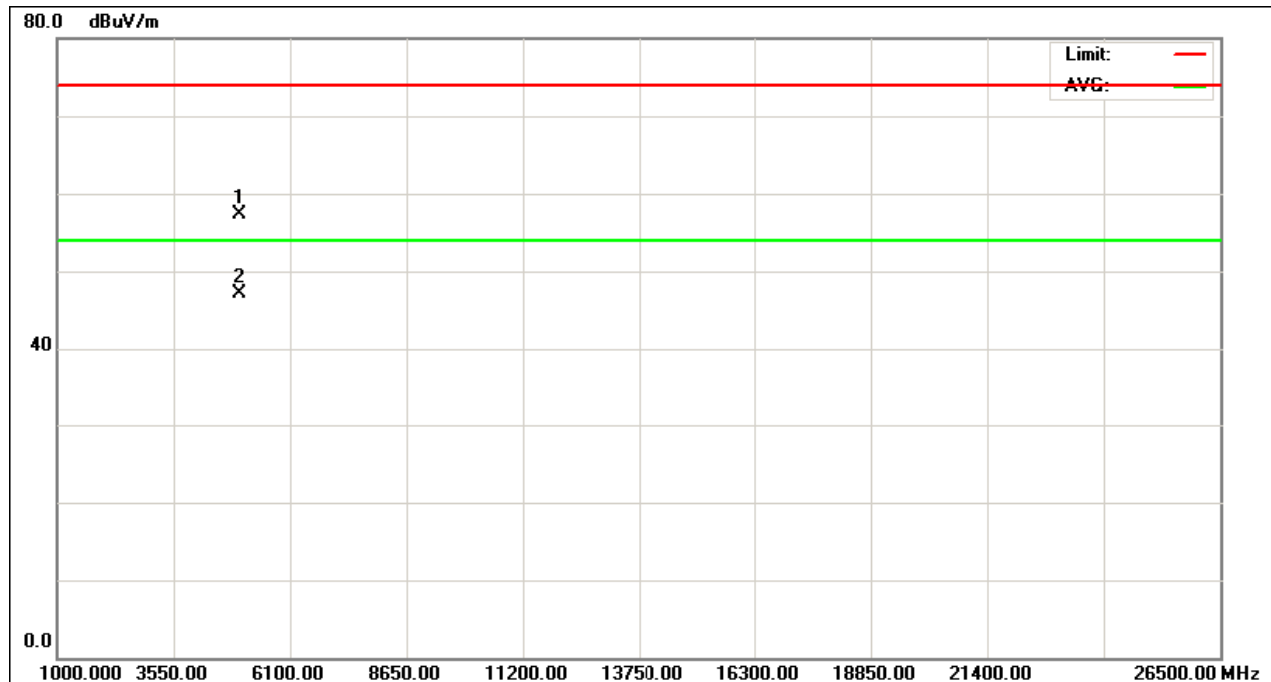
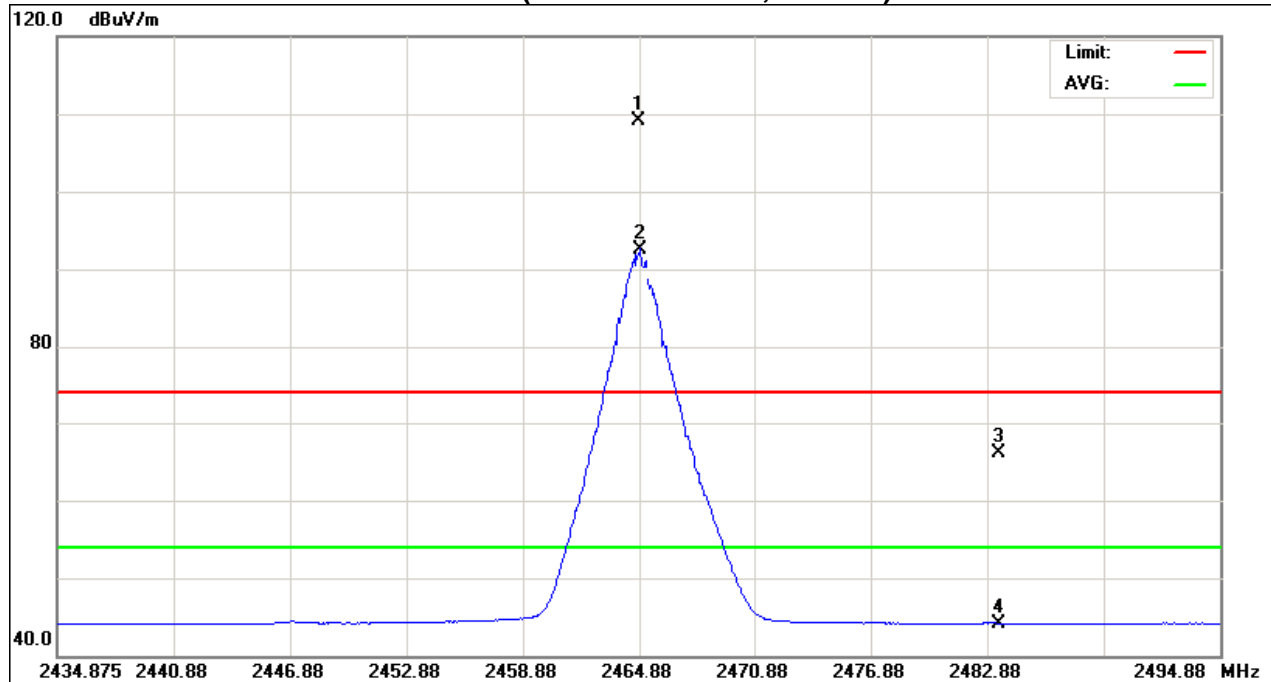
Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2464.82	V	77.36	60.81	31.66	109.02	92.47			X/F
2483.50	V	34.42	12.48	31.70	66.12	44.18	74.00	54.00	X/E
4929.30	V	51.42	41.33	5.79	57.21	47.12	74.00	54.00	X/H

Remark :

- (1) 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 .
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency . "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH14 (Above 1000 MHz, Vertical)





EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX 2464.875MHz		

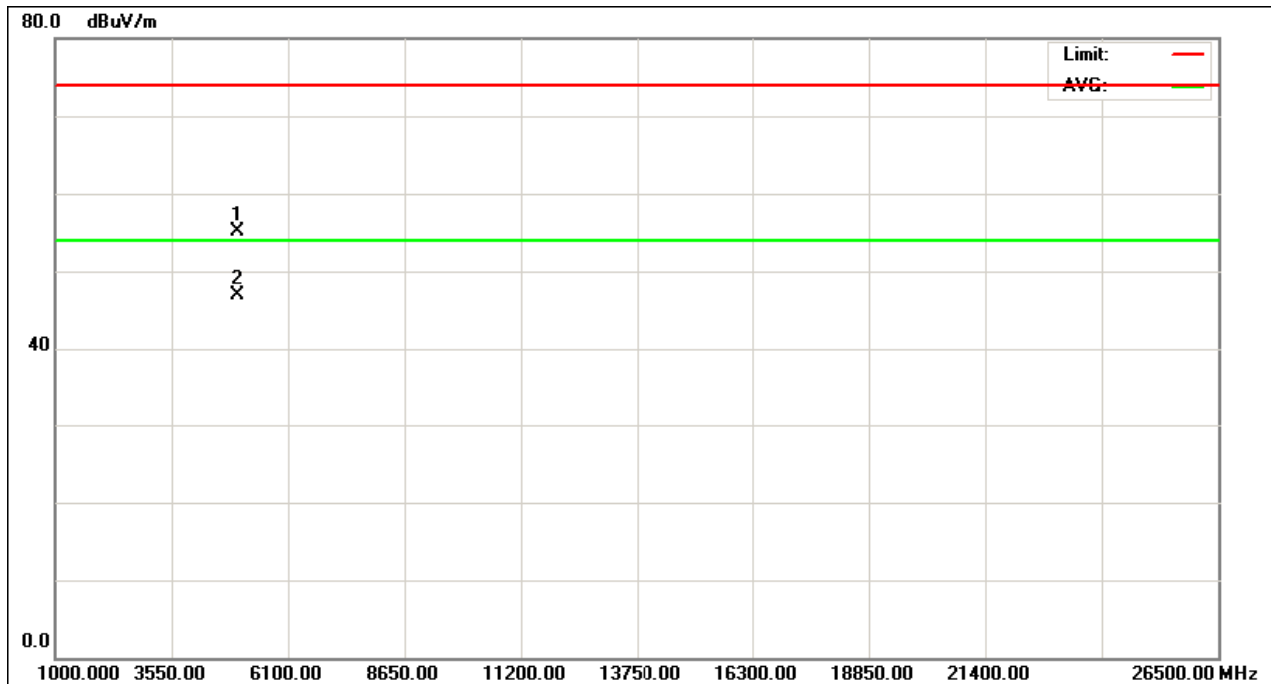
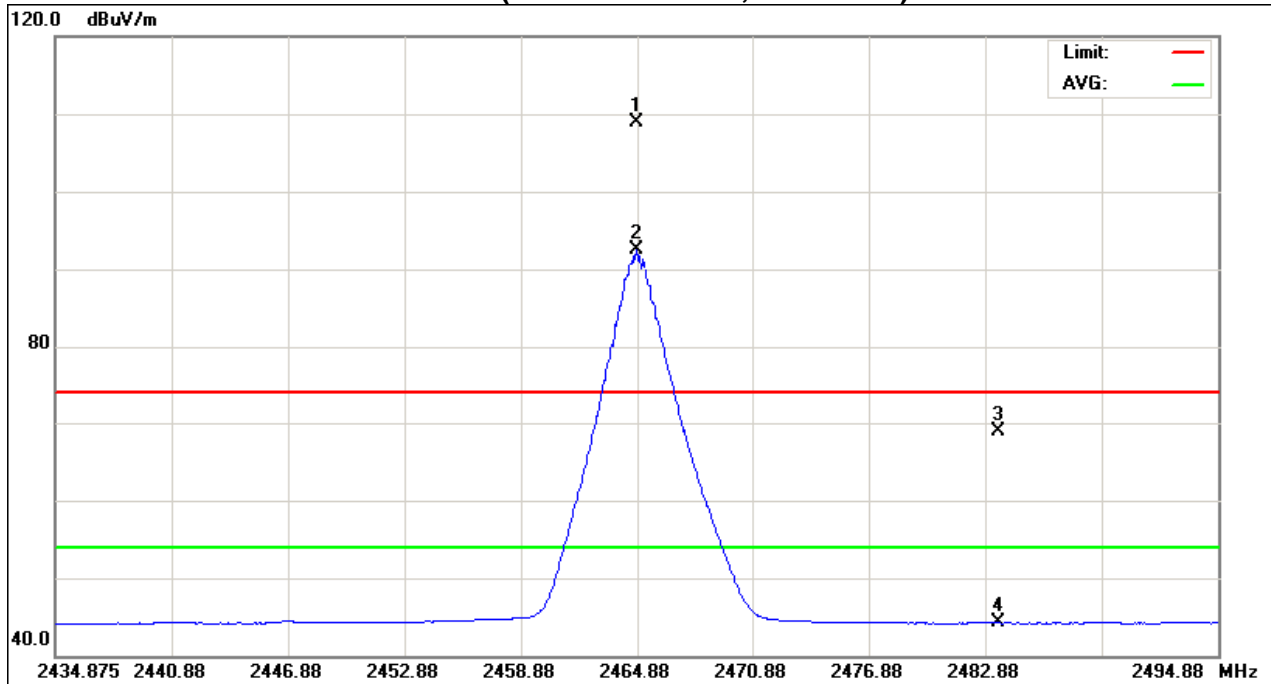
Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2464.82	H	77.31	60.76	31.66	108.97	92.42			X/F
2483.50	H	37.25	12.53	31.70	68.95	44.23	74.00	54.00	X/E
4929.35	H	49.31	41.06	5.79	55.10	46.85	74.00	54.00	X/H

Remark :

- (1) 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 .
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency. "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission .
- (4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) 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



TX CH14 (Above 1000 MHz, Horizontal)





5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	2400-2483.5	PASS

5.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	300 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

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= 300KHz, VBW=300KHz, Sweep time = Auto.

5.1.3 DEVIATION FROM STANDARD

No deviation.

5.1.4 TEST SETUP



5.1.5 EUT OPERATION CONDITIONS

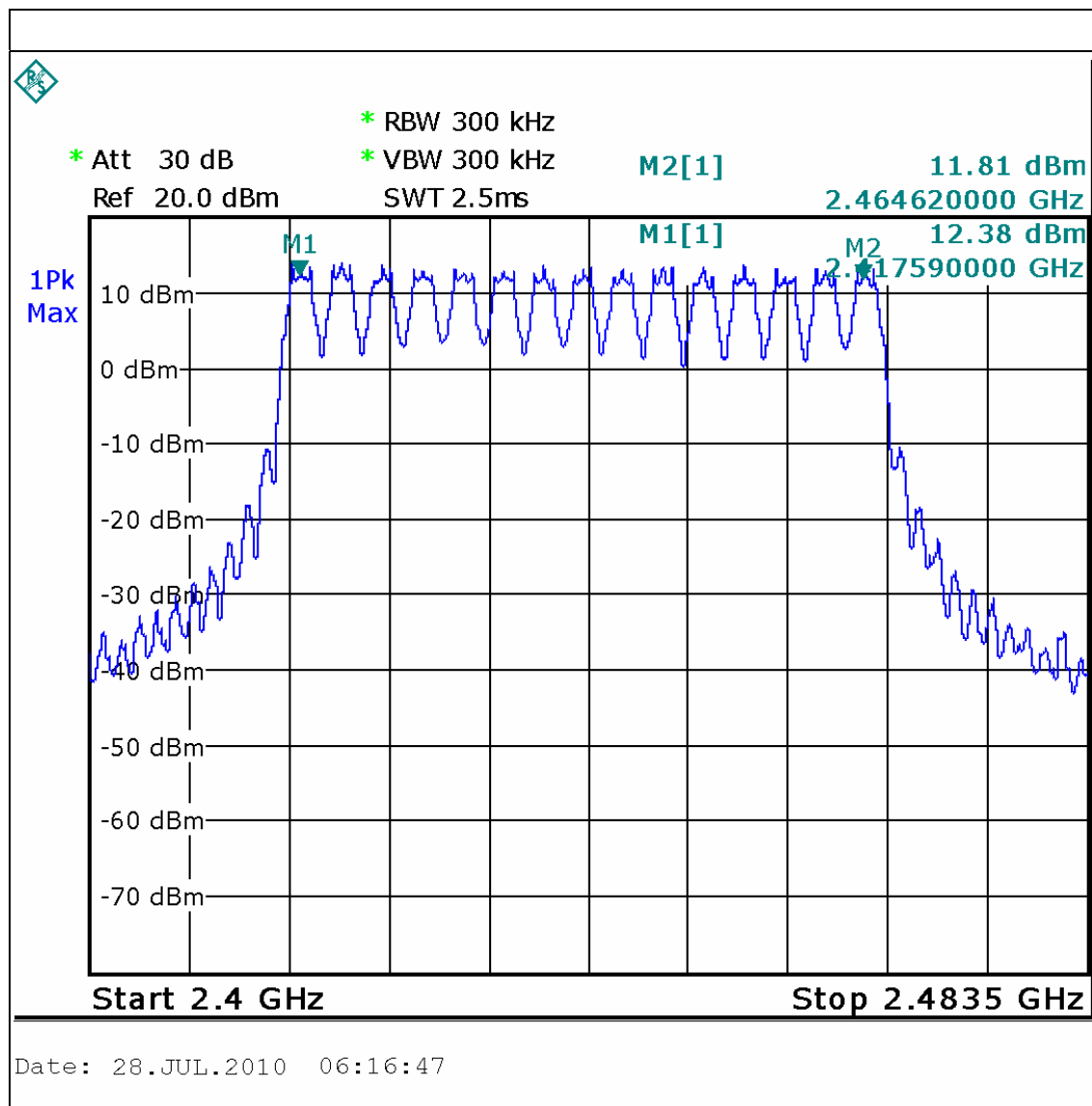
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



5.1.6 TEST RESULTS

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	51 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Hopping Mode		

Number of Hopping Channel	15
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6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.1.1 MEASUREMENT INSTRUMENTS LIST

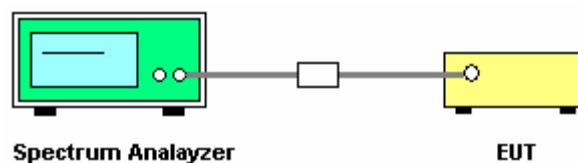
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

6.1.2. TEST PROCEDURES

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Set the EUT for packet transmitting.
- Measure the maximum time duration of one single pulse.
- Dwell time = [spreading rate/15] x duty-cycle x 0.4 seconds

6.1.3. TEST SETUP LAYOUT



6.1.4. TEST DEVIATION

There is no deviation with the original standard.

6.1.5. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting/Hopping mode.



