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Report No.:SZEM130100046901  
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## FCC Test Report (Verification)

**Application No.:** SZEM1301000469IT  
**Applicant/Manufacturer/Factory:** Shenzhen Sopto Technology Co., LTD  
**Address of Applicant/Manufacturer/Factory:** RM222, Block 1, Energy Industrial Zone, Qianhai Road, Nanshan District, Shenzhen, China  
**Equipment Under Test (EUT):**  
EUT Name: Fiber Optical Transceiver  
Model No.: SFP, SFP-T, SFP+, CSFP, QSFP+, XFP ♣  
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.  
Trade mark: SOPTO  
**Standards:** 47 CFR PART 15,Subpart B:2012  
**Date of Receipt:** 2013-01-28  
**Date of Test:** 2013-02-26 to 2013-03-21  
**Date of Issue:** 2013-03-26

<b>Test Result :</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang  
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.



## 2 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 1GHz) §	47 CFR PART 15,Subpart B:2012	ANSI C63.4:2009	Class B	PASS
Conducted Emission (150kHz to 30MHz)	47 CFR PART 15,Subpart B:2012	ANSI C63.4:2009	Class B	PASS

§

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement Range (MHz)
Below 1.705	30
1.705 to 108	1000
108 to 500	2000
500 to 1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

Remark:

Model No.: SFP, SFP-T, SFP+, CSFP, QSFP+, XFP

Only the model SFP was tested, since the electrical circuit design, layout, component used and internal wiring were identical for the above samples, with only difference being the model name.



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## 4 General Information

### 4.1 Details of E.U.T.

Power Supply: Supply by switch  
Test voltage: AC 120V 60Hz

### 4.2 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
PC	DELL	DCSM
LCD-displaying	DELL	SP2208WFPt
KEYBOARD	DELL	SK-8115
MOUSE	Lenovo	MO28UOL
PC	IBM	8172
LCD-displaying	Lenovo	L1711pC
KEYBOARD	IBM	SK-8115
MOUSE	Lenovo	MO28UOA
Coder	HengTong ELECTRON	HT4000
Printer	Canon	BJC-1000SP
Power Supply (AC cable 20cm; DC cable 90cm; unshielded Input: AC 80-265V 50/60Hz 0.4A Output: DC 5V 2A)	Supply client	N/A
Ethernet Media Converter	Supply by client	SPM-ET2X-PX
Manageable Media Converter Fiber/T Transceiver	Supply by client	SPM-IMT23-PXL
Optical cable (310cm)	Supply by client	N/A
LAN (150cm unshielded)	Supply by SGS	N/A
Switch (AC cable: 150cm unshielded Input: AC 100-240V 50/60Hz)	Supply by client	CSC-2960



#### **4.3 Standards Applicable for Testing**

The customer requested FCC tests for Fiber Optical Transceiver.  
The standard used was 47 CFR PART 15, Subpart B

#### **4.4 Test Location**

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.  
518057.

Tel: +86 755 2601 2053      Fax: +86 755 2671 0594

No tests were sub-contracted.



#### **4.5 Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**  
CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.
- **VCCI**  
The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, T-1153 and C-2383 respectively.
- **FCC – Registration No.: 556682**  
SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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.: 556682.
- **Industry Canada (IC)**  
The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

#### **4.6 Deviation from Standards**

None.

#### **4.7 Abnormalities from Standard Conditions**

None.

## 5 Equipment List

RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2013-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2013-05-17
3	EMI Test software	AUDIX	E3	SEL0050	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2013-05-29
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2013-10-24
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2013-05-17
7	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2013-10-24
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2013-10-24
9	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2013-10-24
10	Band filter	Amindeon	Asi 3314	SEL0094	2013-05-17
11	Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2013-10-24

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2013-06-10
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2013-10-24
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2013-05-17
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2013-11-10
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2013-11-10
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2013-11-10
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2013-05-17
8	Coaxial Cable	SGS	N/A	SEL0025	2013-05-29



General used equipment					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0102 to SEL0103	2013-10-24
2	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0101	2013-10-24
3	Barometer	ChangChun	DYM3	SEL0088	2013-05-17





## 6 Test Results

### 6.1 Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement:	47 CFR PART 15, Subpart B
Test Method:	ANSI C63.4
Frequency Range:	150kHz to 30MHz
Class / Severity:	Class B
Limit:	
0.15M-0.5MHz	66dB(dB $\mu$ V)-56dB(dB $\mu$ V) quasi-peak, 56dB(dB $\mu$ V)-46dB(dB $\mu$ V) average
0.5M-5MHz	56dB(dB $\mu$ V) quasi-peak, 46dB(dB $\mu$ V) average
5M-30MHz	60dB(dB $\mu$ V) quasi-peak, 50dB(dB $\mu$ V) average
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

#### 6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 26.0 °C      Humidity: 50% RH      Atmospheric Pressure: 1015 mbar

EUT Operation: Test the EUT in Communicate with PC & optical fiber port mode, build the connection between the EUT and internet through optical fiber port, keep linking with file server, connect the EUT and PC by RJ45, keep data exchanging.

