

FCC CERTIFICATION RADIO MEASUREMENT TECHNICAL REPORT

On Model Name: F25 Industrial Radio Remote Controller

Model Number : F25-12S/F25-12D/F25-10S/F25-10D

F25-8S/F25-8D/F25-6S/F25-6D

Trademark :  **TELECRANE®**
LEE'S HI-TECH ENTERPRISE CO., LTD.

FCC ID : LWN9701F25

Prepared for Lee Hi-tech Enterprise. Co., Ltd.

According to FCC Part 15 (2006), Subpart C

According to IC RSS-210

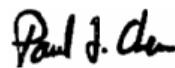
Test Report #: LEE-0801-6785-FCC

Prepared by: Cherry Chang

Reviewed by: Harry Zhao

QC Manager: Paul Chen

Test Report Released by:



Paul Chen

2008 February 1

Date

Test Location

Tests performed at Training Research Co., Ltd. in a Certified ANSI Semi-Anechoic Chamber and Shielded Room performed testing.

*Test Site Location: Training Research Co., Ltd.
No.255,Nanyang St., Shijr City,
Taipei Hsien 221,Taiwan
Tel: 886-2-2693-5155
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Registration Number: 93906*

Accreditation Bodies

Training Research Co., Ltd. is a fully accredited Test Laboratory for ITE, ISM, MIL-STD and Telecommunications Products.



Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code # 200174-0.

*TRC is ECMG's subcontract Lab.
TRC conduct the related EMC/RF test. ECMG collect and generate the report.*

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Opinions and Interpretations

This test report relates to the abovementioned equipment under test (EUT). Without the permission of EMC Compliance Management Group Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.

Statement of Measurement Uncertainty

The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

Administrative Data

Test Sample: F25 Industrial Radio Remote Controller

*Model Number : F25-12S/F25-12D/F25-10S/F25-10D
F25-8S/F25-8D/F25-6S/F25-6D*

*Trade Mark :  TELECRANE®
LEE'S HI-TECH ENTERPRISE CO., LTD.*

Date Tested : 2008 January 31

*Applicant : Lee Hi-tech Enterprise. Co., Ltd.
8F-1 No.288-2, Hsin-Ya Road Chien-Chen
Dist, Kaohsiung, Taiwan, R.O.C*

Telephone : +886-7-812-5652

Fax : +886-7-812-5704

*Manufacturer : Lee Hi-tech Enterprise. Co., Ltd.
8F-1 No.288-2, Hsin-Ya Road Chien-Chen
Dist, Kaohsiung, Taiwan, R.O.C*

EUT Description

*Lee's Hi-Tech Net Co., Ltd. Model number F25-12S
F25-12D/F25-10S/F25-10D/ F25-8S/F25-8D/F25-6S/F25-6D
(referred to as the EUT in this test report) is a Industrial Radio
Remote Controller..*

*The F25-12S/F25-12D/F25-10S/F25-10D/ F25-8S/F25-8D
F25-6S/F25-6D are having the same design structure and the
in differences between F25-12S/F25-12D/F25-10S
F2-10D/F25-8S/F25-8D/F25-6S/F25-6D are just number
of pushbuttons & relays.*

Specifications	
Operation Frequency	433.05~434.79MHz
Hamming Distance	≥ 4
I.D. Code	2^{20} sets (set by factory, never repeated)
Temperature Range	-40°C ~ +85°C
Channel Spacing	25 KHz
Maximum Operation Range	Up to 100 Meters
Protection Degree	IP 65
Transmitter Power Supply	Four 1.5 volts Batteries (AA Size)
RF Power	< 10 mW
Transmitter Dimensions	186x61x51mm (LxWxH)
Transmitter Weight	about 265g (including batteries)
Receiver Power Supply	220/380VAC (50/60Hz), $\pm 20\%$
Receiver Sensitivity	-110 dbm
Output Relays	5A/250VAC
Receiver Dimensions	200x162x107mm (LxWxH)
Receiver Weight	about 1220g(excluding wire cable)

Test Summary

The Electromagnetic Compatibility requirements on F25-10D for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

EMC Test Items			
<i>Reference FCC Part 15 (2006), Subpart C</i>			
Specification	Description	Test Results	Remark
<i>FCC Part 15.203</i>	<i>Antenna Requirement</i>	<i>Compliance</i>	<i>Attachment 1</i>
<i>FCC Part 15.205</i>	<i>Restricted Band of Operation</i>	<i>Compliance</i>	<i>Attachment 2</i>
<i>FCC Part 15.207</i>	<i>Conducted Limits</i>	<i>Test is not applicable, because EUT only employ battery power for operation.</i>	
<i>FCC Part 15.209</i>	<i>Radiated Emission Limits</i>	<i>Compliance</i>	<i>Refer to Attachment 4</i>
<i>FCC Part 15.231</i>	<i>Periodic Operation in the Band 40.66-40.70MHz and above 70MHz</i>	--	--
<i>(a)</i>	<i>Operation Mode</i>	<i>Compliance</i>	<i>Attachment 3</i>
<i>(b)</i>	<i>Field Strength of Fundamental and Spurious Emissions</i>	<i>Compliance</i>	<i>Attachment 4</i>
<i>(c)</i>	<i>Bandwidth 20dB</i>	<i>Compliance</i>	<i>Attachment 5</i>
<i>IC RSS-210</i>	<i>Bandwidth 99%</i>	<i>Compliance</i>	<i>Attachment 6</i>

Test Mode Justification

*The test modes (Lie, Stand) were done for testing.
X,Y define Lie, Z define Stand.*

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

EUT Exercise Software

The device is not programmable and does not use software.

Equipment Modification

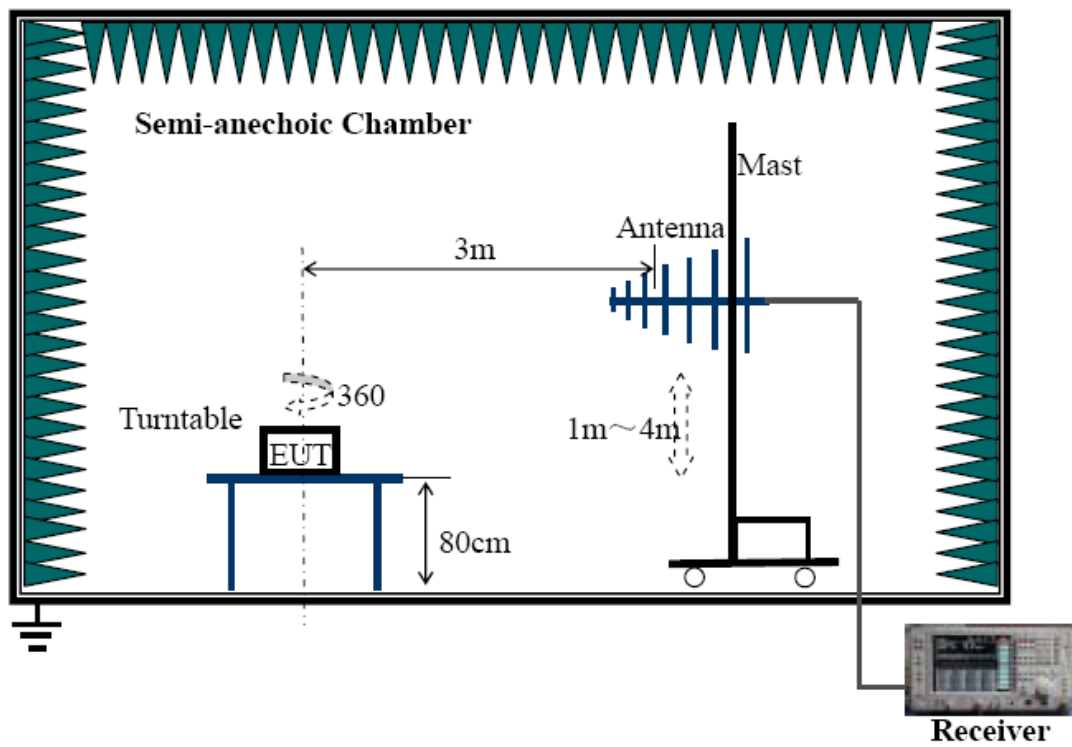
Any modifications installed previous to testing by Lee Hi-tech Enterprise Co., Ltd. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by EMC Compliance Management Group test personnel.

