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Test Report for FCC

FCC ID : TKWXS2-QAPB

Report Number		ESTRFC2012-001			
Applicant	Company name	Suprema Inc			
	Address	17F-5, Parkview Office Tower, 248, Jeongjail-ro, Bundang-gu, Seongnam, Gyeonggi, South Korea			
	Telephone	+82-31-710-4908			
Product	Product name	X-Station 2			
	Model No.	XS2-QAPB	Manufacturer	Suprema Inc	
	Serial No.	NONE	Country of origin	KOREA	
Test date	07-Dec-20 ~ 08-Dec-20		Date of issue	16-Dec-20	
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(15.209), ANSI C 63.10(2013)				
Test item	■ Conducted Emission	□ Class A ■ Class B	Test result	OK	
	■ Radiated Emission	□ Class A ■ Class B	Test result	OK	
Measurement facility registration number		659627			
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
- There are two power sources, one of which is selected and tested(24 V)
- This test report is not related to KOLAS accreditation
- Additional models name:XS2-QDPB, XS2-APB, XS2-DPB
- The XS2-QDPB model is missing a specific support RFID card licensing circuit from the XS2-QAPB model.
- The XS2-APB Model does not have a QR (Barcode) module or decoder in The XS2-QAPB model.
- The XS2-DPB model does not have a specific supported RFID card licensing circuit, QR (Barcode) module or decoder in the XS2-QAPB model.

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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)

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 : 128.5 kHz
Antenna Type : Coil Antenna
Modulation Type : ASK
Channel Spacing : 1

Power Rating : INPUT: AC(100 - 240) V, (50-60)Hz, 1.7 A
OUTPUT: DC 24 V, 2.5 A

Receipt Date : 9-Nov-20

X-tal list(s) or Frequencies generated : The highest operating frequency is 128.5 kHz

2.2 General descriptions of EUT

Category	Feature	Specification
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 & 13.56MHz MIFARE, MIFARE Plus, DESFire EV1/EV2, FeliCa, iCLASS SE/SR/Seos
	RF read range *	MIFARE, DESFire, iCLASS, HID Prox, EM: 50mm / Felica: 30 mm
	Mobile	NFC, BLE
	Barcode	Supported (XS2-QDPB, XS2-QAPB)

2.2 General descriptions of EUT

Category	Feature	Specification
General	CPU	1.5 GHz Quad Core
	Memory	8 GB Flash + 1 GB RAM
	LCD type	4" IPS color LCD
	LCD resolution	480 x 800 pixels
	Sound	24bit
	Operating temperature	-25 °C ~ 50 °C
	Storage temperature	-40 °C ~ 70 °C
	Operating humidity	0% ~ 80 %, non-condensing
	Camera type	CMOS 2M pixels
	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: 280g XS2-QDPB, XS2-QAPB: 343g Bracket XS2-DPB, XS2-APB: 67g (Including washer and bolt) XS2-QDPB, XS2-QAPB: 88g (Including washer and bolt)
Interface	Ethernet	Supported (10/100 Mbps, auto MDI/MDI-X)
	RS-485	1ch Master or Slave (Selectable)
	Wiegand	1 ch Input / Output (Selectable)
	TTL input	2 ch Input
	Relay	1 Relay
	PoE	Supported (IEEE 802.3af compliant)
	USB	USB 2.0 (Host)
	Tamper	Supported
Electrical	Power	DC 12V (Max. 0.8A) or DC 24V (Max. 0.45A)
	Switch input VIH	Min. 3V, Max. 5V
	Switch input VIL	Max. 1V
	Wiegand output Pull-up resistance	Internally pulled-up with 1 kΩ
	Switch Pull-up resistance	4.7kΩ (The input ports are pulled up with 4.7kΩ.)
	Relay	Voltage: Max. 30 VDC, Current: Max. 1A

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

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 2	
15.207	AC Power Conducted Emission	Pass	Meet the requirement	
15.209	Radiated Emission	Pass	Meet the requirement	