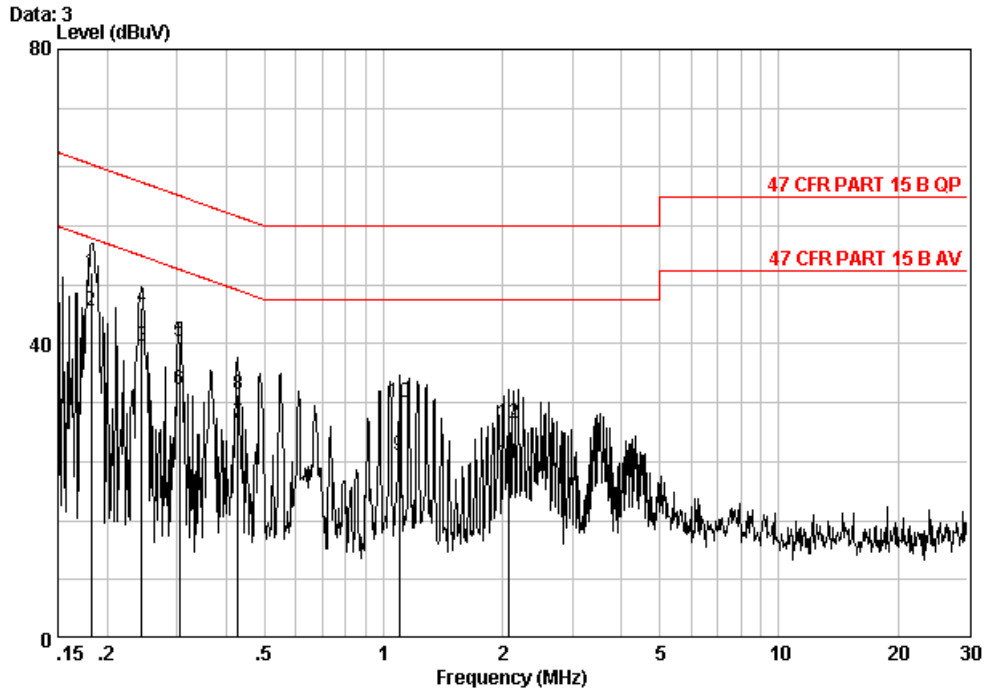
#### 6.1.2 Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



