TEST REPORT

Product Name:	Card reader
FCC ID:	2AT8Z-TCE7300
Trademark:	3CORE
Model Number:	TCE7300
Prepared For:	Shanghai 3Core technologies, Inc.
Address:	No.7, lane175, Wanhuangdu Road, Jingan District, Shanghai, PR China
Manufacturer:	Shenzhen Shannon Tech Co., Ltd
Address:	Room 518, Cybio electronic Building, Kejibei 2rd Road, Nanshan District, Shenzhen City, Guangdong Province
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
Address:	Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Community, Xinqiao Street, Baoan District, Shenzhen, Guangdong, China.
Sample Received Date:	Aug. 17, 2022
Sample tested Date:	Aug. 17, 2022 to Sep. 05, 2022
Issue Date:	Sep. 05, 2022
Report No.:	CTB220905004RFX
Test Standards	FCC Part15.225 ANSI C63.10:2013
Test Results	PASS
Remark:	This is 13.56MHz radio test report.

Compiled by:	Reviewed by:	Approved by:
Chen Zheng	Arron Liu	Bin Liu / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB220905004RFX	Sep. 05, 2022	Original	Valid

2. TESTSUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Radiated Emission	47 CFR Part 15 Subpart C Section 15.209; 15.225(a)(b)(c)(d)	ANSI C63.10-2013	PASS
Frequency Tolerance	47 CFR Part 15 Subpart C Section 15.225(e)	ANSI C63.10-2013	PASS
Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.215	ANSI C63.10-2013	PASS
Antenna requirement	47 CFR Part 15 Subpart C Section 15.203	47 CFR Part 15.203	PASS

3. MEASUREMENTUNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertaintyrepresents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	U=±54.3Hz
Conducted output power Above 1G	U=±1.0dB
Conducted output power below 1G	U=±0.9dB
Power Spectral Density , Conduction	U=±1.0dB
Conduction spurious emissions	U=±2.8dB
Out of band emission	U=±54Hz
3m camber Radiated spurious emission(30MHz-1GHz)	U=±4.3dB
3m chamber Radiated spurious emission(1GHz-18GHz)	U=±4.5dB
humidity uncertainty	U=±5.3%
Temperature uncertainty	U=±0.59℃
Supply voltages	U=±3%
Time	U=±5%

4. PRODUCT INFORMATION AND TESTSETUP

4.1 ProductInformation

Model(s):	TCE7300
Hardware Version:	V2.0
Software Version:	V2.0
Operation Frequency:	13.56MHz
Type of Modulation:	ASK
Antenna installation:	Internal antenna
Antenna Gain:	1dBi
Ratings:	DC 12V from battery

4.2 Test SetupConfiguration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 SupportEquipment

No.	Device Type	Brand	Model	Series No.	Note
1.	Battery	JUXIANG	6-QW-45(430)-C	N/A	/
2	DC power		TPR-12002D	N/A	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during thetest.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intendeduse.

4.4 TestMode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode
Keep the EUT in transmitting mode (NFC mode) with modulation.
The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

4.5 TestEnvironment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	12
Normal Temperature(℃)	23

5. TEST FACILITY AND TEST INSTRUMENTUSED

5.1 TestFacility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test InstrumentUsed

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2023.07.19
2	Power Sensor	Agilent	U2021XA	MY56120032	2023.07.19
3	Power Sensor	Agilent	U2021XA	MY56120034	2023.07.19
4	Communication test set	R&S	CMW500	108058	2023.07.19
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2023.07.19
6	Signal Generator	Agilent	N5181A	MY50140365	2023.07.19
7	Vector signal generator	Agilent	N5182A	MY47420195	2023.07.19
8	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2023.07.19
10	5 GHz Filter	Shenxiang	MSF5150-5850MS-1155	20181015001	2023.07.19
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2023.07.19
12	BT&WI-FI Automatic test software	Micowave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2022.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2023.07.19
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2023.07.19
18	Amplifier	HP	8447E	2945A02747	2023.07.19
19	Amplifier	Agilent	8449B	3008A01838	2023.07.19
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2023.07.22

