

# TEST REPORT



REPORT NUMBER: R12053557-E8b

COMPANY NAME: Bose Corporation

EUT DESCRIPTION: Wireless Module

MODEL: 424821

SERIAL NUMBER: 0122

ISSUE DATE: 2018-08-07

DATE TESTED: 4/4 to 5/17/2018

APPLICABLE STANDARDS: JAPAN RADIO LAW RADIO EQUIPMENT REGULATIONS

TEST METHOD: Notice 88 of Ordinance Concerning Technical Regulations Conformity Certification of Specified Radio Equipment

Place of Testing: UL LLC  
12 Laboratory Drive, RTP, NC 27709, USA

Test Result: Compliant

Classification of Specified Radio Equipment: Article 2 Clause 1 Item 19

Type of radio wave, Frequency and antenna power:

G1D, D1D	2412-2472MHz (Interval of 5MHz 13ch) MIMO	0.006055W/MHz
	2412-2472MHz (Interval of 5MHz 13ch) SISO (Max Chain)	0.003437W/MHz

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released For UL LLC By:

Jeffrey Moser  
Operations Leader  
UL LLC

Prepared By:

Brian T. Kiewra  
Project Engineer  
UL LLC



## 1. EUT Information

Report No. : R12053557-E8b
Applicant : Bose Corporation
Equipment Description: Wireless Module
Model No. : 424821
SerialNo. : 0122
The number of Tx Antenna : 2
Max Antenna Gain : 4.0dBi
Mode : IEEE802.11g
Type of Radio wave : G1D, D1D

<b>Supply Voltage</b> <input checked="" type="radio"/> DC <input type="radio"/> AC    4.00V -	<b>Modulation</b> <input type="radio"/> DS ( e.g. WLAN 11b) <input checked="" type="radio"/> OFDM & OBW ≤ 26MHz ( e.g. WLAN 11g, 11n HT20) <input type="radio"/> OFDM & OBW 26~38MHz (e.g. WLAN 11n HT40) <input type="radio"/> Other Modulation (e.g. GFSK, Not BT)
<b>Voltage Condition</b> <input checked="" type="radio"/> Non-Extreme <input type="radio"/> Extreme Normal DC4V Normal-10% - Normal+10% -	<b>EUT has</b> <input checked="" type="radio"/> ANT Connector <input type="radio"/> No ANT Connector    distance -

The worst-case data rate for each mode is determined to be as follows, based on preliminary test of the chipset utilized in this radio.  
All final tests were made at the Lowest Rate.

### Factors

	[MHz]	Other than for Power		For Power	
		Cable Loss [dB]	ATT/ [dB]	Cable Loss [dB]	ATT/ [dB]
Low Channel (Tx1)	2412	14.68	0.00	14.68	0.00
Middle Channel (Tx2)	2442	14.68	0.00	14.68	0.00
High Channel (Tx3)	2472	14.68	0.00	14.68	0.00

Ver.	Issue Date	Description	Revised By
1	2018-05-01	Initial Release.	Brian T. Kiewra
2	2018-05-21	Revised antenna gain to 4dBi	Brian T. Kiewra
3	2018-06-21	Revised radio wave type	Niklas Haydon
4	2018-06-27	Revised nominal	Brian T. Kiewra
5	2018-07-25	Revised output power to show MIMO and SISO power.	Brian T. Kiewra
6	2018-08-07	Declared MIMO and worst-case SISO power.	Brian T. Kiewra

## 2.TEST Result

### 2.1. Frequency Tolerance

Job No. R12053557-E8b

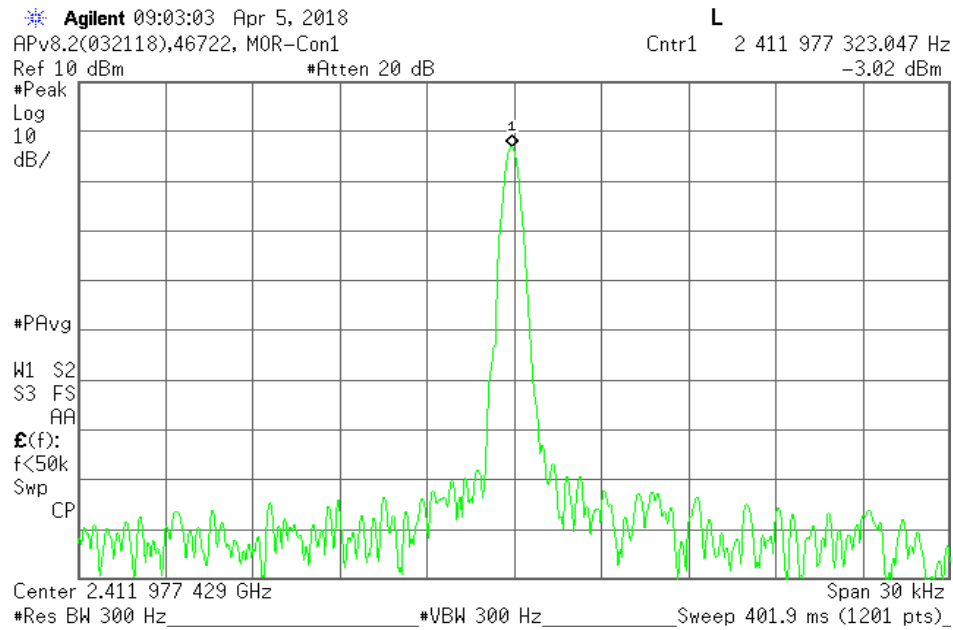
Remark1

Remark2

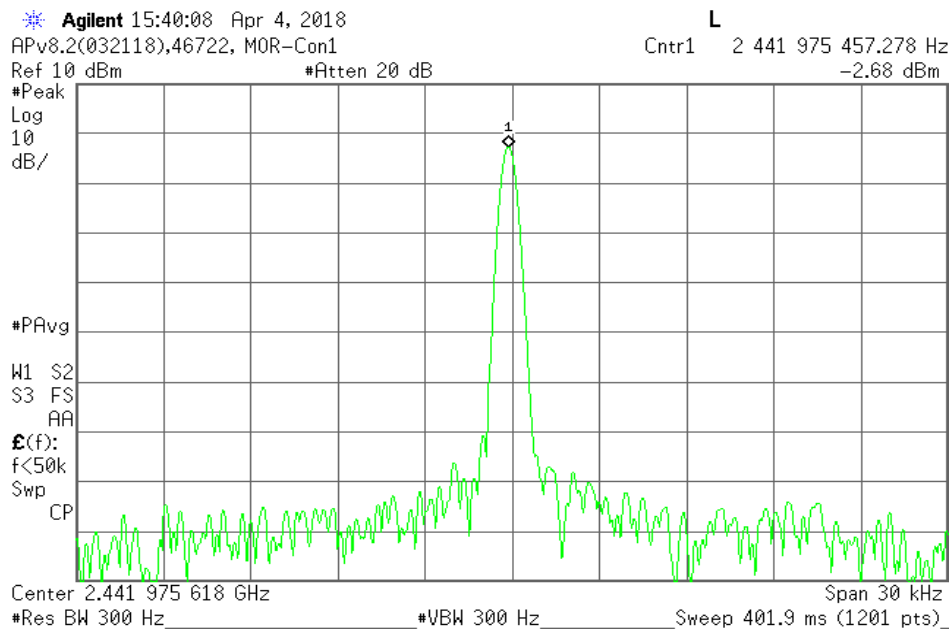
#### [ DATA ]

Voltage	Freq. [MHz]	Result [MHz]	Tolerance [kHz]	Tolerance [ppm]	Limit [ppm]
DC4V	2412	2411.9773	-22.7000	-9.41	±50.0
	2442	2441.9755	-24.5000	-10.03	±50.0
	2472	2471.9752	-24.8000	-10.03	±50.0

