

FCC PART 90

TEST REPORT

For

Shenzhen Genvict Technologies Co.,Ltd

12th Floor, Block A, Tsinghua Hi-tech Park, Nanshan District, Shenzhen, Guangdong, China

FCC ID: 2AL59WB-R30B

Report Type: **Product Type:** Original Report DSRC **Report Number:** RDG170516802-00 **Report Date:** 2017-11-02 Jerry Zhang Jerry Zhang EMC Manager **Reviewed By:** Bay Area Compliance Laboratories Corp. (Dongguan) **Test Laboratory:** No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Genvict Technologies Co.,Ltd*'s product, model number: *WB-R30B* (*FCC ID: 2AL59WB-R30B*) (the "EUT") in this report was a *DSRC*, which was measured approximately: 28 cm (L) x 24.5 cm (W) x 9 cm (H), rated input voltage: DC 48V from RSS232&DC 48Vport or from POE.

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*All measurement and test data in this report was gathered from production sample serial number: 170516802 (Assigned by BACL, Dongguan). The EUT was received on 2017-05-17.

Objective

This test report is prepared on behalf of *Shenzhen Genvict Technologies Co.,Ltd* in accordance with Part 2, and Part 90 of the Federal Communications Commission's rules.

Related Submittal(s)/Grant(s)

FCC PART15C DTS submissions with FCC ID: 2AL59WB-R30B. FCC PART15C DSS submissions with FCC ID: 2AL59WB-R30B.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, part 90.

Applicable Standards: TIA/EIA 603-D-2010, and ASTM E2213-03.

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	$\pm 0.64 dB$
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.32 dB 1G~40GHz: 5.13 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

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Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

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Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

The device is a class C private Roadside Unit(RSU), operating at ASTM-DSRC channel 172-184,

Channel No.	Frequency range (MHz)
172	5855-5865
174	5865-5875
176	5875-5885
178	5885-5895
180	5895-5905
182	5905-5915
184	5915-5925

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The device have two DSRC output, channel 178 works at DSRC1 port, and other channels works at DSRC2 port, they can't transmisit simultaneously.

Test Software Configuration

The software "Launch GVWBL20BTools.exe" was used for testing, and the commands were provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power across all data rates bandwidths, and modulations.

The maximum power was set by commands as following table:

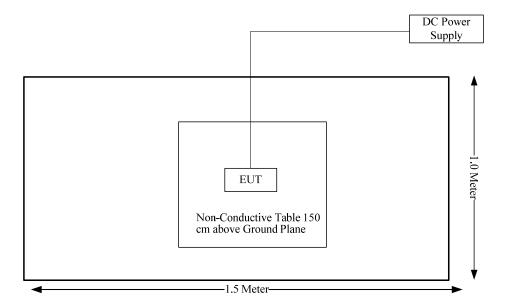
Test Software Version		Launch GVWBL20BTools.exe			
	Antenna Port	Channel No.	Data Rate (Mbps)	Power Level	
	DSRC1 Port	178	3	19	
	DSRC DSRC2 Port	172	3	23	
DSRC		174	3	23	
		176	3	23	
		180	3	15	
		182	3	15	
		184	3	23	

Equipment Modifications

No modification was made to the EUT tested.

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Block Diagram of Test Setup



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SUMMARY OF TEST RESULTS

Rules	Description of Test	Results
FCC§1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
FCC§2.1046; §90.377 ASTM E2213-03§8.9.1	RF Output Power	Compliance
FCC§2.1049 ASTM E2213-03§8.9.2	Occupied Bandwidth and Emission Mask	Compliance
FCC§2.1051 ASTM E2213-03§8.9.2	Spurious Emission at Antenna Terminal	Compliance
FCC§2.1053 ASTM E2213-03§8.9.2	Spurious Radiated Emissions	Compliance
FCC§2.1055 ASTM E2213-03§8.9.5	Frequency Stability	Compliance

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FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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Applicable Standard

According to 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure						
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)		
0.3-1.34	614	1.63	*(100)	30		
1.34–30	824/f	2.19/f	*(180/f²)	30		
30–300	27.5	0.073	0.2	30		
300–1500	/	/	f/1500	30		
1500-100,000	/	/	1.0	30		

f = frequency in MHz;

MPE Calculation

Prediction of power density at the distance of the applicable MPE limit

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW); G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_{i} \frac{S_{i}}{S_{Limit,i}} \le 1$$

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^{* =} Plane-wave equivalent power density;

Madala	Frequency	Ante	enna Gain	Tune-uj	p Power	Evaluation	Power	MPE
Module	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	Distance (cm)	Density (mW/cm ²)	Limit (mW/cm ²)
2.4G	2402-2480	3	2.00	11	12.59	20.00	0.005	1.0
2.40	2412-2462	3	2.00	24	251.19	20.00	0.10	1.0
DSRC	5860-5920	7	5.01	20	100.00	20.00	0.10	1.0

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Note: The maximum tune-up power including tolerance was declared by manufacturer.

