

	ESTECH Co., Ltd. Rm 1015, World Venture Center II, 426-5 Gasan-dong, Guncheon-gu, Seoul, 158-803, Korea	  	Electromagnetic Interference Test Report

Test Report for FCC

FCC ID:TKWBST2ROC

Report Number		ESTF151104-004			
Applicant	Company name	Suprema Inc.			
	Address	16F Parkview Office Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea			
	Telephone	82-31-783-4505			
Product	Product name	FINGERPRINT SYSTEM			
	Model No.	BST2R-OC	Manufacturer	Suprema Inc.	
	Serial No.	NONE	Country of origin	KOREA	
Test date	2011-04-06		Date of issue	25-Apr-11	
Testing location	ESTECH Co., Ltd. 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea				
Standard	FCC PART 15 2010 , ANSI C 63.4 2003				
Test item	☒ Conducted Emission	☐ Class A	☒ Class B	Test result	OK
	☒ Radiated Emission	☐ Class A	☒ Class B	Test result	OK
Measurement facility registration number		94696			
Tested by	Engineer S.B.LEE  (Signature)				
Reviewed by	Engineering Manager J.M.Yang  (Signature)				
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable				
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned					

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1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Rm 1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, Korea
(Safety & Telecom. Test Lab)

EMC Test Lab : 58-1 Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea
97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

1.3 Official Qualification(s)

KCC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Product Name : FINGERPRINT SYSTEM
 Model Number : BST2R-OC
 Serial Number : NONE
 Manufacturer : Suprema Inc.
 Country of origin : KOREA
 Rating : 1. Input : (100 – 240) Va.c., 1.0 A (50 – 60) Hz
 EUT input : 12 Vd.c., 2.5 A
 2. POE : Power over Ethernet
 Receipt Date : 30-Mar-11
 X-tal lists : 24.576 MHz, 25.00 MHz, 48.00 MHz, 27.00 MHz, 20.00MHz, 16.00MHz, 12.00MHz*3ea

2.2 General descriptions of EUT

- CPU : Main B/D CPU - ARM11 667MHz (Samsung S3C6410-667) X 1ea
 Sensor B/D CPU - DSP 400MHz (ADI BP531-400) X 1ea
- Memory : Main B/D - Flash : Nand MLC 1GByte + Nor 1MByte, SDRAM(mDDR) : 256MByte
 Sensor B/D - Flash : SPI 512Kbyte, SDRAM : 32MByte
- DISPLAY : 5inch WVGA TFT LCD (800 X 480) X 1ea
- LED : 3-Color LED X 2ea
- INPUT : Touch Screen X 1ea + 5 Keypad (F1~F4, CALL)
- CAMERA : 1.3M CMOS Camera X 1ea
- I/O Port : Wiegand In/Out
 Switch Input X 4ch
 RS-485 X 2ch
 RS-232(Share with RS-485) X 1ch
 Relay(1A@30Vdc) X 2ch
 Ethernet(10/100M) X 1ch
- Sound Out: System Sound Speaker X 2ea
- RF CARD : Mifare / EM
- Fingerprint Sensor : OC Sensor Model
- Power Input : 12Vdc Adaptor or POE Input

3. Test Standards

Test Standard : FCC PART 15 (2010)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.4 (2003)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units.