Live line

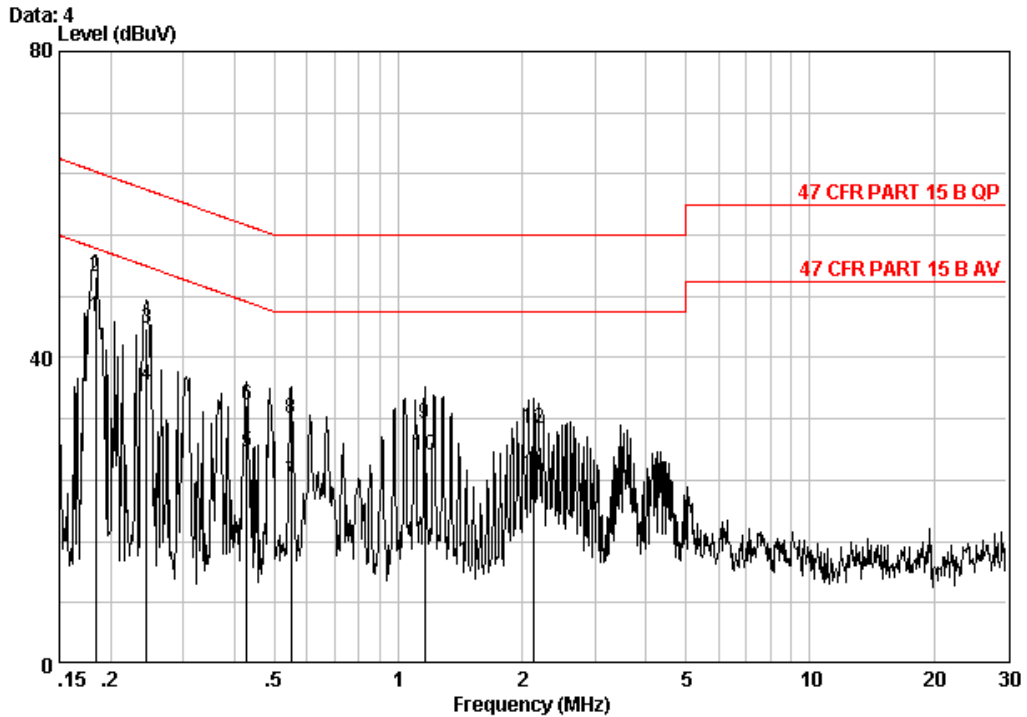


Site : Shielding Room  
Condition : 47 CFR PART 15 B QP CE LINE  
Job No. : 0469IT  
Mode : Communicate with PC & Optical fiber port

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18249	0.02	9.70	39.88	49.60	64.37	-14.77	QP
2	0.18249	0.02	9.70	34.81	44.53	54.37	-9.84	Average
3	0.24422	0.02	9.70	30.05	39.77	51.95	-12.18	Average
4	0.24422	0.02	9.70	35.24	44.96	61.95	-17.00	QP
5	0.30509	0.01	9.71	30.69	40.41	60.10	-19.70	QP
6	0.30509	0.01	9.71	24.16	33.88	50.10	-16.22	Average
7	0.42825	0.01	9.80	19.43	29.24	47.29	-18.04	Average
8	0.42825	0.01	9.80	23.36	33.17	57.29	-24.12	QP
9	1.094	0.02	9.80	15.03	24.85	46.00	-21.15	Average
10	1.094	0.02	9.80	22.32	32.14	56.00	-23.86	QP
11	2.077	0.02	9.80	13.92	23.75	46.00	-22.25	Average
12	2.077	0.02	9.80	19.38	29.20	56.00	-26.80	QP



Neutral line



Site : Shielding Room  
Condition : 47 CFR PART 15 B QP CE NEUTRAL  
Job No. : 0469IT  
Mode : Communicate with PC & Optical fiber port

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18346	0.02	9.70	35.69	45.41	54.33	-8.92	Average
2	0.18346	0.02	9.70	40.76	50.48	64.33	-13.85	QP
3	0.24422	0.02	9.70	34.01	43.73	61.95	-18.23	QP
4	0.24422	0.02	9.70	26.73	36.45	51.95	-15.50	Average
5	0.42825	0.01	9.80	17.96	27.77	47.29	-19.51	Average
6	0.42825	0.01	9.80	23.96	33.77	57.29	-23.51	QP
7	0.54934	0.01	9.80	14.02	23.83	46.00	-22.17	Average
8	0.54934	0.01	9.80	22.27	32.09	56.00	-23.91	QP
9	1.160	0.02	9.80	21.65	31.47	56.00	-24.53	QP
10	1.160	0.02	9.80	17.38	27.20	46.00	-18.80	Average
11	2.133	0.02	9.81	14.84	24.66	46.00	-21.34	Average
12	2.133	0.02	9.81	20.88	30.71	56.00	-25.29	QP



## 6.2 Radiated Emissions, 30MHz to 1GHz

Test Requirement: 47 CFR PART 15, Subpart B  
Test Method: ANSI C63.4  
Frequency Range: 30MHz to 1GHz  
Measurement Distance: 3m  
Class: Class B  
Limit: 40.0 dB $\mu$ V/m between 30MHz & 88MHz  
43.5 dB $\mu$ V/m between 88MHz & 216MHz  
46.0 dB $\mu$ V/m between 216MHz & 960MHz  
54.0 dB $\mu$ V/m above 960MHz  
Detector: Peak for pre-scan (120kHz resolution bandwidth)  
Quasi-Peak if maximised peak within 6dB of limit

