

FCC RF Test Report

(5.8GHz)

Applicant: Autel Robotics Co., Ltd.

Address of Applicant: 18th Floor, Block C1, Nanshan iPark, No. 1001 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, 518055, China

Equipment Under Test (EUT)

Product Name: Autel Smart Controller SE

Model No.: EF6

Trade Mark: 

FCC ID: 2AGNTEF6240958A

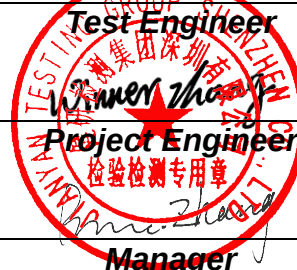
Applicable Standards: FCC CFR Title 47 Part 15E (§15.407)

Date of Sample Receipt: 24 Jun., 2022

Date of Test: 25 Jun., to 14 Jul., 2022

Date of Report Issued: 15 Jul., 2022

Test Result: PASS

Tested by:*Mike Ou***Date:***15 Jul., 2022***Reviewed by:***Wenwen Zhang*
Project Engineer**Date:***15 Jul., 2022***Approved by:***Wenwen Zhang*
Manager**Date:***15 Jul., 2022*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	15 Jul., 2022	Original

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4 General Information

4.1 Client Information

Applicant:	Autel Robotics Co., Ltd.
Address:	18th Floor, Block C1, Nanshan iPark, No. 1001 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, 518055, China
Manufacturer:	Autel Robotics Co., Ltd.
Address:	18th Floor, Block C1, Nanshan iPark, No. 1001 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, 518055, China
Factory:	Autel Robotics Co., Ltd. Guangming Branch
Address:	No.701, Jixie Factory, Building 4, Yanxiang Technology Industrial Park, Gaoxin Road, Dongzhou Community, Guangming street, Guangming district, Shenzhen, Guangdong, China

4.2 General Description of E.U.T.

Product Name:	Autel Smart Controller SE
Model No.:	EF6
Operation Frequency:	5728.0MHz~5847.0MHz
Channel Numbers:	5728.0MHz~5847.0MHz 120 for 1.4MHz Bandwidth 110 for 10 MHz Bandwidth 102 for 20 MHz Bandwidth
Modulation Technology:	QPSK, 16QAM
Antenna Type:	External Antenna
Antenna Gain:	3.1 dBi
Antenna Transmit Mode:	MISO (1TX, 2RX)
Power Supply:	Rechargeable Li-ion Battery DC7.7V/1900mAh
AC Adapter:	Model No.:RLC-537 Input: AC100-240V, 50/60Hz 0.85A Output:USB-C:5V, 3A; 9V, 3A; 12V, 2.5A USB-A:5V, 3A; 9V, 3A; 12V, 2.5A USB-A+ USB-C:5V, 3.4A
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Test Mode and Environment

Test Mode:	
Transmitting mode:	Keep the EUT in continuous transmitting with modulation
Operating Environment:	
Temperature:	15°C ~ 35°C
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1010 mbar
Voltage:	Nominal: 7.7 Vdc, Extreme: Low 6.55 Vdc, High 8.80 Vdc

4.4 Description of Test Auxiliary Equipment

The EUT has been tested as an independent unit.

4.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	±3.11 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.62 dB
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	±5.34 dB
Radiated Emission (30MHz ~ 1GHz) (10m SAC)	±4.32 dB
Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.	

4.6 Additions to, Deviations, or Exclusions from the Method

No

4.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

4.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

4.9 Test Instruments List

Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2024
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	03-07-2022	03-06-2023
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	04-07-2022	04-06-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-20-2022	01-19-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	03-30-2022	03-29-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-05-2022	03-04-2023
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-19-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	10-27-2021	10-26-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-20-2022	01-19-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Radiated Emission(10m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
10m SAC	ETS	RFSD-100-F/A	WXJ090	04-28-2021	04-27-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-1	04-01-2022	03-31-2023
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-2	03-31-2022	03-30-2023
EMI Test Receiver	R&S	ESR 3	WXJ090-3	03-30-2022	03-29-2023
EMI Test Receiver	R&S	ESR 3	WXJ090-4	03-30-2022	03-29-2023
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-6	01-20-2022	01-19-2023
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-7	01-20-2022	01-19-2023
Cable	Bost	JYT10M-1G-NN-10M	WXG002-7	01-20-2022	01-19-2023
Cable	Bost	JYT10M-1G-NN-10M	WXG002-8	01-20-2022	01-19-2023
Test Software	R&S	EMC32	Version: 10.50.40		