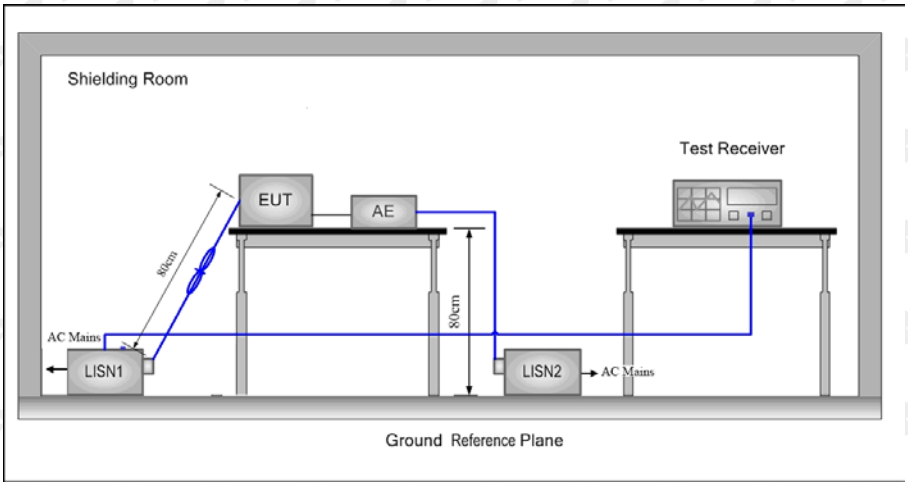
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2023.07.23
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2024.10.30

Continuous disturbance					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	ROHDE&SCHWARZ	ESH3-Z5	100318	2023.07.19
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2023.07.19
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2023.07.19
4	Coaxial cable	ZDECL	Z302S-NJ-SMAJ-12M	18091905	2023.07.19
5	ISN	Schwarzbeck	NTFM8158	183	2023.07.19
6	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
7	Communication test set	R&S	CMW500	108058	2023.07.19
8	EZ-EMC	Frad	EMC-con3A1.1	/	/

Radiated emission					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	2023.07.22
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22
3	Amplifier	Agilent	8449B	3008A01838	2023.07.19
4	Amplifier	HP	8447E	2945A02747	2023.07.19
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2023.07.19
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2023.07.19
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2023.07.19
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2023.07.19
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2023.07.19
10	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
11	Communication test set	R&S	CMW500	108058	2023.07.19
12	EZ-EMC	Frad	EMC-con3A1.1	/	/

6. AC POWER LINE CONDUCTEDEMISSION

6.1 Block Diagram OfTestSetup



6.2 Limit

* Decreasing linearly with the logarithm of the frequency

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

6.3 Testprocedure

1) The mains terminal disturbance voltage test was conducted in a shieldedroom.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. Thepower cables of all other units of the EUT were connected to a second LISN 2, which was bondedtothegroundreferenceplaneinthesamewayastheLISN1fortheunitbeing measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was notexceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground referenceplane,

4) Thetestwasperformedwithaverticalgroundreferenceplane.TherearoftheEUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from theboundaryof the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distancewas

betweentheclosestpointsoftheLISN1andtheEUT.Allotherunitsof the EUT and associated equipment was at least 0,8 m from the LISN2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement**.**

6.4 TestResult

N/A

NOTE: This EUT is powered by DC power only, this test item is not applicable.

