



Test Report

EN 55032 Electromagnetic compatibility of multimedia equipment - Emission Requirements

EN 55035 Electromagnetic compatibility of multimedia equipment - Immunity requirements

Report Reference No	CTL1903042101-E				
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Date of issue:	Mar. 15, 2019				
Testing Laboratory Name:	Shenzhen CTL Testing Technology Co., Ltd.				
Address:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055				
Testing location/ procedure:	Full application of Harmonised standards Partial application of Harmonised standards Other standard testing methods				
Applicant's name	ShenZhen Fiberroad Technology CO., Limited				
Address:	2F, Building 15, Longbi Industrial Park, Dafa Road, Bantian, Longgang District, 518129, Shenzhen, P.R.China				
Test specification:					
Standard:	EN 55032: 2015				
	EN 55035: 2017				
Non-standard test method					
Test Report Form No					
TRF Originator:	Shenzhen CTL Testing Technology Co., Ltd				
Master TRF:	Dated 2011-01				
Shenzhen CTI Testing Technology C	Co., Ltd.				

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Test item description:	Industrial Switch	
Trade Mark	Fiberroad	
Test voltage	DC 12V	
Result:	Pass	

EMC -- Test Report

Test Report No. :	CTL1903042101-E	Mar. 15, 2019
rest Report No	G1E1903042101-E	Date of issue

Equipment under Test : Industrial Switch

Type / Model : FR-7M3416

Listed Models : FR-7N1XXX-(P), FR-7N2XXX-(P), FR-7N3XXX-(P), FR-7M1XXX-(P),

FR-7M2XXX-(P), FR-7M3XXX-(P), FR-7M2XCXX-(P), FR-7M3XCXX-(P)

Applicant : ShenZhen Fiberroad Technology CO., Limited

Address : 2F, Building 15, Longbi Industrial Park, Dafa Road, Bantian, Longgang District,

518129, Shenzhen, P.R.China

Manufacturer : ShenZhen Fiberroad Technology CO., Limited

Address : 2F, Building 15, Longbi Industrial Park, Dafa Road, Bantian, Longgang District,

518129, Shenzhen, P.R.China

Test Result	Pass
Test Result	Pass

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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History of this test report

Report No.	Version	Description	Issued Date
Roport No.	V C151011	Description	100ded Date
CTL1903042101-E	V1.0	Initial Issued Report	Mar. 15, 2019

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1. TEST STANDARDS

The tests were performed according to following standards:

<u>EN 55032:2015</u> Electromagnetic compatibility of multimedia equipment - Emission Requirements <u>EN 55035:2017</u> Electromagnetic compatibility of multimedia equipment - Immunity requirements

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2. SUMMARY

2.1. General Remarks:

Date of receipt of test sample : Mar. 06, 2019

Sampling and Testing commenced on : Mar. 06, 2019

Testing concluded on : Mar. 15, 2019

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage : o 230V / 50 Hz o 115V / 60Hz

o 12 V DC o 24 V DC

Other (specified in blank below)

DC 9V~56V

2.3. Short description of the Equipment under Test (EUT)

The EUT is a Industrial Switch

2.4. EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

The tests are carried out with surge protective devices disconnected.

Test program (customer specific)

Emissions tests...... According to EN55032, searching for the highest disturbance.

Immunity tests According to EN55035, searching for the highest susceptivity.

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2.5. EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- o supplied by the lab

2.6. Performance Criteria

Definition related to the performance level:

\boxtimes	based on the used product standard
	based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion B:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion C:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

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3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd. Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

3.2. Test Facility

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

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 399832

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

Certificated by A2LA, USA Registration No.:4343.01

Date of registration: December 27, 2017

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 22-25 ° C

Humidity: 40-54 %

Atmospheric pressure: 950-1050mbar

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3.4. Test Description

Emission Measurement					
Radiated Emission	EN 55032:2015	PASS			
Immunity Measurement					
Electrostatic Discharge	EN 55035: 2017	PASS			
	IEC 61000-4-2: 2008				
RF Field Strength Susceptibility	EN 55035: 2017	PASS			
	IEC 61000-4-3: 2010				
Power Frequency Magnetic Field	EN 55035: 2017	PASS			
Susceptibility Test	IEC 61000-4-8: 2009	PASS			