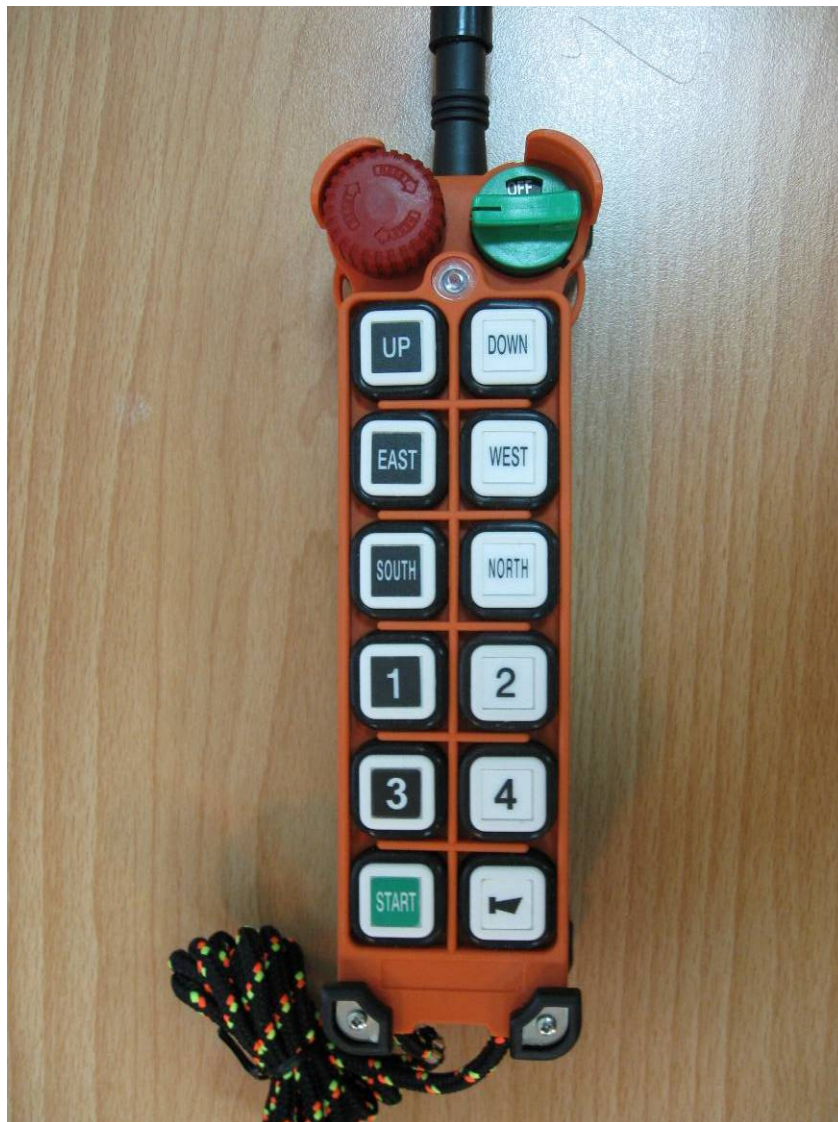
Test System Details

EUT	
Model Number:	F25-12S/F25-12D/F25-10S/F25-10D/F25-8S/F25-8D F25-6S/F25-6D
Trademark::	 TELECRANE™ LEE'S HI-TECH ENTERPRISE CO., LTD.
Serial Number:	Engineering Sample
Input Voltage:	6V DC (4*1.5V AA battery)
Description:	Industrial Radio Remote Control
Manufacturer:	Lee Hi-tech Enterprise. Co., Ltd.
Support Equipment	
None	
Cable Description	
None	