7. RADIATEDEMISSION

7.1 Block Diagram OfTestSetup

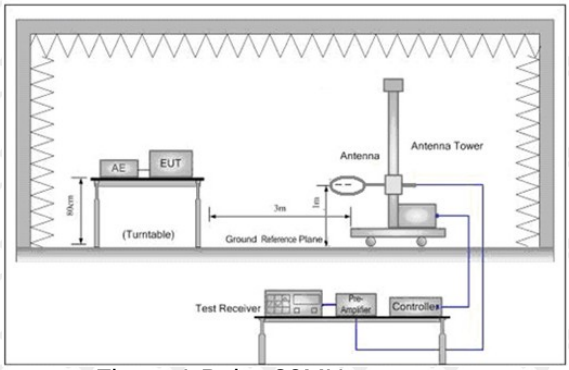


Figure 1.Below30MHz

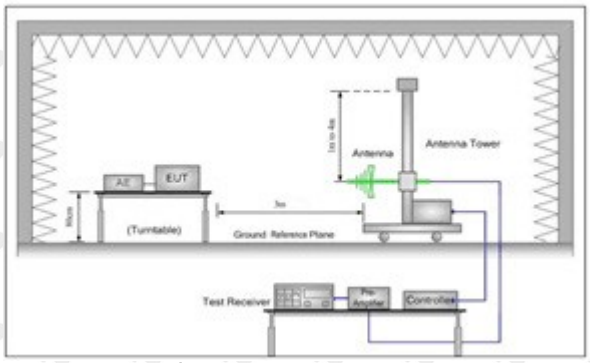


Figure2. 30MHz to 1GHz

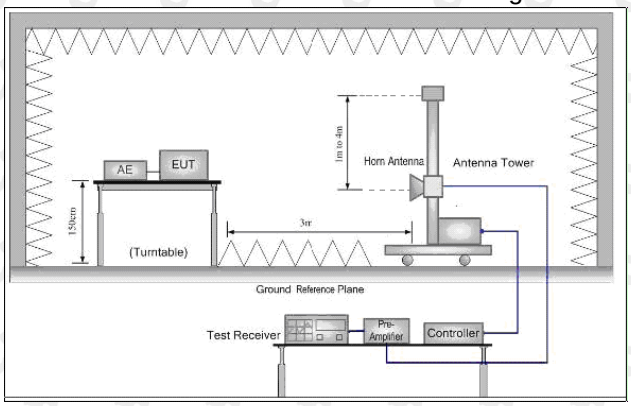


Figure 3. Above 1GHz

7.2 Limit

SpuriousEmissions:

Frequency	Field strength (dBµV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	20log 2400/F (kHz) + 80	Quasi-peak	3
0.490MHz-1.705MHz	20log 24000/F (kHz) + 40	Quasi-peak	3
1.705MHz-30MHz	20log 30 + 40	Quasi-peak	3
30MHz-88MHz	40.0	Quasi-peak	3
88MHz-216MHz	43.5	Quasi-peak	3
216MHz-960MHz	46.0	Quasi-peak	3
960MHz-1GHz	54.0	Quasi-peak	3
Above 1GHz	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximumpermittedaverageemissionlimitapplicabletotheequipmentundertest.Thispeaklimitappliestothe total peak emission level radiated by thedevice.

Field Strength of Fundamental Limit:

a. The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. 15,848 microvolts/meter at 3 meters=124dBuV/m.

b. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. 334 microvolts/meter at 3 meters=94.47dBuV/m.

c. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shallnot

exceed 334 microvolts/meter at 30 meters.

7.3 Testprocedure

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highestradiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antennatower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximumreading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a datasheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).

h.Test the EUT in the lowest channel ,the middle channel ,the Highestchannel

j.Repeat above procedures until all frequencies measured was complete.

Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 TestResult

Field Strength of Fundamental

Frequency (MHz)	Reading (dBuV/m)	Correction Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar (H/V)	Detector
13.33	46.88	15.82	62.70	80.51	-17.81	H	QP
13.33	46.33	15.82	62.15	80.51	-18.36	V	QP
13.91	46.23	15.82	62.05	80.51	-18.46	H	QP
13.91	48.50	15.82	64.32	80.51	-16.19	V	QP
13.553	57.46	15.61	73.07	90.47	-17.40	H	QP
13.553	58.25	15.61	73.86	90.47	-16.61	V	QP
13.56	88.25	12.33	100.58	124	-23.42	H	Peak
13.56	85.24	12.33	97.57	124	-26.43	V	Peak
13.567	56.68	12.33	69.01	90.47	-21.46	H	QP
13.567	56.79	12.33	69.12	90.47	-21.35	V	QP
13.41	46.05	15.82	61.87	80.5	-18.63	H	QP
13.41	44.24	15.82	60.06	80.5	-20.44	V	QP
13.71	43.19	15.82	59.01	80.5	-21.49	H	QP
13.71	46.27	15.82	62.09	80.5	-18.41	V	QP
13.47	54.07	15.82	69.89	90.47	-20.58	H	QP
13.47	52.61	15.82	68.43	90.47	-22.04	V	QP
13.67	50.57	15.82	66.39	90.47	-24.08	H	QP
13.67	49.40	15.82	65.22	90.47	-25.25	V	QP

Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

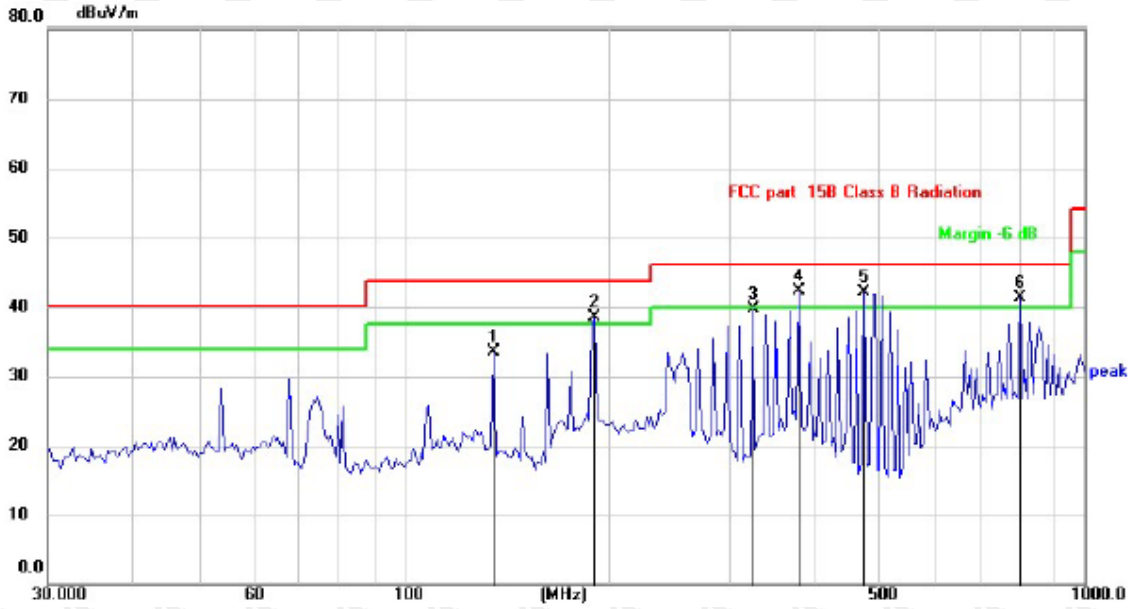
Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: *1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor*