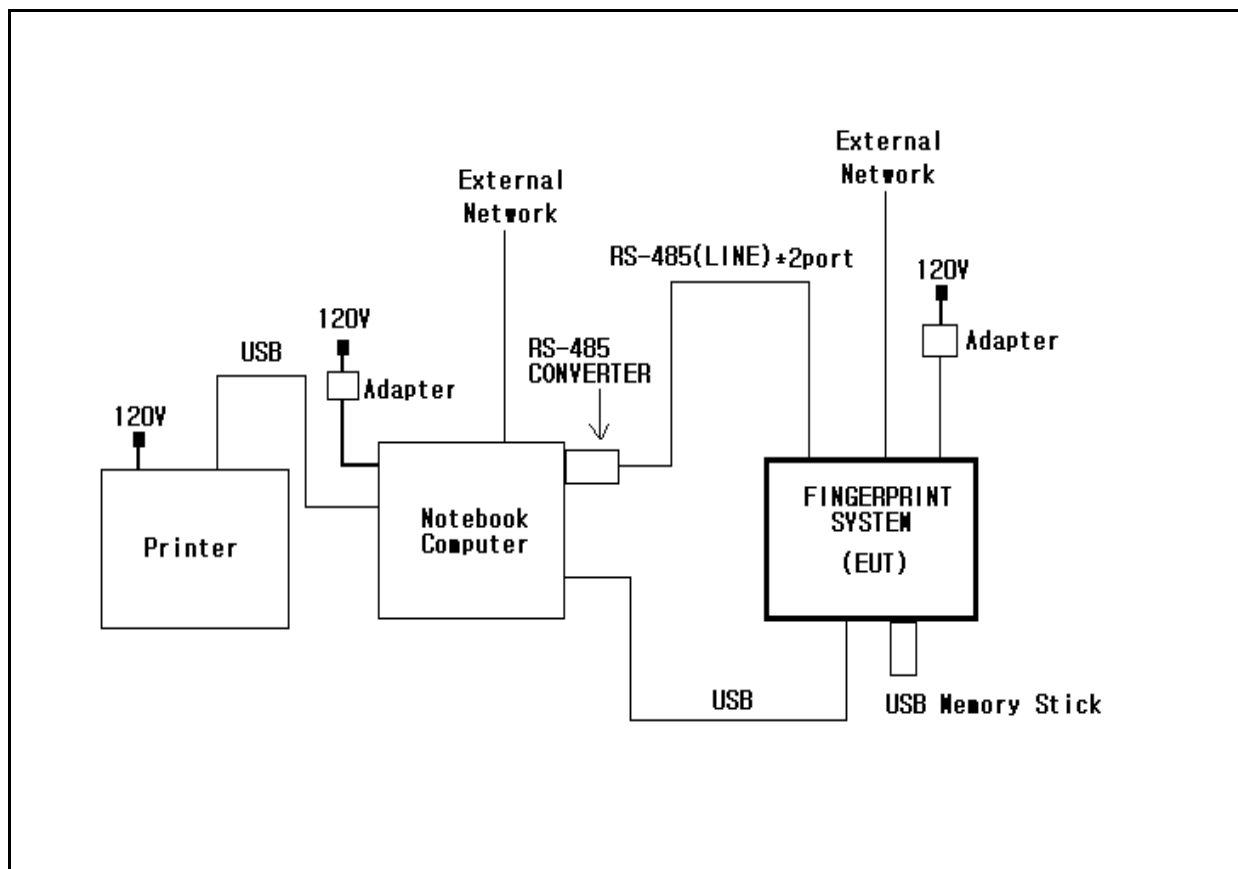
4. Measurement Condition (Test Mode : Adapter)

4.1 EUT Operation.

1. Check to normal mode operation
2. Connect the EUT with Note PC and external network.
3. Check normal communication status by Note PC's RS-232 port.
4. Using ping command between external Network, Transmission and Receiving test at between external Network.

Note : To meet the radiated emission , ring ferrite core(Type:28b1417-200) was added at Lan & RS-485(Line) port.

