TEST REPORT

DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664	Report No : DRTFCC1607-0101(1) Pages:(1) / (37) page	Dt&C

1. Customer

   • Name : eSSys Co., Ltd

   • Address : Daerung Post Tower 5 15F, 60-3 Gasan-dong, Geumcheon-gu, Seoul, Korea

2. Use of Report : FCC Original Grant

3. Product Name (FCC ID): Wireless Module for DSRCS (2ADQJ-EWBP1BR1)

4. Date of Test : 2016-06-16 ~ 2016-07-19, 2016-07-29

5. Test Method Used: FCC Part 95L

6. Testing Environment : See appended test report

7. Test Result : ☒ Pass ☐ Fail

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Name : Jaejin Lee (Signature)	Technical Manager Name : Geunki Son (Signature)

2016 . 08 . 01 .

DT&C Co., Ltd.

* If this test report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1607-0101	Jul. 21, 2016	Initial issue
DRTFCC1607-0101(1)	Aug. 01, 2016	Revised the section 2, 5, 8.2, 8.6 and added the section 7

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1. GENERAL INFORMATION

Applicant Name: eSSys Co., Ltd

Address: Daerung Post Tower 5 15F, 60-3 Gasan-dong, Geumcheon-gu, Seoul, Korea

FCC ID	:	2ADQJ-EWBP1BR1
Model Name	:	W-BR1
Add Model Name	:	NA

2. EUT DESCRIPTION

FCC Classification	Licensed Non-Broadcast Station Transmitter (TNB)
Product	Wireless Module for DSRCS
DSRC-OBU Device Class	C
Power Supply	DC 5 V & DC 3.3 V
Frequency Range	802.11p(10 MHz): 5860 ~ 5920MHz
Max. RF Output Power (EIRP)	0.046 W (16.67dBm) Note1
Maximum antenna input power	0.045 W (16.52dBm) Note1
Emission Designator	8M03D1D
Modulation Type	BPSK, QPSK, 16-QAM, 64-QAM for OFDM
Antenna Specification	Type: External Antenna (2TX) Note2 Antenna 1(Max. peak gain): 1.0 dBi Note3 Antenna 2(Max. peak gain): 1.0 dBi Note3

Note1: The maximum power comply with the ATSM E2213-03 requirements in accordance with Part 95 subpart L. And the requirements of ASTM E2213-03, please refer to the "▣ Limit" of section 8.2.

Note2: This device is supports multiple transmitting. But, it cannot be transmitted to same frequency.

Note3: The antenna gain has been included cable loss. (Cable loss: 5dB)

3. INTRODUCTION CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4. TEST LABORATORY

DT&C Co., Ltd.			
Standard		**Site number**	**Address**
FCC	☒	**165783**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**804488**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**596748**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**678747**	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
IC	☐	**5740A-3**	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	☐	**5740A-2**	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
www.dtnc.net			
Telephone	:	+ 82-31-321-2664	
FAX	:	+ 82-31-321-1664	

5. INFORMATION ABOUT TESTING

5.1 Test mode

Ant.	Mode	Worst data rate
1	802.11p	3 Mbps
2	802.11p	3 Mbps

Note: The power measurement has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.(Refer to the Section 8.2)
And all tests conducted in this report were made at the worst case data rate(i.e., maximum output power) of each modulation.

5.2 Tested channel information

Ant.	802.11p			
	Channel	Available frequency range [MHz]	Declared Frequency [MHz]	Measured frequency [MHz]
1	***172***	***5855-5865***	***5860***	***5859.97***
	174	5865-5875	5870	5869.97
	176	5875-5885	5880	5879.97
	178	***5885-5895***	***5890***	***5889.97***
	180	5895-5905	5900	5899.97
	182	5805-5915	5910	5909.98
	184	***5915-5925***	***5920***	***5919.98***
2	***172***	***5855-5865***	***5860***	***5859.96***
	174	5865-5875	5870	5869.97
	176	5875-5885	5880	5879.98
	178	***5885-5895***	***5890***	***5889.98***
	180	5895-5905	5900	5899.96
	182	5805-5915	5910	5909.97
	184	***5915-5925***	***5920***	***5919.98***

Note: The test was performed at Low, Middle, High channels, except the output power was measured at all channels. (Power deviation between channels are very small and comply with limit.)

6. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
95.639	Maximum transmitter power	ATSM E2213-03 (8.10.1)	Conducted	**C**
2.1049 95.633	Occupied Bandwidth	N/A		**C**
95.935	Transmit spectrum mask	ASTM E2213-03 (8.10.2)		**C**
2.1051	Spurious emissions	ASTM E2213-03 (8.10.2)		**C**
2.1055	Frequency stability	ASTM E2213-03 (8.10.4)		**C**
95.639	Effective isotropic radiated power(EIRP)	ATSM E2213-03 (8.10.1)	Radiated	**C**
2.1053	Spurious emissions	ASTM E2213-03 (8.10.2)		**C**

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

The sample was tested according to the following specification:
ANSI/TIA/EIA-603-C-2004 and KDB 971168 D01 v02r02

7. SAMPLE CALCULATION

A. Emission Designator

Emission Designator = **8M03D1D**

OBW = 8.03 MHz

(Measured at the 99.75 % power bandwidth)

D = Emission in which the main carrier is amplitude and angle-modulated either simultaneously or in a pre-established sequence

1 = A single channel containing quantized or digital information without the use of a modulating sub-carrier, excluding time-division multiplex

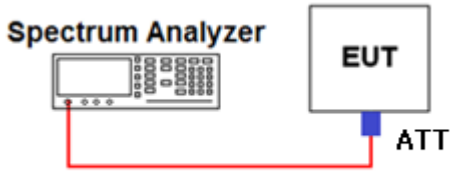
D = Data transmission, telemetry, telecommand

8. TEST RESULT

8.1 Occupied bandwidth

▣ Limit: Not Applicable

▣ Test set-up



▣ Test Procedure

- **KDB971168 v02r02 - Section 4.2**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

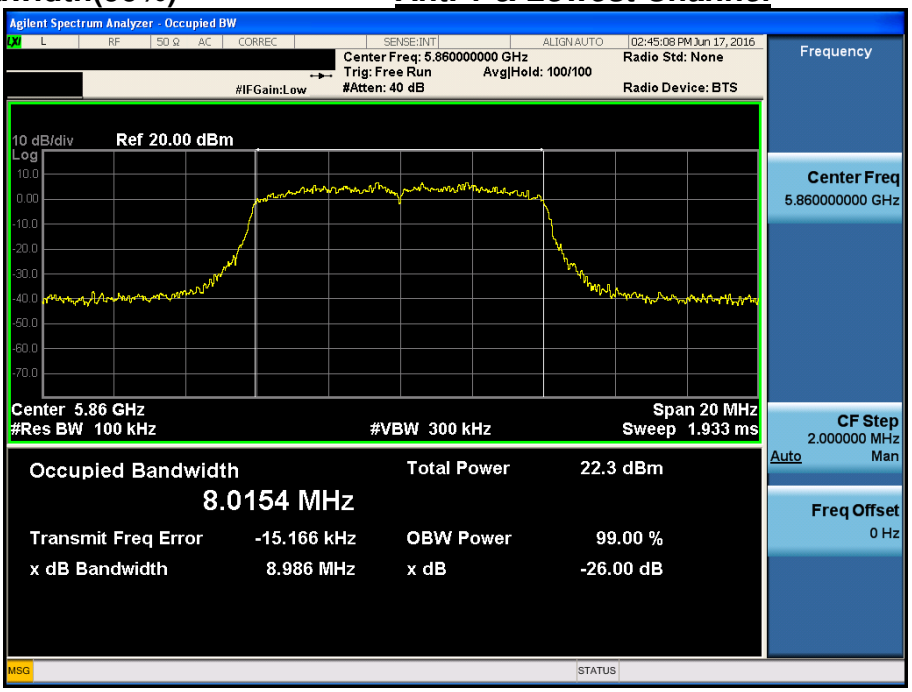
1. The signal analyzer`s automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 ~ 5 % of the expected OBW & VBW ≥ 3 X RBW
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.

▣ Test Results: Comply

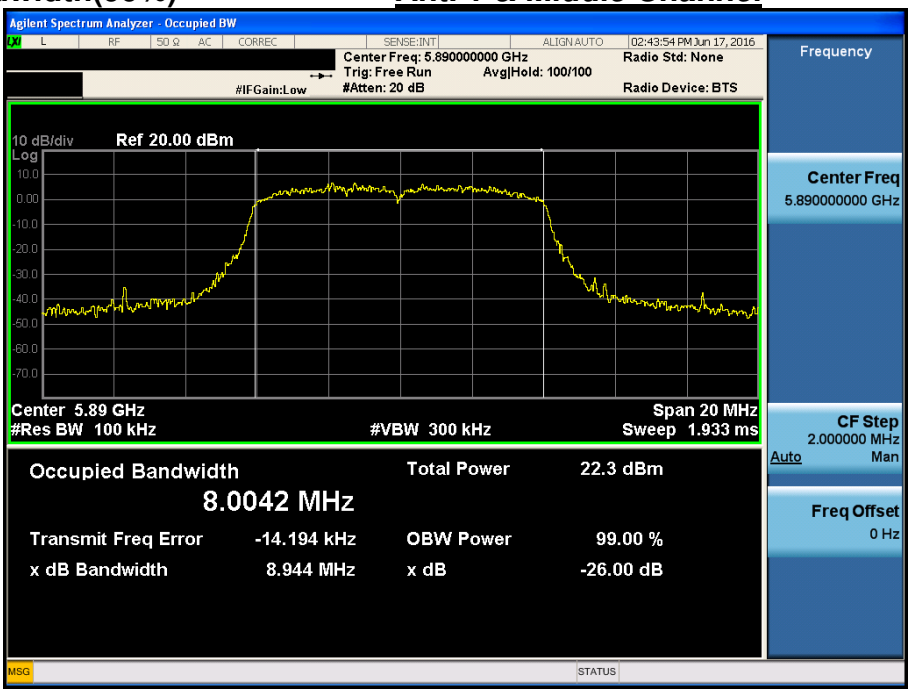
Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]	
			Ant. 1	Ant. 2
802.11p	3 Mbps	5860	8.02	8.01
		5890	8.00	**8.03**
		5920	8.01	8.03

Note 1: See next pages for actual measured spectrum plots.