Remark:

1. The test result PASS and /or FAIL has no relationship with the measurement uncertainty.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission(chamber1)	30~1000MHz	±3.20dB	(1)
Radiated Emission(chamber2)	30~1000MHz	±3.53dB	(1)
Conducted Emission	0.15~30MHz	±2.66dB	(1)
Radiated Emission	Above 1GHz	\pm 4.32dB	(1)
Disturbance Power	30~300MHz	±2.90dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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3.6. Equipments Used during the Test

Radia	Radiated Emission (Chamber 1) (Below 1GHz)							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due		
1	ULTRA- BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	2018/10/08	2019/10/07		
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2018/05/25	2019/05/24		

Electrostatic Discharge						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	ESD Simulator	TESEQ AG	NSG 437	1058	2018/10/07	2019/10/06

RF Field Strength Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	SIGNAL GENERATOR	HEWLETT PACKARD	8648C	3642U01765	2018/10/08	2019/10/07
2	Power Amplifier	AR	150W1000M3	309401	2018/10/08	2019/10/07
3	Power Meter	Agilent	E4419B	GB43317877	2018/10/08	2019/10/07
4	Directional Coupler	Emtrace	DDC-0210- 150W	N/A	2018/10/08	2019/10/07
5	Test Antenna- Bi-Log	SCHWARZBE CK	VULB 9163	N/A	2018/10/08	2019/10/07

Powe	Power Frequency Magnetic Field Susceptibility							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due		
1	MAGNETIC COIL	HTEC Instruments Ltd.	HPFMF	154402	2018/05/25	2019/05/24		

Radiated Emission(Chamber 2) (Above 1GHz)								
Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due			
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2018/05/25	2019/05/24			
Horn Antenna	Sunol Sciences Corp	DRH-118	A062013	2018/05/25	2019/05/24			

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4. TEST CONDITIONS AND RESULTS

4.1. Radiated Emission

For test instruments and accessories used see section 3.6.

4.1.1. Description of the test location

Test location: Radiation Lab

4.1.2. Limits of disturbance

Frequency (MHz)	Distance (Meters)	rs) Field Strengths Limits (dBμ\		
30 ~ 230	3	50		
230 ~ 1000	3	57		
Frequency (MHz)	Distance (Meters)	QP(dBμV/m) AV(dBμV/n		
1000 ~ 3000	3	80 60		
3000 ~ 6000	3	84 64		

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

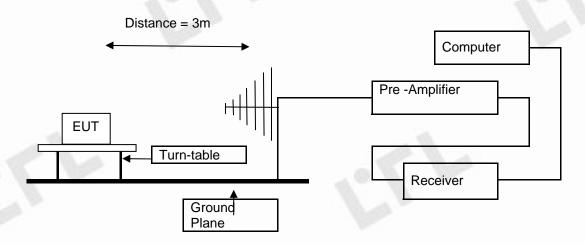
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.1.3. Description of the test set-up

4.1.3.1. Operating Condition

The EUT is set to work shall be carried out with full load mode during the test, and the maximum emanating results are recorded.

4.1.3.2. Configuration of test setup



4.1.4. Test result

The requirements are Fulfilled

Band Width: 120KHz

Frequency Range: 30MHz to 1000MHz

Remarks: The limits are kept. For detailed results, please see the following page(s).

Shenzhen CTL Testing Technology Co., Ltd

Radiation Emission Test EN 55032

FR-7M3416 EUT:

Shenzhen Fiberroad Technology CO., Limited Manufacturer:

Operating Condition: WORKING Test Site: Chamber 1 Operator: WZTest Specification: DC 12V

Comment:

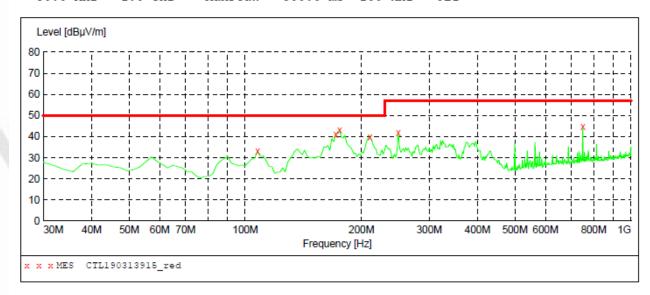
13/03/2019 / 23:42:58 Start of Test:

SWEEP TABLE: "test (30M-1G)"
Short Description: Fi Field Strength

Start Stop Detector Meas. ΙF Transducer

Frequency Frequency Time Bandw.