4.2 Configuration and Peripherals (Test Mode : Adapter)



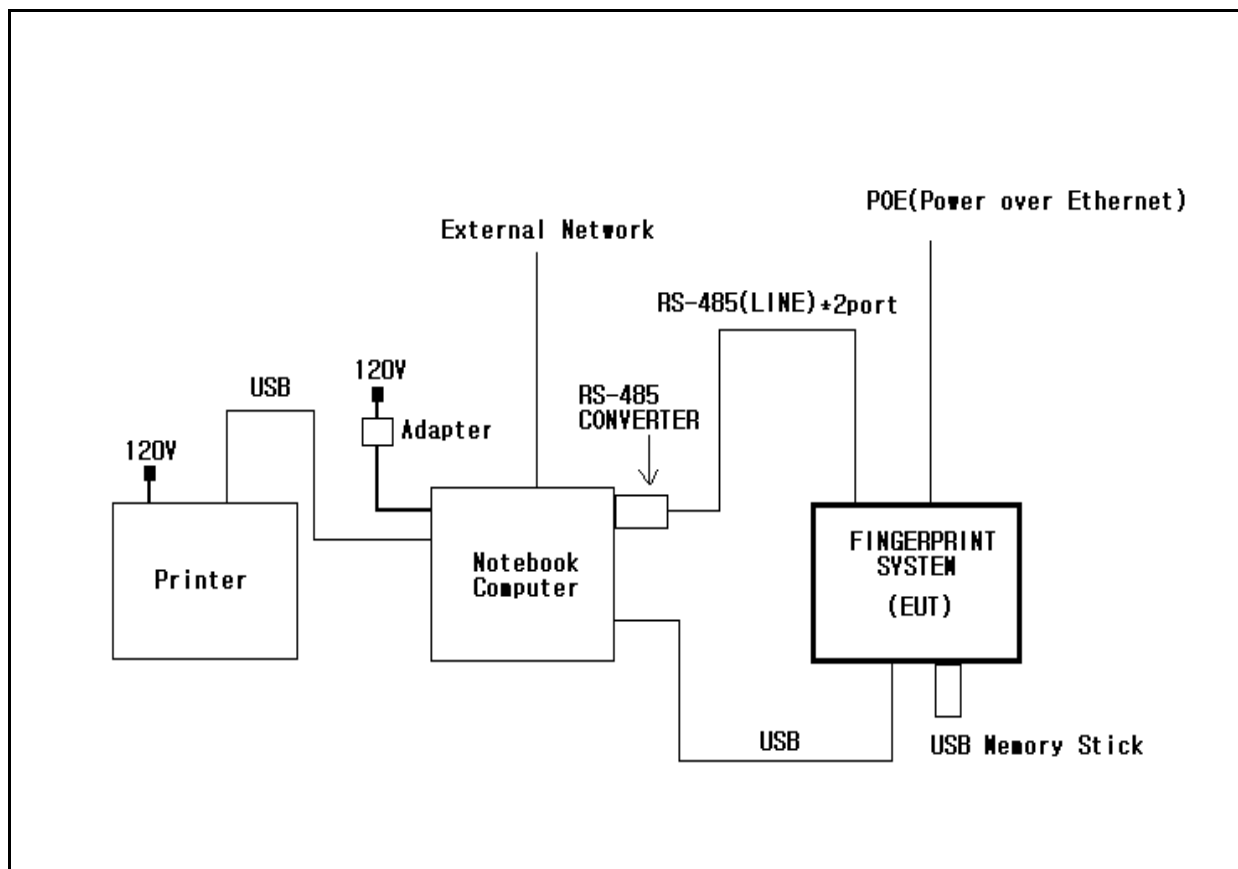
4. Measurement Condition (Test Mode : POE)

4.1 EUT Operation.

1. Check to normal mode operation
2. Connect the EUT with Note PC and external network.
3. Check normal communication status by Note PC's RS-232 port.
4. Using ping command between external Network, Transmission and Receiving test at between external

Note : To meet the radiated emission , ring ferrite core(Type:28b1417-200) was added at Lan & RS-485(Line) port.

4.2 Configuration and Peripherals (Test Mode : POE)



4.3 EUT and Support equipment (Test Mode : Adapter)

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
FINGERPRINT SYSTEM	BST2R-OC	NONE	Suprema Inc.	EUT
Adapter	JPW128	KA1200N05	AULT KOREA Corp.	
RS-485 CONVERTER	TCC-80	azwNG1100053	Moxa Technologies Co., Ltd.	
Notebook Computer	GW687AV	CNU0295R8D	HEWLETT-PACKARD COMPANY	
Adapter	PPP009D	WBGSV0ADDZ303R	DELTA ELECTRONICS (JIANG SU), LTD.	
USB Memory Stick	NONE	NONE	NONE	
Printer	K10229	NONE	CANON VIETNAM CO.,LTD.	