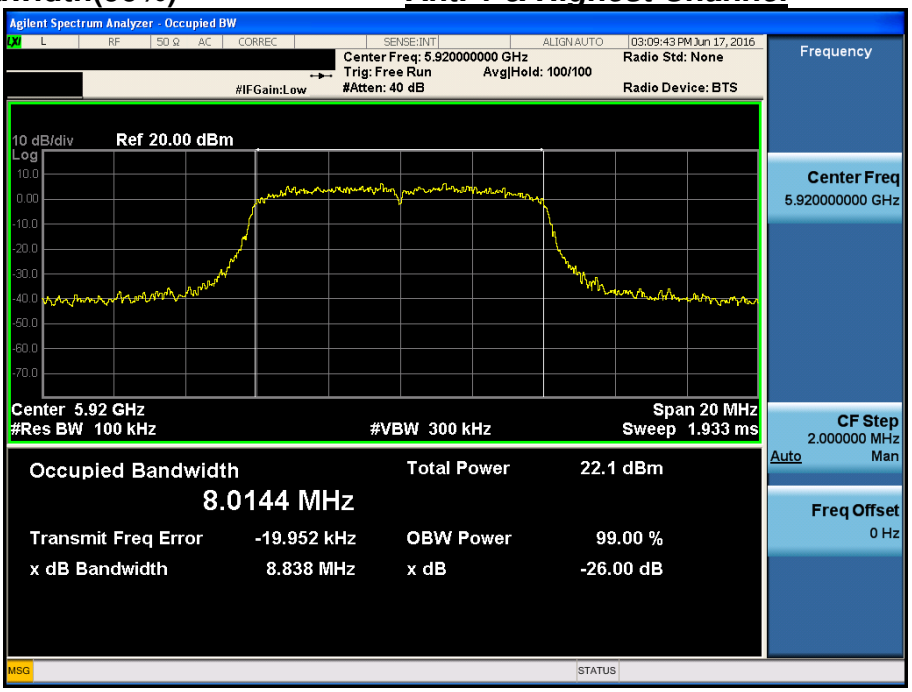
Occupied Bandwidth(99%) *Ant. 1 & Lowest Channel*



Occupied Bandwidth(99%) *Ant. 1 & Middle Channel*

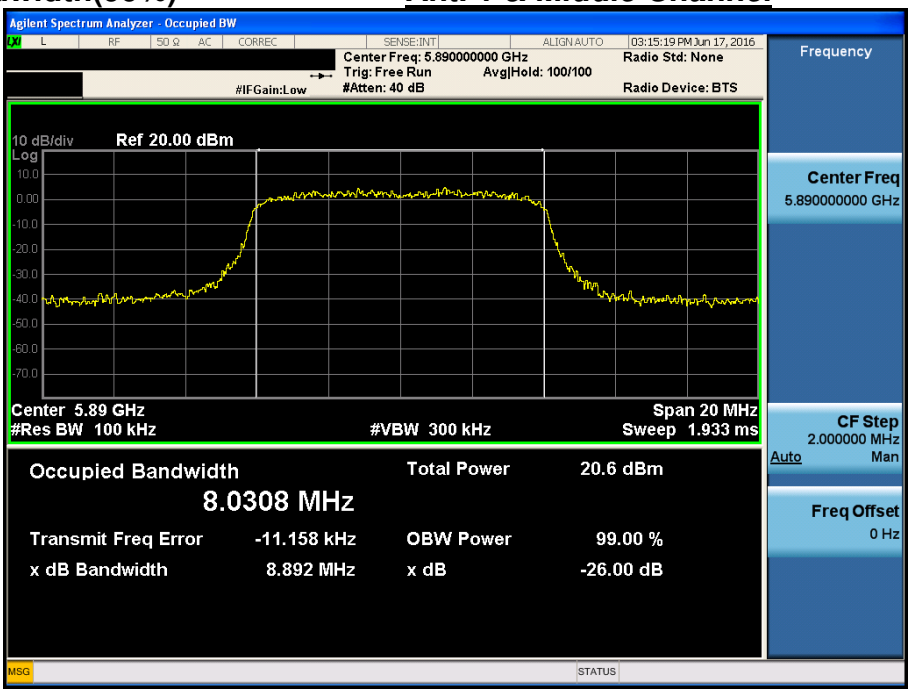


Occupied Bandwidth(99%) *Ant. 1 & Highest Channel*



Occupied Bandwidth(99%) *Ant. 2 & Lowest Channel*

Occupied Bandwidth(99%) *Ant. 1 & Middle Channel*



Occupied Bandwidth(99%) *Ant. 1 & Highest Channel*

8.2 Maximum Transmitter power

▣ **Limit: Part 95.639(h)(i) DSRCS-OBUs are governed under subpart L of this part,** except the maximum output power for portable DSRCS-OBUs is 1.0 mW. For purposes of this paragraph, a portable is a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user

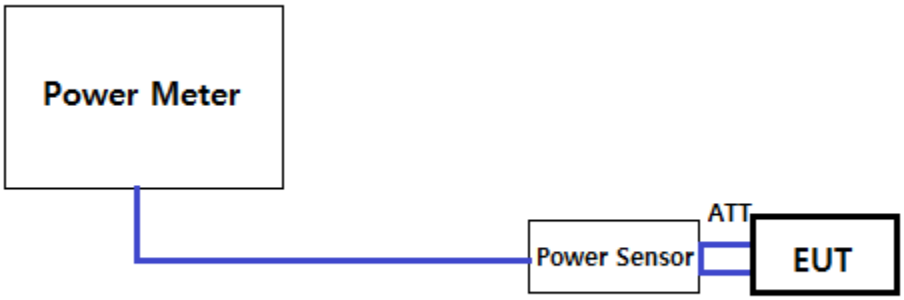
Part 95 Subpart L 95.1509 ASTM E2213-03 DSRC Standard.

On-Board Units operating in the 5850-5925 MHz band shall comply with the following technical standards, which are incorporated by reference: American Society for Testing and Materials (ASTM) E2213-03, Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems—5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications published September 2003 (ASTM E2213-03 DSRC Standard).

ASTM E2213-03 – Section 8.10.1.6

Private OBU operations in Channels 172, 174, 176, 178, and 184 shall not exceed 28.8 dBm antenna input power and 33 dBm EIRP. Private OBU operations in Channel 175 shall not exceed 10 dBm antenna input power and 23 dBm EIRP. **Private OBU operations in Channels 180**, 181, **and 182 shall not exceed 20 dBm antenna input power and 23 dBm EIRP**.

▣ **Test set-up**



▣ **Test Procedure**

- **KDB971168 v02r02 - Section 5.2.3**

The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

▣ Test Results: Comply

Ant.	Channel	Frequency [MHz]	Test Result [dBm]							
			DATA RATE [Mbps]							
			3	4.5	6	9	12	18	24	27
1	172	5860	16.41	16.36	16.32	16.26	16.17	16.10	16.11	16.07
	174	5870	16.43	16.38	16.28	16.31	16.33	16.25	16.14	16.10
	176	5880	16.39	16.41	16.38	16.31	16.21	16.18	16.12	16.08
	178	5890	16.36	16.31	16.33	16.27	16.17	16.25	16.08	16.01
	180	5900	16.48	16.38	16.36	16.30	16.21	16.14	16.05	16.03
	182	5910	16.46	16.42	16.39	16.32	16.22	16.15	16.12	16.15
	184	5920	**16.52**	16.49	16.39	16.42	16.32	16.25	16.28	16.21
2	172	5860	16.02	16.05	16.01	15.95	15.82	15.86	15.82	15.79
	174	5870	16.08	16.01	15.97	15.91	15.78	15.82	15.78	15.84
	176	5880	16.12	16.05	16.01	15.95	15.82	15.86	15.82	15.81
	178	5890	16.11	15.94	15.96	15.89	15.82	15.77	15.72	15.86
	180	5900	16.03	15.86	15.88	15.81	15.74	15.69	15.64	15.73
	182	5910	16.14	16.08	16.00	15.93	15.96	15.91	15.86	15.87
	184	5920	**16.16**	16.08	15.97	16.01	15.91	15.87	15.92	15.89

8.3 Transmit spectrum mask

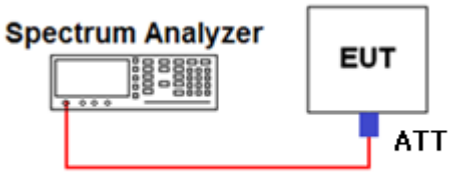
▣ Limit: ASTM E2213-03 – Section 8.10.2

TABLE 10 DSRC Spectrum Mask

Note 1-Reduction in Power Spectral Density, dBr.

Class	± 4.5-MHz Offset	± 5-MHz Offset	± 5.5-MHz Offset	± 10-MHz Offset	± 15-MHz Offset
A	0	-10	-20	-28	-40
B	0	-16	-20	-28	-40
C	**0**	**-26**	**-32**	**-40**	**-50**
D	0	-35	-45	-55	-65

▣ Test set-up



▣ Test Procedure and Requirements

- **ATSM E2213-03 – Section 8.10.2.1**

The DSRC transmitted spectrum mask is relative to the device class of operation. The power in the transmitted spectrum for all DSRC devices shall be −25 dBm or less within 100 kHz outside all channel and band edges. This will be accomplished by attenuating the transmitted signal 100 kHz outside the channel and band edges by 55 + 10log(P) dB, where P is the total transmitted power in watts. The transmitted spectral density of the transmitted signal for all devices shall fall within the spectral mask, as detailed in Table 10.[5] **The measurements shall be made using a 100 kHz resolution bandwidth and a 30 kHz video bandwidth.**

