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Test Report for FCC

FCC ID : TKWXS2-QAPB2

Report Number		ESTRFC2210-003		
Applicant	Company name	Suprema Inc		
	Address	17F-5, Parkview officetower, 248, Jeongjail-ro Bundang-gu, Seongnam-si, Gyeonggi-do South Korea		
	Telephone	+82-31-710-4922		
Product	Product name	X-Station 2		
	Model No.	XS2-QAPB	Manufacturer	Suprema Inc
	Serial No.	NONE	Country of origin	KOREA
Test date	12-Sep-22 ~ 14-Sep-22		Date of issue	27-Oct-22
Testing location	140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea			
Standard	FCC PART 15 Subpart C(15.209), ANSI C 63.10(2013)			
Test item	■ Conducted Emission	Test result	OK	
	■ Radiated Emission	Test result	OK	
Measurement facility registration number		FCC : 659627		
MRA Registration number		KR0019		
Tested by	Engineer H.G. Lee (Signature)			
Reviewed by	Engineering Manager I.K. Hong (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 report is not related to KOLAS accreditation
- Add specific supported RFID card licensing circuit parts : XS2-APB,XS2-OAPB
- Add QR module, add decoder : XS2-QDPB
- Add fingerprint : XS2-OAPB, XS2-ODPB

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Contents

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 : 140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do,
Rep. of 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

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	: X-Station 2
Model Number	: XS2-QAPB
Serial Number	: NONE
Manufacturer	: Suprema Inc
Country of origin	: KOREA
Operating Frequency	: 127.8 kHz
Antenna Type	: PCB Antenna
Modulation Type	: ASK
Channel Spacing	: 1
Power Rating	: INPUT: AC(100 - 240) V, (50-60)Hz, 1.2 A OUTPUT: DC 12 V, 2.5 A
Receipt Date	: 1-Aug-22
X-tal list(s) or Frequencies generated	: The highest operating frequency is 127.8 kHz

2.2 General descriptions of EUT

Category	Feature	Description
Credential	RF Option	• XS2-DPB, XS2-QDPB: 125kHz EM & 13.56MHz MIFARE, MIFARE Plus, DESFire EV1/EV2, FeliCa • XS2-APB, XS2-QAPB: 125kHz EM, HID Prox & 13.56 MHz MIFARE, MIFARE Plus, DESFire EV1/EV2*, FeliCa, iCLASS SE/SR/Seos
	RF read range**	MIFARE, DESFire, iCLASS, HID Prox, EM: 50 mm / FeliCa: 30 mm
	Mobile	NFC,BLE
	Barcode and QR code	Supported (XS2-QDPB, XS2-QAPB)
General	CPU	1.5 GHz Quad Core
	Memory	16 GB Flash + 1 GB RAM
	Creypto chip	Supported
	LCD type	4"IPS color LCD
	LCD resolution	480 x 800
	Sound	24bit
	Operating temperature	-20°C to 50°C
	Storage Temperature	-40°C to 70°C
	Operating humidity	0%-80%, non-condensing
	Storage humidity	0%-90%, non-condensing
	Camera type	CMOS 2M pixels
	Camera resolution	1600 x 1200

2.2 General descriptions of EUT

Category	Feature	Description
General	Dimension (W x H x D)	• XS2-DPB, XS2-APB: 82 mm x 159 mm x 27.2 mm • XS2-QDPB, XS2-QAPB: 82 mm x 203 mm x 35.2 mm
	Weight	Device • XS2-DPB, XS2-APB: 280 g • XS2-QDPB, XS2-QAPB: 343 g Bracket • XS2-DPB, XS2-APB: 67 g(Including washer and bolt) • XS2-QDPB, XS2-QAPB: 88g(Including washer and bolt)
	IP rating	IP65
	Certificates	KC, CE FCC(Compliance: RoHS, REACH, WEEE)
Capacity	Max. User	500,000
	Max. Card	500,000
	Max. Text Log	5,000,000
	Max. Image Log	50,000
Interface	Ethernet	Supported (10/100 Mbps, auto MDI/MDI-X)
	RS-485	1ch Host or Slave (Selectable)
	Wiegand	1 ch Input or Output (Selectable)
	TTL input	2 ch Inputs
	Relay	1 Relay
	USB	USB 2.0(Host)
	PoE	Supported(IEEE 802.3af compliant)
	Tamper	Supported
Electrical	Power	• Power: DC 12 V(Max. 0.8 A) or DC 24 V(Max. 0.45 A) • Adapter recommended specifications: DC 12 V(±10%)with a minimum of 1,500 mA or DC 24 V(±10%)with a munumum of 800 mA***
	Switch input V_{IH}	Min.: 3 V, Max.: 5 V
	Switch input V_{IL}	Max.: 1 V
	Switch Pull-up resistance	4.7 kΩ (The input pots are pulled up with 4.7 kΩ.)
	Wiegand output V_{OH}	More than 4.8 V
	Wiegand output V_{OL}	Less than 0.2 V
	Wiegand output Pull-up resistance	Internally pulled up with 1 kΩ
	Relay	Voltage: MAX 30 VDC Current: 1A, MAX 2A

