

TEST REPORT For FCC

Test Report No. : TK-FR10008

Date of Issue : 03/30 /2010

Description of Product : FM Push button TX

Model No. : LTK-2000T

Applicant : **Lee Technology Korea Co., Ltd.**
3rd Floor # 499-2 Sang 3-Dong, Wonmi-Gu, Bucheon-City,
Kyunggi-Do, Korea


Manufacturer : **Lee Technology Korea Co., Ltd.**
3rd Floor # 499-2 Sang 3-Dong, Wonmi-Gu, Bucheon-City,
Kyunggi-Do, Korea

Standards : FCC Part 15 Subpart C §15.231

Test Date : 03/15/2010 ~ 03/30/2010

Test Results : ☒ PASS ☐ FAIL

The test results relate only to the items tested.

Tested by: 
Kyu-Chul Shin
Test Engineer
Date:03/30/2010

Reviewed by: 
KT Kang
Technical Manager
Date:03/30/2010

THRU-KES CO.,LTD.

477-6, Hager-Ri, Yaju-Up, Yaju-Gun Kyunggi-Do, 469-803, Korea
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1.0 General Product Description

Product : FM Push button TX

Equipment model name : LTK-2000T

Serial number : Prototype

Antenna designation : Internal Fixed Antenna

Antenna type : Helical Antenna

Frequency Range : 433.92MHz

Number of channels : 1

Operating Voltage : DC 3V(Lithium Battery)

Modulation Technique : FM

1.1 Tested Frequency

		CH1	
Frequency (MHz)		433.92	

1.2 Model Differences

Not applicable

1.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
EUT	Lee Technology Korea Co., Ltd.	LTK-2000T	-	-

* note : This camera is setted outside of the test site during testing

1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

THRU-KES Co.,Ltd. (Test Site # : 343818)
477-6, Hager-Ri, Yoju-Up, Yoju-Gun Kyunggi-Do, 469-803, Korea

2.0 Summary of test Results

FCC Part Section(s)	Description Of Tests	Status (note 1)
15.209 15.231(b)	Radiated Emission	C
15.231(c)	Emission Bandwidth	C
15.231(a)	De-activation	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.231, ANSI C63.4-2003

2.1.1 Radiated Emission Test

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

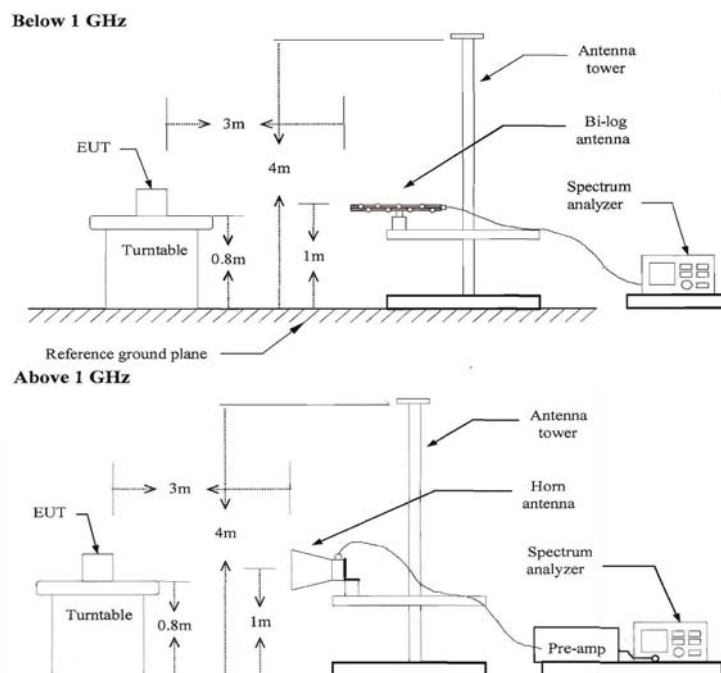
The spectrum analyzer is set to:

Below 1GHz :

RBW=100KHz/VBW=300KHz/Sweep=AUTO

Above 1GHz:

RBW=VBW=1MHz/Sweep=AUTO



Limit

-15.231(b)

Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
(MHz)	(uV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
433.92	10996	80.8	1099.6	60.8

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Test Results

EUT	FM Push button TX	Measurement Detail	
Model	LTK-2000T	Frequency Range	Below 1000MHz
Channel	-	Detector function	Quasi-Peak(QP) Peak(PK) Average(AV)