4.4 Cable Connecting (Test Mode : Adapter)

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
FINGERPRINT SYSTEM	POWER	Adapter	—	1	N	
FINGERPRINT SYSTEM	USB	USB Memory Stick	USB	—	—	
FINGERPRINT SYSTEM	USB	Notebook Computer	USB	2	Y	
FINGERPRINT SYSTEM	RS-485*2port(LINE)	RS-485 CONVERTER	RS-485*2port(LINE)	3	N	
FINGERPRINT SYSTEM	RS-232(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	SWITCH(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	WIEGAND(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	VIDEOPHONE(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	Relay*2port(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	LAN	External Network	LAN	20	N	
Notebook Computer	Serial	RS-485 CONVERTER	Serial	—	—	
Notebook Computer	LAN	External Network	LAN	20	N	
Notebook Computer	POWER	Adapter	—	2	N	
Notebook Computer	USB	Printer	USB	2	Y	

4.3 EUT and Support equipment (Test Mode : POE)

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
FINGERPRINT SYSTEM	BST2R-OC	NONE	Suprema Inc.	EUT
RS-485 CONVERTER	TCC-80	azwNG1100053	Moxa Technologies Co., Ltd.	
Notebook Computer	GW687AV	CNU0295R8D	HEWLETT-PACKARD COMPANY	
Adapter	PPP009D	WBGSV0ADDZ3O3R	DELTA ELECTRONICS (JIANG SU), LTD.	
USB Memory Stick	NONE	NONE	NONE	
Printer	K10229	NONE	CANON VIETNAM CO.,LTD.	

4.4 Cable Connecting (Test Mode : POE)

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
FINGERPRINT SYSTEM	POE(Power over Ethernet)	Prosafe Switch With POE	POE(Power over Ethernet)	20	N	
FINGERPRINT SYSTEM	USB	USB Memory Stick	USB	—	—	
FINGERPRINT SYSTEM	USB	Notebook Computer	USB	2	Y	
FINGERPRINT SYSTEM	RS-485*2port(LINE)	RS-485 CONVERTER	RS-485*2port(LINE)	3	N	
FINGERPRINT SYSTEM	RS-232(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	SWITCH(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	WIEGAND(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	VIDEOPHONE(LINE)	—	—	3	N	Termination
FINGERPRINT SYSTEM	Relay*2port(LINE)	—	—	3	N	Termination
Notebook Computer	Serial	RS-485 CONVERTER	Serial	—	—	
Notebook Computer	LAN	External Network	LAN	20	N	
Notebook Computer	POWER	Adapter	—	2	N	
Notebook Computer	USB	Printer	USB	2	Y	

5. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2010) & ANSI C 63.4 (2003). The test setup was made according to FCC Part 15 (2010) & ANSI C 63.4 (2003) on an open test site, which allows a 3 m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

5.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
Receiver	ESVS10	Rohde & Schwarz	838562/002	27-Jan-12
Spectrum Analyzer	R3273	ADVANTEST	110600592	27-Jan-12
Logbicon Antenna	VULB9160	Schwarzbeck	3142	19-May-11
Horn Antenna	BBHA 9120 D	Schwarzbeck	352	14-Jul-12
PREAMPLIFIER	8449B	Sonoma Instrument	3008A00581	27-Aug-11
Amplifier	8447F	HP	2805A02972	27-Jan-12
Turn Table	2087	EMCO	2129	–
Antenna Mast	2070-01	EMCO	9702-203	–
ANT Mast Controller	2090	EMCO	1535	–
Turn Table Controller	2090	EMCO	1535	–

5.2 Environmental Condition

Test Place : Open site(3 m)

Test Mode : Adapter

Temperature (°C) : 15 °C

Humidity (% R.H.) : 57 % R.H.

Test Mode : POE

Temperature (°C) : 10 °C

Humidity (% R.H.) : 59 % R.H.