Configuration of Tested System



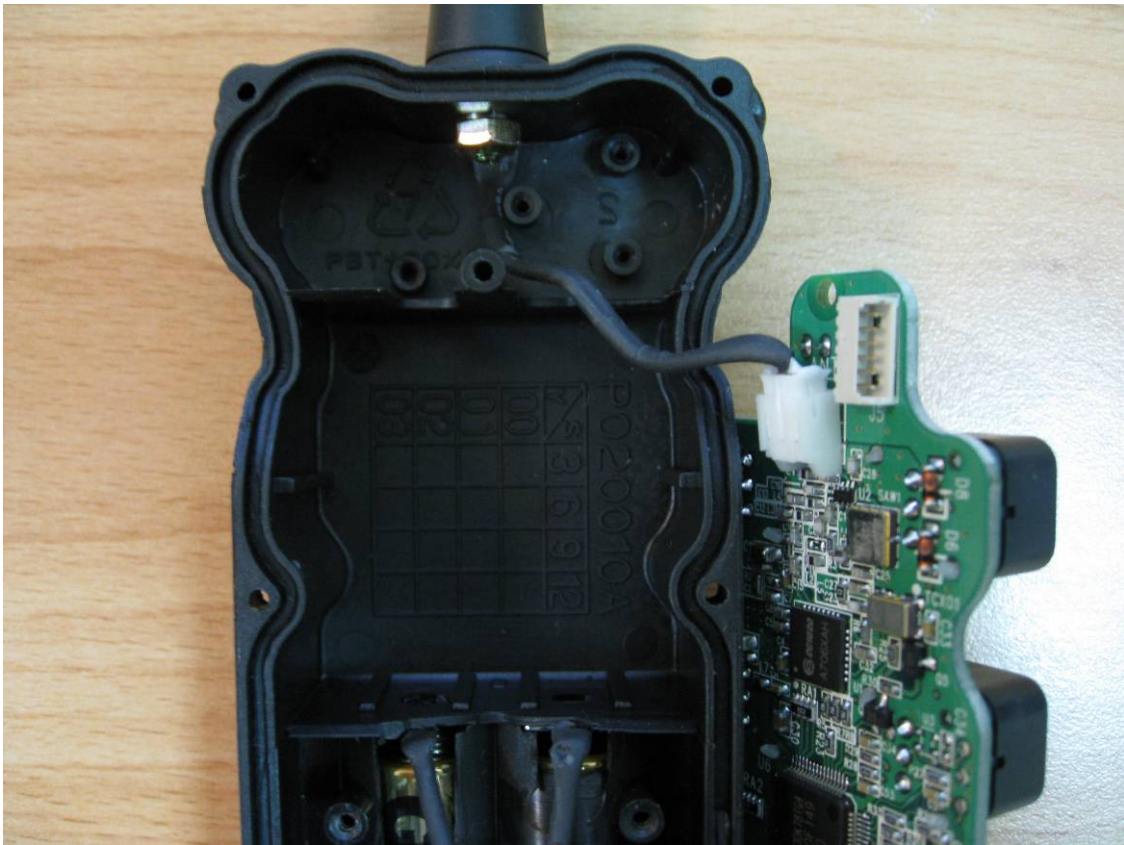
EUT Sample Photos



Sample Photo1



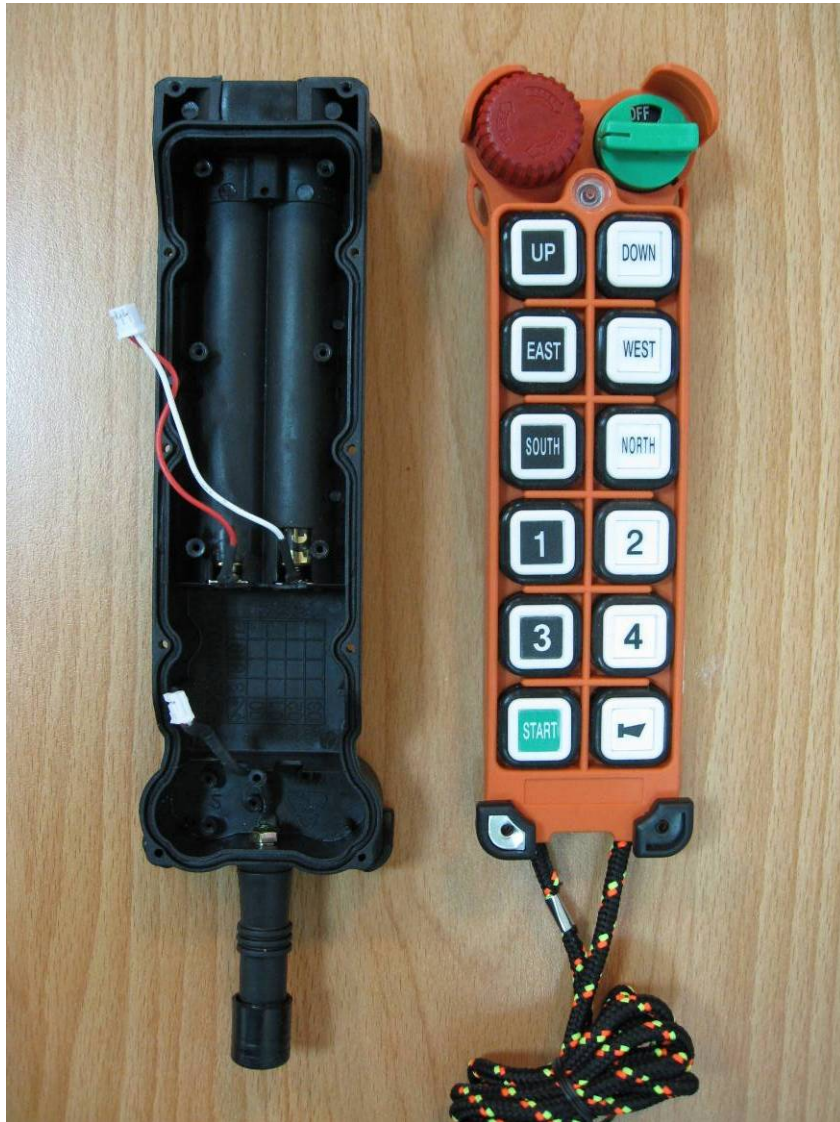
Sample Photo 2



Sample Photo 3



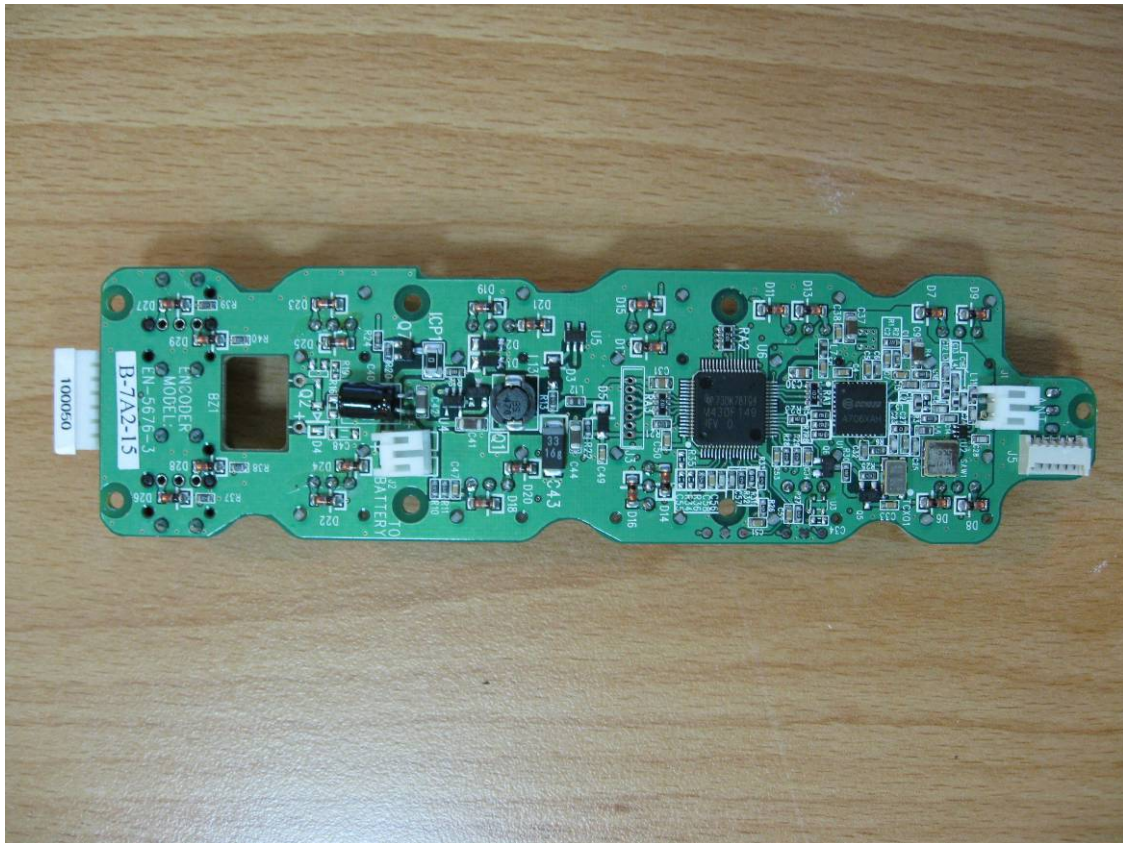
Sample Photo 4



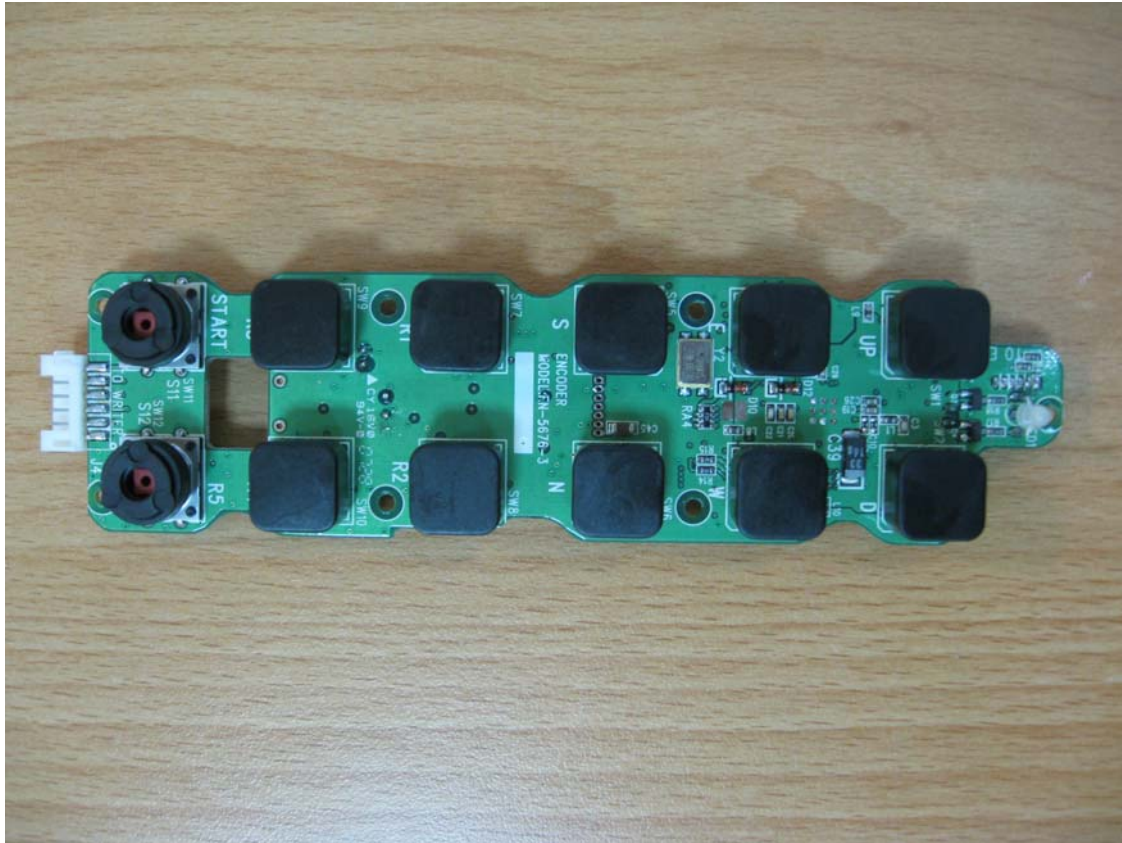
Sample Photo 5



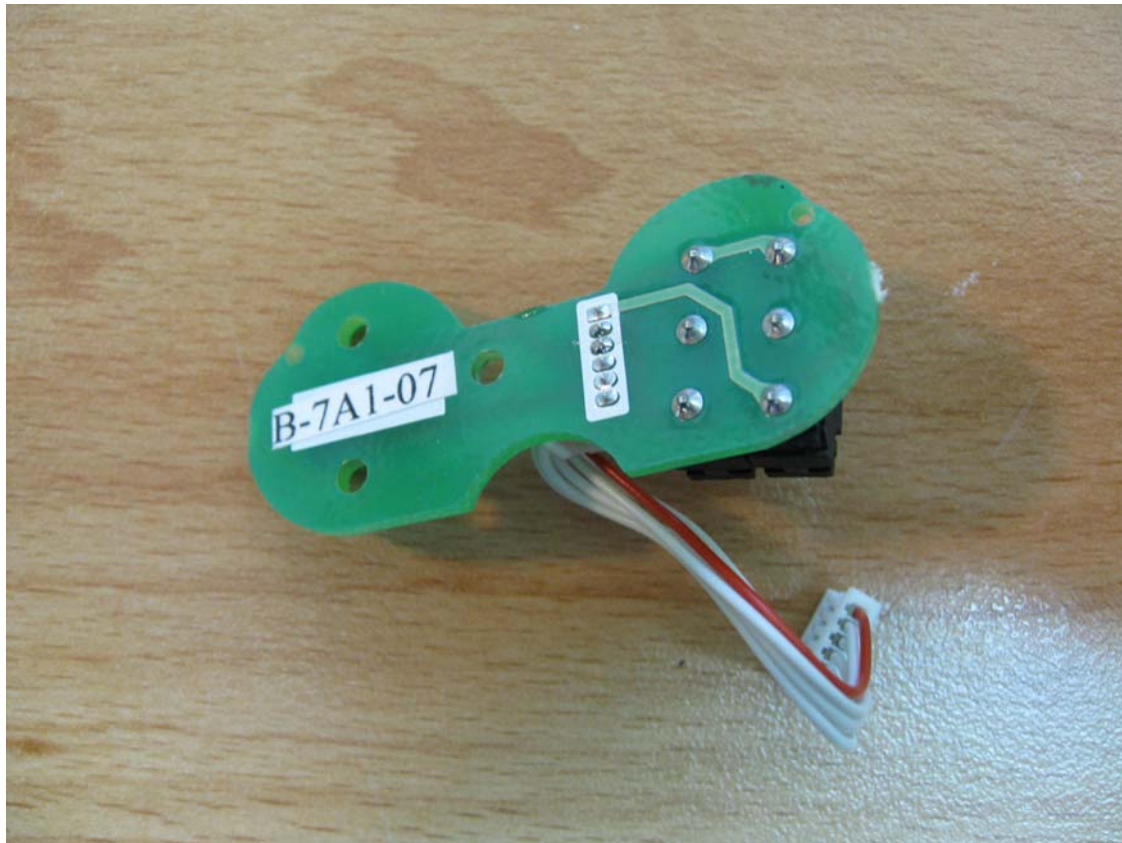
Sample Photo 6



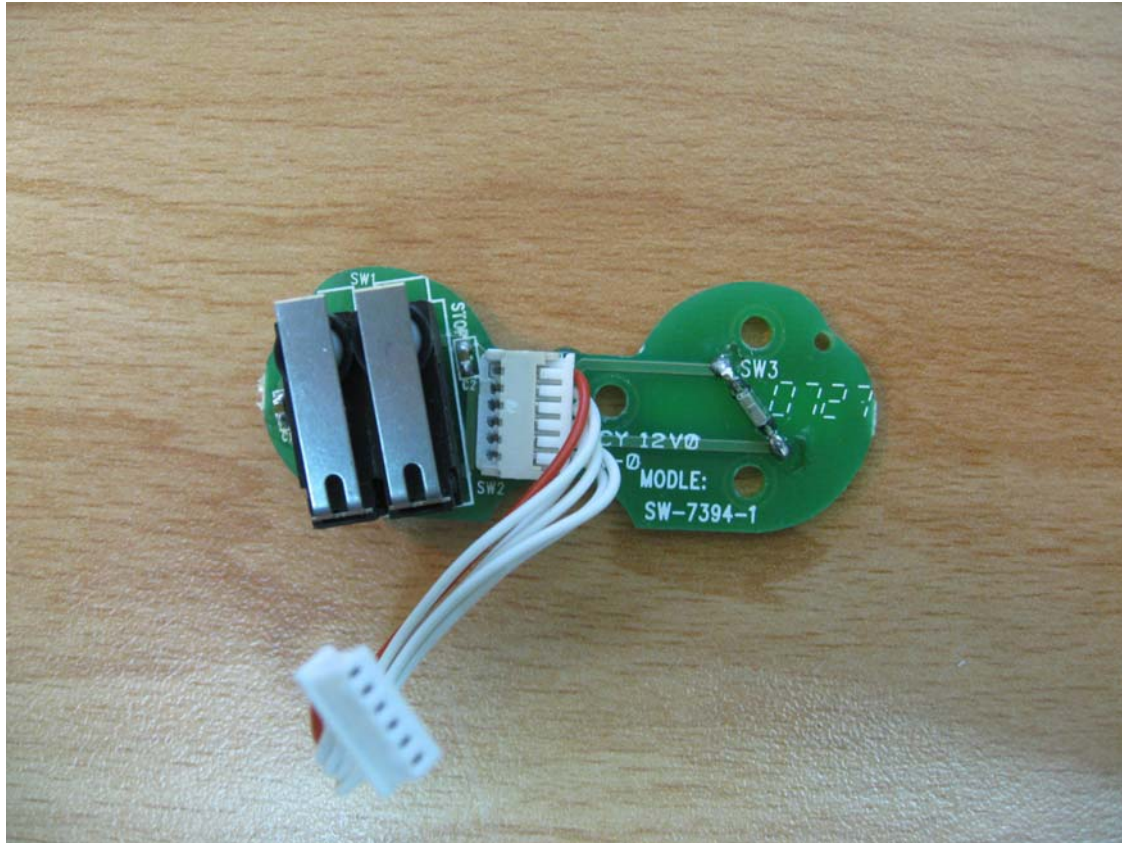
Sample Photo 7



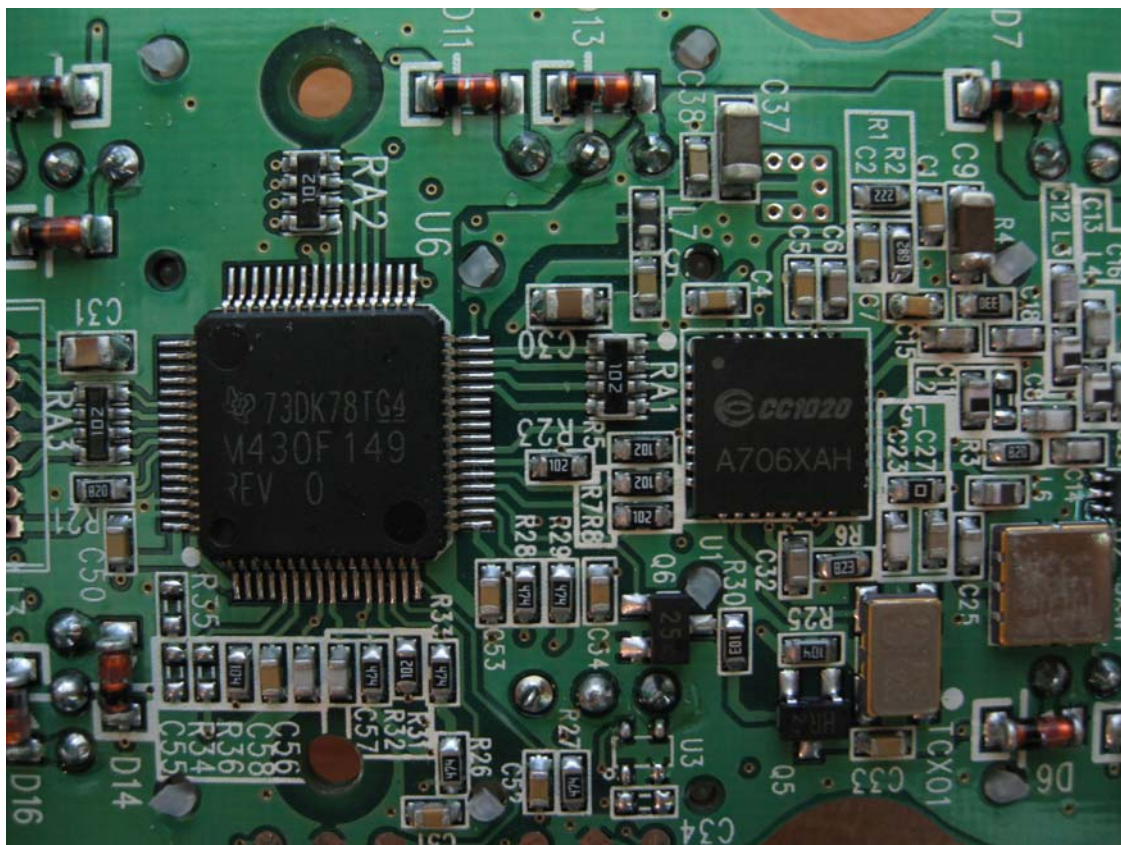
Sample Photo 8



Sample Photo 9



Sample Photo 10

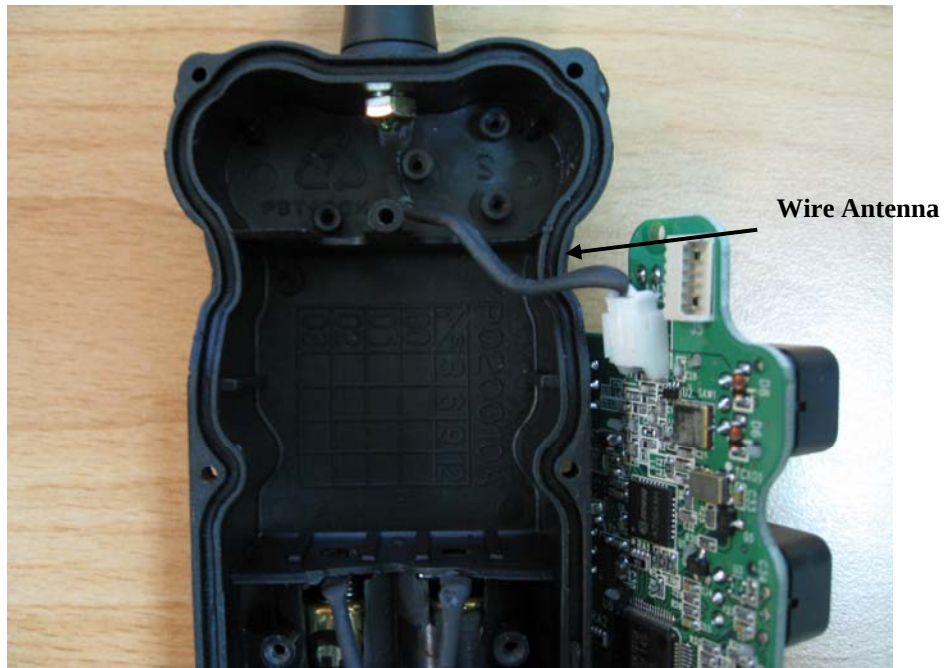


Sample Photo 11

ATTACHMENT 1 – ANTENNA REQUIREMENT

CLIENT:	Lee Hi-tech Enterprise Co., Ltd.	TEST RULE:	FCC Part 15.203 (2006) RSS 210
MODEL NUMBER:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Controller
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing-Win	DATE OF TEST:	2008 January 31
SETUP STANDARD:	N/A		
ANTENNA REQUIREMENT:	An intentional radiator shall be designed to ensure that no antenna other than 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 Sections 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 Section 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.		
TEST VOLTAGE:	6V DC (4*1.5V AA battery)		
TEST STATUS:	Normal Operation As Usual		
RESULTS:	The EUT meets the Antenna requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	N/A		

<i>FCC Section</i>	<i>FCC Rules</i>	<i>Conclusion</i>
15.203	<i>Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.</i> <i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i> <i>● The application (or intended use) of the EUT</i> <i>● The installation requirements of the EUT</i> <i>● The method by which the EUT will be marketed</i>	<i>The RF Device uses an integral antenna without connector.</i>