-Operation mode

By preliminary testing and verifying three axis(X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the test was executed the worst condition and test data were recorded in his report

Frequency (MHz)	Reading (dBuV)	Preamplifier (dB)	Correction Factor (dB/m)	Corrected Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Det. Mode
433.92	58.95	-	16.95	75.90	100.80	24.9	PK
433.92	55.13	-	16.95	72.08	80.80	8.72	AV
867.84	41.57	29.61	23.61	35.57	80.80	45.23	PK
867.84	37.75	29.61	23.61	31.75	60.80	29.05	AV

Remark : 1. Corrected Level = Reading – Preamp + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

3. Margin value = Limits – Corrected Level

4. The average value of fundamental frequency is :

Average = Peak value + 20log(Duty cycle)

$$20\log(\text{Duty cycle}) = 20\log \frac{0.644s \times 1}{1s} = -3.82\text{dB}$$

Test Results

EUT	FM Push button TX	Measurement Detail	
Model	LTK-2000T	Frequency Range	1 ~ 25GHz
Channel	-	Detector function	Peak(PK) Average(AV)

-Operation mode

By preliminary testing and verifying three axis(X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the test was executed the worst condition and test data were recorded in his report

Frequency (MHz)	Reading (dBuV)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Det. Mode
* No emissions were detected at a level greater than 20dB below limit							

Remark : 1. Corrected Level = Reading – Preamp + Correction Factor

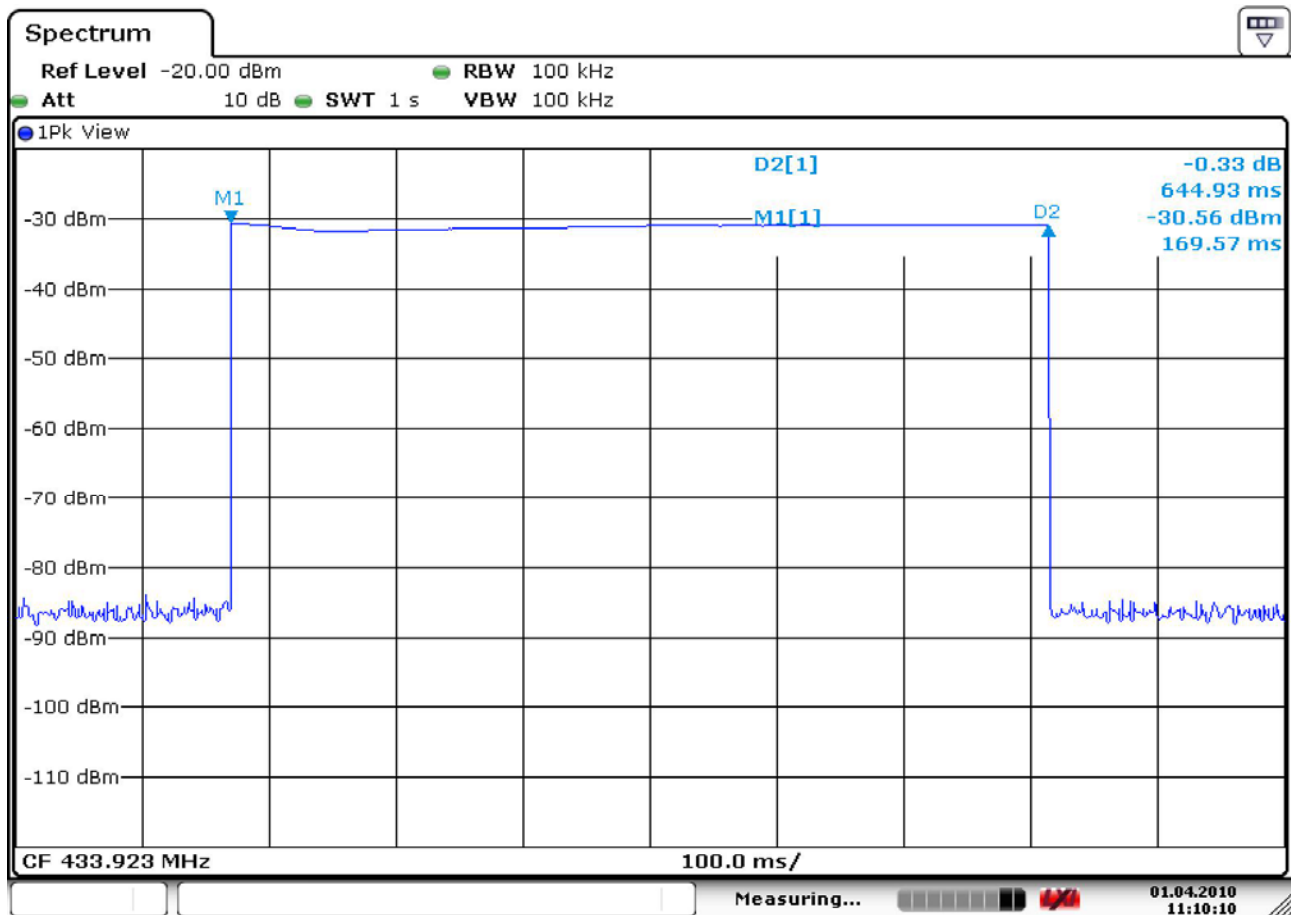
2. Correction Factor = Antenna Factor + Cable Loss