5.3 Test data (Below 1 GHz) <Test Mode:Adapter>

Test Date : 6-Apr-11

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
30.00	15.40	V	1.0	10.44	0.9	40.0	26.72	-13.28
45.77	16.70	H	4.0	11.84	1.0	40.0	29.56	-10.44
72.04	16.50	H	4.0	9.40	1.3	40.0	27.21	-12.80
112.56	13.50	H	3.5	10.21	1.6	43.5	25.36	-18.14
133.01	17.70	V	1.0	11.87	1.9	43.5	31.43	-12.07
152.83	18.20	H	3.0	12.75	2.0	43.5	32.95	-10.55
224.99	16.90	H	2.0	10.62	2.6	46.0	30.09	-15.91
234.01	15.60	H	2.0	11.18	2.6	46.0	29.42	-16.58
240.02	12.20	V	1.0	11.48	2.7	46.0	26.37	-19.63
274.99	15.20	V	1.0	12.75	3.0	46.0	31.00	-15.00
316.66	15.70	V	1.0	13.91	3.4	46.0	32.98	-13.02
383.34	13.00	V	1.0	15.42	3.9	46.0	32.31	-13.69
405.52	14.60	H	1.1	15.90	4.1	46.0	34.56	-11.44
450.00	14.00	H	1.0	16.80	4.5	46.0	35.29	-10.71
516.63	8.40	H	1.0	18.20	4.9	46.0	31.49	-14.51
624.00	13.20	H	1.0	20.41	5.6	46.0	39.24	-6.76
Remark	H : Horizontal, V : Vertical *There is no detected Radiated Emission above 1 GHz *CL = Cable Loss-Amplifier Gain(In case of above1000 Mhz) *CL = Cable Loss(In case of below1000 Mhz) *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection at frequency below 1 GHz. *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10Hz for average detection at frequency above 1 GHz.							

5.3 Test data (Below 1 GHz) <Test Mode : POE>

Test Date : 6-Apr-11

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
30.41	18.60	V	1.0	10.45	0.9	40.0	29.94	-10.06
50.01	20.20	H	4.0	12.00	1.1	40.0	33.29	-6.71
120.02	14.40	H	4.0	10.91	1.8	43.5	27.07	-16.43
143.99	7.20	H	3.7	12.50	2.0	43.5	21.70	-21.80
166.64	9.50	H	3.4	12.43	2.2	43.5	24.08	-19.42
219.68	12.20	H	3.2	12.16	2.5	46.0	26.89	-19.11
224.98	12.90	V	1.0	10.62	2.6	46.0	26.08	-19.92
230.26	14.40	H	3.0	10.99	2.6	46.0	28.00	-18.00
240.00	12.20	H	3.0	11.48	2.7	46.0	26.37	-19.63
320.78	11.10	V	1.0	14.01	3.4	46.0	28.52	-17.48
405.49	13.50	V	1.0	15.90	4.1	46.0	33.46	-12.54
545.97	17.20	H	2.4	18.89	5.2	46.0	41.26	-4.74
597.98	6.70	V	1.0	20.10	5.5	46.0	32.25	-13.75
623.96	11.70	V	1.0	20.41	5.6	46.0	37.74	-8.26
675.97	7.00	V	1.0	20.98	6.1	46.0	34.11	-11.89
Remark	H : Horizontal, V : Vertical *There is no detected Radiated Emission above 1 GHz *CL = Cable Loss-Amplifier Gain(In case of above1000 Mhz) *CL = Cable Loss(In case of below1000 Mhz) *The resolution bandwidth and video bandwidth of test receiver/sp							