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESR3	WXJ003-2	10-21-2021	10-20-2022
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	02-24-2022	02-23-2023
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	03-30-2022	03-29-2023
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	02-24-2022	02-23-2023
RF Switch	TOP PRECISION	RSU0301	WXG003	N/A	
Test Software	AUDIX	E3	Version: 6.110919b		

Conducted Method:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-27-2021	10-26-2022
DC Power Supply	Keysight	E3642A	WXJ025-2	11-27-2020	11-26-2023
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	03-19-2021	03-18-2023
Power Detector Box	MWRFTTEST	MW100-PSB	WXJ007-4	11-19-2021	11-18-2022
RF Control Unit	MWRFTTEST	MW100-RFCB	WXG006	N/A	
Test Software	MWRFTTEST	MTS 8310	Version: 2.0.0.0		

5 Measurement Setup and Procedure

5.1 Test Channel

According to ANSI C63.10-2013 chapter 5.6.1 Table 4 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

5.8GHz:

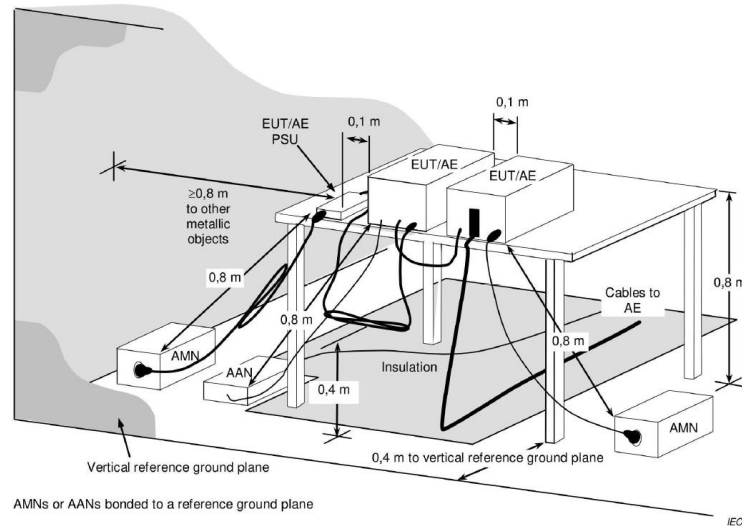
Operation Frequency each of channel for 1.4MHz Bandwidth							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5728.0MHz	4	5731.0MHz	....	....	120	5847.0MHz
2	5729.0MHz	5	5732.0MHz	61	5788MHz		
3	5730.0MHz	6	5733.0MHz	....	....		
Note:							
1. Channel 1, 61 & 120 selected as Lowest, Middle and Highest channel.							

Operation Frequency each of channel for 10MHz Bandwidth							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5733.0MHz	4	5736.0MHz	....	....	109	5841.0MHz
2	5734.0MHz	5	5737.0MHz	56	5788.0MHz	110	5842.0MHz
3	5735.0MHz	6	5738.0MHz	....	....		
Note:							
1. Channel 1, 56 & 110 selected as Lowest, Middle and Highest channel.							

Operation Frequency each of channel for 51 for 20MHz Bandwidth							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5738.0MHz	4	5741.0MHz	....	....	50	5838.0MHz
2	5739.0MHz	5	5742.0MHz	52	5789.0MHz	51	5839.0MHz
3	5740.0MHz	6	5743.0MHz	....	....		
Note:							
1. Channel 1, 52 & 51 selected as Lowest, Middle and Highest channel.							

5.2 Test Setup

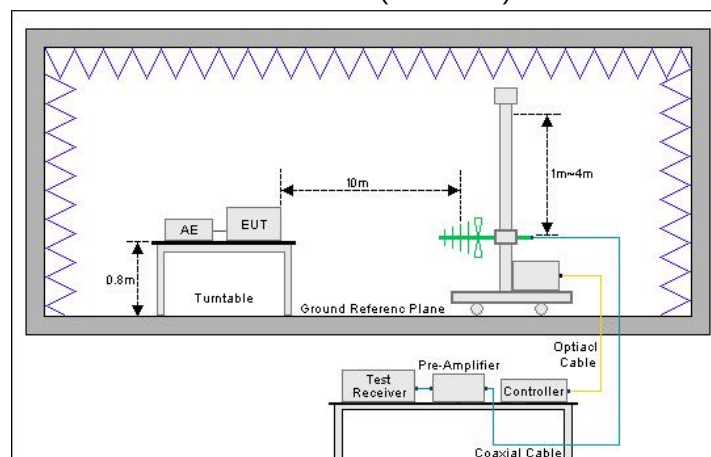
1) Conducted emission measurement:



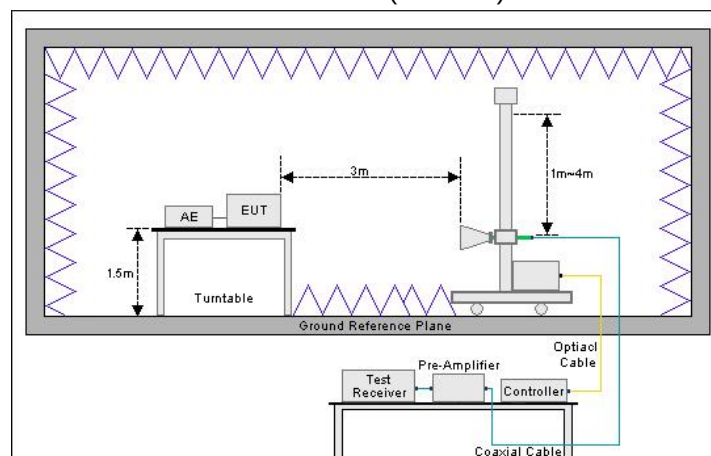
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

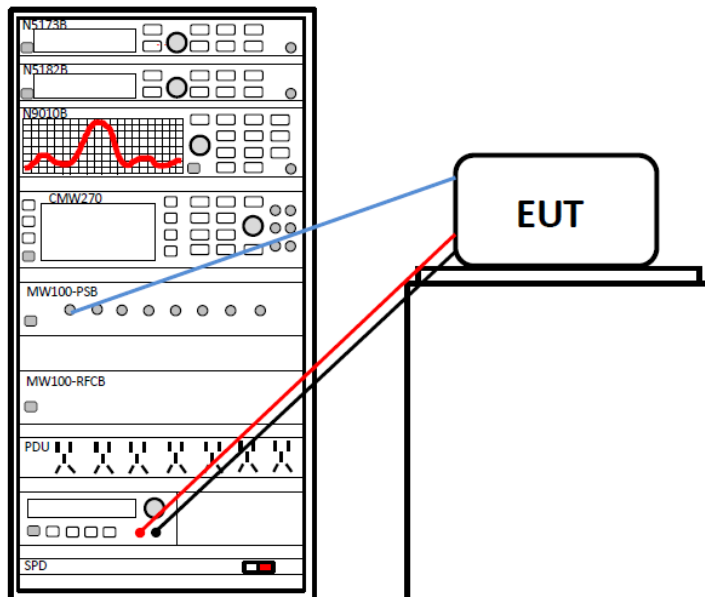
Below 1GHz (10m SAC)



Above 1GHz (3m SAC)



3) Conducted test method



5.3 Test Procedure

Test method	Test step
Conducted emission	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. 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.
Radiated emission	For below 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 10 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 10 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. For above 1GHz: 1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
Conducted test method	1. The Wi-Fi antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software.

6 Test Results

6.1 Summary

6.1.1 Clause and Data Summary

Test items	Standard clause	Test data	Result
Antenna Requirement	15.203	See Section 6.2	Pass
AC Power Line Conducted Emission	15.207 15.407 (b)(9)	See Section 6.3	Pass
Duty Cycle	ANSI C63.10-2013	Appendix A - 5.8GHz	Pass
Conducted Peak Output Power Power Spectral Density	15.407 (a)(3)(i)	Appendix A - 5.8GHz	Pass
26dB Emission Bandwidth 99% Occupied Bandwidth	15.407 (a)(12)	Appendix A - 5.8GHz	Pass
6dB Emission Bandwidth	15.407 (e)	Appendix A - 5.8GHz	Pass
Unwanted Emissions	15.205 15.209 15.407 (4), (9), (10)	See Section 6.4	Pass
Frequency Stability	15.407 (g)	Appendix A - 5.8GHz	Pass
Remark: 1. Pass: The EUT complies with the essential requirements in the standard. 2. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 1.0dB (provided by the customer).			
Test Method:	ANSI C63.10-2013 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01		

6.1.2 Test Limit

Test items	Limit														
AC Power Line Conducted Emission	<table><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-Peak</th><th>Average</th></tr><tr><td>0.15 – 0.5</td><td>66 to 56 Note 1</td><td>56 to 46 Note 1</td></tr><tr><td>0.5 – 5</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>60</td><td>50</td></tr></table> Note 1: The limit level in dBμV decreases linearly with the logarithm of frequency. Note 2: The more stringent limit applies at transition frequencies.	Frequency (MHz)	Limit (dBμV)		Quasi-Peak	Average	0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1	0.5 – 5	56	46	5 – 30	60	50
Frequency (MHz)	Limit (dBμV)														
	Quasi-Peak	Average													
0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1													
0.5 – 5	56	46													
5 – 30	60	50													
Conducted Peak Output Power Power Spectral Density	For the band 5.725-5.895 GHz: For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, Fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.														
26dB Emission Bandwidth 99% Occupied Bandwidth	N/A														
6dB Emission Bandwidth	Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.														

