

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: Original Report	Product Type: DSRC
Report Number:	RDG170516802-00
Report Date:	2017-11-02
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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.

**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	±0.64dB
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%

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

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.

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

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

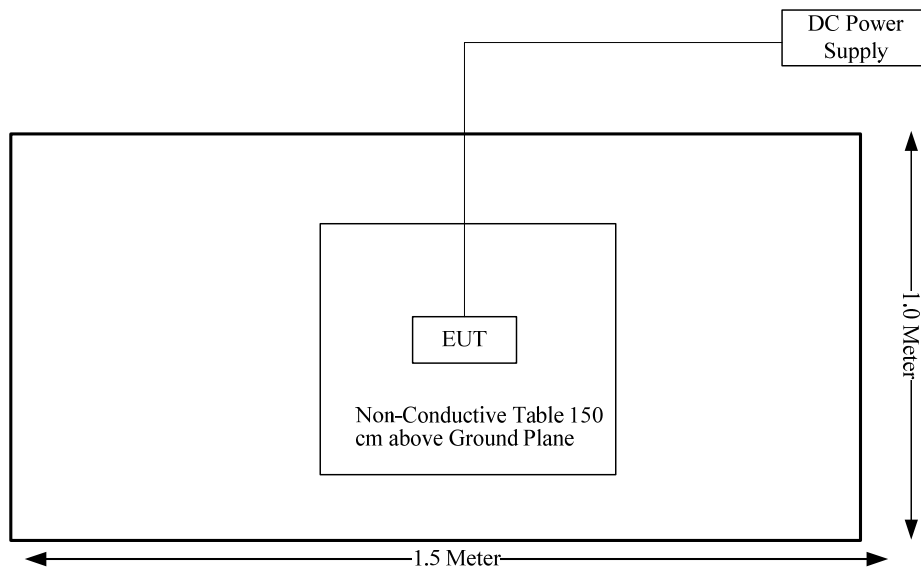
The maximum power was set by commands as following table:

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

Block Diagram of Test Setup



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

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

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/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	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;

* = Plane-wave equivalent power density;

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:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Module	Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G	2402-2480	3	2.00	11	12.59	20.00	0.005	1.0
	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

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

The WLAN or Bluetooth can transmit simultaneously with DSRC:

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

$$\begin{aligned}
 &= S_{2.4}/S_{limit-2.4} + S_{DSRC}/S_{limit-DSRC} \\
 &= 0.1/1 + 0.1/1 \\
 &= 0.2 \\
 &< 1.0
 \end{aligned}$$

Result: The device meet FCC MPE at 20 cm distance

FCC §2.1046, §90.377&ASTM E2213-03§8.9.1- RF OUTPUT POWER**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 °C
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.

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	7	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		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

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.

