TEST REPORT

FCC ID: 2AI4T-VVDI

For

Shenzhen Xhorse Electronics Co., Ltd.

VVDI Key Tool

Model No.	:	VVDI Key Tool
Trade Name	:	Xhorse®
Prepared for	:	Shenzhen Xhorse Electronics Co., Ltd.
Address	:	2009, Changhong Science and Technology Building, Science Park South 12th Road, Nanshan District Shenzhen
Prepared by	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road, Bao'an, Shenzhen, China
Report No.	:	T1870724 08
Date of Receipt	:	June 06, 2017
Date of Test	:	June 06- July 05, 2017
Date of Report	:	July 05, 2017
Version Number	:	REV0

Contents

DECLARATION

Applicant	:	Shenzhen Xhorse Electronics Co., Ltd.
Manufacturer	:	Shenzhen Xhorse Electronics Co., Ltd.
Product	:	VVDI Key Tool
(A) Model No.	:	VVDI Key Tool
(B) Trade Name	:	Xhorse®
(C) Power supply	:	DC 3.7V From Battery, DC 5V from USB Port

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231: 2017,
ANSI C63.4:2014 ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Reak Yang Test Engineer	Reak Yang
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……..:		July 05, 2017

1. General Information

1.1. Description of Device (EUT)

EUT	:	VVDI Key Tool
Model No.	:	VVDI Key Tool
DIFF.	:	N/A
Trade mark	:	Xhorse®
Power supply	:	DC 3.7V From Battery, DC 5V from USB Port
Operation frequency	:	433.92MHz
Channel	:	1
Modulation	:	ASK
Antenna Type	:	Internal antenna, max gain 0dBi.
Applicant	:	Shenzhen Xhorse Electronics Co., Ltd.
Address	:	2009, Changhong Science and Technology Building, Science Park South 12th Road, Nanshan District Shenzhen
Manufacturer		Shenzhen Xhorse Electronics Co., Ltd.
Address		2009, Changhong Science and Technology Building, Science Park South 12th Road, Nanshan District Shenzhen

1.2. Accessories of device (EUT)

Accessories	:	N/A
Model	:	N/A
Input	:	N/A
Output	:	N/A
Accessories2	:	N/A
Model	:	N/A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road, Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Spurious Emission	Section 15.231&15.209	PASS
Conduction Emission	Section 15.207	PASS
Occupied bandwidth	Section 15.231	PASS
Transmission time	Section 15.231	PASS
Band Edge	Section 15.231	N/A
Antenna Requirement	Section 15.203	PASS
Duty cycle	Section 15.231&15.35	PASS
Note ： Test according to ANSI C63.4-2014 and ANSI C63.10-2013		

2.2. Assistant equipment used for test

Description1	:	Notebook
Manufacturer	:	ACER
Model No.	:	ZQR
Remark: FCC DOC approved		

2.3. Block Diagram

1. For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was set into test mode before test. New battery is used during all test

2.4. Test mode

EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
ASK	CH1	433.92

2.5. Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.71dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90 dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.26 dB	Polarize: H
	4.28 dB	Polarize: V
Uncertainty for conducted RF Power	0.16dB	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	CHENYU	N/A	N/A	2016.01.18	2Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2017.01.16	1Year
Receiver	R&S	ESPI	101873	2017.01.16	1Year
Receiver	R&S	ESCI	101165	2017.01.16	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	VULB9168-438	2016.01.18	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.20	2Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.01.16	1 Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2017.01.16	1 Year
Cable	Resenberger	N/A	No.1	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.2	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.3	2017.01.16	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2017.01.18	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2017.01.18	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2016.11.16	1 Year
vector Signal Generator	Agilent	E4438C	US44271917	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	2016.11.16	1 Year
Signal Analyzer	Agilent	N9020A	MY48030494	2016.11.16	1 Year
Remark: 1 For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement. Antenna Connector Impedance: 50Ω , Cable Loss: 1.0 dB					

3. Radiation Emission

3.1. Radiation Emission Limits(15.209&231e)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

	Field Strength of the Fundamental (dB μ V/mat 3 m)	Field Strength of spurious emission (dB μ V/mat 3 m)
433.92MHz	72.87dB μ V/m	52.87dB μ V/m

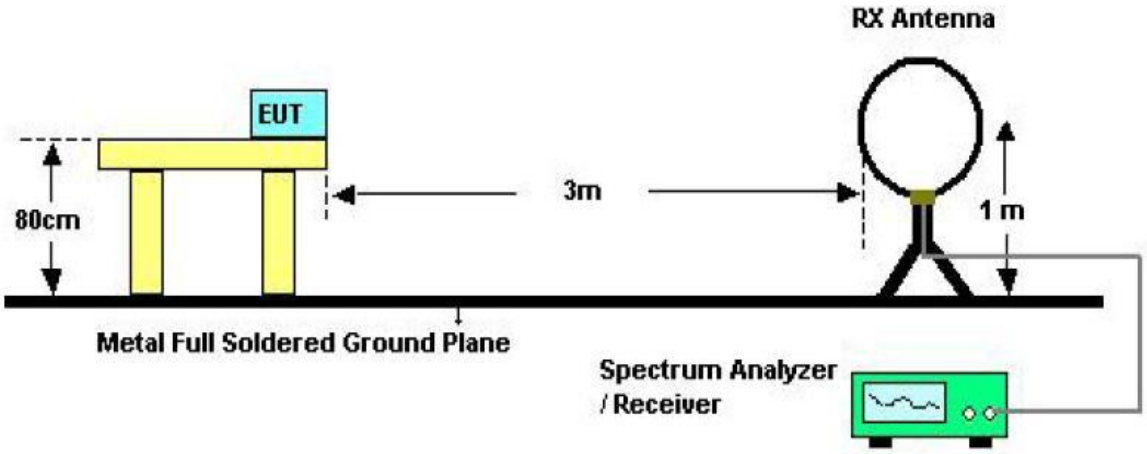
NOTE:

a) The tighter limit applies at the band edges.

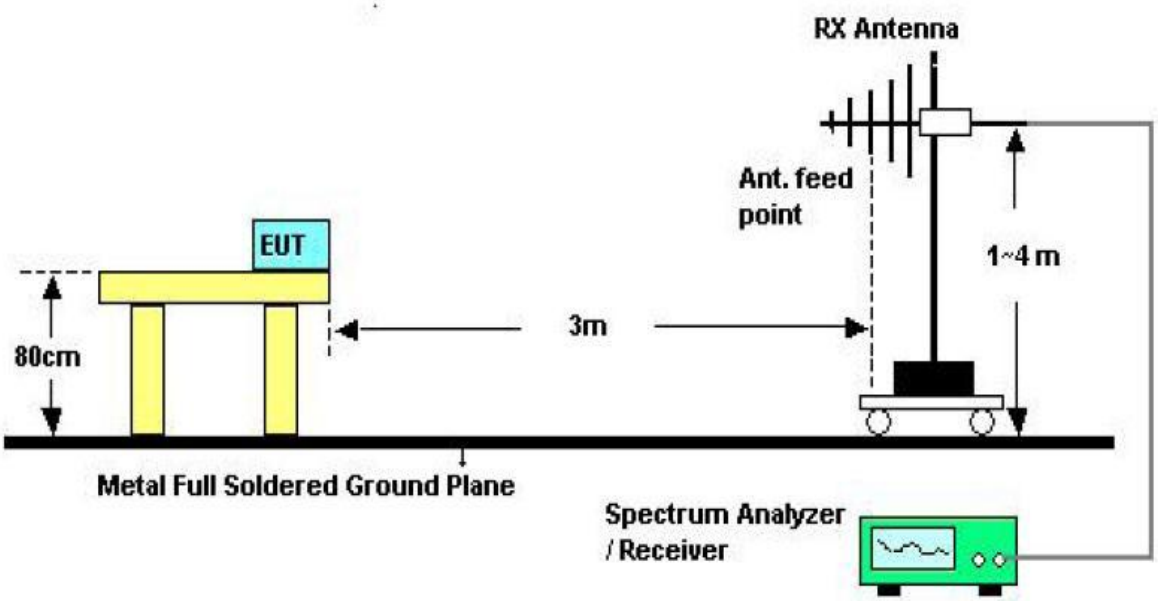
b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

3.2. Test Setup

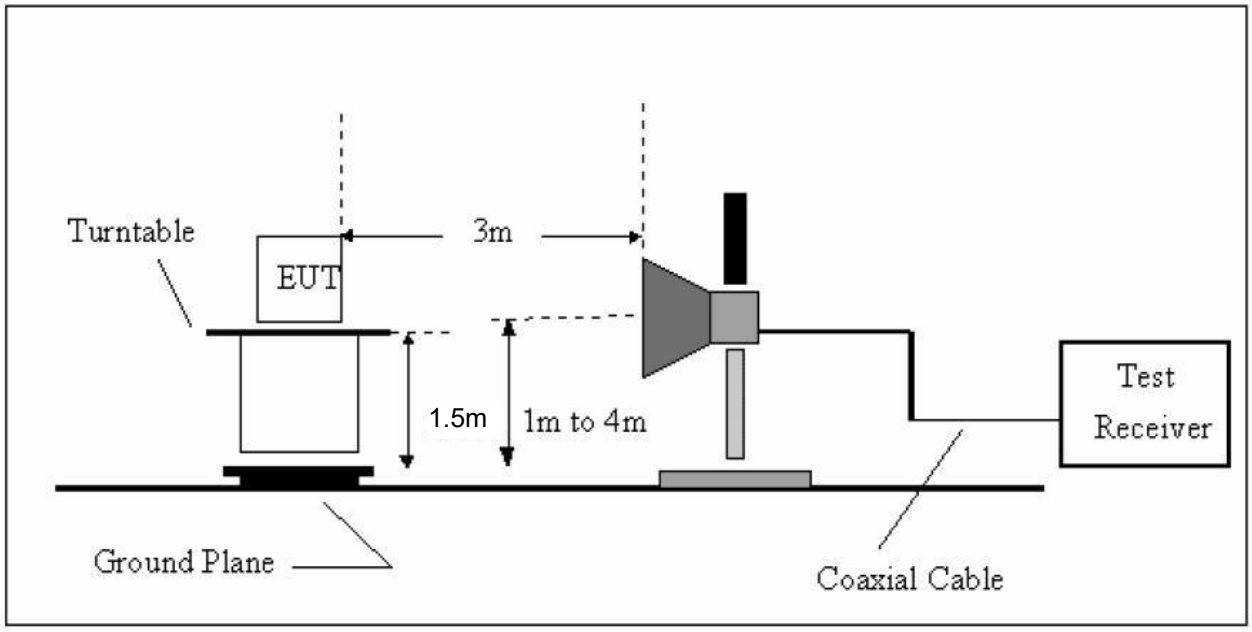
See the next page.