30.0 MHz 1.0 GHz 300.0 ms 100 kHz MaxPeak JB1



MEASUREMENT RESULT: "CTL190313915 red"

13/03/2019 23:44 Frequency Level Transd Limit Margin Det. Height Azimuth Polarization dBµV/m dB dBµV/m dB MHz cm deg 107.600000 33.00 12.9 50.0 17.0 0.0 0.00 HORIZONTAL 171.620000 40.90 14.5 50.0 9.1 ___ 0.0 0.00 HORIZONTAL 175.500000 50.0 7.0 43.00 14.6 0.0 0.00 HORIZONTAL 210.420000 39.70 14.5 50.0 10.3 ---0.0 0.00 HORIZONTAL 15.3 ---249.220000 41.70 57.0 14.4 0.0 0.00 HORIZONTAL 749.740000 44.60 24.9 57.0 12.4 0.0 0.00 HORIZONTAL

Shenzhen CTL Testing Technology Co., Ltd

Radiation Emission Test EN 55032

FR-7M3416

Manufacturer: Shenzhen Fiberroad Technology CO., Limited

Operating Condition: WORKING Test Site: Chamber 1 Operator: Test Specification: DC 12V

Comment:

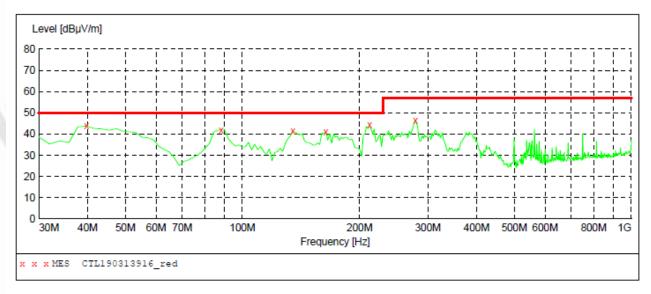
Start of Test: 13/03/2019 / 23:44:57

SWEEP TABLE: "test (30M-1G)"
Short Description: Fi Field Strength

Stop Start Detector Meas. ΙF Transducer

Time Bandw.

Frequency Frequency 30.0 MHz 1.0 GHz 300.0 ms 100 kHz JB1 MaxPeak



MEASUREMENT RESULT: "CTL190313916_red"

13/03/2019 23:47

13/03/2019 23	3.4/							
Frequency MHz	Level dBµV/m		Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
39.700000	43.80	15.2	50.0	6.2		0.0	0.00	VERTICAL
88.200000	42.00	8.8	50.0	8.0		0.0	0.00	VERTICAL
134.760000	41.40	15.1	50.0	8.6		0.0	0.00	VERTICAL
163.860000	40.80	14.5	50.0	9.2		0.0	0.00	VERTICAL
212.360000	44.10	14.5	50.0	5.9		0.0	0.00	VERTICAL
278.320000	46.30	15.4	57.0	10.7		0.0	0.00	VERTICAL

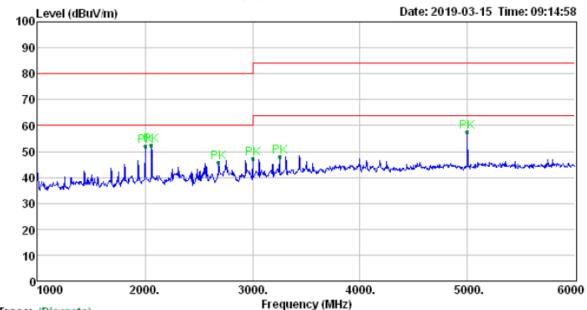
Manufacturer: ShenZhen Fiberroad Technology (O., Limit

Operating Comdition: WAORKING
Test Site: Chamber 2

Operator: WYC
Test Specification: DC12V
Comment: /

.....

