

Test Report for FCC

FCC ID :TKWBSL2-OE

Report Number		ESTEFC1603-005		
Applicant	Company name	SUPREMA INC		
	Address	16F Parkview Office Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea		
	Telephone	82-31-710-5674		
Contact person		Tae-Hoon Lee		
Product	Product name	BioStation L2		
	Model No.	BSL2-OE	Manufacturer	SUPREMA INC
	Serial No.	542500925	Country of origin	KOREA
Test date	2016-02-22 ~ 2016-03-08		Date of issue	28-Mar-16
Testing location	347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea			
Standard	FCC PART 15 Subpart C(15.225), ANSI C 63.10(2009)			
Result		Complied		
Measurement facility registration number		659627		
Tested by	Senior Engineer D.H. Jung		(Signature)	
Reviewed by	Engineering Manager J.M. Yang		(Signature)	
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable			
<p>* Note</p> <ul style="list-style-type: none"> - 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 : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu,
Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do 467-811, R. O. Korea

1.3 Official Qualification(s)

MSIP : 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 : Conformity Assessment Body(CAB) with registration number 659627 under APEC TEL MRA between the RRA and the FCC

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

2. Description of EUT

2.1 Summary of Equipment Under Test

Product : BioStation L2
 Model Number : BSL2-OE
 Serial Number : NONE
 Manufacturer : SUPREMA INC
 Country of origin : KOREA
 Operating Frequency : 125 kHz
 Antenna Type : Mag Integrated Loop Antenna
 Modulation Type : ASK
 Power Rating : DC 12 V, MAX 600 mA
 Testing Voltage : AC 120 V , 60 Hz
 Receipt Date : 11-Feb-16
 X-tal list(s) or Frequencies generated : The highest operating frequency is CPU 1.2 GHz

2.2 General descriptions of EUT

General	CPU	1.2 GHz Quad Core
	Memory	2GB Flash + 256 MB RAM
	LCD type	2" color TFT LCD
	LCD resolution	220 x 176 pixels
	Sound	16-bit Hi-Fi
	Operating temperature	-20 °C ~ 50 °C
	Storage temperature	-40 °C ~ 70 °C
	Operating humidity	0 % ~ 80 %, non-condensed
	Storage humidity	0 % ~ 90 %, non-condensed
	Dimension (W x H x D)	71 mm x 201 mm x 44 mm (Bottom) / 34 mm (Top)
	Weight	Device: 280 g Bracket: 61 g (including washers and bolts)
Electrical	Certificates	CE, FCC, KC, RoHS, REACH, WEEE
	Power	Voltage: 12VDC Current: Max. 600 mA
	Switch input V _H	Min. 4V Max. 5V
	Switch input V _L	Max. 1V
	Switch pull-up resistor	4.7 kΩ (The input ports are pulled up with 4.7 kΩ)
	Wiegand output V _{OH}	Min. 4V Max. 5V
	Wiegand output V _{OL}	Max. 1V
	Wiegand output pull-up resistor	Internal pull-up with 1 kΩ
Relay	Voltage: Max. 30VDC Current: 1A, Max. 2A	

3. Test Standards

Test Standard : FCC PART 15 Subpart C(15.225)

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 63.10 (2009)

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.

Summary of Test Results

Applied Standard : 47 CFR Part 15, Subpart C			
Standard	Test Type	Result	Remark
15.203	Antenna Requirement	Pass	See Appendix 2
15.207	AC Power Conducted Emission	Pass	Meet the requirement
15.205	Restricted bands	Pass	Meet the requirement
15.209	Radiated Emission	Pass	Meet the requirement