The WLAN or Bluetooth can transmit simultaneously with DSRC:

$$\sum_i \frac{S_i}{S_{\mathit{Limit},i}}$$

$$= S_{2.4}/S_{\text{limit-2.4}} + S_{\text{DSRC}}/S_{\text{limit-DSRC}}$$

$$= 0.1/1 + 0.1/1$$

$$= 0.2$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

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FCC §2.1046, §90.377&ASTM E2213-03§8.9.1- RF OUTPUT POWER

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Applicable Standard

According to FCC §90.377 and ASTM E2213-03§8.9.1

Test Procedure

Conducted RF Output Power:

TIA-603-D section 2.2.1

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/

^{*} Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25.9 ℃
Relative Humidity:	43 %
ATM Pressure:	101.9kPa

The testing was performed by Gavin Xu on 2017-11-01.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

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RF Output Power:

Channel No.	Frequency (MHz)	Antenna Output Power (dBm)	Antenna Output Power Limit (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	e.i.r.p Limit (dBm)
172	5860	19.8	28.8		26.8	33
174	5870	19.79	28.8		26.79	33
176	5880	19.4	28.8		26.4	33
178	5890	11.31	28.8	7	18.31	33
180	5900	9.45	10		16.45	23
182	5910	9.4	10		16.4	23
184	5920	18.38	28.8		25.38	33

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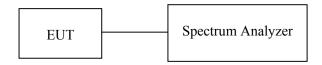
FCC §2.1049& ASTM E2213-03§8.9.2– OCCUPIED BANDWIDTH AND EMISSION MASK

Applicable Standard

According to FCC §2.1049 and ASTM E2213-03§8.9.2

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.



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Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/

^{*} Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25.9 ℃
Relative Humidity:	43 %
ATM Pressure:	101.9kPa

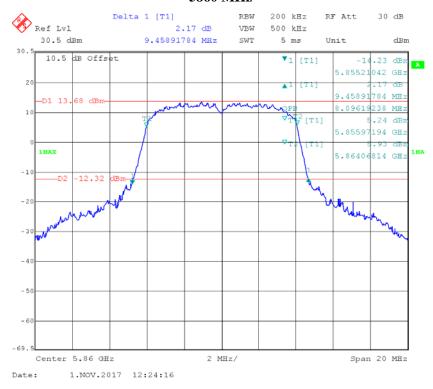
The testing was performed by Gavin Xu on 2017-11-01.

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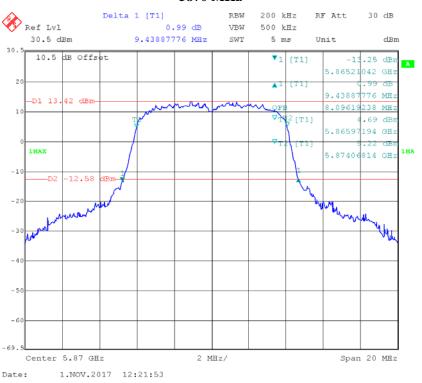
Channel No.	Frequency (MHz) 99% Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
172	5860	8.096	9.459	
174	5870	8.096	9.439	
176	5880	8.056	9.389	
178	5890	8.096	9.900	
180	5900	8.056	9.459	
182	5910	8.016	9.359	
184	5920	8.056	9.459	

Please refer to the following plots:

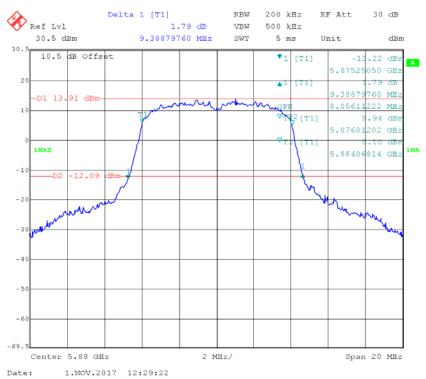
5860 MHz



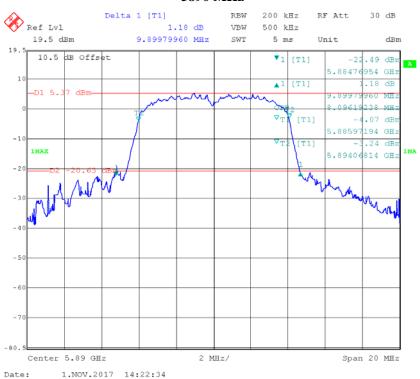
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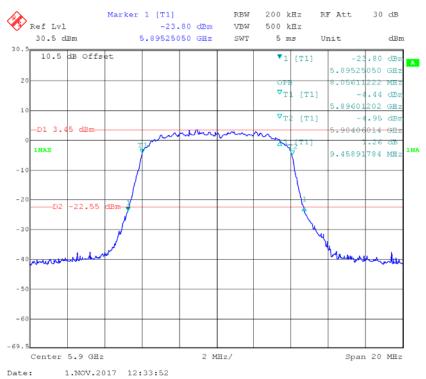
5880 MHz



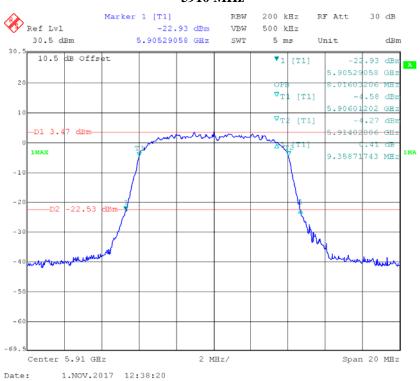
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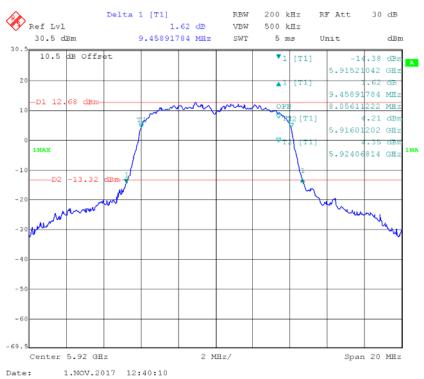
5900 MHz



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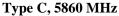


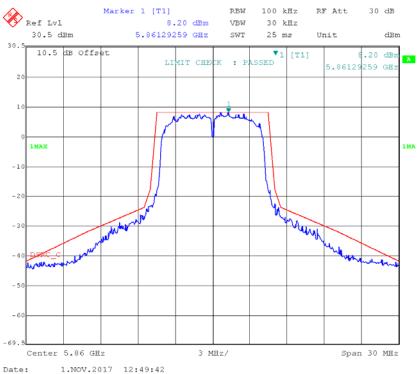
5920 MHz



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Emission Mask:



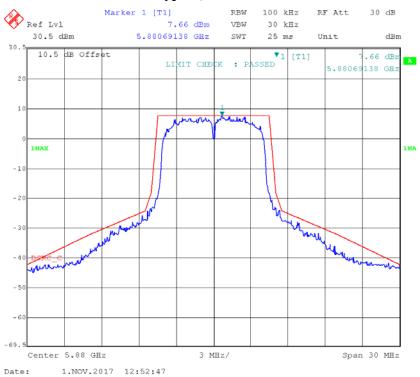


Type C, 5870 MHz

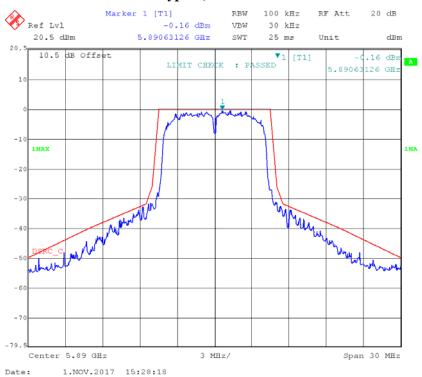


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Type C, 5880 MHz

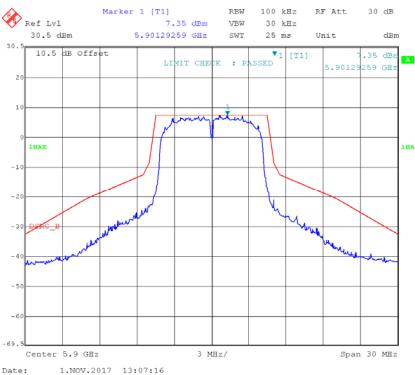


Type C,5890 MHz



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Type B,5900 MHz



Type B,5910 MHz



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Type C,5920 MHz



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FCC §2.1051& ASTM E2213-03§8.9.2 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Report No.: RDG170516802-00