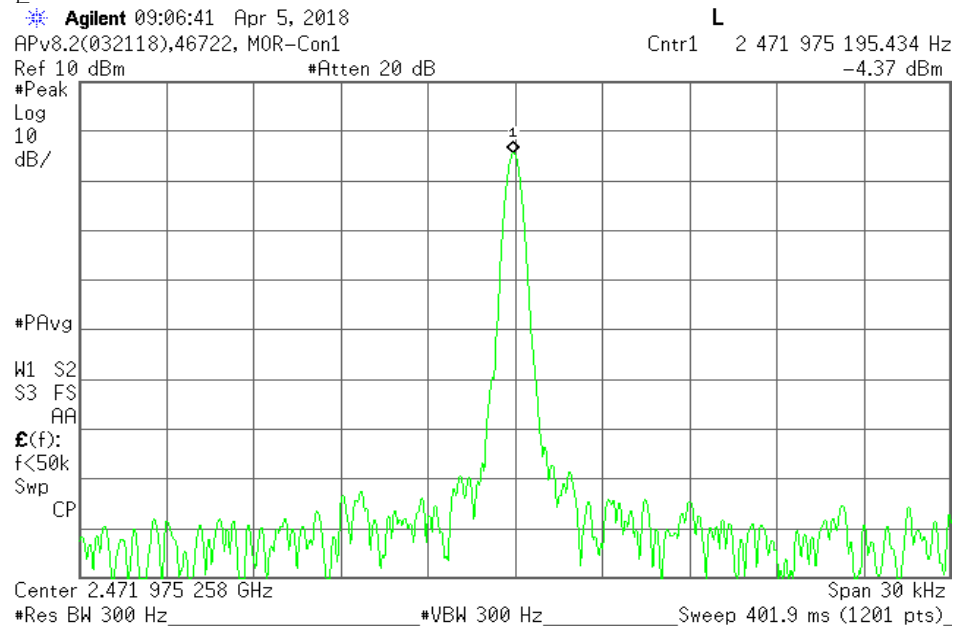
Tx1\_Freq\_Nom



Tx2\_Freq\_Nom



Tx3\_Freq\_Nom



## 2.2. Occupied Bandwidth / Spreading Bandwidth

Job No. R12053557-E8b

Remark1

Remark2

[ DATA]

### 99% Occupied Frequency Bandwidth

Voltage	Freq. [MHz]	Result [MHz]	Limit [MHz]
DC4V	2412	16.3517	38
	2442	16.3772	38
	2472	16.4901	38

(Reference data)

### Spreading Bandwidth

Voltage	Freq. [MHz]	Result [MHz]	Result [kHz]	Limit [kHz]
DC4V	2412	14.5155	14515.5	500
	2442	14.5011	14501.1	500
	2472	14.7914	14791.4	500

### 99% Occupied Frequency Bandwidth

Tx1\_99OBW\_Nom

Agilent 08:35:06 Apr 5, 2018

APv8.2(032118),46722, M0R-Con1

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

LgRv

M1 S2

Center 2.412 00 GHz

#Res BW 300 kHz

#VBW 300 kHz

Sweep 1.04 ms (1201 pts)

Span 50 MHz

Occupied Bandwidth

16.3517 MHz

Occ BW % Pwr

99.00 %

x dB

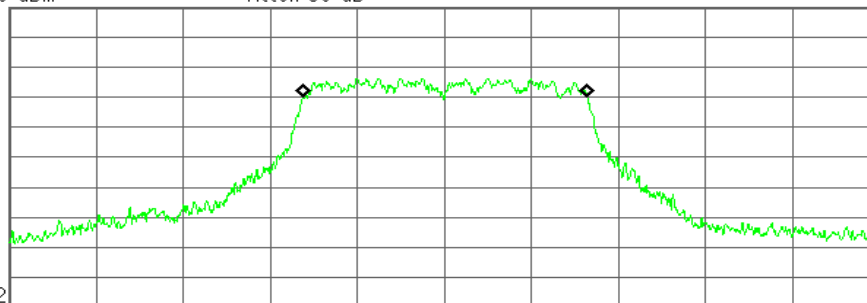
-26.00 dB

Transmit Freq Error

40.419 kHz

x dB Bandwidth

19.097 MHz



Tx2\_99OBW\_Nom

Agilent 08:25:53 Apr 5, 2018

APv8.2(032118),46722, MOR-Con1

Ref 20 dBm

#Atten 30 dB

L

#Peak

Log

10

dB/

LgAv

M1 S2

Center 2.442 00 GHz

#Res BW 300 kHz

#VBW 300 kHz

Span 50 MHz  
Sweep 1.04 ms (1201 pts)

Occupied Bandwidth

16.3772 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error 18.292 kHz

x dB Bandwidth 19.664 MHz

Tx3\_99OBW\_Nom

Agilent 09:20:23 Apr 5, 2018

APv8.2(032118),46722, MOR-Con1

Ref 20 dBm

#Atten 30 dB

L

#Peak

Log

10

dB/

LgAv

M1 S2

Center 2.472 00 GHz

#Res BW 300 kHz

#VBW 300 kHz

Span 50 MHz  
Sweep 1.04 ms (1201 pts)

Occupied Bandwidth

16.4901 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error 46.380 kHz

x dB Bandwidth 19.199 MHz

### Spreading Bandwidth

Tx1 900BW Nom

Agilent 08:44:28 Apr 5, 2018

APv8.2(032118),46722, MOR-Con1

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

LgAv

M1 S2

Center 2.412 00 GHz

#Res BW 300 kHz

#VBW 300 kHz

Span 50 MHz

Sweep 1.04 ms (1201 pts)

Occupied Bandwidth

14.5155 MHz

Occ BW % Pwr 90.00 %

x dB -26.00 dB

Transmit Freq Error

105.947 kHz

x dB Bandwidth

18.654 MHz

Tx2 900BW Nom

Agilent 08:31:47 Apr 5, 2018

APv8.2(032118),46722, MOR-Con1

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

LgAv

M1 S2

Center 2.442 00 GHz

#Res BW 300 kHz

#VBW 300 kHz

Span 50 MHz

Sweep 1.04 ms (1201 pts)

Occupied Bandwidth

14.5011 MHz

Occ BW % Pwr 90.00 %

x dB -26.00 dB

Transmit Freq Error

-32.931 kHz

x dB Bandwidth

17.939 MHz

Tx3 900BW Nom

Agilent 09:23:09 Apr 5, 2018

R L

APv8.2(032118),46722, MOR-Con1

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

LgAv

M1 S2

Center 2.472 00 GHz

#VBW 300 kHz

Span 50 MHz

Sweep 1.04 ms (1201 pts)

Occupied Bandwidth

14.7914 MHz

Occ BW % Pwr 90.00 %

x dB -26.00 dB

Transmit Freq Error -12.000 kHz

x dB Bandwidth 19.265 MHz



## 2.3. Unwanted Emission Strength (Normal Voltage)

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Freq.	Freq.	S/A Reading	Cable Loss	Atten. Loss	Result	Result	Limit	Remark
	[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[uW]	[uW]	
DC4V	2412	449.50	-71.26	14.68	0.00	-46.58	0.022	2.500	♣1
		2386.99	-53.07	14.68	0.00	-38.39	0.145	2.500	♣1
		2399.33	-34.13	14.68	0.00	-19.45	11.350	25.000	♣2
		2399.99	-33.89	14.68	0.00	-19.21	11.995	25.000	♣2
		6913.00	-46.28	14.68	0.00	-31.60	0.692	2.500	♣4
		7009.00	-45.04	14.68	0.00	-30.36	0.920	2.500	♣4
	2442	7239.00	-46.17	14.68	0.00	-31.49	0.710	2.500	♣4
		481.90	-68.27	14.68	0.00	-43.59	0.044	2.500	♣1
		6875.00	-46.19	14.68	0.00	-31.51	0.706	2.500	♣4
		7009.00	-45.73	14.68	0.00	-31.05	0.785	2.500	♣4
	2472	7066.00	-45.91	14.68	0.00	-31.23	0.753	2.500	♣4
		509.30	-74.97	14.68	0.00	-50.29	0.009	2.500	♣1
		2483.51	-32.44	14.68	0.00	-17.76	16.749	25.000	♣3
		2483.58	-32.68	14.68	0.00	-18.00	15.849	25.000	♣3
		2496.51	-55.49	14.68	0.00	-40.81	0.083	2.500	♣4
		6875.00	-45.66	14.68	0.00	-30.98	0.798	2.500	♣4
		6951.00	-45.85	14.68	0.00	-31.17	0.764	2.500	♣4
		7066.00	-46.20	14.68	0.00	-31.52	0.705	2.500	♣4