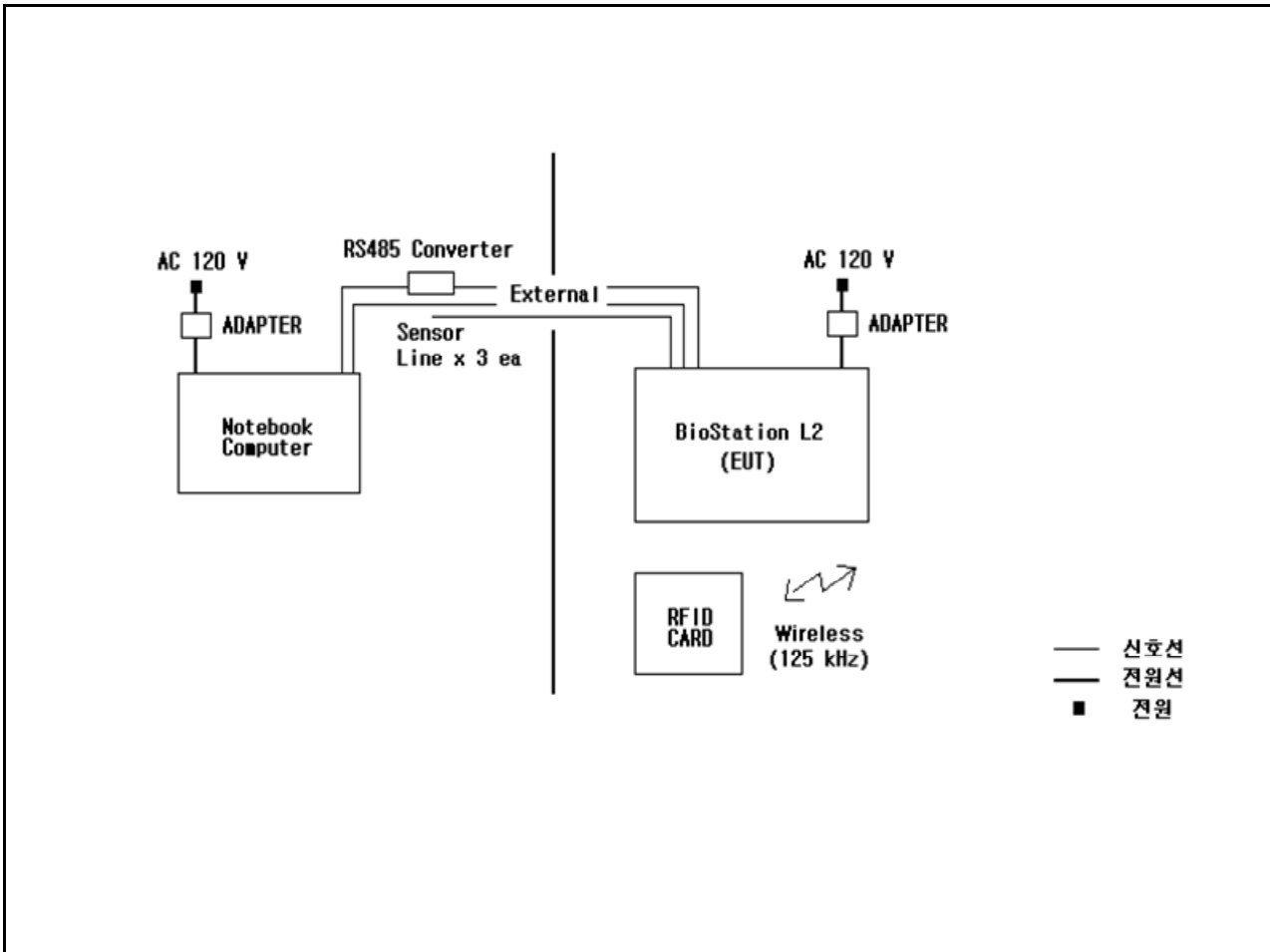
4. Measurement Condition

4.1 EUT Operation.

-The EUT was tested, tested under transmission/receiving condition continuously between the EUT

1. Check normal communication with RF OUT Frequency (125 kHz)

4.2 Configuration and Peripherals



4.3 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
BioStation L2	BSL2-OE	542500925	SUPREMA INC	EUT
ADAPTER	DPS-65VB	HIVD1536003713	Delta Electronics Power(Dongguan) Co., Ltd.	