Integral Antenna without Connector View

ATTACHMENT 2 – RESTRICTED BAND OF OPERATION

CLIENT:	Lee Hi-tech Enterprise. Co., Ltd.	TEST RULE:	FCC 15.205 (2006) RSS 210 2.2(a)
MODEL NUMBER:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Controller
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	55%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing.Win	DATE OF TEST:	2008 February 1
SETUP STANDARD:	ANSI C63.4 - 2003		
RESTRICTED BANDS OF OPERATION REQUIREMENT:	The only spurious emissions are permitted in any of the frequency bands listed below table of next page.		
TESTED RANGE:	30MHz to 6000MHz		
TEST VOLTAGE:	6VDC (4*1.5V AA battery)		
TEST STATUS:	Keep Tx in continuous transmission mode, FSK modulated.		
RESULTS:	The EUT meets the restricted bands of operation requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

FCC Restricted Band:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	²
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

IC Restricted Band:

MHz	MHz	MHz
0.090-0.110	73-74.6	7250-7750
2.1735-2.1905	74.8-75.2	8025-8500
3.020-3.026	108-138	
4.125-4.128	156.52475-156.52525	
4.17725-4.17775	156.7-156.9	
4.20725-4.20775	240-285	
5.677-5.683	322-335.4	
6.215-6.218	399.9-410	
6.26775-6.26825	608-614	
6.31175-6.31225	960-1427	
8.291-8.294	1435-1626.5	
8.362-8.366	1645.5-1646.5	
8.37625-8.38675	1660-1710	
8.41425-8.41475	1718.8-1722.2	
12.29-12.293	2200-2300	
12.51975-12.52025	2310-2390	
12.57675-12.57725	2655-2900	
13.36-13.41	3260-3267	
16.42-16.423	3332-3339	
16.69475-16.69525	3345.8-3358	
16.80425-16.80475	3500-4400	
25.5-25.67	4500-5150	
37.5-38.25	5350-5460	

Note: Certain frequency bands listed in Table 1 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as in RSS-310.