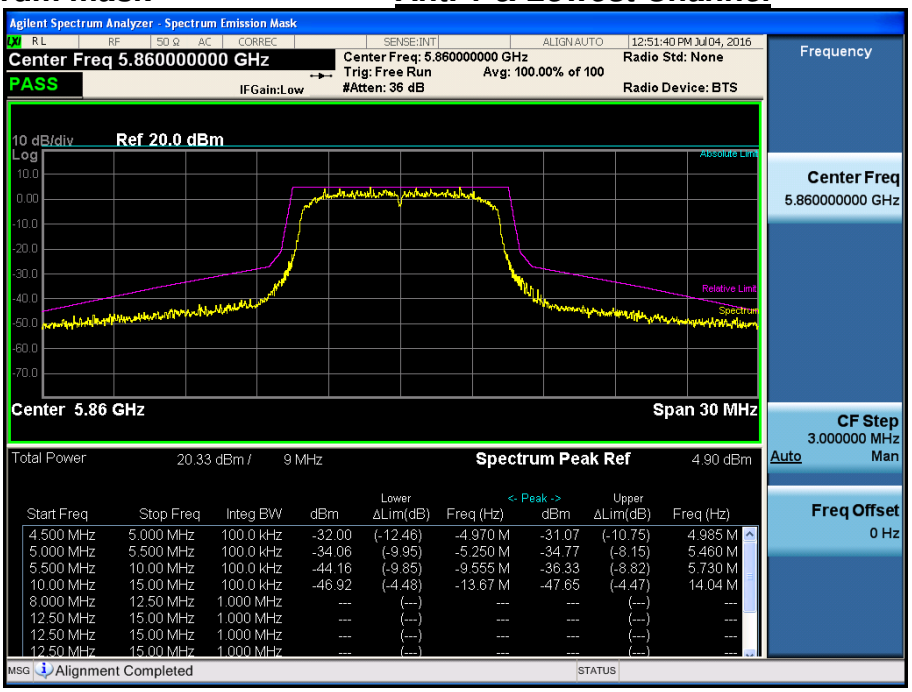
Test setting

1. RBW = 100 kHz
2. VBW = 30 kHz
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize

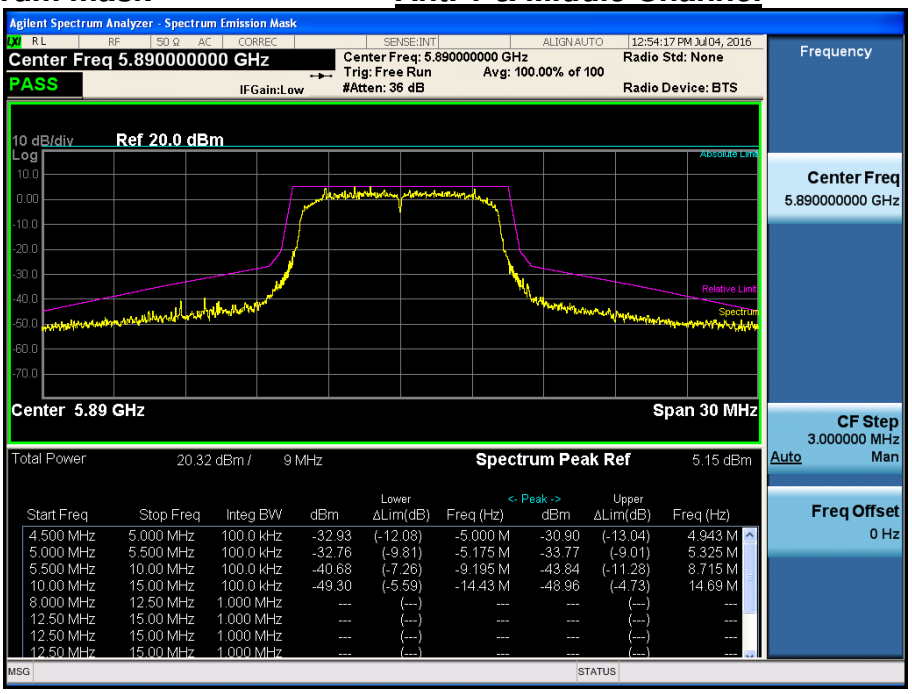
▣ Test Results: Comply

Refer to the next page.

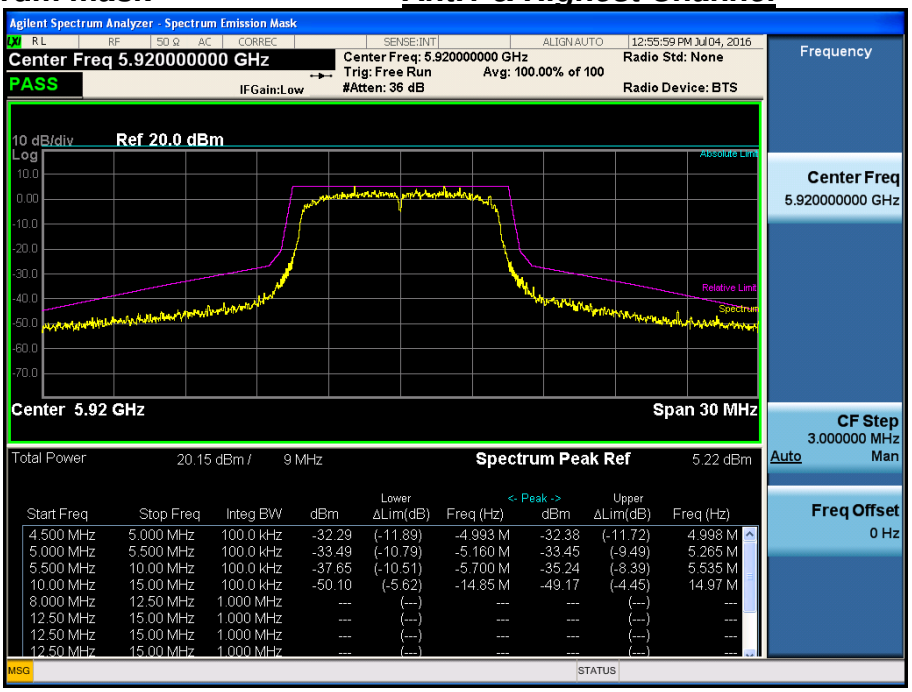
Transmit spectrum mask *Ant. 1 & Lowest Channel*



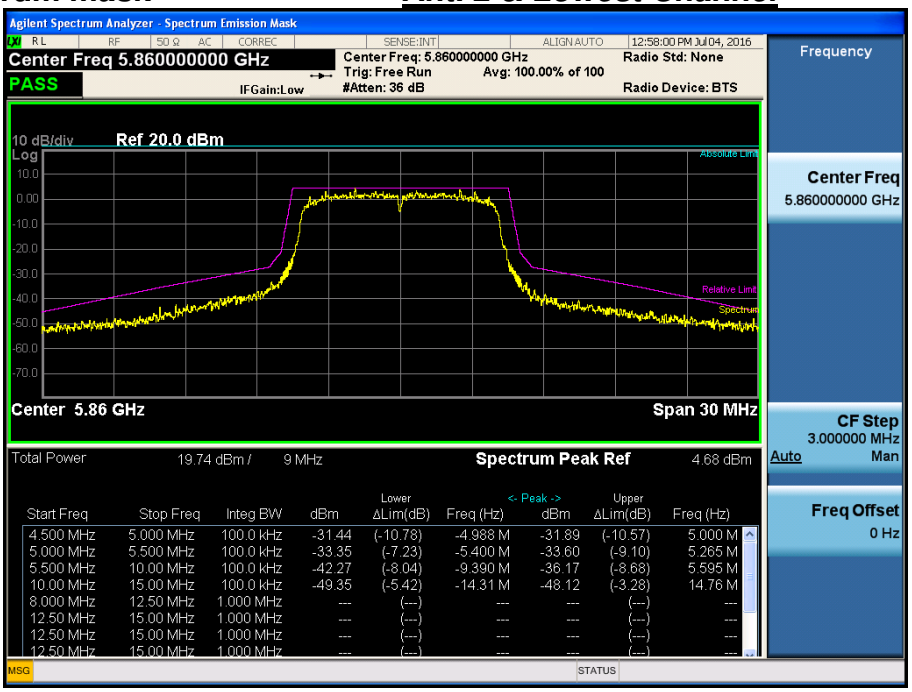
Transmit spectrum mask *Ant. 1 & Middle Channel*



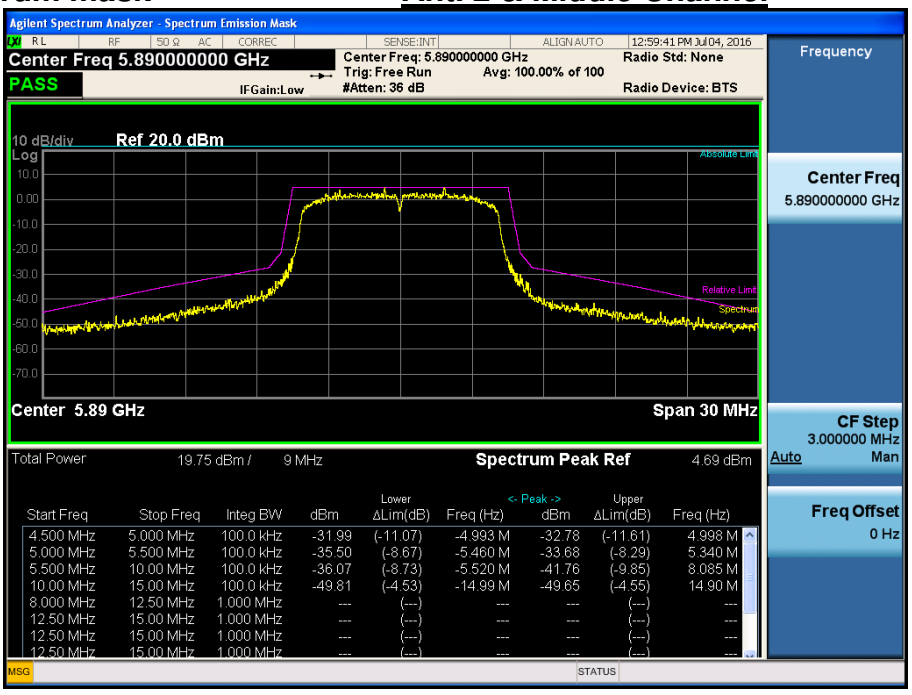
Transmit spectrum mask *Ant.1 & Highest Channel*



Transmit spectrum mask *Ant. 2 & Lowest Channel*

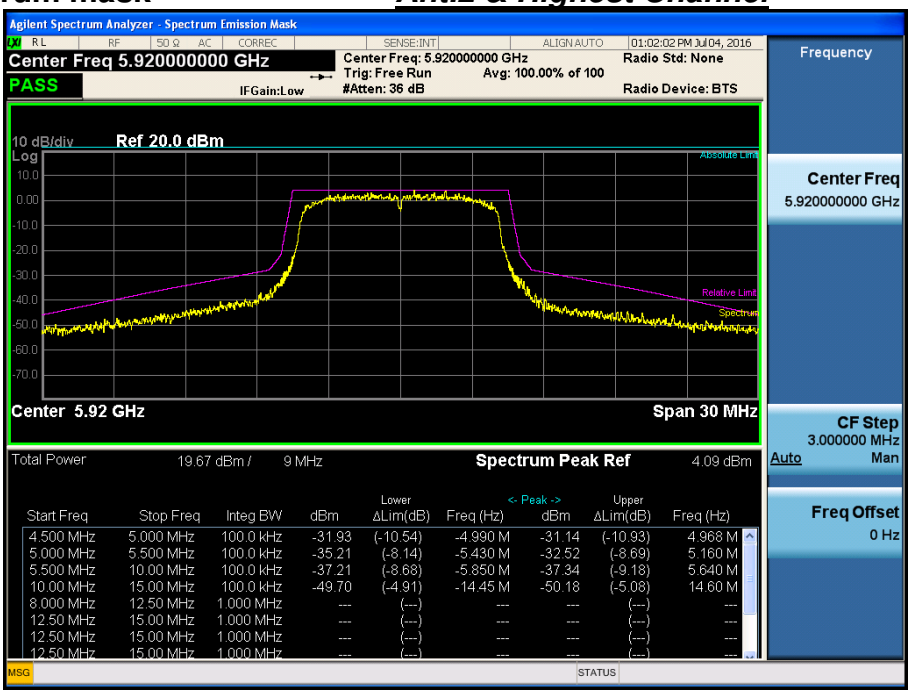


Transmit spectrum mask *Ant. 2 & Middle Channel*



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
4.500 MHz	5.000 MHz	100.0 kHz	-31.99	(-11.07)	-4.993 M	-32.78	(-11.61)	4.998 M
5.000 MHz	5.500 MHz	100.0 kHz	-35.50	(-8.67)	-5.460 M	-33.68	(-8.29)	5.340 M
5.500 MHz	10.00 MHz	100.0 kHz	-36.07	(-8.73)	-5.520 M	-41.76	(-9.85)	8.085 M
10.00 MHz	15.00 MHz	100.0 kHz	-49.81	(-4.53)	-14.99 M	-49.65	(-4.55)	14.90 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

