Telab B.V.
Telab Laboratory

FCC PART 15 CLASS C Test Report

REPORT NO.: 20141365EI

MODEL: RCTM3PK, RCTM21

EQUIPMENT TYPE: Remote Controller

TEST DATE: May 23, 2014

APPLICANT: Prime Wire & Cable Inc.

ADDRESS: 280 Machlin Court 2th Floor, City Of Industry, CA 91789, USA

MANUFACTURER: Ningbo Jiangbei Potek Electronics & Technology Co.,Ltd.

ADDRESS: 2th Floor, No.137 Jinji Road, Economic And Technological Development Zone, Ningbo City, Zhejiang P.R.C.

ISSUED BY: Telab Compliance Laboratory Co., Ltd.

LAB LOCATION: 1-6-49 Kairui Garden 63# Yingkang Road Chengdu ,Sichuan,China.

Checked Signatory Sean Chen-Test Engineer **Date** May 26, 2014

Authorized Signatory Steven Shi-Project Manager **Date** May 27, 2014

1. General Information

1.1 Purpose

The purpose of the test was to verify the compliant of the electromagnetic compatibility (E.M.C) requirements according to FCC Standards.

1.2 Description of Equipment under Test (EUT)

Applicant:	Prime Wire & Cable Inc.
Address:	280 Machlin Court 2th Floor, City Of Industry, CA 91789, USA
Manufacture:	Ningbo Jiangbei Potek Electronics & Technology Co.,Ltd.
Address:	2th Floor, No.137 Jinji Road, Economic And Technological Development Zone, Ningbo City, Zhejiang P.R.C.
Country of Origin:	China
Product type:	Remote Controller
Model:	RCTM3PK, RCTM21
Nominal Voltage:	3V DC (Battery)
Operation Frequency:	315MHz
Modulation:	ASK
Antenna Designation:	Integral antenna, non-user removable
Channel Description:	There is one channel only(315MHz)
FCC ID	QJX-004

1.3 General Description Of Applied Standards

The EUT is a kind of measurement control and laboratory use equipment and, according to the specifications of the manufacturers, must comply with the requirements of the following standards:

Main Standards	Description
47CFR Part 15 (2010)	Radio Frequency Devices
ANSI C63.4 (2003)	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.4 Description of Test Facility

Name	Telab Compliance Laboratory Co., Ltd.
Address:	1-6-49 Kairui Garden 63# Yingkang Road Chengdu ,Sichuan,China.
FCC Registration Number:	370174
Contact	Steven shi Tel:086-2888430263 Tax:086-2888430273

1.5 Test Laboratory Climate

Ambient Temperature: 24.0℃
Relative Humidity: 51%
Barometric Pressure: 103.3KPa (QNH)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Test Item	Referance Clause	Result	Remarks
Power line conducted emission	15.207	N/A	
Restrict Band Radiated Emission	15.205	Pass	
Fundamental & Spurious Emission	15.231(b)	Pass	
Deactivating Time	15.231(a)(1)	Pass	
Emission Bandwidth	15.231(c)	Pass	

3. SYSTEM CONFIGURATION DURING EMC TESTING.

The equipment under test (EUT) was configured for all testing as described below, details of test specific setup is given on the relevant pages.

Emission Testing
The EUT consisted to 5VDC battery. The EUT was set up simulating a typical user installation on the test site, and then tested in accordance with the specification.
The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as “max hold” continuously and the highest reading among the whole test procedure was recorded.

4. CONDUCTED EMISSION (15.207)

4.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A(dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	/	/	66 - 56	56 - 46
0.50 - 5.0	/	/	56	46
5.0 - 30.0	/	/	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2 EUT Configuration

The equipment under test was set up in the shielded room with the EUT 40cm away from the wall of the room. The EUT was placed on a non-conductive test table which is 80cm in height. Excess power cord was folded back and forth to form a 30cm by 40cm bundle. The distance between EUT and LISN is 80cm.
Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

4.3 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

4.4 EMI Receiver/Spectrum Analyzer Configuration

Frequency	150KHz--30MHz
Range:Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth (RBW):	9KHz

4.5 Test Setup

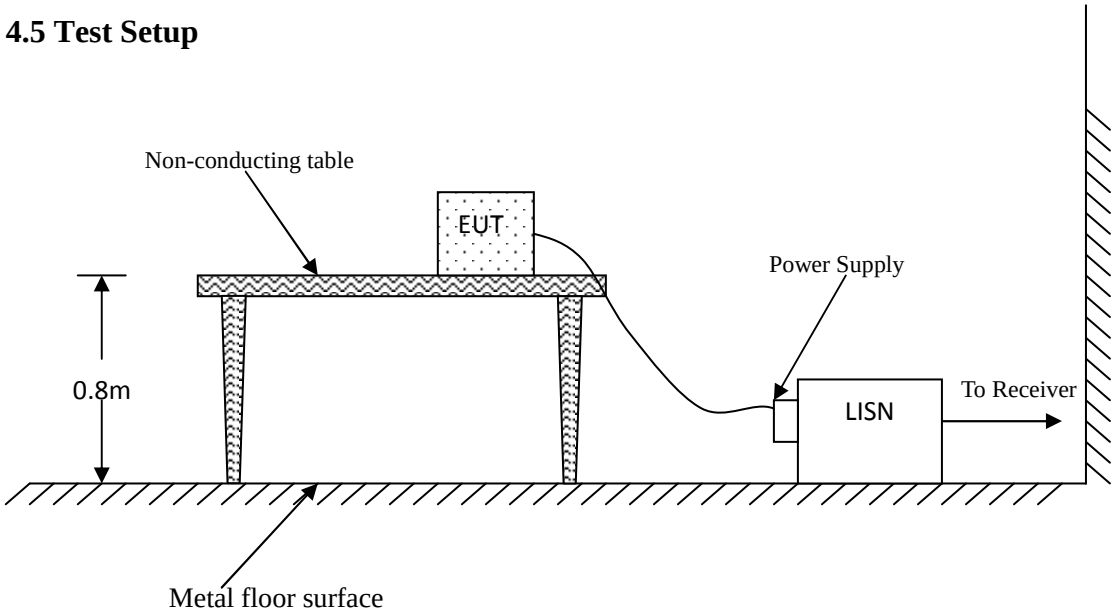


Figure 1: Side view of conducted test setup. The LISN output connects to the receiver.

