TEST REPORT

EN 301 893 V2.1.1: 2017

MEASUREMENT AND TEST REPORT

For

Guangzhou Baolun Electronics Co., Ltd.

No.1 Building, Zhongcun Industrial B Zone,Zhongcun Street, Panyu, Guangzhou, China

MODEL:
TV-811F, TV-812F, TV-814F, TV-810MB, TV-810RC, TV-810S

June 26, 2019

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless projection interactive terminal

Test Engineer:	Eric/ Eric
Report Number:	TH19FR-937T-2
Test Date:	June 18-26, 2019
Reviewed By:	Prince/
Approved By:	Prince/
Prepared By:	**Shenzhen Tian Hai Test Technology Co,.Ltd.** 4F, A3 BLDG, The Silicon Valley Power intelligent terminal industrial park, Guanlan street, Longhua district, Shenzhen Tel: +86-755-86615100 Fax: +86-755-86615105

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Tian Hai Test Technology Co,.Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	**Guangzhou Baolun Electronics Co., Ltd.**
Address	No.1 Building, Zhongcun Industrial B Zone,Zhongcun Street, Panyu, Guangzhou, China
Manufacturer:	**Guangzhou Baolun Electronics Co., Ltd.**
Address	No.1 Building, Zhongcun Industrial B Zone,Zhongcun Street, Panyu, Guangzhou, China
Factory:	**Guangzhou Baolun Electronics Co., Ltd.**
Address	No.1 Building, Zhongcun Industrial B Zone,Zhongcun Street, Panyu, Guangzhou, China

General Description of E.U.T

EUT Description:	Wireless projection interactive terminal
Model No.:	TV-811F, TV-812F, TV-814F, TV-810MB, TV-810RC, TV-810S
Rating:	Input: 100-240V～, 50/60Hz
Trade mark:	itc
Frequency Range:	5.8G

Note: The test data is gathered from a production sample provided by the manufacturer.

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1.2 Test Standards

The following report is prepared on behalf of the EUT in accordance with ETSI EN 301 893 V2.1.1(2017-05), 5 GHz RLAN;Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 893 V2.1.1(2017-05), 5 GHz RLAN;Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

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1.4 EUT Setup and Test Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TS-W101	Transmitting	-
TS-W111	Receiver	-

Test Conditions					
	Normal	LTLV	LTHV	HTHV	HTLV
Temperature (℃)	20	-10	-10	60	60
Voltage (VDC)	48	43.2	52.8	43.2	52.8

1.5 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	--	±1×10-7
Power Spectral Density	Conducted	±0.70dB
Transmitter Spurious Emissions	Radiated	±5.2dB
Receiver Spurious Emissions	Radiated	±5.2dB

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1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	N9020A	US47140102	2019-03-15	2020-03-14
Signal Generator	Agilent	83752A	3610A01453	2019-03-15	2020-03-14
Vector Signal Generator	Agilent	HUADOO HG03 GT182A	MY47070202	2019-03-15	2020-03-14
Power Sensor	Agilent	U2021XA	MY54250019	2019-03-15	2020-03-14
Power Sensor	Agilent	U2021XA	MY54250021	2019-03-15	2020-03-14
Power Sensor	Agilent	U2021XA	MY54210040	2019-03-15	2020-03-14
Power Sensor	Agilent	U2021XA	MY54260021	2019-03-15	2020-03-14
Simultaneous Sampling	Agilent	U2531A	TW54243509	2019-03-15	2020-03-14
Power Splitter	Mini-Circuits	Z4PD-642W-S+	N846501416	2019-03-15	2020-03-14
Spectrum Analyzer	R&S	FSP	836079/035	2019-03-15	2020-03-14
Pre-amplifier	Agilent	8447F	3113A06717	2019-03-15	2020-03-14
Pre-amplifier	Compliance Direction	PAP-0118	24002	2019-03-15	2020-03-14
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2019-03-15	2020-03-14
Horn Antenna	ETS	3117	00086197	2019-03-15	2020-03-14
Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-03-15	2020-03-14

