FCC RADIO TEST REPORT

FCC ID: 2ABH3FRC12TA-BLC

Product：	Digital Wireless Camera System(FCA48TA-BL)
Trade Name：	FURRION
Model Name：	FRC12TA-BL
Serial Model：	FCA48TA-BL, FCS43TA-BL
Report No.：	NTEK-2013NT1206184F2

Prepared for

Furrion Ltd.

Suite 3-5, 16/F Pacific Plaza, 410 Des Voeux Road West, Sai Wan, Hong Kong.

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	Furrion Ltd.
Address	Suite 3-5, 16/F Pacific Plaza, 410 Des Voeux Road West, Sai Wan, Hong Kong.
Manufacture's Name.....	Dongguan Protronic Electronics Ltd.,
Address	Protronic Industrial Park, Xiangxi Village, Shipai Town, DongGuan, GuangDong, China
Product description	
Product name	Digital Wireless Camera System(FCA48TA-BL)
Model and/or type reference	FRC12TA-BL
Serial Model：	FCA48TA-BL, FCS43TA-BL
Standards	FCC Part15.247
Test procedure	ANSI C63.4-2003

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test	
Date (s) of performance of tests	06 Dec. 2013 ~31 Dec. 2013
Date of Issue.....	31 Dec. 2013
Test Result.....	**Pass**

Testing Engineer : Polo Cha

(Polo Cha)

Technical Manager : Brown Lu

(Brown Lu)

Authorized Signatory : Bovey Yang

(Bovey Yang)

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1. 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	N/A	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration No.:238937; IC Registration No.:9270A-1
CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Digital Wireless Camera System(FCA48TA-BL)
Trade Name	FURRION
Model Name	FRC12TA-BL
Serial Model	FCA48TA-BL, FCS43TA-BL
Model Difference	All models are identical except model names.
Product Description	The EUT is a Digital Wireless Camera System(FCA48TA-BL)(Operation Frequency: 2409.75~2472.75MHz Modulation Type: GFSK Number Of Channel 18 CH Antenna Designation: Please see Note 3. Output Power(Conducted): 20.90dBm 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.
Adapter	N/A
Battery	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

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)
00	2409.75	01	2413.125	02	2416.5
03	2419.875	04	2423.25	05	2426.625
06	2430	07	2433.375	08	2436.75
09	2442.375	10	2445.75	11	2449.125
12	2452.5	13	2455.875	14	2459.25
15	2462.625	16	2466	17	2469.375
18	2472.75				

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	PCB Antenna	N/A	3.0	Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristicsgenerates from EUT, the test system was pre-scanning tested base 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 Mode	Description
Mode 1	CH00
Mode 2	CH09
Mode 3	CH18
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH09
Mode 3	CH18

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

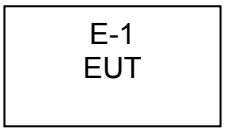
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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: Broadcom		
Frequency	2409.75 MHz	2442.375 MHz	2472.75 MHz
Parameters	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.5 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	Brand	Model/Type No.	Series No.	Note
E-1	Digital Wireless Camera System(FCA48TA-BL)	FURRION	FRC12TA-BL	N/A	EUT

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.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2013.07.06	2014.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2013.06.07	2014.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2013.07.06	2014.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2013.06.07	2014.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2013.06.07	2014.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2013.07.06	2014.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2013.07.06	2014.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2013.12.22	2014.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2013.06.08	2014.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2013.07.06	2014.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2013.07.06	2014.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2013.06.06	2014.06.05	1 year
2	LISN	R&S	ENV216	101313	2013.08.24	2014.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2013.08.24	2014.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2013.06.07	2014.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2013.06.07	2014.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2013.06.08	2014.06.07	1 year

1	Attenuation	MCE	24-10-34	BN9258	2013.06.08	2014.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 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.

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

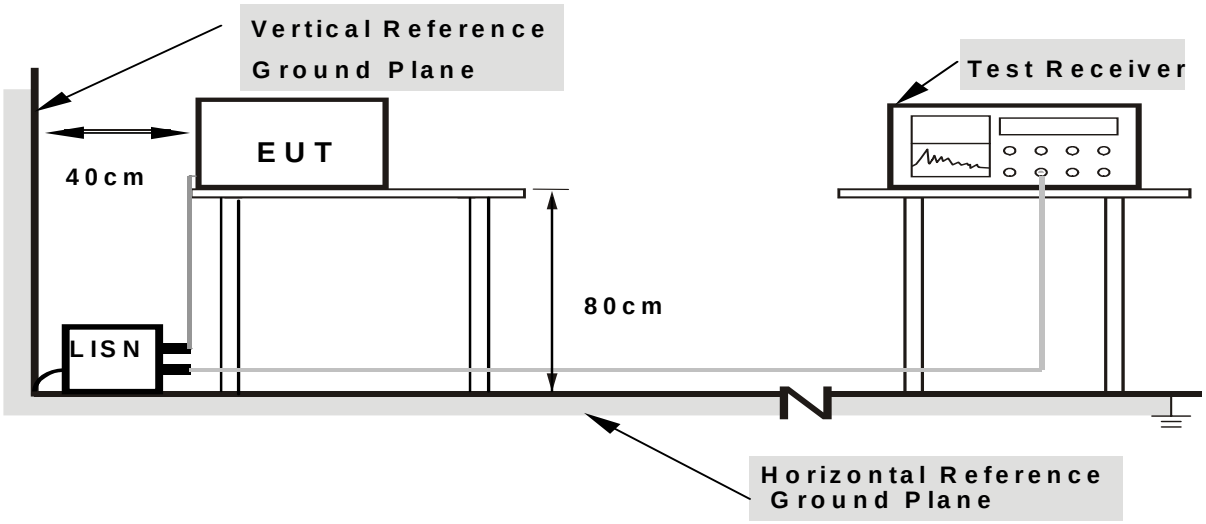
3.1.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 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 from other units and other metal planes

3.1.5 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.

3.1.6 TEST RESULTS

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N/A
Test Voltage ：	N/A	Test Mode：	N/A

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 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 (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 A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	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	5th harmonic of the highest frequency or 40 GHz, whichever is lower

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

3.2.2 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.

Note:

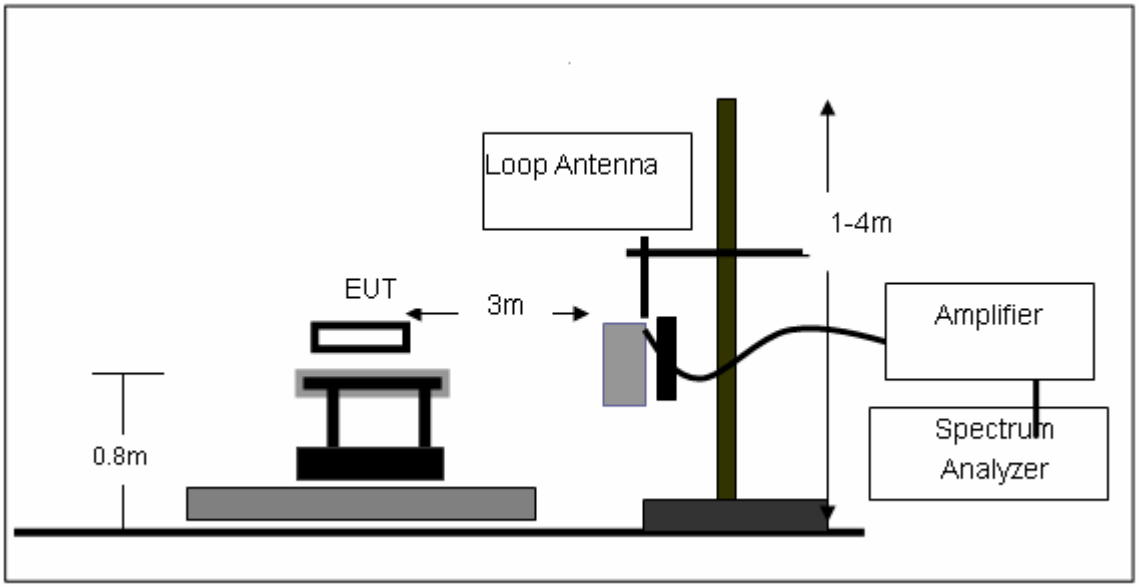
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