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

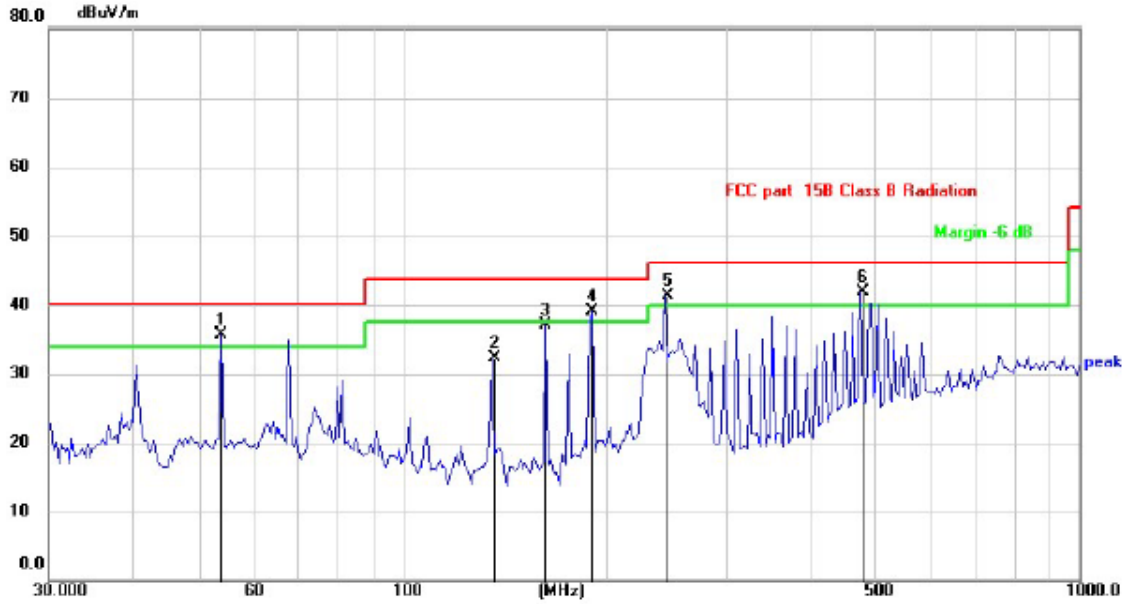
About 30MHz-1GHz Test Results:

Antenna polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		135.5061	39.35	-5.76	33.59	43.50	-9.91	QP
2	!	190.7390	46.56	-8.09	38.47	43.50	-5.03	QP
3		325.5958	44.03	-4.31	39.72	46.00	-6.28	QP
4	*	381.2485	44.68	-2.34	42.34	46.00	-3.66	QP
5	!	474.6661	42.08	0.10	42.18	46.00	-3.82	QP
6	!	803.1933	35.27	6.04	41.31	46.00	-4.69	QP

Antenna polarity: V

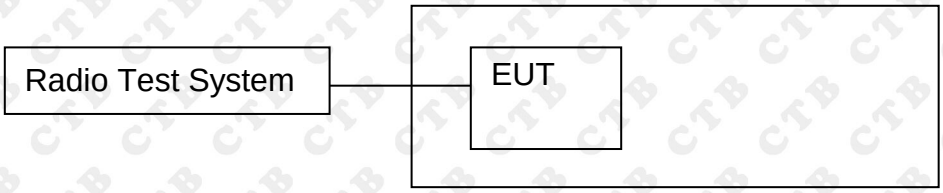


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	!	53.9763	41.46	-5.85	35.61	40.00	-4.39	QP
2		135.5062	38.14	-5.76	32.38	43.50	-11.12	QP
3		162.8959	42.91	-5.74	37.17	43.50	-6.33	QP
4	!	190.7390	47.21	-8.09	39.12	43.50	-4.38	QP
5	!	243.8043	47.14	-5.76	41.38	46.00	-4.62	QP
6	*	474.6662	41.89	0.10	41.99	46.00	-4.01	QP

Remark: 1. Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level
2. This EUT was tested in 3 axis and the worst case position data was reported.