* DESFire EV2 cards are supported by having backward compatibility of DESFire EV1 cards. CSN and smart card functions are compatible with X-station 2.

** RF read range will vary depending on the installation environment.

*** Adapter is sold separately. Refer to the recommended specifications.

3. Test Standards

Test Standard : FCC PART 15

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 (2013)

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 decides 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 method apply to the measurement of individual units or systems comprised of multiple units

Summary of Test Results

Applied Satandard : 47 CFR Part 15, Subpart C				
Standard	Test Type	Result	Remark	Limit
15.203	Antenna Requirement	Pass	See Appendix 5	
15.207	AC Power Conducted Emission	Pass	Meet the requirement	
15.209	Radiated Emission	Pass	Meet the requirement	
15.215	20 dB Bandwidth	Pass	Meet the requirement	

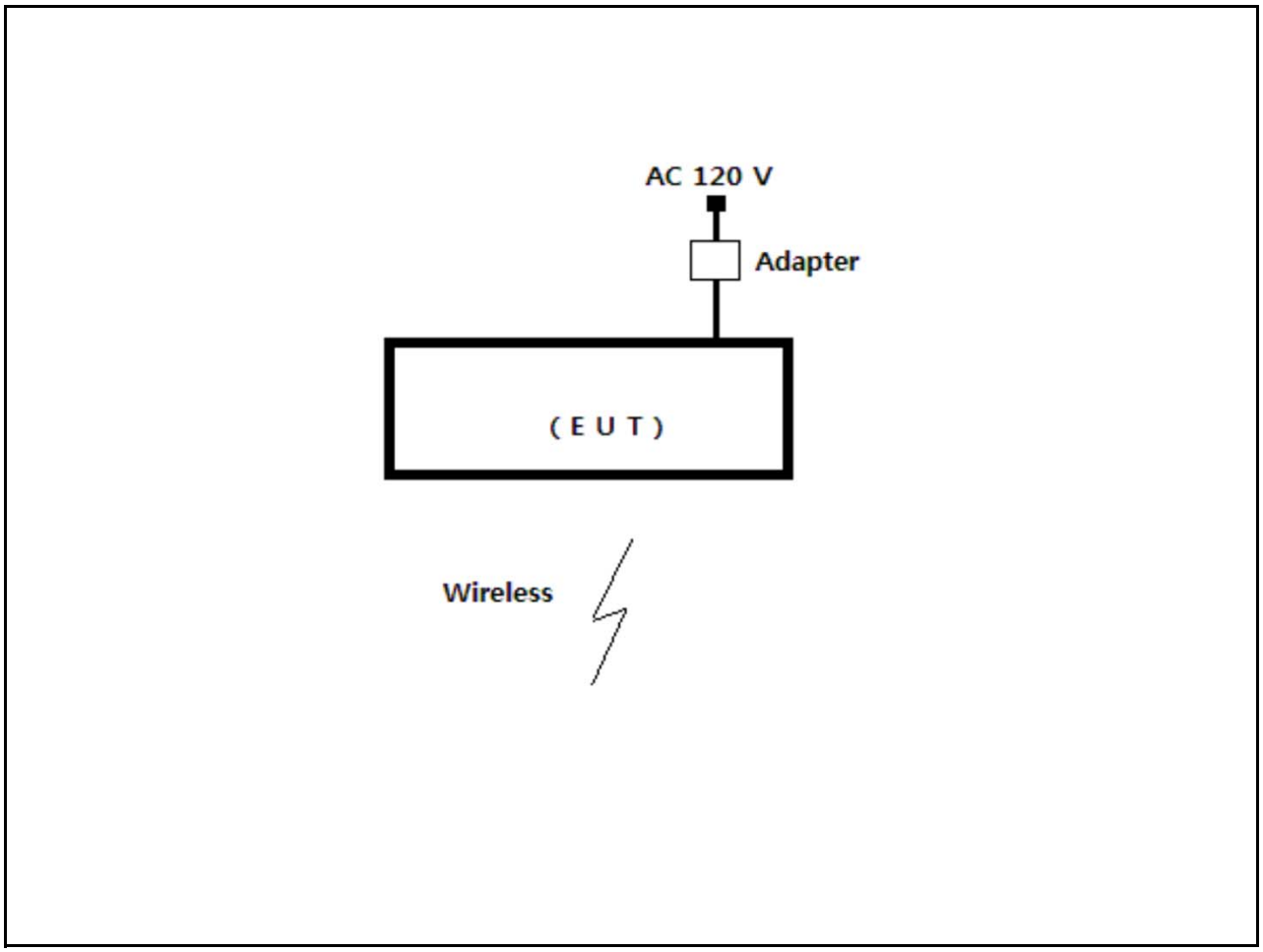
4. Measurement Condition

4.1 EUT Operation.

-The EUT was tested, under transmission / receiving

1. Normal communication with RF OUT Frequeny(127.8 kHz).
2. Monitoring the operation status of frequency by using RF CARD.

4.2 Configuration and Peripherals



4.3 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
X-Station 2	XS2-QAPB	NONE	Suprema Inc	EUT
Adapter	DZ036DL120250F	NONE	KEERDA	

4.4 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