**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).

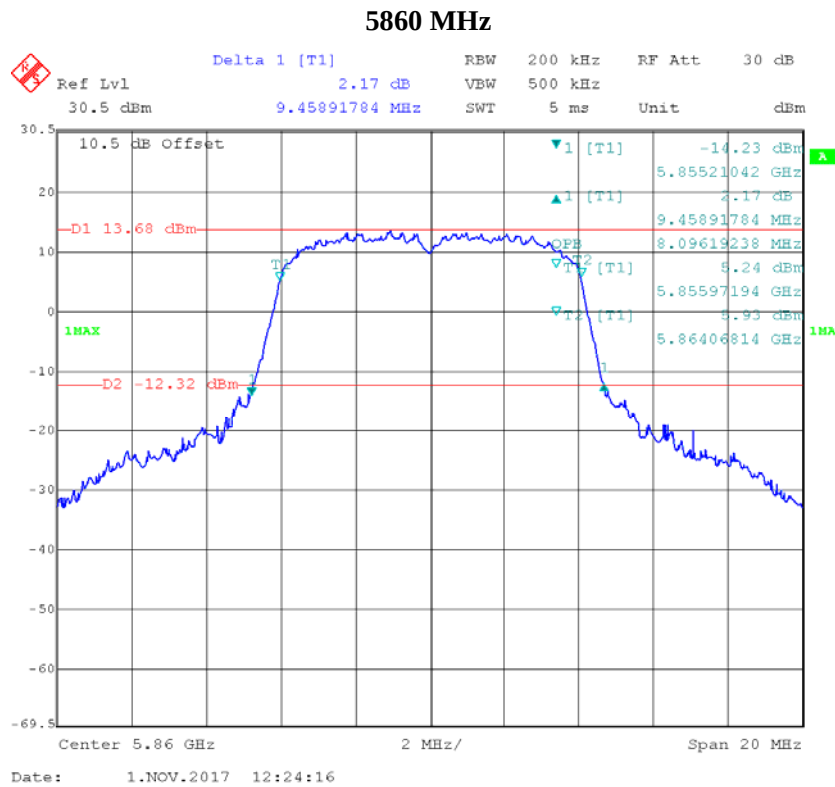
Test Data**Environmental Conditions**

Temperature:	25.9 °C
Relative Humidity:	43 %
ATM Pressure:	101.9kPa

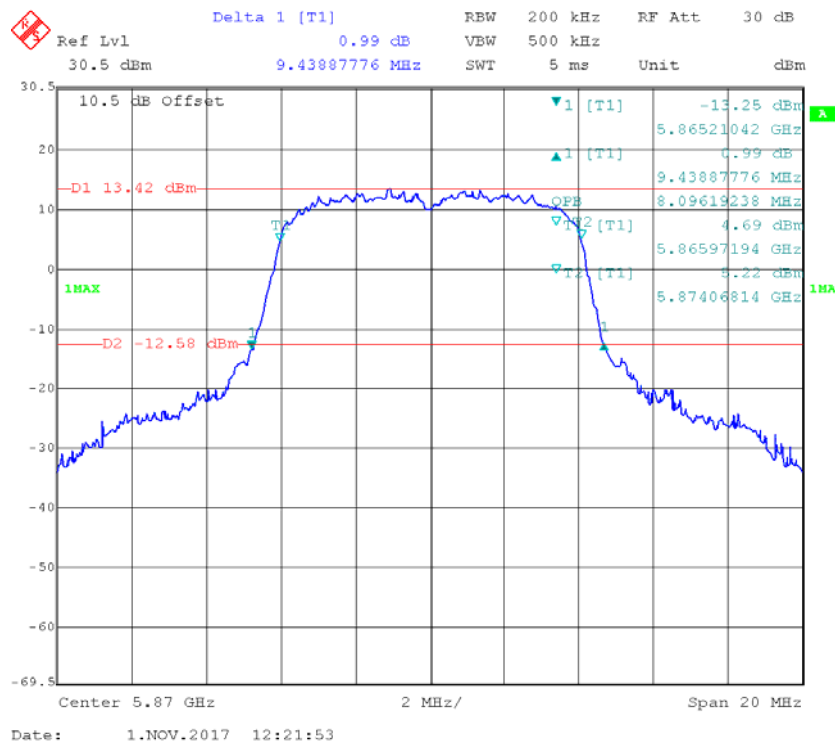
The testing was performed by Gavin Xu on 2017-11-01.

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

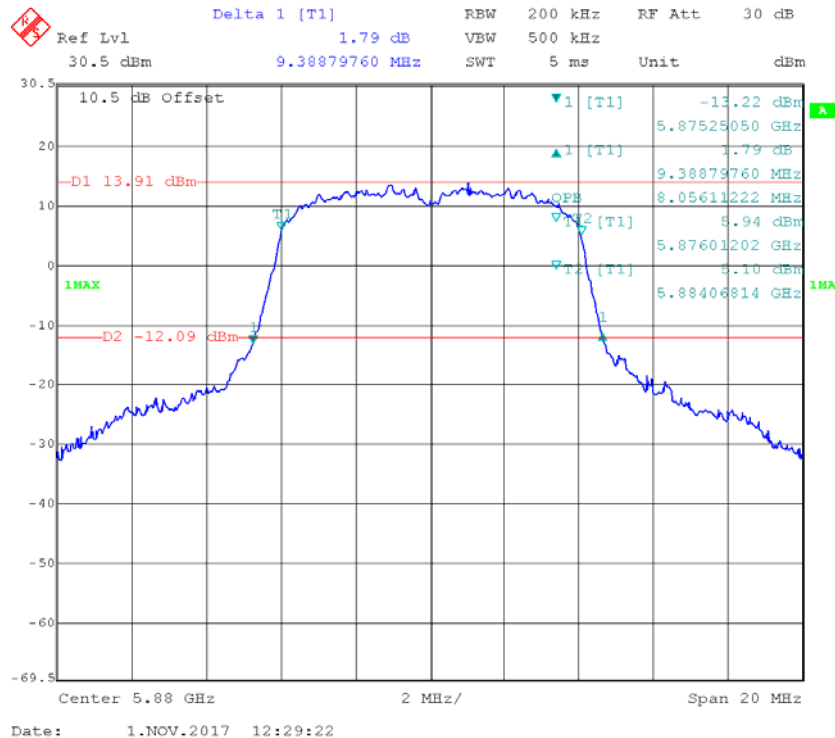
Please refer to the following plots:



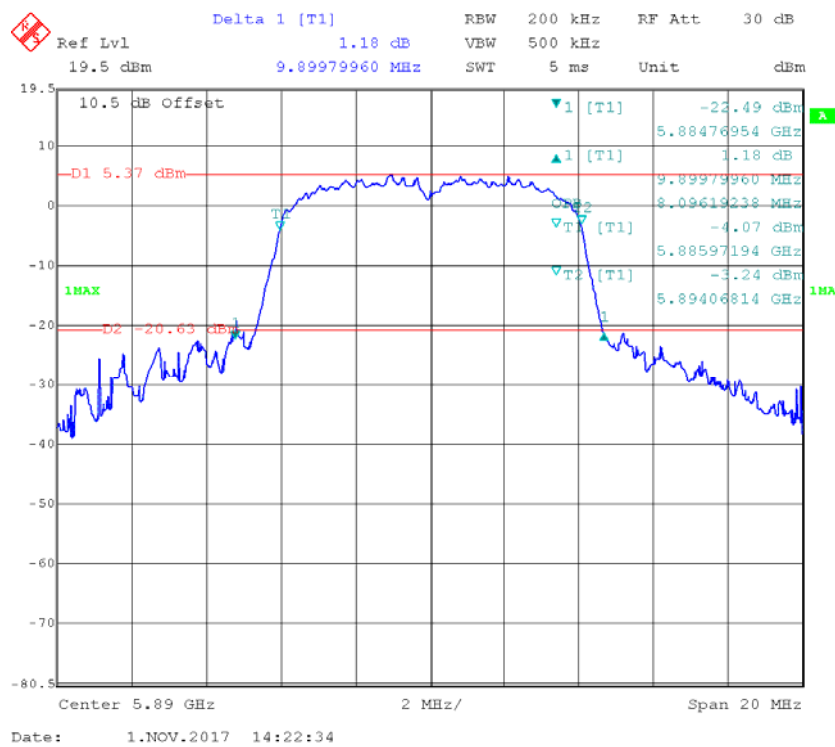
5870 MHz



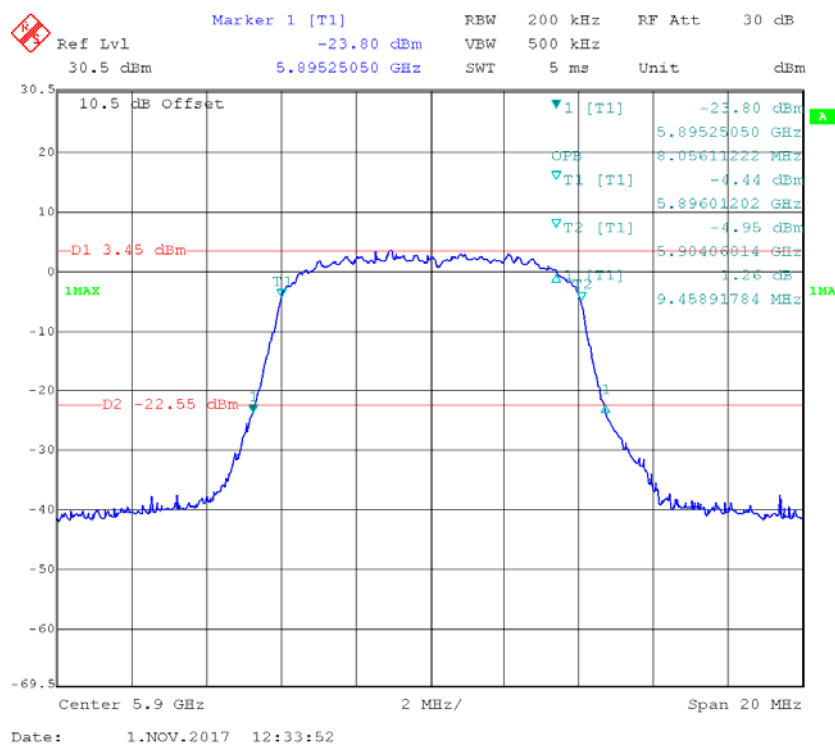
5880 MHz



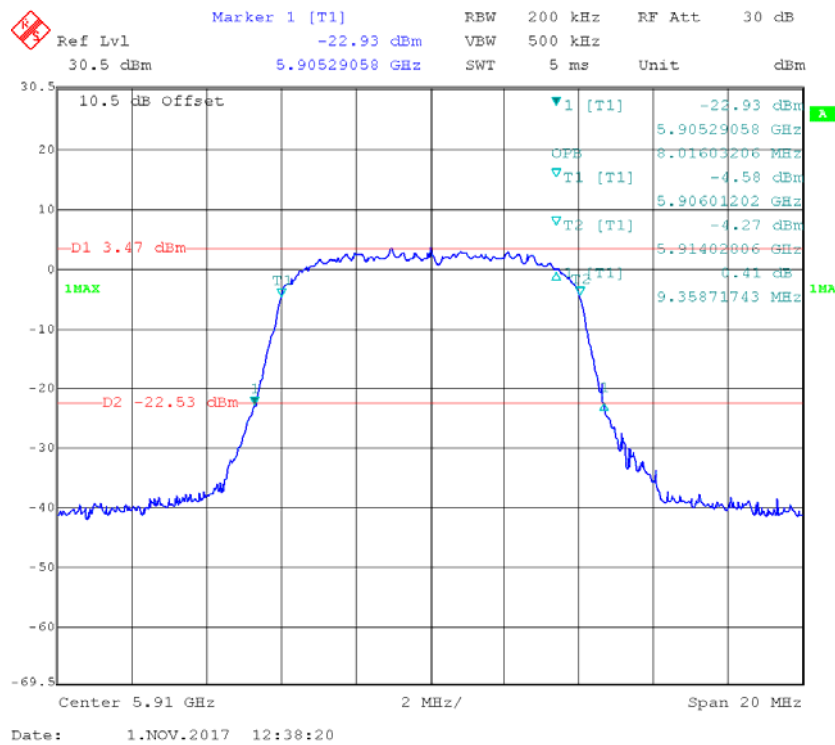