Transmit spectrum mask *Ant.2 & Highest Channel*



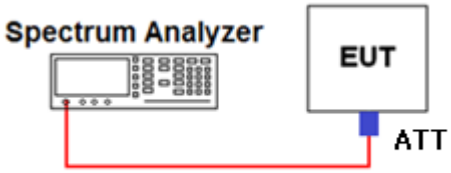
Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Lower Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Upper Freq (Hz)
4.500 MHz	5.000 MHz	100.0 kHz	-31.93	(-10.54)	-4.990 M	-31.14	(-10.93)	4.968 M
5.000 MHz	5.500 MHz	100.0 kHz	-35.21	(-8.14)	-5.430 M	-32.52	(-8.69)	5.160 M
5.500 MHz	10.00 MHz	100.0 kHz	-37.21	(-8.68)	-5.850 M	-37.34	(-9.18)	5.640 M
10.00 MHz	15.00 MHz	100.0 kHz	-49.70	(-4.91)	-14.45 M	-50.18	(-5.08)	14.60 M
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

8.4 Spurious emissions (Conducted)

▣ Limit: ASTM E2213-03 – Section 8.10.2

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least **55 10 log(P) dB**

▣ Test set-up



▣ Test Procedure

- **KDB971168 v02r02 - Section 6.0**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths. The spectrum is scanned from 9 kHz to 40GHz.

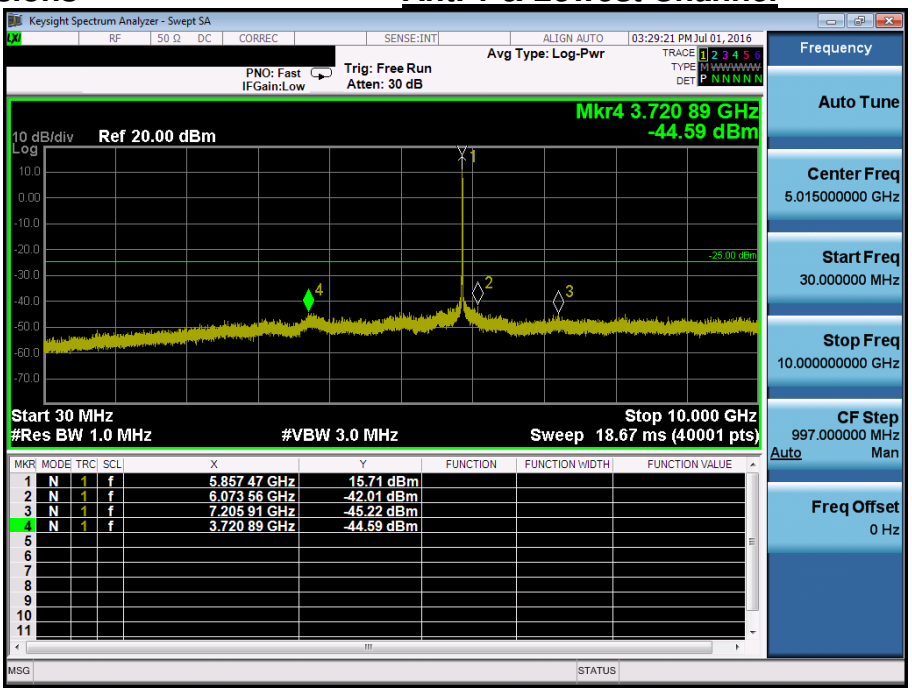
Test setting

1. RBW = 1 MHz & VBW ≥ 3 X RBW
2. Detector = PEAK
3. Trace mode = Max hold
4. Sweep time = Auto couple
5. Number of sweep point ≥ 2 X span / RBW
6. The trace was allowed to stabilize

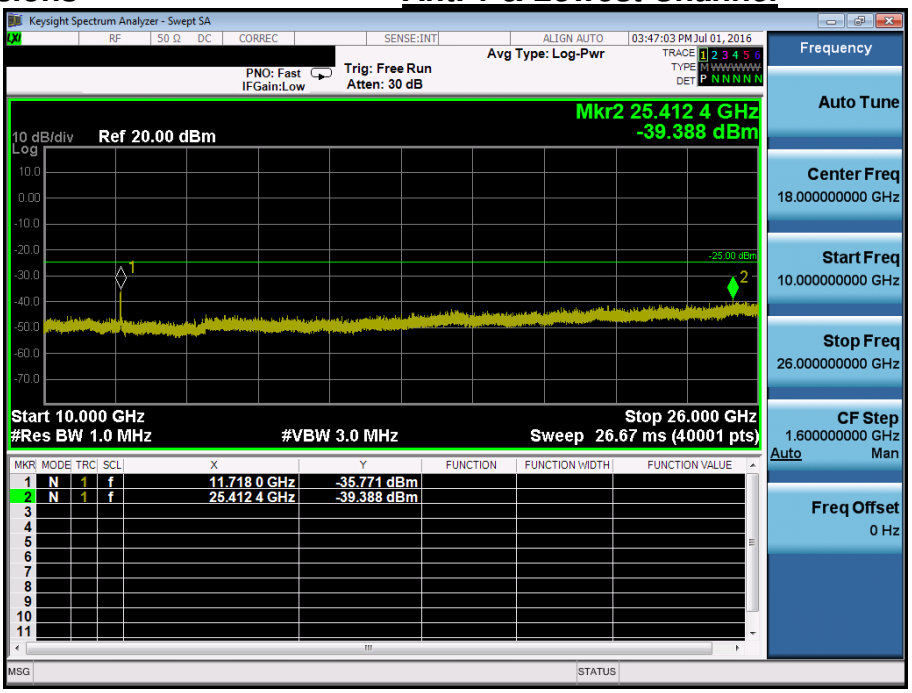
▣ Test Results: Comply

Refer to the next page.

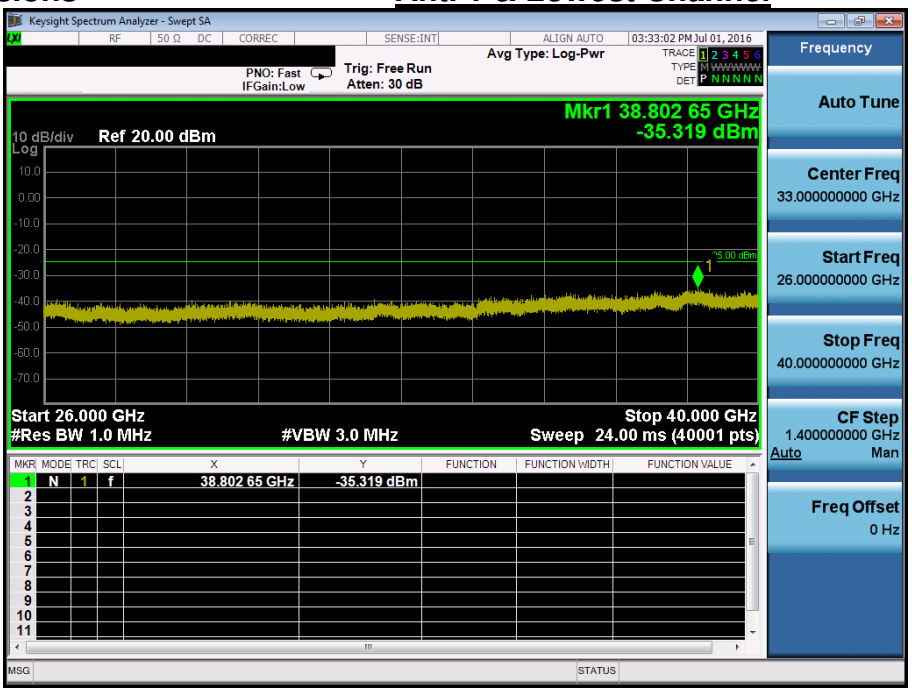
Spurious emissions *Ant. 1 & Lowest Channel*



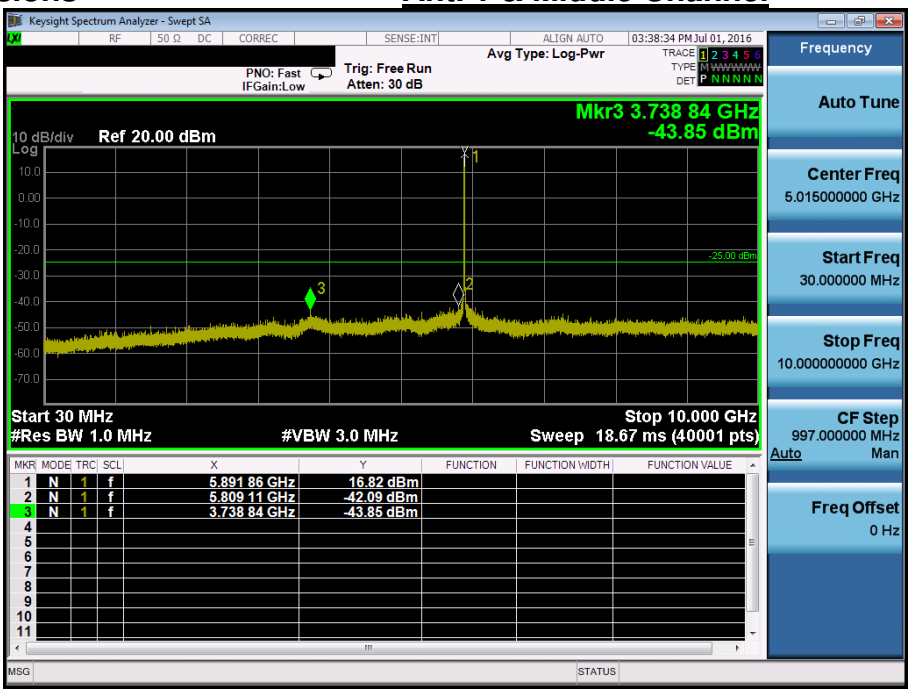
Spurious emissions *Ant. 1 & Lowest Channel*