6.1.6. RESULTS OF OCCUPIED BANDWIDTH AND SPREAD-SPECTRUM BANDWIDTH

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	60 %
Pressure :	1015 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Hopping Mode		

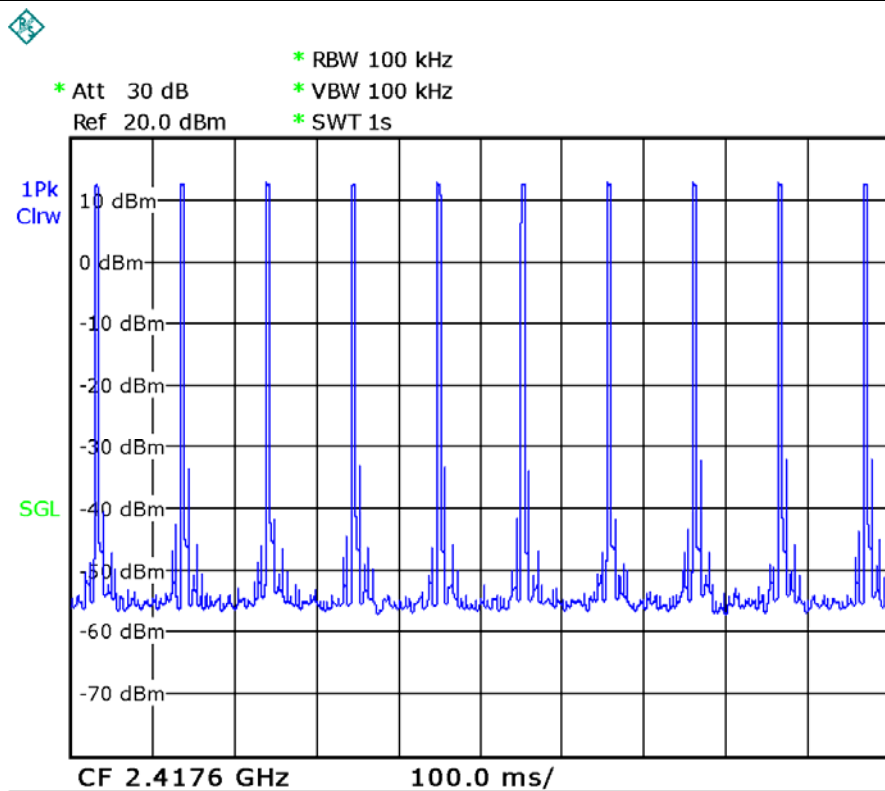
Mode	Number of transmission in a 6 (15Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
2417.625 MHz	(10/1) *6=60 times Note1	5.8	348	400

Note1: 10 times of occupied channels per 1 second

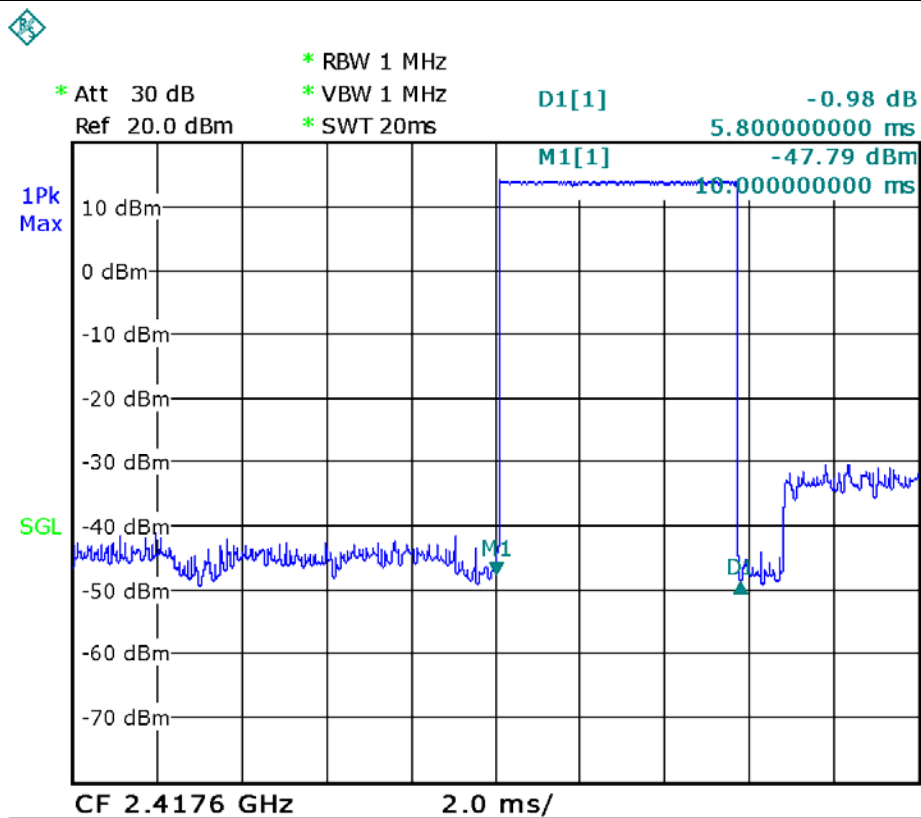
	Results
Measured cycle (sec)	15 CH*0.4=6
The total number of frequency-hopping per second	((10/1)*15)=150
The number of occupied channels per second	150/15=10(number/sec)
occupied time for each channel(1)	5.8ms
The total number of channels occupied within one cycle (2)	(10 /1) *6=60 times
The average time of occupancy within one cycle(1)*(2)	348ms
LIMIT (msec)	400ms



Hopping Mode : 10(times/1sec)



Date: 23.JUL.2010 06:22:45



Date: 23.JUL.2010 06:21:55

7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

7.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

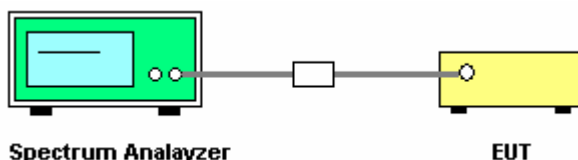
7.1.2 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.1.3 DEVIATION FROM STANDARD

No deviation.

7.1.4 TEST SETUP



7.1.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

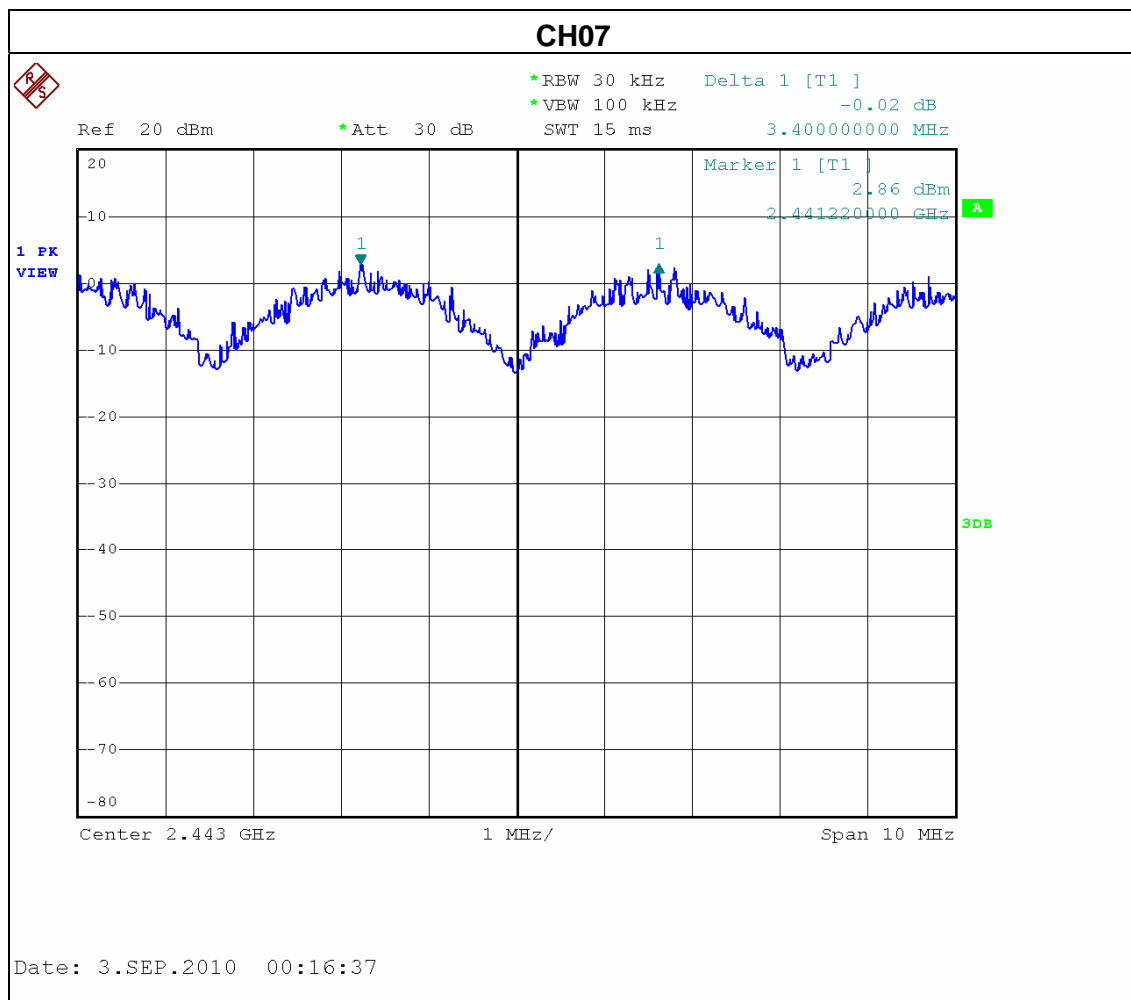


7.1.6 TEST RESULTS

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	60 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH07		