5890 MHz



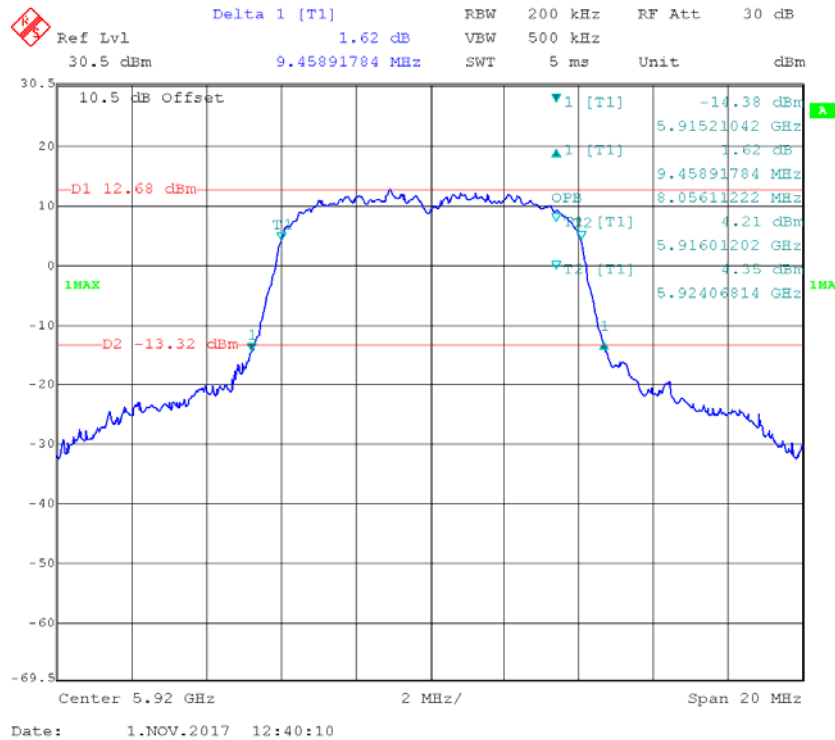
5900 MHz

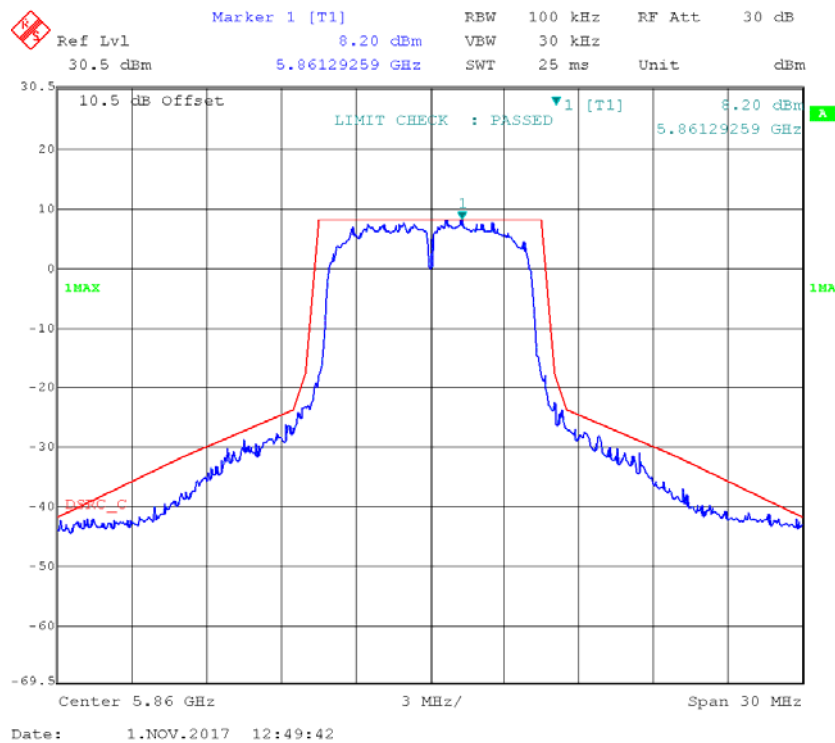
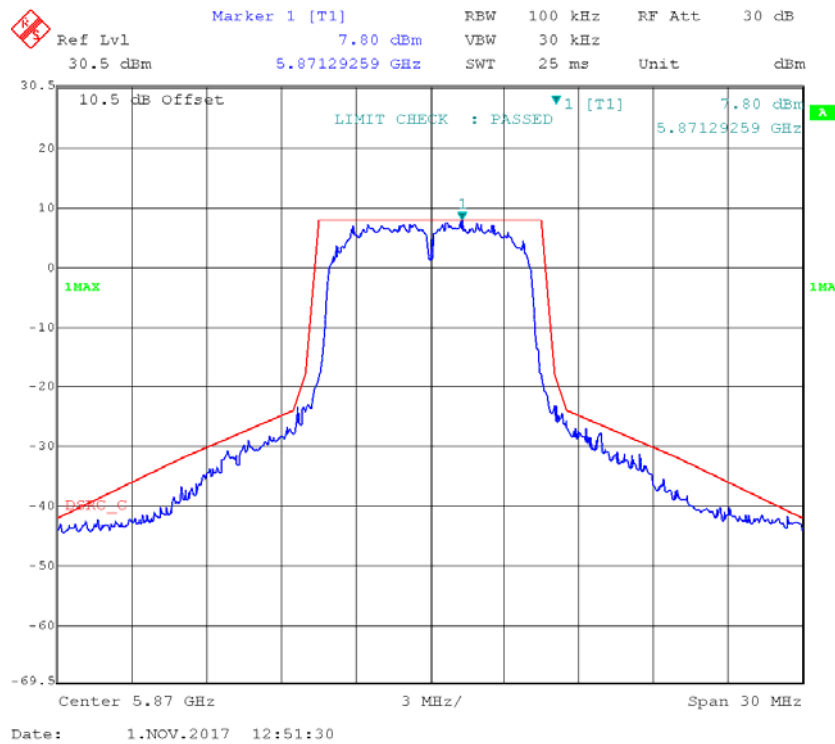