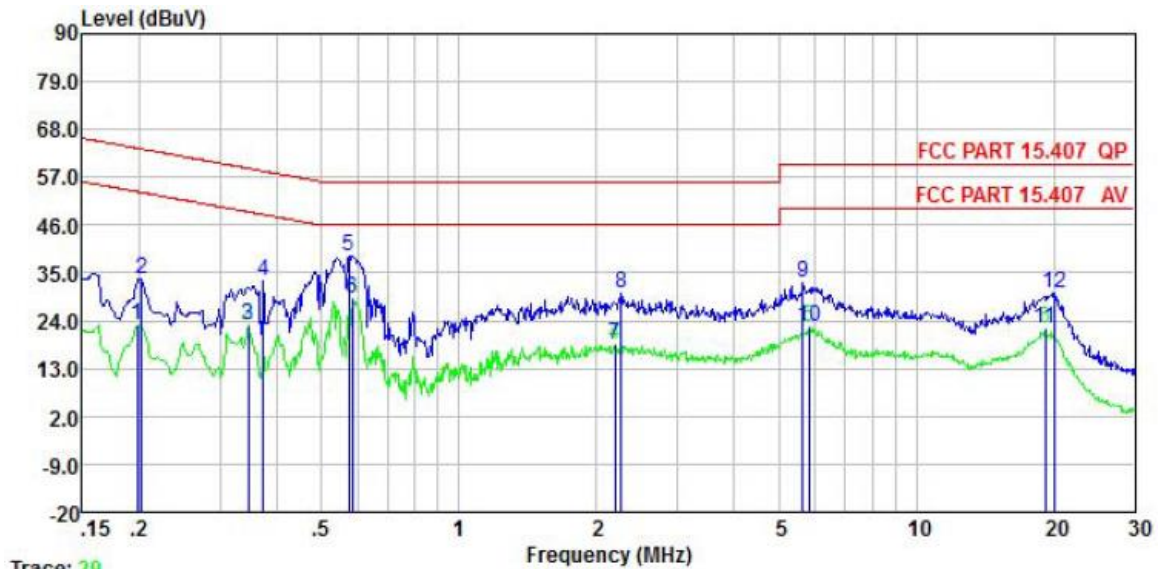
Unwanted Emissions	(1) For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.																						
	(2) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. The provisions of § 15.205 apply to intentional radiators operating under this section:																						
	<table><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBµV/m)</th><th rowspan="2">Detector</th></tr><tr><th>@ 3m</th><th>@ 10m</th></tr><tr><td>30 – 88</td><td>40.0</td><td>30.0</td><td>Quasi-peak</td></tr><tr><td>88 – 216</td><td>43.5</td><td>33.5</td><td>Quasi-peak</td></tr><tr><td>216 – 960</td><td>46.0</td><td>36.0</td><td>Quasi-peak</td></tr><tr><td>960 – 1000</td><td>54.0</td><td>44.0</td><td>Quasi-peak</td></tr></table>	Frequency (MHz)	Limit (dBµV/m)		Detector	@ 3m	@ 10m	30 – 88	40.0	30.0	Quasi-peak	88 – 216	43.5	33.5	Quasi-peak	216 – 960	46.0	36.0	Quasi-peak	960 – 1000	54.0	44.0	Quasi-peak
	Frequency (MHz)		Limit (dBµV/m)			Detector																	
		@ 3m	@ 10m																				
30 – 88	40.0	30.0	Quasi-peak																				
88 – 216	43.5	33.5	Quasi-peak																				
216 – 960	46.0	36.0	Quasi-peak																				
960 – 1000	54.0	44.0	Quasi-peak																				
Note: The more stringent limit applies at transition frequencies.																							
<table><tr><th rowspan="2">Frequency</th><th colspan="2">Limit (dBµV/m) @ 3m</th></tr><tr><th>Average</th><th>Peake</th></tr><tr><td>Above 1 GHz</td><td>54.0</td><td>74.0</td></tr></table>	Frequency	Limit (dBµV/m) @ 3m		Average	Peake	Above 1 GHz	54.0	74.0															
Frequency		Limit (dBµV/m) @ 3m																					
	Average	Peake																					
Above 1 GHz	54.0	74.0																					
Note: The measurement bandwidth shall be 1 MHz or greater.																							
Frequency Stability	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.																						

6.2 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203
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.	
E.U.T Antenna:	
The antenna is an External antenna which cannot replace by end-user, the best case gain of the antenna is 3.1 dBi. See product internal photos for details.	