Frequency	Ch. Separation (MHz)	20d Bandwidth B (MHz)	Result
2441.25 MHz	3.40	3.34	Complies

Ch. Separation Limits: >20dB bandwidth or >2/3 of 20dB bandwidth





8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(2)	Bandwidth	≤ 3.4 MHz (20dB bandwidth)	2400-2483.5	PASS

8.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (20dB Bandwidth)
VB	100 kHz (20dB Bandwidth)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

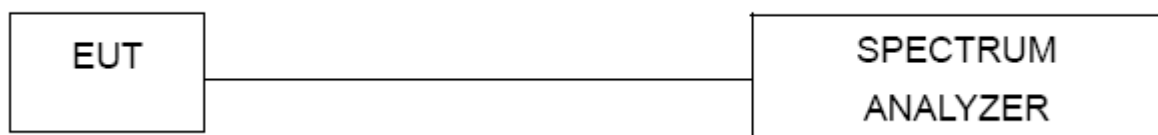
8.1.2 TEST PROCEDURE

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

8.1.3 DEVIATION FROM STANDARD

No deviation.

8.1.4 TEST SETUP



8.1.5 EUT OPERATION CONDITIONS

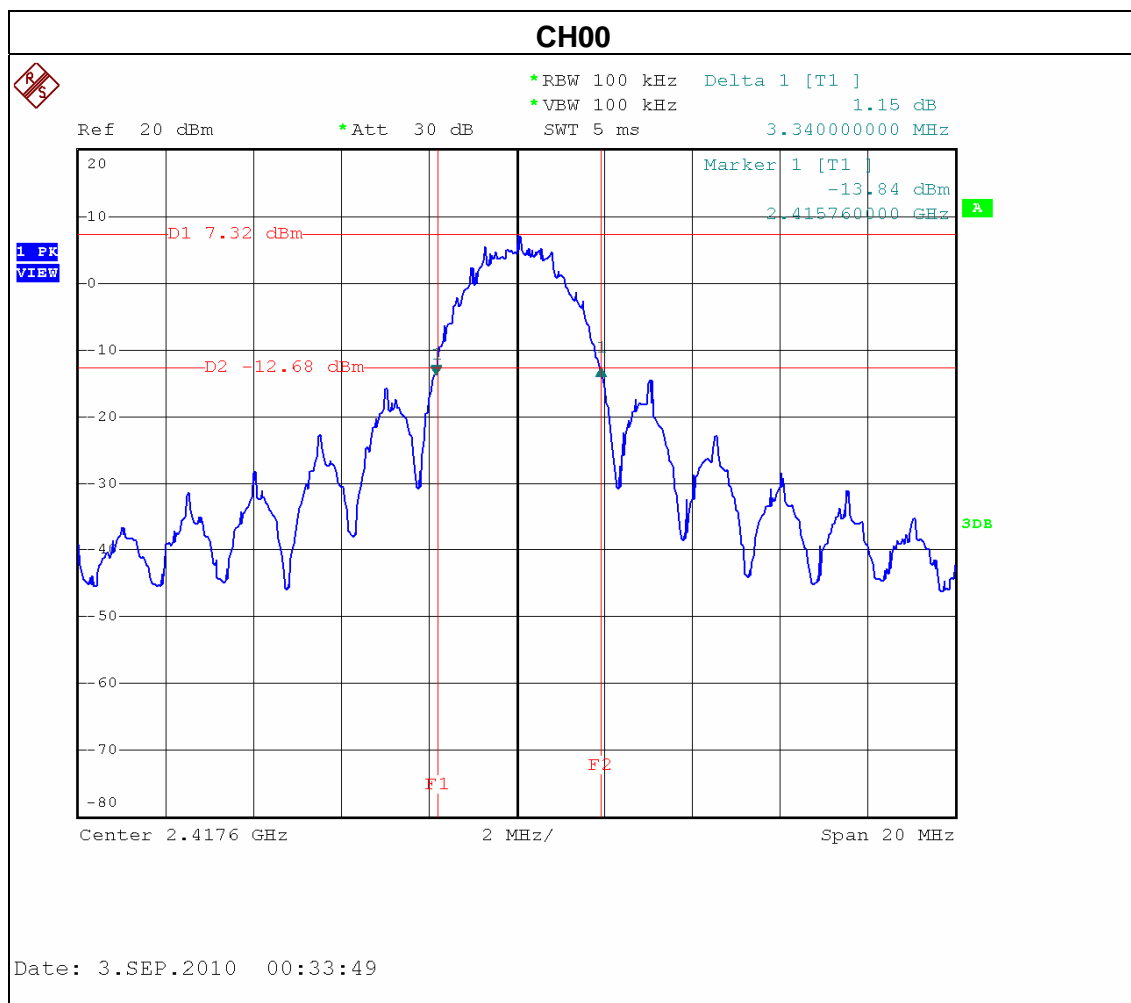
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



8.1.6 TEST RESULTS

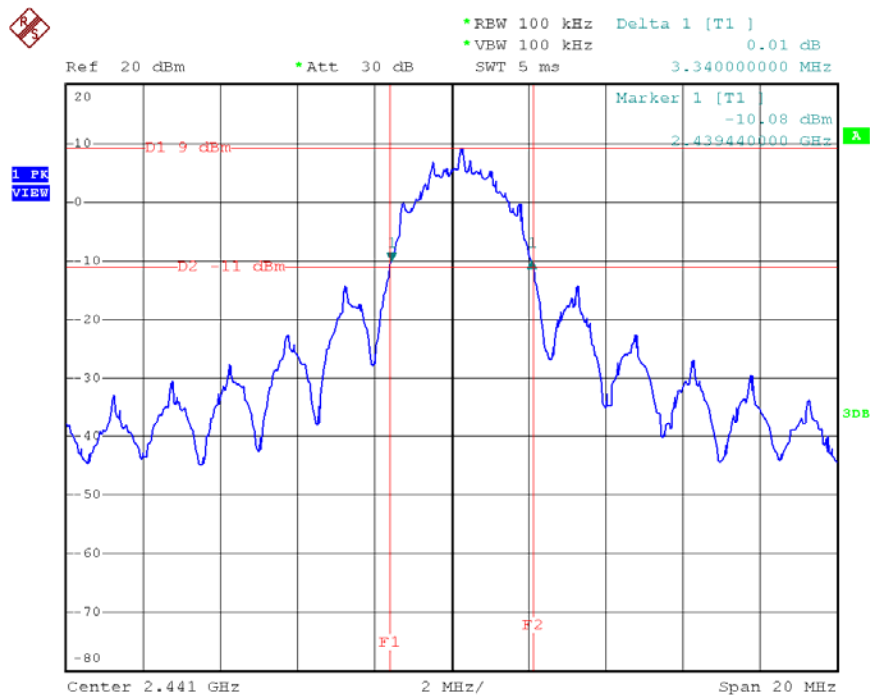
EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	60 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH00/CH07/CH14		

Frequency	20dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2417.625 MHz	3.340	<= 3.40MHz	PASS
2441.25 MHz	3.340	<= 3.40MHz	PASS
2464.875 MHz	3.340	<= 3.40MHz	PASS



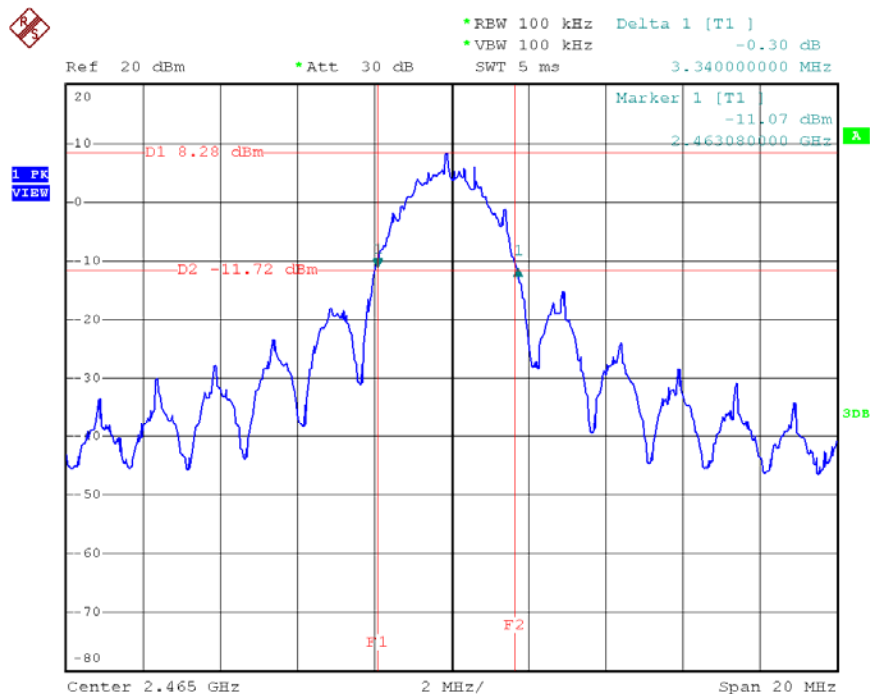


CH07



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CH14



Date: 3.SEP.2010 01:01:50



9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(1)	Peak Output Power	0.125 watt	2400-2483.5	PASS