5.3 Test data(Above 1 GHz)–Adapter mode

Test Date : 6-Apr-11

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
1290.00	50.40	H	1.5	24.78	−35.4	74.0	39.75	−34.25
1290.00	53.28	V	1.0	24.78	−35.4	74.0	42.63	−31.37
1496.00	50.10	H	1.5	25.20	−35.1	74.0	40.25	−33.75
1496.00	53.42	V	1.5	25.20	−35.1	74.0	43.57	−30.43
1992.00	52.42	H	1.2	26.01	−34.9	74.0	43.55	−30.45
1992.00	53.67	V	1.5	26.01	−34.9	74.0	44.80	−29.20
2988.00	53.17	H	1.2	28.20	−34.9	74.0	46.52	−27.48
2988.00	51.84	V	1.0	28.20	−34.9	74.0	45.19	−28.81
Average(RBW:1 MHz VBW:10 Hz)								
1290.00	32.04	H	1.5	24.78	−35.4	54.0	21.39	−32.61
1290.00	34.04	V	1.2	24.78	−35.4	54.0	23.39	−30.61
1496.00	35.02	H	1.5	25.20	−35.1	54.0	25.17	−28.83
1496.00	35.20	V	1.2	25.20	−35.1	54.0	25.35	−28.65
1992.00	34.12	H	1.0	26.01	−34.9	54.0	25.25	−28.75
1992.00	31.02	V	1.4	26.01	−34.9	54.0	22.15	−31.85
2988.00	31.02	H	1.0	28.20	−34.9	54.0	24.37	−29.63
2988.00	33.01	V	1.0	28.20	−34.9	54.0	26.36	−27.64
Remark	H : Horizontal, V : Vertical *CL = Cable Loss–Amplifier Gain(In case of above1000 MHz) *CL = Cable Loss(In case of below1000 MHz) *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10Hz for average detection atfrequency above 1 GHz.							

6. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC Part 15 (2010) & ANSI C 63.4 (2003). The test setup was made according to FCC Part 15 (2010) & ANSI C 63.4 (2003) in a shielded Room. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m. The test receiver with Quasi Peak detector complies with CISPR 16.

6.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESPI7	Rohde & Schwarz	100185	24-Aug-11
LISN	ESH3-Z5	Rohde & Schwarz	838979/010	27-Jan-12
LISN	ENV 216	Rohde & Schwarz	101231	13-Aug-11
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	27-Jan-12

6.2 Environmental Condition

Test Place : Shielded Room
 Temperature (°C) : 20 °C
 Humidity (% R.H.) : 43 % R.H.

6.3 Test data (Test Mode : Adapter)

Test Date : 6-Apr-11

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisp (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.16	0.00	0.2	N	65.67	36.60	36.82	55.67	32.60	32.82
0.19	0.03	0.2	N	63.86	38.75	38.99	53.86	36.61	36.85
0.20	0.03	0.2	H	63.82	39.82	40.06	53.82	39.25	39.49
0.26	0.08	0.2	H	61.50	33.62	33.90	51.50	31.45	31.73
0.32	0.09	0.2	H	59.84	34.60	34.88	49.84	28.05	28.33
0.36	0.11	0.2	N	58.73	41.61	41.90	48.73	41.49	41.78
0.95	0.24	0.2	N	56.00	45.21	45.69	46.00	35.86	36.34
1.08	0.23	0.2	N	56.00	40.80	41.28	46.00	40.62	41.10
2.16	0.33	0.4	N	56.00	40.92	41.62	46.00	40.97	41.67
2.88	0.56	0.4	N	56.00	41.14	42.13	46.00	41.26	42.25
3.60	0.80	0.5	N	56.00	40.68	41.97	46.00	40.63	41.92
4.32	1.03	0.6	N	56.00	41.33	42.91	46.00	39.89	41.47
10.31	1.75	1.0	H	60.00	42.99	45.70	50.00	40.00	42.71
10.37	1.75	1.0	N	60.00	43.28	45.99	50.00	38.71	41.42
10.95	1.72	1.0	H	60.00	43.85	46.57	50.00	40.19	42.91
11.53	1.69	1.0	N	60.00	44.61	47.33	50.00	41.60	44.32
12.37	1.64	1.1	N	60.00	44.09	46.82	50.00	41.21	43.94
14.04	1.55	1.2	N	60.00	43.35	46.09	50.00	34.09	36.83
Remark	H : Hot Line, N : Neutral Line								