Sample Calculation :

Result = Reading + Cable Loss + Attenuator + RBW Correction (<1000MHz)

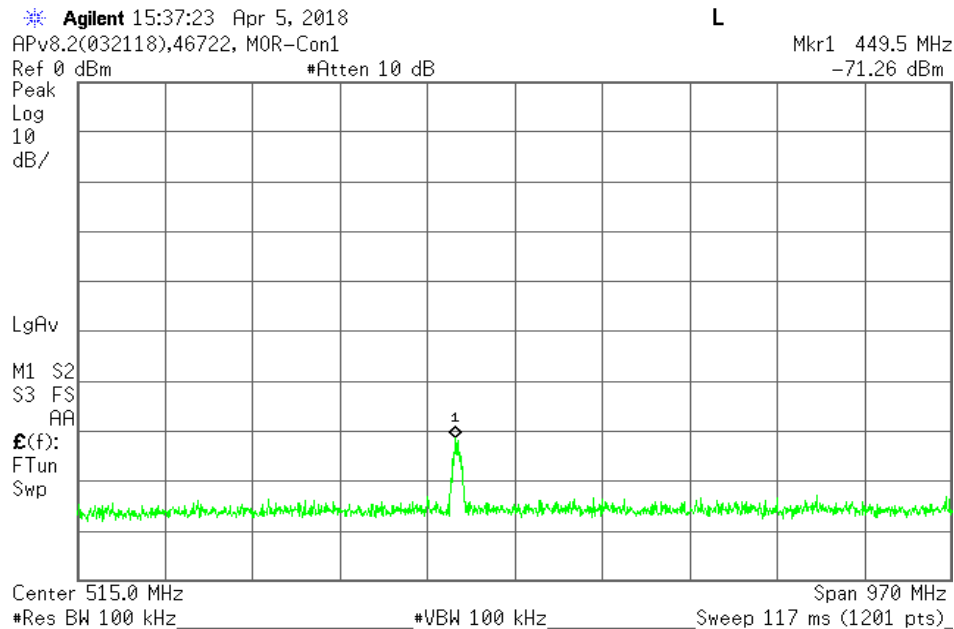
♣1:Freq Range1 (≥ 30MHz, < 2,387MHz)

♣2:Freq Range2 (2,387MHz以上, < 2,400MHz)

♣3:Freq Range3 (> 2,483.5MHz, ≤ 2,496.5MHz)

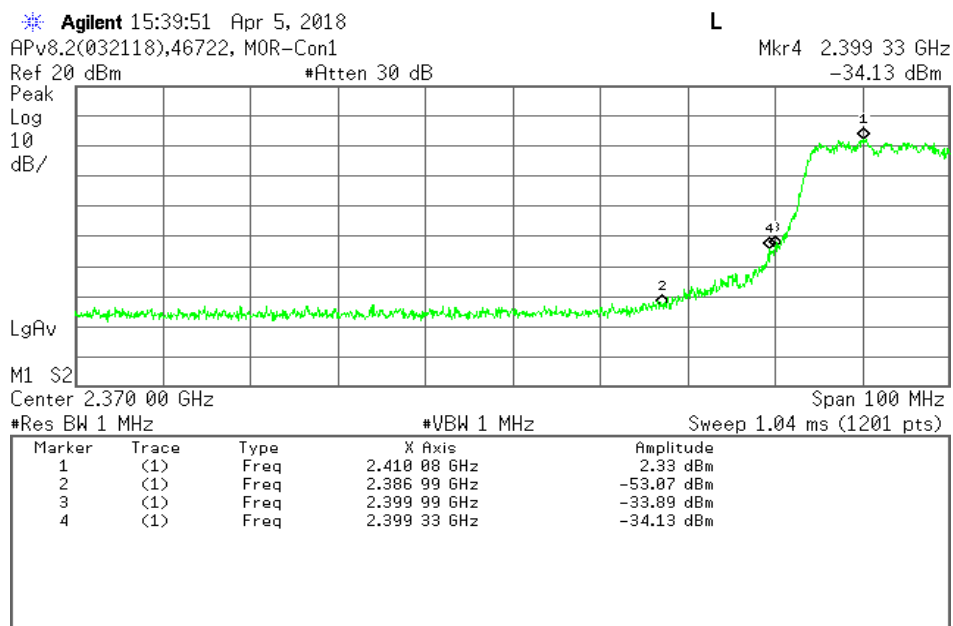
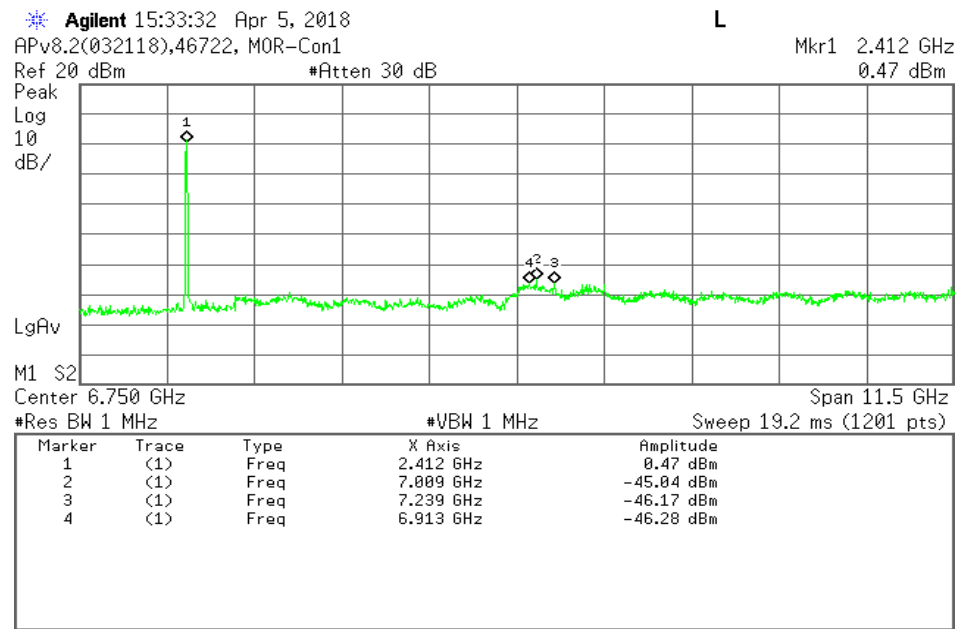
♣4:Freq Range4 (> 2,496.5MHz, ≤ 12.5GHz)

Tx1\_SpuriousM\_Nom



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U.S.A. Office: 12 Laboratory Drive, RTP, NC 27709 Phone: 919-549-1400



\* Agilent 15:41:22 Apr 5, 2018

L

APv8.2(032118),46722, MOR-Con1

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

100

W1 S2

Center 2.399 330 0 GHz

#Res BW 30 kHz

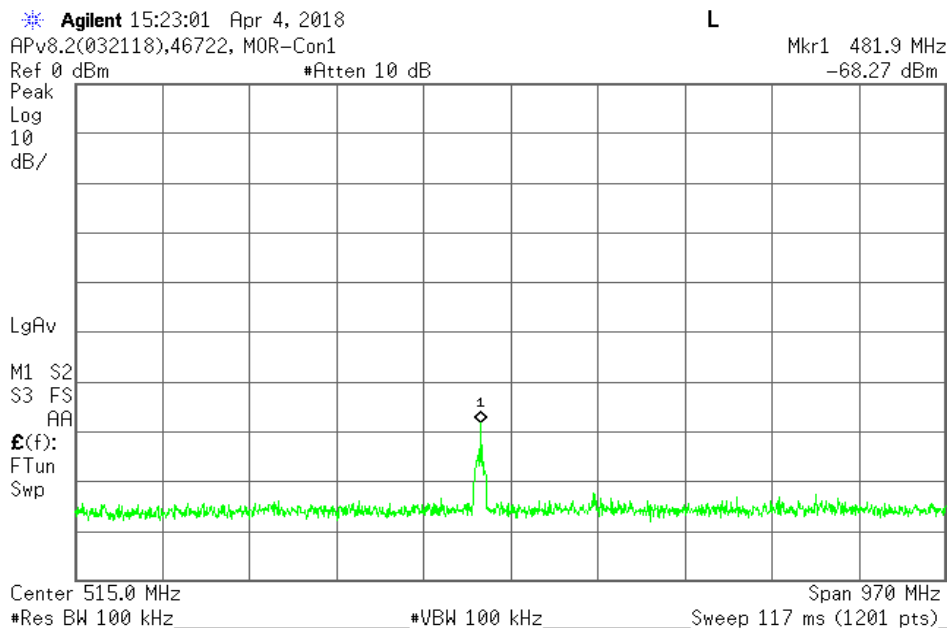
#VBW 300 kHz

Sweep 3.28 ms (1201 pts)