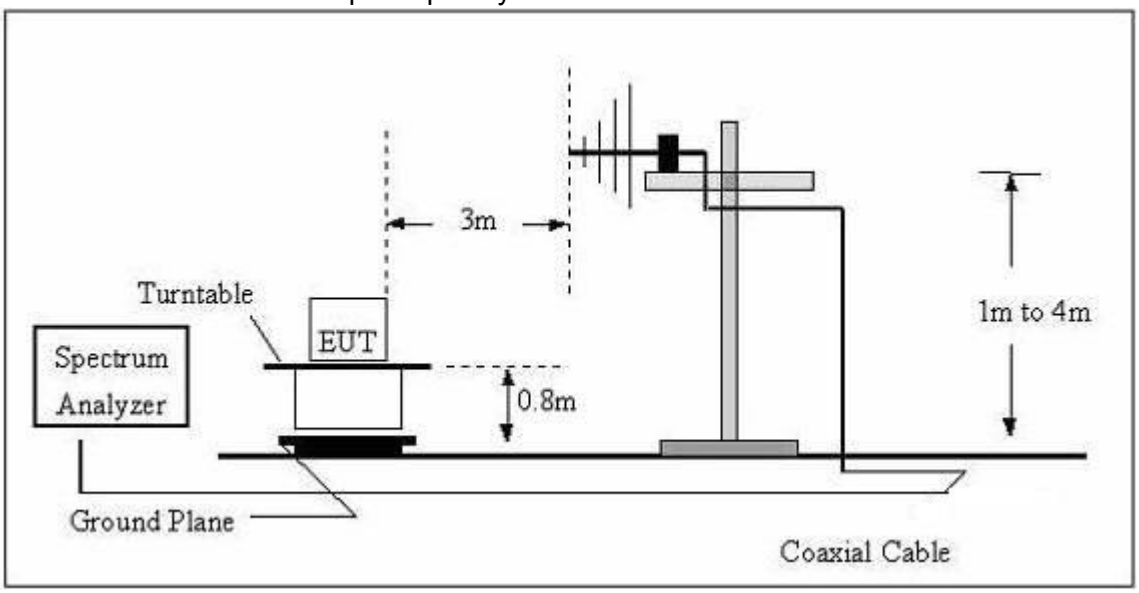
No deviation

3.2.4 TEST SETUP

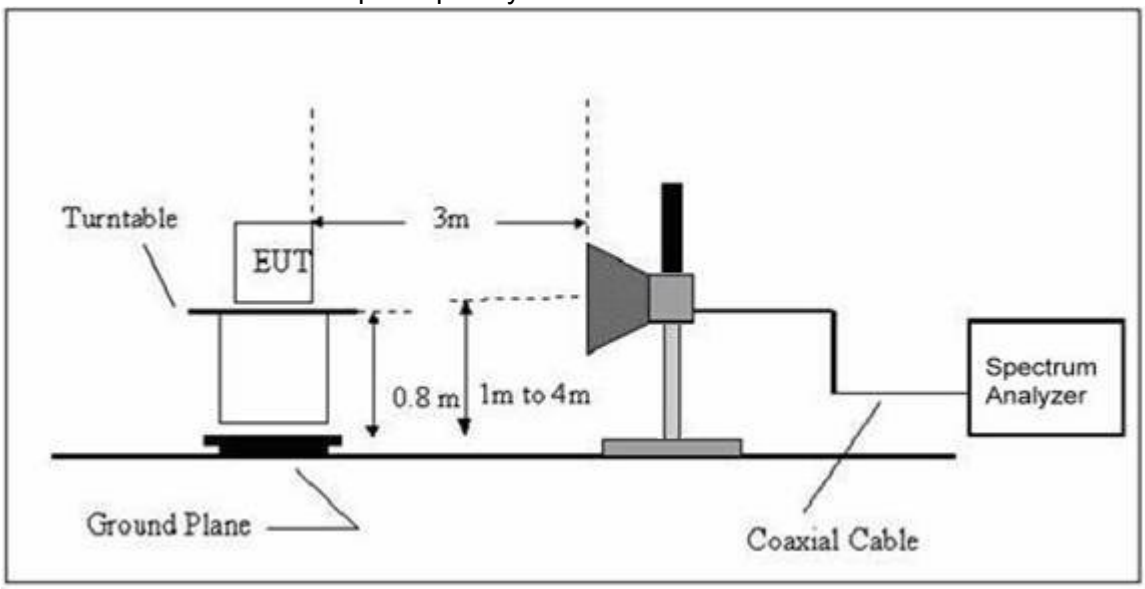
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 12V
Test Mode ：	TX	Polarization：	---

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Mode：	TX
Test Voltage ：	DC12V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Vertical	32.9791	10.41	16.91	27.32	40.00	-12.68	QP
Vertical	96.0986	15.50	10.18	25.68	43.50	-17.82	QP
Vertical	336.0352	13.74	16.03	29.77	46.00	-16.23	QP
Vertical	432.5457	11.89	18.83	30.72	46.00	-15.28	QP
Vertical	734.4913	7.43	26.36	33.79	46.00	-12.21	QP
Vertical	938.8325	7.46	29.56	37.02	46.00	-8.98	QP
Horizontal	336.0352	22.17	16.03	38.20	46.00	-7.80	QP
Horizontal	383.9318	22.10	17.38	39.48	46.00	-6.52	QP
Horizontal	432.5457	19.14	18.83	37.97	46.00	-8.03	QP
Horizontal	890.7278	15.34	27.46	42.80	46.00	-3.20	QP
Horizontal	912.8618	14.61	28.34	42.95	46.00	-3.05	QP
Horizontal	938.8324	12.50	29.56	42.06	46.00	-3.94	QP

3.2.8 **TEST RESULTS (ABOVE 1000 MHZ)**

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010hPa	Test Mode：	TX
Test Mode ：	DC12V		

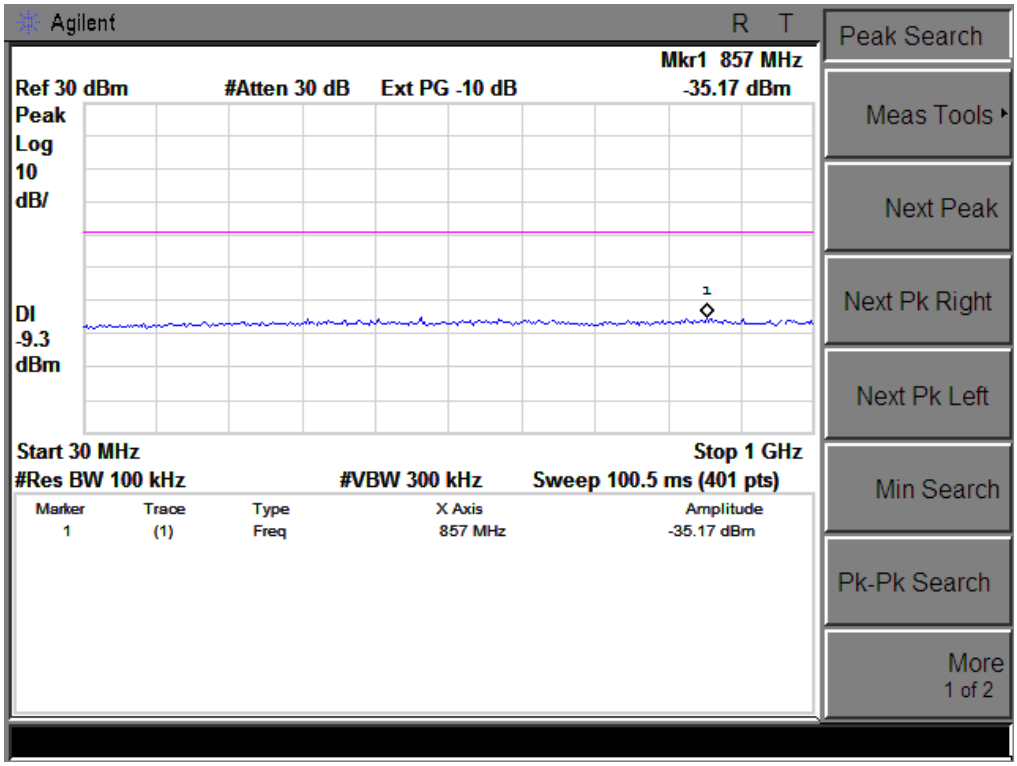
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Frequency:2409.75MHz							
V	3223.642	61.55	-3.79	57.76	74.00	-16.24	peak
V	3223.642	35.70	-3.79	31.91	54.00	-22.09	AVG
V	4821.029	52.91	-3.64	49.27	74.00	-24.73	peak
V	7231.926	48.67	-0.95	47.72	74.00	-26.28	peak
H	3231.027	60.30	-3.79	56.51	74.00	-17.49	peak
H	3231.027	36.43	-3.79	32.64	54.00	-21.36	AVG
H	4822.034	52.51	-3.64	48.87	74.00	-25.13	peak
H	7230.241	48.04	-0.95	47.09	74.00	-26.91	peak
Frequency:2442.375MHz							
V	3281.354	57.62	-3.78	53.84	74.00	-20.16	peak
V	4883.267	51.73	-3.67	48.06	74.00	-25.94	peak
V	7324.755	47.41	-0.82	46.59	74.00	-27.41	peak
H	3283.861	56.20	-3.78	52.42	74.00	-21.58	peak
H	4884.025	51.64	-3.67	47.97	74.00	-26.03	peak
H	7325.015	49.13	-0.82	48.31	74.00	-25.69	peak
Frequency:2472.75MHz							
V	4945.631	52.26	-3.59	48.67	74.00	-25.33	peak
V	7410.326	48.74	-0.68	48.06	74.00	-25.94	peak
H	4946.591	50.88	-3.59	47.29	74.00	-26.71	peak
H	7412.856	46.59	-0.68	45.91	74.00	-28.09	peak

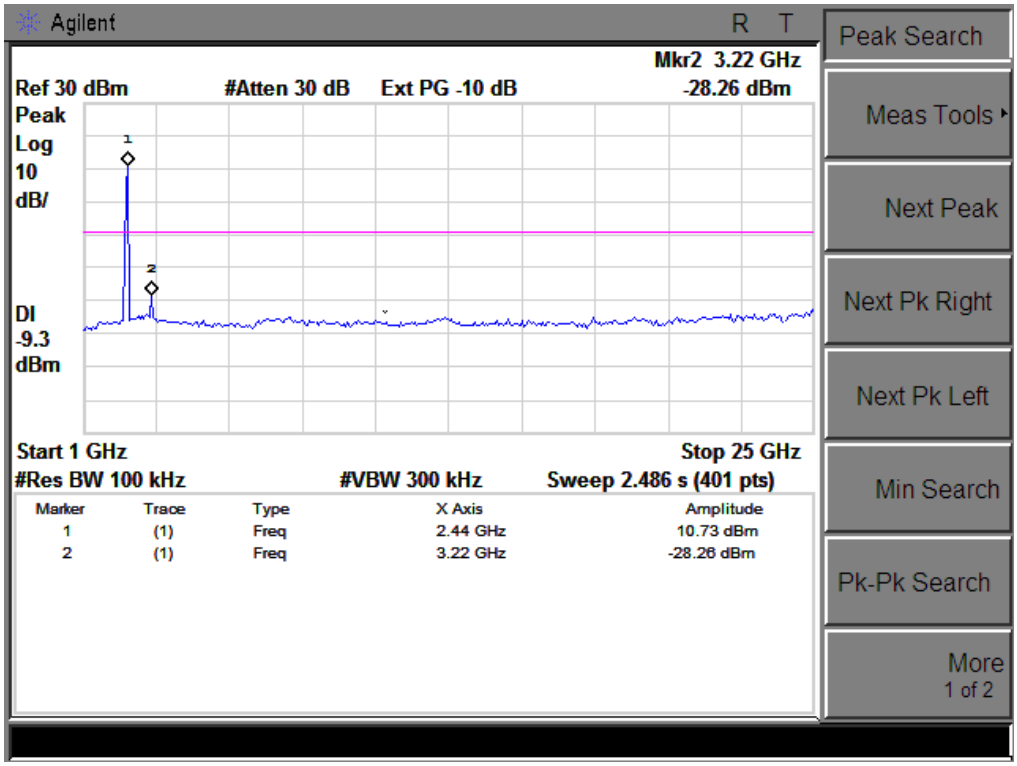
Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit

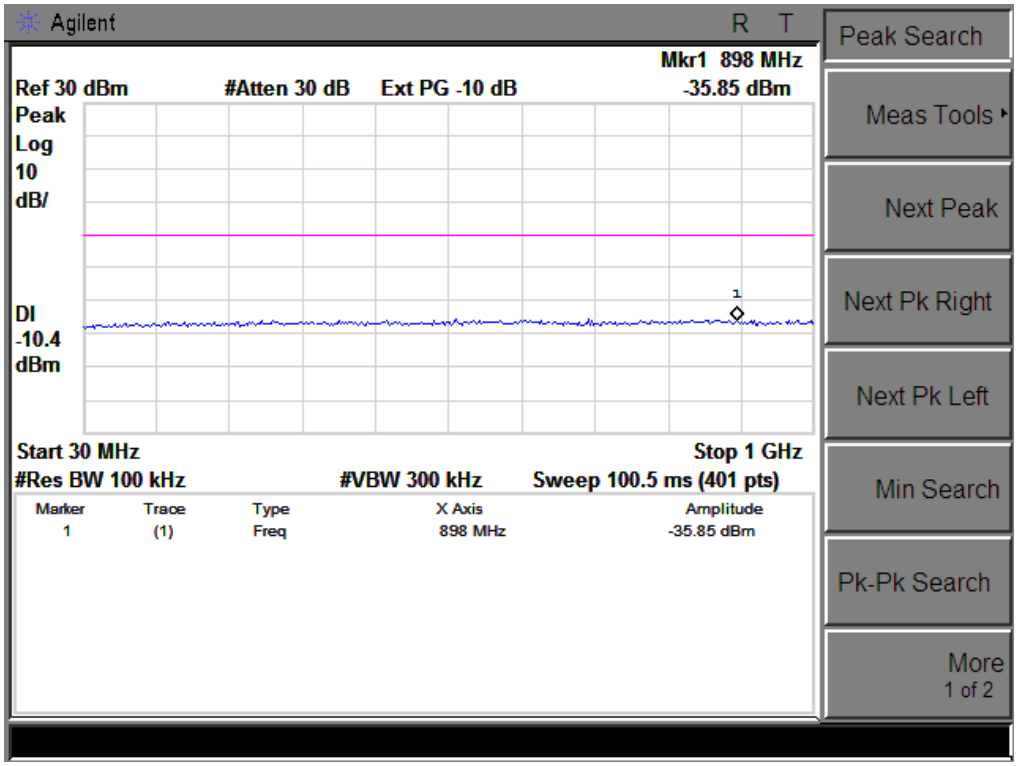
Conducted Spurious Emissions at Antenna Port:

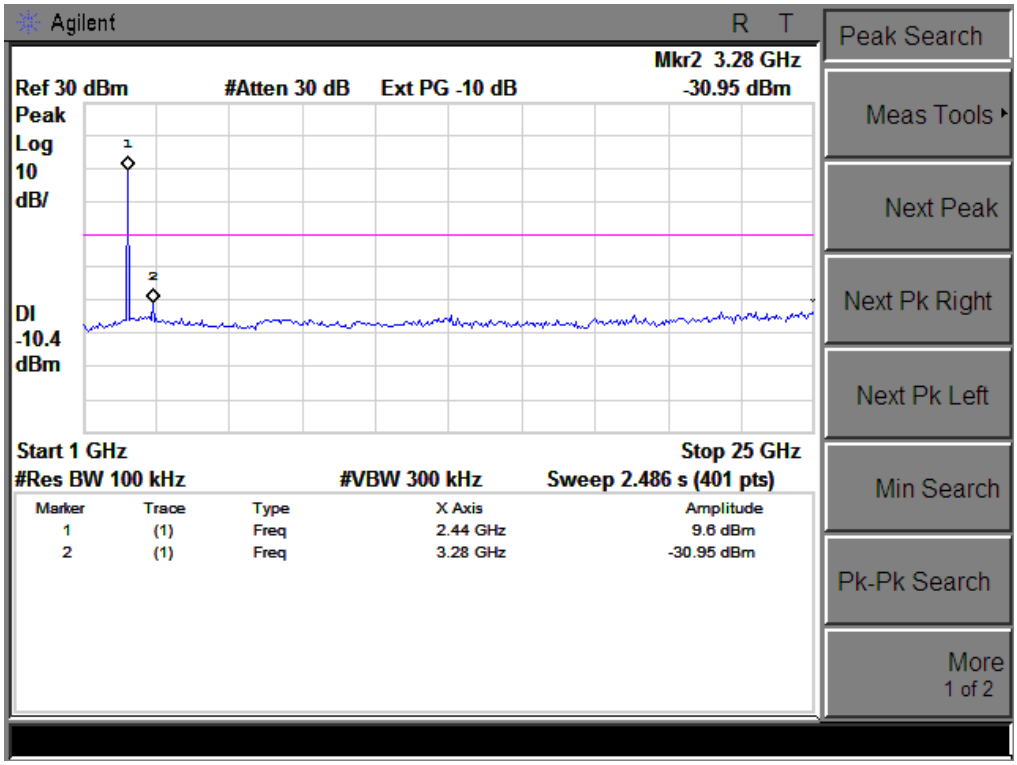
CH00



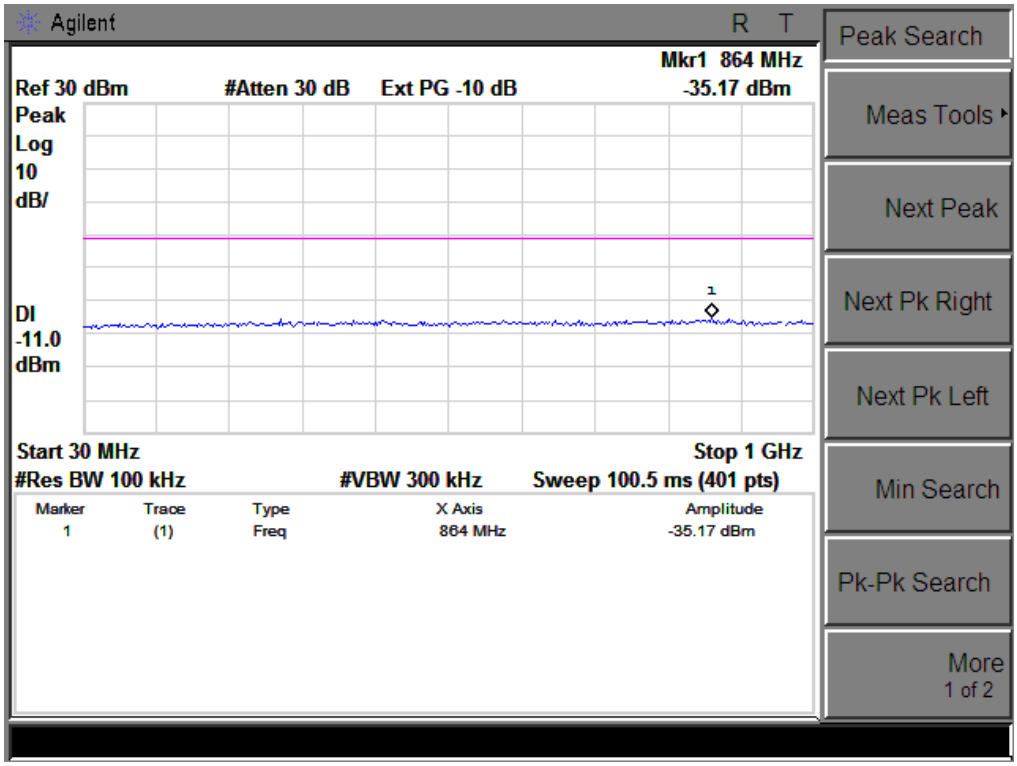


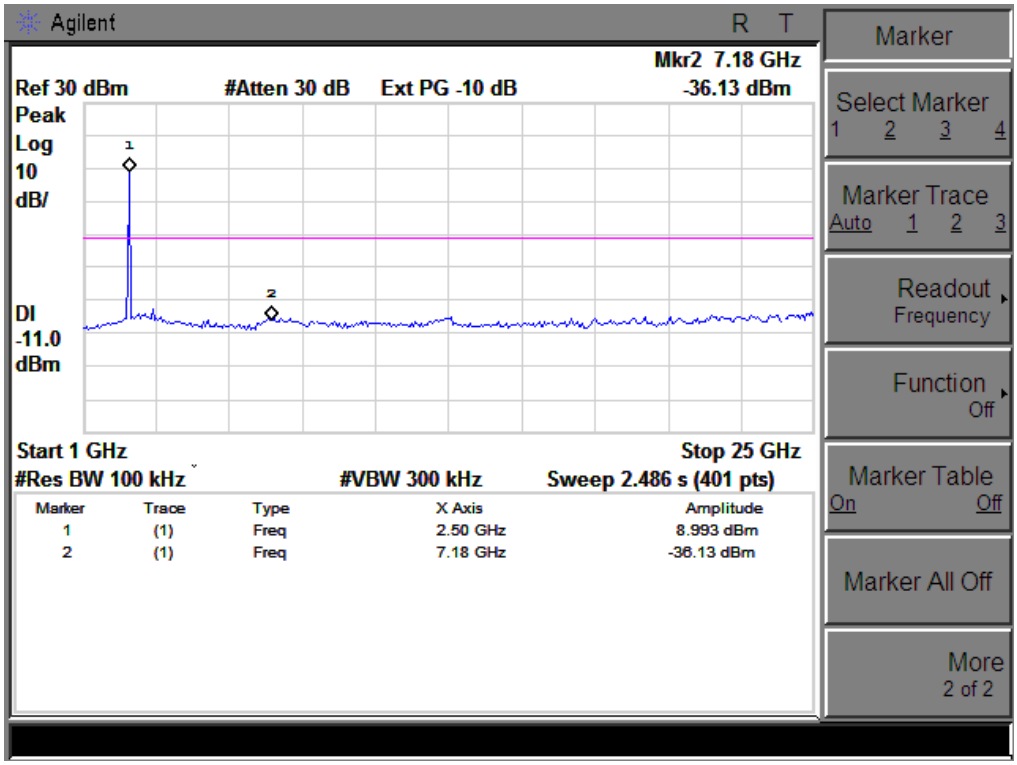
CH09


Agilent
R T
Mkr1 898 MHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-35.85 dBm
Peak
Log
10
dB/
DI
-10.4
dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 898 MHz -35.85 dBm
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
R T
Mkr2 3.28 GHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-30.95 dBm
Peak
Log
10
dB/
DI
-10.4
dBm
Start 1 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25 GHz
Sweep 2.486 s (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.44 GHz 9.6 dBm
2 (1) Freq 3.28 GHz -30.95 dBm
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