Data: 1747 File: E:\E3 TEST DATA\1g-6g scan.EM6 (1796)



Trace: (Discrete)

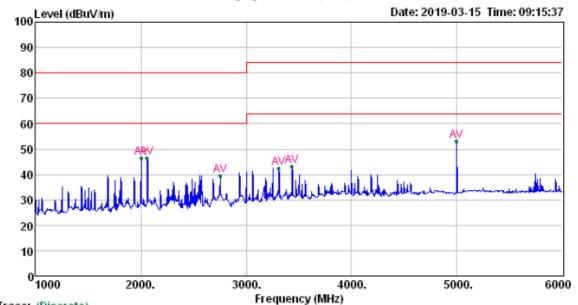
Mark	Frequency MHz	Le∨el dBuV	Factor dB	Reading dBuV	Limit dB	Margin dB	Det.	Polarization
1	2000.00	52.11	-4.16	56.27	80.00	27.89	Peak	HORIZONTAL
2	2060.00	52.36	-3.98	56.34	80.00	27.64	Peak	HORIZONTAL
3	2685.00	45.68	-2.37	48.05	80.00	34.32	Peak	HORIZONTAL
4	3000.00	47.06	-0.78	47.84	80.00	32.94	Peak	HORIZONTAL
5	3250.00	47.83	0.42	47.41	84.00	36.17	Peak	HORIZONTAL
6	5000.00	57.42	5.43	51.99	84.00	26.58	Peak	HORIZONTAL

Manufacturer: ShenZhen Fiberroad Technology (O., Limit

Operating Comdition: WAORKING
Test Site: Chamber 2
Operator: WYC
Test Specification: DC12V

Comment:





Trace: (Discrete	:)
----------	----------	----

ı	4ark	Frequency MHz	Le∨el dBuV	Factor dB	Reading dBuV	Limit dB	Margin dB	Det. Polarization
	1	2000.00	46.47	-4.16	50.63	60.00	13.53	Average HORIZONTAL
	2	2060.00	46.56	-3.98	50.54	60.00	13.44	Average HORIZONTAL
	3	2750.00	39.48	-2.11	41.59	60.00	20.52	Average HORIZONTAL
	4	3310.00	42.44	0.65	41.79	64.00	21.56	Average HORIZONTAL
	5	3435.00	43.08	0.95	42.13	64.00	20.92	Average HORIZONTAL
	6	5000.00	53.15	5.43	47.72	64.00	10.85	Average HORIZONTAL

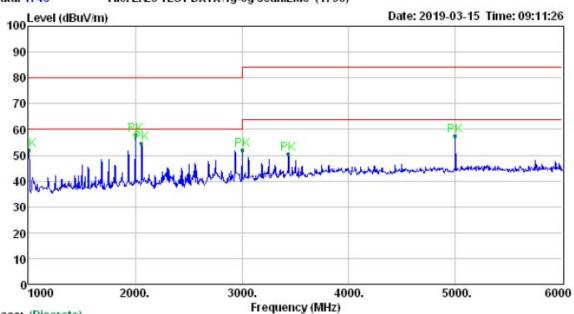
Manufacturer: ShenZhen Fiberroad Technology (O., Limit

Operating Comdition: WAORKING Test Site: Chamber 2

Operator: WYC
Test Specification: DC12V

Comment: /

Data: 1745 File: E:\E3 TEST DATA\1g-6g scan.EM6 (1796)



Trace:	(Discrete)	

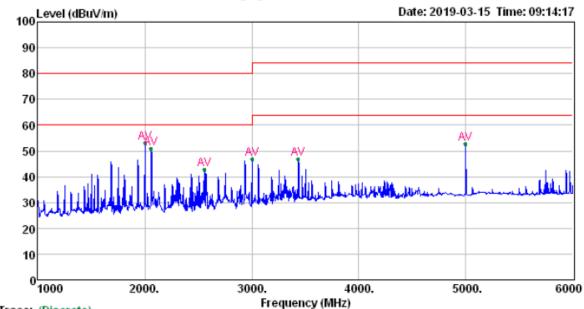
Mark	Frequency MHz	Le∨el dBuV	Factor dB	Reading dBuV	Limit dB	Margin dB	Det.	Polarization
1	1005.00	51.87	-9.77	61.64	80.00	28.13	Peak	VERTICAL
2	2000.00	58.06	-4.16	62.22	80.00	21.94	Peak	VERTICAL
3	2060.00	54.47	-3.98	58.45	80.00	25.53	Peak	VERTICAL
4	3000.00	51.94	-0.78	52.72	80.00	28.06	Peak	VERTICAL
5	3435.00	50.67	0.95	49.72	84.00	33.33	Peak	VERTICAL
6	5000.00	57.70	5.43	52.27	84.00	26.30	Peak	VERTICAL