Applicable Standard

According to FCC §2.1051 and ASTM E2213-03§8.9.2

Test Procedure

Adjust the spectrum analyzer for the following settings:

- 1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
- 2) Video Bandwidth ≥3 times the resolution bandwidth.
- 3) Sweep Speed ≤ 2000 Hz per second.
- 4) Detector Mode = mean or average power.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08
R&S	Spectrum Analyzer	FSP 38	100478	2016-12-08	2017-12-08
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/

^{*} Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

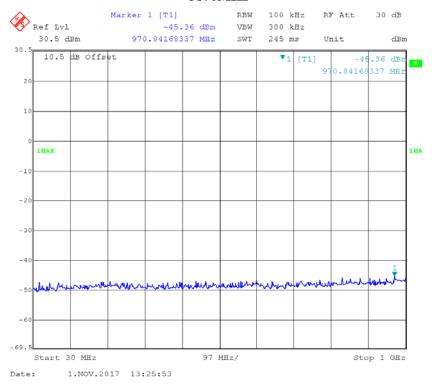
Temperature:	25.9~26.6 ℃	
Relative Humidity:	43 %	
ATM Pressure:	101.9kPa	

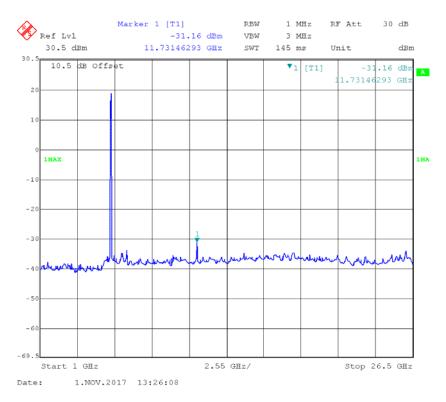
The testing was performed by Gavin Xu from 2017-11-01 to 2017-11-02.

Test Result: Compliance. Please refer to following table.

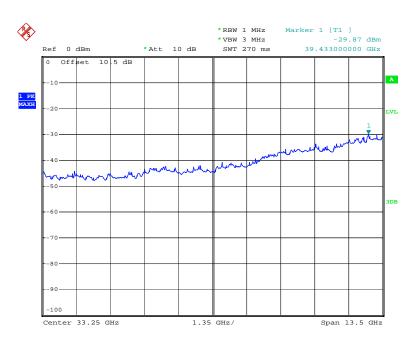
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Test Mode: Transmitting(all spurious emission under limit -25dBm)



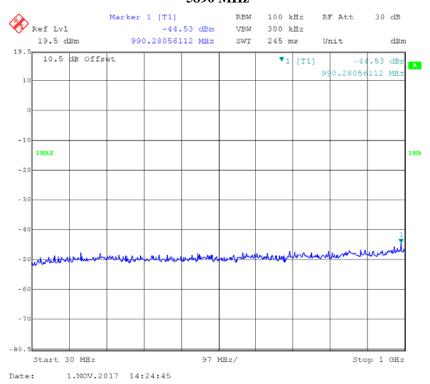


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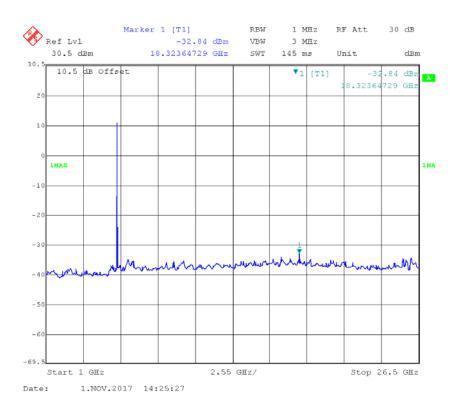


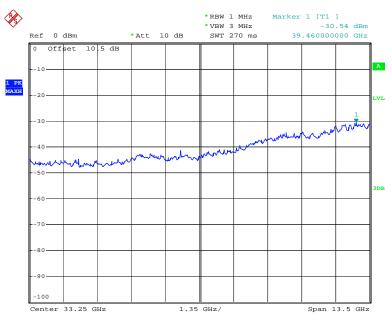
Date: 2.NOV.2017 14:23:25

5890 MHz



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Date: 2.NOV.2017 14:26:02

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FCC §2.1053& ASTM E2213-03§8.9.2- RADIATED SPURIOUS EMISSIONS