Ch1:

Freq(MHz)	Amp(dBuV)	Margin(dB)	Limit(dBuV)	CF(dB)	Angle	Height	QP
* 437.40	63.30	17.30	80.79	0.62	357	1.00	---
866.62	32.45	-13.55	60.79	13.90	133	1.00	---

Test Data (Below 1GHz)**Ch70:**

Freq(MHz)	Amp(dBuV)	Margin(dB)	Limit(dBuV)	CF(dB)	Angle	Height	QP
* 439.82	61.74	15.74	80.85	0.73	249	1.00	---

Test Data (Below 1GHz)**Ch1:**

頻率 Frequency	天線 高度 Antenna height	轉桌 角度 Table angle	干擾讀值 峰值 / 平均 Raw value Peak / Avg		校正 參數 Correction factor	校正後讀值 峰值 / 平均 Emission level Peak / Avg		限制值 峰值 / 平均 Limit Peak / Avg		餘裕 Margin
MHz	m	degree	dBuV		dB/m	dBuV/m		dBuV/m		dB
1300.00	1.00	260.00	33.41	---	0.80	34.21	---	73.96	53.96	-19.75
1731.25	1.00	337.00	35.24	---	0.65	35.89	---	73.96	53.96	-18.07
2597.92	1.00	219.00	30.74	---	7.61	38.35	---	73.96	53.96	-15.61
3464.58	1.00	80.00	30.08	---	10.31	40.39	---	73.96	53.96	-13.57
4331.25	1.00	74.00	29.08	---	12.96	42.04	---	73.96	53.96	-11.92

Peak-----RBW:1MHZ VBW:1MHZ

Avg----- RBW:1MHZ VBW:10HZ

Sweep time:auto

Test Data (Above 1GHz)**Ch70:**

頻率 Frequency	天線 高度 Antenna height	轉桌 角度 Table angle	干擾讀值 峰值 / 平均 Raw value Peak / Avg		校正 參數 Correction factor	校正後讀值 峰值 / 平均 Emission level Peak / Avg		限制值 峰值 / 平均 Limit Peak / Avg		餘裕 Margin
MHz	m	degree	dBuV		dB/m	dBuV/m		dBuV/m		dB
1304.17	1.00	275.00	33.91	---	0.78	34.69	---	73.96	53.96	-19.27
1739.58	1.00	207.00	35.74	---	0.67	36.41	---	73.96	53.96	-17.55
2172.92	1.00	291.00	31.91	---	5.19	37.10	---	73.96	53.96	-16.86
2606.25	1.00	228.00	29.57	---	7.67	37.24	---	73.96	53.96	-16.72
3041.67	1.00	293.00	30.57	---	9.30	39.87	---	73.96	53.96	-14.09
4347.92	1.00	343.00	28.74	---	12.98	41.72	---	73.96	53.96	-12.24

Peak-----RBW:1MHZ VBW:1MHZ

Avg----- RBW:1MHZ VBW:10HZ

Sweep time:auto

Test Data (Above 1GHz)

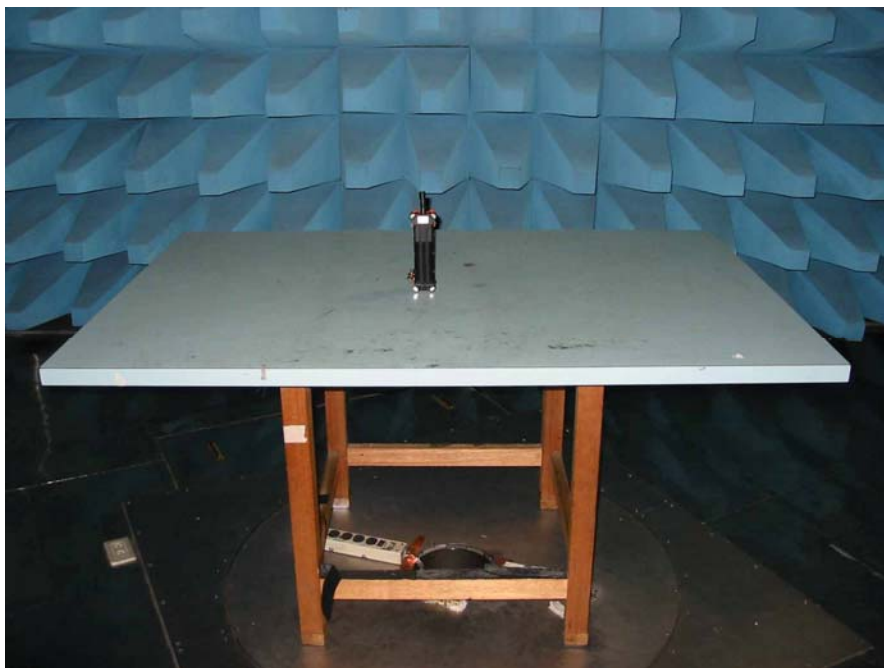
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
EMI Receiver	8546A	HP	3520A00242	09/06/06	03/05/08
RF Filter Section	85460A	HP	3448A00217	09/06/06	03/05/08
Small Biconical Antenna (30MHz to 1GHz)	UBAA9114&BBVU9135	Schwarzeck	127	12/07/06	03/06/08
Pre-amplifier	PA1F(1-6G)	TRC	1FAC	04/10/07	04/10/08
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	04/10/07	04/10/08
Coaxial Cabel (Double shielded, 15meter)	A30A30-0058-50FS-15M	Jyebao	SMA-01	04/10/07	04/10/08
Coaxial Cabel (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-02	04/10/07	04/10/08
Spectrum Analyzer	8564E	HP	3720A00840	12/11/06	03/10/08
Microwave Preamplifier	84125C	HP	US36433002	04/20/07	04/19/08
Horn Antenna	3115	EMCO	9104-3668	02/05/07	02/05/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/14/07	12/13/08
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/14/07	12/14/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Naing-Win
ENGINEER

REVIEWED BY: Harry
SENIOR ENGINEER



Radiated Emissions Test Set-up (Below 1GHz)



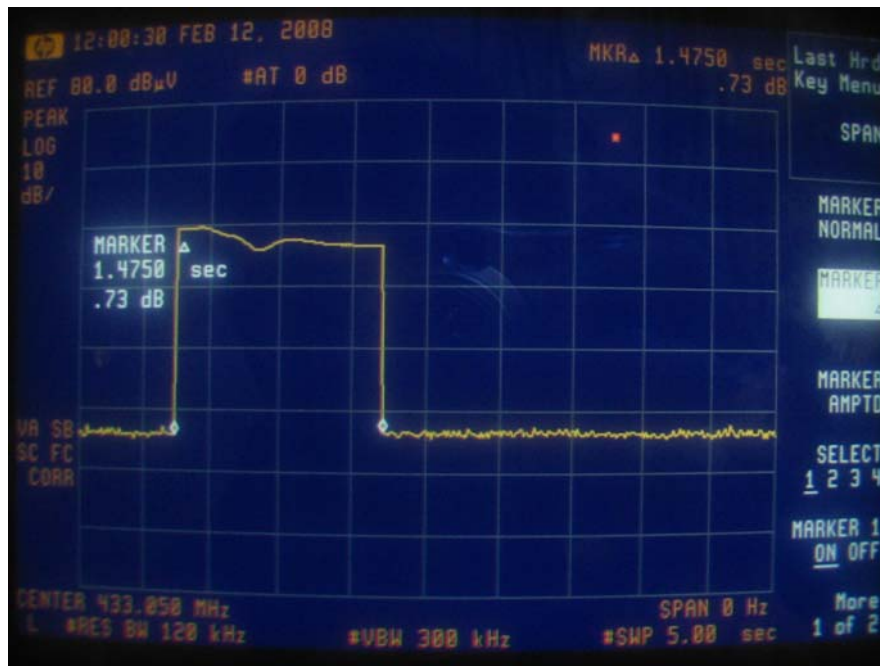
Radiated Emissions Test Set-up (Above 1GHz)

ATTACHMENT 3 – OPERATION MODE

CLIENT:	Lee Hi-tech Enterprise Co., Ltd.	TEST RULE:	FCC Part 15.231 (a) (2006) RSS 210 A1.1.1(b)
MODEL NUMBER:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Controller
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing.Win	DATE OF TEST:	2008 February 1
SETUP STANDARD:	N/A		
OPERATION MODE REQUIREMENT:	(1) A manually operated transmitter shall employ a switch that will automatically the transmitter within not more than 5 seconds of being released.. (2) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used on 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. (3) 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.		
TEST VOLTAGE:	6VDC (4*1.5V AA battery)		
TEST STATUS:	Normal Operation As Usual		
RESULTS:	The EUT meets the operation mode requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	N/A		

FCC Section	FCC Rules	Conclusion
15.231 (a)	<i>The provisions of this Section are restricted to periodic operation within the band 40.66 – 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of 15.231 Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:</i> <i>(1) A manually operated transmitter shall employ a switch that will automatically the transmitter within not more than 5 seconds of being released</i> <i>(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.</i> <i>(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used on 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.</i> <i>(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety</i>	<i>The transmitter operates manually and does not perform periodic transmissions.</i>

	<i>of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.</i>	
--	--	--



From the picture, the sweep time is 5 seconds. And the signal is around 1.5 second after the push button released according to this picture.
(Test Result = 1.5 sec < 5 sec.)