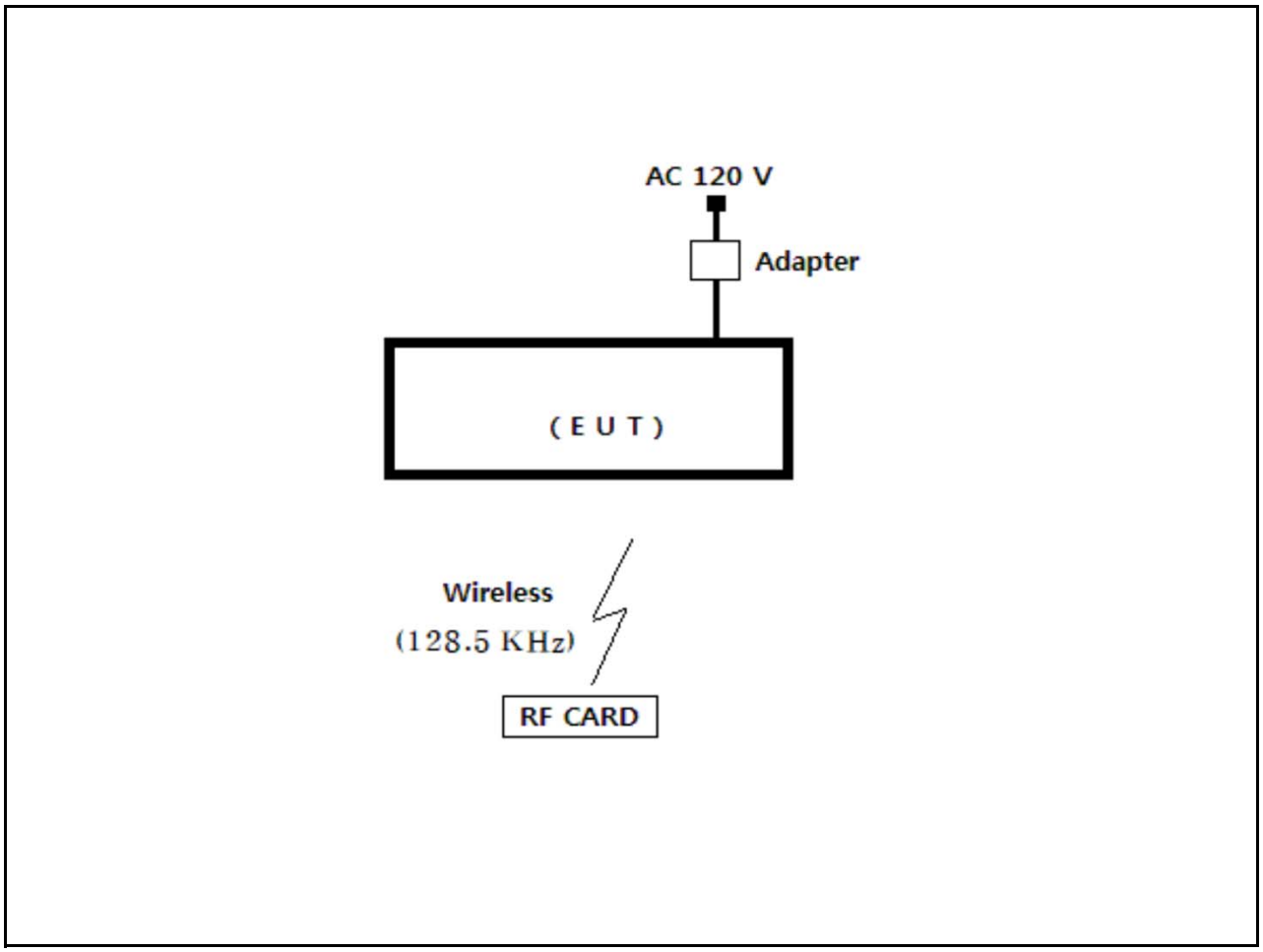
4. Measurement Condition

4.1 EUT Operation.

-The EUT was tested, under transmission / receiving

1. Normal communication with RF OUT Frequeny(133.13 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	KPL-060M	NONE	Channel Well Technology(Guangzhou)Co., Ltd.	
RF CARD	NONE	NONE	Suprema Inc	

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 (128.5 kHz)	RF CARD	Wireless (128.5 kHz)	-	-	

5. 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.

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	ESCI7	ROHDE & SCHWARZ	100916	24-Aug-21
Logbicon Antenna	VULB 9168	SCHWARZBECK	193	14-Jan-22
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	26-Aug-22

5.3 Environmental Condition

Test Place 10 m Semi-anechoic chamber
Temperature (°C) : 23.5 ℃
Humidity (%) : 43.2 % R.H.