Manufacturer: ShenZhen Fiberroad Technology (O., Limit

Operating Comdition: WAORKING
Test Site: Chamber 2

Operator: WYC
Test Specification: DC12V
Comment: /

Data: 1746 File: E:\E3 TEST DATA\1g-6g scan.EM6 (1796)



|--|

Mark	Frequency MHz	Le∨el dBuV	Factor dB	Reading dBuV	Limit dB	Margin dB	Det.	Polarization
1	2000.00	52.98	-4.16	57.14	60.00	7.02	A∨erag	e VERTICAL
2	2060.00	50.77	-3.98	54.75	60.00	9.23	Averag	e VERTICAL
3	2560.00	42.76	-2.65	45.41	60.00	17.24	Averag	e VERTICAL
4	3000.00	46.69	-0.78	47.47	60.00	13.31	Averag	e VERTICAL
5	3435.00	47.01	0.95	46.06	64.00	16.99	Averag	e VERTICAL
6	5000.00	52.63	5.43	47.20	64.00	11.37	Averag	e VERTICAL

4.2. Electrostatic discharge

For test instruments and accessories used see section 3.6.

4.2.1. Description of the test location and date

Test location: 1# EMC Test Room

Date of test: Mar. 14, 2019

Operator: Lykan

4.2.2. Severity levels of electrostatic discharge

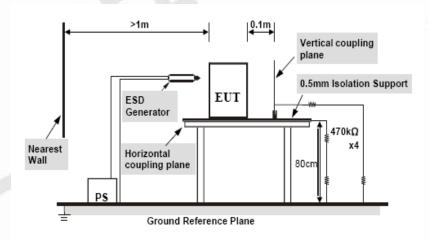
Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
Х	Special	Special

4.2.3. Description of the test set-up

4.2.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.2.3.2. Configuration of test setup



4.2.4. Test specification:

Contact discharge voltage: ■ 2 kV ■ 4 kV

Air discharge voltage: ■ 2 kV ■ 4 kV ■ 8 kV

Number of discharges: $\blacksquare \ge 10$ $\square \ge 25$

<u>Type of discharge:</u> Direct discharge ■ Air discharge

Contact discharge

Indirect discharge ■ Contact discharge

Polarity: ■ Positive ■ Negative

<u>Discharge location:</u> ■ see photo documentation of the test set-up

■ all external locations accessible by hand

■ horizontal plate (HCP)

vertical coupling plate (VCP)

4.2.5. Test result

The requirements are **Fulfilled** Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

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4.3. Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 3.6.

4.3.1. Description of the test location and date

Test location: Chamber 2

Date of test: Mar. 14, 2019

Operator: Lykan

4.3.2. Severity levels of radiated, radio-frequency, electromagnetic field

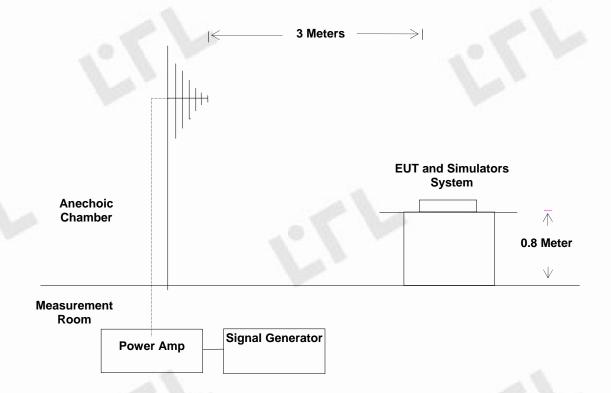
Level	Field Strength (V/m)
1.	1
2.	3
3.	10
Х	Special

4.3.3. Description of the test set-up

4.3.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.3.3.2. Configuration of test setup



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4.3.4. Test specification:

Frequency range: ■ 80 MHz to 1000 MHz

Field strength: ■ 3 V/m

EUT - antenna separation: ■ 3 m

Modulation: ■ AM: 80 %

■ sinusoidal 1000Hz

Frequency step: 1 % with 3 s dwell time

Antenna polarisation: ■ horizontal ■ vertical

4.3.5. Test result

The requirements are **Fulfilled** Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

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4.4. Magnetic Field Immunity

For test instruments and accessories used see section 3.6.