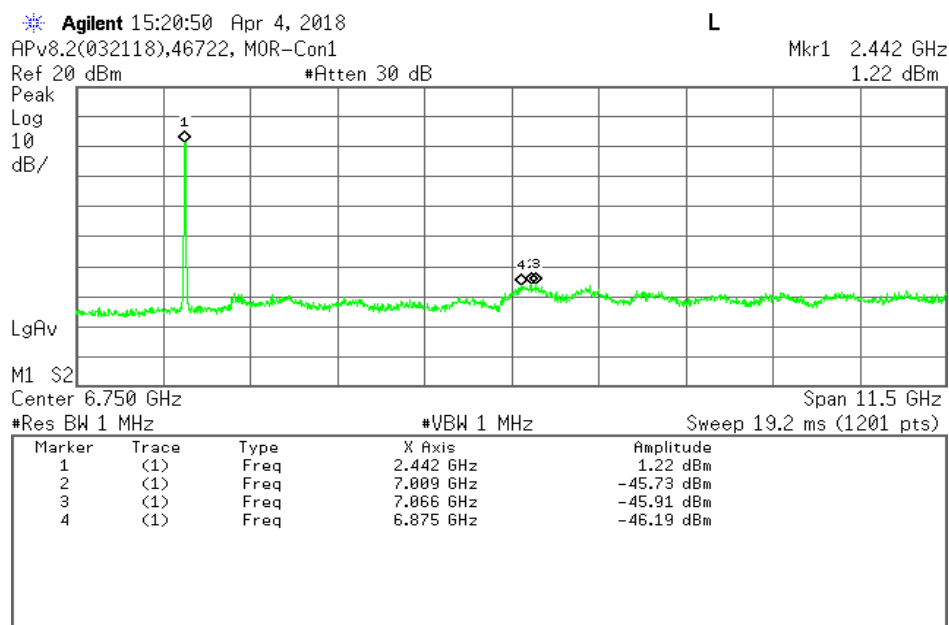
Span 1 MHz

**Channel Power****Power Spectral Density****-47.91 dBm /1.0000 MHz****-107.91 dBm/Hz**

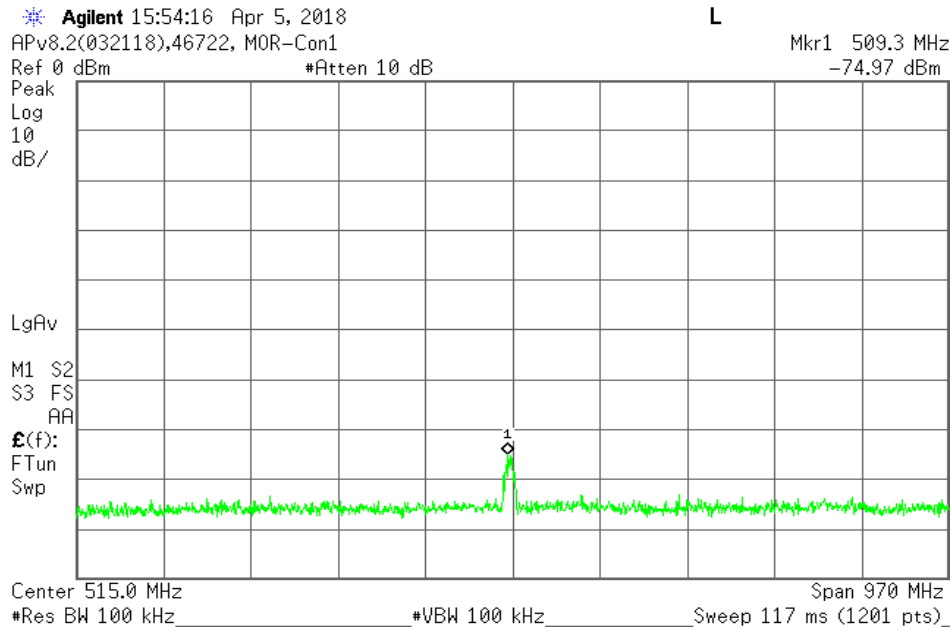
Tx2\_SpuriousM\_Nom



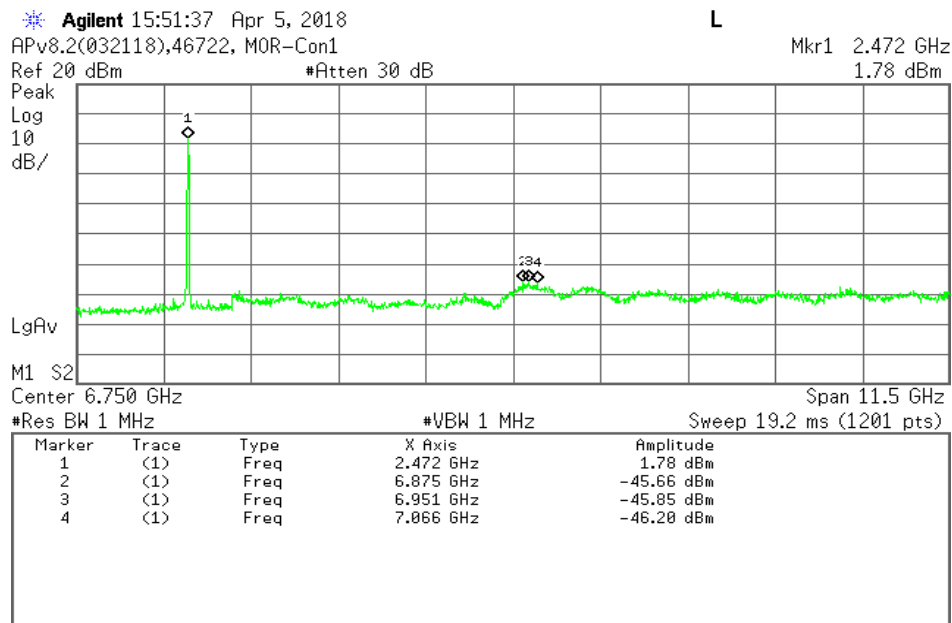
Tx2\_SpuriousG\_Nom



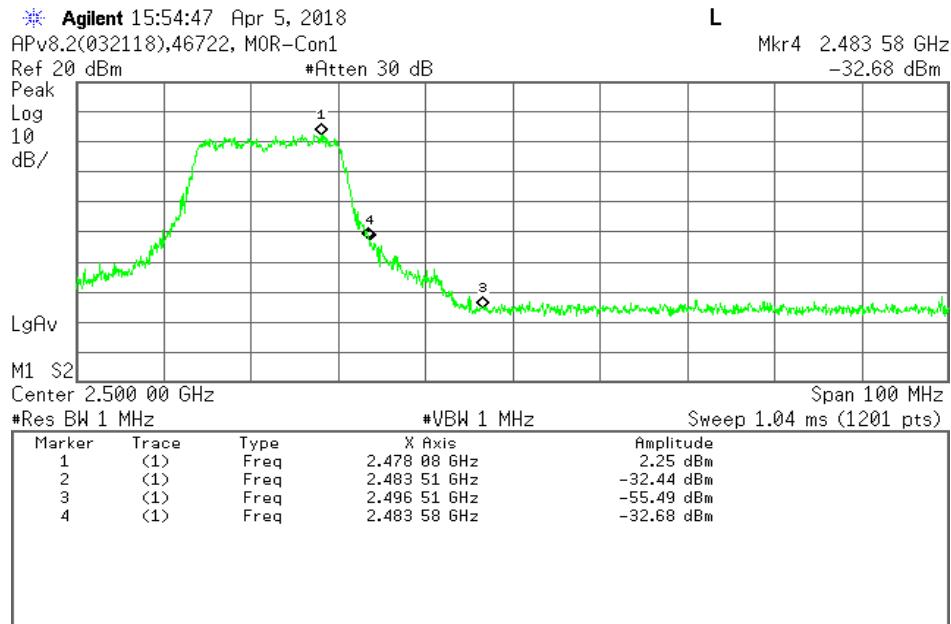
Tx3\_SpuriousM\_Nom



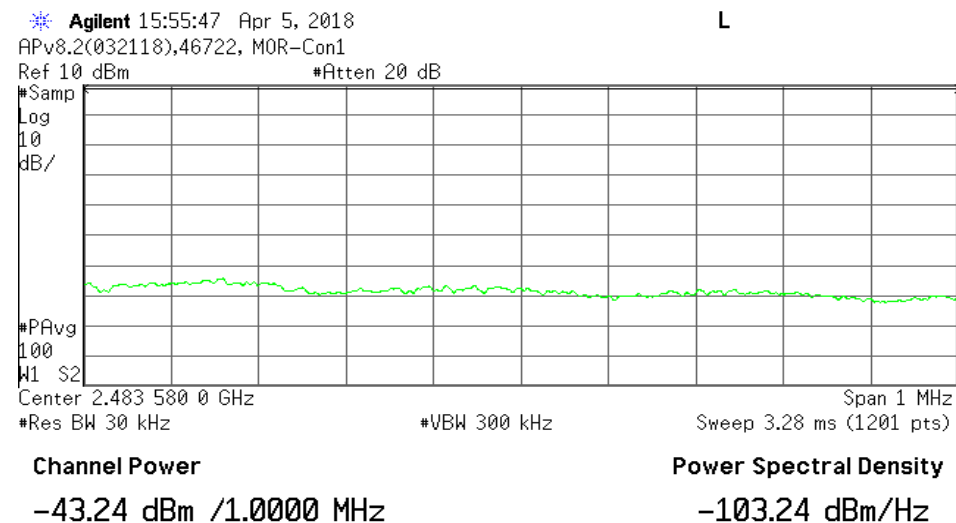
Tx3\_SpuriousG\_Nom



Tx3\_BandEdgeHigh\_Nom



Tx3\_BandEdgeHighZoom\_Nom



## 2.4.1. Output Power (MIMO)

Job No. R12053557-E8b

Remark1

Remark2

### [DATA]

Voltage	Chain	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [W/MHz]	Burst Rate	Output Power (A) [W/MHz]	Antenna Gain [dBi]	E.I.R.P. (A) [W/MHz]
DC4V	0	2412	-13.19	14.68	0.00	0.001409	2.33	0.003276	4.00	0.008229
		2442	-13.77	14.68	0.00	0.001235	2.33	0.002870	4.00	0.007210
		2472	-13.26	14.68	0.00	0.001388	2.33	0.003226	4.00	0.008104
DC4V	1	2412	-14.68	14.68	0.00	0.001001	2.33	0.002328	4.00	0.005847
		2442	-15.10	14.68	0.00	0.000907	2.33	0.002109	4.00	0.005297
		2472	-14.02	14.68	0.00	0.001163	2.33	0.002704	4.00	0.006792
DC4V	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
DC4V	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-

Sample Calculation :

Output Power (A) =  $10^{\left( \left( \text{Reading [dBm]} + \text{Cable Loss} + \text{Atten. Loss} \right) / 10 \right)}$  \* Burst Rate

E.I.R.P. (A) = Output Power (A) \*  $10^{\left( \text{Antenna Gain[dBi]} / 10 \right)}$

### [Total Power / Result and Limit]

Voltage	Freq. [MHz]	Output Power				E.I.R.P.		
		Result (B)	Tolerance Result	Limit	Tolerance Limit	Result (B)	Result	Limit
		[W/MHz]	[%]	[W/MHz]	[%]	[W/MHz]	[dBm/MHz]	[dBm/MHz]
DC4V	2412	0.005604	-7.5	0.010000	+20 ~ -80	0.014075	11.48	12.14
	2442	0.004979	-17.8	0.010000	+20 ~ -80	0.012507	10.97	12.14
	2472	0.005931	-2.1	0.010000	+20 ~ -80	0.014897	11.73	12.14

Sample Calculation :

Tolerance = Output Power Result (B) / Declared Output Power \* 100 - 100.

Output Power Result (B) : Sum of all "Output Power (A)" at same Freq.

E.I.R.P. Result (B): Sum of all "E.I.R.P. (A)" at same Freq.

### [Declared Output Power]

Average of Output Power Result (B)	0.005504	[W/MHz]	Average of E.I.R.P. Result(B)	0.013826	[W/MHz]
Declared Output Power	0.006055	[W/MHz]	E.I.R.P. for Declared Output Power	11.82	[dBm/MHz]
+20	0.007266	[W/MHz]			
Middle (Declared Output Power -30%)	0.004238	[W/MHz]			
-80	0.001211	[W/MHz]			

Sample Calculation :

E.I.R.P. for Declared Output Power

=  $10 * \log \left( \text{Average of E.I.R.P. Result (B)} * \left( \text{Declared Output Power} / \text{Average of Output Power Result (B)} \right) * 1000 \right)$