5.4 Test data (9 kHz ~ 30 MHz)

Test Date : 7-Dec-20 Measurement Distance : 3 m

Frequency (kHz)	Reading (dBμV)	Vertical Position [Angle]	Height (m)	Correction Factor		Result Value(Qeas-Peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
128.50	54.10	40.0	0.8	19.68	0.1	105.1	73.83	-31.29

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 3m Limit using square factor(x) as it was found by measurements as follows;
3 m Limit(dBuV/m) = 20log(2400/F(KHz))+40log(300/3)= 20log(2400/133.13)+40log(300/3)

5.4 Test data(30 MHz ~ 1 000 MHz)

Test Date : 7-Dec-20 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)
31.30	17.47	V	1.0	12.02	0.81	40.00	30.29	9.71
216.40	16.22	V	1.2	10.13	2.30	46.00	28.66	17.34
250.00	20.90	V	1.3	11.70	2.50	46.00	35.10	10.90
375.00	11.02	H	1.4	15.09	3.09	46.00	29.21	16.79
400.00	7.84	V	1.4	15.40	3.21	46.00	26.45	19.55
846.10	10.66	V	1.6	22.68	4.80	46.00	38.14	7.86

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

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 & 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.

6.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	24-Aug-21
LISN	ESH2-Z5	Rohde & Schwarz	836679/025	24-Aug-21
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	NONE	24-Aug-21

6.2 Environmental Condition

Test Place : Shielded Room
Temperature (°C) : 23.6 ℃
Humidity (% R.H.) : 43.5 % R.H.