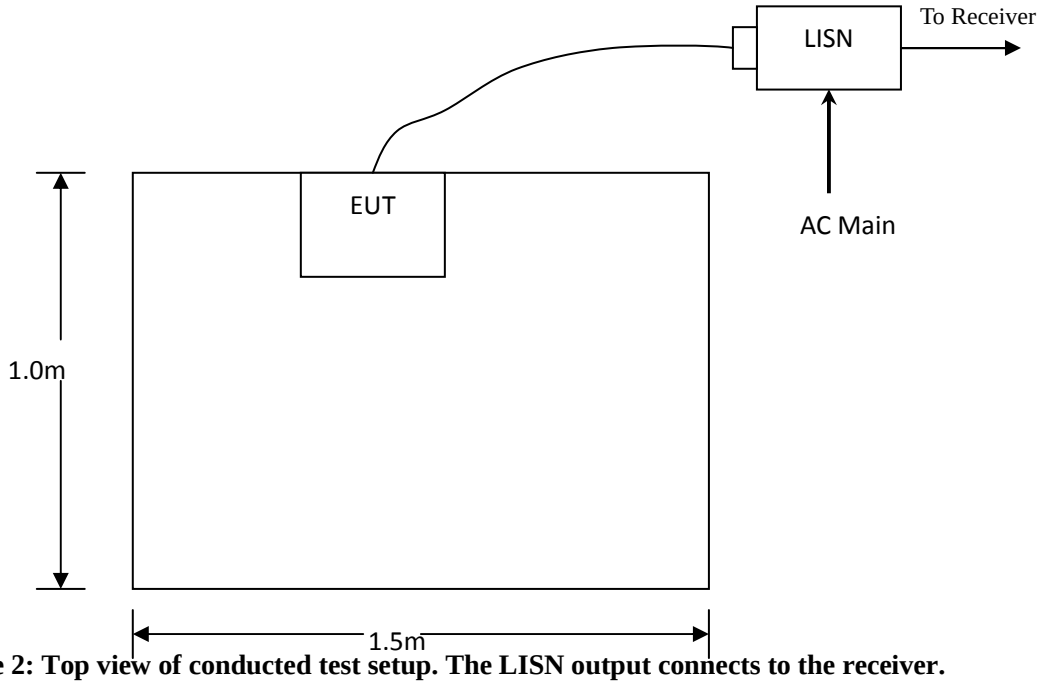


Figure 2: Top view of conducted test setup. The LISN output connects to the receiver.

4.6 Test Curve & Data

- Not Application

5. FUNDAMENTAL & SPURIOUS EMISSION (15.231b)

5.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Fundamental Frequency (Mhz)	Fundamental Limit μV/m (at 3m)	Spurious Limit μV/m (at 3m)
40.66 – 40.70	2250	225
70 – 130	1250	125
130 - 174	1250 to 3750	125 to 375
174 - 260	3750	375
260 – 470	3750 to 12500	375 to 1250
Above 470	12500	1250

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emissions from a device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.2 EUT Configuration

The radiated emissions test setups are in accordance with ANSI C63.4
The equipment under test was set up on the 3 meter Anechoic chamber test non-conductive table 80cm above ground, same as conducted Excess data cable was folded back and forth to form a 30cm by 40cm bundle.
Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.
If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

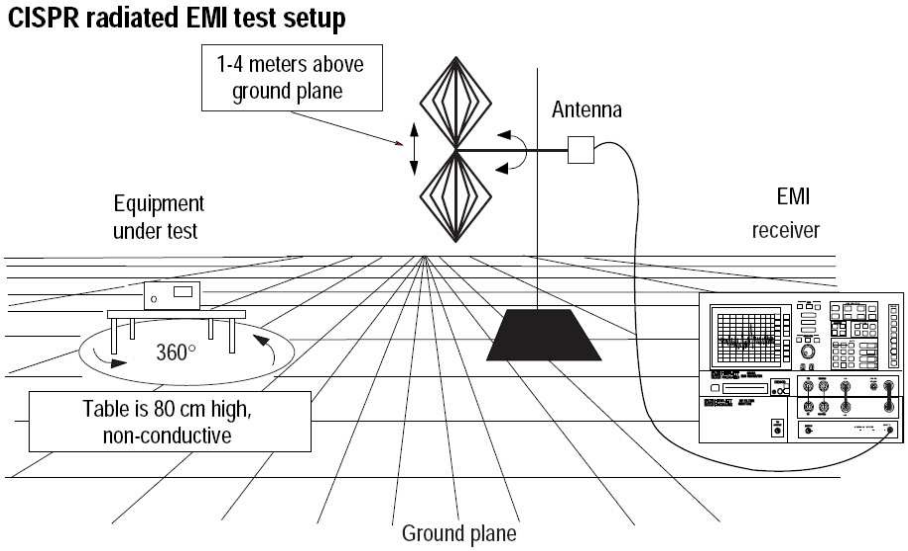
5.3 Test Procedure

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier and high pass filter is equipped just at the output terminal of the antenna.
metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
Both horizontal and vertical polarities of the receiving antenna were assessed and the higher reading was listed in this report..