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
EMI Receiver	8546A	HP	3520A00242	09/06/06	03/05/08
RF Filter Section	85460A	HP	3448A00217	09/06/06	03/05/08
Small Biconical Antenna (30MHz to 1GHz)	UBAA9114&BBVU9135	Schwarzeck	127	12/07/06	03/06/08
Pre-amplifier	PA1F(1-6G)	TRC	1FAC	04/10/07	04/10/08
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	04/10/07	04/10/08
Coaxial Cable (Double shielded, 15meter)	A30A30-0058-50FS-15M	Jyebao	SMA-01	04/10/07	04/10/08
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-02	04/10/07	04/10/08
Spectrum Analyzer	8564E	HP	3720A00840	12/11/06	03/10/08
Microwave Preamplifier	84125C	HP	US36433002	04/20/07	04/19/08
Horn Antenna	3115	EMCO	9104-3668	02/05/07	02/05/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/14/07	12/13/08
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/14/07	12/14/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Naing-Win
ENGINEER

REVIEWED BY: Harry
SENIOR ENGINEER

ATTACHMENT 4 –FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

CLIENT:	Lee Hi-tech Enterprise. Co., Ltd.	TEST RULE:	FCC Part 15.231(b), FCC Part 15.35 RSS 210 A1.1.2
MODEL NUMBER:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Controller
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing.Win	DATE OF TEST:	2008 February 1
SETUP STANDARD:	ANSI C63.4 : 2003, FCC Part 15.35		
TEST PROCEDURE:	a. The EUT was placed on a rotatable table with 0.8 meters above ground. b. The EUT was set 3 meters from the interference-receiving antenna, which was mounted on the top of a variable height antenna tower. c. The antenna was varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna were set to make measurement. d. For each suspected emission the EUT was arranged to its worst case and then change the antenna tower height (from 1m to 4m) and turn table (from 0 degree to 360 degree) to find the maximum reading. e. If the emission level of the EUT in peak mode was 20 dB lower than the specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be tested using the quasi-peak method in about six maximal points and the results will be reported. f. Broadband antenna (Calibrated antenna) was used as receiving antenna below 1000MHz. Horn antenna were used as receiving antenna above 1000MHz. g. The bandwidth is 120 kHz below 1000 MHz, and 1 MHz above 1000 MHz Explanation of the Correction Factor are given as follows: $FS = RA + AF + CF - AG - DC$ Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain DC = Duty Cycle Correction Factor		

CONTINUE ON THE NEXT PAGE...

TESTED RANGE:	30MHz to 6000MHz
TEST VOLTAGE:	6VDC (4*1.5V AA battery)
TEST STATUS:	Keep Tx in continuous transmission mode, FSK modulated.
RESULTS:	The EUT meets the requirements of field strength test. The test results only to the equipment under test provided by client.
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB

Peak value of the measured emissions:

Ch1:

		Freq	read level	factor	Field Strength	limit	Over limit
X	Horizontal	433.05	75.1	0.56	75.66	80.7	-5.04
		806	21.33	11.83	33.16	60.7	-27.54
		866.62	21.54	13.9	35.44	60.7	-25.26
		1300	33.57	0.8	34.37	60.7	-26.33
		1731.25	36.08	0.65	36.73	60.7	-23.97
		2597.92	31.57	7.61	39.18	60.7	-21.52
		3464.58	30.58	10.31	40.89	60.7	-19.81
		4331.25	28.08	12.96	41.04	60.7	-19.66
	Vertical	433.05	60.82	0.62	61.44	80.7	-19.26
		864.2	19.06	13.81	32.87	60.7	-27.83
		1300	34.57	0.8	35.37	60.7	-25.33
		1731.25	35.24	0.65	35.89	60.7	-24.81
		2597.92	30.4	7.61	38.01	60.7	-22.69
		3464.58	29.41	10.31	39.72	60.7	-20.98
		4331.25	28.91	12.96	41.81	60.7	-18.89
Y	Horizontal	433.05	74.68	0.62	75.3	80.7	-5.4
		866.62	21.08	13.9	34.98	60.7	-25.72
		1300	33.41	0.8	34.21	60.7	-26.49
		1731.25	35.24	0.65	35.89	60.7	-24.81
		2597.92	30.74	7.61	38.35	60.7	-22.35
		3464.58	30.08	10.31	40.39	60.7	-20.31
		4331.25	29.08	12.96	42.04	60.7	-18.66
	Vertical	433.05	60.63	0.56	61.19	80.7	-19.51
		866.62	18.44	13.9	32.34	60.7	-28.36
		1300	33.41	0.8	34.21	60.7	-26.49
		1731.25	35.24	0.65	35.89	60.7	-24.81
		2597.92	30.57	7.61	38.18	60.7	-22.52
		3464.58	29.74	10.31	40.05	60.7	-20.65
		4331.25	28.91	12.96	41.87	60.7	-18.83
Z	Horizontal	433.05	53.67	0.56	54.23	80.7	-26.47
		862.99	18.66	13.76	32.42	60.7	-28.28
		1300	33.74	0.8	34.54	60.7	-26.16
		1731.25	35.24	0.65	35.89	60.7	-24.81
		2597.92	30.57	7.61	38.18	60.7	-22.52
		3464.58	29.91	10.31	40.22	60.7	-20.48
		4331.25	29.08	12.96	42.04	60.7	-18.66
		433.05	74.19	0.56	74.75	80.7	-5.95

	Vertical	866.62	21.82	13.9	35.72	60.7	-24.98
		1300	33.74	0.8	34.54	60.7	-26.16
		1731.25	34.91	0.65	35.56	60.7	-25.14
		2597.92	30.57	7.61	38.18	60.7	-22.52
		3464.58	30.41	10.31	40.72	60.7	-19.98
		4331.25	28.24	12.96	41.2	60.7	-19.5

Factor: Amplifier + Cable less + Antenna factor

Ch 70:

		Freq	read level	factor	Field Strength	limit	Over limit
X	Horizontal	434.774	73.01	0.73	73.74	80.7	-6.96
		645.95	20.18	7.88	28.06	60.7	-32.64
		849.65	20	13.26	33.26	60.7	-27.44
		1304.17	33.91	0.78	33.91	60.7	-26.79
		1739.58	35.74	0.67	35.74	60.7	-24.96
		2172.92	31.91	5.19	31.91	60.7	-28.79
		2606.25	29.57	7.67	29.57	60.7	-31.13
		3041.67	30.57	9.3	30.57	60.7	-30.13
		4347.92	28.74	12.98	28.74	60.7	-31.96
	Vertical	434.775	59.81	0.73	60.54	80.7	-20.16
		631.4	19.72	7.43	27.15	60.7	-33.55
		844.8	20	13.1	33.1	60.7	-27.6
		1304.17	32.58	0.78	32.58	60.7	-28.12
		1739.58	34.74	0.67	34.74	60.7	-25.96
		2172.92	31.58	5.19	31.58	60.7	-29.12
		2606.25	30.24	7.67	30.24	60.7	-30.46
		3041.67	29.91	9.3	29.91	60.7	-30.79
		4347.92	27.9	12.98	27.09	60.7	-33.61
Y	Horizontal	434.775	60.9	0.73	61.63	80.7	-19.07
		672.62	20.99	8.7	29.69	60.7	-31.01
		858.14	19.29	13.58	32.87	60.7	-27.83
		1304.17	33.24	0.78	34.02	60.7	-26.68
		1739.58	34.58	0.67	35.25	60.7	-25.45
		2172.92	31.91	5.19	37.1	60.7	-23.6
		2606.25	30.07	7.67	37.74	60.7	-22.96
		3041.67	30.07	9.3	39.37	60.7	-21.33
		4347.92	25.57	12.98	42.55	60.7	-18.15
	Vertical	434.775	60.28	0.73	61.01	80.7	-19.69
		652.01	19.67	8.07	27.74	60.7	-32.96
		858.14	20.31	13.58	33.89	60.7	-26.81
		1304.17	31.91	0.78	32.69	60.7	-28.01
		1739.58	34.74	0.67	35.41	60.7	-25.29
		2172.92	32.41	5.19	37.6	60.7	-23.1
		2606.25	30.4	7.67	38.07	60.7	-22.63
		3041.67	29.41	9.3	38.71	60.7	-21.99
		4347.92	28.24	12.98	41.22	60.7	-19.48
Z	Horizontal	434.775	56.62	0.67	57.29	80.7	-23.41

		565.92	20.24	5.51	25.75	60.7	-34.95
Z	Horizontal	695.66	19.95	9.4	29.35	60.7	-31.35
		888.45	19.78	14.72	34.5	60.7	-26.2
		1304.17	32.91	0.78	33.69	60.7	-27.01
		1739.58	35.08	0.67	35.75	60.7	-24.95
		2172.92	32.08	5.19	37.27	60.7	-23.43
		2606.25	30.4	7.67	38.07	60.7	-22.63
		3041.67	30.41	9.3	39.71	60.7	-20.99
		4347.92	27.4	12.98	40.68	60.7	-20.02
	Vertical	434.775	71.77	0.67	72.44	80.7	-8.26
		671.41	20.29	8.66	28.95	60.7	-31.75
		888.45	20.08	14.72	34.8	60.7	-25.9
		1304.17	33.58	0.78	34.36	60.7	-26.34
		1739.58	35.08	0.67	35.75	60.7	-24.95
		2172.92	31.24	5.19	36.43	60.7	-24.27
		2606.25	29.4	7.67	37.07	60.7	-23.63
		3041.67	29.57	9.3	38.87	60.7	-21.83
		4347.92	28.07	12.98	41.05	60.7	-19.65

Factor: Amplifier + Cable loss + Antenna factor

According to FCC 15.35(b), maximum permitted peak field strength is 20dB above the maximum permitted average emission limit.

Duty Cycle Correction Factor is calculated by averaging the sum of the pulse train. Correction factor is measured as follows:

Keep the EUT in continuous transmission mode (modulated), and set the spectrum to the fundamental frequency and set the span width to 0 Hz. Then connect a storage oscilloscope to the video output of the spectrum that is used to detect the pulse train. Adjust the oscilloscope settings to observe the pulse train and determine the number and width of the pulses, as well as the period of the train.