4.4.1. Description of the test location

Test location: 2# EMC Test Room

Date of test: Mar. 14, 2019

Operator: Lykan

4.4.2. Severity levels of magnetic field immunity

4 4 4	
Level	Magnetic Field Strength (A/m)
1	1
2	3
3	10
4	30
5	100
X.	Special

4.4.3. Description of the test set-up

4.4.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.4.4. Test specification:

Test frequency: ■ 50 Hz

Continuous field: ■ 1 A/m

Test duration: ■ 5 Minutes

Antenna factor: 0.917 A/m

<u>Axis:</u> ■ x-axis ■ y-axis ■ z-axis

4.4.5. Test result

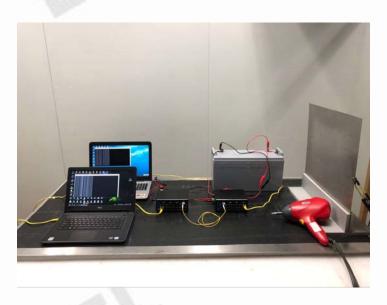
The requirements are **Fulfilled**Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

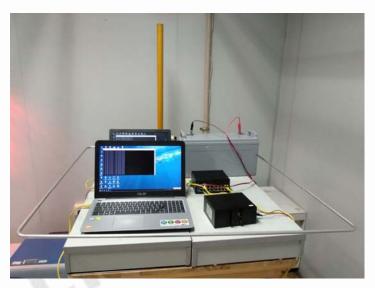
5. Test Setup Photos











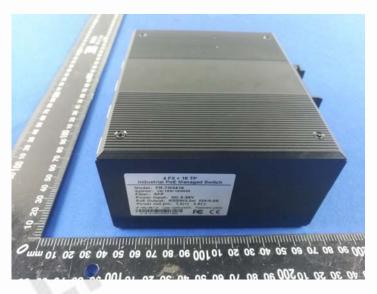
6. Photos of the EUT







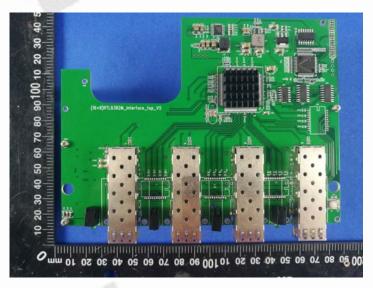




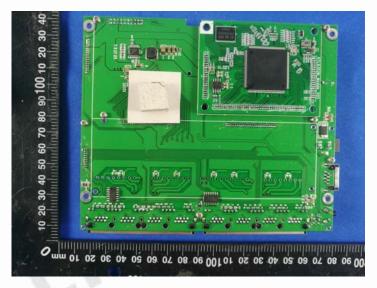






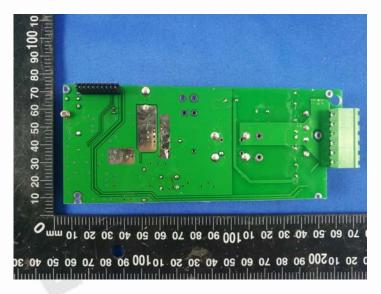


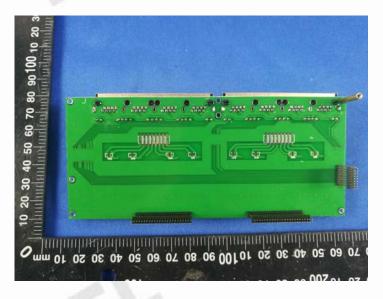


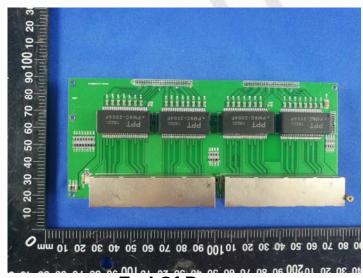












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