5.4 EMI Receiver Configuration (for the frequencies tested)

Frequency Range: Detector Function: Resolution Bandwidth (RBW):	30MHz--1000MHz Peak Mode 100KHz
Frequency Range: Detector Function: Resolution Bandwidth (RBW):	Above 1000MHz Peak Mode 1MHz

5.5 Test Setup



5.6 Calculating Max Permitted Fundamental Field Strengths

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

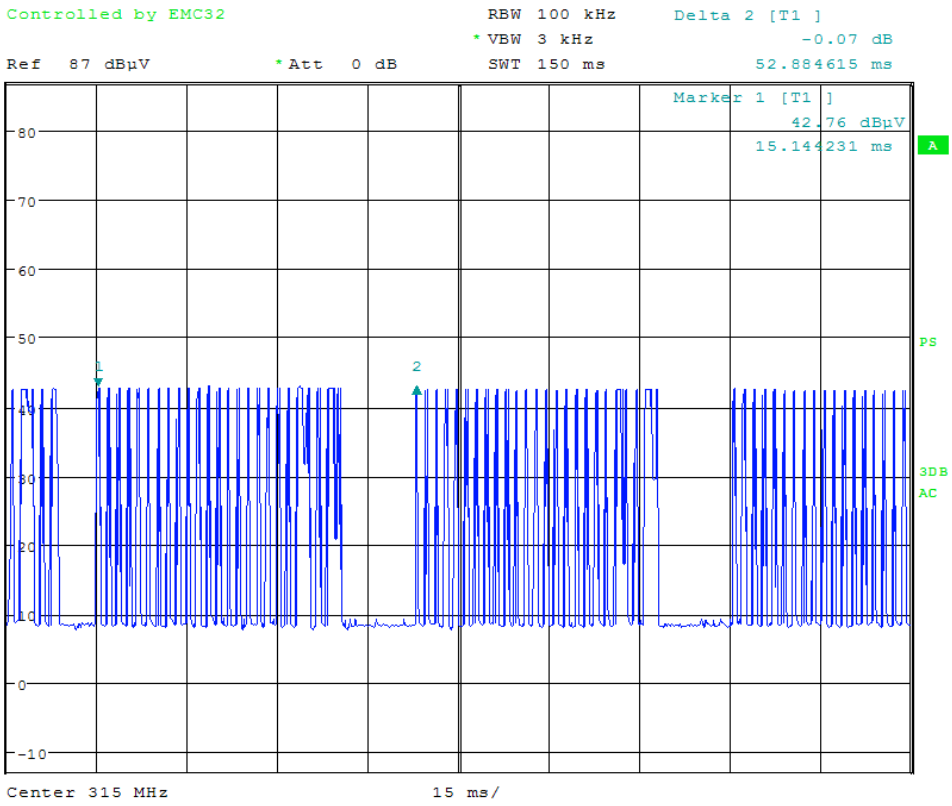
-Fundamental limit = 41.6667 x 315.18 - 7083.3333 = 6049.18uV/m = 75.6dBuV/m

-Spurious limit:75.6-20 = 55.6dBuV/m

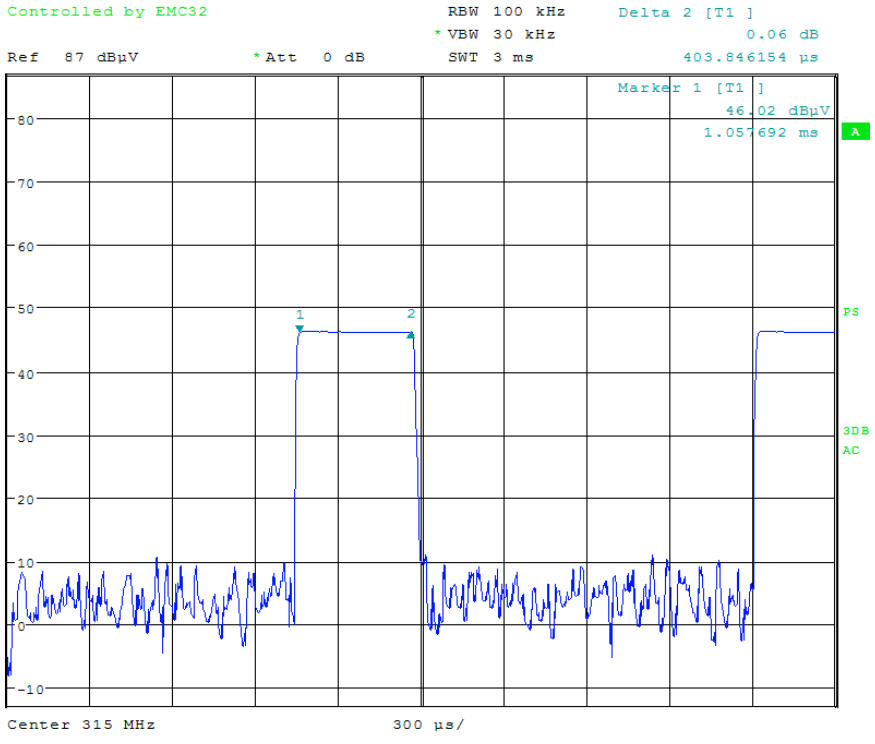
5.7 Duty Cycle /Correct Factor

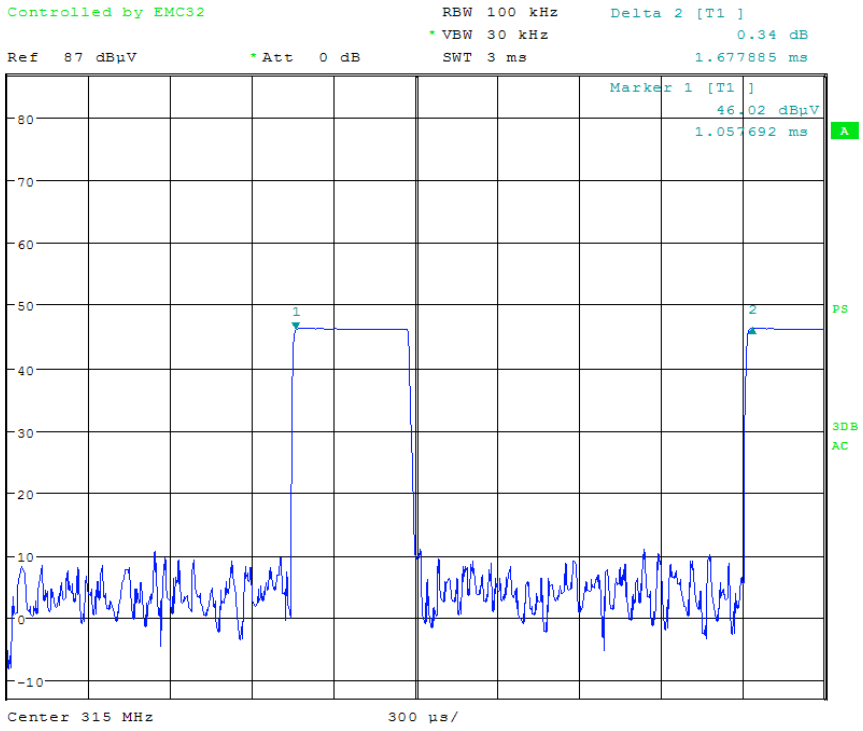
15.35 (c) when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