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2. SUMMARY OF TEST RESULTS

EN 301 893-1 V2.1.1: 2017	Description of Test	Result
§4.2.1	Carrier frequencies	Compliant
§4.2.2	Nominal, and occupied, channel bandwidth	Compliant
§4.2.3	RF output power	Compliant
§4.2.4.1	Transmitter unwanted emissions outside the 5 GHz RLAN bands	Compliant
§4.2.5	Receiver spurious emissions	Compliant
§4.2.8	Receiver Blocking	Compliant

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3. Conformance requirements

3.1 Standard Applicable

The Nominal Centre Frequencies (fc) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1).

fc = 5 160 + (g × 20) MHz, where 0 ≤ g ≤ 9 or 16 ≤ g ≤ 27 and where g shall be an integer. (1)

A maximum offset of the Nominal Centre Frequency of ±200 kHz is permitted. Where the manufacturer decides tomake use of this frequency offset, the manufacturer shall declare the actual centre frequencies used by the equipment.

The actual centre frequency for any given channel shall be maintained within the range f c ± 20 ppm.

Equipment may have simultaneous transmissions on more than one Operating Channel with a Nominal Channel Bandwidth of 20 MHz.

3.2 Test Procedure

These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.3).

The channels on which the conformance requirements in clause 4.2.1 shall be verified are defined in clause 5.3.2.

The UUT shall be configured to operate at a normal RF Output Power level. In addition, the UUT shall be configured to operate on a single channel.

3.3 Summary of Test Results

Test Conditions	Measured Value	Frequency Error		Limit
	MHz	kHz	ppm	ppm
Normal	5260.0017	1.7	1.97	≤±20
LTLV	5260.0033	3.3	3.82	≤±20
LTHV	5260.0045	4.5	5.21	≤±20
HTHV	5260.0046	4.6	5.32	≤±20
HTLV	5260.0026	2.6	3.01	≤±20

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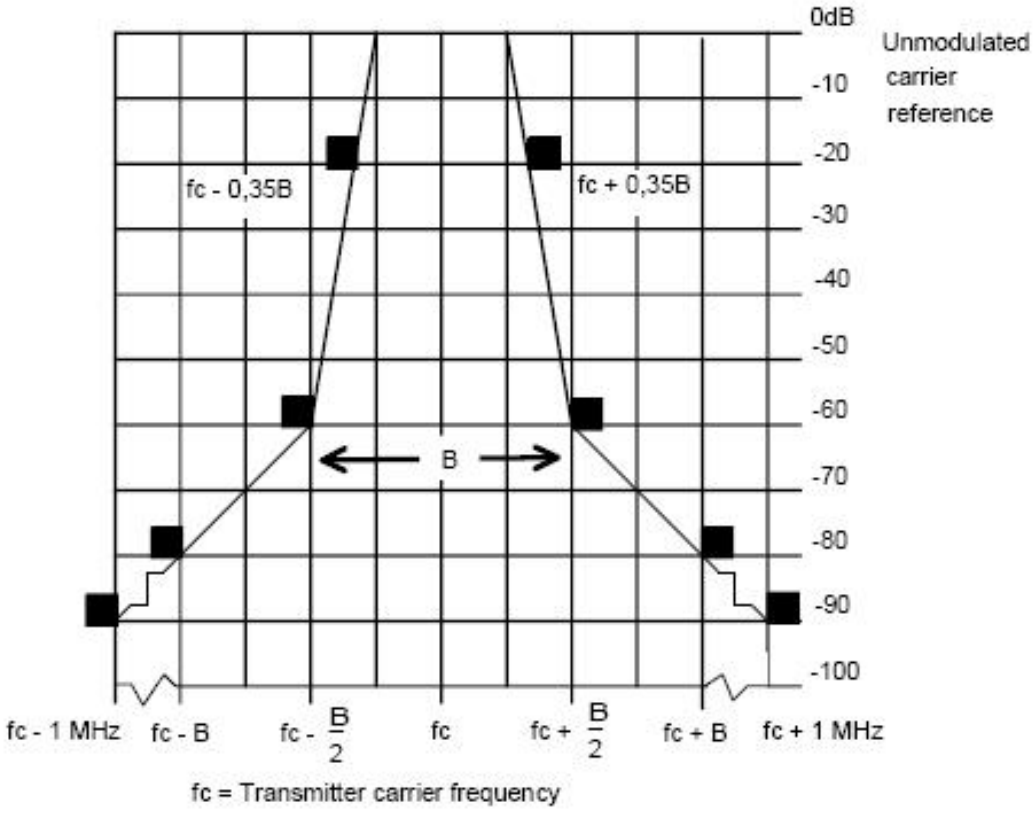
4. Nominal Channel Bandwidth and Occupied Channel Bandwidth

