Test Report

FCC ID.: 2AGCXLQSQ5

Date of issue: Dec. 10, 2015

Sample Description:	The remote control
Model(s):	Q5
Applicant:	Shenzhen Knight Electronics Co., Ltd.
Address:	4th Building, Hongxiang Industrial Park, Hezhou Village, Xixiang Town, Baoan District, Shenzhen, Guangdong, China
Date of Test:	Oct. 12, 2015 to Dec. 03, 2015

Shenzhen Microtest Co., Ltd.
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TEST RESULT CERTIFICATION	
Applicant's name:	Shenzhen Knight Electronics Co., Ltd.
Address:	4th Building, Hongxiang Industrial Park, Hezhou Village, Xixiang Town, Baoan District, Shenzhen, Guangdong, China
Manufacture's Name:	Shenzhen Knight Electronics Co., Ltd.
Address:	4th Building, Hongxiang Industrial Park, Hezhou Village, Xixiang Town, Baoan District, Shenzhen, Guangdong, China
Product description	
Product name:	The remote control
Trademark:	/
Model name:	Q5
Serial Model:	/
Standards:	FCC Part 15.231
Test Procedure:	ANSI C63.4-2009

This device described above has been tested by Shenzhen Microtest Co., Ltd. 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.

Tested By : David Chen

David Chen Dec. 10, 2015

Reviewed By : Leon Chen

Leon Chen Dec. 10, 2015

Approved By : Ares Liu

Ares Liu Dec. 10, 2015

SUMMARY OF TEST RESULT

Item	FCC Part No.	Description of Test	Result
1	15.203	Antenna requirement	Pass
2	15.207	AC power line conducted emission	N/A
3	15.231(c)	20dB bandwidth	Pass
4	15.231(b)	Radiated emission	Pass
5	15.231(a)(1)	Release time	Pass

1. General description

1.1 Feature of equipment under test (EUT)

Product name:	The remote control
Model name:	Q5
Serial Model:	/
Tx/Rx frequency range:	Tx: 315MHz
Modulation type:	ASK
Modulation Technology:	OOK
Power source:	3VDC (CR2032 battery)
Adapter information:	/
Antenna designation:	PCBA antenna (Antenna Gain: 1.3dBi)
Hardware version:	V1.1
Software version:	V1.0

1.2 operation channel list

Channel	Frequency
1	315MHz

2. Test Configuration of EUT

2.1 EUT operation mode

During testing, the EUT is operated in a normal mode.

2.2 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 20ºC~30ºC
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

2.3 Testing site

Test Site	Shenzhen Toby Technology Co., Ltd.
Test Site Location	1 A/F., Bldg.6, Yusheng Industrial Zone The National Road No.107 Xixiang Section 467
FCC Registration No.:	811562

2.4 Ancillary equipment list

Equipment	Model	S/N	Manufacturer
/	/	/	/

2.5 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1 x 10-7
RF power, conducted	± 1 dB
Conducted emission of receivers	± 1 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Temperature	±1 degree
Humidity	± 5 %

3. List of test equipment

For AC power line conducted emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
LISN	R&S	ENV216	101313	2015.12.06
LISN	SCHWARZBECK	NNLK 8129	8129245	2015.12.25
Pulse Limiter	SCHWARZBECK	VTSD 9561F	9716	2015.12.25
Test Cable	N/A	N/A	C01	2015.12.06
EMI Test Receiver	R&S	ESCI	101160	2015.12.06

For Radiated emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2015.12.11
Horn Antenna	Schwarzbeck	BBHA 9120D	631	2015.12.05
Horn Antenna	Schwarzbeck	BBHA 9170	373	2015.12.05
Test Cable	United Microwave	57793	1m	2015.12.05
Test Cable	United Microwave	A30A30-5006	10M	2015.12.05
Microwave Pre_amplifier	Agilent	8449B	3008A01714	2015.12.05
Pre-Amplifier	Anritsu	MH648A	M09961	2015.12.05
EMI Test Receiver	R&S	ESCI-7	101318	2015.12.05
Spctrum analyzer	Agient	E4470B	MY41441082	2016.06.01