8. FREQUENCYTOLERANCE

8.1 Block Diagram OfTestSetup



8.2 Limit

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Limit: ±0.01% of 13.56MHz=±1356Hz

8.3 Testprocedure

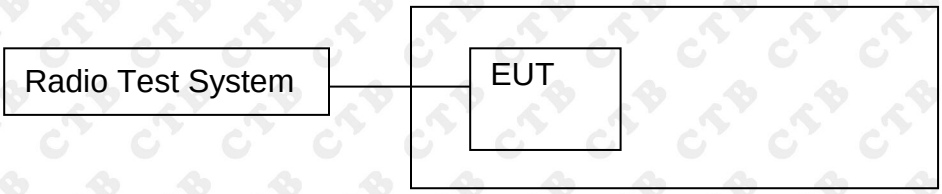
1. Set RBW = 10kHz.
2. Set the video bandwidth (VBW)≥RBW.
3. Detector = Peak.
4. Trace mode = maxhold.
5. Sweep = autocouple.
6. Allow the trace tostabilize.
7. The transmitter output (antenna port) was connected to the spectrumanalyzer.

8.4 TestResult

Test Conditions			Frequency Deviation		Limit
Frequency MHz	Power(Vdc)	Temperature (℃)	Measured Freq. (MHz)	Deviation (%)	
13.56	Normal	-20	13.5602	0.0014	±0.01%
	Normal	-10	13.5601	0.0007	
	Normal	0	13.5600	0.0000	
	Normal	10	13.5604	0.0029	
	Normal	20	13.5605	0.0037	
	Normal	30	13.5606	0.0044	
	Normal	40	13.5603	0.0022	
	Normal	50	13.5601	0.0007	
	Normal*85%	20	13.5601	0.0007	
	Normal *115%	20	13.5602	0.0015	

9. OCCUPIEDBANDWIDTH

9.1 Block Diagram OfTestSetup



9.2 Limit

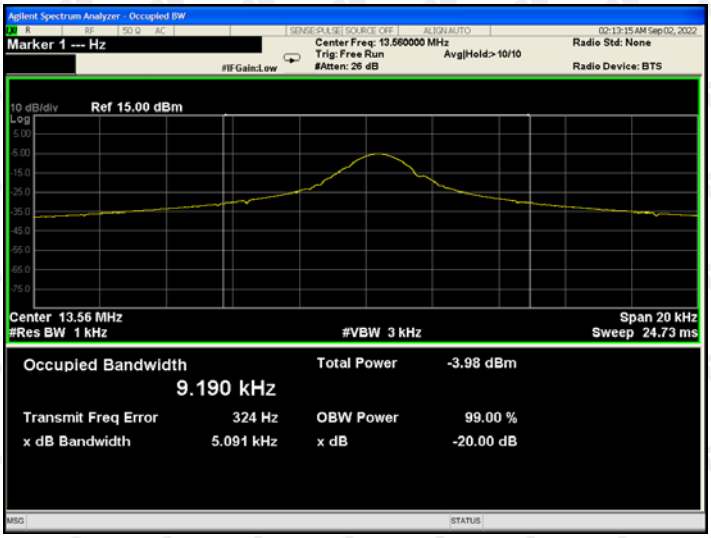
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be.deomonstrated by measuring the radiated emissions.

9.3 Testprocedure

1. Set RBW = 1kHz.
2. Set the video bandwidth (VBW)≥RBW.
3. Detector = Peak.
4. Trace mode = maxhold.
5. Sweep = autocouple.
6. Allow the trace tostabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamentalemission.

9.4 TestResult

Test Channel (MHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
13.56	5.001	N/A	PASS



