

FCC Part 15 Subpart C Requirement
Measurement and Test Report

For

Sanwa Electronic Instrument Co., Ltd

1-2-50, Yoshida Honmachi, Higashi-Osaka, Osaka 578-0982, Japan

FCC ID: L73EDFCDRI

February 26, 2013

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: EDFC Active Driver Unit
Test Engineer:	Daomen
Report Number:	SE13B-194F
Test Date:	February 20 to 23, 2013
Reviewed By:	 Karbon Y. Chung (Senior Manager) 
Prepared By:	S&E Technologies Laboratory Ltd Room 407, Block A Shennan Garden, Hi-Tech Industrial Park, Shenzhen 518057, P.R. China. Tel: 86-755-26636573, 26630631 Fax: 86-755-26630557

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of S&E Technologies Laboratory Ltd.

Table of Contents

1-TEST RESULT CERTIFICATION	3
2- EUT DESCRIPTION	4
3-TEST SYSTEM	5
3.1 TEST MODE	5
3.2 TEST SETUP DIAGRAM	5
3.3 BLOCK DIAGRAM OF EUT SYSTEM.....	5
3.4 LIST OF CABLES	5
4- TEST EQUIPMENT AND CALIBRATION	6
5- LABORATORY ACCREDITATIONS AND MEASUREMENT UNCERTAINTY	7
5.1 LABORATORY ACCREDITATION.....	7
5.2 MEASUREMENT UNCERTAINTY	7
6- TECHNICAL REQUIREMENTS AND RESULTS.....	8
6.1 RADIATED EMISSION MEASUREMENT	8

1- Test Result Certification

Applicant: Sanwa Electronic Instrument Co., Ltd
 1-2-50, Yoshida Honmachi, Higashi-Osaka, Osaka
 578-0982, Japan

Equipment Under Test: EDFC Active Driver Unit

Trade Mark: **EDFC**

Model Number.: EDC01-P7370

Type of Modulation: GFSK

Operation Frequency: 2405MHz, 2424MHz, 2449MHz, 2479MHz

Number of Channels: 4

Antenna Designation: Non-user replaceable (fixed)

Power Supply: DC12.0V [from a car battery]

Date of Test: February 20 to 23, 2013

Applicable Standards	
Standard	Test Result
FCC 47 CFR Part 15 Subpart C, §15.249	No non-compliance noted

We hereby certify that:

The above equipment was tested at laboratory of Guangdong Galanz Enterprises Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4-2003. The energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15C: 2007, §15.249.

The test results of this report relate only to the tested sample identified in this report.

2- EUT Description

Product Name:	EDFC Active Driver Unit
Trade Mark:	<i>EDFC</i>
Model Number:	EDC01-P7370
Model Difference:	N/A
Type of Modulation:::	GFSK
Frequency Range:	2405MHz, 2424MHz, 2449MHz, 2479MHz
Number of Channels:	4
Power Supply:	12.0V DC supplied by regulated DC power supply
Antenna Designation:	Non-user replaceable (fixed)

Remark: This submittal test report is intended for FCC ID: L73EDFCDR1 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

3-Test System

3.1 Test Mode

The compliance test was performed under test modes:

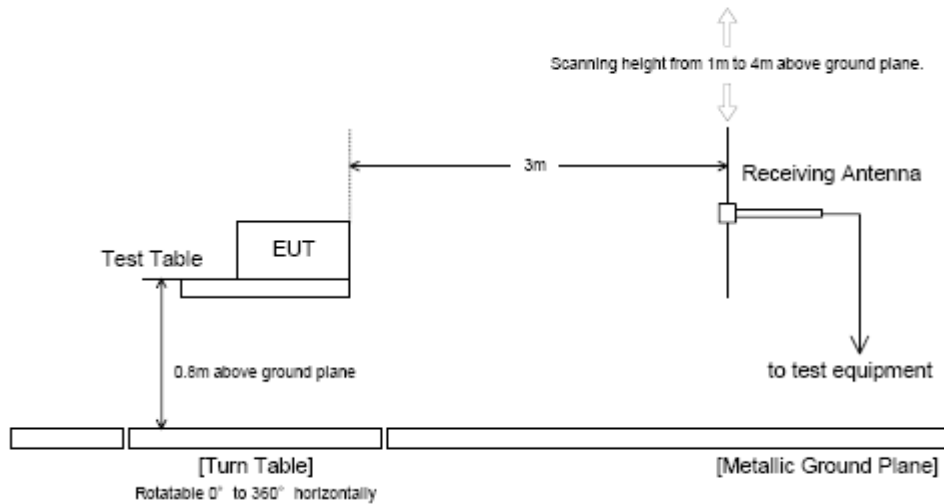
- Mode 1: Transmitting at 2405MHz.
- Mode 2: Transmitting at 2449MHz.
- Mode 3: Transmitting at 2479MHz.