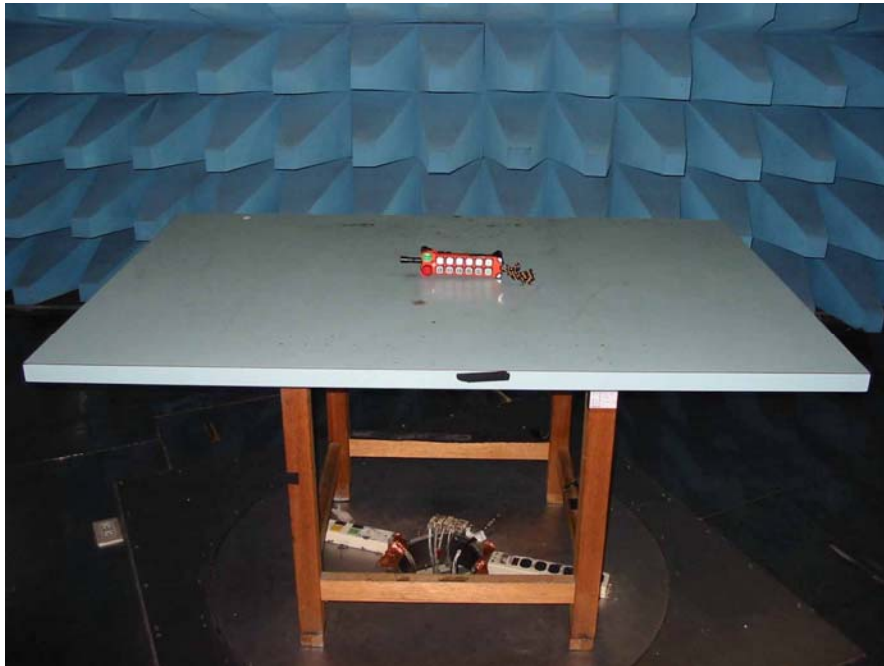
Duty Cycle Correction Factor at its maximum value

Duty Cycle=20|log 100%=0

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
EMI Receiver	8546A	HP	3520A00242	09/06/06	03/05/08
RF Filter Section	85460A	HP	3448A00217	09/06/06	03/05/08
Small Biconical Antenna (30MHz to 1GHz)	UBAA9114&BBVU9135	Schwarzeck	127	12/07/06	03/06/08
Pre-amplifier	PA1F(1-6G)	TRC	1FAC	04/10/07	04/10/08
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	04/10/07	04/10/08
Coaxial Cabel (Double shielded, 15meter)	A30A30-0058-50FS-15M	Jyebao	SMA-01	04/10/07	04/10/08
Coaxial Cabel (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-02	04/10/07	04/10/08
Spectrum Analyzer	8564E	HP	3720A00840	12/11/06	03/10/08
Microwave Preamplifier	84125C	HP	US36433002	04/20/07	04/19/08
Horn Antenna	3115	EMCO	9104-3668	02/05/07	02/05/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/14/07	12/13/08
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/14/07	12/14/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Naing.Win
ENGINEER

REVIEWED BY: Harry
SENIOR ENGINEER



Field Strength Emissions Test Set-up



Field Strength Emissions Test Set-up

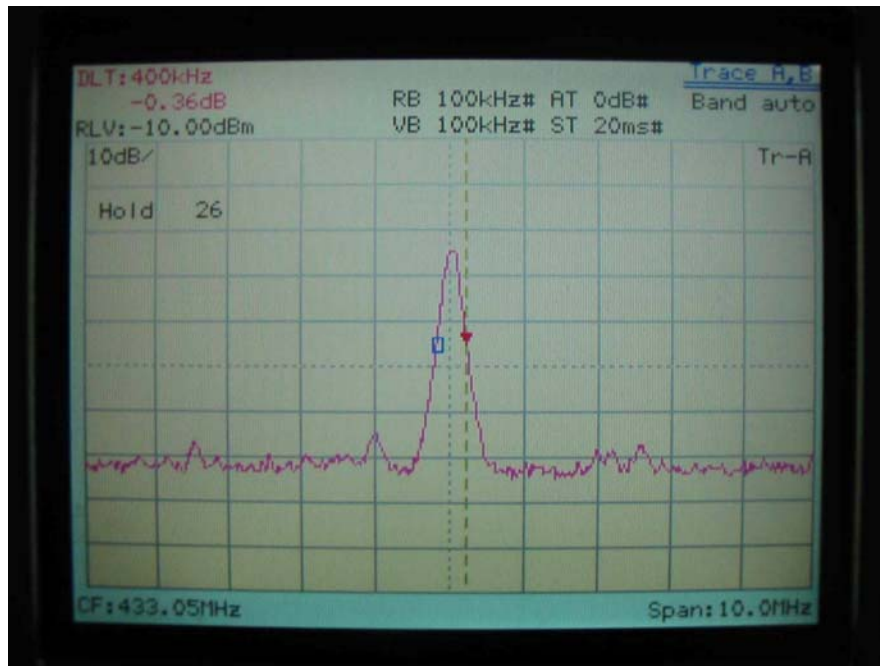


Field Strength Emissions Test Set-up

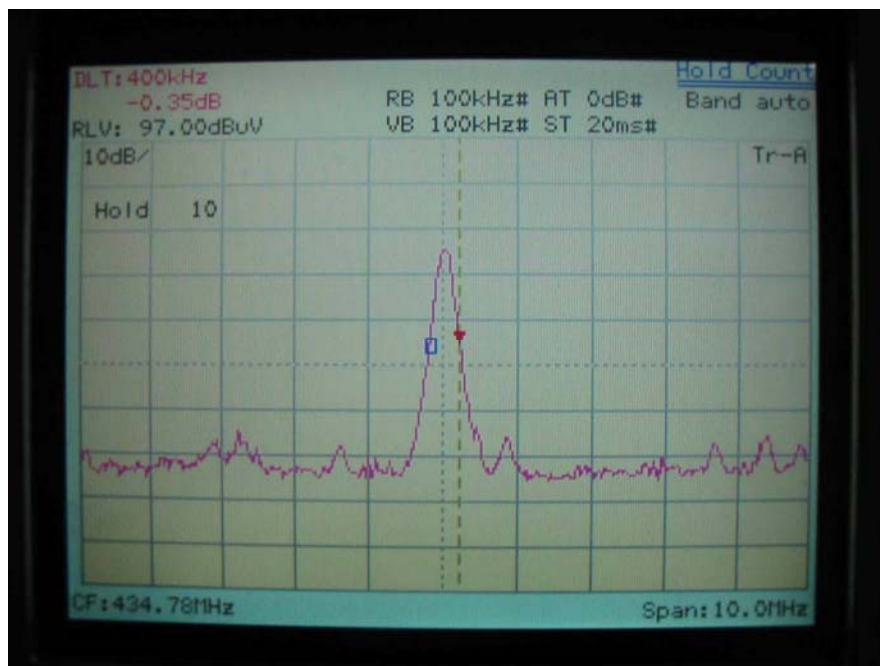
ATTACHMENT 5 – 20dB BANDWIDTH TEST For FCC Test

CLIENT:	Lee Hi-tech Enterprise. Co., Ltd.	TEST RULE:	FCC Part 15.231 (C) IC RSS-210 A1.1.3
MODEL TESTED:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Control
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing.Win	DATE OF TEST:	2008 January 31
SETUP STANDARD:	ANSI C63.4 - 2003		
BANDWIDTH REQUIREMENT:	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 20 dB down from the modulated carrier.		
TEST VOLTAGE:	6VDC (4*1.5V AA battery)		
TEST STATUS:	Keep Tx in continuous transmission mode, FSK modulated.		
RESULTS:	The EUT meets the bandwidth requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Test Data (Fundamental Frequency)



433.05MHz Ch1 20dB BW



434.78MHz Ch70 20dB BW

So, Ch1 20dB Bandwidth =400kHz

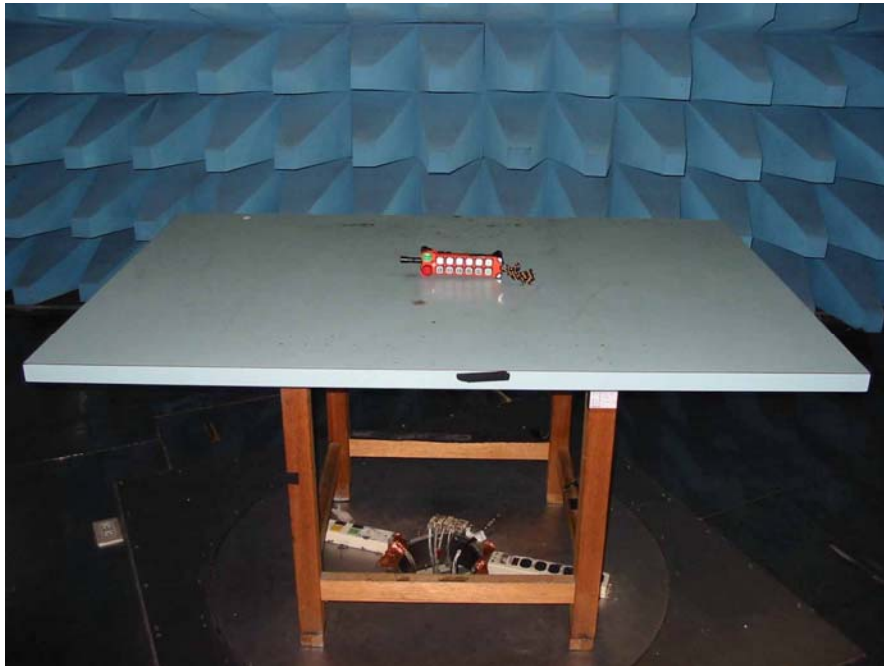
Ch70 20dB Bandwidth =400kHz

Frequency (MHz)	Bandwidth Limit (MHz) ($F_{center} \times 0.25\%$)	Test Result (MHz) ($F_{end}-F_{start}$)	Conclusion
<i>Center</i>			
<i>Ch1 433.05</i>	<i>1.0826</i>	<i>0.4</i>	<i>Compliance</i>
<i>Ch70 434.78</i>	<i>1.0869</i>	<i>0.4</i>	<i>Compliance</i>
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.			