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

4. Test Result

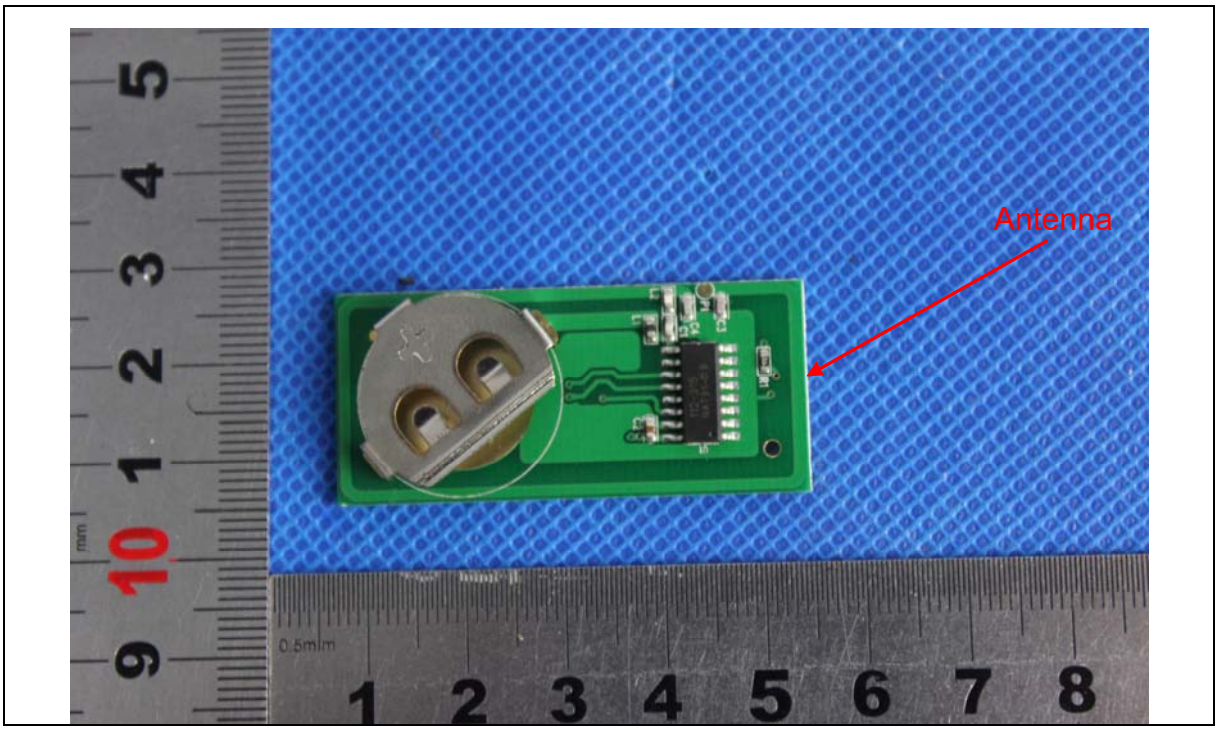
4.1 Antenna requirement

4.1.1 Requirement defined in FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.1.2 EUT antenna description

The radio antenna of EUT is an internal permanently attached antenna, the maximum gain is 1.3dBi. So the antenna meets the requirement of this part.



4.2 20dB emission bandwidth

4.2.1 Limits

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. So the emission bandwidth limits have been calculated in below table.