The EUT is designed both of horizontally placed and vertically placed. In radiated emission measurement, each condition was conducted.

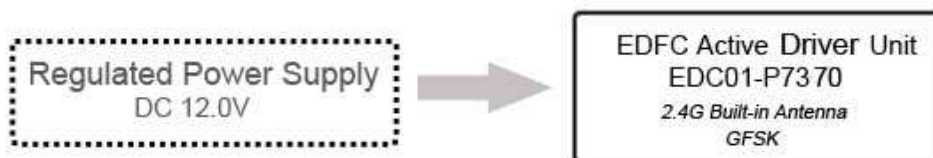
As a result, the below operation that produce the maximum emission were reported.
Radiated emission measurement --- Mode 1, Mode 2, Mode 3

3.2 Test Setup Diagram

. Radiated Emision



3.3 Block Diagram of EUT System



3.4 List of Cables

No	Cable Name	Shielded (Y/N)	Length (m)	Spec.	Remark
1	AWM2464	Y	0.15	20AWG 80°C 300V	For power supply and signal

4- Test Equipment and Calibration

Equipment type	Manufacturer	Model	Serial Number	Calibration Due
Biconilog Antenna	ETS	3142C	00042672	2013/09
Receiver	SCHAFFNER	SMR4503	11725	2013/07
Spectrum Analyzer	R/S	FSP30	100755	2013/11
Double-Ridged-Waveguide Horn Antenna	ETS	3115	6587	2013/08
Double-Ridged-Waveguide Horn Antenna	ETS	3160	00052486	2013/08
Amplifier	Agilent	83017A	MY39500438	2013/11
Band-pass Filter	Micro-Tronic	BRM50702	S/N-030	2013/11
DC Power Supply	Jiangbo	JB-305	A0412374	2013/10
HF Loop Antenna	TESEQ	HLA6120	26348	2013/10
Chamber	ETS	N/A	N/A	2013/05

5- Laboratory Accreditations and Measurement Uncertainty

5.1 Laboratory Accreditation

FCC-Registration No.: 580210

Guangdong Galanz Enterprises Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration no. 580210, Listing date November 28, 2012.

5.2 Measurement Uncertainty

of +/-4.5dB for Radiated Emissions

6- Technical Requirements and Results

6.1 Radiated Emission Measurement

Applicable Standard:

Fundamental and Harmonics Emission Limit

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency MHz	Field Strength of Fundamental (mV/m @3m) (dBuV/m @3m)		Field Strength of Harmonics (uV/m @3m) (dBuV/m @3m)	
2400-2483.5	50	94(Average) 114(Peak)	500	54(Average) 74(Peak)

General Radiated Emission Limit

According to §15.249(d), emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Procedure:

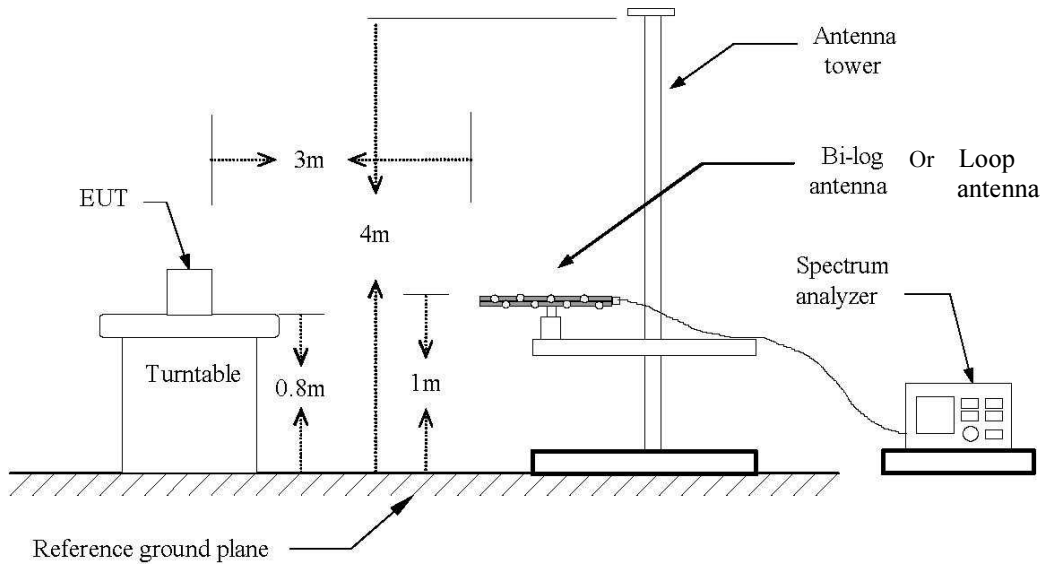
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measurement were completed.
7. Emissions were investigated to the 10th harmonic of the fundamental frequency.