CH18


Agilent
R T
Mkr1 864 MHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-35.17 dBm
Peak
Log
10
dB/
DI
-11.0
dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 864 MHz -35.17 dBm
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
R T
Mkr2 7.18 GHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-36.13 dBm
Peak
Log
10
dB/
DI
-11.0
dBm
Start 1 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25 GHz
Sweep 2.486 s (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.50 GHz 8.993 dBm
2 (1) Freq 7.18 GHz -36.13 dBm
Marker
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Frequency
Function
Off
Marker Table
On Off
Marker All Off
More
2 of 2

4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW ≥ 1% of the span
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

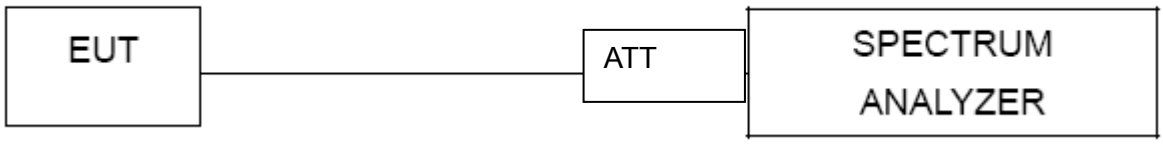
4.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 1MHz, VBW=1MHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



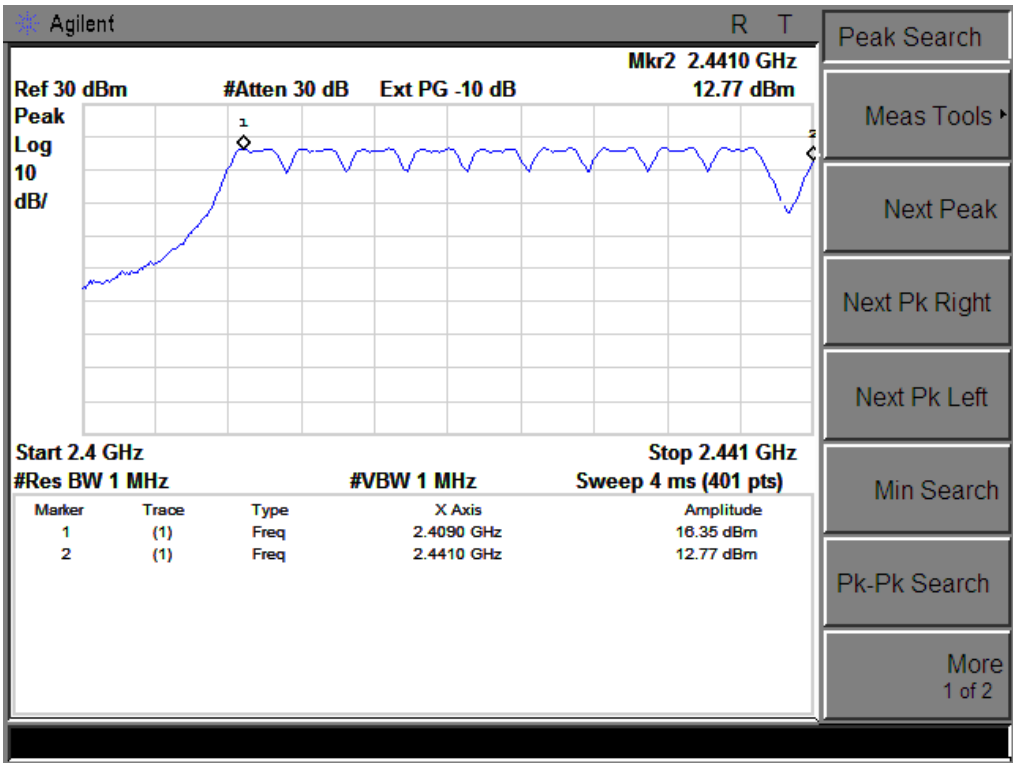
4.1.4 EUT OPERATION CONDITIONS

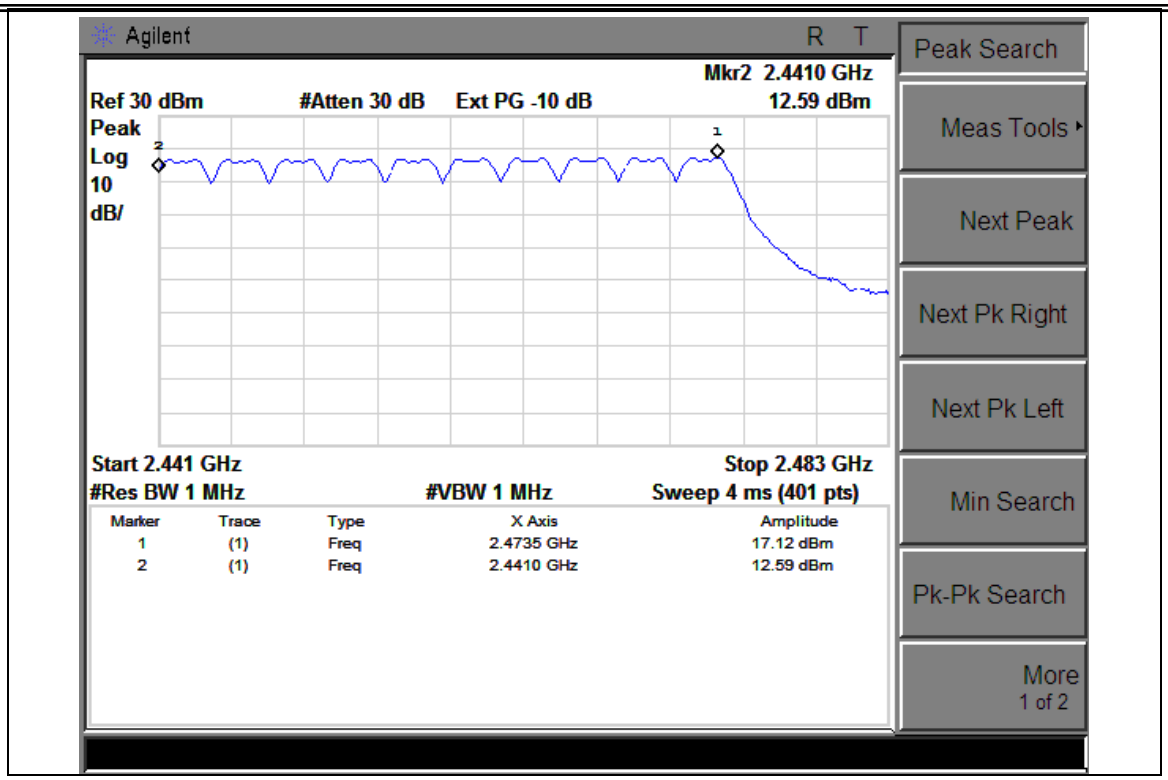
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 12V
Test Mode ：	Hopping Mode		

Number of Hopping Channel	19




Agilent
R T
Mkr2 2.4410 GHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
12.59 dBm
Peak
Log
10
dB/
Start 2.441 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 2.483 GHz
Sweep 4 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4735 GHz 17.12 dBm
2 (1) Freq 2.4410 GHz 12.59 dBm
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

5. AVERAGE TIME OF OCCUPANCY

5.1 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

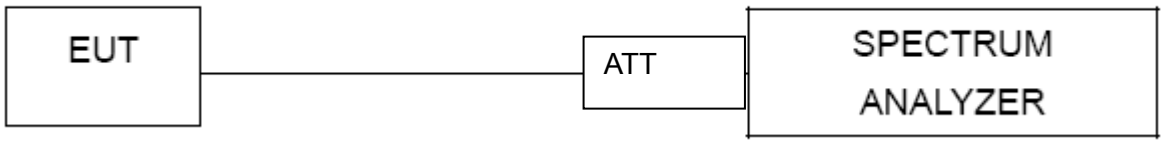
5.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. A Period Time = (channel number)*0.4
Time Slot: Reading * (97/2)*7.2/(channel number)

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

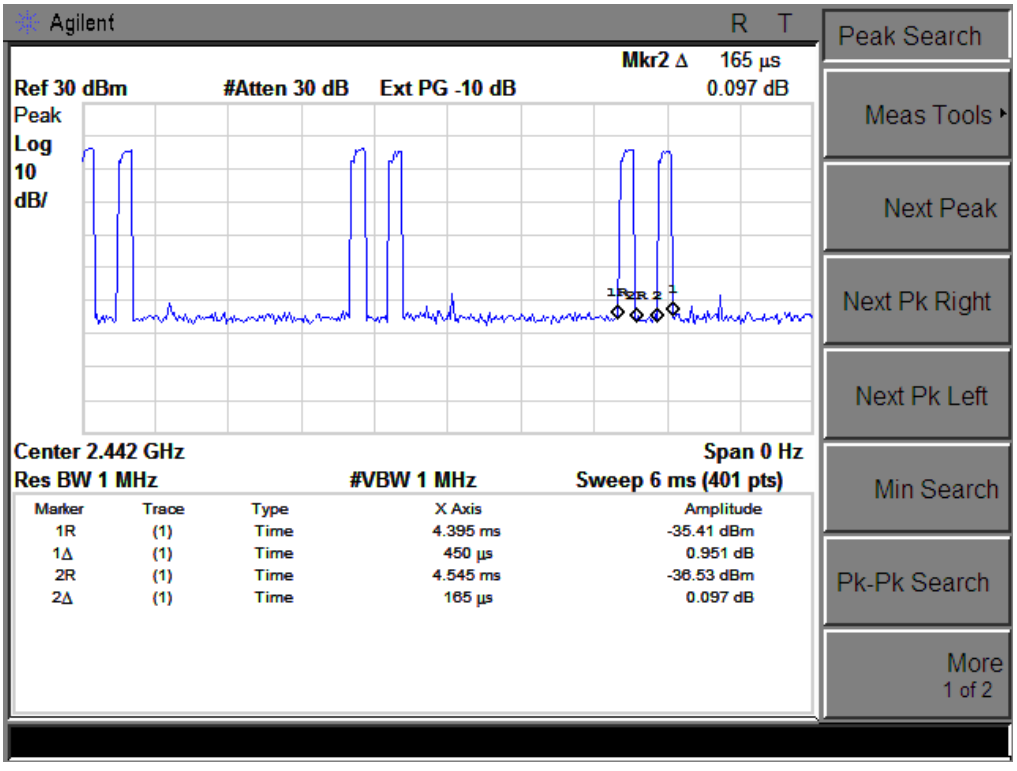
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	CH09		

Frequency	Pulse Duration	Dwell Time	Limits
	(ms)	(s)	(s)
2442.375MHz	0.29	0.006	0.4

CH09



Note:1R to 1△ is 450 μs, 2R to 2△ is 165 μs, Pulse Duration=450 μs-165 μs=0.29ms .