7. Photographs of test setup (Test Mode : Adapter)

7.1 Setup for Radiated Test

[Front]



[Rear]



7. Photographs of test setup (Test Mode : POE)

7.1 Setup for Radiated Test

[Front]



[Rear]



7.2 Setup for Radiated Test : Above 1 GHz

[Front]



[Rear]



7.3 Setup for Conducted Test : 0.15 MHz ~ 30 MHz

[Front]



[Rear]



8. Photographs of EUT

[Front]



[Rear]



8.1 Photographs of EUT

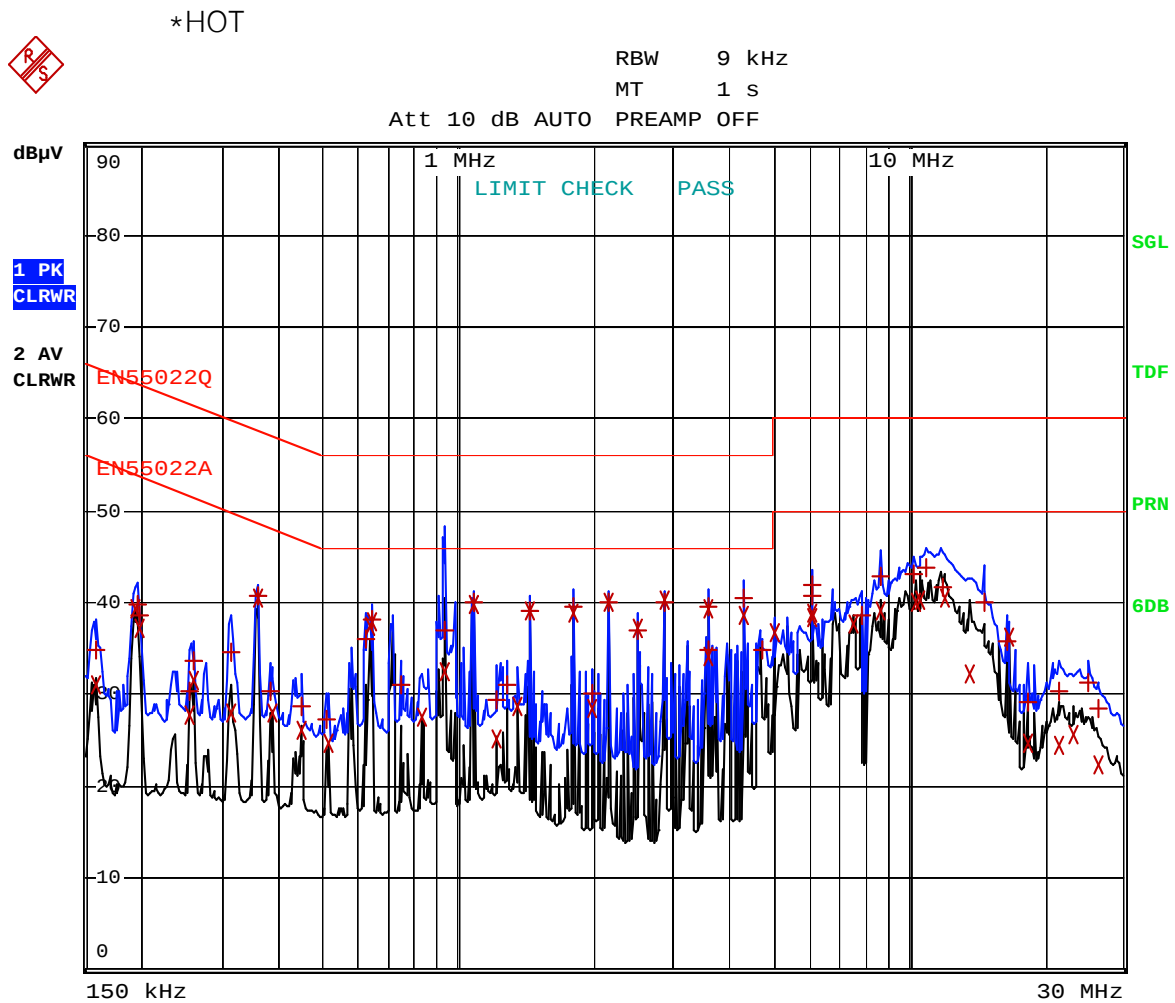
[Front]