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

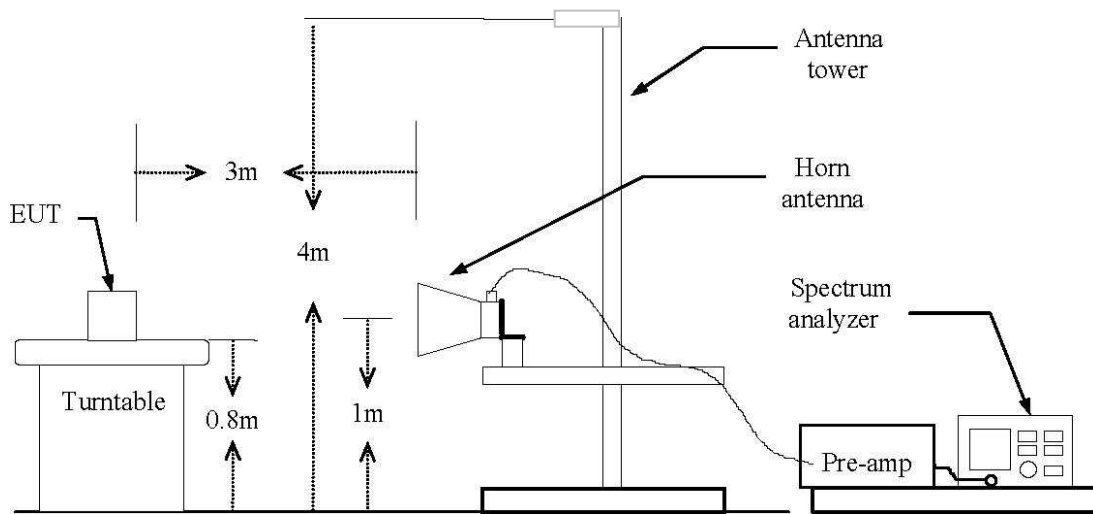
$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Test Configuration between 9K and 1 GHz:



Test Configuration above 1 GHz:



Test Results:

Temperature:	24°C
Humidity:	52%
EUT Operation:	Transmitting
Test Date:	February 21, 2013

Spurious Emission In the Frequency Rang 9KHz to 1GHz:

Fc= 2405MHz Transmitting Operation

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
30.30	H	QP	5.8	16.7	22.5	40.0	-17.5
191.94	H	QP	16.5	7.1	23.6	43.5	-19.9
30.06	V	QP	7.7	16.7	24.4	40.0	-15.6
144.00	V	QP	19.5	9.1	28.6	43.5	-14.9
192.00	V	QP	25.7	7.1	32.8	43.5	-10.7

Fc= 2449MHz Transmitting Operation

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
30.00	H	QP	5.4	16.7	22.1	40.0	-17.9
191.88	H	QP	17.4	7.1	24.5	43.5	-19.0
30.13	V	QP	8.6	16.7	25.3	40.0	-14.7
144.20	V	QP	19.3	9.1	28.4	43.5	-15.1
192.10	V	QP	26.6	7.1	33.7	43.5	-9.8

Fc= 2479MHz Transmitting Operation

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
30.00	H	QP	4.9	16.7	21.6	40.0	-18.4
191.90	H	QP	17.7	7.1	24.8	43.5	-18.7
30.08	V	QP	6.8	16.7	23.5	40.0	-16.5
144.00	V	QP	18.4	9.1	27.5	43.5	-16.0
192.20	V	QP	24.1	7.1	31.2	43.5	-12.3

Note: For emission measurement, the compliance tests were performed both of horizontally placed and vertically placed in EUT (X position, Y position, Z position). As a result, the data of operation mode that produce the maximum emission were reported. The other emissions are more than 20dB below the limit or the field strength is too small to be measured.