A Period Time = (channel number)*0.4

Dwell Time: Reading * (97/2)*7.2/(channel number)=0.29*(97/2)*7.2/19=0.006S

6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 TEST PROCEDURE

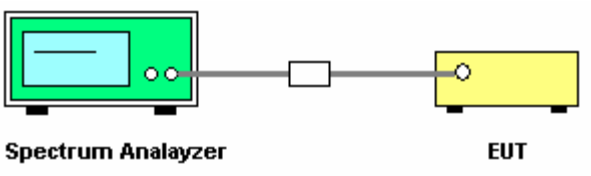
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

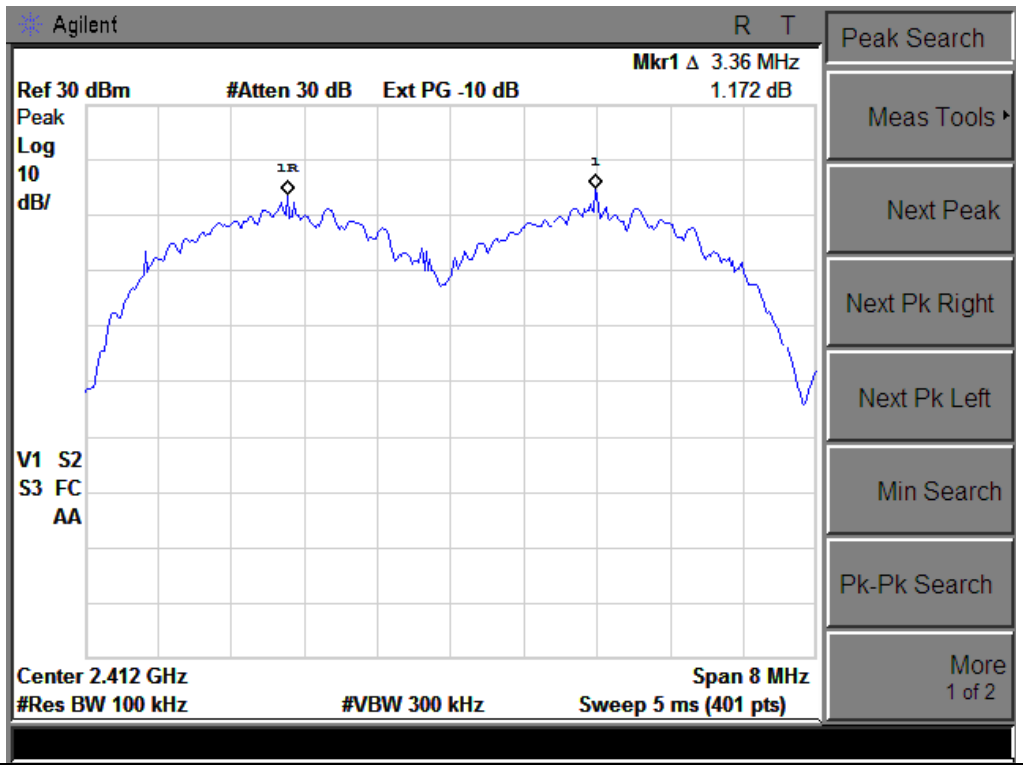
6.1.5 TEST RESULTS

EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	CH00 / CH09 /CH18		

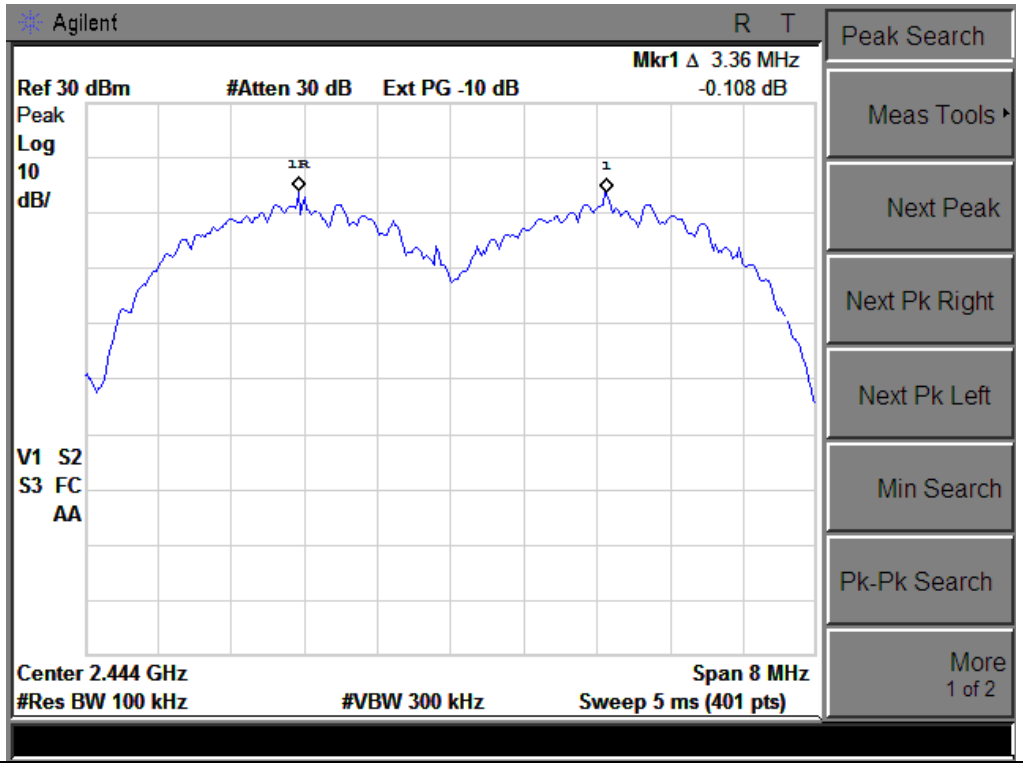
Frequency	Ch. Separation (MHz)	Result
2409.75 MHz	3.360	**Complies**
2442.375 MHz	3.360	**Complies**
2472.75 MHz	3.420	**Complies**

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

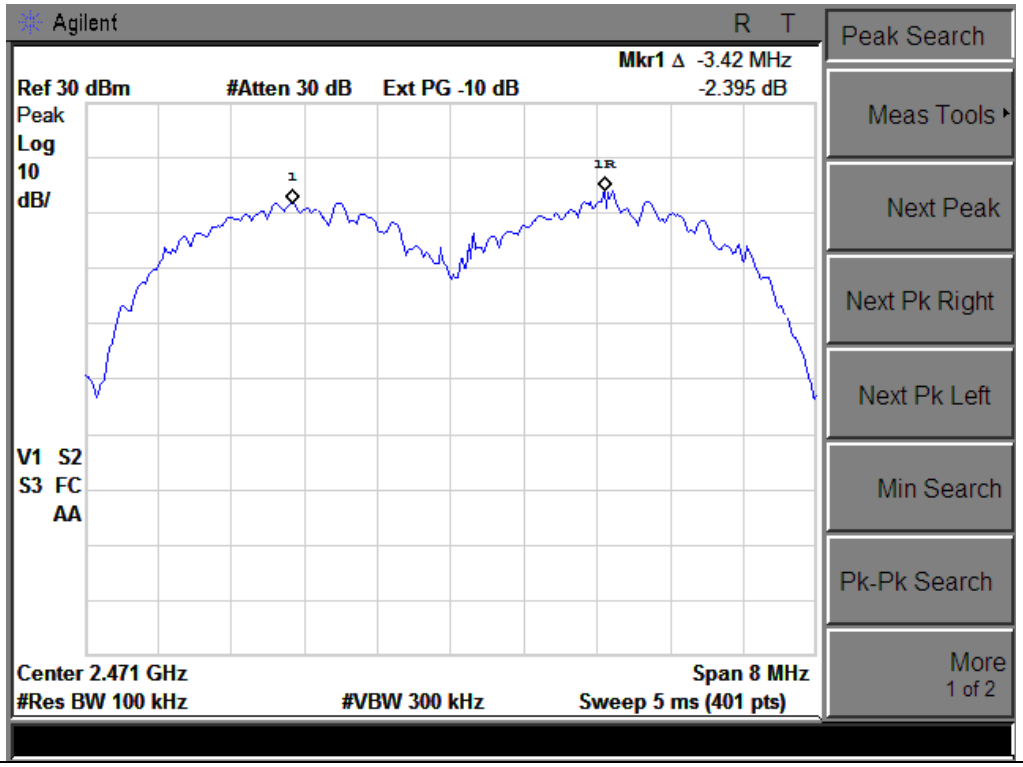
CH00



CH09


Agilent
R T
Mkr1 Δ 3.36 MHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-0.108 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 FC
AA
Center 2.444 GHz
Span 8 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

CH18


Agilent
R T
Mkr1 Δ -3.42 MHz
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
-2.395 dB
Peak
Log
10
dB/
1
1R
V1 S2
S3 FC
AA
Center 2.471 GHz
Span 8 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