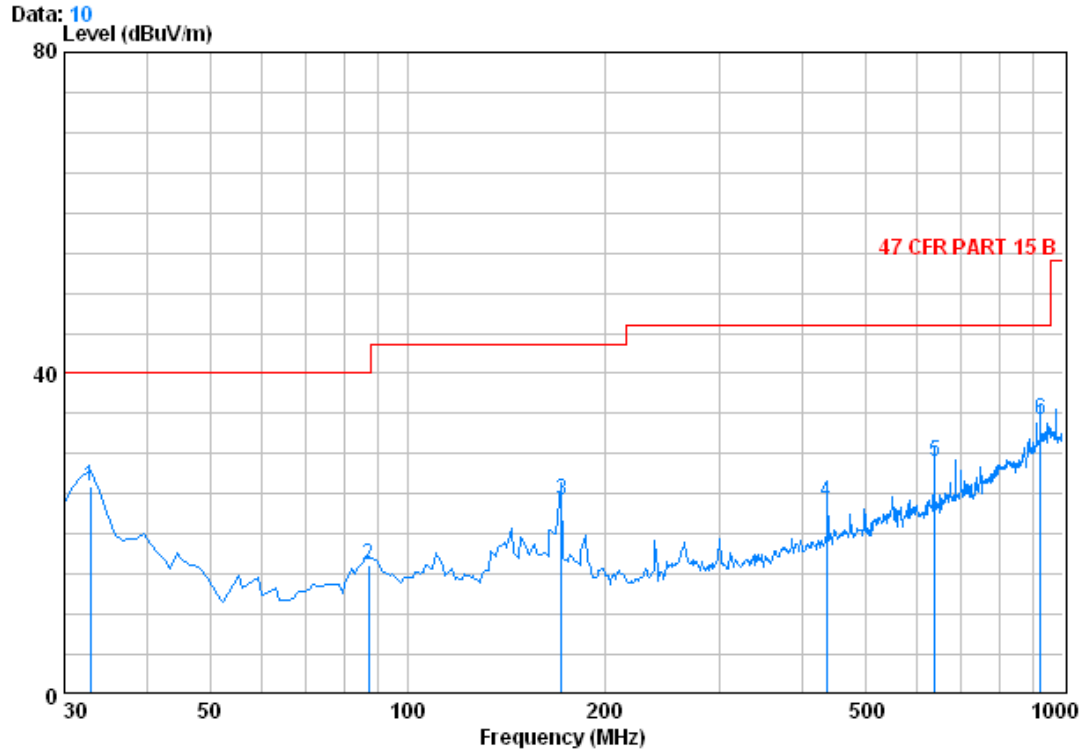
### 6.2.1 E.U.T. Operation

Operating Environment:  
Temperature: 24.0 °C Humidity: 50% RH Atmospheric Pressure: 1020 mbar  
EUT Operation: Test the EUT in Communicate with PC & optical fiber port mode, build the connection between the EUT and internet through optical fiber port, keep linking with file server, connect the EUT and PC by RJ45, keep data exchanging.

### 6.2.2 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

Horizontal



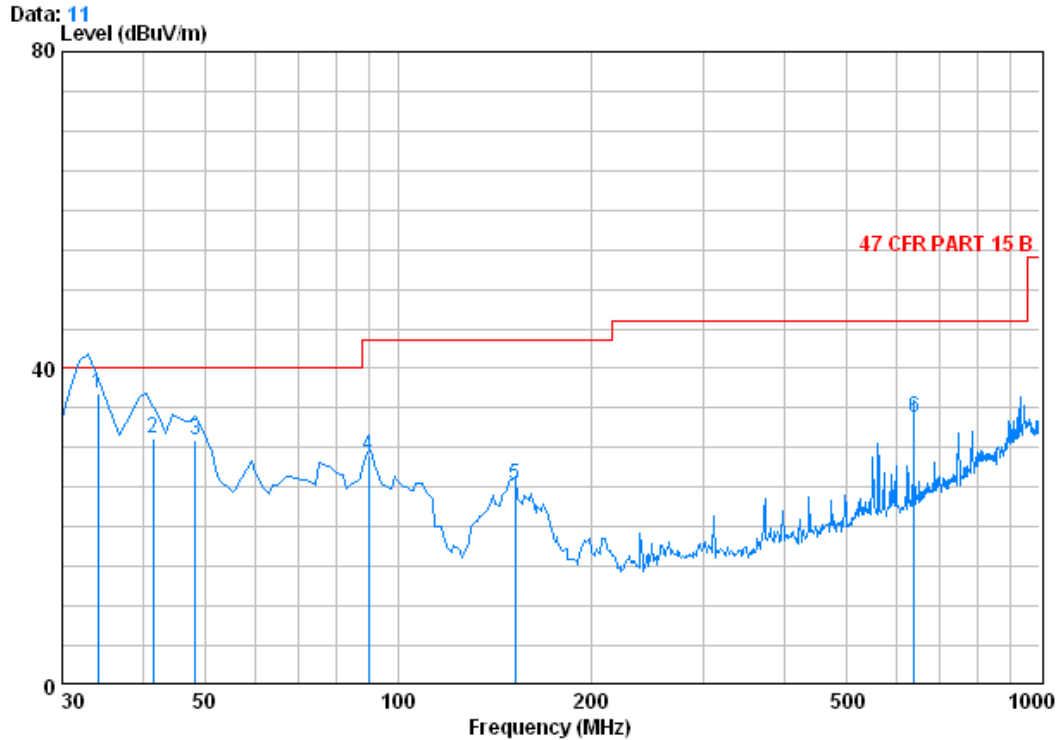
Condition : 47 CFR PART 15 B 3m 3142C NEW HORIZONTAL  
Job No. : 0469IT  
Mode : Communicate with PC & Optical fiber port