- 150ms Sweep Time



-3ms Sweep Time





- The duration of one cycle = 52.9ms
- Number of burst in one duration cycle = 52.9ms/1.68ms = 31.5
- Effective period of the cycle =0.404ms x 31.5=12.7ms
- DC = 12.7ms / 52.9ms = 0.24
- Averaging Factor = 20*log(DC) = -12.4dB

5.8 Test Curve & Data

5.8.1 Test Data (RCTM3PK)

Frequency (MHz)	PK (dBμV /m)	Emission Type	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
315.18	67.8	Fundamental	100.0	H	154.0	-15.8	-27.8	95.6
630.236	64.7	Fundamental	100.0	V	152.0	-25.8	-30.9	95.6
299.044	43.2	Spurious	200.0	H	37.0	-25.5	-32.4	75.6
457.964	44.4	Spurious	200.0	H	98.0	-25.5	-31.2	75.6
551.472	47.0	Spurious	108.0	H	274.0	-18.6	-28.6	75.6
1260.50	45.2	Fundamental	110.0	H	44.0	-7.0	-50.4	95.6
1575.00	43.5	Spurious	120.0	H	289.0	-5.6	-32.1	75.6
2205.50	56.8	Spurious	100.0	V	241.0	-1.2	-18.8	75.6
3150.00	42.5	Fundamental	100.0	V	262.0	-5.1	-53.6	95.6

Remark: 1,Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain
2, Margin = Corr. Ampl. – 15.231(b) Limit

the AV value according to the duty cycle

Frequency (MHz)	PK (dBμV /m)	Emission Type	AV (dBμV /m)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
315.18	67.8	Fundamental	55.4	-12.4	-20.2	75.6
630.236	64.7	Fundamental	52.3		-23.3	75.6
299.044	43.2	Spurious	30.8		-24.8	55.6
457.964	44.4	Spurious	32.0		-23.6	55.6
551.472	47.0	Spurious	34.6		-21.0	55.6
1260.50	45.2	Fundamental	32.8		-42.8	75.6
1575.00	43.5	Spurious	31.1		-24.5	55.6
2205.50	56.8	Spurious	44.4		-11.2	55.6
3150.00	42.5	Fundamental	30.1		-45.5	75.6

Remark: 1.Correct Factor = 20lg (duty cycle) = 20lg (0.24) = -12.4
2. AV Reading = PK Reading + Correct Factor
3. Margin = AV Reading – limit

Test Data (RCTM21)

Frequency (MHz)	PK (dBμV /m)	Emission Type	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
315.16	64.2	Fundamental	100.0	H	150.0	-15.8	-31.4	95.6
630.230	52.1	Fundamental	100.0	V	148.0	-25.8	-43.5	95.6
1260.50	44.4	Fundamental	110.0	H	44.0	-7.0	-51.2	95.6
1575.00	56.6	Spurious	110.0	H	289.0	-5.6	-19.0	75.6
2205.50	58.3	Spurious	100.0	H	241.0	-1.2	-17.3	75.6
3150.00	40.9	Fundamental	100.0	V	262.0	-5.1	-54.7	95.6

Remark: 1,Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain
2, Margin = Corr. Ampl. – 15.231(b) Limit

the AV value according to the duty cycle

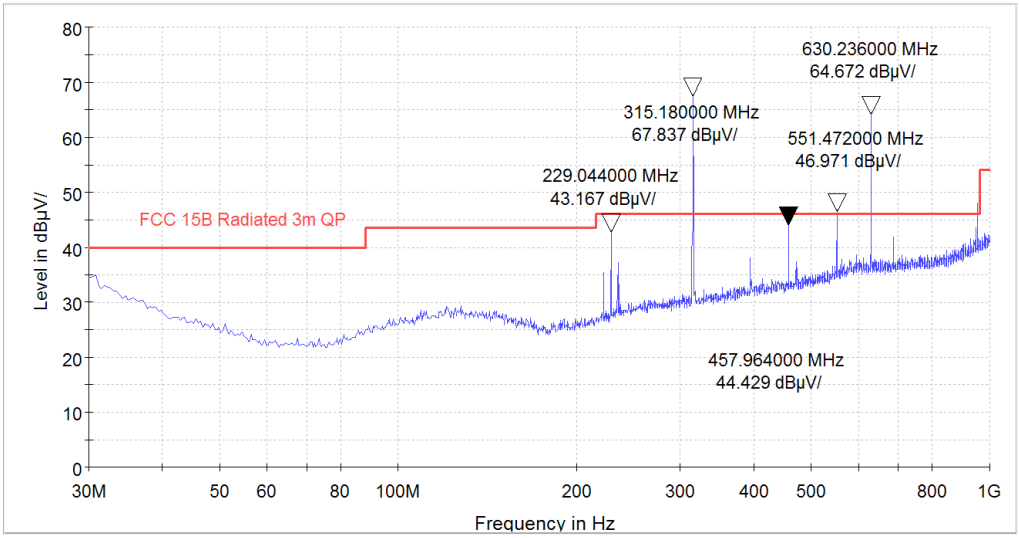
Frequency (MHz)	PK (dBμV /m)	Emission Type	AV (dBμV /m)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
315.16	64.2	Fundamental	51.8	-12.4	-23.8	75.6
630.230	52.1	Fundamental	39.7		-35.9	75.6
1260.50	44.4	Fundamental	32.0		-43.6	75.6
1575.00	56.6	Spurious	44.2		-11.4	55.6
2205.50	58.3	Spurious	45.9		-9.7	55.6
3150.00	40.9	Fundamental	28.5		-47.1	75.6