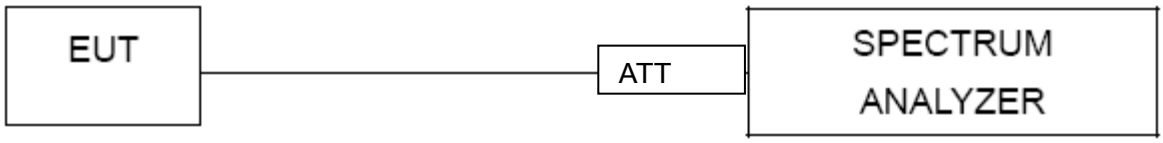
7.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

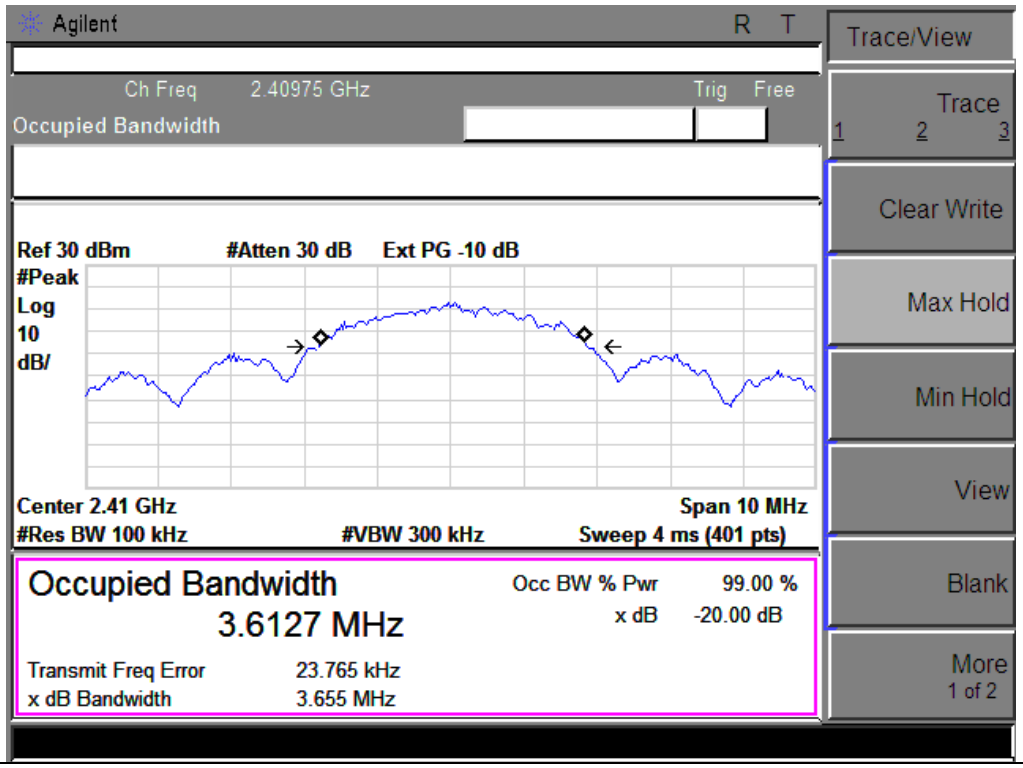
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

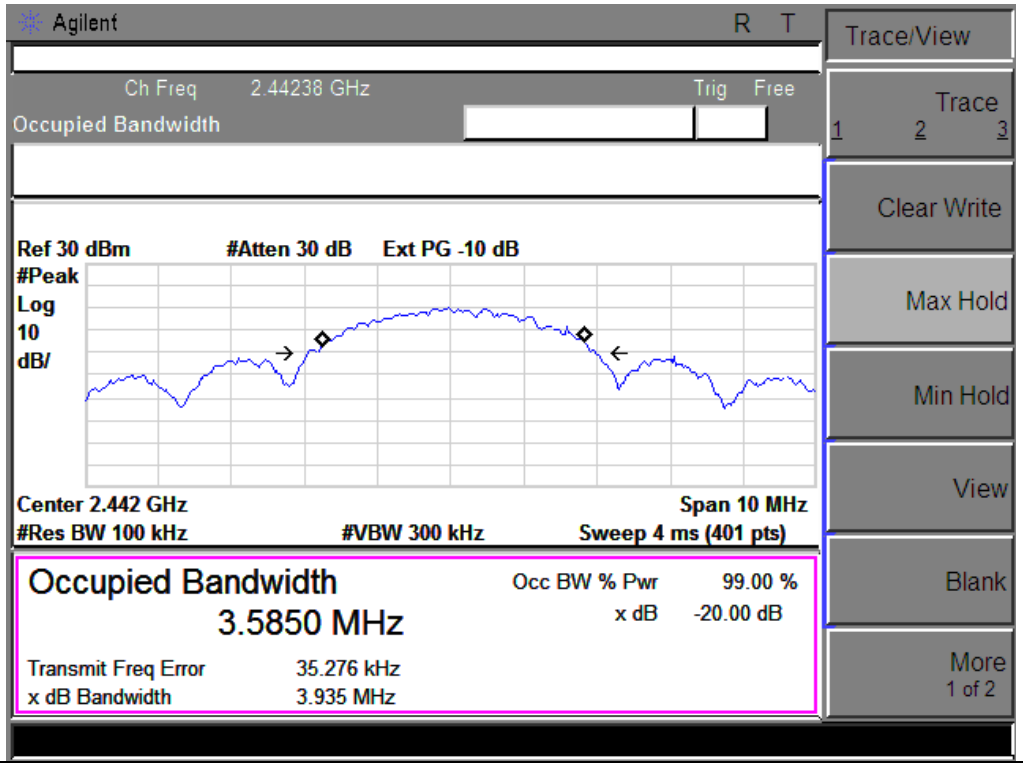
EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	CH00 / CH09 /C18		

Frequency	20dB Bandwidth (MHz)	Result
2409.75 MHz	3.655	**PASS**
2442.375 MHz	3.935	**PASS**
2472.75 MHz	3.637	**PASS**

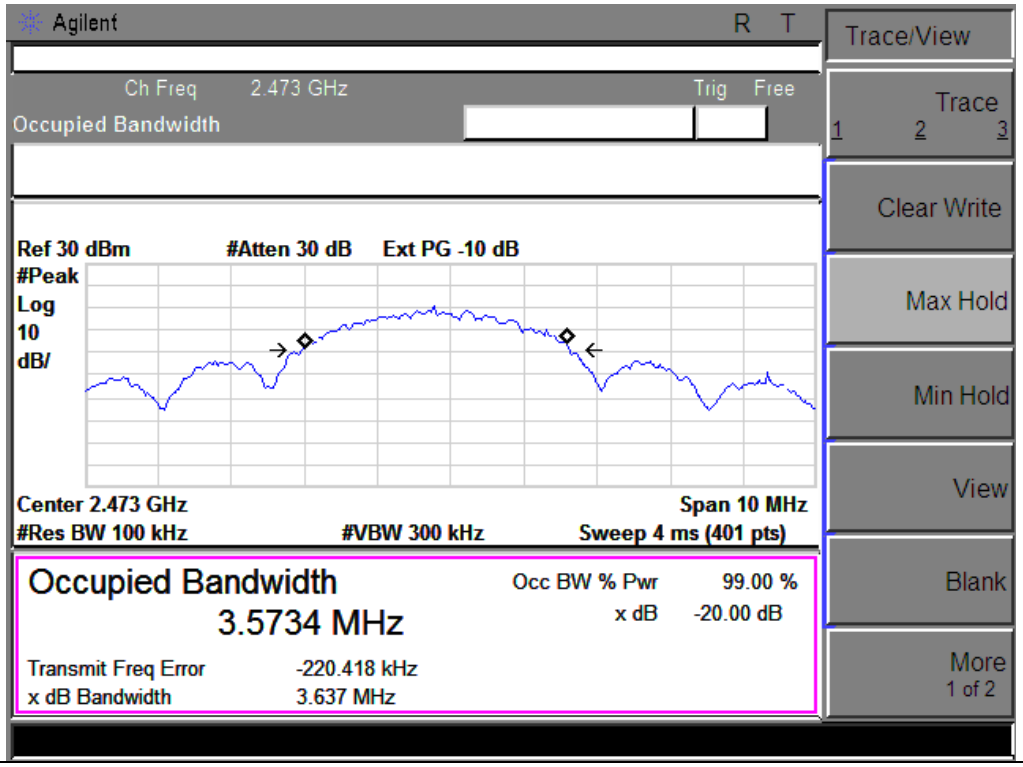
CH00



CH09


Agilent
R T
Ch Freq 2.44238 GHz
Trig Free
Occupied Bandwidth
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.442 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
3.5850 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 35.276 kHz
x dB Bandwidth 3.935 MHz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

CH18


Agilent
R T
Ch Freq 2.473 GHz
Trig Free
Occupied Bandwidth
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.473 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
3.5734 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -220.418 kHz
x dB Bandwidth 3.637 MHz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

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

8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. Spectrum Setting :