4.1 Standard Application

According to EN 301 893-1 V2.1.1(2017-05) section 4.2.2., the transmitter output spectrum shall be within the mask defined in the following figure.



4.2 Test procedure

The measurement procedure shall be as follows:

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test
- Resolution Bandwidth: 100 kHz
- Video Bandwidth: 300 kHz
- Frequency Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Sweep time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 2:

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- Wait for the trace to stabilize.

Step 3:

- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
- Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels.

4.3 Summary of Test Results/Plots

Center Freq	Start Freq	Stop Freq
5260.000000Mhz	5150Mhz	5350Mhz

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5. RATED OUTPUT POWER

5.1 Standard Application

According to EN 301 893-1 V2.1.1(2017-05) section 4.2.3

5.2 Test procedure

On a test site, the sample shall be placed on the support in the following position:
- for equipment with an internal antenna, it shall stand vertically, with that axis vertical which is closest to vertical in normal use;
- for equipment with a rigid external antenna, the antenna shall be vertical;
- for equipment with a non-rigid external antenna, the antenna shall be extended vertically upwards by a non-conducting support.

The transmitter shall be switched on, with modulation, and the test receiver shall be tuned to the frequency of the signal being measured. The test antenna shall be oriented for vertical polarization and shall be raised or lowered through the specified height range until a maximum signal level is detected on the test receiver.
The transmitter shall be rotated horizontally through 360° until the highest maximum signal is received.
NOTE: This maximum may be a lower value than the value obtainable at heights outside the specified limits.
The transmitter shall be replaced by a substitution antenna and the test antenna raised or lowered as necessary to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the test receiver.
The carrier power is equal to the power supplied to the substitution antenna, increased by the known relationship if necessary.
The measurement shall be repeated for any alternative antenna supplied by the provider.
A check shall be made in the horizontal plane of polarization to ensure that the value obtained above is the maximum. If larger values are obtained, this fact shall be recorded in the test report.

5.3 Summary of Test Results/Plots

Test Conditions	ERP	ERP	Rated Power	Tolerance	Limit
	dBm	Mw	Mw	%	dBm
Normal	9.21	8.34	10	-16.6	23
LTLV	9.23	8.38	10	-16.2	23
LTHV	9.36	8.63	10	-13.7	23
HTHV	9.10	8.13	10	-18.7	23
HTLV	9.05	8.04	10	-19.6	23

Note: Tolerance = (Output Power – Rated Output Power) / Rated Output Power * 100%

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6. Receiver spurious emissions

6.1 Standard Applicable

According to ETSI EN 301 893-1 V2.1.1 (2017-05) section 8.4.3. The power of the spurious emissions shall not exceed the limits of table.

Frequency range	Maximum power	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

6.2 Test Procedure

Tx was placed on a nonmetal table which is 1.5 meter above the grounded reference plane and set to work in normal operation mode. Details refer to ETSI EN 301 893-1 V2.1.1 (2017-05) subclause 8.4.2.