Fundamental Frequency	20 dB Bandwidth Limits (MHz)
315MHz	0.7875

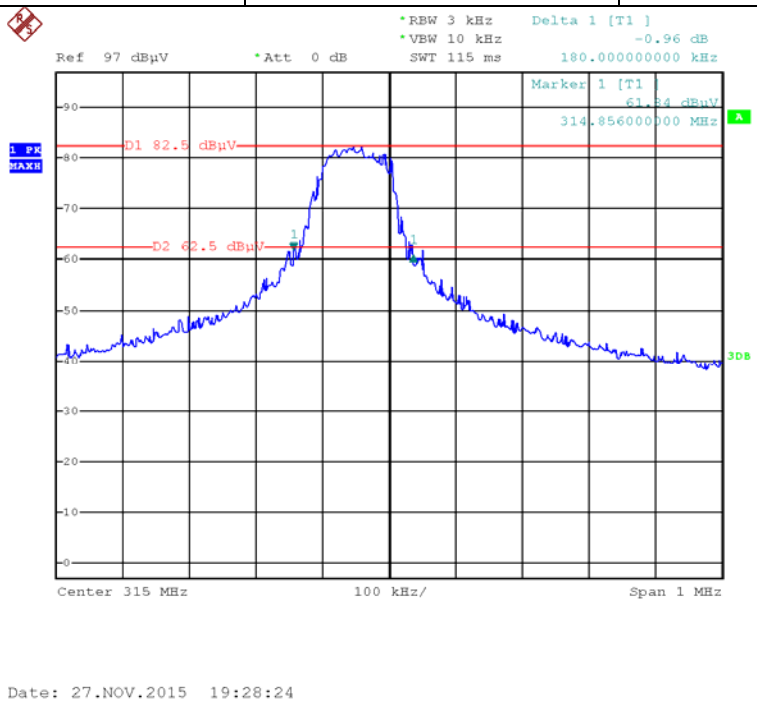
4.2.2 Test method

Set Spectrum Analyzer centre Frequency= Fundamental Frequency, RBW=3 kHz, VBW= 10 kHz, Span= 1 MHz

Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

4.2.3 Test result

Frequency (MHz)	20dB Bandwidth (MHz)	Result
315	0.18	PASS



4.3 Radiated emission

4.3.1 Limit

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolt/meter) at 3m	Field Strength of Spurious Emissions (microvolt/meter) 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

** Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Frequency (MHz)	Field strength μV/m	Field strength dBμV/m	Detector	Measurement distance
30-88	100	40	QP	3m
88-216	150	43.5	QP	
216-960	200	46	QP	
960-1000	500	46	QP	
Above 1000	500	54	AV	
Above 1000	5000	74	PK	

4.3.2 Test method

The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground; the table was rotated 360 degrees to determine the position of the highest radiation.

The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

For the actual test configuration, please see the test setup photo.

4.3.3 Test Result

PK:

Frequency	Reading (dBμV)		Duty Factor	Result dBμV/m		Limit	Margin (dB)		Remark
MHz	Hor.	Ver.	dB	Hor.	Ver.	dBμV/m	Hor.	Ver.	
315	83.19	64.89	-	83.19	64.89	102.16	18.97	37.27	Fundamental
630	48.38	44.73	-	48.38	44.73	82.16	33.78	37.43	Noise
945	57.48	55.77	-	57.48	55.77	82.16	24.68	26.39	Noise
1260	47.44	62.3	-	47.44	62.3	82.16	34.72	19.86	Noise
1575	64.21	61.14	-	64.21	61.14	82.16	17.95	21.02	Noise
1890	63.33	62.06	-	63.33	62.06	82.16	18.83	20.1	Noise
2205	63.7	65.07	-	63.7	65.07	82.16	18.46	17.09	Noise
2520	65.94	53.9	-	65.94	53.9	82.16	16.22	28.26	Noise
2835	60.91	66.24	-	60.91	66.24	82.16	21.25	15.92	Noise
3150	65.03	65.48	-	65.03	65.48	82.16	17.13	16.68	Noise