10. ANTENNAREQUIREMENT

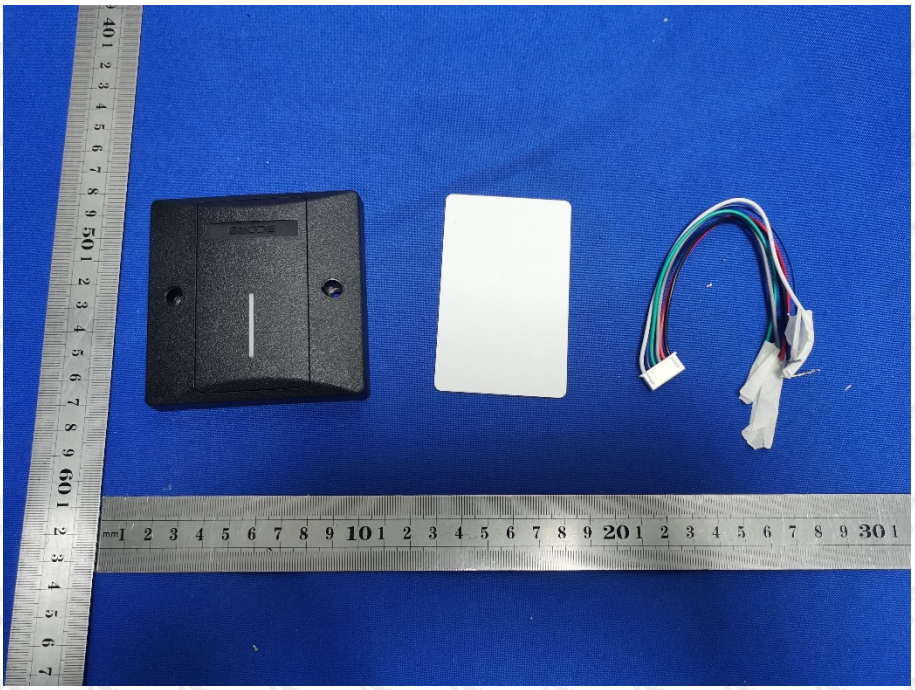
15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer 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.

EUT Antenna:

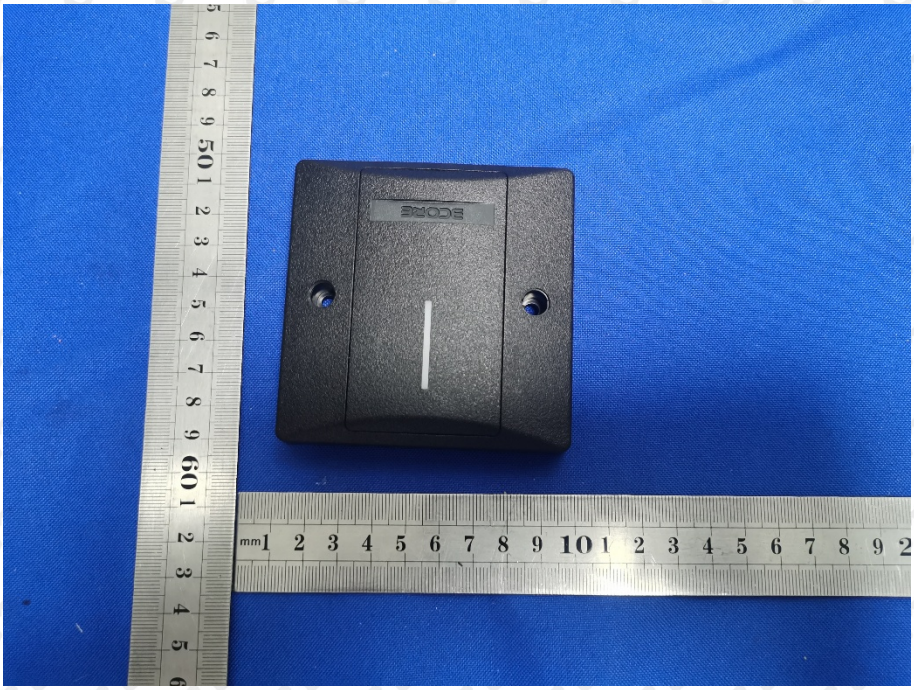
The antenna is Internal antenna and no consideration of replacement. The best case gain of the antenna is 1dBi.

11. EUTPHOTOGRAPHS

EUT Photo1



EUT Photo2



12. EUT TEST SETUPPHOTOGRAPHS

Radiated Emission

30M-1GHz

9KHz-30MHz

※※※※※ END OF REPORT ※※※※※