9.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

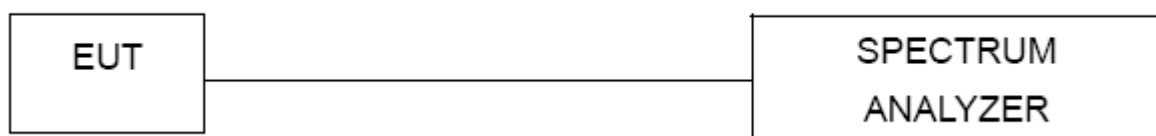
9.1.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 10MHz, VBW= 10MHz, Sweep time = Auto.

9.1.3 DEVIATION FROM STANDARD

No deviation.

9.1.4 TEST SETUP



9.1.5 EUT OPERATION CONDITIONS

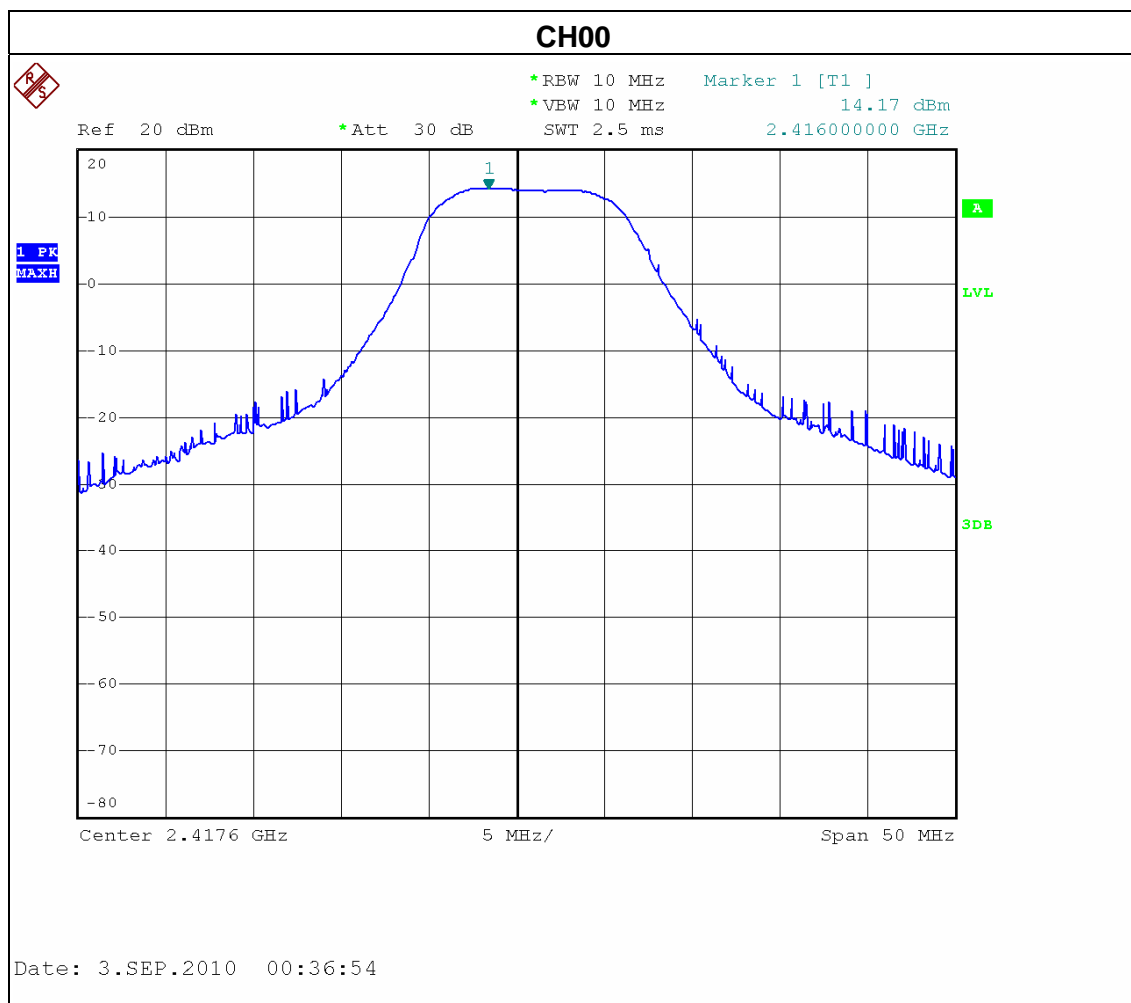
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



9.1.6 TEST RESULTS

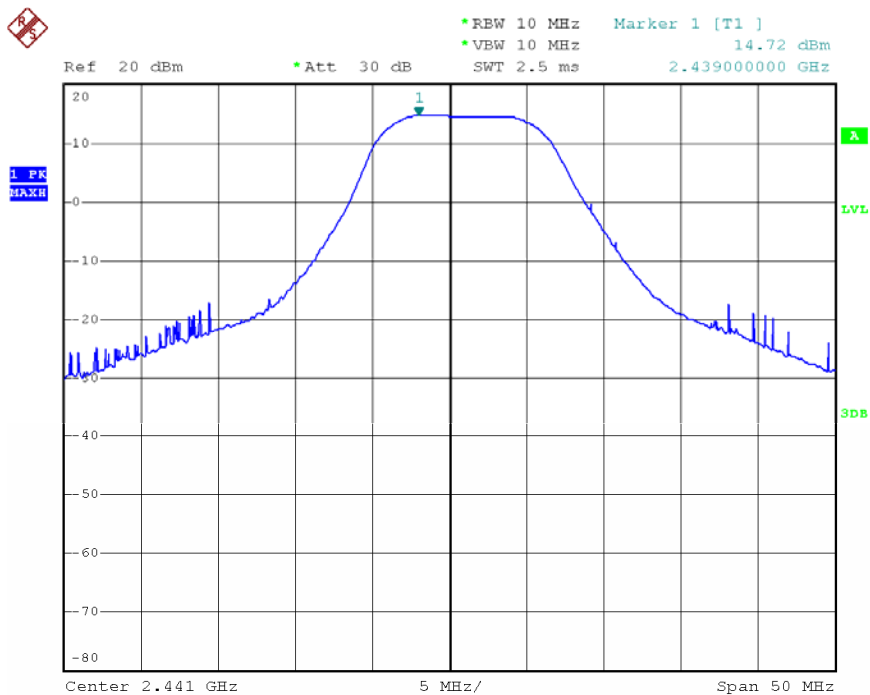
EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	60 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH00/ CH07 /CH14		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH00	2417.62	14.17	21	1
CH07	2441.25	14.72	21	1
CH14	2464.875	13.77	21	1