Tx1\_Power\_Chain0\_Nom

Agilent 13:10:11 May 17, 2018

L

APv8.3(050118),46722, M0R-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.405 880 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-13.19 dBm /1.0000 MHz

Power Spectral Density

-73.19 dBm/Hz

Tx2 Power Chain0\_Nom

Agilent 13:18:16 May 17, 2018

L

APv8.3(050118),46722, M0R-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.447 160 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-13.76 dBm /1.0000 MHz

Power Spectral Density

-73.76 dBm/Hz



Tx3\_Power\_Chain0\_Nom

Agilent 14:14:11 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.477 460 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-13.26 dBm /1.0000 MHz

Power Spectral Density

-73.26 dBm/Hz

Tx1\_Power\_Chain1\_Nom

Agilent 13:14:10 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.405 300 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-14.68 dBm /1.0000 MHz

Power Spectral Density

-74.68 dBm/Hz

Tx2\_Power\_Chain1\_Nom

Agilent 13:22:33 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.438 760 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-15.10 dBm /1.0000 MHz

Power Spectral Density

-75.10 dBm/Hz

Tx3 Power Chain1\_Nom

Agilent 14:07:16 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.464 760 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-14.02 dBm /1.0000 MHz

Power Spectral Density

-74.02 dBm/Hz

## 2.4.2. Output Power (SISO CH0)

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Chain	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [W/MHz]	Burst Rate	Output Power (A) [W/MHz]	Antenna Gain [dBi]	E.I.R.P. (A) [W/MHz]
DC4V	0	2412	-13.19	14.68	0.00	0.001409	2.33	0.003276	4.00	0.008229
		2442	-13.77	14.68	0.00	0.001235	2.33	0.002870	4.00	0.007210
		2472	-13.26	14.68	0.00	0.001388	2.33	0.003226	4.00	0.008104
-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-

Sample Calculation :

Output Power (A) =  $10^{((\text{Reading [dBm]} + \text{Cable Loss} + \text{Atten. Loss}) / 10)} \times \text{Burst Rate}$

E.I.R.P. (A) = Output Power (A) \*  $10^{(\text{Antenna Gain[dBi]}/10)}$

### [Total Power / Result and Limit]

Voltage	Freq. [MHz]	Output Power				E.I.R.P.		
		Result (B)	Tolerance Result	Limit	Tolerance Limit	Result (B)	Result	Limit
		[W/MHz]	[%]	[W/MHz]	[%]	[W/MHz]	[dBm/MHz]	[dBm/MHz]
DC4V	2412	0.003276	-4.7	0.010000	+20 ~ -80	0.008229	9.15	12.14
	2442	0.002870	-16.5	0.010000	+20 ~ -80	0.007210	8.58	12.14
	2472	0.003226	-6.1	0.010000	+20 ~ -80	0.008104	9.09	12.14

Sample Calculation :

Tolerance = Output Power Result (B) / Declared Output Power \* 100 - 100.