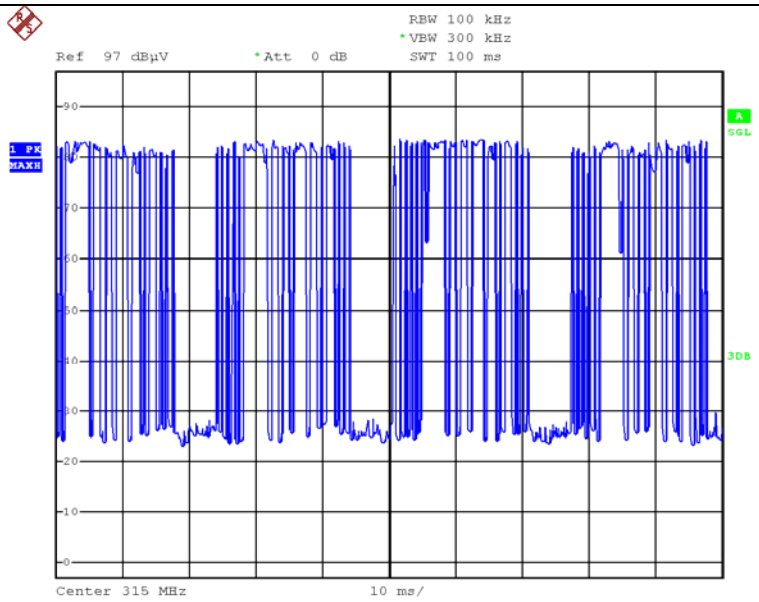
AV (PK with Duty factor)

Frequency	Reading (dBμV)		Duty Factor	Result dBμV/m		Limit	Margin (dB)		Remark
MHz	Hor.	Ver.	dB	Hor.	Ver.	dBμV/m	Hor.	Ver.	
315	83.19	64.89	-8.53	74.66	56.36	82.16	7.5	25.8	Fundamental
630	48.38	44.73	-8.53	39.85	36.2	62.16	22.31	25.96	Noise
945	57.48	55.77	-8.53	48.95	47.24	62.16	13.21	14.92	Noise
1260	47.44	62.3	-8.53	38.91	53.77	62.16	23.25	8.39	Noise
1575	64.21	61.14	-8.53	55.68	52.61	62.16	6.48	9.55	Noise
1890	63.33	62.06	-8.53	54.8	53.53	62.16	7.36	8.63	Noise
2205	63.7	65.07	-8.53	55.17	56.54	62.16	6.99	5.62	Noise
2520	65.94	53.9	-8.53	57.41	45.37	62.16	4.75	16.79	Noise
2835	60.91	66.24	-8.53	52.38	57.71	62.16	9.78	4.45	Noise
3150	65.03	65.48	-8.53	56.5	56.95	62.16	5.66	5.21	Noise

Remark:
other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Duty Factor = $20*\log_{10}$ (Duty cycle) = $20*\log_{10}$ ((0.232*15+0.652*10)/26.7) = -8.53 (Please see the following plots for the detail of duty cycle).
AV Emission Level= PK Emission Level+ Duty Factor
If the PK measured values lower than average mode limit, the EUT shall be deemed to meet average limits.

Duty Cycle:

Plot 1



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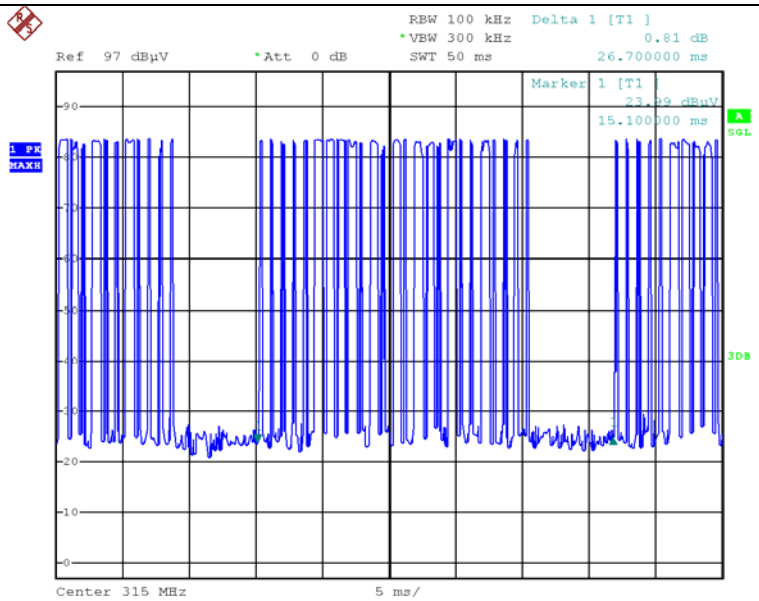
Plot 2