3. Margin value = Limits – Corrected Level

4. The average value of fundamental frequency is :

Average = Peak value + 20log(Duty cycle)

$$20\log(\text{Duty cycle}) = 20\log \frac{0.644s \times 1}{1s} = -3.82\text{dB}$$



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$$20\log(\text{Duty cycle}) = 20\log \frac{0.644\text{s} \times 1}{1\text{s}} = -3.82\text{dB}$$

2.1.2 Emission bandwidth

Test Standard

FCC Part 15 15.231©

Limit of emission Bandwidth measurement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70MHz and Below 900MHz

Fundamental Frequency (MHz)	Limit of Emissions Bandwidth(KHz)
433.92	1084.80

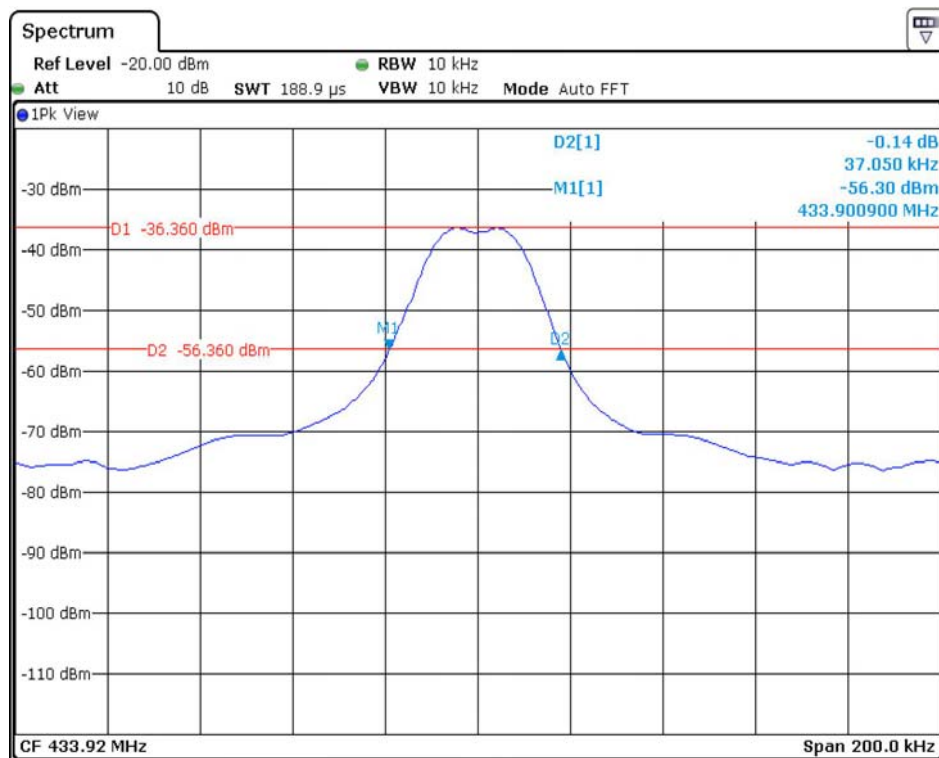
Test Procedures

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with operation band.

Test Results

Channel Frequency (MHz)	Measured 20dB Bandwidth(KHz)	Limit(KHz)
433.92	37.05	1084.8

See next pages for actual measured spectrum plots.