The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting	
Frequency Start to Stop	30 MHz to 1GHz	1Gz to 26GHz
Resolution bandwidth	100 kHz	1 MHz
Video bandwidth	300 kHz	3 MHz
Filter type	3 Db (Gaussian)	
Detector mode	Peak	
Trace Mode	Max Hold	

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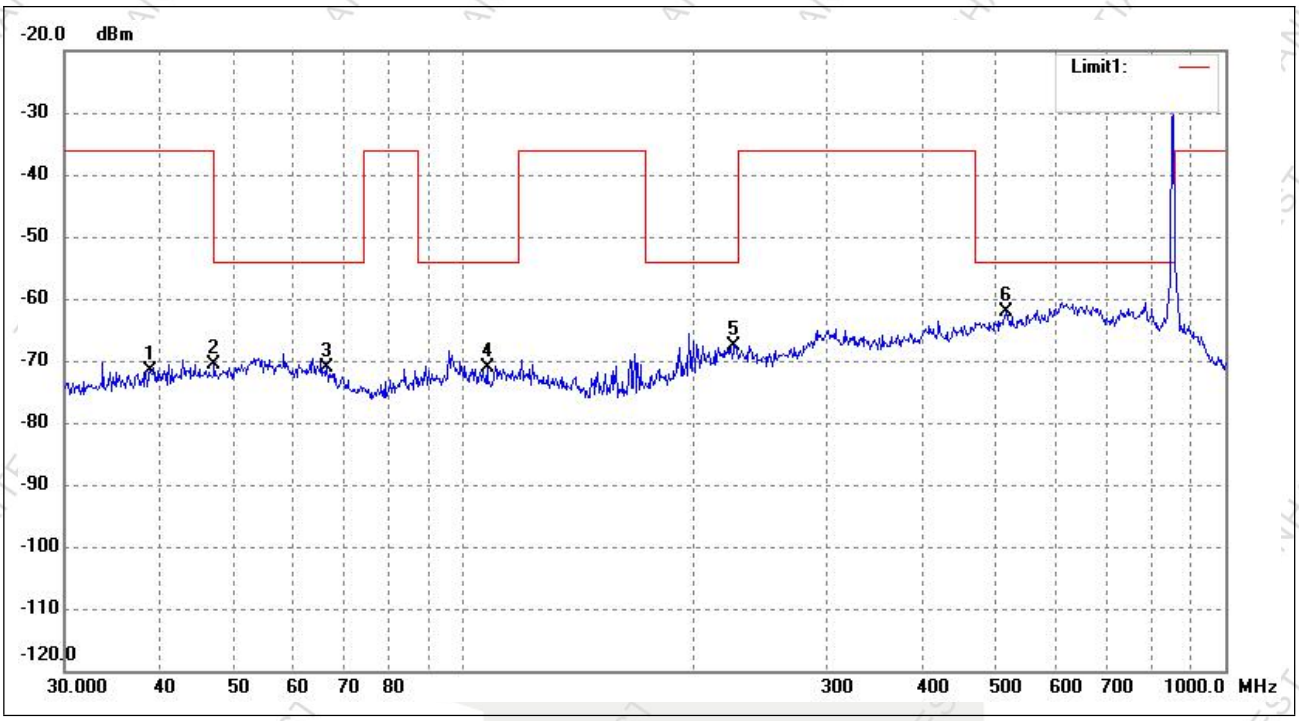
6.3 Summary of Test Results

Spurious Emission from 30MHz to 1GHz
Test Mode: Transmitting-High channel (Worst case)
Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	Db	(dBm)	(dBm)	(Db)	( )	(cm)	
1	38.8879	-88.07	16.54	-71.53	-36.00	-35.53	0	100	peak
2	47.1599	-87.37	16.72	-70.65	-54.00	-16.65	0	100	peak
3	66.2660	-86.43	15.43	-71.00	-54.00	-17.00	0	100	peak
4	107.5100	-87.72	16.51	-71.21	-54.00	-17.21	0	100	peak
5	226.8934	-87.16	19.48	-67.68	-54.00	-13.68	0	100	peak
6	515.4374	-86.51	24.41	-62.10	-54.00	-8.10	0	100	peak