[Label]



Appendix 1. Spectral diagram



Comment: BioStation T2 (BST2R-OC)_HOT
Date: 6.APR.2011 18:11:05

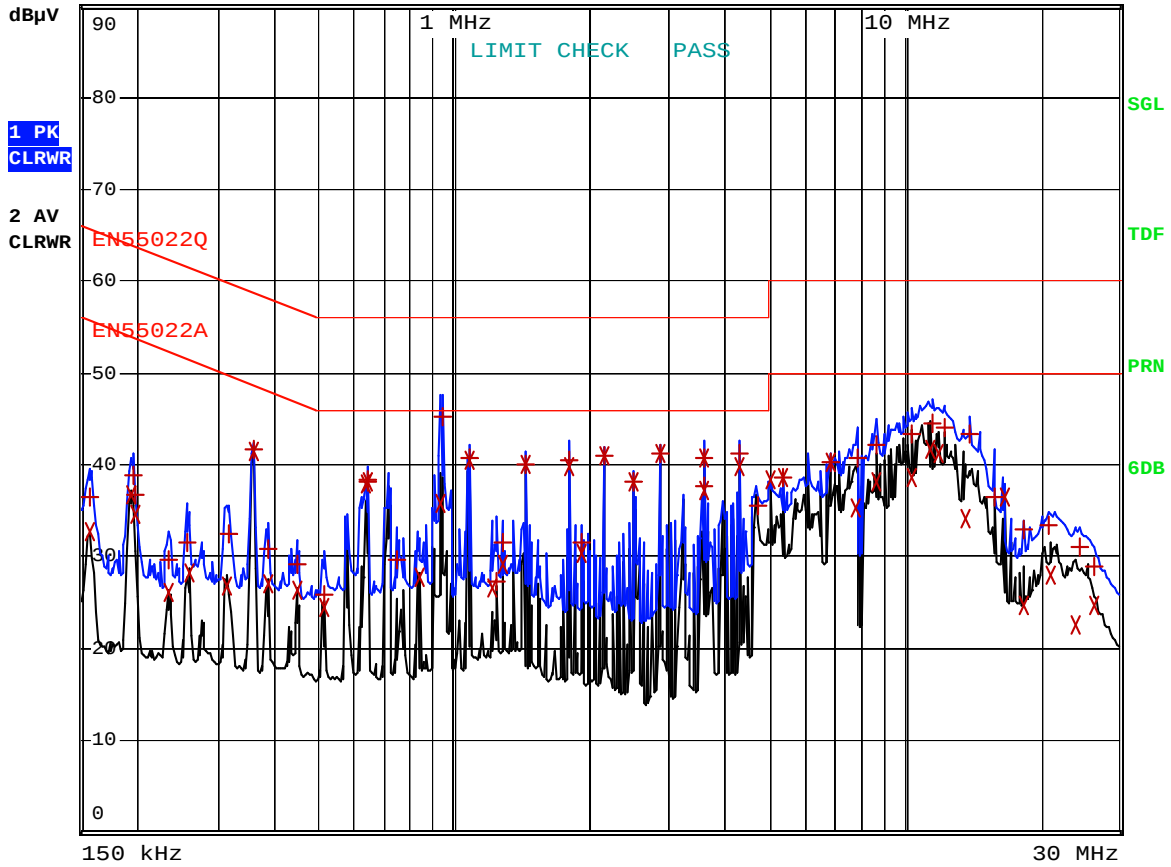
*NEUTRAL



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



Comment: BioStation T2 (BST2R-OC)_NEUTRAL

Date: 6.APR.2011 18:03:59

Appendix 2. Photographs of EUT inside

[Inside]