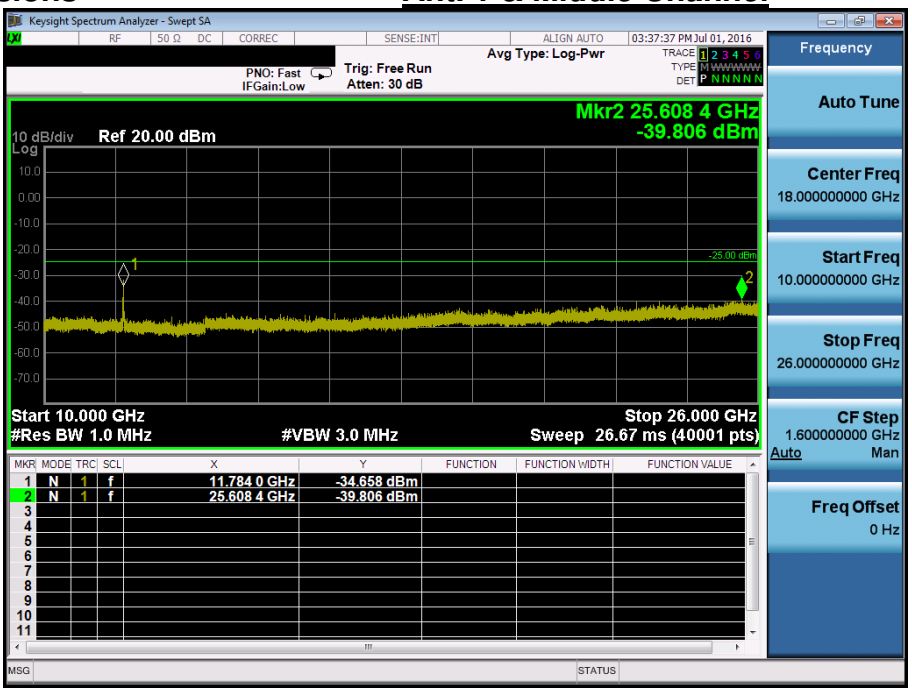
Spurious emissions *Ant. 1 & Lowest Channel*



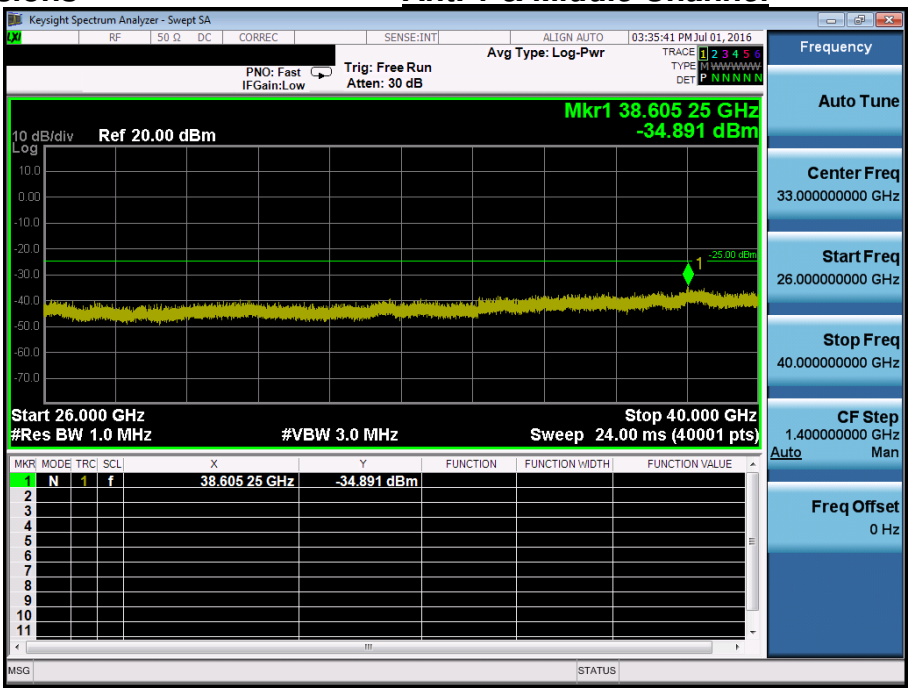
Spurious emissions *Ant. 1 & Middle Channel*



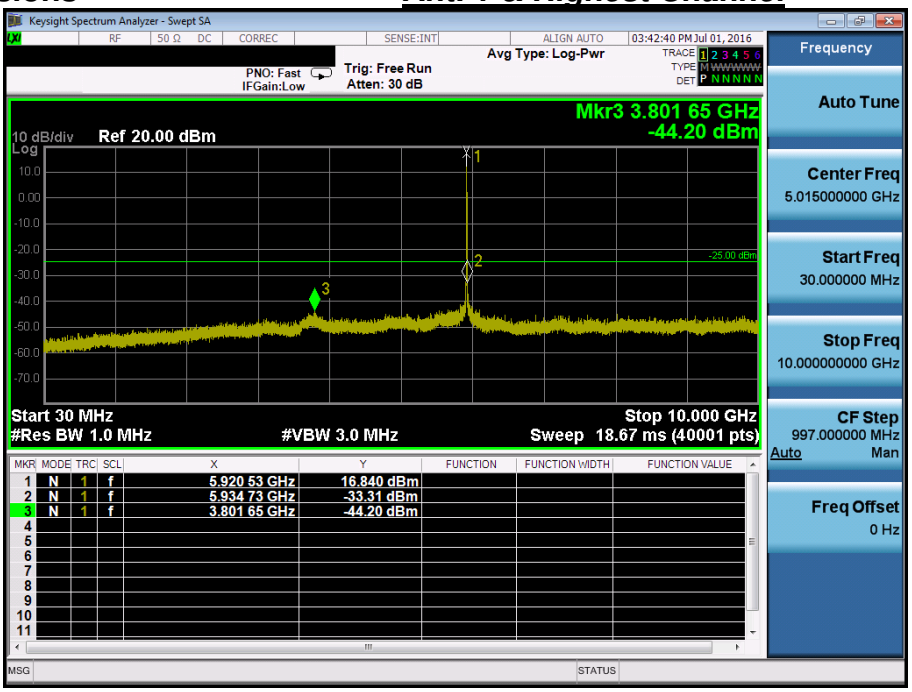
Spurious emissions *Ant. 1 & Middle Channel*



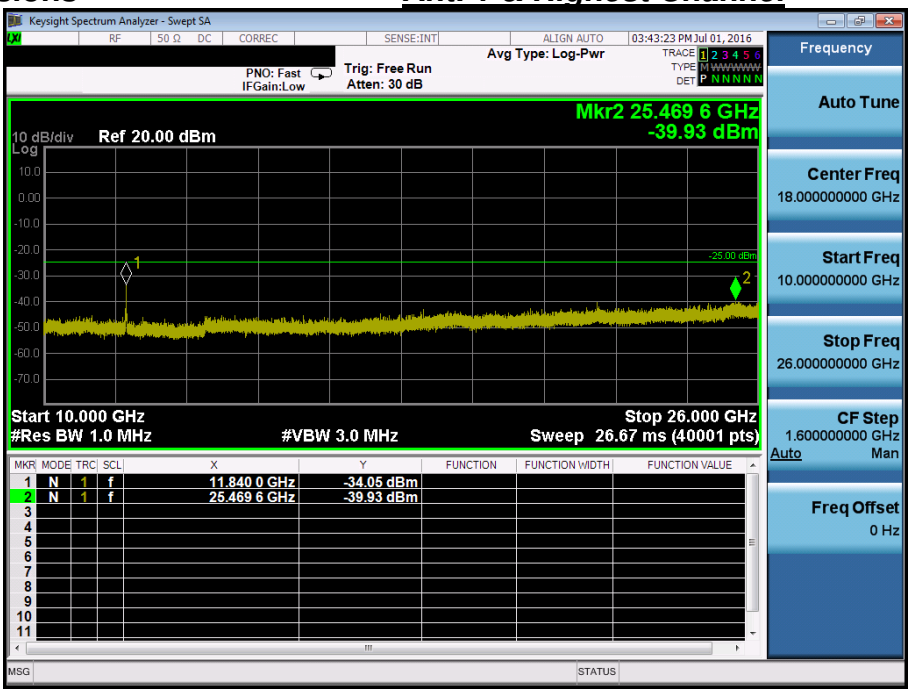
Spurious emissions *Ant. 1 & Middle Channel*



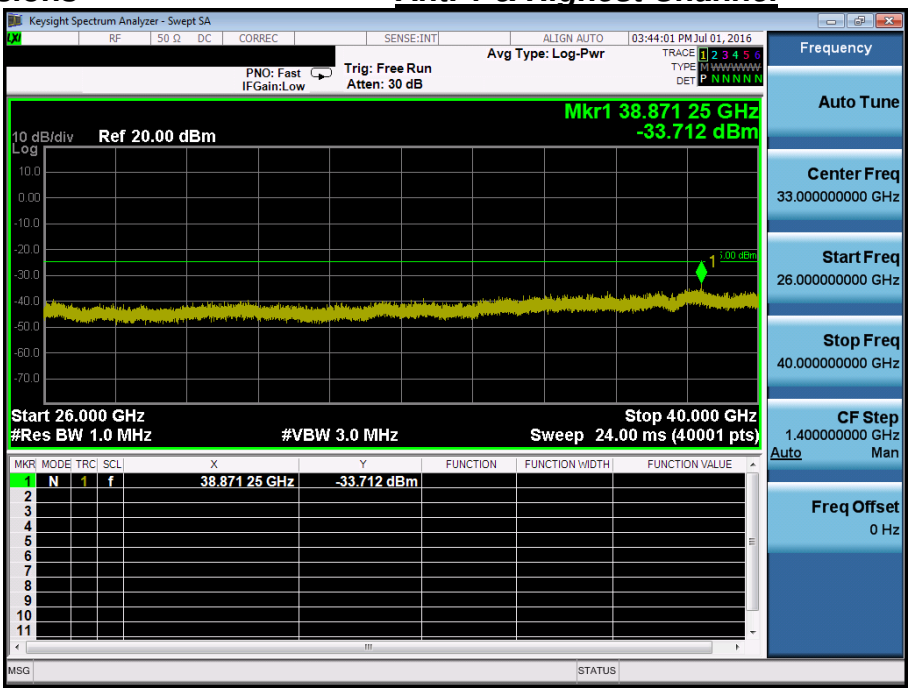
Spurious emissions *Ant. 1 & Highest Channel*



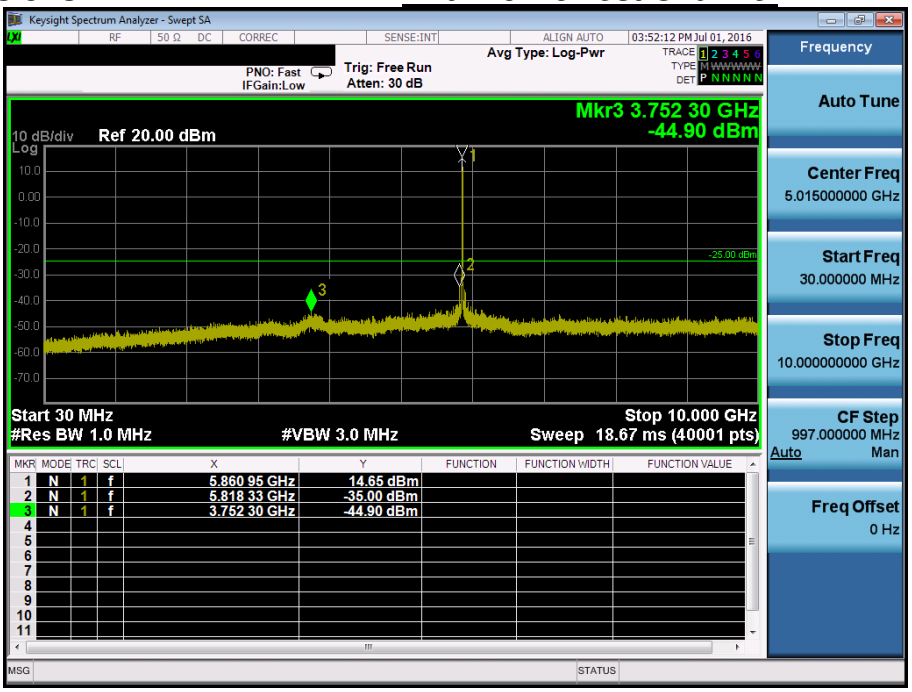
Spurious emissions *Ant. 1 & Highest Channel*