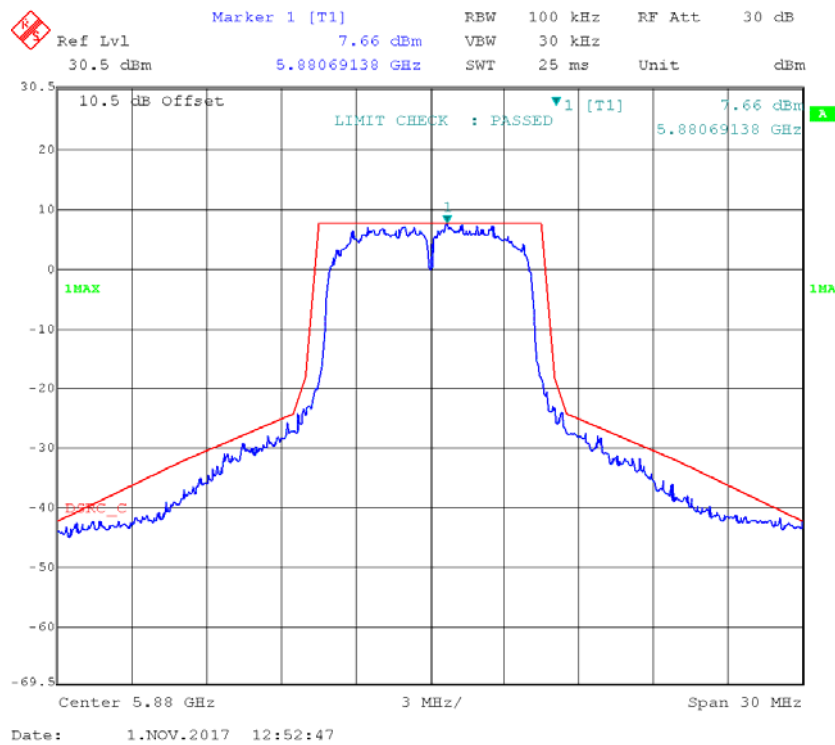
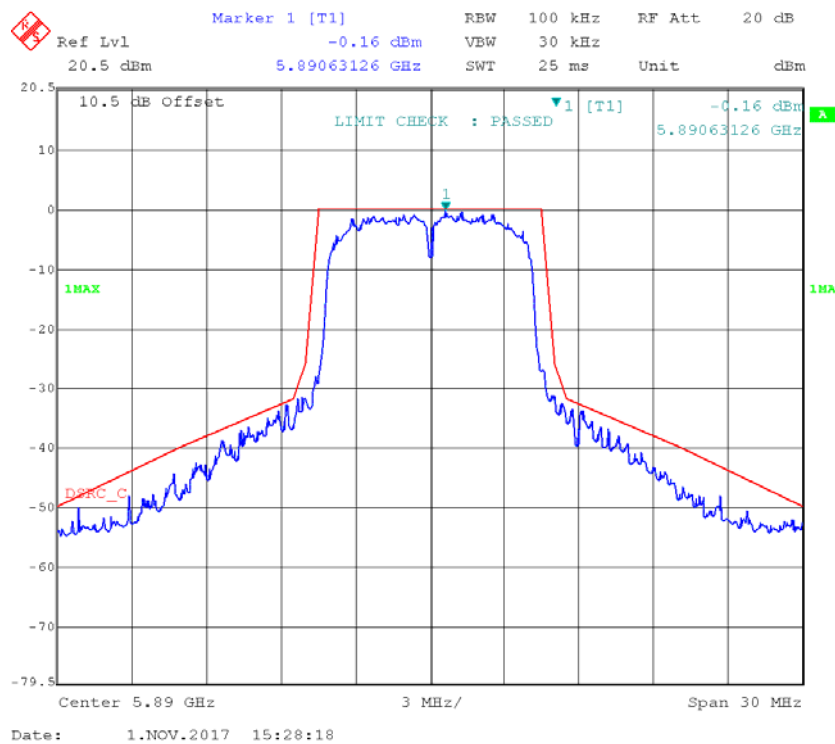
5910 MHz

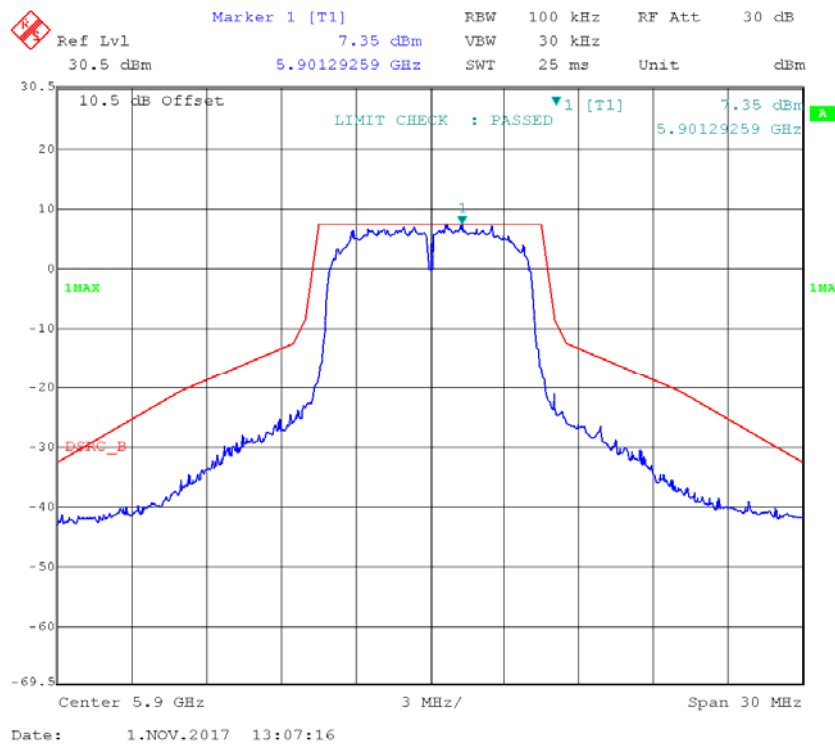
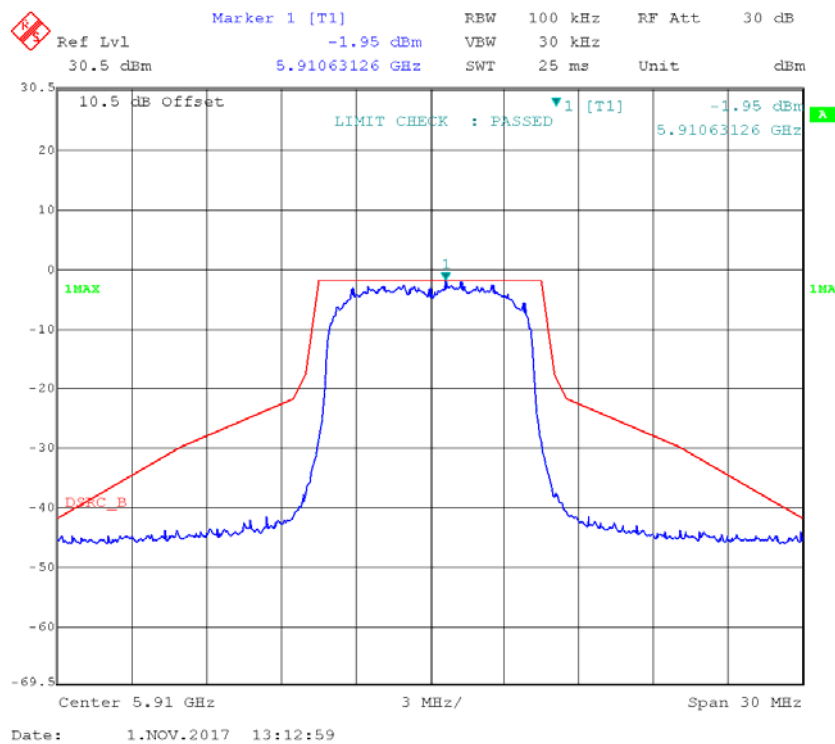