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW=1MHz
VBW=3xRBW

Sweep = auto

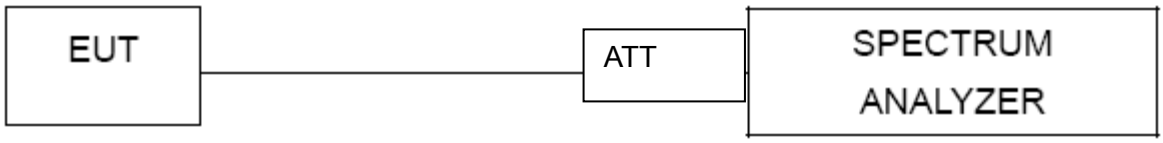
Detector function = peak

Trace = max hold

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

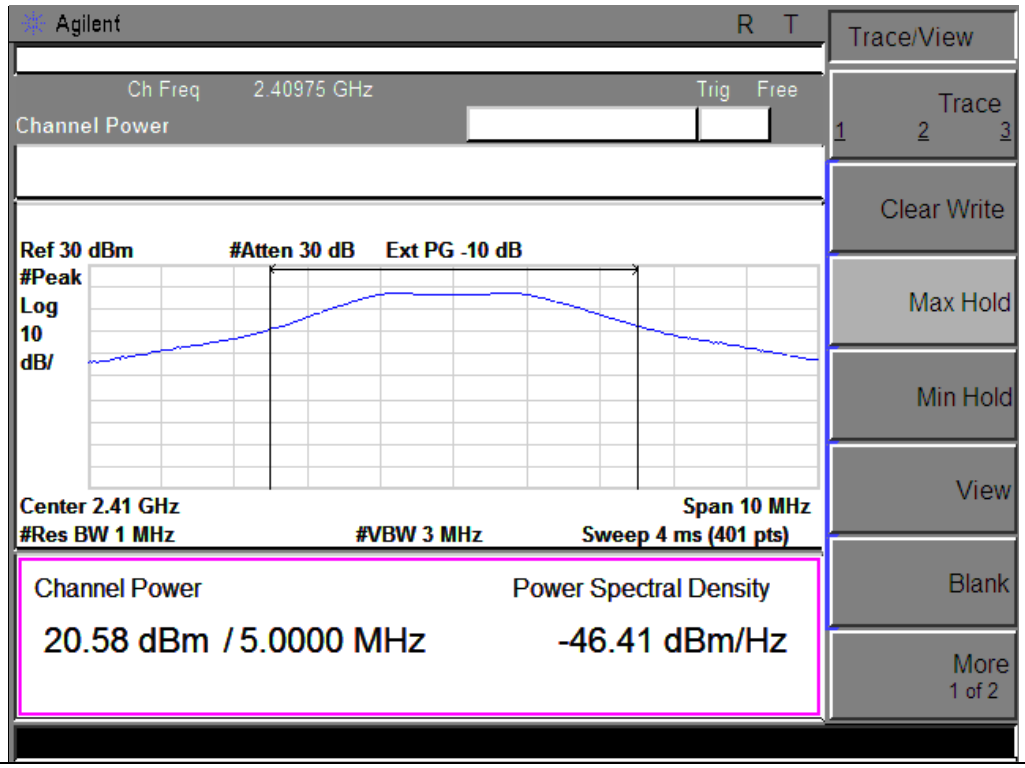
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

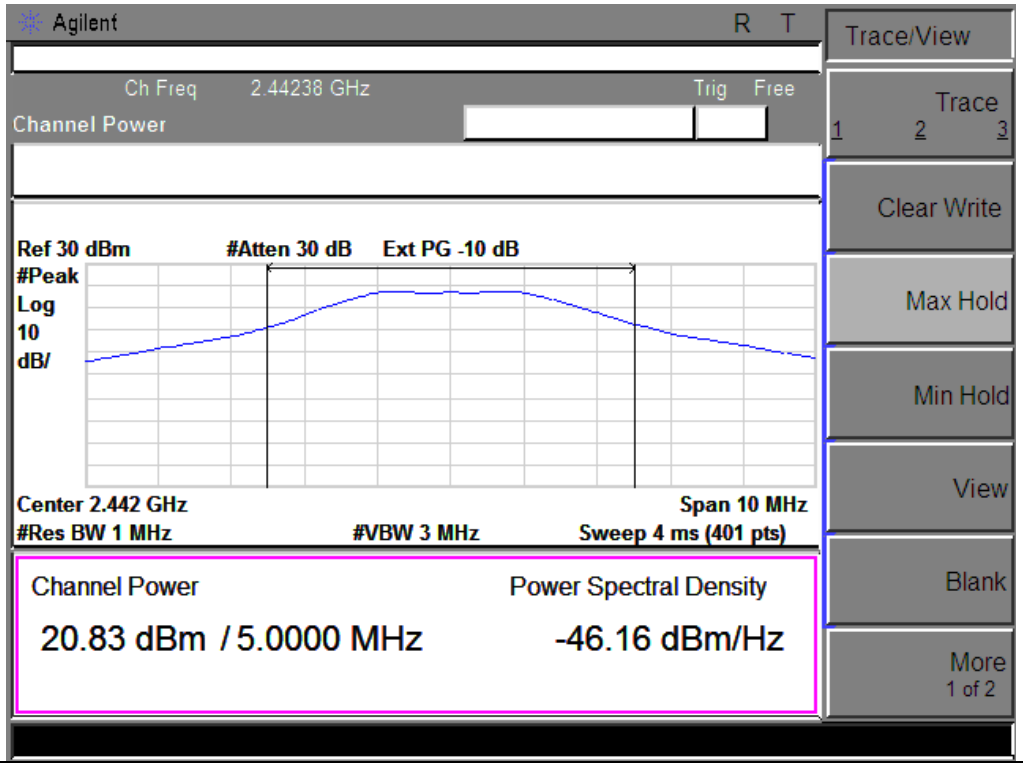
EUT：	Digital Wireless Camera System(FCA48TA-BL)	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V
Test Mode ：	CH00/ CH09 /CH18		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2409.75	20.58	20.97
CH09	2442.375	20.83	20.97
CH18	2472.75	20.90	20.97

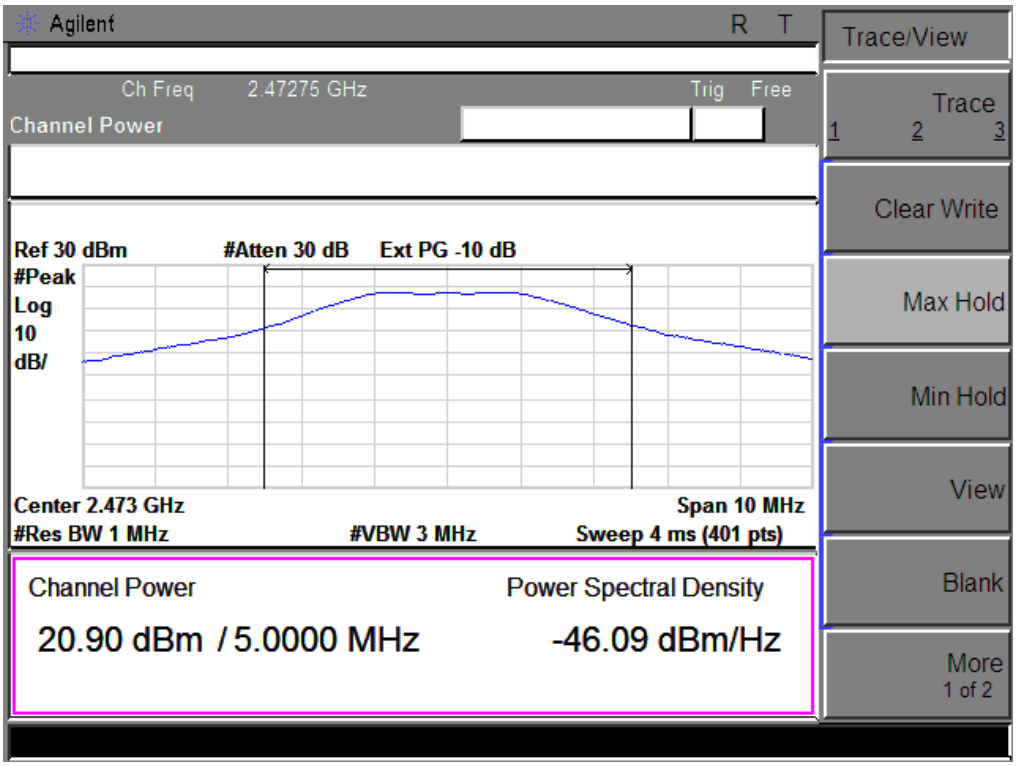
CH00



CH09


Agilent
R T
Ch Freq 2.44238 GHz
Trig Free
Channel Power
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.442 GHz
Span 10 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 4 ms (401 pts)
Channel Power
20.83 dBm / 5.0000 MHz
Power Spectral Density
-46.16 dBm/Hz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

CH18


Agilent
R T
Ch Freq 2.47275 GHz
Trig Free
Channel Power
Ref 30 dBm
#Atten 30 dB
Ext PG -10 dB
#Peak
Log
10
dB/
Center 2.473 GHz
Span 10 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 4 ms (401 pts)
Channel Power
20.90 dBm / 5.0000 MHz
Power Spectral Density
-46.09 dBm/Hz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

9. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

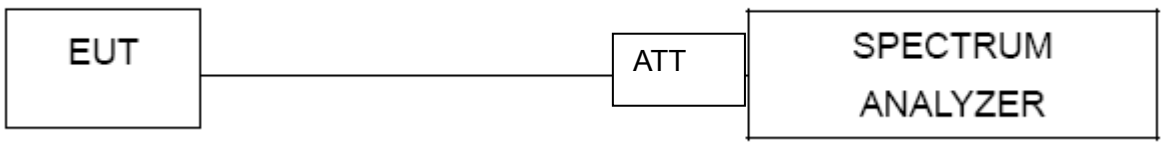
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

9.1 DEVIATION FROM STANDARD

No deviation.