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.3. Test Procedure

a) The measureing distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground,The table was rotated 360 degrees to determine the position of the highest radiation
b) The Test antenna shall vary between 1m and 4m,Both Horizontal and Vertical antenna are set ot make measurement.
c) The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significent Peaks are then marked. and then Qusia Peak Detector mode remeasured
d) If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
e) For the actual test configuration, please see the test setup photo.

3.4. Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHz~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

3.5. Test Condition

Continual Transmitting in maximum power(The new battery be used during Test)

3.6. Test Result

We have scanned the 10th harmonic from 9KHz to the EUT.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: **PASS**

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

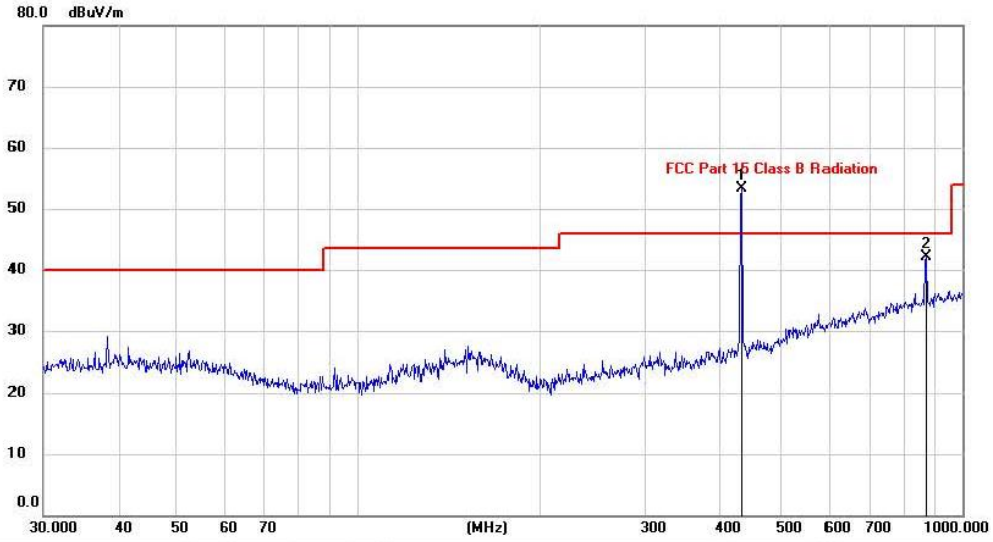
Notes: 1 --Means other frequency and mode comply with standard requirements and at least have 20dB margin.
Correct Factor=Cable Loss+Antenna Factor-Amplifier Gain
Measurement Result=Reading + Correct Factor
Margin=Measurement Result-Limit
2 –Spectrum setting:
a. Peak setting 30MHz-1GHz, RBW=100KHz, VBW=300KHz.
3- PK measure result values is less than the AVG limit values, so AV measure result values test not applicable.

Site LAB 966-2 Chamber	Polarization: *Horizontal*	Temperature: 23.8
Limit: FCC Part 15 C	Power:	Humidity: 56 %
EUT:	Distance:	
M/N: VVDI Key TOOL		
Mode:		
Note:		

Engineer Signature:

Radiated Emission Measurement

File : Data :#6 Date: 2017/6/23 Time: 15:14:32

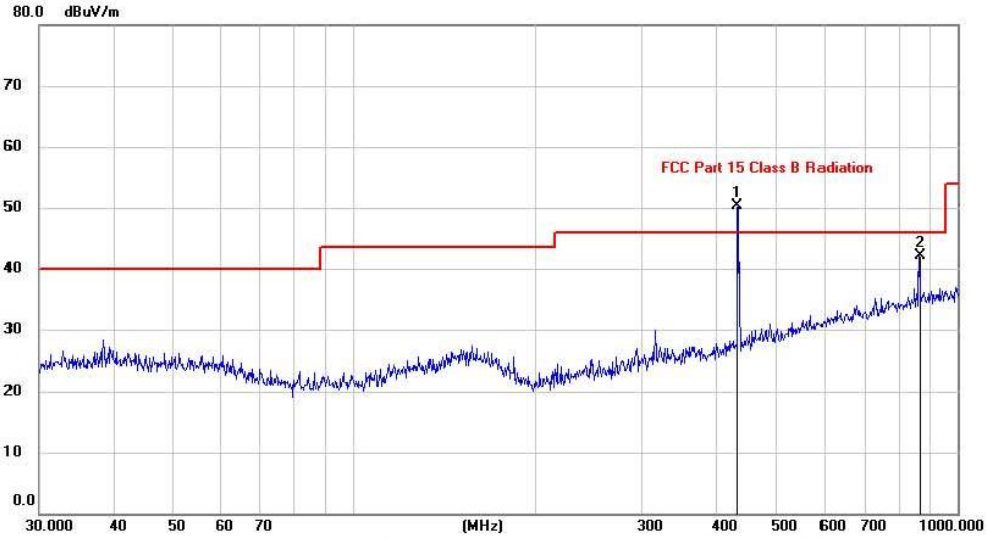


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	433.9200	37.02	16.36	53.38			peak			
2		867.8400	19.52	22.66	42.18	46.00	-3.82	peak			

Site LAB 966-2 Chamber	Polarization: *Vertical*	Temperature: 23.8
Limit: FCC Part 15 C	Power:	Humidity: 56 %
EUT:	Distance:	
M/N: VVDI Key TOOL		
Mode:		
Note:		
Engineer Signature:		

Radiated Emission Measurement

File : Data :#7 Date: 2017/6/23 Time: 15:15:04



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	433.9200	33.88	16.36	50.24			peak			
2		867.8400	19.39	22.66	42.05	46.00	-3.95	peak			

Note: This report only list the worst data below 1GHz.

Radiated Emissions Result of Inside band above 1GHz

EUT	VVDI Key Tool	**Model Name**	VVDI Key Tool
Temperature	25°C	**Relative Humidity**	56%
Pressure	960hPa	**Test voltage**	DC 3.7V from battery
Test Mode	TX CH1	**Test by**	Reak

Channel (433.92MHz Above 1GHz)

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
1301.76	V	55.23	---	-10.41	44.82	74.00	-29.18	Peak
--	V	--	---	--	--	--	--	--
1301.76	H	58.91	---	-10.41	48.5	74.00	-25.5	Peak
--	H	--	---	--	--	--	--	--

4. POWER LINE CONDUCTED EMISSION

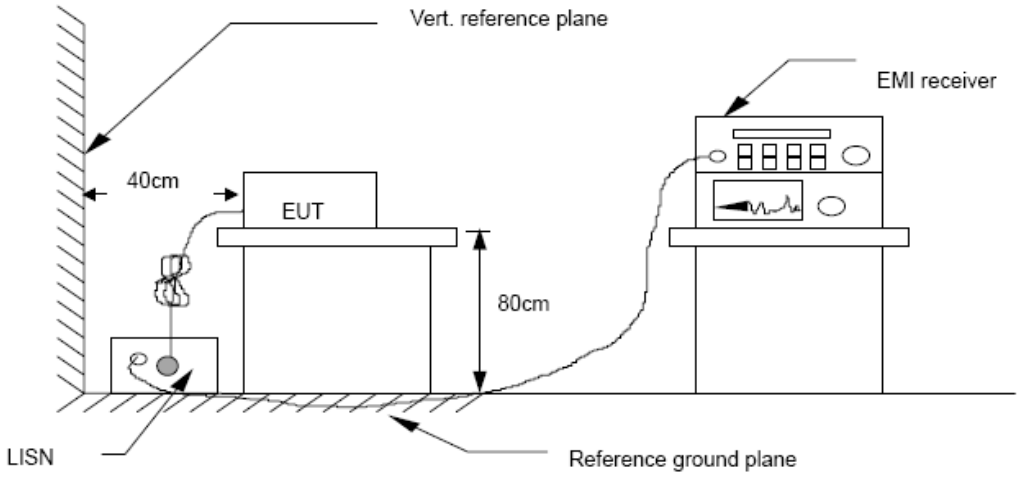
4.1. Conducted Emission Limits (15.209)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

4.2. Test Setup



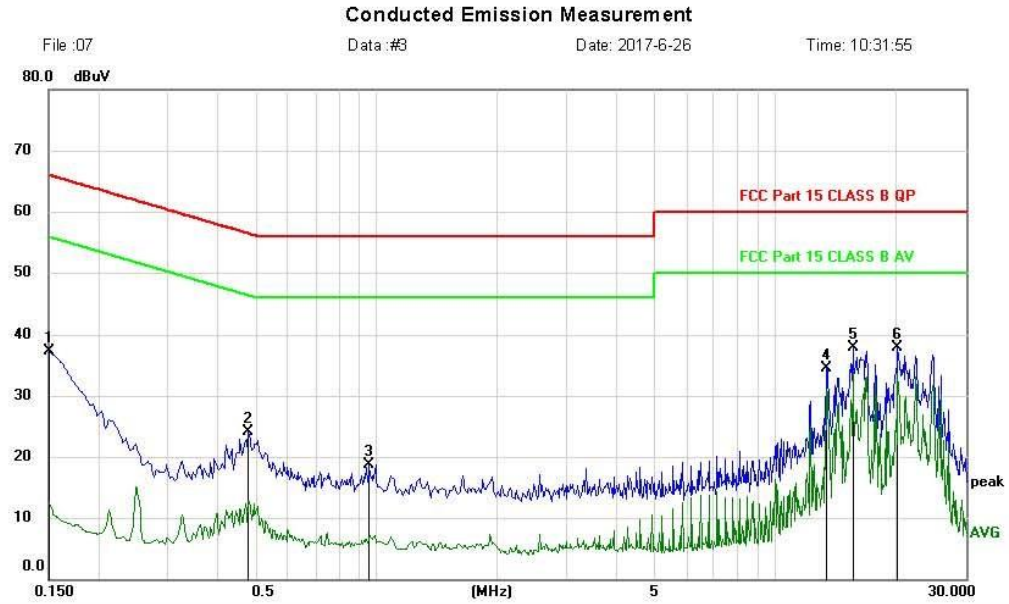
4.3. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4-2014 on Conducted Emission Measurement.
The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