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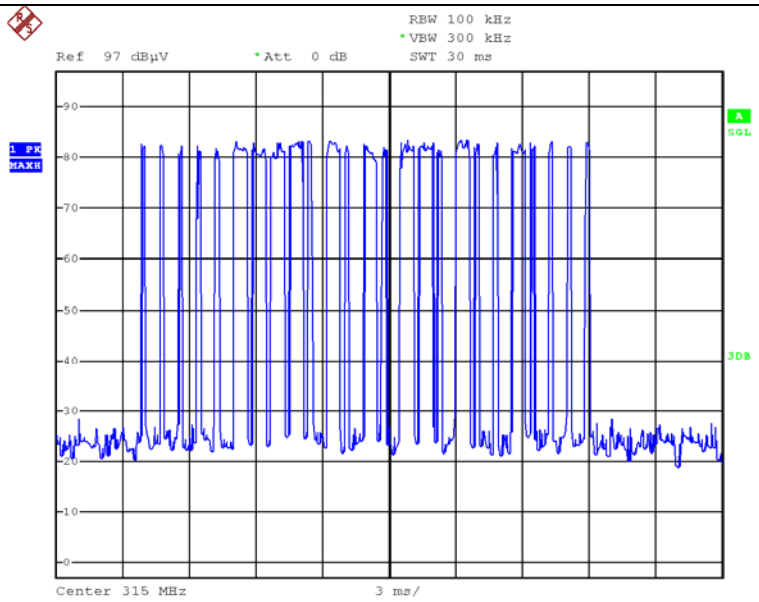
Duty Cycle:

Plot 3



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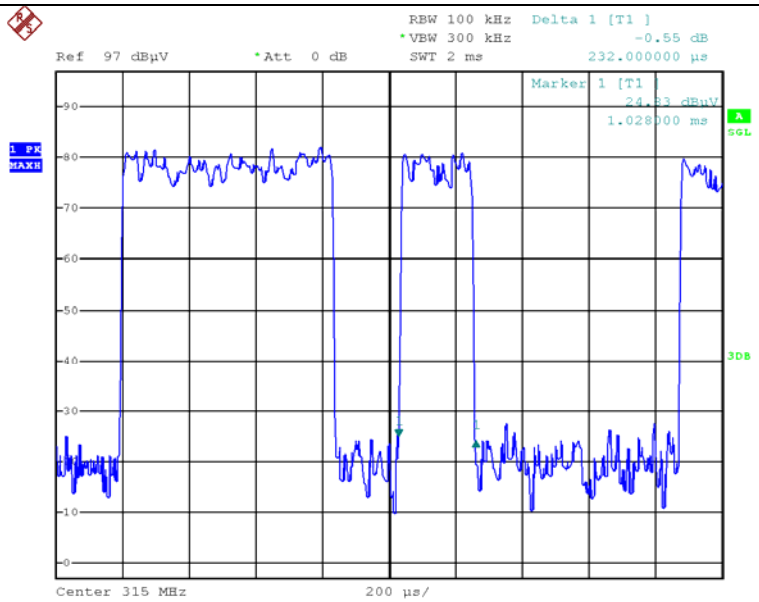
Plot 2