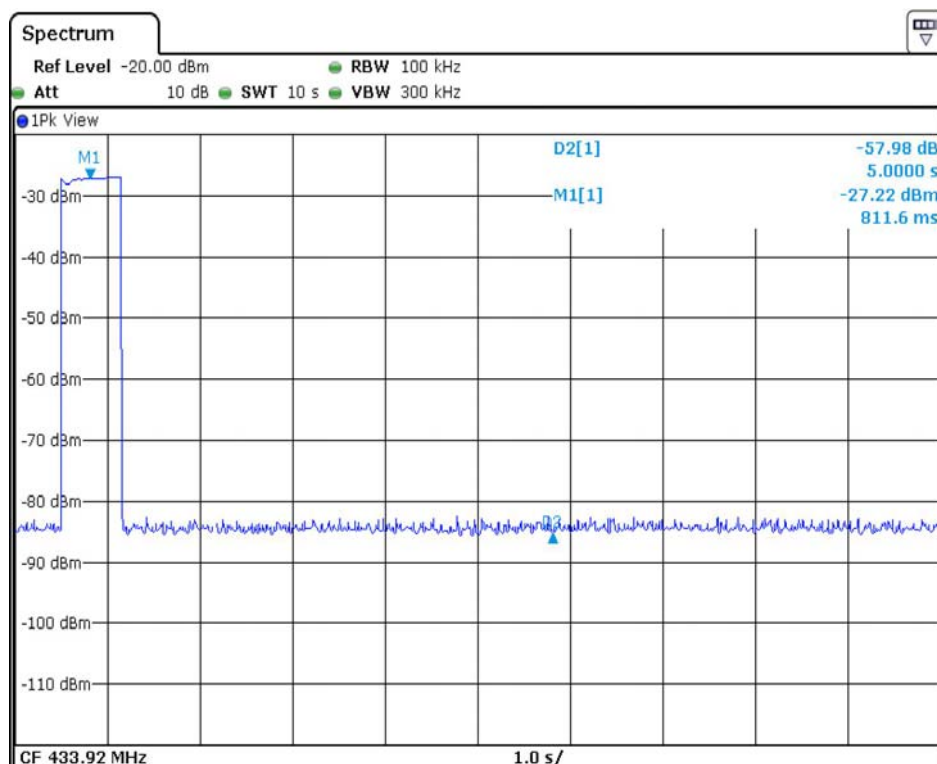
2.1.3 Deactivation Time

Test Standard

FCC Part 15 15.231(a)

Limit of Deactivation Time measurement

A transmitter activated automatically shall cease transmission within 5 seconds after activation.



APPENDIX A – Test Equipment Used For Tests

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.
1	Test Receiver	Rohde & Schwarz	ESHS 10	862970/018	2010.06.11
2	Test Receiver	Rohde & Schwarz	ESVS 10	826008/014	2010.05.20
3	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2010.05.15
4	Spectrum Analyzer	Advantest	R3273	101008536	2010.05.15
5	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2010.05.15
6	Audio analyzer	Hewlett Packard	8903B	3011A12915	2010.05.15
7	Preamplifier	Hewlett Packard	8447F	2805A02570	2010.05.15
8	Preamplifier	A.H. Systems	PAM-0118	164	2010.04.17
9	Signal Generator	Hewlett Packard	8673D	2708A00448	2010.05.15
10	Power Meter	Hewlett Packard	437B	312U24787	2010.04.21
11	Power Sensor	Hewlett Packard	8482B	3318A06943	2010.05.15
12	Loop Antenna	Rohde & Schwarz	HFH2-Z2.335.4711.52	826532/006	2011.02.06
13	Dipole Antenna	Rohde & Schwarz	VHAP	574	2010.07.07
14	Dipole Antenna	Rohde & Schwarz	VHAP	575	2010.07.17
15	Dipole Antenna	Rohde & Schwarz	UHAP	545	2010.07.17
16	Dipole Antenna	Rohde & Schwarz	UHAP	546	2010.07.07
17	Biconical Antenna	Eaton Corp.	94455-1	0977	2010.07.03
18	Biconical Antenna	EMCO	3104C	9111-2468	2010.07.03
19	Log Periodic Antenna	EMCO	3146	2051	2010.06.05
20	Log Periodic Antenna	EMCO	3146	8901-2320	2010.07.03
21	Horn Antenna	A.H. Systems	SAS-571	414	2011.03.16
22	LISN	EMCO	3810/2	2228	2010.05.156
23	Waveform Generator	Hewlett Packard	33120A	US34001190	2010.05.15
24	Digital Oscilloscope	Tektronix	TDS 340A	B012287	2010.05.15
25	Dummy Load	Bird Electronics	8251	11511	2010.04.17

Test Setup Photos and Configuration

Radiated Electric Field Emissions