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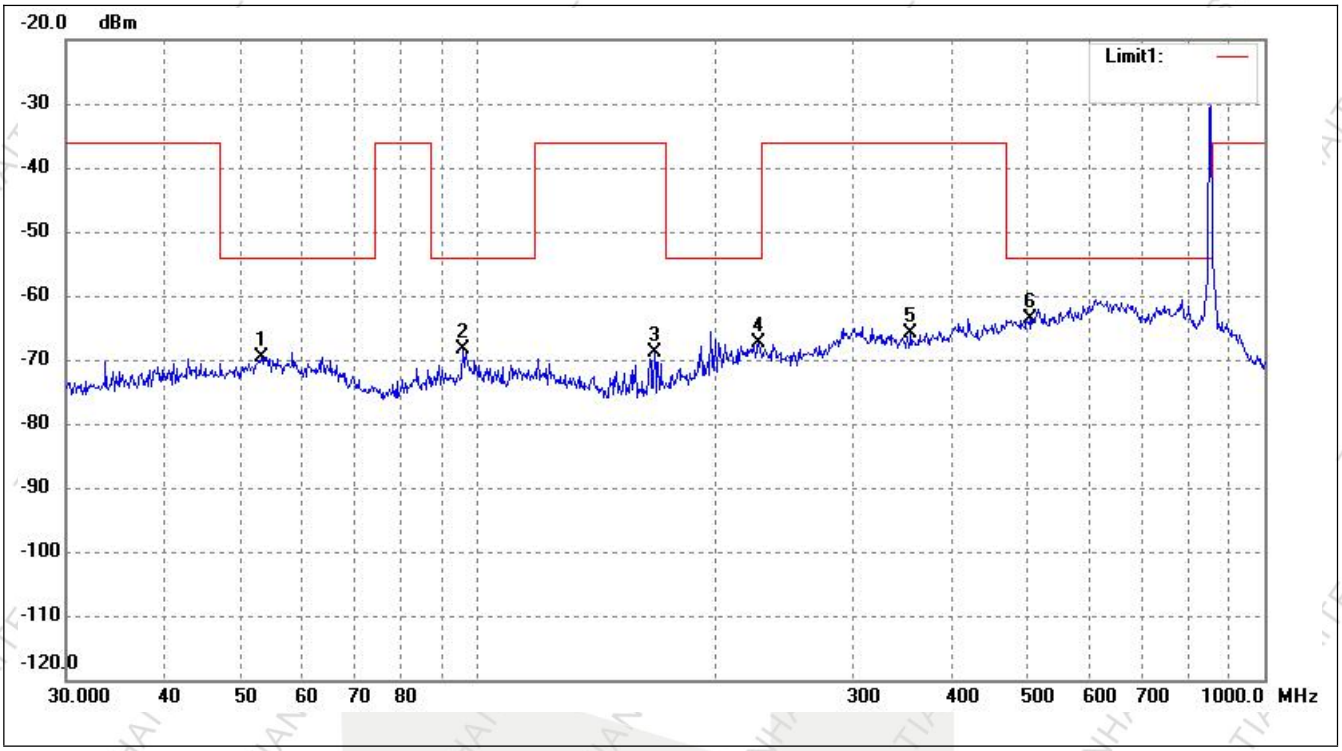
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	Db	(dBm)	(dBm)	(Db)	( )	(cm)	
1	53.1313	-86.31	16.81	-69.50	-54.00	-15.50	150	150	peak
2	95.7622	-84.37	15.95	-68.42	-54.00	-14.42	150	150	peak
3	167.8240	-82.90	13.98	-68.92	-36.00	-32.92	150	150	peak
4	227.6904	-86.93	19.52	-67.41	-54.00	-13.41	150	150	peak
5	355.4273	-88.72	22.89	-65.83	-36.00	-29.83	150	150	peak
6	502.9395	-87.71	24.18	-63.53	-54.00	-9.53	150	150	peak

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Spurious Emission Above 1GHz

Frequency	SG Reading	Angle	Height	Polar	Correct (Db)	Result dBm	Limit dBm	Margin Db
MHz	dBm	Degree	Meter	H/V				
High Channel (Worst case)								
1728.00	-42.02	242	1.4	H	2.61	-39.41	-30	-9.41
1728.00	-40.87	302	1.4	V	2.61	-38.26	-30	-8.26
2592.00	-45.78	128	1.5	H	6.35	-39.43	-30	-9.43
3592.00	-48.19	130	1.6	V	6.35	-41.84	-30	-11.84
4456.00	-53.98	126	1.6	H	7.53	-46.45	-30	-16.45
5456.00	-55.62	157	1.6	V	7.53	-48.09	-30	-18.09

Emissions above 5th harmonic are close to the base noise, Standby mode does not cause any spurious emissions and no peak detected.