Remark: 1.Correct Factor = 20lg (duty cycle) = 20lg (0.24) = -12.4
2. AV Reading = PK Reading + Correct Factor
3. Margin = AV Reading – limit

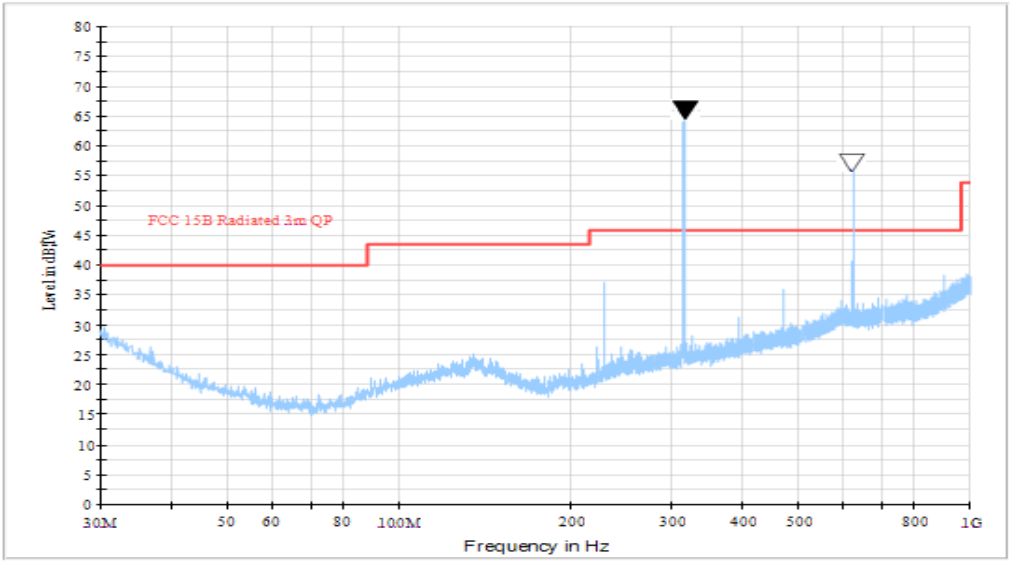
5.8.2 Test Data Curve

Test Freqency (30-1000MHz)