4.4. Test Results

Conclusion: **PASS**
Detailed information please see the following page.

Site: LAB	Phase: N	Temperature: 24.2
Limit: FCC Part 15 C	Power:	Humidity: 53 %
EUT:		
M/N: VVDI Key TOOL		
Mode: TX		
Note:		

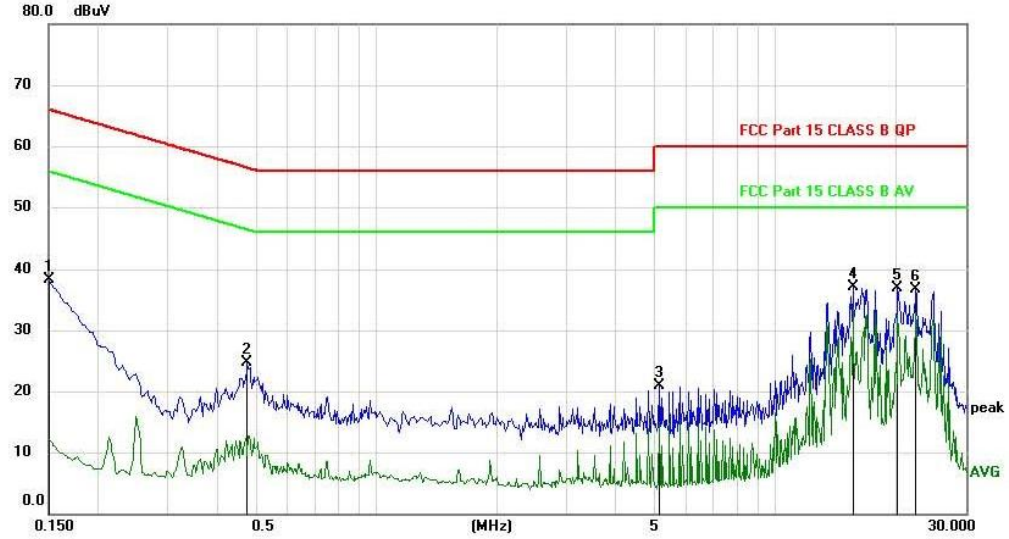


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	27.68	9.66	37.34	66.00	-28.66	peak	
2		0.4785	14.30	9.71	24.01	56.37	-32.36	peak	
3		0.9555	8.92	9.77	18.69	56.00	-37.31	peak	
4		13.3605	24.16	10.35	34.51	60.00	-25.49	peak	
5		15.6205	27.41	10.43	37.84	60.00	-22.16	peak	
6	*	20.2605	27.40	10.48	37.88	60.00	-22.12	peak	

Site LAB	Phase:	*L1*	Temperature: 24.2
Limit: FCC Part 15 C	Power:		Humidity: 53 %
EUT:			
M/N: VVDI Key TOOL			
Mode: TX			
Note:			

Conducted Emission Measurement

File :07 Data :#4 Date: 2017-6-26 Time: 10:33:00



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	28.59	9.66	38.25	66.00	-27.75	peak	
2		0.4740	14.90	9.71	24.61	56.44	-31.83	peak	
3		5.1205	10.71	10.16	20.87	60.00	-39.13	peak	
4	*	15.6205	26.76	10.43	37.19	60.00	-22.81	peak	
5		20.2605	26.48	10.48	36.96	60.00	-23.04	peak	
6		22.4605	26.04	10.61	36.65	60.00	-23.35	peak	

5. Occupied bandwidth

5.1. Test limit

Please refer section15.231

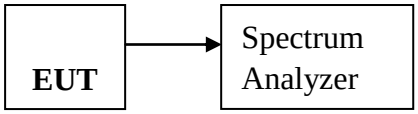
According to §15.231(C), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