4.4 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
BioStation L2	POWER	ADAPTER	-	2.0	Unshielded	
BioStation L2	LAN	Notebook Computer (External)	LAN	3.0	Unshielded	
BioStation L2	RS-485	RS485 Converter (External)	SERIAL	3.0	Shielded	
BioStation L2	Jack Line	Sensor Line x 3 (External)	-	3.0	Shielded	
BioStation L2	Wireless (125 kHz)	RFID CARD	Wireless (125 kHz)	-	-	
RS485 Converter	SERIAL	Notebook Computer (External)	USB	2.0	Shielded	

5. Measurement of radiated disturbance

The EUT was placed on the top of a rotating table 0.8 m above the ground at a 10 m semi-anechoic chamber . The table was rotated 360° to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at 1 m above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0° to 360° to find the maximum reading. The test receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.1 Radiated emission limits, general requirements

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength(microvolt/meter)	Distance(meter)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

* dBuV/m=20*log(uV/m) * Distance factor=40dB / decade(15.31(f))

5.2 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESC17	ROHDE & SCHWARZ	100916	7-Sep-16
Logbicon Antenna	VULB 9168	SCHWARZBECK	9168-193	30-Sep-16
Turn Table	DT3000-2t	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/641 /28051111/L	-
Loop Antenna	HFH2-Z2	ROHDE & SCHWARZ	100188	19-Aug-16

5.3 Environmental Condition

Test Place : 10 m Semi-anechoic chamber

Below 1 GHz

Temperature (°C) : 19.5 °C

Humidity (% R.H.) : 49.6 % R.H.

Test Place : 3 m Semi-anechoic chamber(3 m)

Above 1 GHz – N / A

Temperature (°C) :

Humidity (% R.H.) :



5.5 Test data(30 MHz ~ 1 000 MHz)

Test Date : 22-Feb-16

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
97.40	14.27	1.0	V	8.36	1.55	43.50	24.18	19.32
250.00	20.04	1.0	V	11.67	2.52	46.00	34.23	11.77
372.00	13.95	3.5	H	15.11	3.10	46.00	32.16	13.84
504.00	14.38	1.0	V	18.15	3.64	46.00	36.17	9.83
601.90	15.97	1.0	V	20.09	4.02	46.00	40.08	5.92
633.60	15.74	1.0	V	20.48	4.12	46.00	40.34	5.66
Remark	<p>H : Horizontal, V : Vertical *Result Value = Reading + Antenna + Cable loss *Correction Factor = Ant Factor + Cable *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection</p>							

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 63.10 (2009) The test setup was made according to FCC Part 15 (2010) & ANSI C 63.10 (2009) 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	Model	Manufacturer	Serial No.	Next Calibration date
TEST RECEIVER	ESPI	Rohde & Schwarz	100005	7-Dec-16
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	7-Dec-16
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	7-Dec-16

6.2 Environmental Condition

Test Place : Shielded Room
 Temperature (°C) : 19.8 °C
 Humidity (% R.H.) : 49.4 % R.H.



6.3 Test data

Test Date : 22-Feb-16

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (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)
0.15	0.13	0.12	N	66.00	44.75	45.00	56.00		
0.17	0.13	0.13	N	64.96	39.82	40.08	54.96		
0.21	0.12	0.14	H	63.21	39.22	39.48	53.21		
0.24	0.12	0.14	H	62.10	36.70	36.97	52.10		
0.44	0.14	0.16	N	57.06	41.60	41.90	47.06		
27.16	0.71	0.46	N	60.00	38.19	39.36	50.00		
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