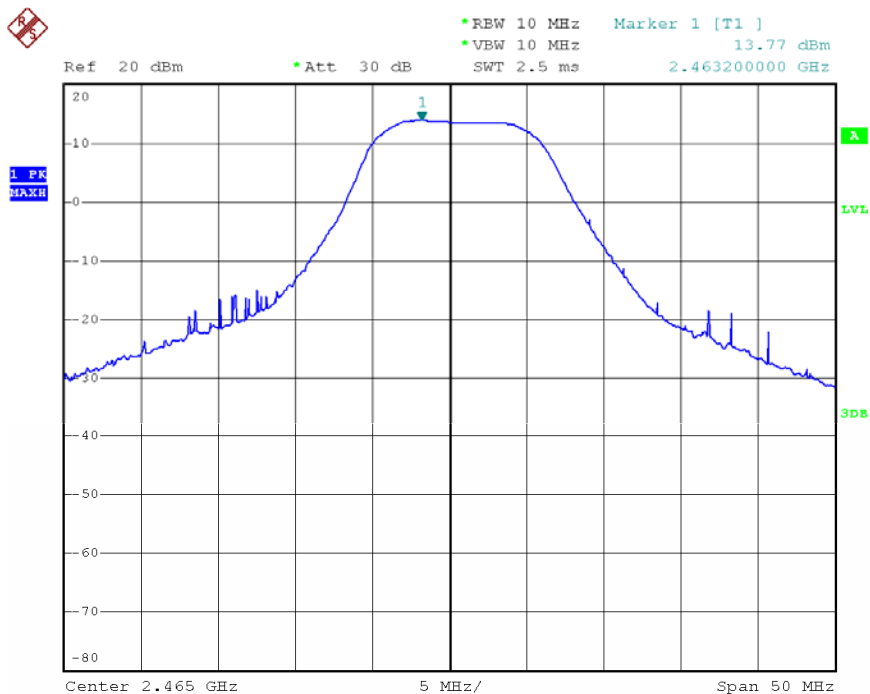


CH07



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CH14



Date: 3.SEP.2010 00:53:27



10. ANTENNA CONDUCTED SPURIOUS EMISSION

10.1 APPLIED PROCEDURES / LIMIT

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

10.1.1 MEASUREMENT INSTRUMENTS LIST AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.27.2010

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

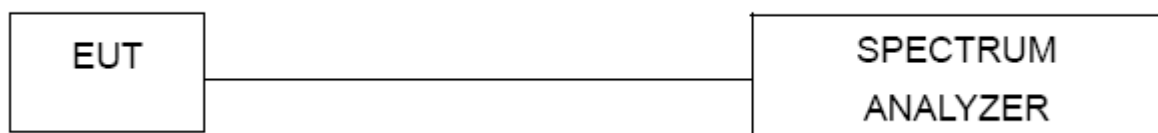
10.1.2 TEST PROCEDURE

- 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.

10.1.3 DEVIATION FROM STANDARD

No deviation.

10.1.4 TEST SETUP



10.1.5 EUT OPERATION CONDITIONS

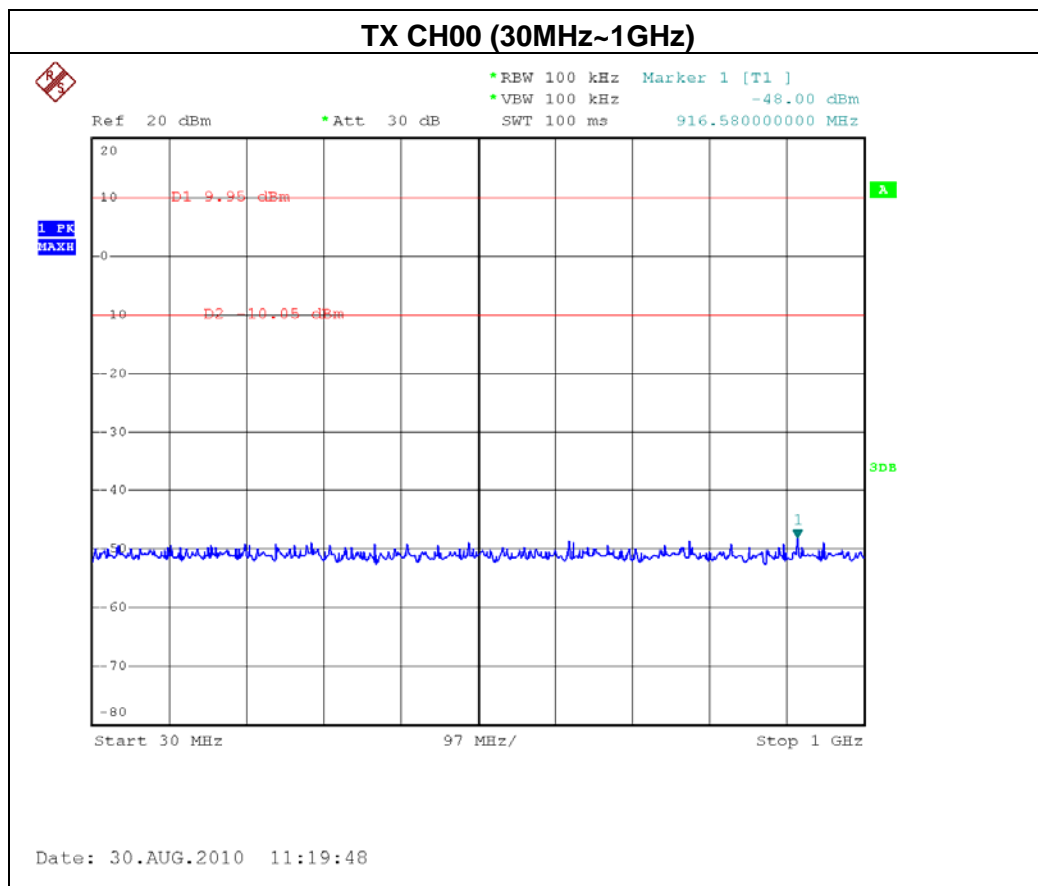
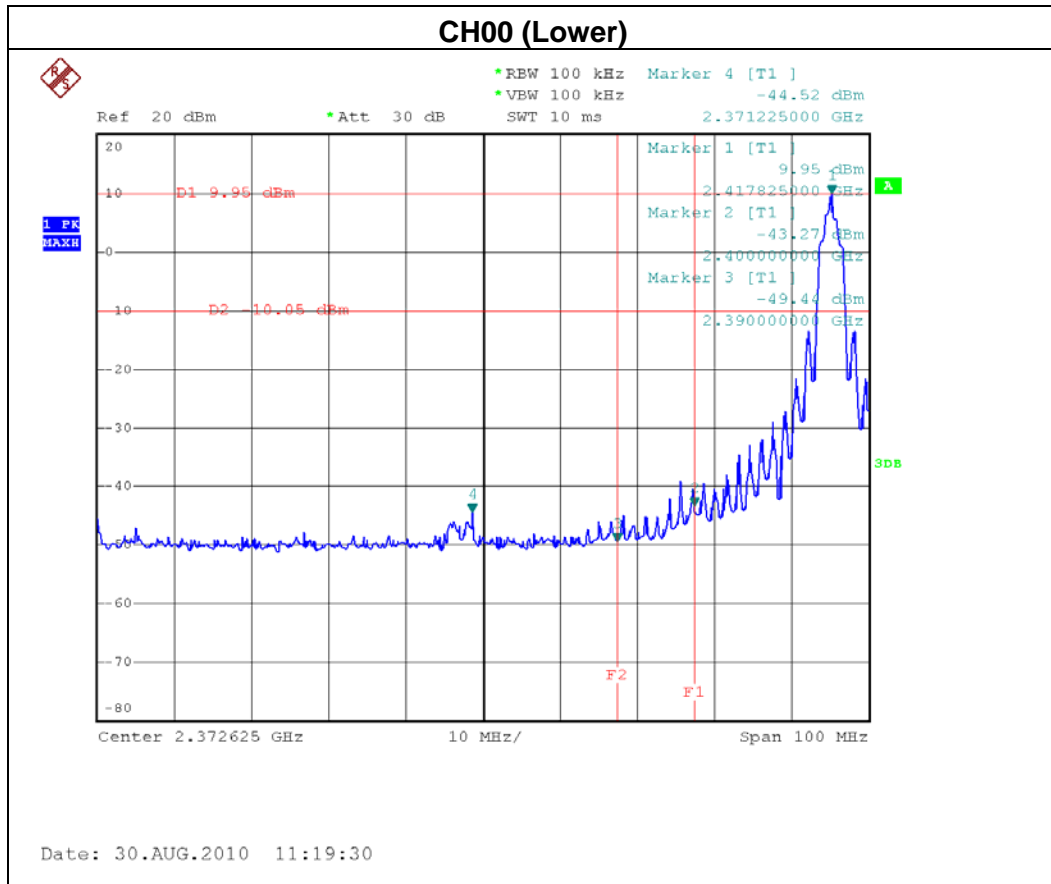
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