5920 MHz

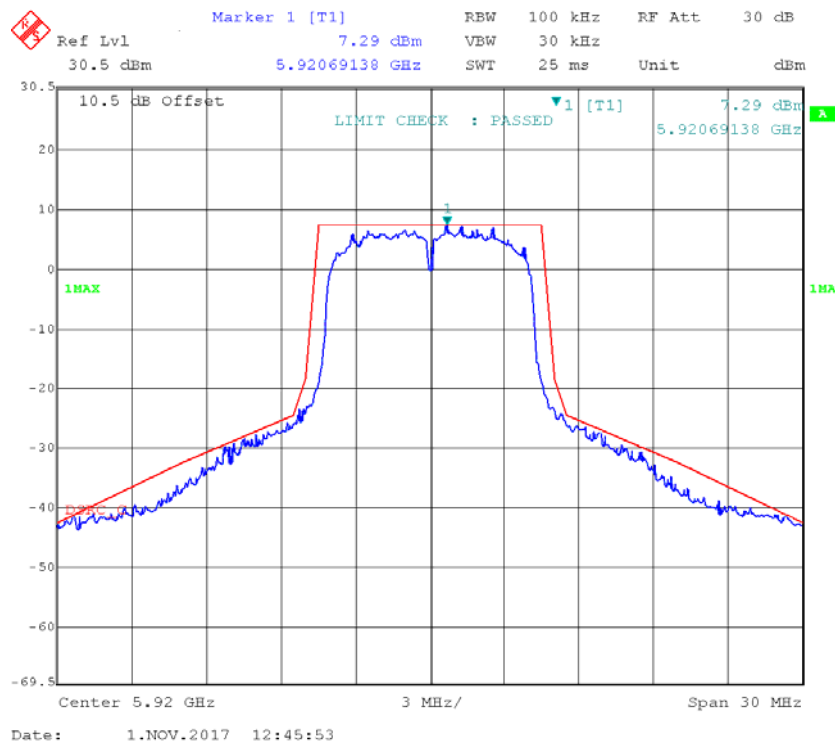


Emission Mask:**Type C, 5860 MHz****Type C, 5870 MHz**

Type C, 5880 MHz**Type C, 5890 MHz**

Type B, 5900 MHz**Type B, 5910 MHz**

Type C, 5920 MHz



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

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