Output Power Result (B) : Sum of all "Output Power (A)" at same Freq.

E.I.R.P. Result (B): Sum of all "E.I.R.P. (A)" at same Freq.

### [Declared Output Power]

Average of Output Power Result (B)	0.003124	[W/MHz]	Average of E.I.R.P. Result(B)	0.007848	[W/MHz]
Declared Output Power	0.003437	[W/MHz]	E.I.R.P. for Declared Output Power	9.36	[dBm/MHz]
+20	0.004124	[W/MHz]			
Middle (Declared Output Power -30%)	0.002406	[W/MHz]			
-80	0.000687	[W/MHz]			

Sample Calculation :

E.I.R.P. for Declared Output Power

=  $10 * \log(\text{Average of E.I.R.P. Result (B)} * (\text{Declared Output Power} / \text{Average of Output Power Result (B)}) * 1000)$

Tx1\_Power\_Chain0\_Nom

Agilent 13:10:11 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp  
Log  
10  
dB/

#PAvg

W1 S2

Center 2.405 880 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz

Sweep 32.48 ms (1201 pts)

Channel Power

-13.19 dBm /1.0000 MHz

Power Spectral Density

-73.19 dBm/Hz

Tx2\_Power\_Chain0\_Nom

Agilent 13:18:16 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp  
Log  
10  
dB/

#PAvg

W1 S2

Center 2.447 160 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz

Sweep 32.48 ms (1201 pts)

Channel Power

-13.76 dBm /1.0000 MHz

Power Spectral Density

-73.76 dBm/Hz

Agilent 14:14:11 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.477 460 GHz

#Res BW 30 kHz

#VBW 300 kHz

Sweep 32.48 ms (1201 pts)

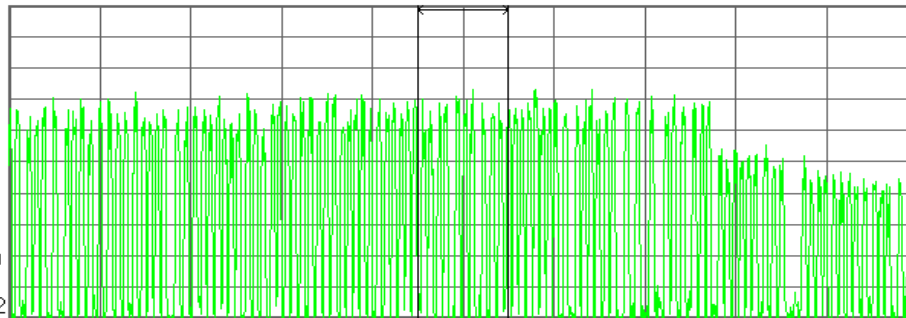
Span 10 MHz

Channel Power

-13.26 dBm /1.0000 MHz

Power Spectral Density

-73.26 dBm/Hz



### 2.4.3. Output Power (SISO CH1)

Job No. R12053557-E8b

Remark1

Remark2

#### [ DATA ]

Voltage	Chain	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [W/MHz]	Burst Rate	Output Power (A) [W/MHz]	Antenna Gain [dBi]	E.I.R.P. (A) [W/MHz]
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
DC4V	1	2412	-14.68	14.68	0.00	0.001001	2.33	0.002328	4.00	0.005847
		2442	-15.10	14.68	0.00	0.000907	2.33	0.002109	4.00	0.005297
		2472	-14.02	14.68	0.00	0.001163	2.33	0.002704	4.00	0.006792
DC4V	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
DC4V	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-

Sample Calculation :

Output Power (A) =  $10^{((\text{Reading [dBm]} + \text{Cable Loss} + \text{Atten. Loss}) / 10)} \times \text{Burst Rate}$

E.I.R.P. (A) = Output Power (A) \*  $10^{(\text{Antenna Gain[dBi]}/10)}$

#### [Total Power / Result and Limit]

Voltage	Freq. [MHz]	Output Power				E.I.R.P.		
		Result (B)	Tolerance Result	Limit	Tolerance Limit	Result (B)	Result	Limit
		[W/MHz]	[%]	[W/MHz]	[%]	[W/MHz]	[dBm/MHz]	[dBm/MHz]
DC4V	2412	0.002328	-32.3	0.010000	+20 ~ -80	0.005847	7.67	12.14
	2442	0.002109	-38.6	0.010000	+20 ~ -80	0.005297	7.24	12.14
	2472	0.002704	-21.3	0.010000	+20 ~ -80	0.006792	8.32	12.14

Sample Calculation :

Tolerance = Output Power Result (B) / Declared Output Power \* 100 - 100.

Output Power Result (B) : Sum of all "Output Power (A)" at same Freq.

E.I.R.P. Result (B): Sum of all "E.I.R.P. (A)" at same Freq.

#### [Declared Output Power]

Average of Output Power Result (B)	0.003124	[W/MHz]	Average of E.I.R.P. Result(B)	0.007848	[W/MHz]
Declared Output Power	0.003437	[W/MHz]	E.I.R.P. for Declared Output Power	9.36	[dBm/MHz]
+20	0.004124	[W/MHz]			
Middle (Declared Output Power -30%)	0.002406	[W/MHz]			
-80	0.000687	[W/MHz]			

Sample Calculation :

E.I.R.P. for Declared Output Power

=  $10 * \log(\text{Average of E.I.R.P. Result (B)} * (\text{Declared Output Power} / \text{Average of Output Power Result (B)}) * 1000)$

✱ Agilent 13:14:10 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.405 300 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

**Channel Power**

**Power Spectral Density**

-14.68 dBm /1.0000 MHz

-74.68 dBm/Hz

Tx2\_Power\_Chain1\_Nom

Agilent 13:22:33 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.438 760 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-15.10 dBm /1.0000 MHz

Power Spectral Density

-75.10 dBm/Hz

Tx3\_Power\_Chain1\_Nom

Agilent 14:07:16 May 17, 2018

L

APv8.3(050118),46722, MOR-DFS

Ref 10 dBm

#Atten 20 dB

#Samp

Log

10

dB/

#PAvg

W1 S2

Center 2.464 760 GHz

#Res BW 30 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 32.48 ms (1201 pts)

Channel Power

-14.02 dBm /1.0000 MHz

Power Spectral Density

-74.02 dBm/Hz



## 2.5. Secondary Radiated Emission Strength

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Freq.	Freq.	S/A Reading	Cable Loss	Atten. Loss	Result	Result	Limit	Remark
[V]	[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[nW]	[nW]	
DC4V	2412	882.8	-82.85	14.68	0.00	-68.17	0.152	4.000	◆5
		7028.0	-65.86	14.68	0.00	-51.18	7.621	20.000	◆6

The sum of the results exceeding 1/10 of the Limit [nW] : 7.621

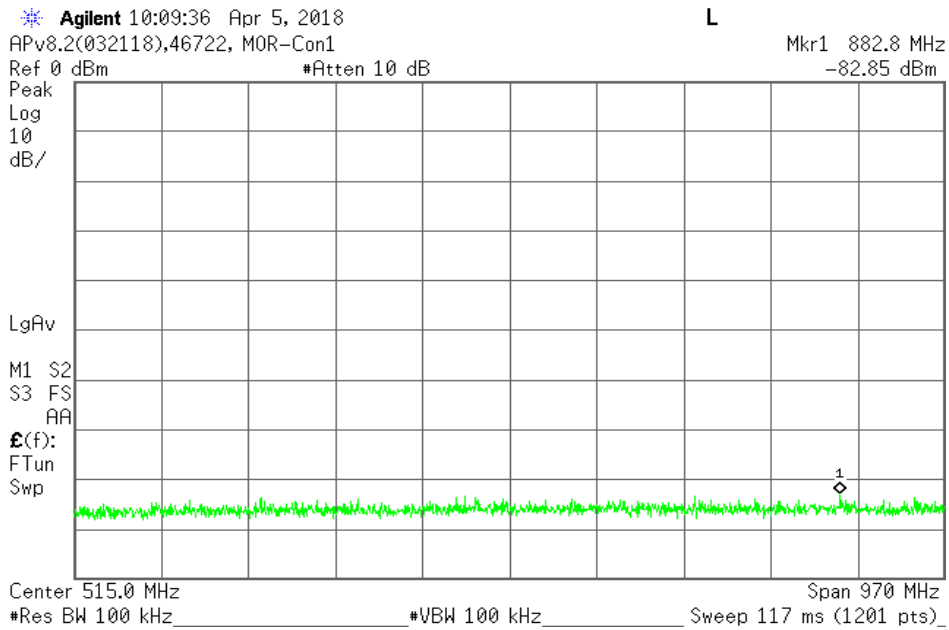
Sample Calculation :