6.3 AC Power Line Conducted Emission

Product name:	Autel Smart Controller SE	Product model:	EF6
Test by:	Mike	Test mode:	5G Wi-Fi mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz		



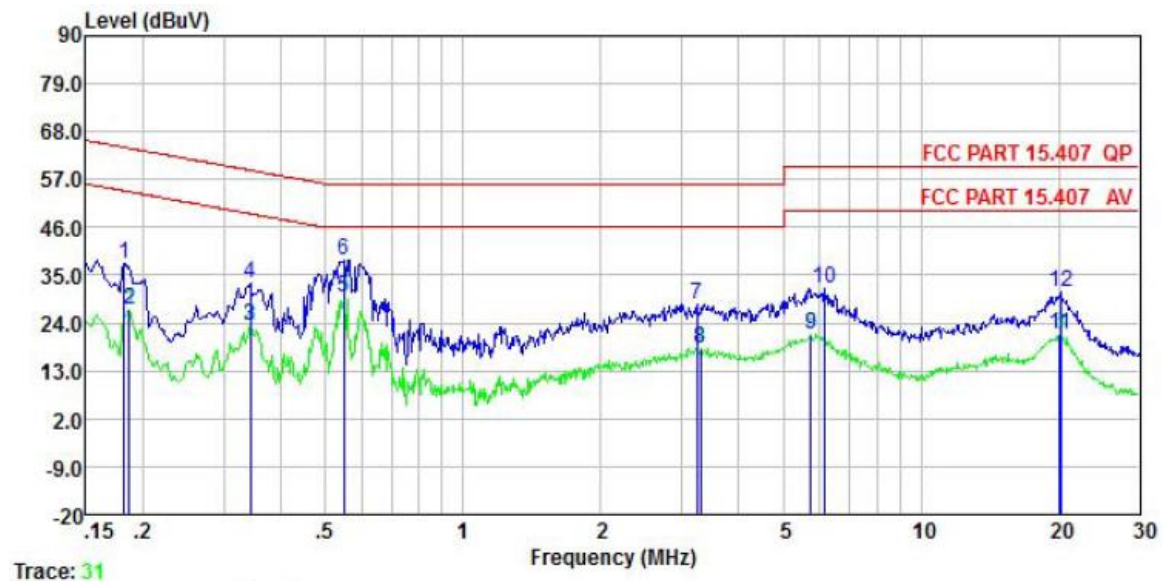
Trace: 29

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	dBuV	Factor	Loss	dBuV	dBuV	Limit	Remark
			dB	dB			dB	
1	0.198	23.00	0.05	0.04	23.09	53.71	-30.62	Average
2	0.202	33.56	0.05	0.04	33.65	63.54	-29.89	QP
3	0.346	22.79	0.06	0.02	22.87	49.05	-26.18	Average
4	0.373	33.16	0.06	0.03	33.25	58.43	-25.18	QP
5	0.573	38.95	0.06	0.02	39.03	56.00	-16.97	QP
6	0.585	29.03	0.06	0.02	29.11	46.00	-16.89	Average
7	2.190	18.31	0.08	0.18	18.57	46.00	-27.43	Average
8	2.261	30.06	0.08	0.17	30.31	56.00	-25.69	QP
9	5.653	32.58	0.14	0.09	32.81	60.00	-27.19	QP
10	5.836	22.36	0.14	0.09	22.59	50.00	-27.41	Average
11	19.122	21.54	0.33	0.15	22.02	50.00	-27.98	Average
12	20.056	30.00	0.34	0.19	30.53	60.00	-29.47	QP

Remark:

1. Level = Read level + LISN Factor + Cable Loss.

Product name:	Autel Smart Controller SE	Product model:	EF6
Test by:	Mike	Test mode:	5G Wi-Fi mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.182	37.61	0.05	0.01	37.67	64.42	-26.75	Peak
2	0.186	27.01	0.05	0.02	27.08	54.20	-27.12	Average
3	0.343	23.52	0.05	0.02	23.59	49.13	-25.54	Average
4	0.343	33.14	0.05	0.02	33.21	59.13	-25.92	Peak
5	0.549	29.75	0.05	0.02	29.82	46.00	-16.18	Average
6	0.549	38.33	0.05	0.02	38.40	56.00	-17.60	Peak
7	3.241	28.32	0.09	0.07	28.48	56.00	-27.52	Peak
8	3.293	18.00	0.09	0.07	18.16	46.00	-27.84	Average
9	5.744	21.37	0.13	0.09	21.59	50.00	-28.41	Average
10	6.153	31.82	0.14	0.09	32.05	60.00	-27.95	Peak
11	20.056	20.71	0.33	0.19	21.23	50.00	-28.77	Average
12	20.162	30.50	0.33	0.19	31.02	60.00	-28.98	Peak