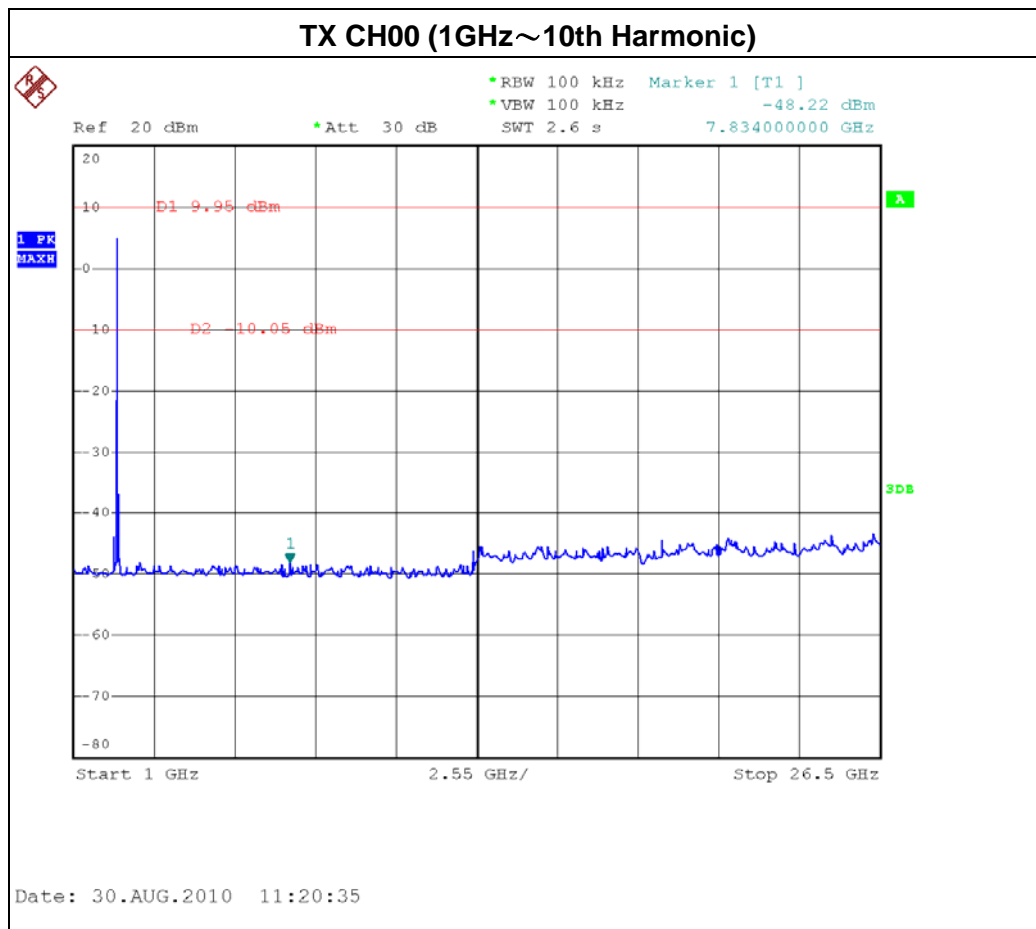


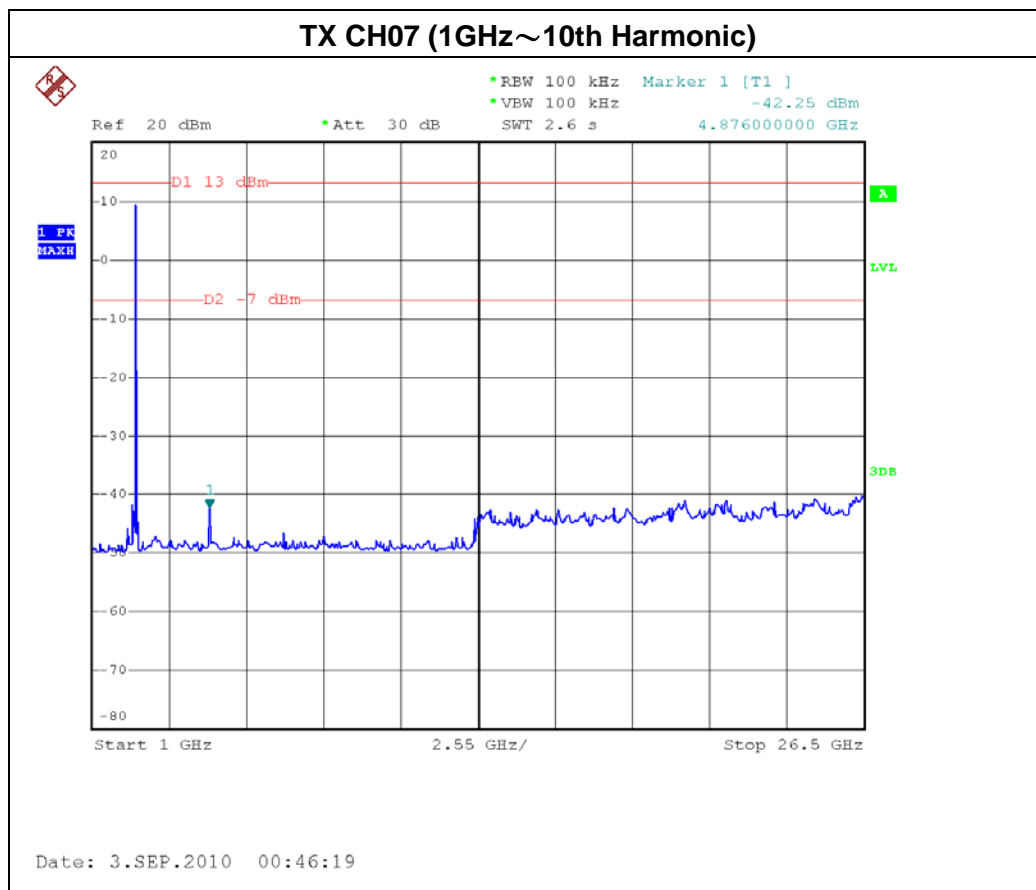
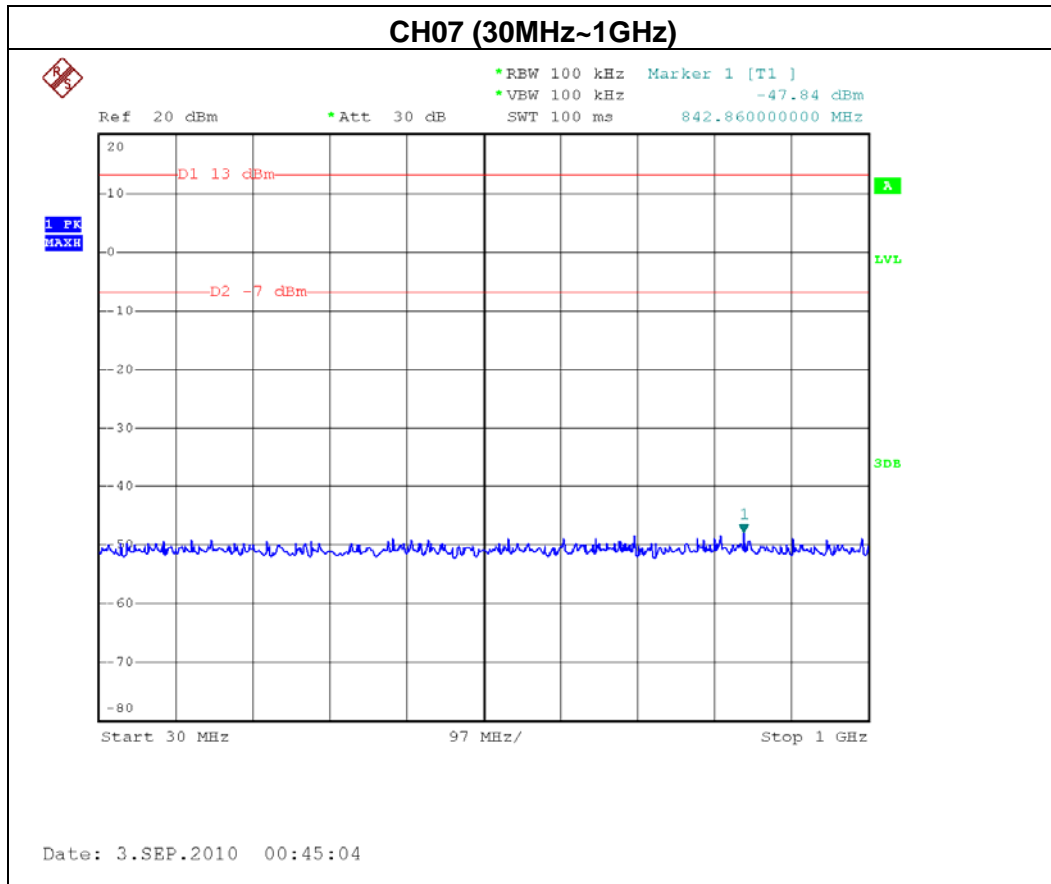
10.1.6 TEST RESULTS

EUT :	2.4GHz Digital Solution Wireless Remote Pan/Tilt Camera Kit	Model Name :	GD7615
Temperature :	25 °C	Relative Humidity :	60 %
Pressure :	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	CH00 / CH14		

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)
2371.23	-44.52	2484.40	-40.68
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.			