X-Station 2	Power	Adapter	-	2	Unshielded	
X-Station 2	Wireless (116.5 kHz)	RF CARD	Wireless (116.5 kHz)	-	-	

5. 20dB Bandwidth

5.1 Test settings

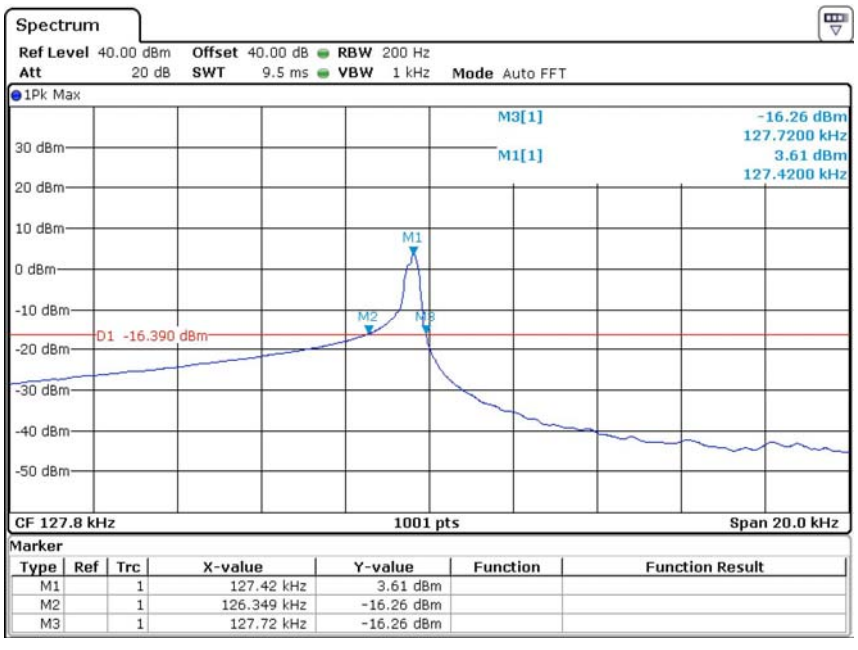
The transmitter shall be operated at its maximum carrier power measured under normal test
conditions.
• The span of the analyzer shall be set to capture all products of the modulation process, including
the emission skirts.
• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied

5.2 Test results

Frequency(㎑)	20dB Bandwidth(㎑)	Limit
127.8	1.371	Reporting purpose only

5.3 Test Plots

20dB Bandwidth
127.8 kHz



6. Measurement of radiated disturbance

The EUT was placed on the top of a rotating table 0.8 m above the ground at a 3 m Open test site. The table was rotated 360 ° to determine the position of the highest radiation.Then antenna is a loop antenna is fixed at one meter 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 degrees to 360 ° to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

6.1 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))

6.2 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESCI7	ROHDE & SCHWARZ	100916	29-Jun-23
Logbicon Antenna	VULB 9168	SCHWARZBECK	193	9-Dec-23
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	29-Aug-24

6.3 Environmental Condition

Test Place 10 m Semi-anechoic chamber
Temperature (°C) : 23.7 ℃
Humidity (%) : 43.4 % R.H.