Report No.: RDG170516802-00

Applicable Standard

According to FCC §2.1053 and ASTM E2213-03§8.9.2

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

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Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	ЈВ3	A060611-1	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2017-09-01	2018-09-01
R&S	Spectrum Analyzer	E4440A	SG43360054	2016-12-08	2017-12-08
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
MITEQ	Amplifier	AFS42- 00101800-25- S-42	2001271	2017-09-05	2018-09-05
Quinstar	Amplifier	QLW- 18405536-JO	15964001001	2017-06-27	2018-06-27
HP	Signal Generator	1026	320408	2016-12-08	2017-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-02 1302	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1302	2016-11-18	2019-11-18
Unknown	Coaxial Cable	Chamber A-1	4m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-1	0.75m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-2	8m	2017-09-05	2018-09-05

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Test Data

Environmental Conditions

Temperature:	29.5~27 ℃
Relative Humidity:	57.3~56 %
ATM Pressure:	100.1~100.1 kPa

The testing was performed by Gavin Xu from 2017-10-23 to 2017-10-27.

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^{*} Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

30MHz-40GHz:

	_ Receiv		Sub	stituted Meth	od	Absolute		
Frequency (MHz) Polar (H/V) Reading (dBµV)	Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Level (dBm)	Limit (dBm)	Margin (dB)		
			Freque	ncy:5890.000	MHz			
11780.000	Н	26.45	-33.7	12.8	6.9	-27.8	-25.0	2.8
11780.000	V	26.44	-33.8	12.8	6.9	-27.9	-25.0	2.9
625.580	Н	29.31	-49.6	0.0	0.8	-50.4	-25.0	25.4
625.580	V	34.80	-41.6	0.0	0.8	-42.4	-25.0	17.4
			Freque	ncy: 5870.000	MHz			
11740.000	Н	26.54	-33.7	12.9	6.9	-27.7	-25.0	2.7
11740.000	V	26.78	-33.5	12.9	6.9	-27.5	-25.0	2.5
125.060	Н	37.33	-48.3	0.0	0.3	-48.6	-25.0	23.6
125.060	V	38.55	-41.6	0.0	0.3	-41.9	-25.0	16.9

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Note

Absolute Level = Substituted Level - Cable loss + Antenna Gain Margin = Limit- Absolute Level

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FCC §2.1055&& ASTM E2213-03§8.9.5- FREQUENCY STABILITY

Applicable Standard

FCC §2.1055 and ASTM E2213-03§8.9.4

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

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After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/

^{*} Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25.9 ℃	
Relative Humidity:	43 %	
ATM Pressure:	101.9kPa	

The testing was performed by Gavin Xu on 2017-11-01.

Test Mode: Transmitting

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DSRC1 Port

Test Frequency:5890MHz						
Temperature	Voltage	Voltage Measured Frequency Stabilty		Limit		
$^{\circ}$	V_{DC}	MHz	ppm	ppm		
-30		5890.004	0.679	+/-10		
-20		5890.002	0.340	+/-10		
-10		5890.003	0.509	+/-10		
0]	5890.005	0.849	+/-10		
10	48	5890.006	1.019	+/-10		
20		5890.011	1.868	+/-10		
30]	5890.012	2.037	+/-10		
40]	5890.002	0.340	+/-10		
50		5890.012	2.037	+/-10		
25	57	5890.005	0.849	+/-10		
25	37	5890.003	0.509	+/-10		

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DSRC2 Port:

Test Frequency:5870MHz						
Temperature	Voltage	Voltage Measured Frequency F		Limit		
°C	V_{DC}	MHz	ppm	ppm		
-30		5870.008	1.363	+/-10		
-20		5870.012	2.044	+/-10		
-10]	5870.013	2.215	+/-10		
0]	5870.016	2.726	+/-10		
10	48	5870.012	2.044	+/-10		
20]	5870.012	2.044	+/-10		
30]	5870.006	1.022	+/-10		
40]	5870.002	0.341	+/-10		
50	1	5870.012	2.044	+/-10		
25	57	5870.012	2.044	+/-10		
25	37	5870.003	0.511	+/-10		

***** END OF REPORT *****

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