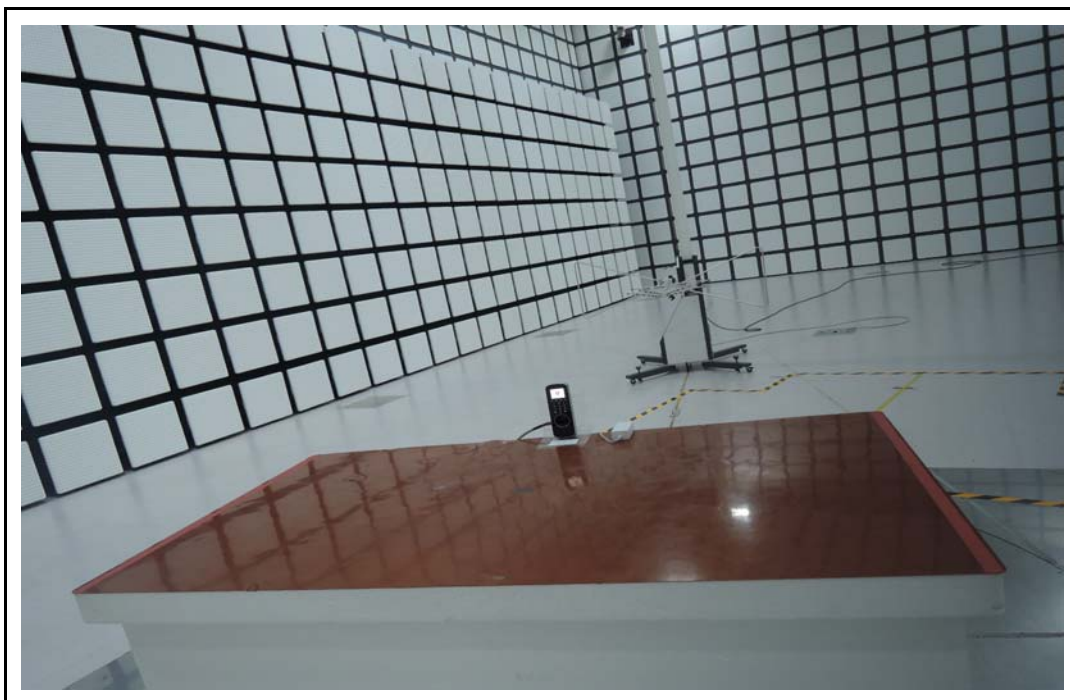
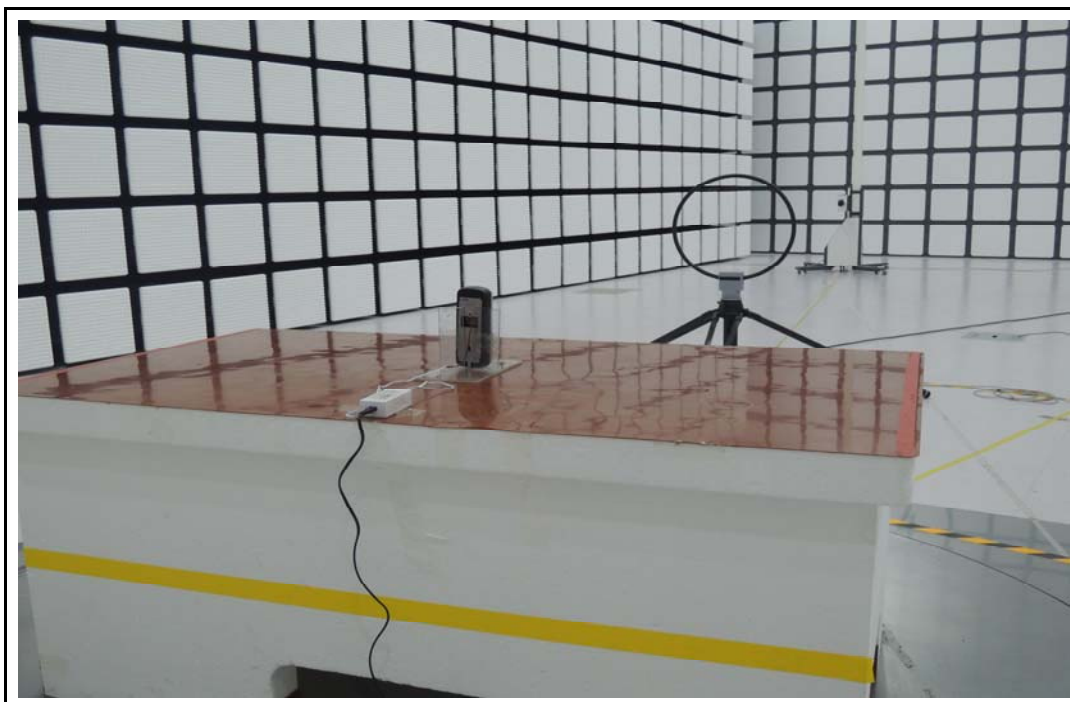