6.4 Test data (9 kHz ~ 30 MHz)

Test Date : 12-Sep-22 Measurement Distance : 3 m

Frequency (kHz)	Reading (dBμV)	Horizontal Position [Angle]	Height (m)	Correction Factor		Result Value(Qeas-Peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
127.80	57.40	360.0	0.8	19.80	0.08	105.47	77.28	28.19

Remark	H : Horizontal, V : Vertical There did not measure any radiated spurious emission in the range 9 kHz to 30 MHz *There is no found Restricted bands. *The 300 m limit was converted to 3 m Limit using square factor(x) as it was found by measurements as follows; 3 m Limit(dBuV/m) = 20log(2400/F(KHz))+40log(300/10)= 20log(2400/127.8)+40log(300/3)

6.5 Test data(30 MHz ~ 1 000 MHz)

Test Date : 12-Sep-22 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
30.10	21.45	V	1.5	12.00	0.76	40.00	34.21	5.79
32.50	23.87	V	1.8	12.15	0.79	40.00	36.81	3.19
40.20	18.28	V	1.3	12.82	0.90	40.00	32.00	8.00
96.20	29.66	V	1.5	8.01	1.35	43.50	39.02	4.48
250.00	22.71	V	1.4	11.70	2.28	46.00	36.69	9.31
984.00	12.24	V	1.5	24.50	4.87	54.00	41.61	12.39

Remark	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

7. 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 & ANSI C 63.10 (2013) The test setup was made according to FCC Part 15 & ANSI C 63.10 (2013) 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.

7.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	29-Jun-23
LISN	ESH2-Z5	Rohde & Schwarz	836679/025	29-Jun-23
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	NONE	29-Jun-23

7.2 Environmental Condition

Test Place : Shielded Room
Temperature (°C) : 23.5 ℃
Humidity (% R.H.) : 44.3 % R.H.

7.3 Test data

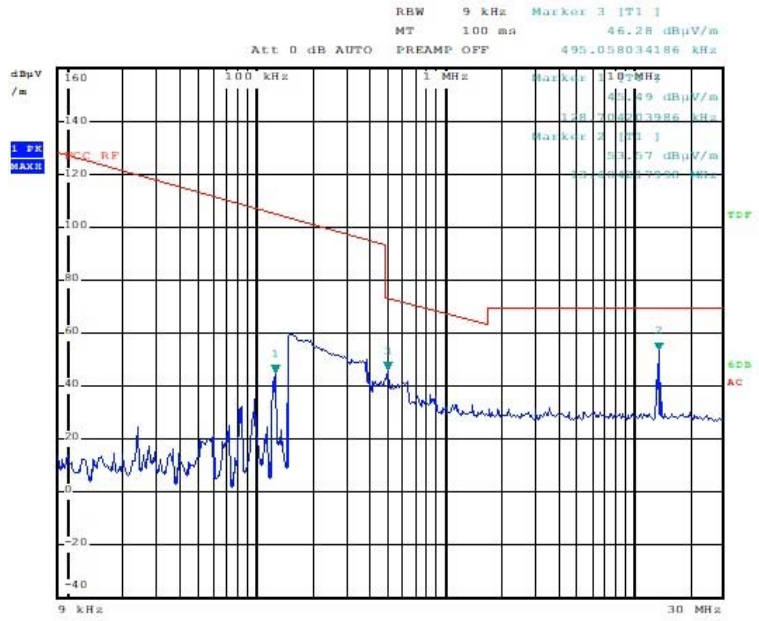
Test Date : 14-Sep-22

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dBμV)	Reading (dBμV)	Result (dBμV)	Limit (dBμV)	Reading (dBμV)	Result (dB)
0.15	0.05	0.14	H	65.83	35.73	35.92	55.83	23.34	23.53
0.16	0.05	0.14	N	65.36	35.69	35.88	55.36	24.68	24.87
0.30	0.04	0.15	N	60.24	31.34	31.53	50.24	21.94	22.13
0.32	0.04	0.15	N	59.60	32.16	32.35	49.60	21.70	21.89
0.33	0.04	0.15	H	59.37	31.41	31.60	49.37	21.60	21.79
0.45	0.04	0.15	H	56.93	40.13	40.32	46.93	31.73	31.92

Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading

Appendix 1. Special diagram

*Horizontal



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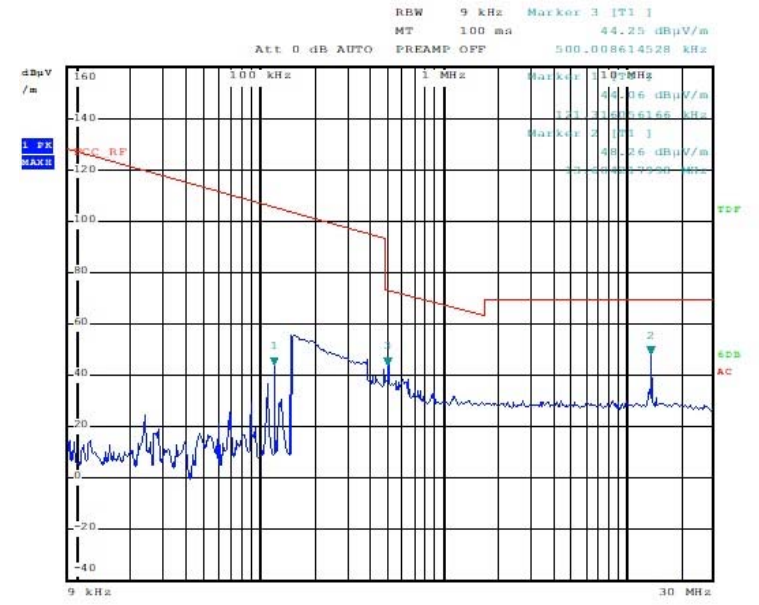
*Vertical



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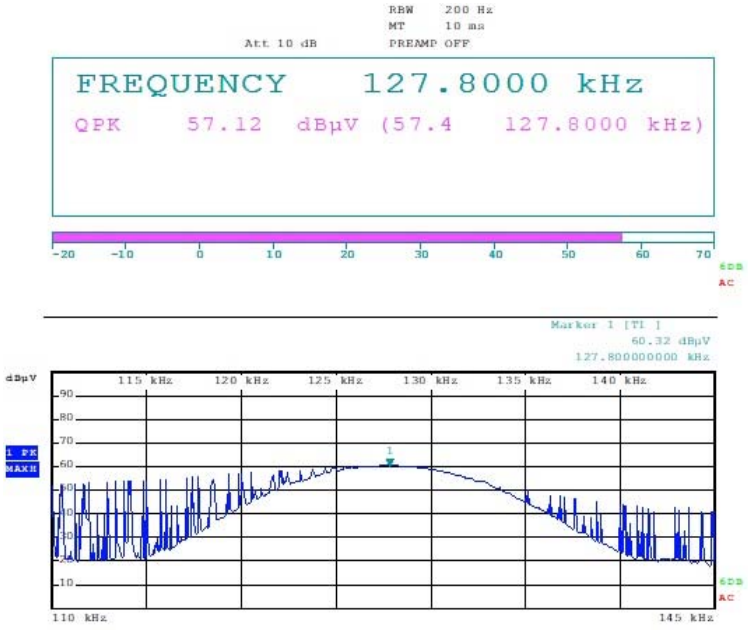
Appendix 2. Special diagram