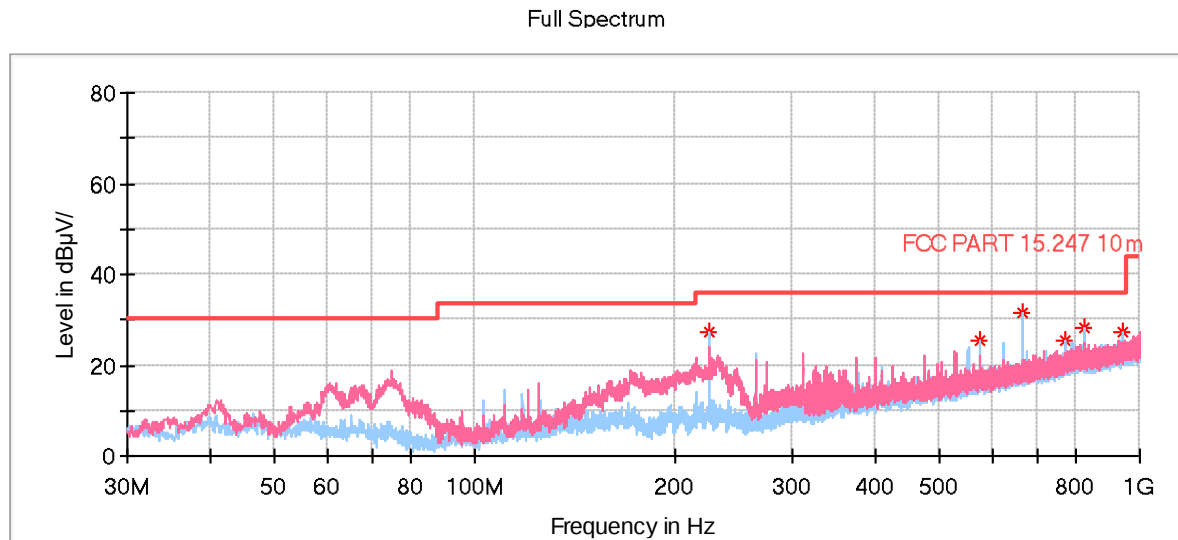
Remark:

1. Level = Read level + LISN Factor + Cable Loss.

6.4 Unwanted Emissions

Below 1GHz:

Product Name:	Autel Smart Controller SE	Product Model:	EF6
Test By:	Mike	Test mode:	5G Wi-Fi mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical & Horizontal
Test Voltage:	DC 7.7V		



* Critical Freqs PK+ — FCC PART 15.247 10m ◆ Final Result QPK
— Preview Result 1H-PK+ — Preview Result 1V-PK+

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
775.008500	25.27	36.00	10.73	100.0	H	79.0	-3.6
664.622500	31.43	36.00	4.57	100.0	H	243.0	-6.1
825.012000	28.02	36.00	7.98	100.0	H	243.0	-2.7
574.994500	25.46	36.00	10.54	100.0	H	257.0	-8.1
224.970000	27.08	36.00	8.92	100.0	H	264.0	-17.6
945.001000	27.07	36.00	8.93	100.0	H	304.0	-1.0

Remark:

1. Level = Read level + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz

1.4M-QPSK						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	39.75	17.02	56.77	68.20	11.43	Vertical
5700.00	40.40	17.13	57.53	105.20	47.67	Vertical
5720.00	40.63	17.21	57.84	110.80	52.96	Vertical
5725.00	67.37	17.23	84.60	122.20	37.60	Vertical
11476.00	53.56	7.21	60.77	74.00	13.23	Vertical
5650.00	40.02	17.02	57.04	68.20	11.16	Horizontal
5700.00	39.86	17.13	56.99	105.20	48.21	Horizontal
5720.00	40.00	17.21	57.21	110.80	53.59	Horizontal
5725.00	59.91	17.23	77.14	122.20	45.06	Horizontal
5650.00	39.75	17.02	56.77	68.20	11.43	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	43.87	7.21	51.08	54.00	2.92	Vertical
11476.00	44.57	7.21	51.78	54.00	2.22	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	67.76	17.55	85.31	122.20	36.89	Vertical
5855.00	41.73	17.55	59.28	110.80	51.52	Vertical
5875.00	39.43	17.57	57.00	105.20	48.20	Vertical
5925.00	39.02	17.37	56.39	68.20	11.81	Vertical
11678.00	53.74	7.09	60.83	74.00	13.17	Vertical
5850.00	60.19	17.55	77.74	122.20	44.46	Horizontal
5855.00	40.01	17.55	57.56	110.80	53.24	Horizontal
5875.00	38.77	17.57	56.34	105.20	48.86	Horizontal
5925.00	38.82	17.37	56.19	68.20	12.01	Horizontal
11678.00	54.56	7.09	61.65	74.00	12.35	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	43.79	7.09	50.88	54.00	3.12	Vertical
11678.00	44.62	7.09	51.71	54.00	2.29	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