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7. RECEIVER SPURIOUS EMISSION

7.1 Standard Application

According to ETSI EN 301 893-1 V2.1.1 (2017-05) Section 9.1.3, The power of the spurious emissions shall not exceed the limits of table 5.

Table 5: Limits for receiver spurious emissions

Frequency Range	Limit
30 MHz to 1 GHz	-57 dBm
Above 1 GHz to 12.75 Ghz	- 47 dBm

7.2 Test procedure

Please refer to ETSI EN 301 893-1 V2.1.1 (2017-05) clause 9.1.2 for the test conditions.

The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting	
Frequency Start to Stop	30 MHz to 1000 MHz	1000 MHz to 4000MHz
Resolution bandwidth	100 kHz	1 MHz
Video bandwidth	300 kHz	3 MHz
Filter type	3 Db (Gaussian)	
Detector mode	Peak	
Trace Mode	Max Hold	

7.3 Summary of Test Results/Plots

According to the data, the EUT complied with the ETSI EN 301 893-1 V2.1.1 (2017-05) standards, and had the worst margin as follow:

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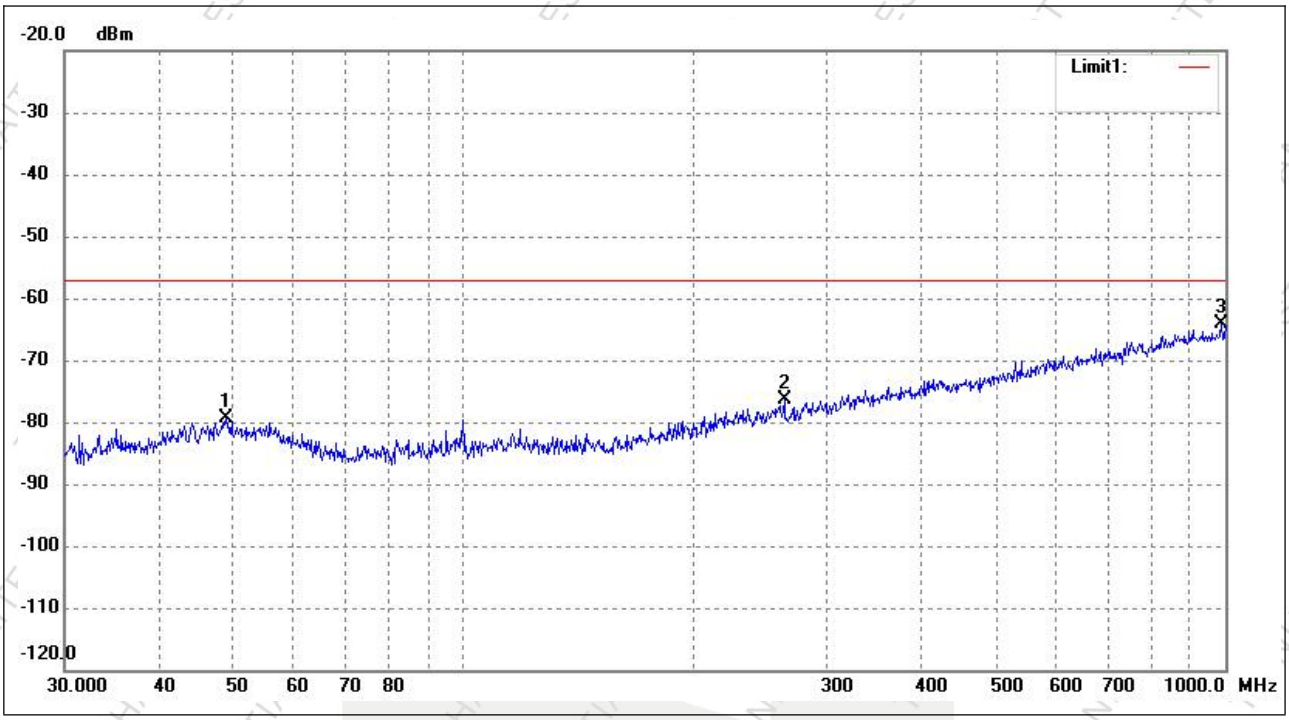
Receiving 30 MHz to 1 GHz