*Horizontal



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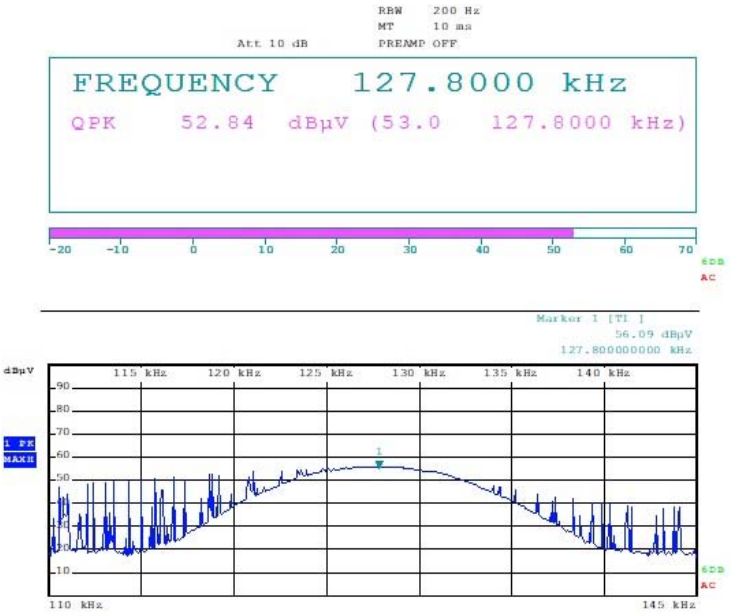
*Vertical



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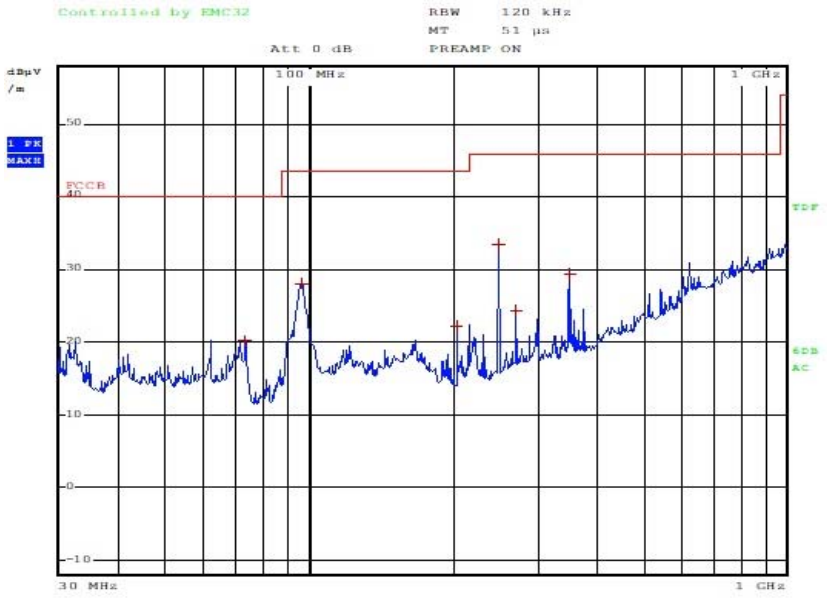
Appendix 3. Special diagram

*Horizontal



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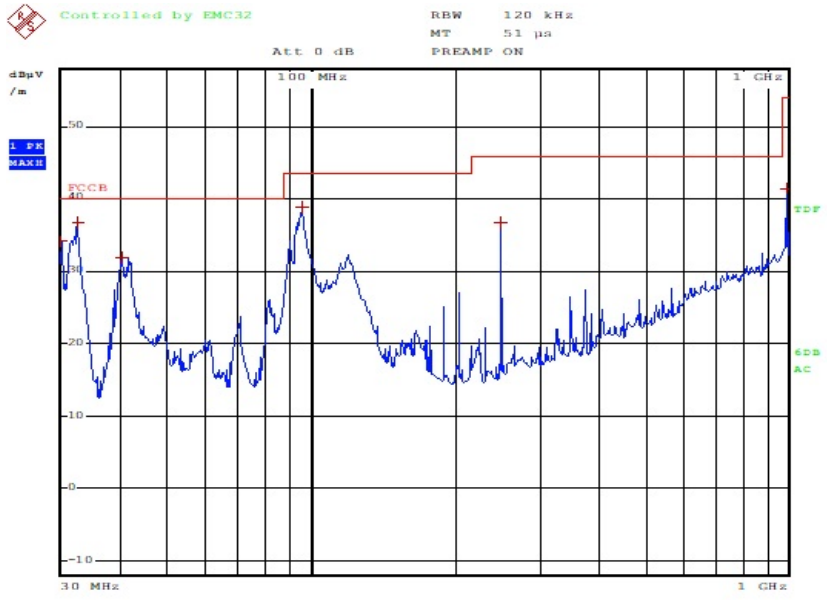
*Vertical