9.2 TEST SETUP



9.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.4 TEST RESULTS

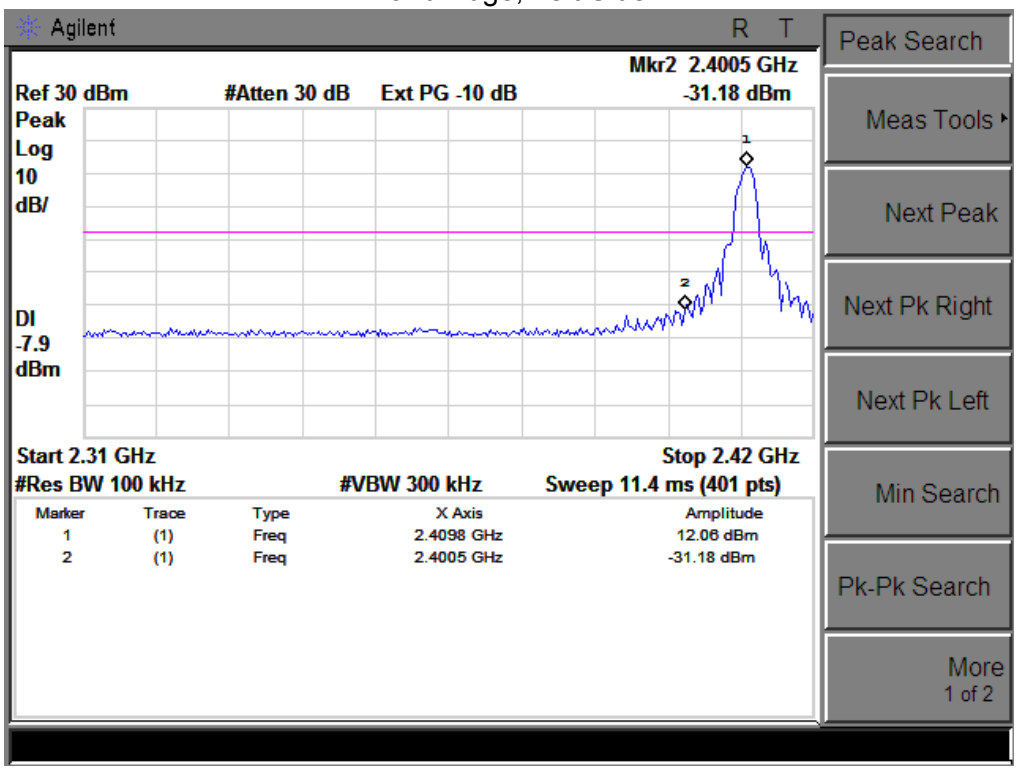
EUT：	Digital Wireless Camera System(FCA48TA-BL)(	Model Name ：	FRC12TA-BL
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 12V

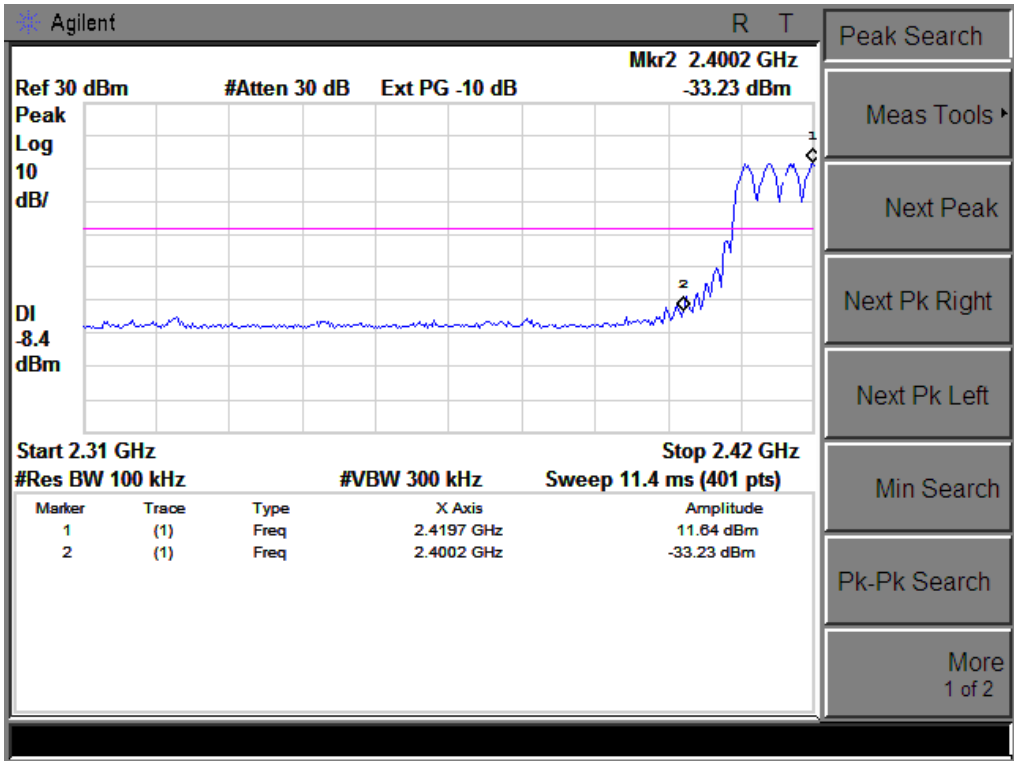
Frequency Band	Delta Peak to band emission(Non-FHSS) (dBc)	Delta Peak to band emission(FHSS) (dBc)	＞Limit (dBc)	Result
Left-band	43.24	44.87	20	Pass
Right-band	45.20	45.18	20	Pass

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Non-FHSS							
2390	64.43	-13.06	51.37	74.00	-22.63	peak	Vertical
2390	63.87	-13.06	50.81	74.00	-23.19	peak	Horizontal
2483.5	61.70	-12.78	48.92	74.00	-25.08	peak	Vertical
2483.5	62.06	-12.78	49.28	74.00	-24.72	peak	Horizontal
FHSS							
2390	63.10	-13.06	50.04	74.00	-23.96	peak	Vertical
2390	62.88	-13.06	49.82	74.00	-24.18	peak	Horizontal
2483.5	62.11	-12.78	49.33	74.00	-24.67	peak	Vertical
2483.5	63.49	-12.78	50.71	74.00	-23.29	peak	Horizontal

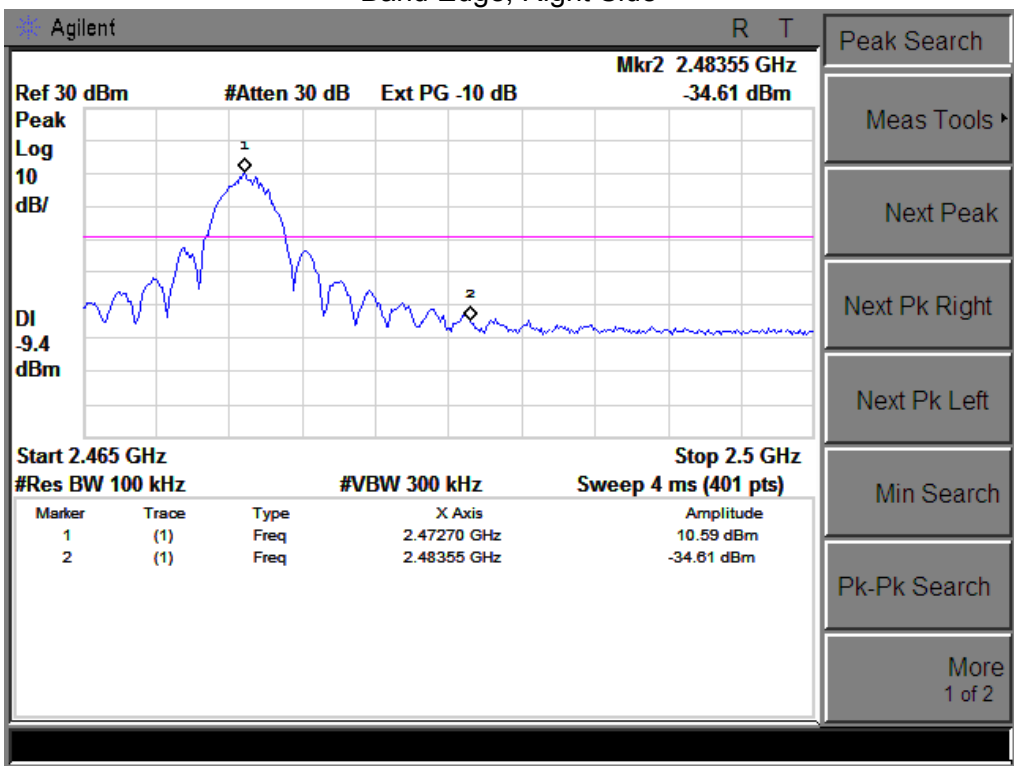
Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average didn't record.

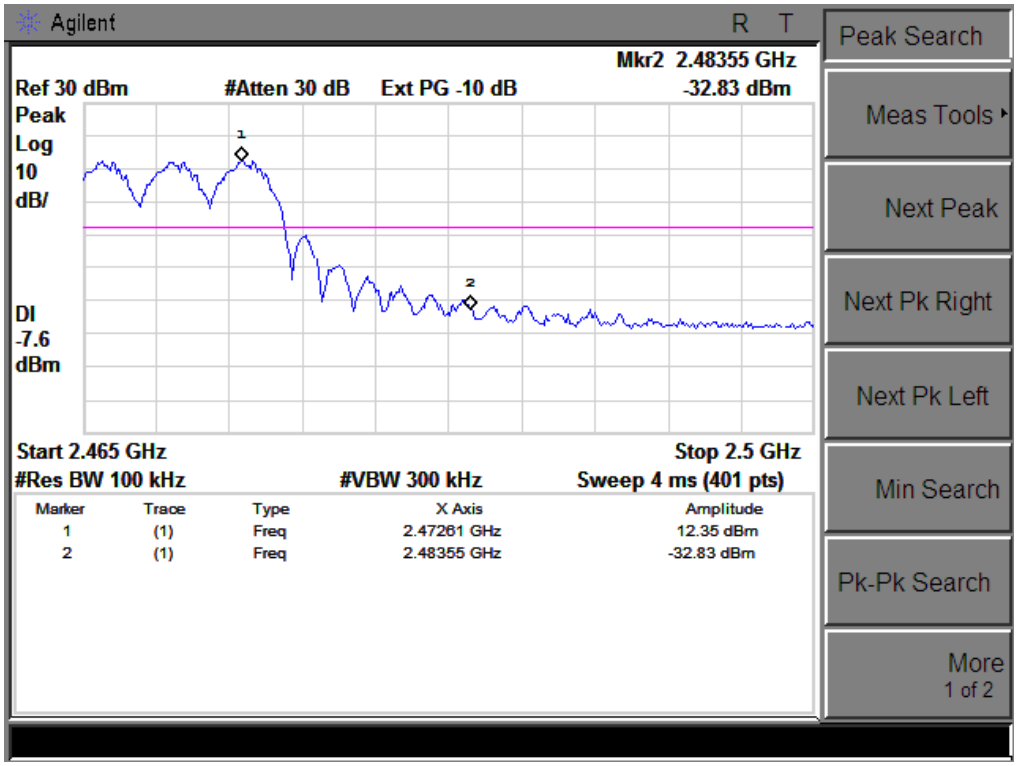
Band Edge, Left Side





Band Edge, Right Side





10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

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

10.2 EUT ANTENNA

The EUT antenna is Integrated(PCB) antenna. It comply with the standard requirement.

11. EUT TEST PHOTO

Radiated Measurement Photos