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Db	(dBm)	(dBm)	(Db)	
1	48.8429	-82.74	3.28	-79.46	-57.00	-22.46	ERP
2	263.8190	-82.01	5.72	-76.29	-57.00	-19.29	ERP
3	986.0717	-82.24	18.12	-64.12	-57	-7.12	ERP

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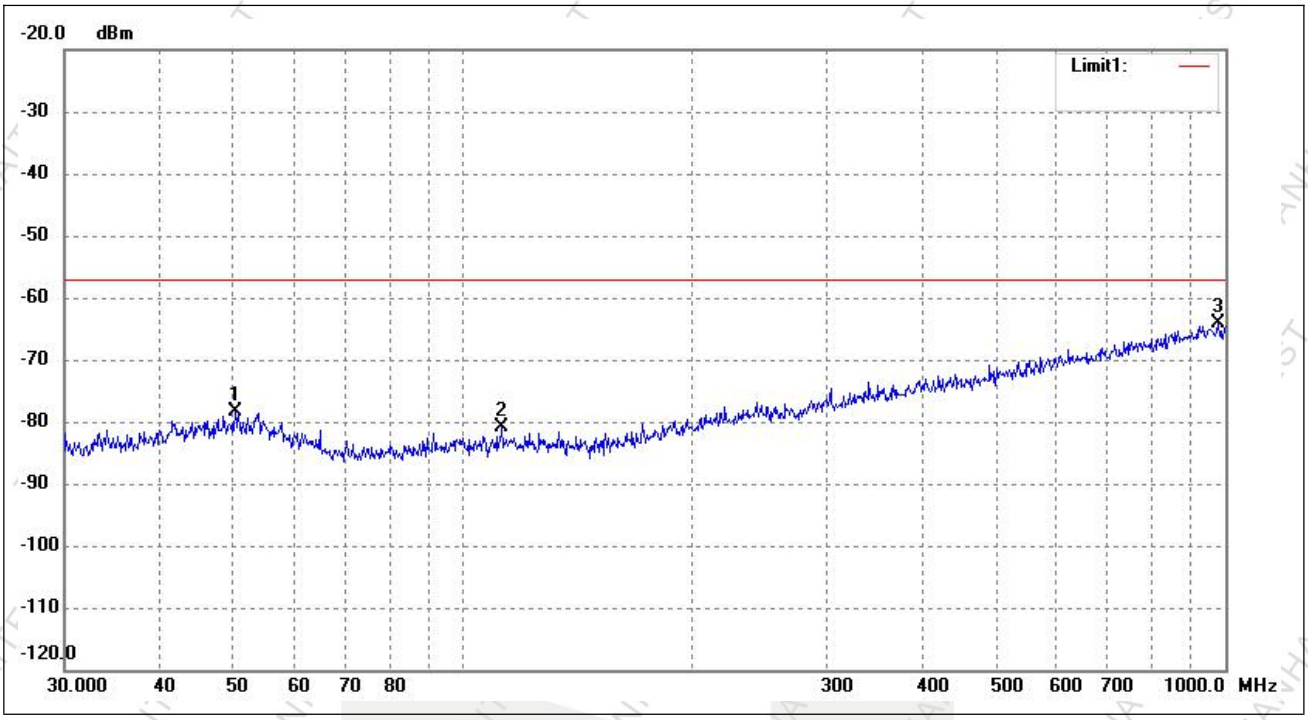
Receiving 30 MHz to 1 GHz

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Db	(dBm)	(dBm)	(Db)	
1	50.2325	-81.68	3.40	-78.28	-57.00	-21.28	ERP
2	112.5244	-82.20	1.30	-80.90	-57.00	-23.90	ERP
3	979.1804	-82.06	18.04	-64.02	-57.00	-7.02	ERP

Note: Emissions attenuated more than 20 Db below the permissible value are not reported.