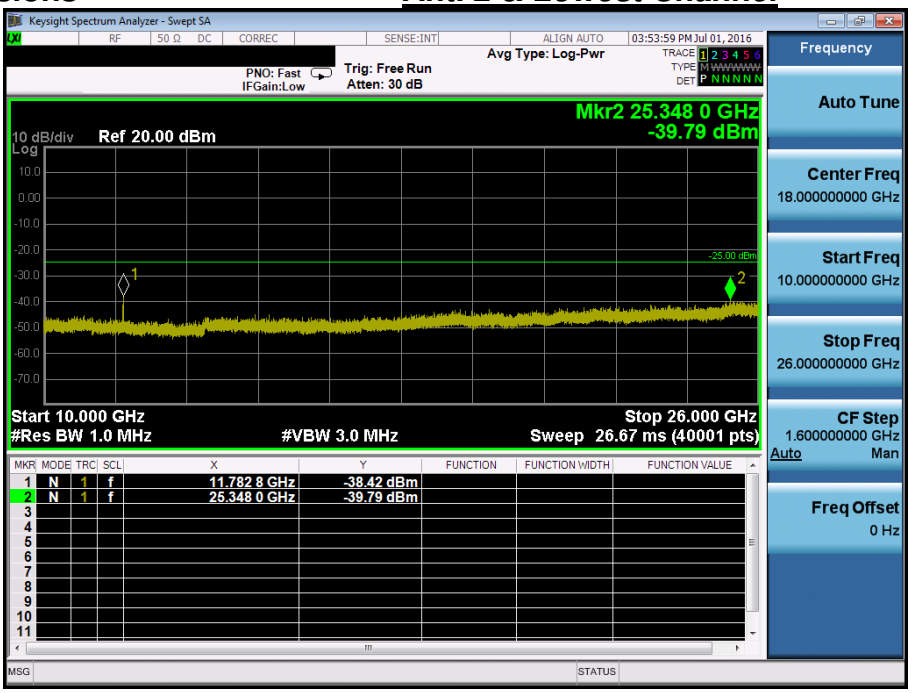
Spurious emissions ***Ant. 1 & Highest Channel***



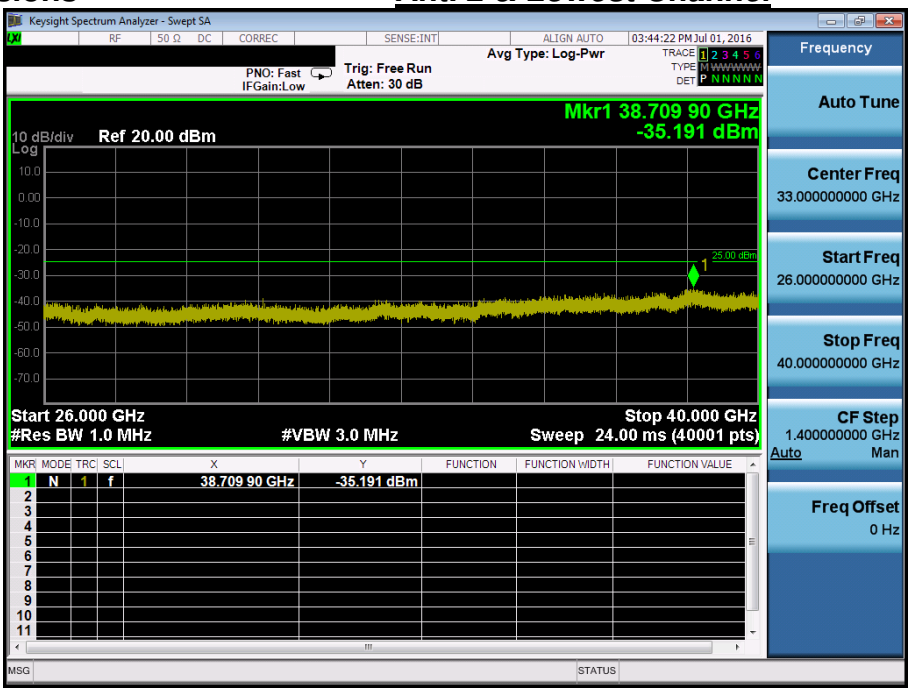
Spurious emissions *Ant. 2 & Lowest Channel*



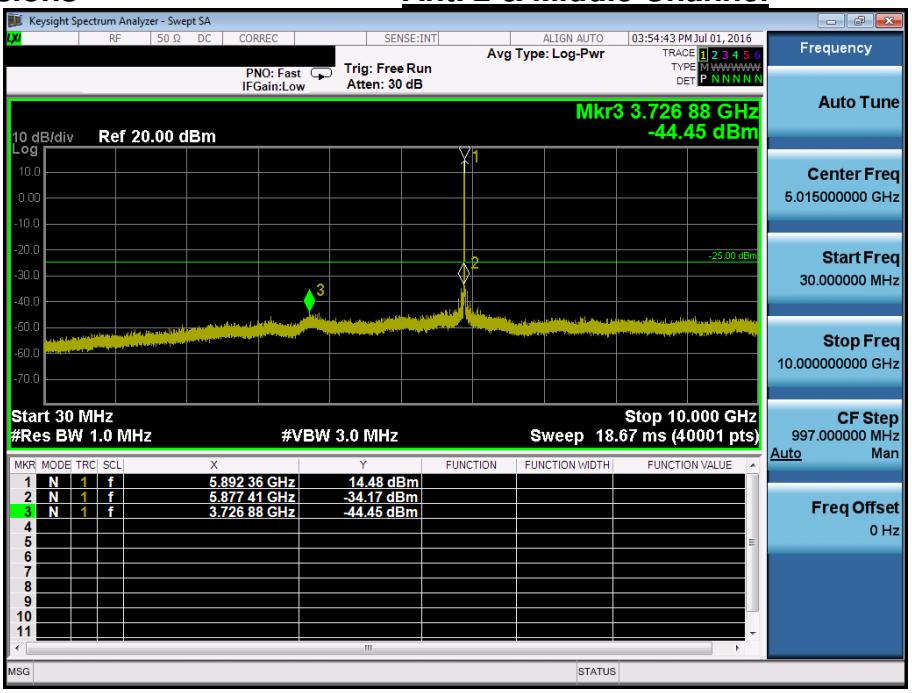
Spurious emissions *Ant. 2 & Lowest Channel*



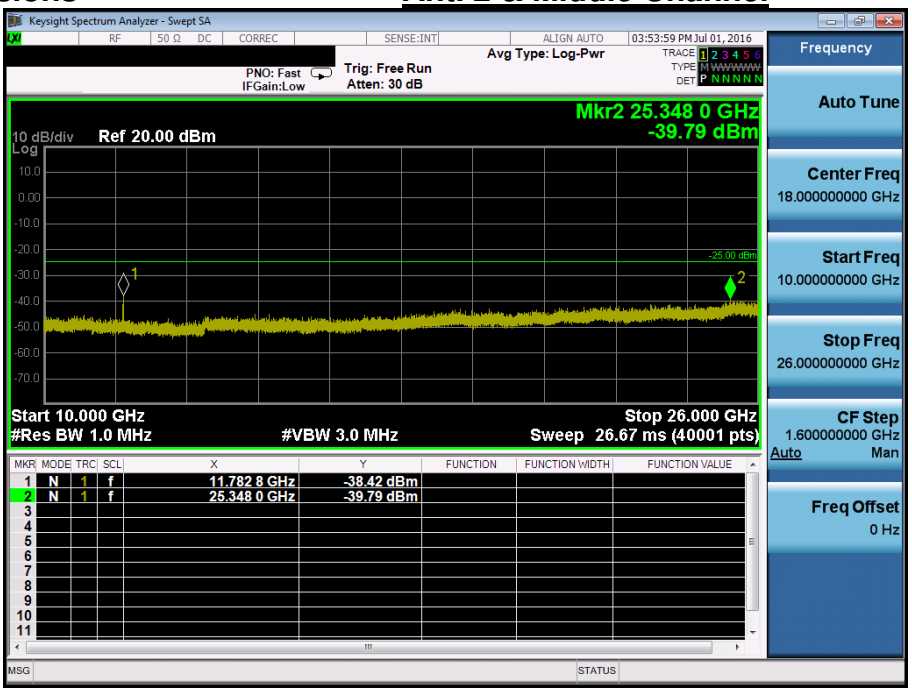
Spurious emissions *Ant. 2 & Lowest Channel*



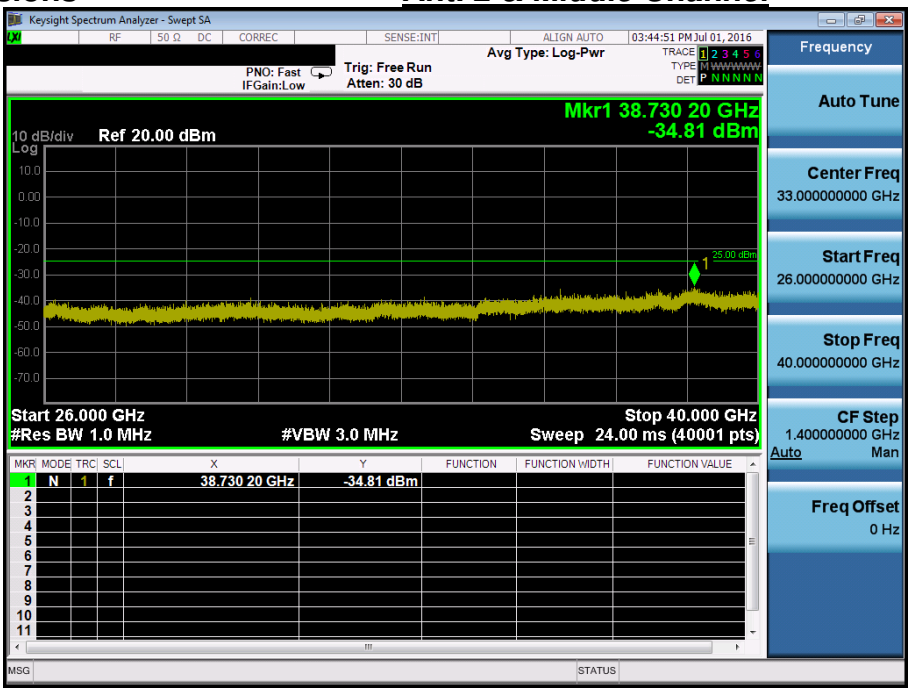
Spurious emissions *Ant. 2 & Middle Channel*