	Freq MHz	CableAntenna		Preamp Factor dB	Read Level dBuV	Limit Level dBuV/m	Over Line dBuV/m	Over Limit dB
		Loss dB	Factor dB/m					
1	32.910	0.60	15.60	27.35	37.11	25.96	40.00	-14.04
2	87.230	1.10	5.99	27.22	36.36	16.23	40.00	-23.77
3	171.620	1.36	8.73	26.81	41.00	24.27	43.50	-19.23
4	436.430	2.36	12.23	27.35	36.79	24.02	46.00	-21.98
5	637.220	2.78	15.75	27.49	37.90	28.94	46.00	-17.06
6	924.340	3.63	20.73	26.64	36.46	34.18	46.00	-11.82





Vertical



Condition : 47 CFR PART 15 B 3m 3142C NEW VERTICAL  
Job No. : 0469IT  
Mode : Communicate with PC & Optical fiber port

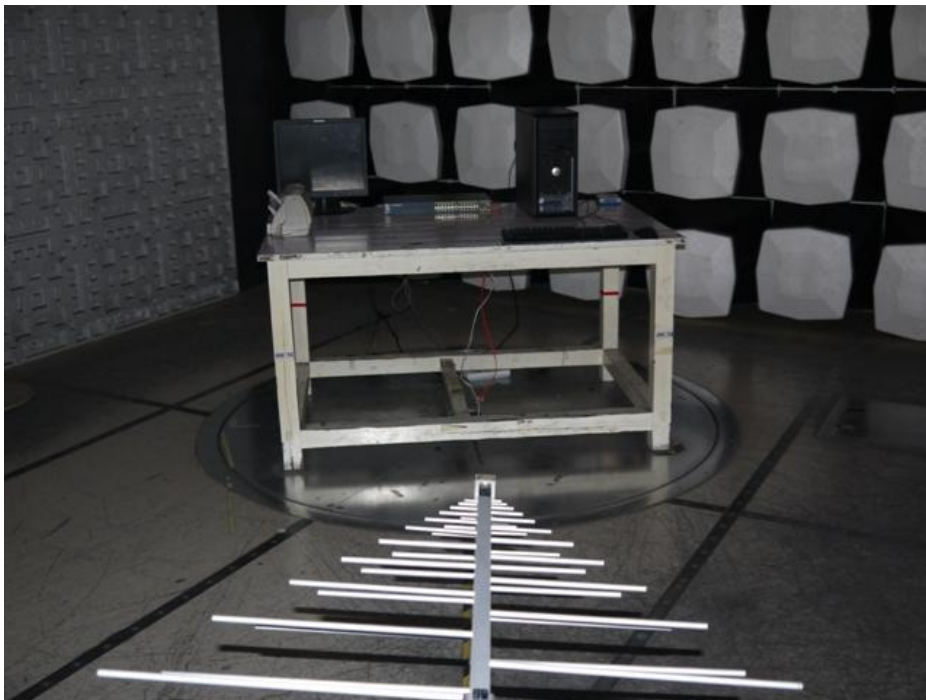
	Freq	Cable Loss	Antenna Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	34.144	0.60	14.58	27.34	49.00	36.83	40.00	-3.17
2	41.600	0.63	10.81	27.31	47.00	31.13	40.00	-8.87
3	48.430	0.77	8.18	27.29	49.24	30.90	40.00	-9.10
4	90.140	1.10	6.05	27.21	49.01	28.96	43.50	-14.54
5	152.220	1.32	9.43	26.90	41.49	25.34	43.50	-18.16
6	637.220	2.78	15.75	27.49	42.86	33.90	46.00	-12.10

## 7 Photographs

### 7.1 Conducted Emission Test Setup



### 7.2 Radiated Emission Test Setup



### 7.3 EUT Constructional Details