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
EMI Receiver	8546A	HP	3520A00242	09/06/06	03/05/08
RF Filter Section	85460A	HP	3448A00217	09/06/06	03/05/08
Small Biconical Antenna (30MHz to 1GHz)	UBAA9114&BBVU9135	Schwarzeck	127	12/07/06	03/06/08
Pre-amplifier	PA1F(1-6G)	TRC	1FAC	04/10/07	04/10/08
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	04/10/07	04/10/08
Coaxial Cabel (Double shielded, 15meter)	A30A30-0058-50FS-15M	Jyebao	SMA-01	04/10/07	04/10/08
Coaxial Cabel (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-02	04/10/07	04/10/08
Spectrum Analyzer	8564E	HP	3720A00840	12/11/06	03/10/08
Microwave Preamplifier	84125C	HP	US36433002	04/20/07	04/19/08
Horn Antenna	3115	EMCO	9104-3668	02/05/07	02/05/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/14/07	12/13/08
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/14/07	12/14/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Naing.Win
ENGINEER

REVIEWED BY: Harry
QC

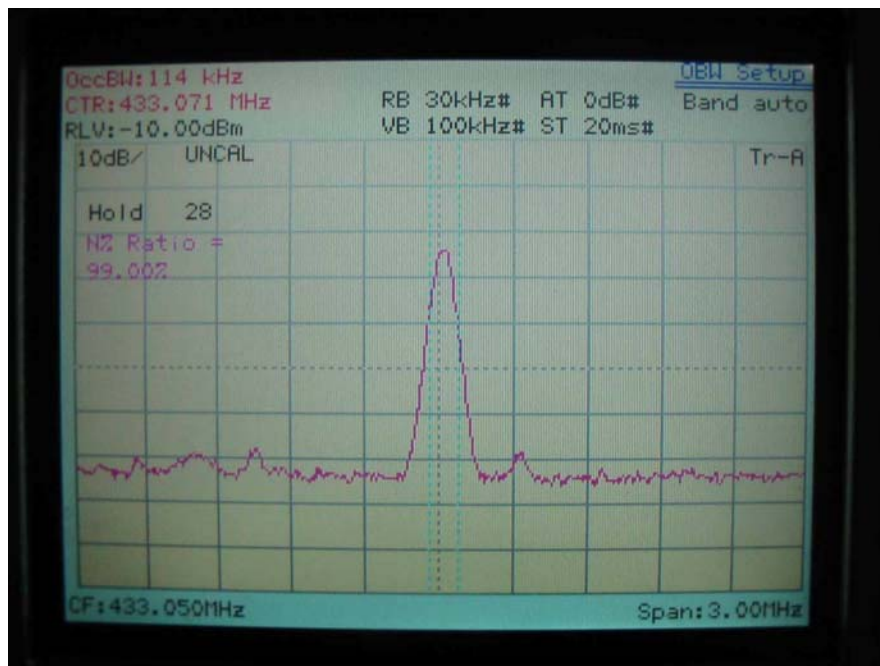


Bandwidth Test Set-up

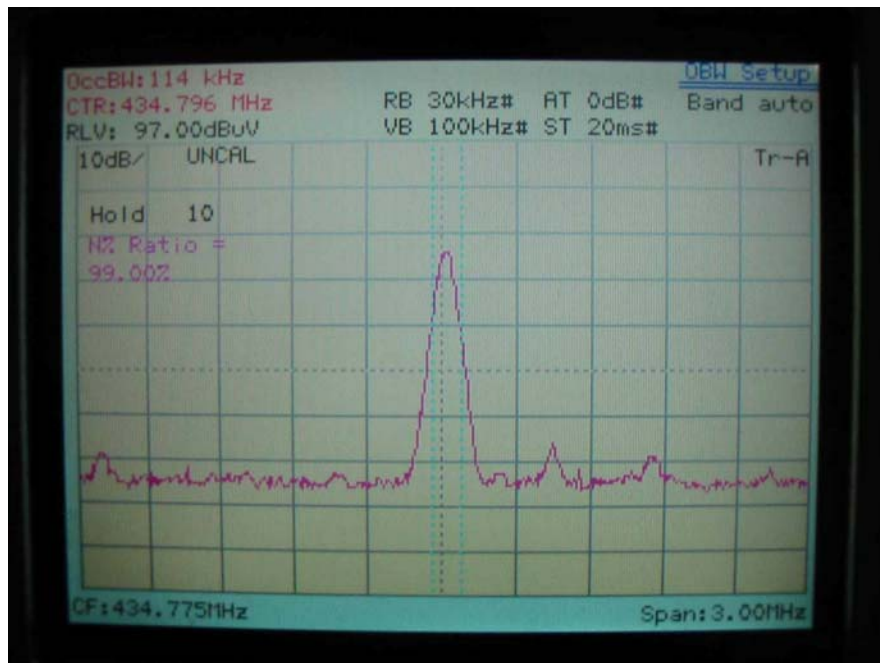
ATTACHMENT 6 – 99 % BANDWIDTH TEST- For IC Test

CLIENT:	Lee Hi-tech Enterprise. Co., Ltd.	TEST RULE:	IC RSS-210 A1.1.3
MODEL TESTED:	F25-10D	PRODUCT:	F25 Series Industrial Radio Remote Controller
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21 °C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Naing.Win	DATE OF TEST:	2008 January 31
SETUP STANDARD:	ANSI C63.4 - 2003		
BANDWIDTH REQUIREMENT:	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.		
TEST VOLTAGE:	6VDC (4*1.5V AA battery)		
TEST STATUS:	Keep Tx in continuous transmission mode, FSK modulated.		
RESULTS:	The EUT meets the bandwidth requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Test Data (Fundamental Frequency)



433.05MHz Ch1 99% BW



434.775MHz Ch70 99% BW

So, Ch1 99% Bandwidth = 114 kHz

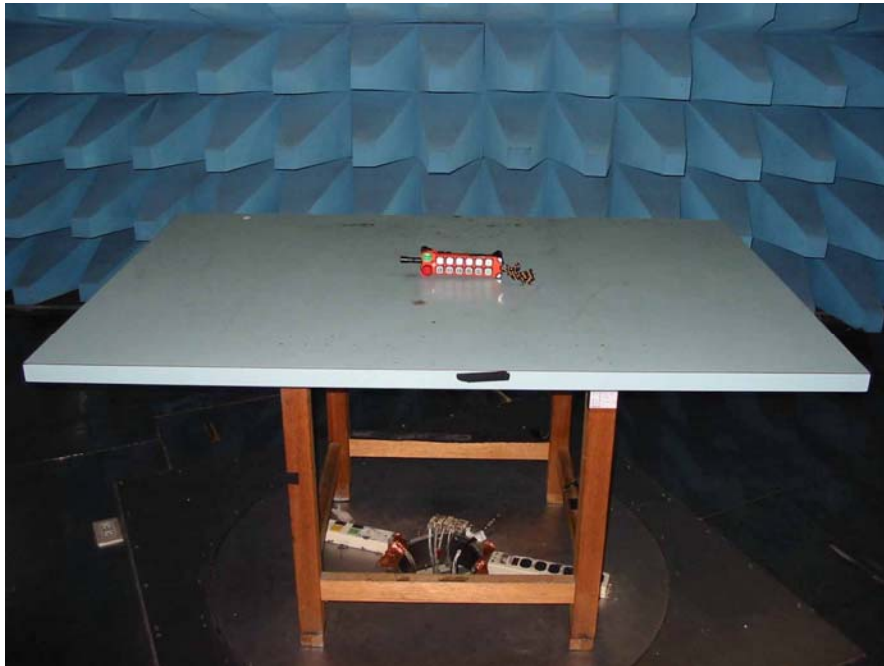
Ch70 99% Bandwidth = 114 kHz

<i>Frequency (MHz)</i>	<i>Bandwidth Limit (MHz) ($F_{center} \times 0.25\%$)</i>	<i>Test Result (MHz) ($F_{end}-F_{start}$)</i>	<i>Conclusion</i>
<i>Center</i>			
<i>Ch1 433.05</i>	<i>1.0826</i>	<i>0.114</i>	<i>Compliance</i>
<i>Ch70 434.775</i>	<i>1.0869</i>	<i>0.114</i>	<i>Compliance</i>
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.			

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
EMI Receiver	8546A	HP	3520A00242	09/06/06	03/05/08
RF Filter Section	85460A	HP	3448A00217	09/06/06	03/05/08
Small Biconical Antenna (30MHz to 1GHz)	UBAA9114&BBVU9135	Schwarzeck	127	12/07/06	03/06/08
Pre-amplifier	PA1F(1-6G)	TRC	1FAC	04/10/07	04/10/08
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	04/10/07	04/10/08
Coaxial Cabel (Double shielded, 15meter)	A30A30-0058-50FS-15M	Jyebao	SMA-01	04/10/07	04/10/08
Coaxial Cabel (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-02	04/10/07	04/10/08
Spectrum Analyzer	8564E	HP	3720A00840	12/11/06	03/10/08
Microwave Preamplifier	84125C	HP	US36433002	04/20/07	04/19/08
Horn Antenna	3115	EMCO	9104-3668	02/05/07	02/05/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/14/07	12/13/08
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/14/07	12/14/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Naing.Win
ENGINEER

REVIEWED BY: Harry
QC



Bandwidth Test Set-up