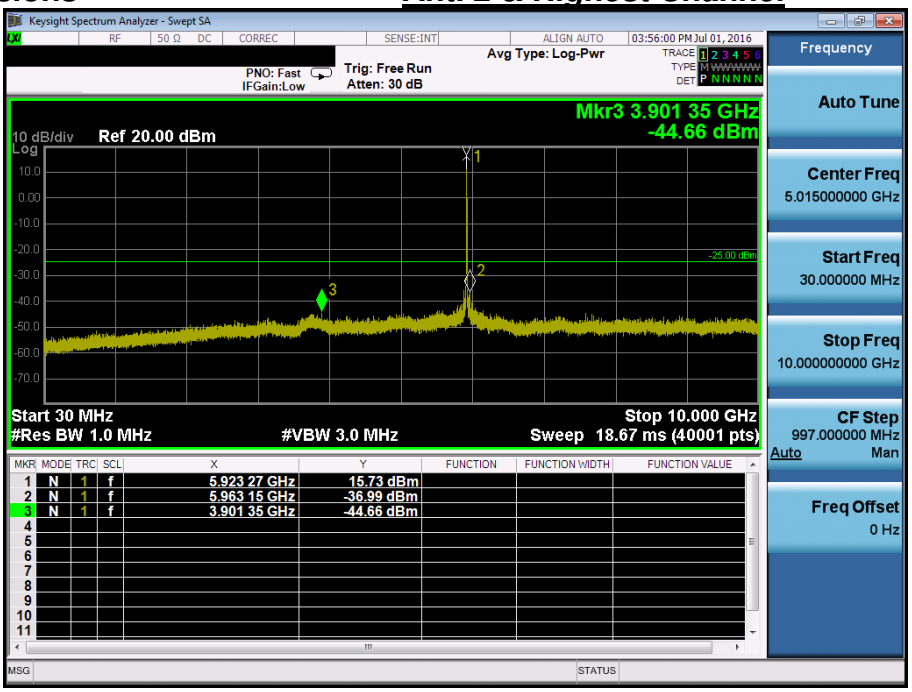
Spurious emissions *Ant. 2 & Middle Channel*



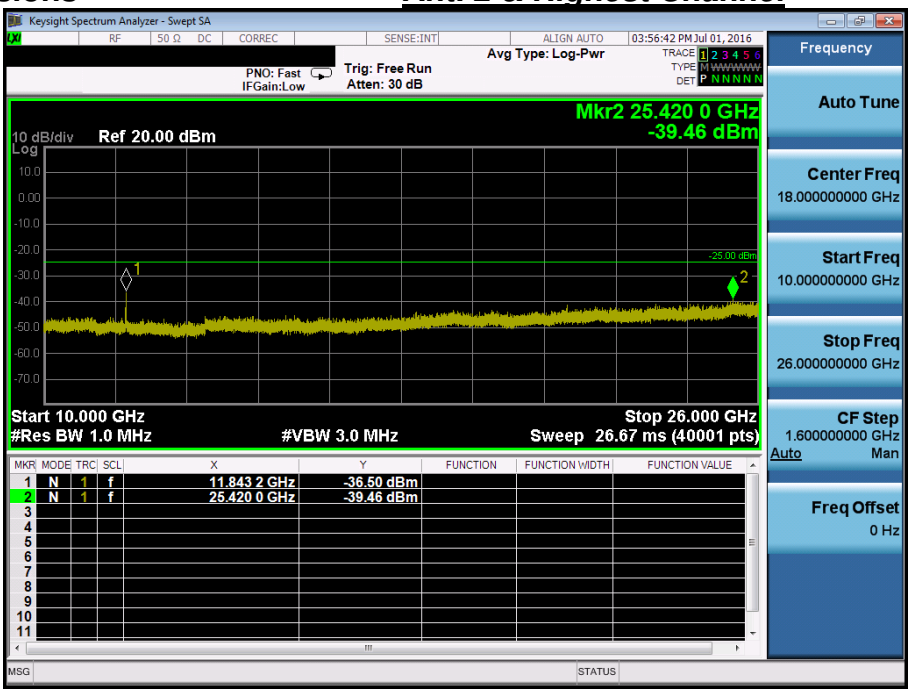
Spurious emissions *Ant. 2 & Middle Channel*



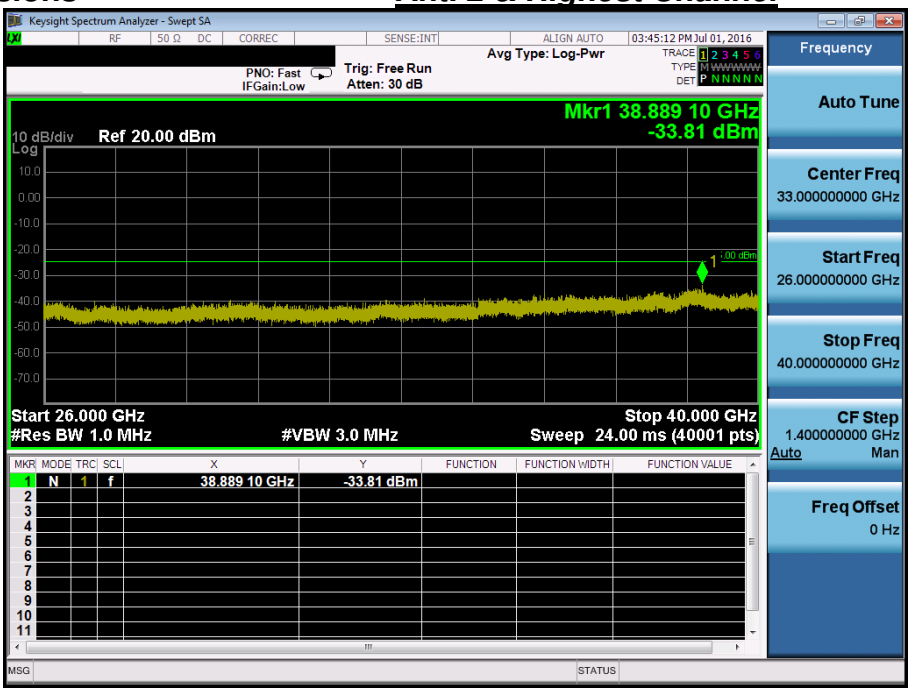
Spurious emissions *Ant. 2 & Highest Channel*



Spurious emissions *Ant. 2 & Highest Channel*



Spurious emissions *Ant. 2 & Highest Channel*

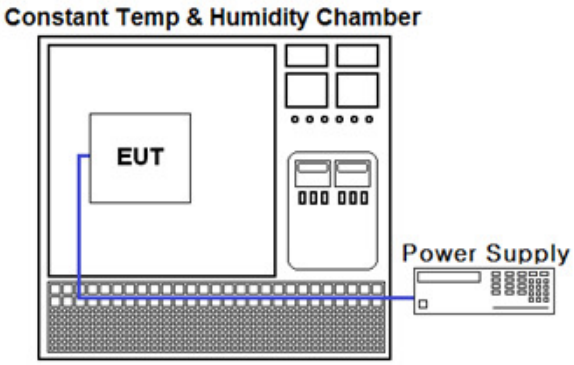


8.5 Frequency Stability

▣ Limit: ASTM E2213-03 – Section 8.10.4

The transmitted center frequency tolerance shall be ±10 ppm maximum for RSUs and ±10 ppm maximum for OBUs.

▣ Test set-up



▣ Test Procedure

- **ANSI/TIA-603-C-2004**
- **KDB971168 v02r02 - Section 9.0**

The frequency stability of the transmitter is measured by:

a.) **Temperature:**
The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**
The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

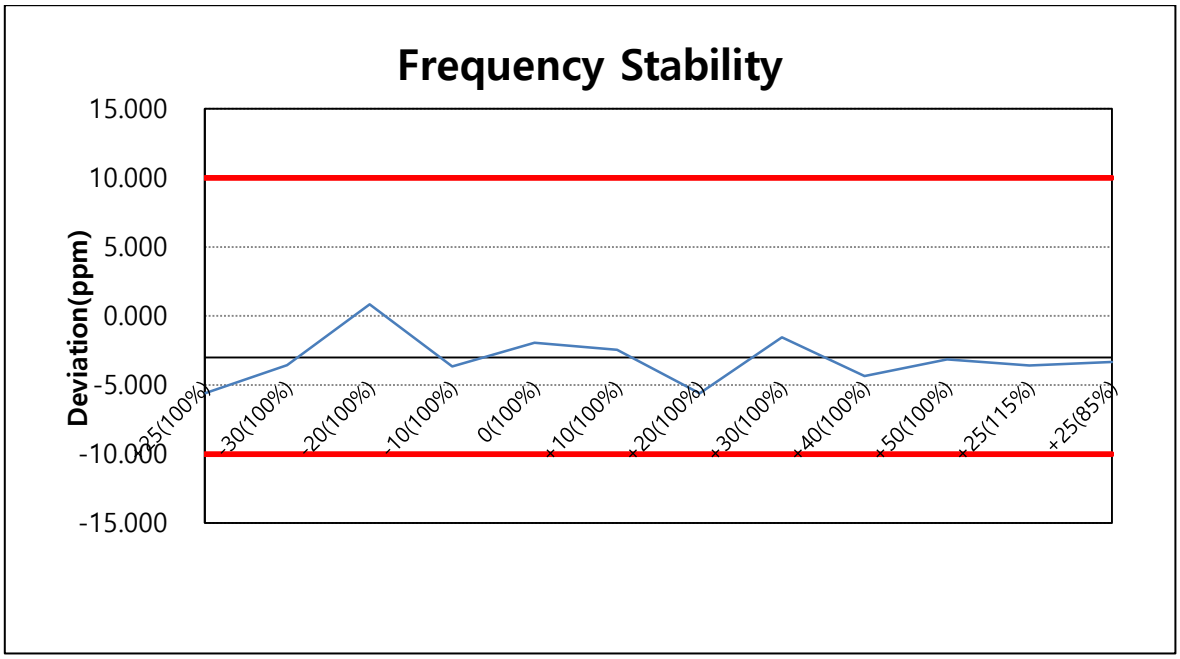
Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature. (20 °C to provide a reference)
2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

▣ Test Results: Comply

OPERATING FREQUENCY : 5890 MHz
REFERENCE VOLTAGE(Power Supply 1) : 5.000 V DC
REFERENCE VOLTAGE(Power Supply 2) : 3.300 V DC
DEVIATION LIMIT : ± 0.0010 % or 10 ppm

VOLTAGE (%)	POWER Supply 1 (V DC)	POWER Supply 2 (V DC)	TEMP (℃)	FREQ (Hz)	Deviation	
					(ppm)	(%)
100%	5.000	3.300	+20(Ref)	5,889,967,000	-5.603	-0.00056027
100%			-30	5,889,979,062	-3.555	-0.00035549
100%			-20	5,890,004,938	0.838	0.00008384
100%			-10	5,889,978,500	-3.650	-0.00036503
100%			0	5,889,988,625	-1.931	-0.00019312
100%			+10	5,889,985,625	-2.441	-0.00024406
100%			+20	5,889,967,000	-5.603	-0.00056027
100%			+30	5,889,990,875	-1.549	-0.00015492
100%			+40	5,889,974,375	-4.351	-0.00043506
100%			+50	5,889,981,500	-3.141	-0.00031409
115%	5.750	3.795	+25	5,889,978,875	-3.587	-0.00035866
85%	4.250	2.805	+25	5,889,980,375	-3.332	-0.00033319



8.6 Effective Isotropic Radiated Power (EIRP)

▣ **Limit: Part 95.639(h)(i) DSRCS-OBUs are governed under subpart L of this part,** except the maximum output power for portable DSRCS-OBUs is 1.0 mW. For purposes of this paragraph, a portable is a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user

Part 95 Subpart L 95.1509 ASTM E2213-03 DSRC Standard.