-For RCTM3PK

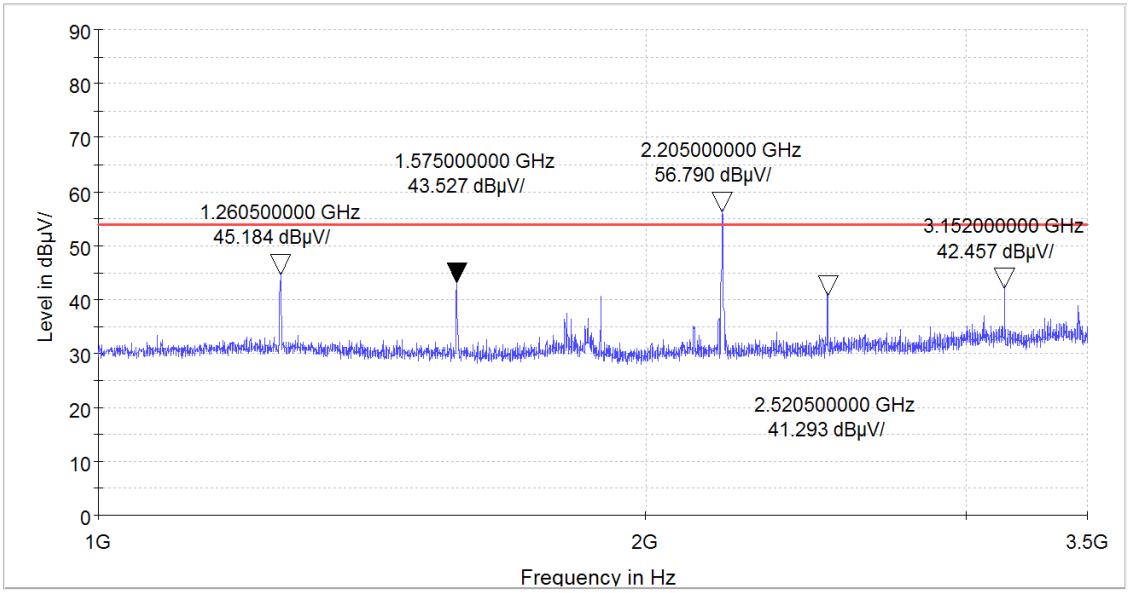


-For RCTM21

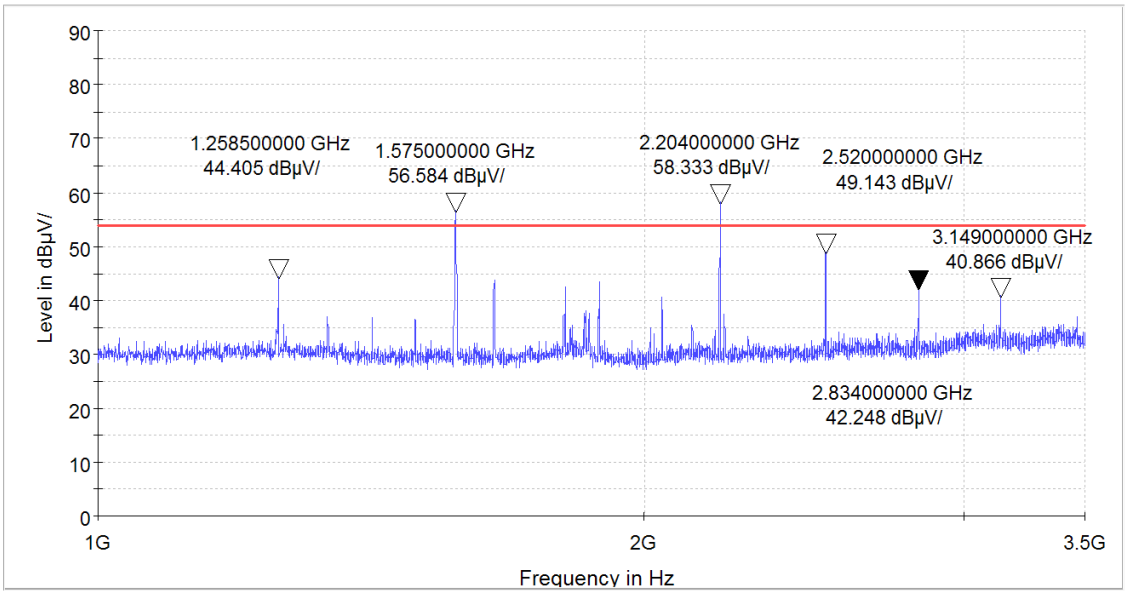


Test Freqency (1000-3500MHz)

-For RCTM3PK



-For RCTM21



6. RESTRICT BAND RADIATED EMISSION (15.205)

6.1 LIMITS OF RADIATED EMISSION MEASUREMENT(15.209)

Frequency (MHz)	Limit Strength		Measurement Distance
	μV/m	dBμV/m	(m)
0.009 – 0.490	2400/F	67.6 - 20log(F)	300
0.490 - 1.705	24000/F	87.6 - 20log(F)	30
1.705 -30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emissions from a device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

(4) The measurement were performed use peak detector with 10kHz RBW at distance of 3 m,
30m to 3m correction factor calculation 40 x Log(30m/3m)= 40dB
300m to 3m correction factor calculation 40 x Log(300m/3m)=60dB

(5) dBμA/m= dBμV/m-51.5dB

6.2 EUT Configuration

The radiated emissions test setups are in accordance with ANSI C63.4
The equipment under test was set up on the 3 meter Anechoic chamber test non-conductive table 80cm above ground, same as conducted Excess data cable was folded back and forth to form a 30cm by 40cm bundle.
Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.
If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

6.3 Test Procedure

Magnetic field measurements are made in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna as specified in 4.5.1, positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground.

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier and high pass filter is equipped just at the output terminal of the antenna.
metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
Both horizontal and vertical polarities of the receiving antenna were assessed and the higher reading was listed in this report..

6.4 EMI Receiver Configuration (for the frequencies tested)

Frequency Range: Detector Function: Resolution Bandwidth (RBW):	0.09MHz—30MHz Peak Mode 10KHz
Frequency Range: Detector Function: Resolution Bandwidth (RBW):	30MHz--1000MHz Peak Mode 100KHz
Frequency Range: Detector Function: Resolution Bandwidth (RBW):	Above 1000MHz Peak Mode 1MHz

6.5 Test Setup

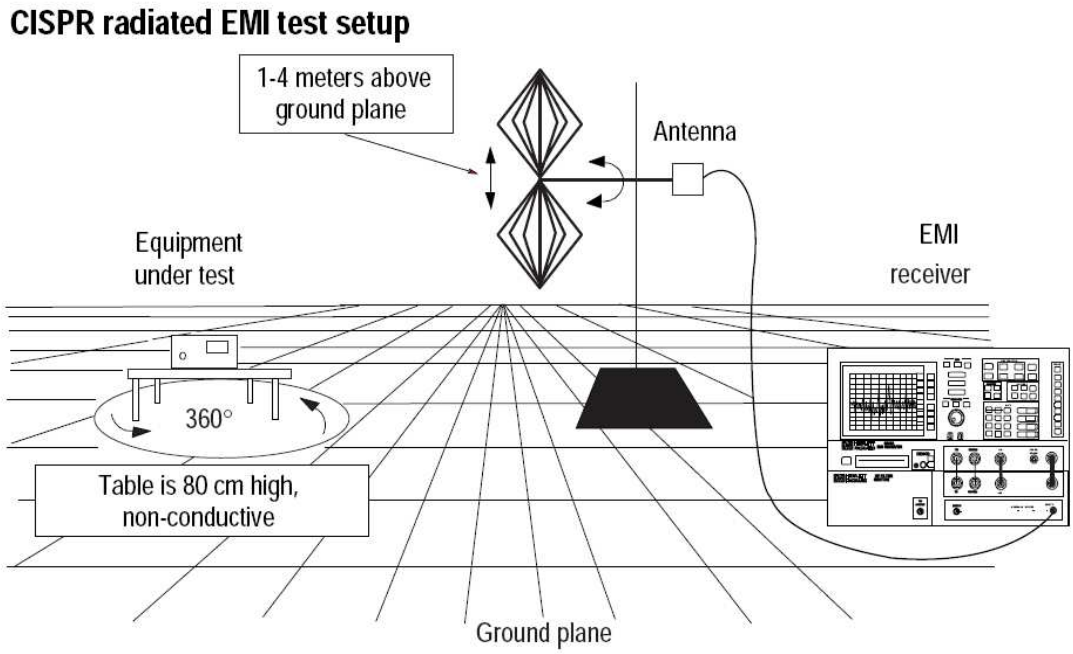


Figure 4 Radiated Emission test setup

6.6 Test Curve & Data

-For RCTM3PK

Frequency (MHz)	PK (dBμV /m)	Emission Type	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1575.00	43.5	Restrict	120.0	H	289.0	-5.6	-30.5	74.0
2205.50	56.8	Restrict	100.0	V	241.0	-1.2	-17.2	74.0