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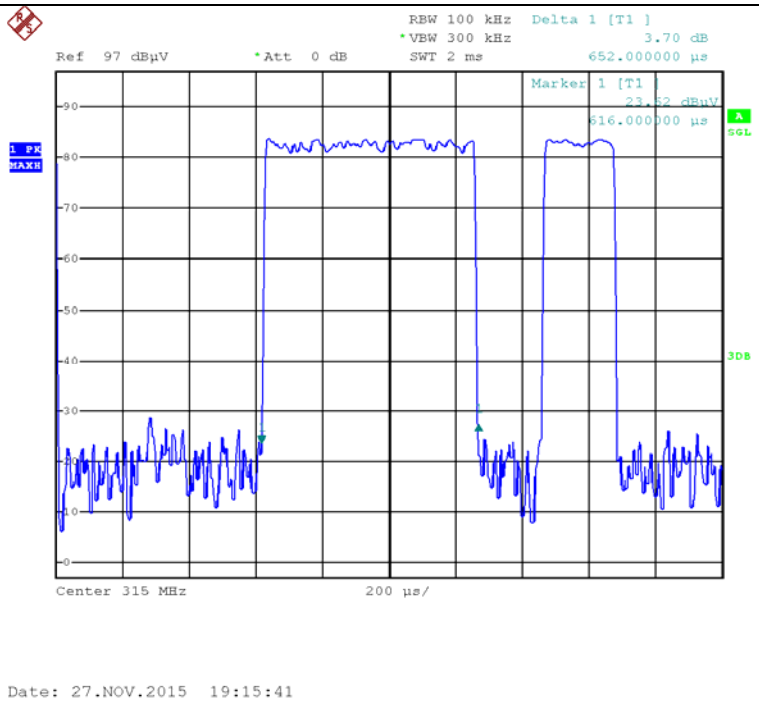
Duty Cycle:

Plot 5



4.4 Time of occupancy (dwell time)

4.4.1 Limit

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

4.4.2 Test method

Setup the EUT as show in the block diagram above.

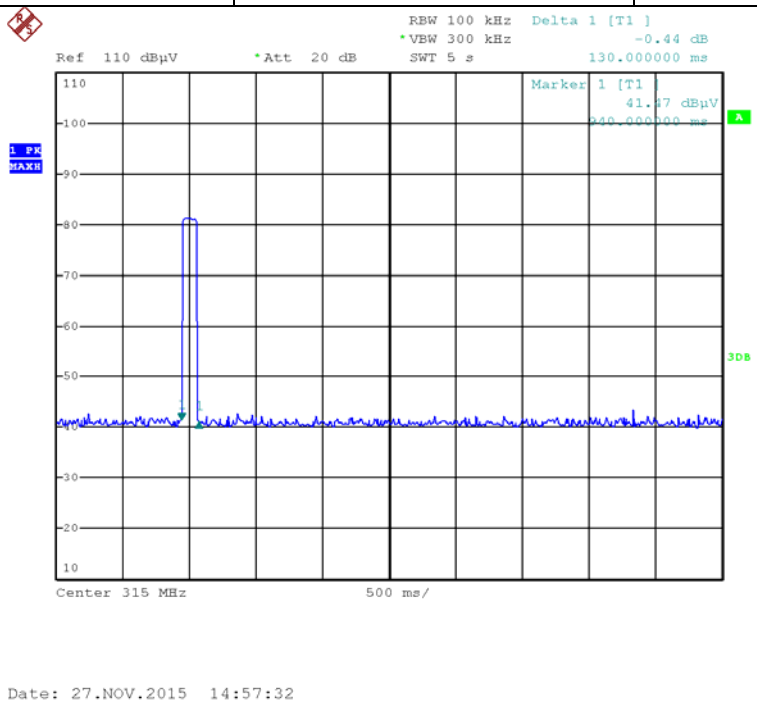
Set Spectrum Analyzer Centre Frequency= Fundamental Frequency, RBW=100 kHz, VBW= 100 kHz, Span= 0 Hz. Sweep Time= 5 Seconds.

Setup the EUT as normal operation and press Transmitter button.

Release the button, use Delta Mark function to test the time.

4.4.3 Test Result

Release Time (s)	Limit (s)	Result
0.13	5	PASS



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