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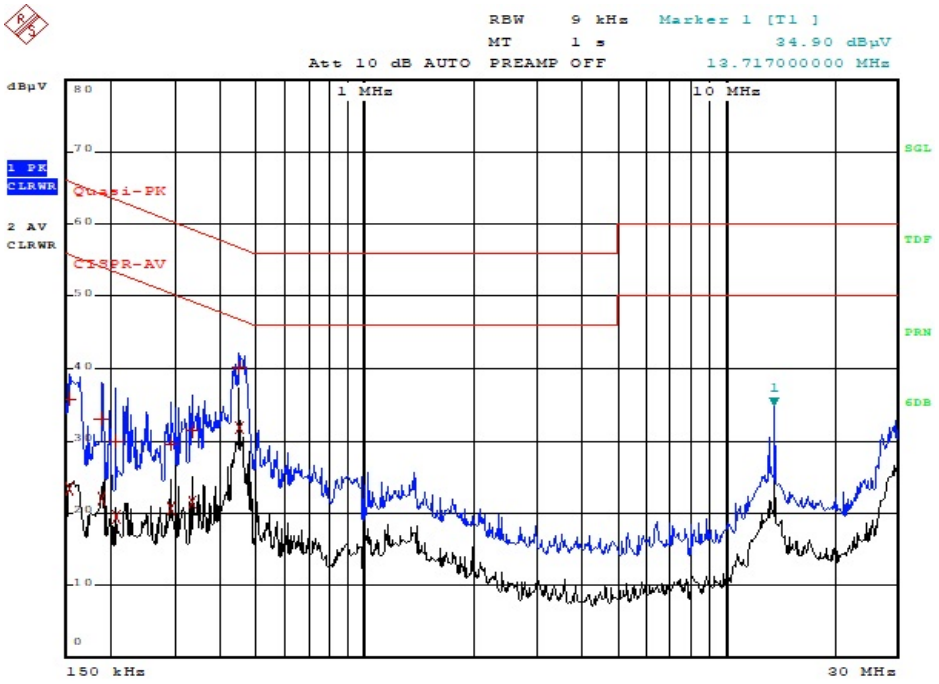
Appendix 4. Special diagram

*HOT LINE



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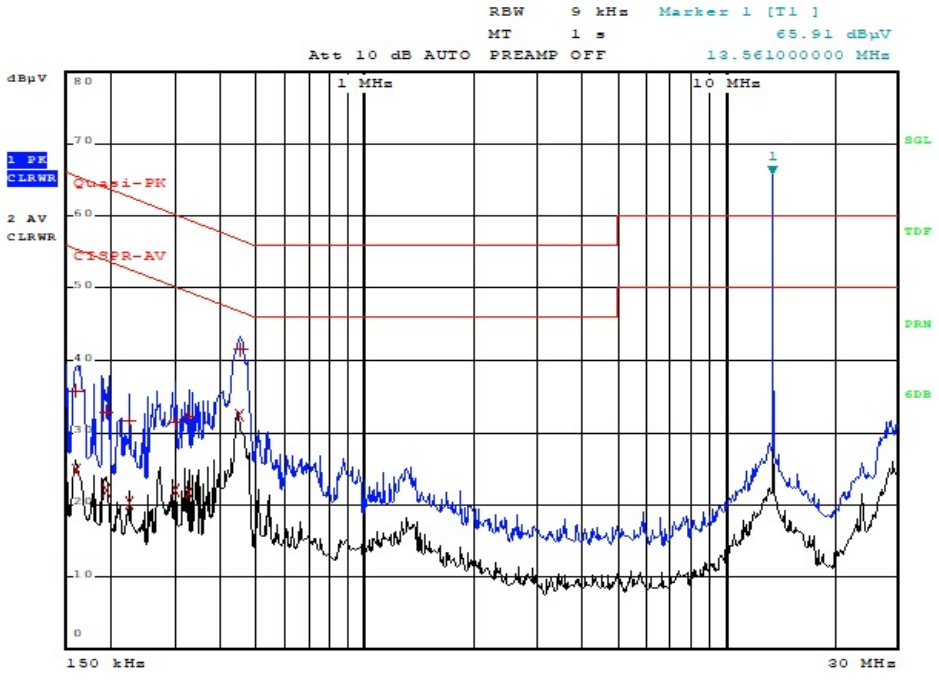
*NEUTRAL LINE



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Appendix 5. Antenna Requirement

Requlation

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 PCB antenna.