-For RCTM21

Frequency (MHz)	PK (dBμV /m)	Emission Type	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1575.00	56.6	Restrict	110.0	H	241.0	-1.2	-17.4	74.0
2205.50	58.3	Restrict	100.0	H	262.0	-5.1	-15.7	74.0

Remark: 1,Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain
2, Margin = Corr. Ampl. – 15.209(a) Limit

the AV value according to the duty cycle

-For RCTM3PK

Frequency (MHz)	PK (dBμV /m)	Emission Type	AV (dBμV /m)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1575.00	43.5	Restrict	31.1	-12.4	-22.9	54.0
2205.50	56.8	Restrict	44.4		-9.6	54.0

-For RCTM21

Frequency (MHz)	PK (dBμV /m)	Emission Type	AV (dBμV /m)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1575.00	56.6	Restrict	44.2	-12.4	-9.8	54.0
2205.50	58.3	Restrict	45.9		-8.1	54.0

Remark: 1.Correct Factor = 20lg (duty cycle) = 20lg (0.24) = -12.4
2. AV Reading = PK Reading + Correct Factor
3. Margin = AV Reading - limit

7. DEACTIVATING TIME

7.1 Test limit

☒ (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

☐ (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

☐ (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm,may operate during the pendency of the alarm condition.

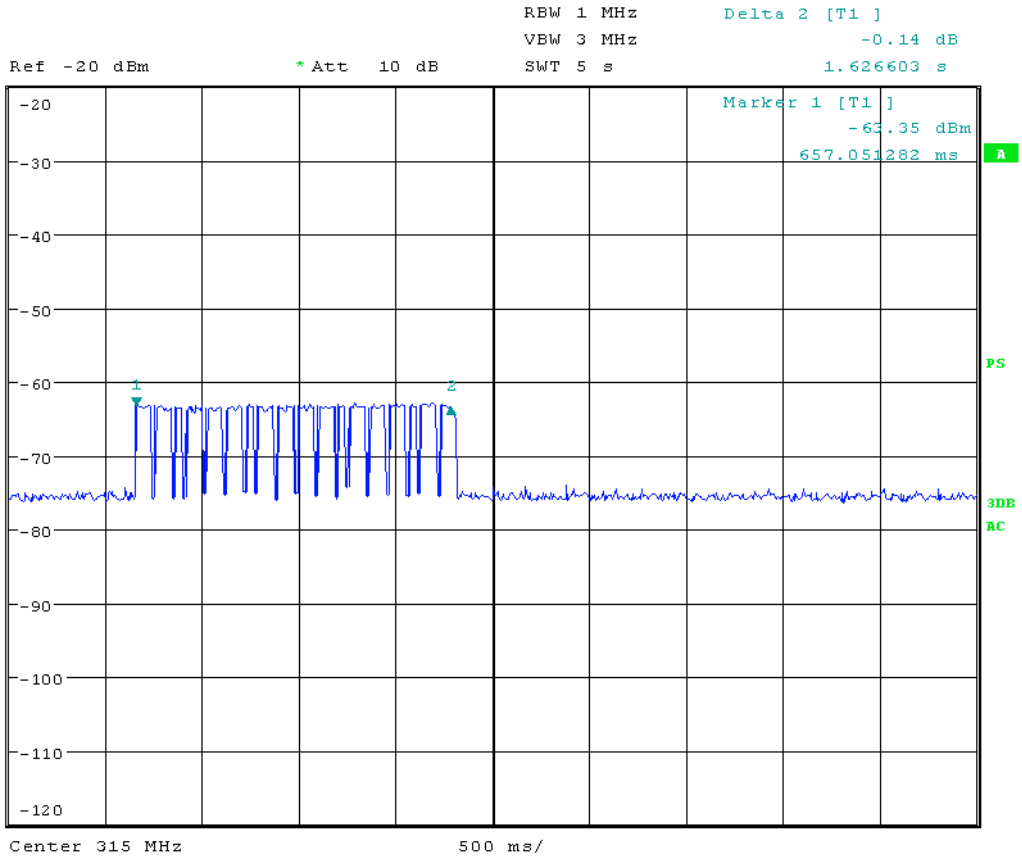
☐ (5) Transmission of set-up information for security systems may exceed the transmission duration limits in (1) and (2) above, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

7.2 Test Procedure And Test Setup

The measurement was applied in a semi-anechoic chamber. The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.
The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual switching, to avoid uncertainty, the operating above would be repeated five times and the worst data is recorded

7.3 Test Result

Whole time from the triggered moment to the time of stopping radiating: 1.626s.
As a result, the EUT complies with the limit of 5s' deactivating time.



8.EMISSION BANDWIDTH

8.1 Test Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

The limit for the EUT = 0.25% X 315MHz = 787.5kHz

8.2 Test Procedure And Test Setup

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontalmetal ground plane.
The central frequency of test receiver was set near the operating frequency of EUT.
The test was conducted using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz.