Spurious Emission In the Frequency Rang above 1GHz:

Fc= 2405MHz Transmitting Operation

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
2405.00	H	PK	96.34	-2.61	93.73	114.00	-20.27
2405.00	H	AV	71.71	-2.61	69.10	94.00	-24.90
2400.00	H	PK	69.77	-2.61	67.16	74.00	-6.84
2400.00	H	AV	39.18	-2.61	36.57	54.00	-17.43
4810.00	H	PK	52.77	0.92	53.69	74.00	-20.31
4810.00	H	AV	44.22	0.92	45.14	54.00	-8.86
2405.00	V	PK	99.44	-2.61	96.83	114.00	-17.17
2405.00	V	AV	73.85	-2.61	71.24	94.00	-22.76
2400.00	V	PK	70.88	-2.61	68.27	74.00	-5.73
2400.00	V	AV	39.73	-2.61	37.12	54.00	-16.88
4810.00	V	PK	52.13	0.92	53.05	74.00	-20.95
4810.00	V	AV	43.64	0.92	44.56	54.00	-9.44

Note: For emission measurement, the compliance tests were performed both of horizontally placed and vertically placed in EUT (X position, Y position, Z position). As a result, the data of operation mode that produce the maximum emission were reported. The other emissions are more than 20dB below the limit or the field strength is too small to be measured.

Fc= 2449MHz Transmitting Operation

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
2449.00	H	PK	95.79	-2.10	93.69	114.00	-20.31
2449.00	H	AV	72.79	-2.10	70.69	94.00	-23.31
2483.50	H	PK	50.88	-1.86	49.02	74.00	-24.98
2483.50	H	AV	31.63	-1.86	29.77	54.00	-24.23
4898.00	H	PK	53.86	0.92	54.78	74.00	-19.22
4898.00	H	AV	44.63	0.92	45.55	54.00	-8.45
2449.00	V	PK	99.92	-2.10	97.82	114.00	-16.18
2449.00	V	AV	77.61	-2.10	75.51	94.00	-18.49
2483.50	V	PK	51.85	-1.86	49.99	74.00	-24.01
2483.50	V	AV	31.65	-1.86	29.79	54.00	-24.21
4900.00	V	PK	52.95	0.92	53.87	74.00	-20.13
4900.00	V	AV	43.33	0.92	44.25	54.00	-9.75

Note: For emission measurement, the compliance tests were performed both of horizontally placed and vertically placed in EUT (X position, Y position, Z position). As a result, the data of operation mode that produce the maximum emission were reported. The other emissions are more than 20dB below the limit or the field strength is too small to be measured.

Fc= 2479MHz Transmitting Operation-11.34

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp.CF (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Margin (dB)
2479.00	H	PK	95.13	-1.90	93.23	114.00	-20.77
2479.00	H	AV	71.98	-1.90	70.08	94.00	-23.92
2483.50	H	PK	70.77	-1.86	68.91	74.00	-5.09
2483.50	H	AV	38.75	-1.86	36.89	54.00	-17.11
4958.00	H	PK	52.13	0.92	53.05	74.00	-20.95
4958.00	H	AV	43.25	0.92	44.17	54.00	-9.83
2479.00	V	PK	98.57	-1.90	96.67	114.00	-17.33
2479.00	V	AV	74.91	-1.90	73.01	94.00	-20.99
2483.50	V	PK	71.81	-1.86	69.95	74.00	-4.05
2483.50	V	AV	39.86	-1.86	38.00	54.00	-16.00
4958.00	V	PK	53.30	0.92	54.22	74.00	-19.78
4958.00	V	AV	43.29	0.92	44.21	54.00	-9.79

Note: For emission measurement, the compliance tests were performed both of horizontally placed and vertically placed in EUT (X position, Y position, Z position). As a result, the data of operation mode that produce the maximum emission were reported. The other emissions are more than 20dB below the limit or the field strength is too small to be measured.