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7. Photographs of test setup

7.1. Setup for Radiated Test : 9 kHz ~ 1 000 MHz



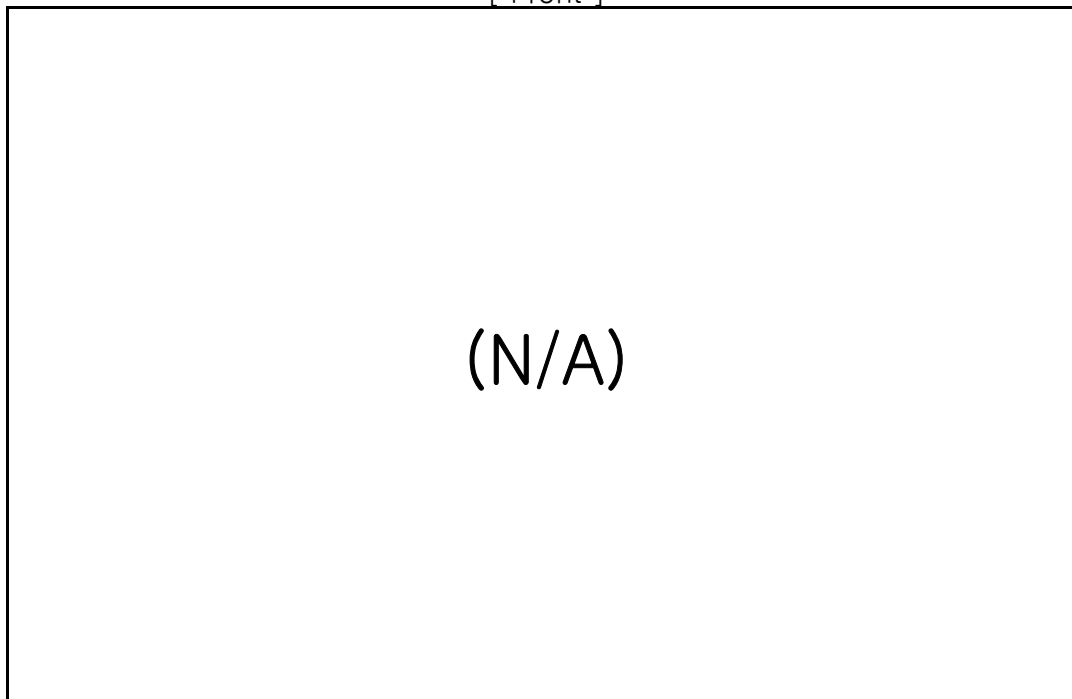


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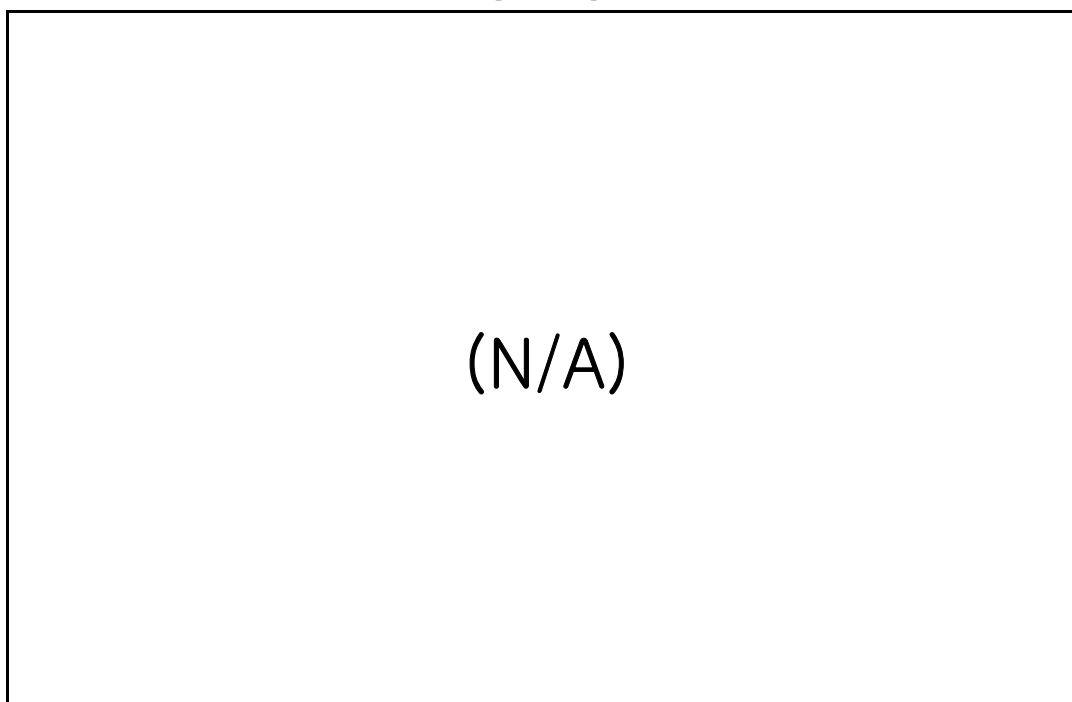
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7.2. Setup for Radiated Test : Above 1 GHz

[Front]



[Rear]





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7.3. Setup for Conducted Test : (0.15 ~ 30) MHz

[Front]



[Rear]





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8. Photographs of EUT

[Front]



[Rear]