5.2. Method of measurement

a)The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

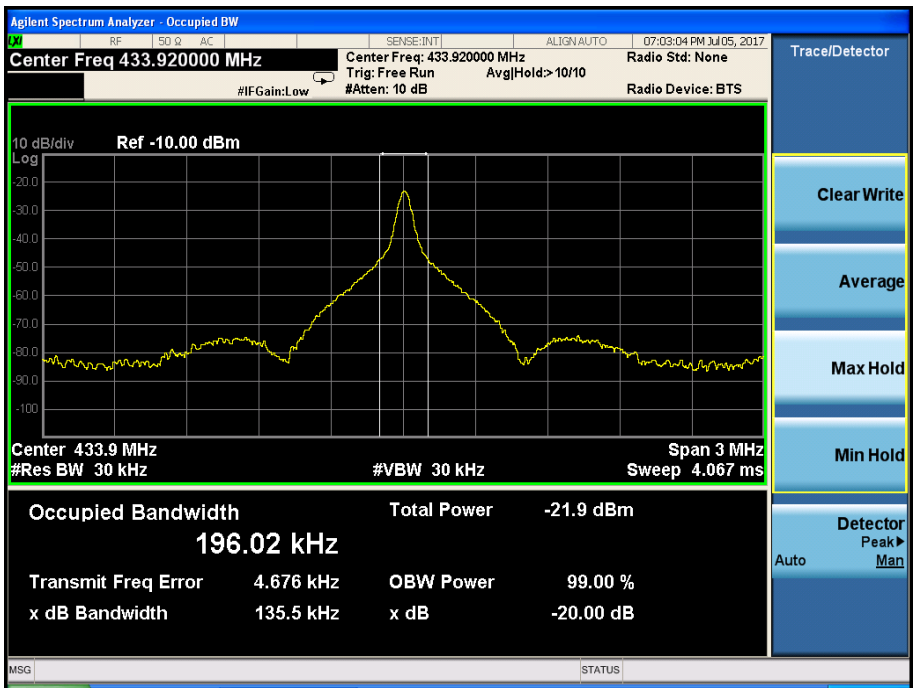
b)The test receiver RBW set 30KHz,VBW set 30KHz,Sweep time set auto.

5.3. Test Setup



5.4. Test Results

EUT: VVDI Key Tool					
M/N: VVDI Key Tool					
Test Mode: Keeping TX mode					
Test date: 2017-06-26		Test site: RF site		Tested by: Eric	
Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth	Limit (kHz)	Conclusion
ASK	433.92	135.5	/	1084.8	PASS


Agilent Spectrum Analyzer - Occupied BW
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
07:03:04 PM Jul 05, 2017
Center Freq 433.920000 MHz
#IFGain:Low
Center Freq: 433.920000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Log
Ref -10.00 dBm
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100
Center 433.9 MHz
#Res BW 30 kHz
#VBW 30 kHz
Span 3 MHz
Sweep 4.067 ms
Occupied Bandwidth
196.02 kHz
Total Power -21.9 dBm
Transmit Freq Error 4.676 kHz
OBW Power 99.00 %
x dB Bandwidth 135.5 kHz
x dB -20.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS

6. Transmission time

6.1. Test limit

Please refer section15.231(e)

According to §15.231(e), In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.2. Method of measurement

6.2.1. Place the EUT on the table and set it in transmitting mode.

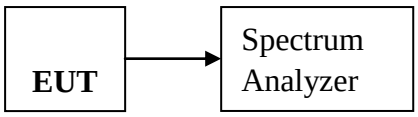
6.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3. Set spectrum analyzer Span = 0MHz, Sweep = 200ms.