1.4M-16QAM						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	40.81	17.02	57.83	68.20	10.37	Vertical
5700.00	40.66	17.13	57.79	105.20	47.41	Vertical
5720.00	41.40	17.21	58.61	110.80	52.19	Vertical
5725.00	68.39	17.23	85.62	122.20	36.58	Vertical
11476.00	53.55	7.21	60.76	74.00	13.24	Vertical
5650.00	39.48	17.02	56.50	68.20	11.70	Horizontal
5700.00	39.82	17.13	56.95	105.20	48.25	Horizontal
5720.00	39.17	17.21	56.38	110.80	54.42	Horizontal
5725.00	61.46	17.23	78.69	122.20	43.51	Horizontal
11476.00	54.92	7.21	62.13	74.00	11.87	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	43.84	7.21	51.05	54.00	2.95	Vertical
11476.00	44.43	7.21	51.64	54.00	2.36	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	40.16	17.55	57.71	122.20	64.49	Vertical
5855.00	40.52	17.55	58.07	110.80	52.73	Vertical
5875.00	39.24	17.57	56.81	105.20	48.39	Vertical
5925.00	39.99	17.37	57.36	68.20	10.84	Vertical
11678.00	53.37	7.09	60.46	74.00	13.54	Vertical
5850.00	59.27	17.55	76.82	122.20	45.38	Horizontal
5855.00	39.74	17.55	57.29	110.80	53.51	Horizontal
5875.00	38.76	17.57	56.33	105.20	48.87	Horizontal
5925.00	38.57	17.37	55.94	68.20	12.26	Horizontal
11678.00	54.76	7.09	61.85	74.00	12.15	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	43.72	7.09	50.81	54.00	3.19	Vertical
11678.00	44.88	7.09	51.97	54.00	2.03	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

10M-QPSK						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	40.43	17.02	57.45	68.20	10.75	Vertical
5700.00	39.45	17.13	56.58	105.20	48.62	Vertical
5720.00	48.64	17.21	65.85	110.80	44.95	Vertical
5725.00	60.26	17.23	77.49	122.20	44.71	Vertical
11476.00	53.05	7.21	60.26	74.00	13.74	Vertical
5650.00	39.85	17.02	56.87	68.20	11.33	Horizontal
5700.00	40.32	17.13	57.45	105.20	47.75	Horizontal
5720.00	42.08	17.21	59.29	110.80	51.51	Horizontal
5725.00	53.11	17.23	70.34	122.20	51.86	Horizontal
11476.00	51.29	7.21	58.50	74.00	15.50	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	44.71	7.21	51.92	54.00	2.08	Vertical
11476.00	43.66	7.21	50.87	54.00	3.13	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	63.61	17.55	81.16	122.20	41.04	Vertical
5855.00	58.69	17.55	76.24	110.80	34.56	Vertical
5875.00	39.07	17.57	56.64	105.20	48.56	Vertical
5925.00	38.70	17.37	56.07	68.20	12.13	Vertical
11678.00	52.65	7.09	59.74	74.00	14.26	Vertical
5850.00	54.72	17.55	72.27	122.20	49.93	Horizontal
5855.00	51.33	17.55	68.88	110.80	41.92	Horizontal
5875.00	39.09	17.57	56.66	105.20	48.54	Horizontal
5925.00	38.78	17.37	56.15	68.20	12.05	Horizontal
11678.00	52.28	7.09	59.37	74.00	14.63	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	44.39	7.09	51.48	54.00	2.52	Vertical
11678.00	44.59	7.09	51.68	54.00	2.32	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