On-Board Units operating in the 5850-5925 MHz band shall comply with the following technical standards, which are incorporated by reference: American Society for Testing and Materials (ASTM) E2213-03, Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems—5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications published September 2003 (ASTM E2213-03 DSRC Standard).

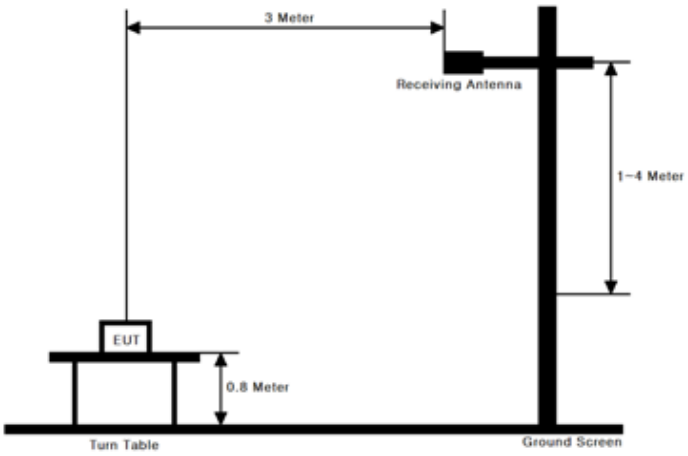
ASTM E2213-03 – Section 8.10.1.6

Private OBU operations in Channels 172, 174, 176, 178, and 184 shall not exceed 28.8 dBm antenna input power and 33 dBm EIRP. Private OBU operations in Channel 175 shall not exceed 10 dBm antenna input power and 23 dBm EIRP. **Private OBU operations in Channels 180**, 181, **and 182 shall not exceed 20 dBm antenna input power and 23 dBm EIRP**.

ASTM E2213-03 – Section 8.10.1.6

Private OBU operations in Channels 172, 174, 176, 178, and 184 shall not exceed 28.8 dBm antenna input power and 33 dBm EIRP. Private OBU operations in Channel 175 shall not exceed 10 dBm antenna input power and 23 dBm EIRP. Private OBU operations in Channels 180, 181, and 182 shall not exceed 20 dBm antenna input power and 23 dBm EIRP.

▣ **Test set-up**



▣ Test Procedure

- **ANSI/TIA-603-C-2004 - Section 2.2.17**
- **KDB971168 v02r02 - Section 5.2.2**

These measurements were performed at 3 &10 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

Test setting

1. Set RBW = 1-5 % of the OBW, not to exceed 1 MHz.
2. Set VBW ≥ 3 x RBW.
3. Number of points in sweep ≥ 2 × span / RBW.(This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
4. Sweep time = auto
5. Detector = RMS (power averaging).
6. Set sweep trigger to “free run”.
7. Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
8. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
9. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is a constant 25%.

Duty Cycle Corrections

Rate	Duty Cycle(%)	T_{on}(ms)	T_{on}+ T_{off}(ms)	DCF = 10log(1/Duty) (dB)
3Mbps	55.95	2.82	5.04	2.52
-	-	-	-	-

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna`s terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the

difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

▣ Test Results: Comply

- Simultaneous transmission

Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5860 MHz) & Ant.2 (5860 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5860	X	V	2.92	11.44	14.36	0.027	5.0 & 3.3	-
5890	X	V	2.56	11.49	14.05	0.025	5.0 & 3.3	-

Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5860 MHz) & Ant.2 (5920 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5860	X	V	2.77	11.44	14.21	0.026	5.0 & 3.3	-
5920	X	V	3.29	11.53	14.82	0.030	5.0 & 3.3	-

Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5890 MHz) & Ant.2 (5860 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5890	X	V	3.82	11.49	15.31	0.034	5.0 & 3.3	-
5860	X	V	2.01	11.44	13.45	0.022	5.0 & 3.3	-

Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5890 MHz) & Ant.2 (5920 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5890	X	V	4.14	11.49	15.63	0.037	5.0 & 3.3	-
5920	X	V	3.36	11.53	14.89	0.031	5.0 & 3.3	-

Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5920 MHz) & Ant.2 (5860 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5920	***X***	***V***	***5.14***	***11.53***	***16.67***	***0.046***	***5.0 & 3.3***	***-***
5860	X	V	2.00	11.44	13.44	0.022	5.0 & 3.3	-

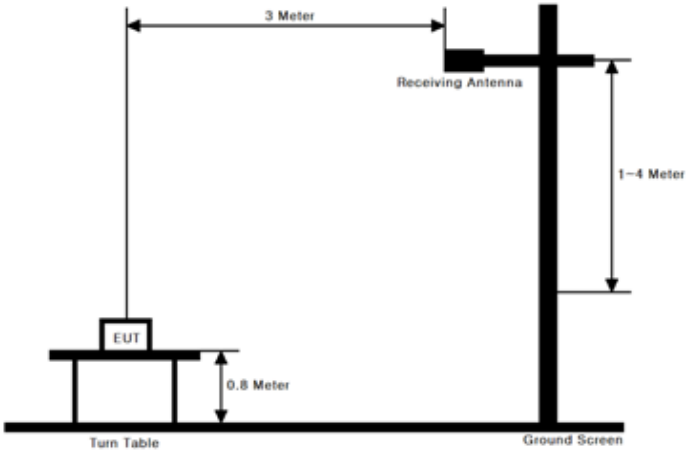
Tx Freq. (MHz)	EUT Position (Axis)	Test mode : Ant. 1 (5920 MHz) & Ant.2 (5890 MHz)						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage (V DC)	Note.
5920	X	V	5.07	11.53	16.60	0.046	5.0 & 3.3	-
5890	X	V	2.66	11.49	14.15	0.026	5.0 & 3.3	-

NOTES:

The test was performed on the Simultaneous transmission status.
And We have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna. The worst case data is reported in the table above.

8.7 Spurious Emissions (Radiated)

▣ Test Set-up



▣ Test Procedure

- **ANSI/TIA-603-C-2004 - Section 2.2.12**
- **KDB971168 v02r02 - Section 5.8**

These measurements were performed at 3 & 10m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW ≥ 3 X RBW
2. Detector = Peak & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.
This measurement was performed with the EUT oriented in 3 orthogonal axis.

▣ Test Results: Comply

- Simultaneous transmission

Tx Ant Tx Freq. (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBi)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
Ant 1 5860 & Ant 2 5890 (0.027)	11721.67	X	V	-43.17	12.57	-30.60	44.96	39.36
	11779.49	X	V	-41.91	12.59	-29.32	43.68	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Ant 1 5860 & Ant 2 5920 (0.030)	11723.49	X	V	-41.06	12.57	-28.49	43.31	39.82
	11841.35	X	V	-42.29	12.62	-29.67	44.49	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Ant 1 5890 & Ant 2 5860 (0.034)	11717.39	X	V	-42.32	12.57	-29.75	45.06	40.31
	11781.05	X	V	-41.90	12.60	-29.30	44.61	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Ant 1 5890 & Ant 2 5920 (0.037)	11781.43	X	V	-42.66	12.60	-30.06	45.69	40.63
	11837.01	X	V	-43.47	12.62	-30.85	46.48	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Ant 1 5920 & Ant 2 5860 (0.046)	11719.67	X	V	-42.75	12.57	-30.18	46.85	41.67
	11839.85	X	V	-43.89	12.62	-31.27	47.94	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
Ant 1 5920 & Ant 2 5890 (0.046)	11778.99	X	V	-42.41	12.59	-29.82	46.42	41.60
	11841.11	X	V	-42.49	12.62	-29.87	46.47	
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation= 55 + 10 $\log_{10}$(EIRP [W]) [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:

The test was performed on the Simultaneous transmission status.
And We have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna. The worst case data is reported in the table above.

9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
MXA Signal Analyzer	Agilent Technologies	N9020A	15/09/09	16/09/09	MY46471248
PXA Signal Analyzer	Agilent Technologies	N9030A	15/09/09	16/09/09	MY53310140
DC Power Supply	HP	66332A	16/01/05	17/01/05	US37471368
DC Power Supply	SM techno	SDP30-5D	15/09/23	16/09/23	305DMG305
Multimeter	FLUKE	17B	16/04/21	17/04/21	26030065WS
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	15/10/19	16/10/19	SJ-TH-S50-131011
Vector Signal Generator	R&S	SMBV100A	16/01/05	17/01/05	255571
SMF100A	Rohde Schwarz	SMF100A	15/06/29	16/06/29	102341
			16/06/23	17/06/23	
Thermohygrometer	BODYCOM	BJ5478	16/02/25	17/02/25	1209
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
TRILOG Broadband Test-Antenna	Schwarzbeck	VULB 9160	14/07/31	16/07/31	9160-3362
HORN ANT	ETS	3115	15/02/09	17/02/09	00021097
HORN ANT	ETS	3117	16/05/03	18/05/03	140394
HORN ANT	A.H.Systems	SAS-574	15/04/30	17/04/30	154
HORN ANT	A.H.Systems	SAS-574	15/09/03	17/09/03	155
High Power RF Amplifier	EMPOWER	BBS3Q8CCJ	15/10/20	16/10/20	1005
Low Noise Pre Amplifier	tsj	MLA-010K01-B01-27	16/03/10	17/03/10	1844539
PreAmplifier	Agilent	8449B	15/11/06	16/11/06	3008A02108
PreAmplifier	A.H.Systems	PAM-1840VH	15/12/03	16/12/03	163
2W 3dB Attenuator	SMAJK	SMAJK-2-3	15/10/19	16/10/19	3
Highpass Filter	WHNX6-6320-8000-26500-40CC	Wainwright Instruments	15/09/23	16/09/23	1