6.2.4. Set the spectrum analyzer as RBW, VBW=1MHz,

6.2.5. Max hold, view and count how many channel in the band.

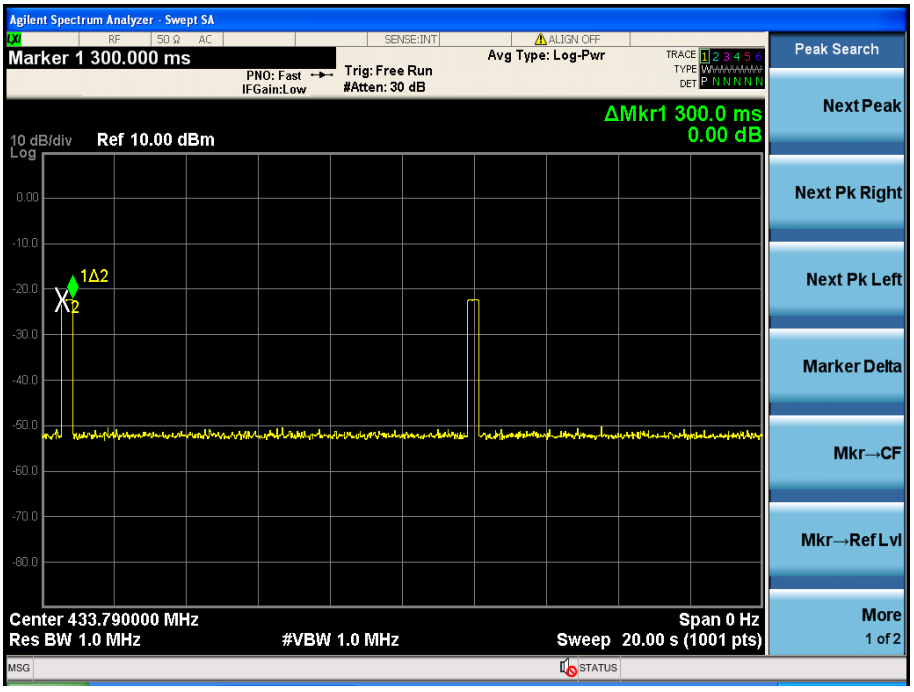
6.3. Test Setup

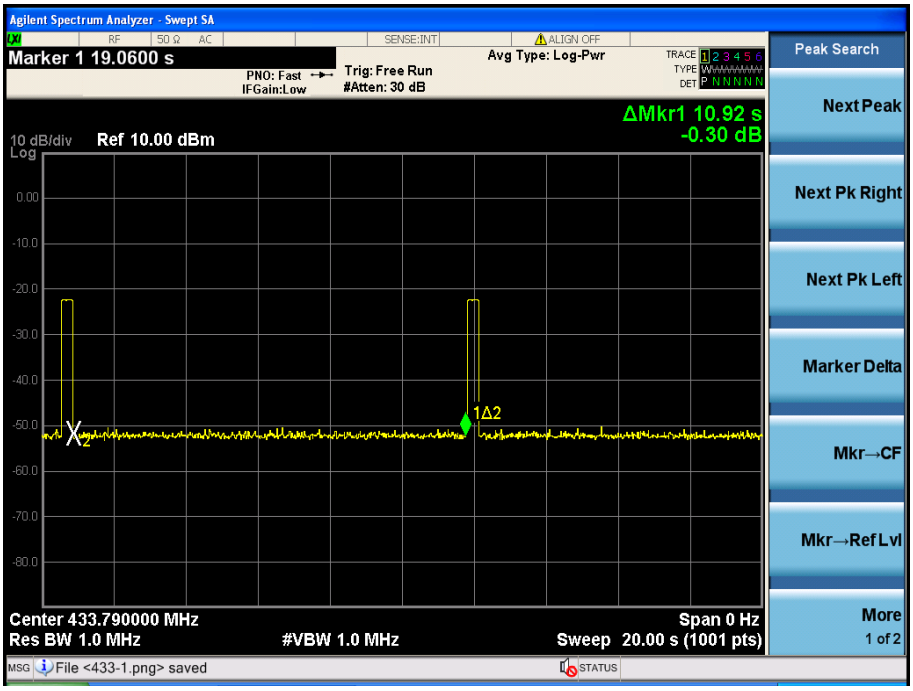


6.4. Test Results

EUT: VVDI Key Tool				
M/N: VVDI Key Tool				
Test Mode: Keeping TX mode				
Test date: 2016-06-26		Test site: RF site	Tested by: Eric	
Mode	Freq (MHz)	Test Result(S)	Limit (S)	Conclusion
ASK	433.92	0.3	<1S	PASS

EUT: VVDI Key Tool				
M/N: VVDI Key Tool				
Test Mode: Keeping TX mode				
Test date: 2016-06-26		Test site: RF site	Tested by: Eric	
Mode	Freq (MHz)	Silent Period(S)	Limit (S)	Conclusion
ASK	433.92	10.92	>10S	PASS
Note: According OP, EUT interval 11S transmitter a time, compliance with 15.231e section.				




Agilent Spectrum Analyzer - Swept SA
Marker 1 19.0600 s
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
ΔMkr1 10.92 s
-0.30 dB
10 dB/div
Log
Ref 10.00 dBm
1Δ2
Center 433.790000 MHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 20.00 s (1001 pts)
File <433-1.png> saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

7. Antenna Requirement

7.1. Standard 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 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.

7.2. Antenna Connected Construction

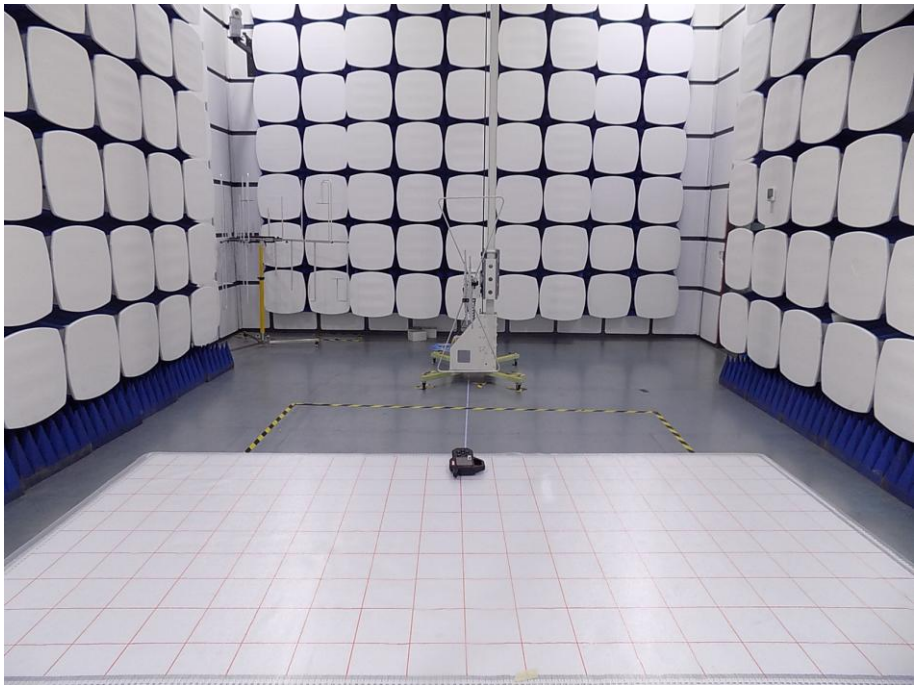
The directional gains of antenna used for transmitting is 2.5dBi, and the antenna connector is de- signed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