6.3 Test data

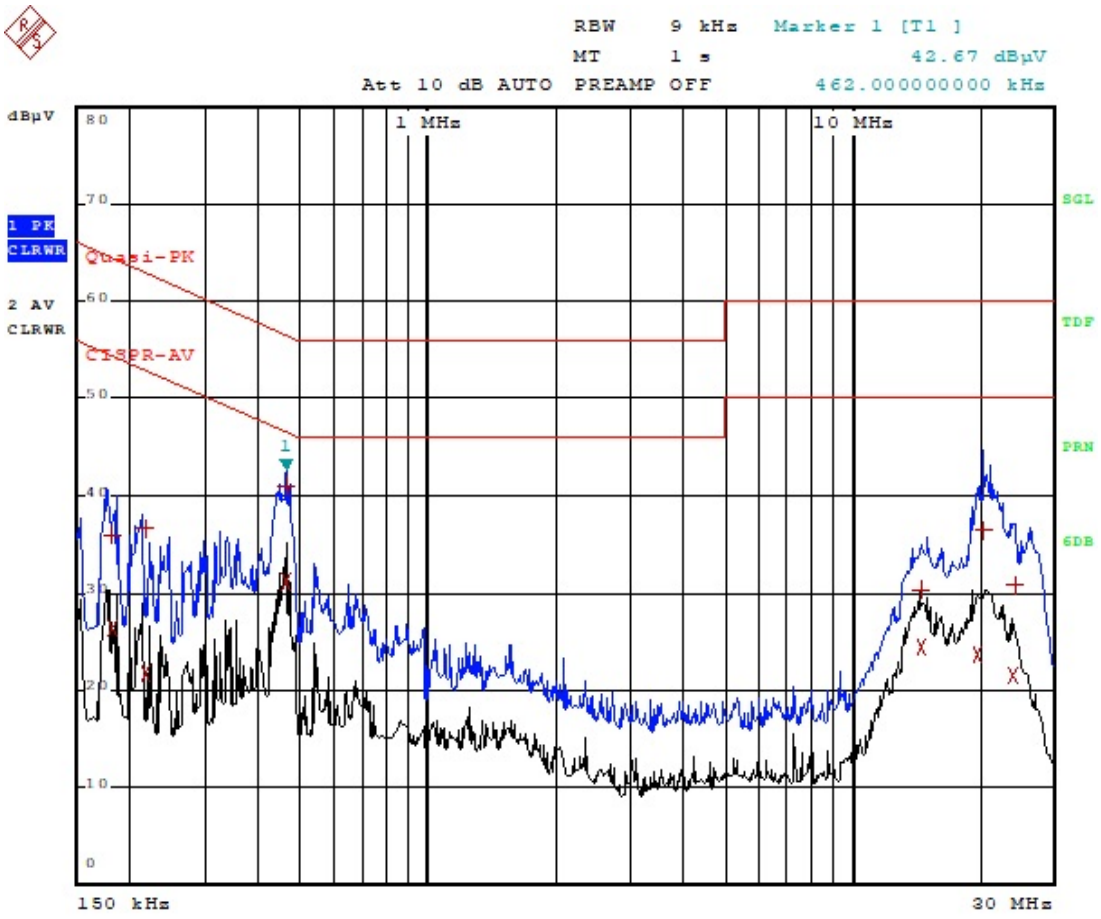
Test Date : 8-Dec-20

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)
0.18	0.06	0.17	H	64.49	36.02	36.25	54.49	26.41	26.64
0.22	0.05	0.17	H	62.97	36.66	36.88	52.97	21.70	21.92
0.46	0.04	0.17	H	56.66	41.95	42.16	46.66	31.26	31.47
14.64	0.25	0.35	H	60.00	30.27	30.87	50.00	24.41	25.01
19.88	0.33	0.37	H	60.00	36.34	37.04	50.00	23.63	24.33
24.12	0.38	0.39	H	60.00	30.66	31.44	50.00	21.49	22.27

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

Appendix 1. Special diagram

*HOT LINE



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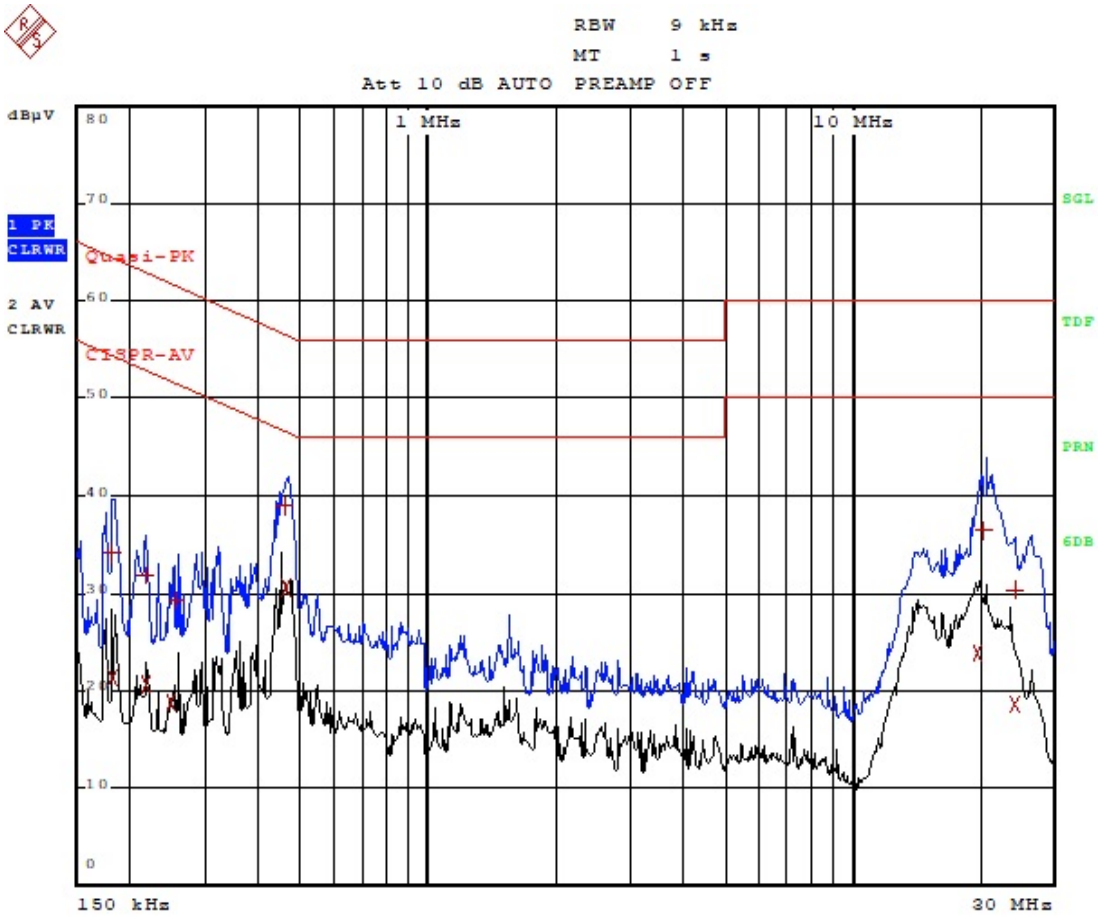
*NEUTRAL LINE



Comment: ESTR-20-00447

Appendix 2. 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 integral Coil antenna.