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8. RECEIVER BLOCKING

8.1 Standard Application

According to ETSI EN 301 893-1 V2.1.1 (2017-05) Section 9.4.3

Receiver blocking, for any frequency within the specified ranges, shall not go below the limits listed in table 8.

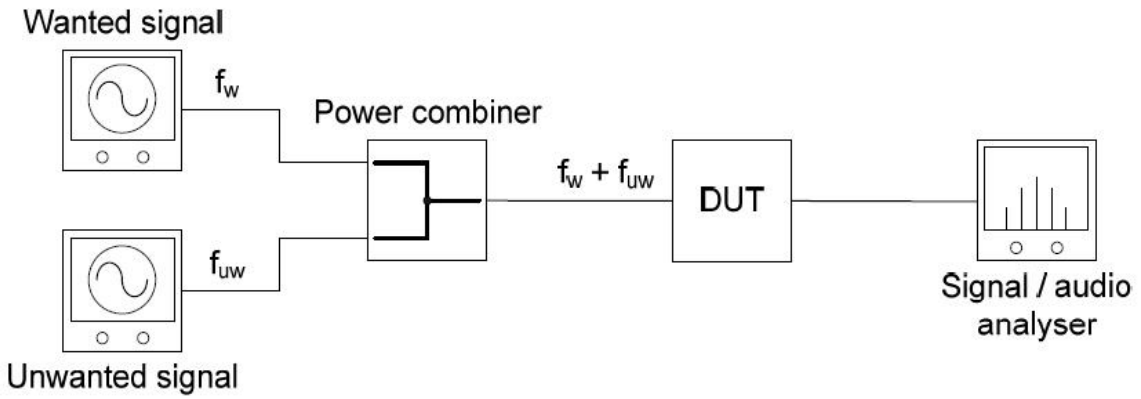
Table 9: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

8.2 TEST PROCEDURES

Please refer to ETSI EN 301 893-1 V2.1.1 (2017-05) clause9.4.2 for the test conditions.

8.3 TEST SETUP



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8.4 TEST RESULTS

Test Channel (MHz)	Declare Bandwidth （MHz）	Foffset (MHz)	Rxsensitivity (dBm)	Blocking signal (dBm)	Wante signal (dBm)	Receiver blocking (dBm)	Limit (dBm)
216	0.3	0.60	-84.19	-31.12	-81.19	50.07	≥40
		-0.60	-84.19	-32.08	-81.19	49.11	≥40
		1.00	-84.19	-31.60	-81.19	49.59	≥40
		-1.00	-84.19	-31.19	-81.19	50.00	≥40
		2.00	-84.19	-33.64	-81.19	47.55	≥40
		-2.00	-84.19	-32.54	-81.19	48.65	≥40
		5.00	-84.19	-32.83	-81.19	48.36	≥40
		-5.00	-84.19	-32.66	-81.19	48.53	≥40

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APPENDIX A - EUT PHOTOGRAPHS

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China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L5885)

Shenzhen Tianhai Test Technology Co., Ltd.

(Legal Entity: Shenzhen Tianhai Test Technology Co., Ltd.)

4B/F., Building A3, The Silicon Valley Power Intelligent Terminal Industrial Park, Guanlan Street, Longhua District, Shenzhen, Guangdong, China

is accredited in accordance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence to undertake the service described in the schedule attached to this certificate.

The scope of accreditation is detailed in the attached schedule bearing the same registration number as above. The schedule forms an integral part of this certificate.

Effective Date：2019-01-22

Expiry Date：2025-01-21

Signed on behalf of China National Accreditation Service for Conformity Assessment

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