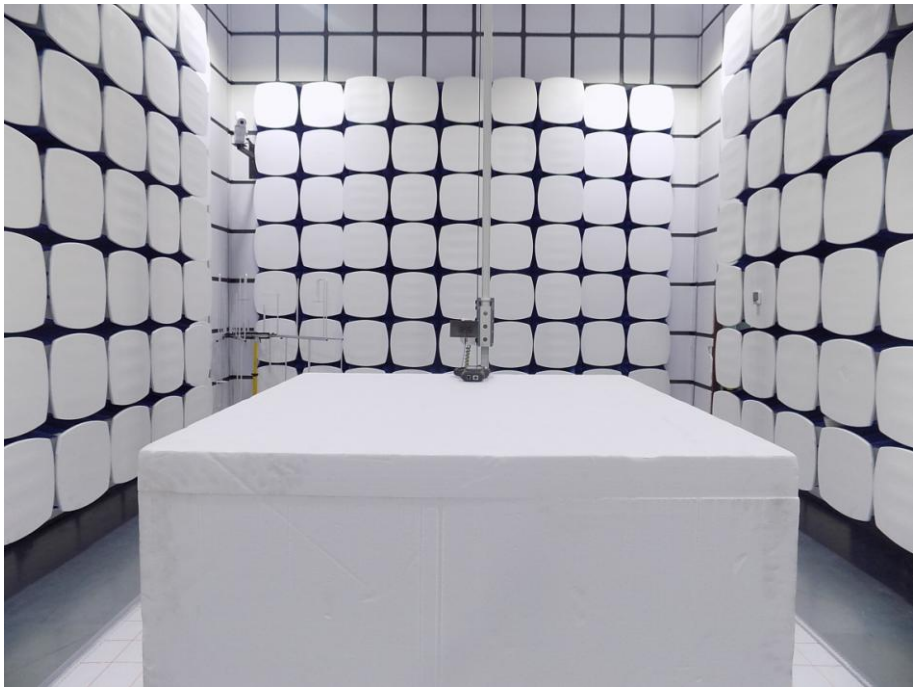
7.3. Result

The EUT antenna is Integrated antenna. It comply with the standard requirement.

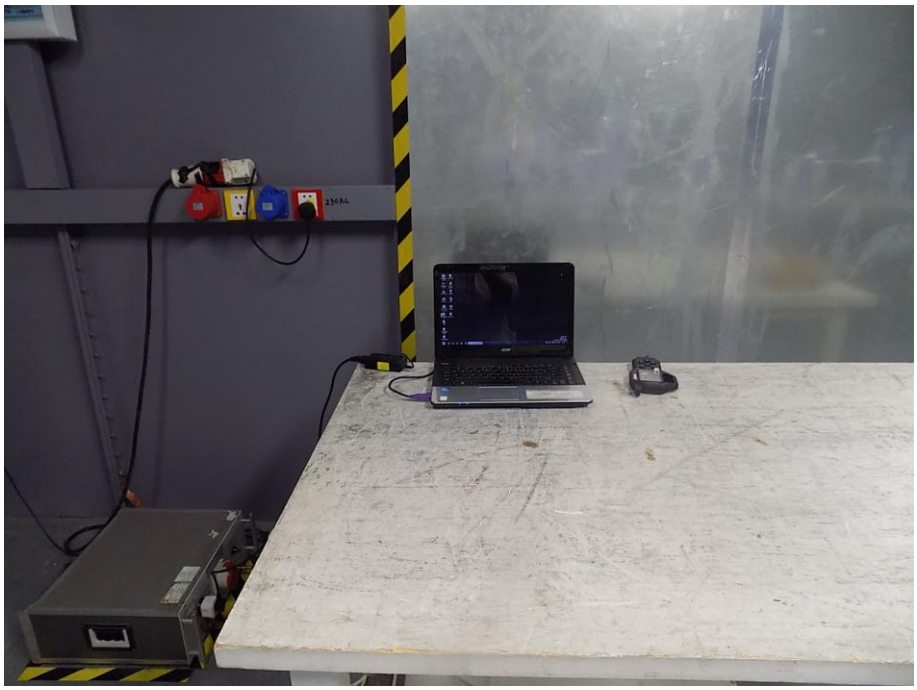
8. Test setup photo

Photos of Radiated emission





Photos of Power Line Conducted Emission



9. Photos of EUT

---------END OF THE REPORT-------