Result = Reading + Cable Loss + Atten Loss

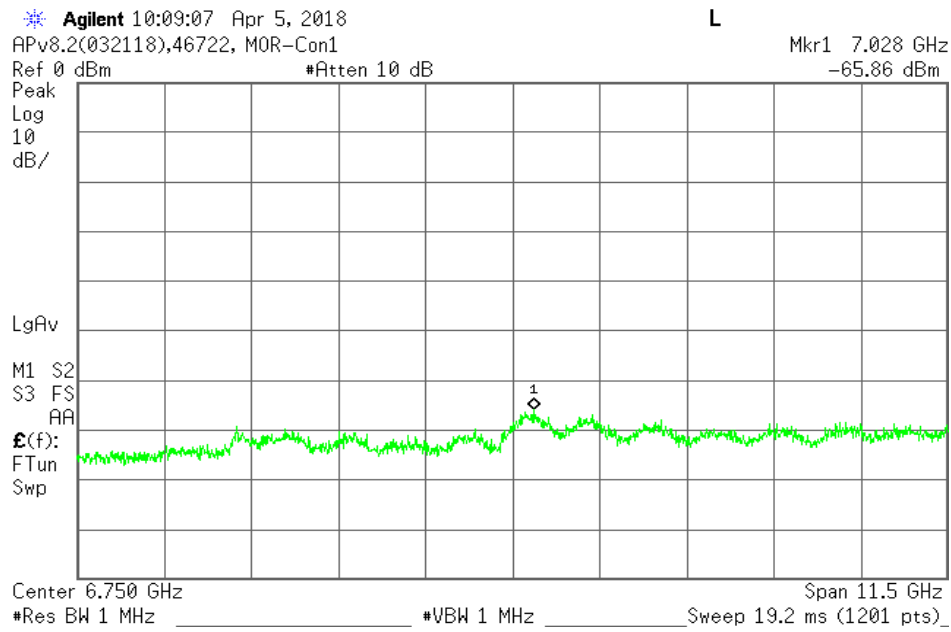
◆5:Freq Range5 (≥ 30MHz, <1GHz)

◆6:Freq Range6 (≥ 1GHz, ≤ 12.5GHz)

Rx1\_SpuriousM\_Nom



Rx1\_SpuriousG\_Nom



2.6. Secondary Radiated Emission Strength

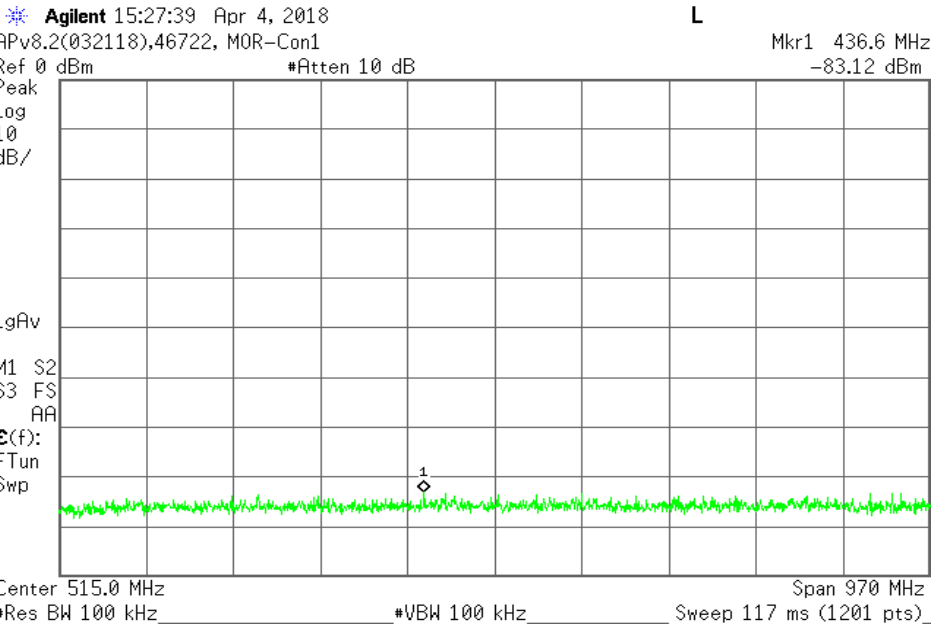
Job No.	R12053557-E8b
Remark1	
Remark2	

[ DATA ]									
Voltage	Freq.	Freq.	S/A Reading	Cable Loss	Atten. Loss	Result	Result	Limit	Remark
[V]	[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[nW]	[nW]	
DC4V	2442	436.6	-83.12	14.68	0.00	-68.44	0.143	4.000	◆5
		6980.0	-65.56	14.68	0.00	-50.88	8.166	20.000	◆6

The sum of the results exceeding 1/10 of the Limit [nW] : 8.166

Sample Calculation :  
Result = Reading + Cable Loss + Atten Loss  
◆5:Freq Range5 (≥ 30MHz, <1GHz)  
◆6:Freq Range6 (≥ 1GHz, ≤ 12.5GHz)

Rx1\_SpuriousM\_Nom



Agilent 15:27:01 Apr 4, 2018

L

APv8.2(032118),46722, MOR-Con1

Mkr1 6.980 GHz

Ref 0 dBm

#Atten 10 dB

-65.56 dBm

Peak  
Log  
10  
dB/

LgAv

M1 S2

S3 FS

AA

E(f):

FTun

Swp

Center 6.750 GHz

Span 11.5 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 19.2 ms (1201 pts)

## 2.7. Secondary Radiated Emission Strength

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Freq.	Freq.	S/A Reading	Cable Loss	Atten. Loss	Result	Result	Limit	Remark
[V]	[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[nW]	[nW]	
DC4V	2472	823.0	-82.92	14.68	0.00	-68.24	0.150	4.000	◆5
		6922.0	-65.89	14.68	0.00	-51.21	7.568	20.000	◆6

The sum of the results exceeding 1/10 of the Limit [nW] : 7.568

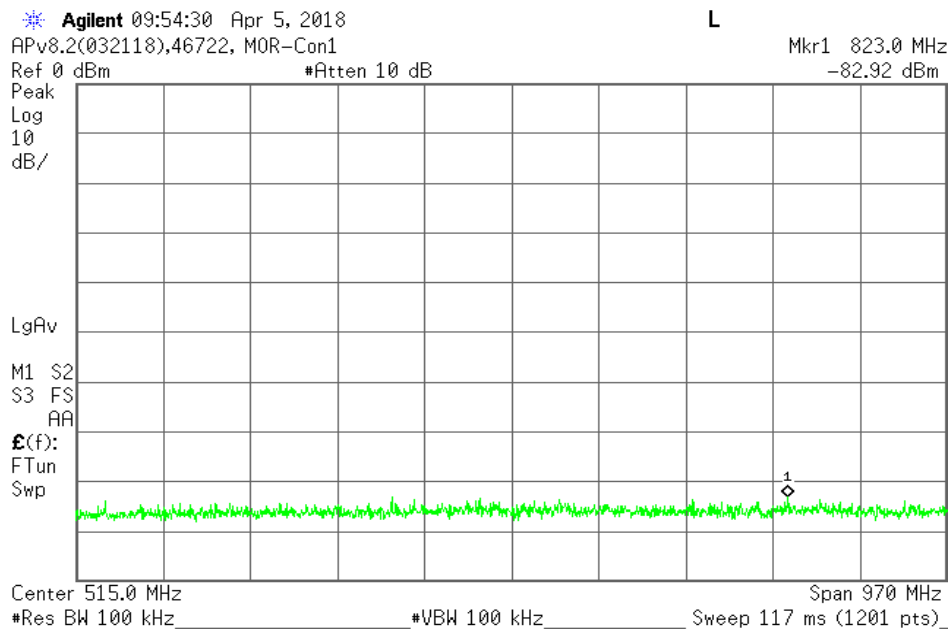
Sample Calculation :