10M-16QAM						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	40.02	17.02	57.04	68.20	11.16	Vertical
5700.00	40.08	17.13	57.21	105.20	47.99	Vertical
5720.00	48.67	17.21	65.88	110.80	44.92	Vertical
5725.00	60.60	17.23	77.83	122.20	44.37	Vertical
11476.00	52.70	7.21	59.91	74.00	14.09	Vertical
5650.00	39.95	17.02	56.97	68.20	11.23	Horizontal
5700.00	39.99	17.13	57.12	105.20	48.08	Horizontal
5720.00	43.00	17.21	60.21	110.80	50.59	Horizontal
5725.00	54.25	17.23	71.48	122.20	50.72	Horizontal
11476.00	51.53	7.21	58.74	74.00	15.26	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	44.22	7.21	51.43	54.00	2.57	Vertical
11476.00	44.05	7.21	51.26	54.00	2.74	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	63.34	17.55	80.89	122.20	41.31	Vertical
5855.00	58.94	17.55	76.49	110.80	34.31	Vertical
5875.00	39.22	17.57	56.79	105.20	48.41	Vertical
5925.00	39.79	17.37	57.16	68.20	11.04	Vertical
11678.00	52.56	7.09	59.65	74.00	14.35	Vertical
5850.00	55.50	17.55	73.05	122.20	49.15	Horizontal
5855.00	49.63	17.55	67.18	110.80	43.62	Horizontal
5875.00	38.98	17.57	56.55	105.20	48.65	Horizontal
5925.00	39.84	17.37	57.21	68.20	10.99	Horizontal
11678.00	51.93	7.09	59.02	74.00	14.98	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	44.31	7.09	51.40	54.00	2.60	Vertical
11678.00	44.24	7.09	51.33	54.00	2.67	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

20M-QPSK						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	40.98	17.02	58.00	68.20	10.20	Vertical
5700.00	44.47	17.13	61.60	105.20	43.60	Vertical
5720.00	61.31	17.21	78.52	110.80	32.28	Vertical
5725.00	63.71	17.23	80.94	122.20	41.26	Vertical
11476.00	51.49	7.21	58.70	74.00	15.30	Vertical
5650.00	39.95	17.02	56.97	68.20	11.23	Horizontal
5700.00	40.46	17.13	57.59	105.20	47.61	Horizontal
5720.00	51.85	17.21	69.06	110.80	41.74	Horizontal
5725.00	55.21	17.23	72.44	122.20	49.76	Horizontal
11476.00	50.73	7.21	57.94	74.00	16.06	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	44.25	7.21	51.46	54.00	2.54	Vertical
11476.00	44.05	7.21	51.26	54.00	2.74	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	69.92	17.55	87.47	122.20	34.73	Vertical
5855.00	66.74	17.55	84.29	110.80	26.51	Vertical
5875.00	46.97	17.57	64.54	105.20	40.66	Vertical
5925.00	40.02	17.37	57.39	68.20	10.81	Vertical
11678.00	51.70	7.09	58.79	74.00	15.21	Vertical
5850.00	62.03	17.55	79.58	122.20	42.62	Horizontal
5855.00	58.55	17.55	76.10	110.80	34.70	Horizontal
5875.00	41.46	17.57	59.03	105.20	46.17	Horizontal
5925.00	40.52	17.37	57.89	68.20	10.31	Horizontal
11678.00	51.36	7.09	58.45	74.00	15.55	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	44.67	7.09	51.76	54.00	2.24	Vertical
11678.00	44.72	7.09	51.81	54.00	2.19	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

20-16QAM						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5650.00	39.92	17.02	56.94	68.20	11.26	Vertical
5700.00	44.79	17.13	61.92	105.20	43.28	Vertical
5720.00	61.28	17.21	78.49	110.80	32.31	Vertical
5725.00	63.18	17.23	80.41	122.20	41.79	Vertical
11476.00	51.34	7.21	58.55	74.00	15.45	Vertical
5650.00	40.31	17.02	57.33	68.20	10.87	Horizontal
5700.00	40.17	17.13	57.30	105.20	47.90	Horizontal
5720.00	52.35	17.21	69.56	110.80	41.24	Horizontal
5725.00	55.78	17.23	73.01	122.20	49.19	Horizontal
11476.00	50.86	7.21	58.07	74.00	15.93	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11476.00	44.03	7.21	51.24	54.00	2.76	Vertical
11476.00	44.45	7.21	51.66	54.00	2.34	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5850.00	71.17	17.55	88.72	122.20	33.48	Vertical
5855.00	69.15	17.55	86.70	110.80	24.10	Vertical
5875.00	48.10	17.57	65.67	105.20	39.53	Vertical
5925.00	41.10	17.37	58.47	68.20	9.73	Vertical
11678.00	51.74	7.09	58.83	74.00	15.17	Vertical
5850.00	61.54	17.55	79.09	122.20	43.11	Horizontal
5855.00	58.89	17.55	76.44	110.80	34.36	Horizontal
5875.00	41.10	17.57	58.67	105.20	46.53	Horizontal
5925.00	40.29	17.37	57.66	68.20	10.54	Horizontal
11678.00	51.04	7.09	58.13	74.00	15.87	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
11678.00	44.24	7.09	51.33	54.00	2.67	Vertical
11678.00	44.67	7.09	51.76	54.00	2.24	Horizontal
Remark: 1. Level = Read level + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

-----End of report-----