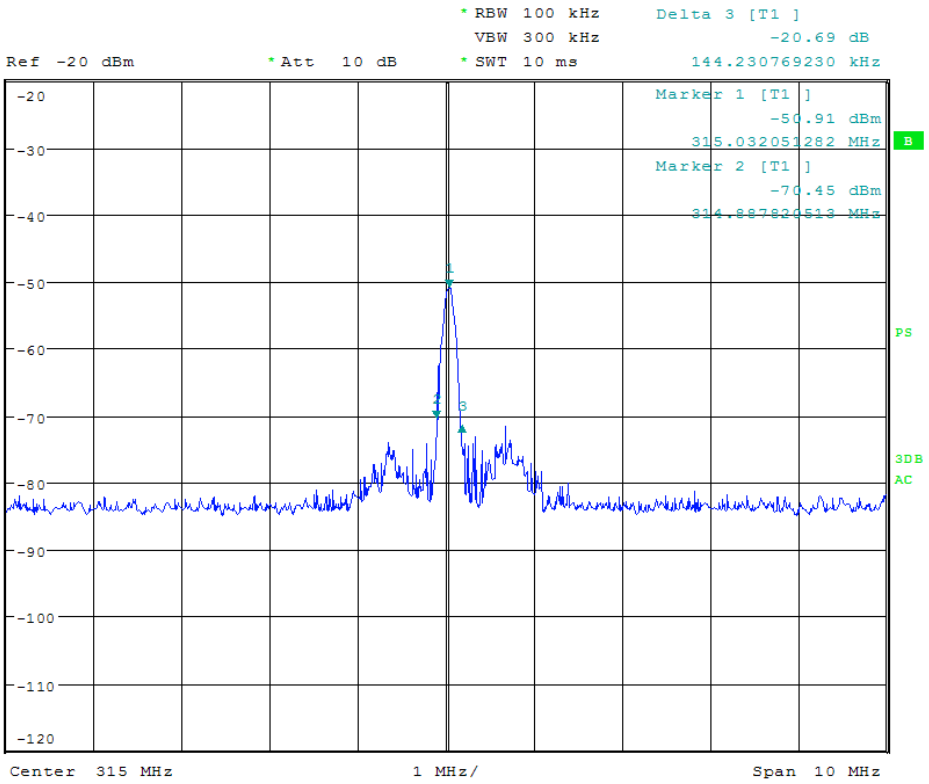
8.3 Test Result

Temperature : 25.0 C
Relative Humidity : 48 %

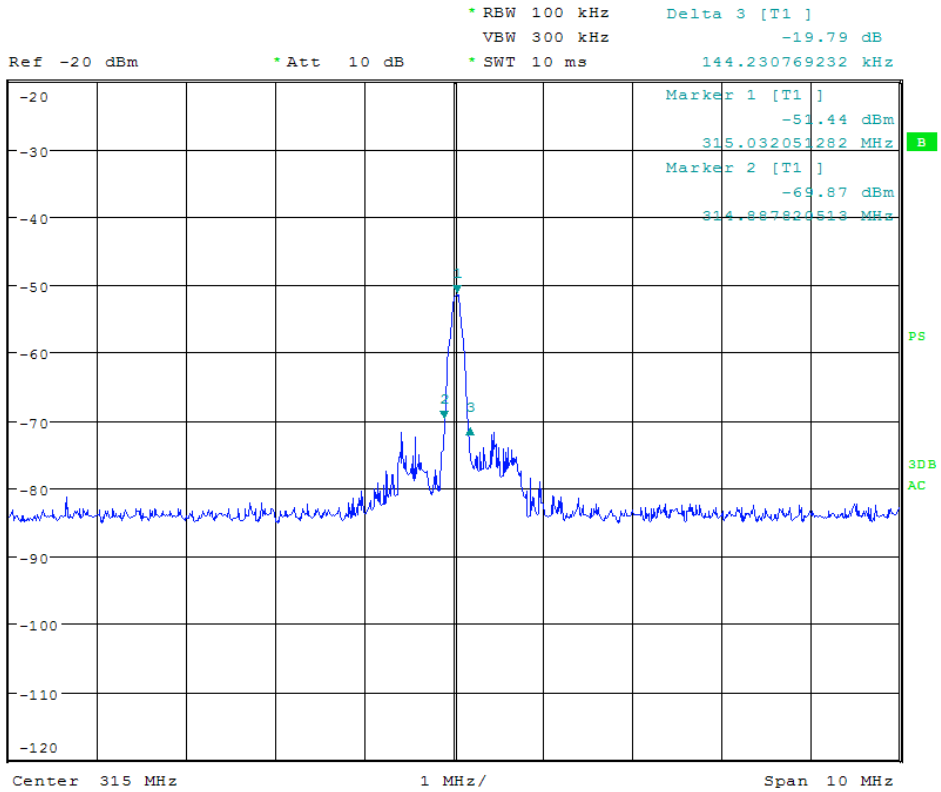
Model	Channel	Emission Bandwidth (kHz)	Limit (kHz)
RCTM3PK	1 (315MHz)	144.2	787.5
RCTM21	1 (315MHz)	144.2	787.5

8.4 Test Photograph

- for RCTM3PK



- for RCTM21



9. INFORMATION ON THE TESTING EQUIPMENT

Manufacturer	Description	Model	Serial Number	Cal. Due Date
SCHAFFNER	ESD Generator	NSG435	08-31-01-0004	08/Oct/14
SCHAFFNER	FBT Generator	NSG2025	15-62-01-0002	08/Oct/14
SCHAFFNER	Surge Generator	NSG2025	15-62-01-0003	08/Oct/14
USA/AR	Sensor	PF4000	08-03-01-0001	10/Oct/14
USA/AR	Transmit-antenna	N/S	18-03-01-0001	10/Oct/14
BONN	Power Amplifier	BLWA0810-160/50 D	10-32-02-0001	10/Oct/14
R/S	Power Meter	NRVD	10-31-01-0001	10/Oct/14
EM TEST	RF Generator	CWS550	15-31-14-0001	08/Oct/14
R/S	Signal Generator	SMY01	15-21-16-0002	08/May/15
R/S	Audio Generator	808G	15-01-12-1	08/May/15
R/S	Milli-voltage Meter	URV5	02-21-13-0001	10/May/15
SCHAFFNER	Audio Analyzer	UPA	15-91-04-0001	10/Oct/14
R/S	EMS test system	TS9980	/	/
R/S	EMI Receiver	ESU40	100082	09/May/15
R/S	AMN	ESH2-Z5	17-72-01-0001	08/May/15
R/S	AMN	ESH3-Z5	17-72-02-0001	08/May/15
SCHAFFNER	Antenna	GBL6112B	/	08/May/15
R/S	Hore Antenna	HF906	100614	08/May/15
R/S	Absorbing Clamp	NDS21	08-12-03-0001	08/May/15
R/S	Runner	KMS560	/	/
R/S	Runner Controller	HD050	/	/
R/S	Loop Antenna	HFH2-Z2	100174	08/May/15