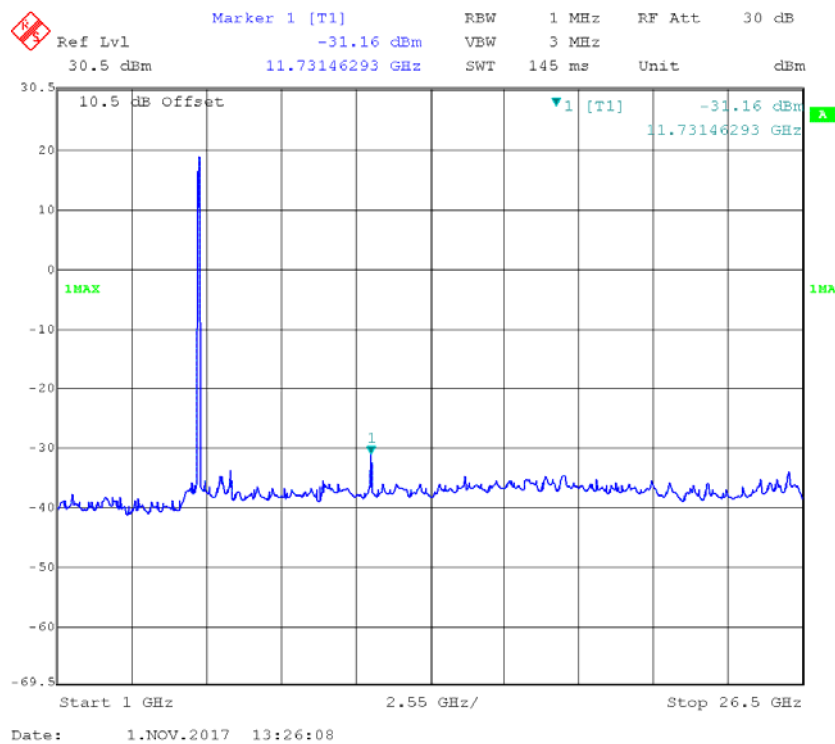
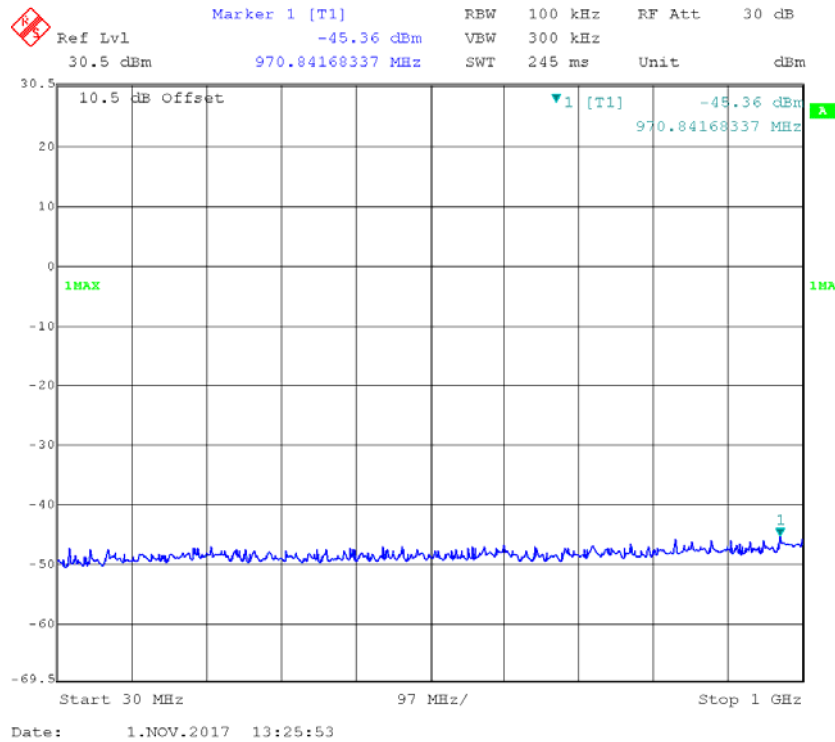
Temperature:	25.9~26.6 °C
Relative Humidity:	43 %
ATM Pressure:	101.9kPa

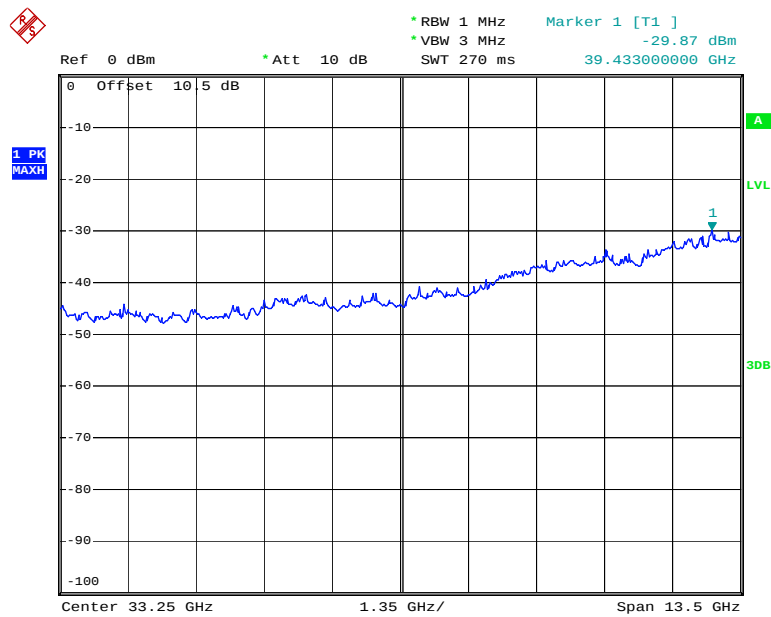
The testing was performed by Gavin Xu from 2017-11-01 to 2017-11-02.

Test Result: Compliance. Please refer to following table.