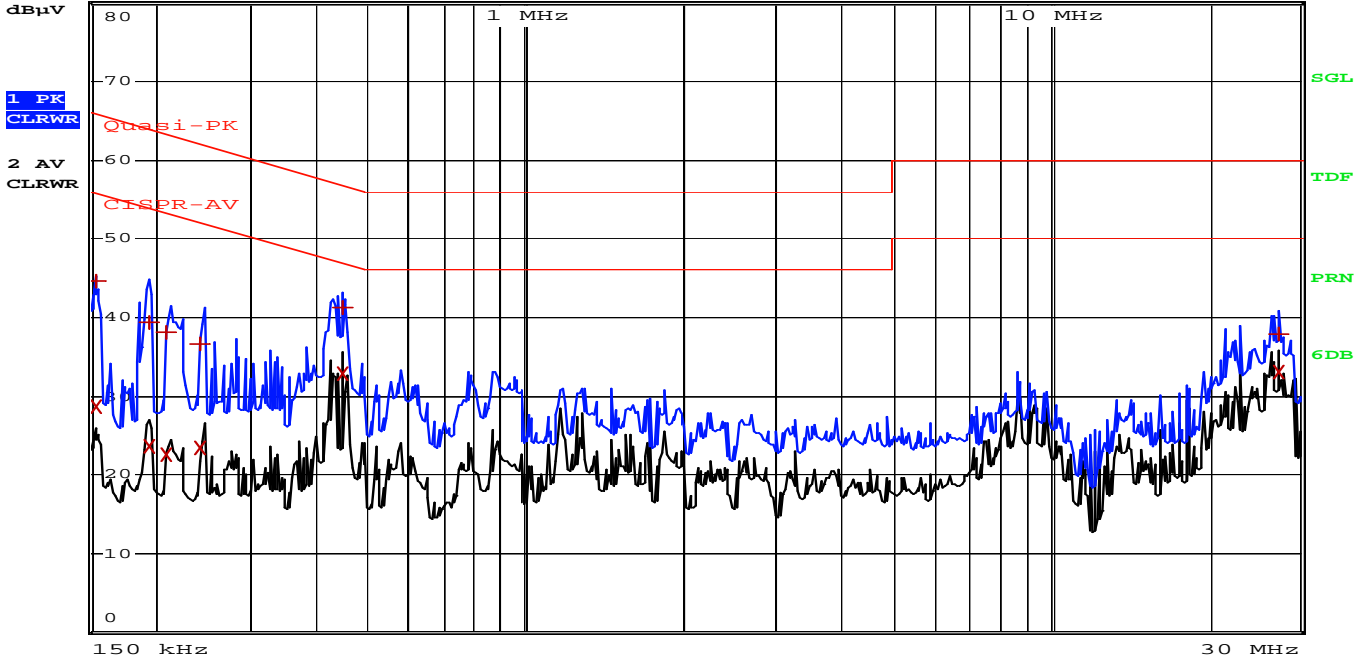


Appendix 1. Special diagram

* HOT LINE



RBW 9 kHz
MT 1 s
Att 10 dB AUTO PREAMP OFF

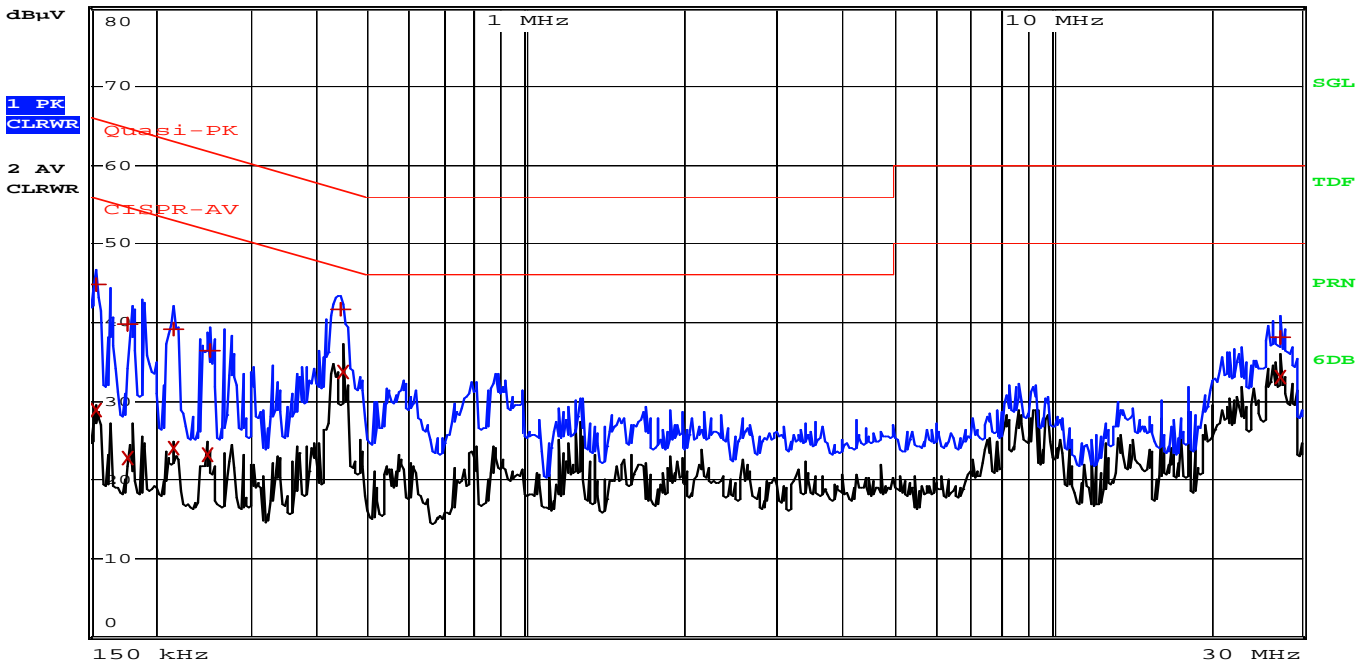


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* NEUTRAL LINE



RBW 9 kHz
MT 1 s
Att 10 dB AUTO PREAMP OFF



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Date: 22.FEB.2016 10:45:47

Appendix 1. Antenna Requirement

Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that 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.

Result

–Complied

The transmitter has an Mag Integrated Loop Antenna.