Result = Reading + Cable Loss + Atten Loss

◆5:Freq Range5 (≥ 30MHz, <1GHz)

◆6:Freq Range6 (≥ 1GHz, ≤ 12.5GHz)

Rx1\_SpuriousM\_Nom



Rx1\_SpuriousG\_Nom

Agilent 09:53:50 Apr 5, 2018

L

APv8.2(032118),46722, MOR-Con1

Mkr1 6.922 GHz

Ref 0 dBm

\*Atten 10 dB

-65.89 dBm

Peak  
Log  
10  
dB/

LgAv

M1 S2  
S3 FS  
AA

E(f):  
FTun  
Swp

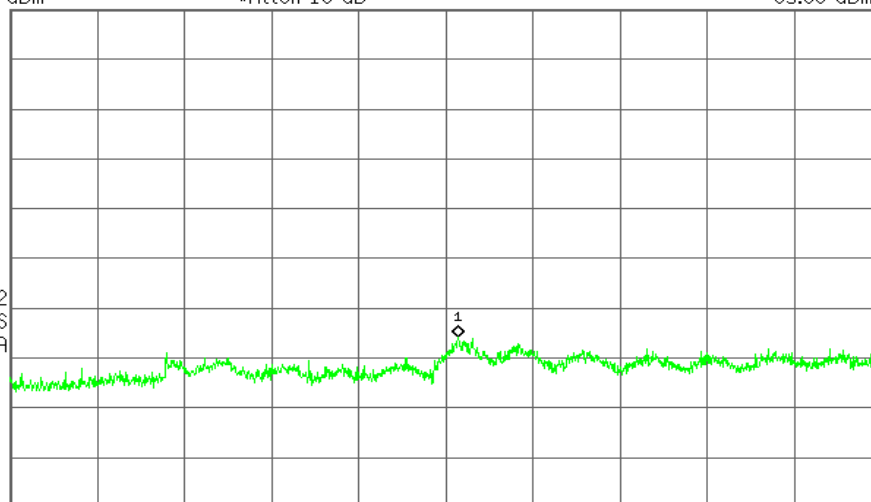
Center 6.750 GHz

Span 11.5 GHz

\*Res BW 1 MHz

\*VBW 1 MHz

Sweep 19.2 ms (1201 pts)



## 2.8. Duty / Burst Rate

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Freq.	On Time	Period	Result (Duty)	Result (Burst Rate)
[V]	[MHz]	[msec]	[msec]	[ % ]	
DC4V	2442	0.128	0.298	43.0	2.325

Sample Calculation :

Result(Duty) = On Time / Period \* 100

Result(Burst Rate) = Period / On Time

Tx2\_Duty\_Nom

Agilent 15:35:39 Apr 4, 2018

L

APv8.2(032118),46722, MOR-Con1

▲ Mkr3 297.6 μs

Ref 10 dBm

#Atten 20 dB

0.065 dB

#Peak

Log

10

dB/

#PAvg

1

W1 S2

Center 2.442 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 8 MHz

Sweep 1.28 ms (1201 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	259.2 μs	-20.72 dBm
1Δ	(1)	Time	128 μs	10.79 dB
3R	(1)	Time	259.2 μs	-20.72 dBm
3Δ	(1)	Time	297.6 μs	0.07 dB

## Average Power

Job No. R12053557-E8b

Remark1

Remark2

### [ DATA ]

Voltage	Port No.	Freq.	Reading	Cable Loss	Atten. Loss	Burst Rate	Output Power Result
		[MHz]	[dBm]	[dB]	[dB]		[dBm]
DC4V	0	2412	1.64	14.68	0.00	2.33	19.98
		2442	1.78	14.68	0.00	2.33	20.12
		2472	2.05	14.68	0.00	2.33	20.39
DC4V	1	2412	0.85	14.68	0.00	2.33	19.19
		2442	1.25	14.68	0.00	2.33	19.59
		2472	1.34	14.68	0.00	2.33	19.68
DC4V	-	-		-	-	-	-
		-		-	-	-	-
		-		-	-	-	-
DC4V	-	-		-	-	-	-
		-		-	-	-	-
		-		-	-	-	-

### Total Output Power

Voltage	Freq.	Power
	[MHz]	[mW]
DC4V	2412	182.70
	2442	193.98
	2472	202.49



### 3. Measurement Equipment

Use	Int. No.	Kind of Equipment	Model No.	Manufacturer	Serial No.	Calibration Authority	Calibration Date
X	72822	Spectrum Analyzer	E4446A	Agilent	MY51100032	World Cal	2017-08-21
X	PWM005	Power Meter	N1912A	Keysight	MY55116004	World Cal	2018-04-25
X	PWS005	Power Sensor	N1921A	Keysight	MY55090030	World Cal	2018-04-26

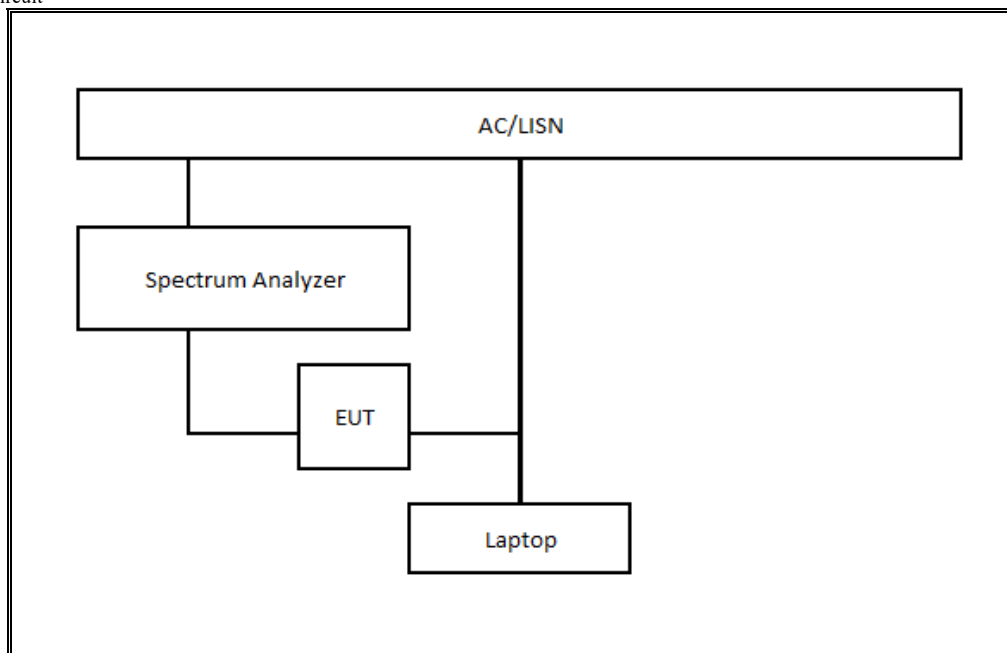
- Note :
1. The calibration of measurement equipment is valid for a one year period.
  2. "X" used equipment.
  3. All equipment is calibrated and traceable to ISO17025

### 4. Test Condition

Test Item	Date	Temp	Hum	Engineer	Test Room
Frequency Tolerance	4/4 to 4/5/2018	23.7C	50.30%	46722	MOR-Con1
Occupied Bandwidth	2018-04-05	24C	51.40%	46722	MOR-Con1
Unwanted Emission Strength	4/4 to 4/5/2018	23.7C	50.30%	46722	MOR-Con1
Output Power/ E.I.R.P	2018-05-17	22.9C	49.00%	46722	MOR-DFS
Secondary Radiated Emission Strength	4/4 to 4/5/2018	23.7C	50.30%	46722	MOR-Con1

## 5. TEST CONFIGURATION

Test Circuit



Photo