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

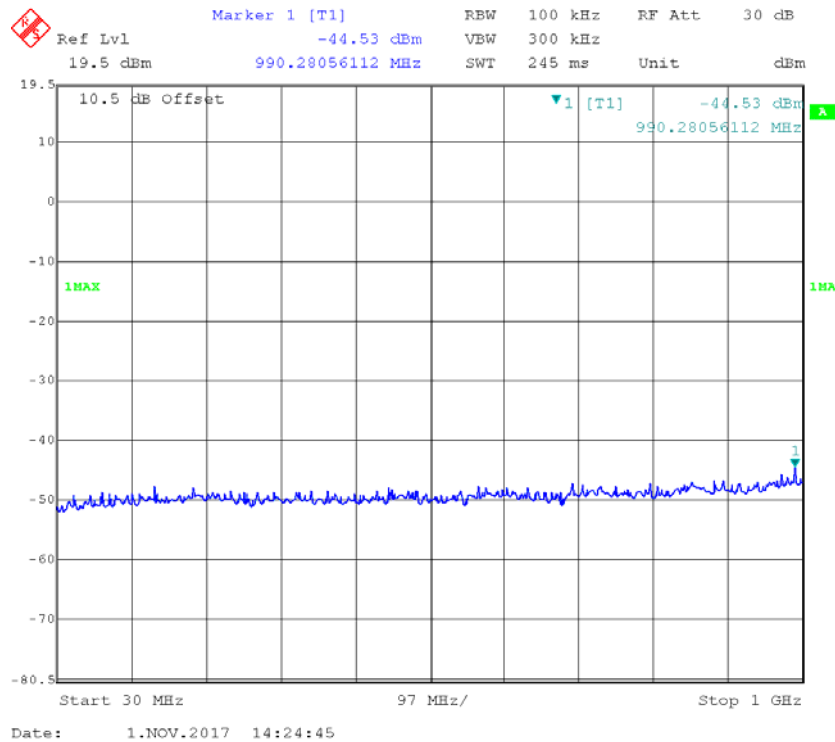
5870MHz

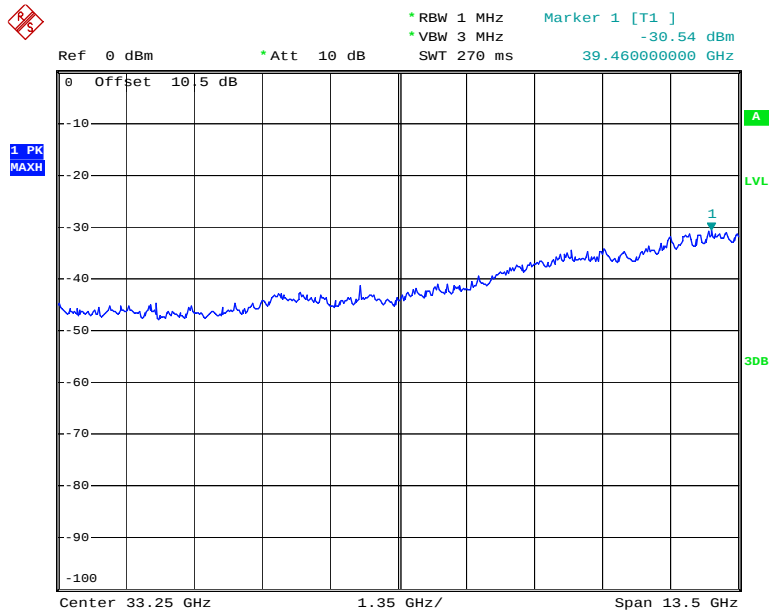
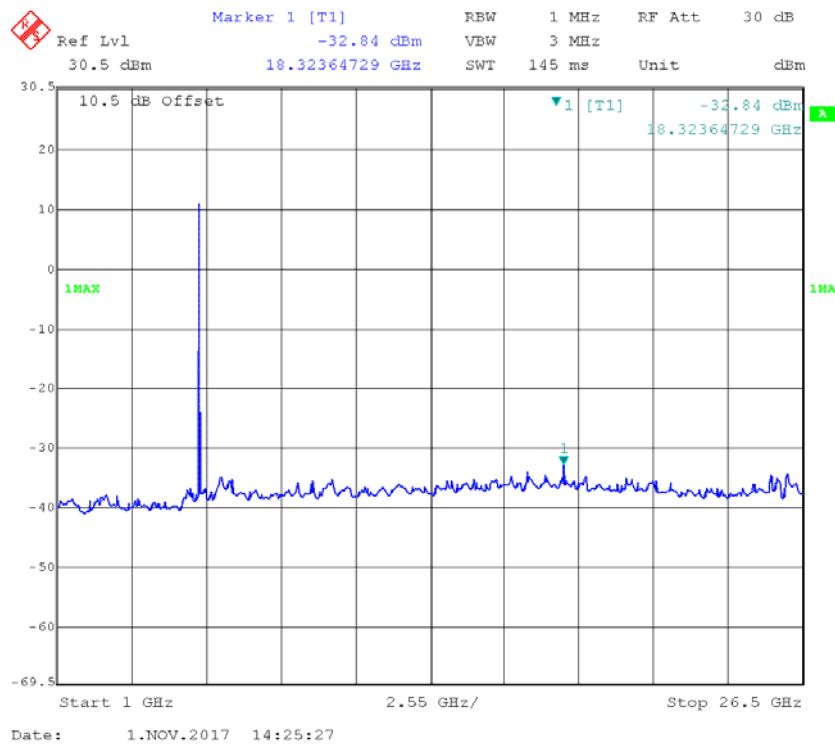




Date: 2.NOV.2017 14:23:25

5890 MHz





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

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

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.

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	JB3	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 Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-02 1302	2016-11-18	2019-11-18
Ducommun Technologies	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

*** 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:	29.5~27 °C
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.

30MHz-40GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency:5890.000 MHz								
11780.000	H	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	H	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
Frequency: 5870.000 MHz								
11740.000	H	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	H	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

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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.

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 °C
Relative Humidity:	43 %
ATM Pressure:	101.9kPa

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

Test Mode: Transmitting

DSRC1 Port

Test Frequency:5890MHz				
Temperature	Voltage	Measured Frequency	Frequency Stability	Limit
°C	V _{DC}	MHz	ppm	ppm
-30	48	5890.004	0.679	+/-10
-20		5890.002	0.340	+/-10
-10		5890.003	0.509	+/-10
0		5890.005	0.849	+/-10
10		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

DSRC2 Port:

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

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