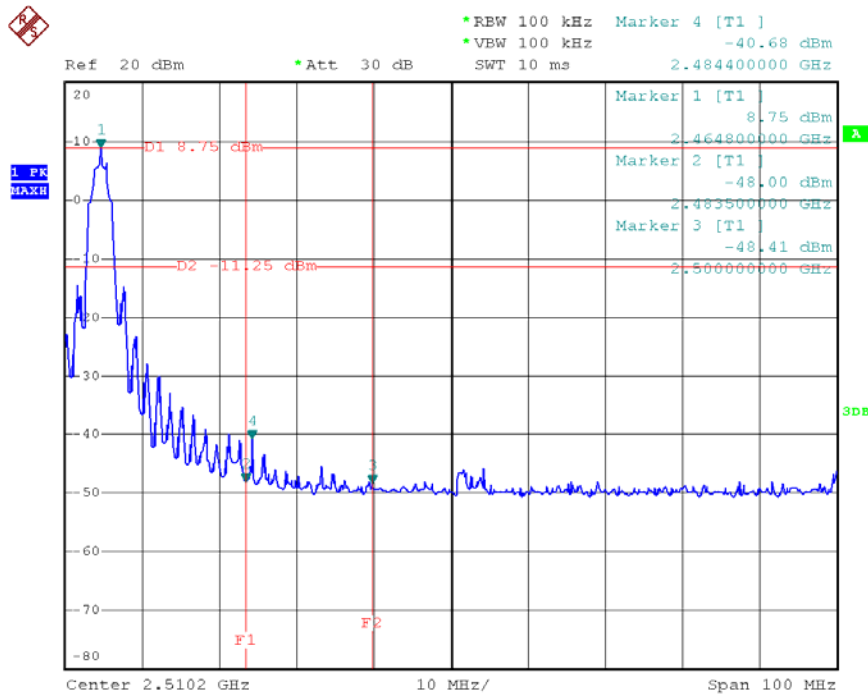






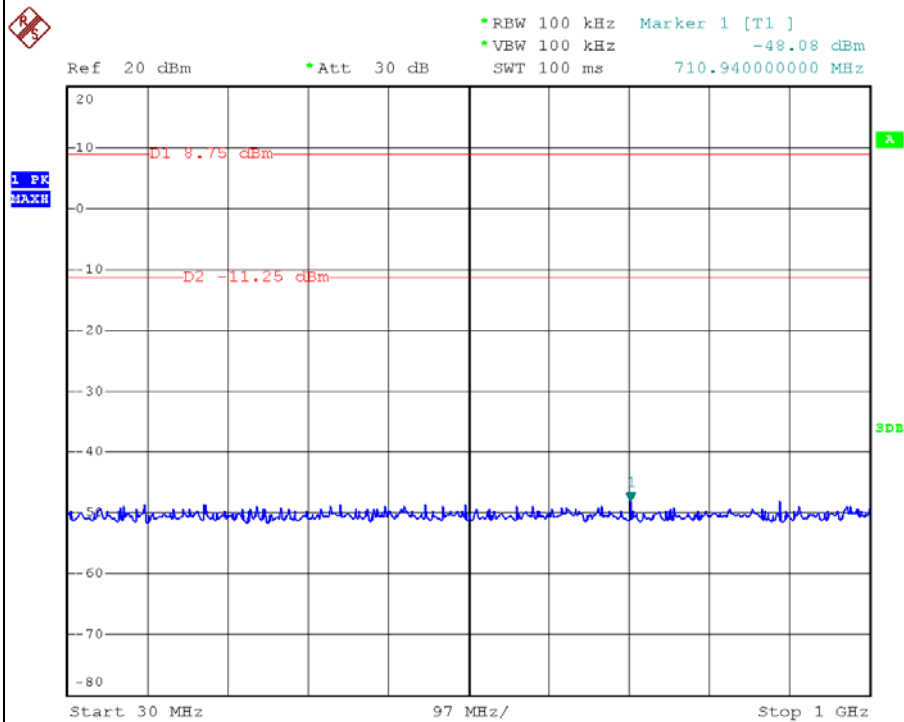


CH 14 (Upper)

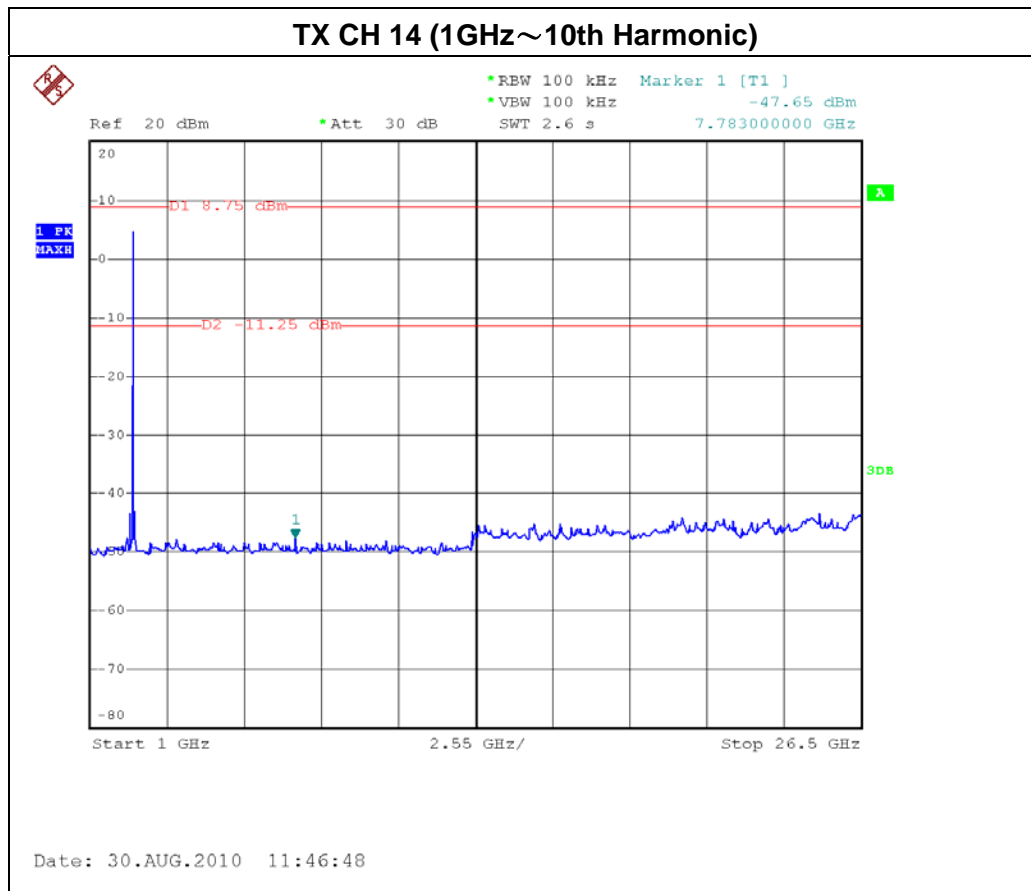


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TX CH14 (30MHz~1GHz)



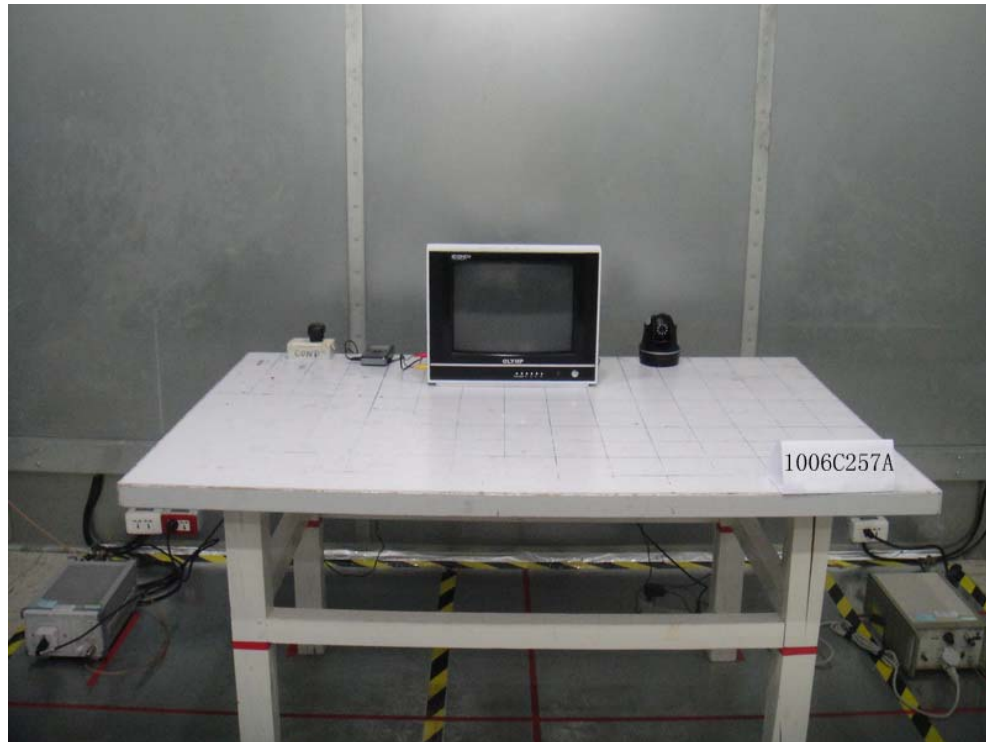
Date: 30.AUG.2010 11:47:16





11. EUT TEST PHOTO

Conducted Measurement Photos





Radiated Measurement Photos

