

TEST REPORT

REPORT NUMBER: 4788623965.3-5

COMPANY NAME: ASUSTek Computer Inc.

EUT DESCRIPTION: LED Projector

MODEL: S2

SERIAL NUMBER: 028

ISSUE DATE: 6-Sep-18

DATE TESTED: 20-Aug-18 to 6-Sep-18

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 Verification Services (Guangzhou) Co., Ltd., Song Shan Lake Branch
Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech
Development Zone Dongguan, People's Republic of China

Test Result: Pass

Classification of Specified
Radio Equipment: Article 2 Clause 1 Item 19-3

Type of radio wave, Frequency
and antenna power: G1D, D1D 5260-5320MHz (Interval of 20MHz 4ch) 0.002151W/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 Verification Services (Guangzhou) Co., Ltd., Song Shan Lake Branch and all revisions are duly noted

Approved & Released By: Stephen

Tested By: Kebo

Engineer Full Name: Stephen Guo
Engineer Title: Laboratory Manager
UL Verification Services (Guangzhou) Co., LTD.
Songshan Lake Branch

Engineer Full Name: Kebo Zhang
Engineer Title: Engineer
UL Verification Services (Guangzhou) Co., LTD.
Songshan Lake Branch

1. EUT Information

Report No. : 4788623965.3-5
Applicant : ASUSTek Computer Inc.
Equipment Description: LED Projector
Model No. : S2
SerialNo. : 028
Series Model : S2E, S2C,S2M,S2Z
Model Difference : The schematic and structure of each model is same, the only difference is that the name of the model is different, but it will not affect the test result.
The number of Tx Antenna : 1
Max Antenna Gain : 3.40dBi
Mode : IEEE802.11a
Type of Radio wave : G1D, D1D

Supply Voltage
☒ DC ☒ AC 100.00V

Voltage Condition
☒ Non-Extreme ☐ Extreme
Normal AC100V
Normal-10% -
Normal+10% -

Band
☒ W52 ☒ W53

Modulation
☒ OFDM (OBW<19MHz)
☐ OFDM (OBW<19~38MHz)
☐ DS (OBW<18MHz)
☐ Other Modulation (OBW<18MHz)

EUT has
☒ ANT Connector ☐ No ANT Connector distance -

TEUT has
☒ TPC Function ☐ No TPC Function

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

Note: The results documented in this report : Other than for Power and ACP For Power

	[MHz]	Cable Loss [dB]	ATT/ [dB]	Cable Loss [dB]	ATT/ [dB]
Low Channel (Tx1)	5260	1.50	10.00	1.50	10.00
Middle Channel (Tx2)	5300	1.50	10.00	1.50	10.00
High Channel (Tx3)	5320	1.50	10.00	1.50	10.00

* Cable loss and ATT are not taken into account for ACP.

2.TEST Result

2.1. Frequency Tolerance

Job No. 4788623965.3-5

Remark1

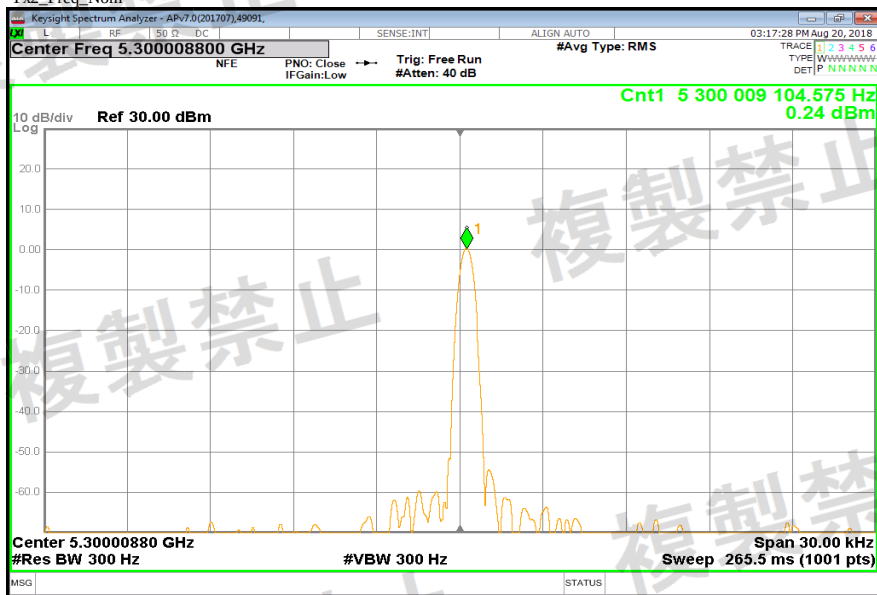
Remark2

[DATA]

Voltage	Freq. [MHz]	Result [MHz]	Tolerance [kHz]	Tolerance [ppm]	Limit [ppm]
AC100V	5260	5260.0096	9.6000	1.83	±20.0
	5300	5300.0091	9.1000	1.72	±20.0
	5320	5320.0089	8.9000	1.67	±20.0



Tx2 Freq_Nom



Tx3 Freq_Nom



2.2. Occupied Bandwidth

Job No. 4788623965.3-5

Remark1

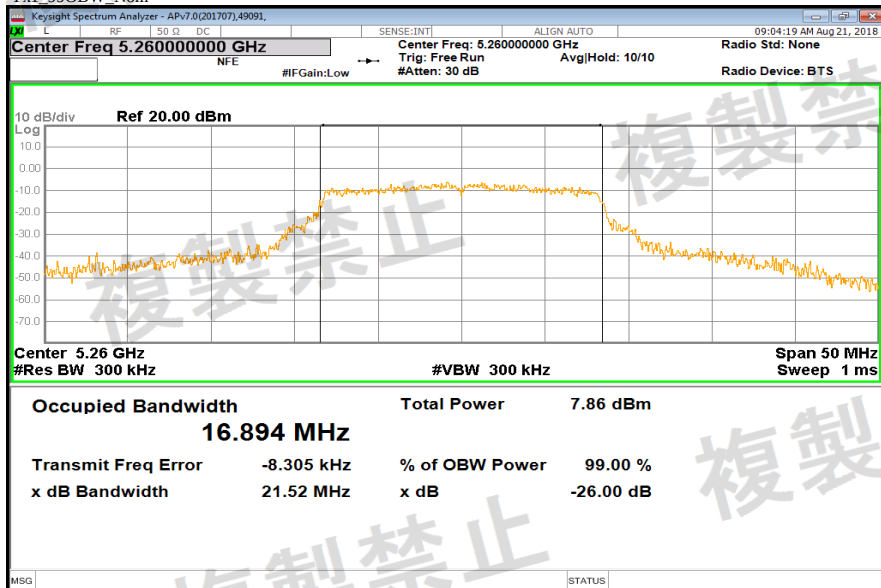
Remark2

[DATA]

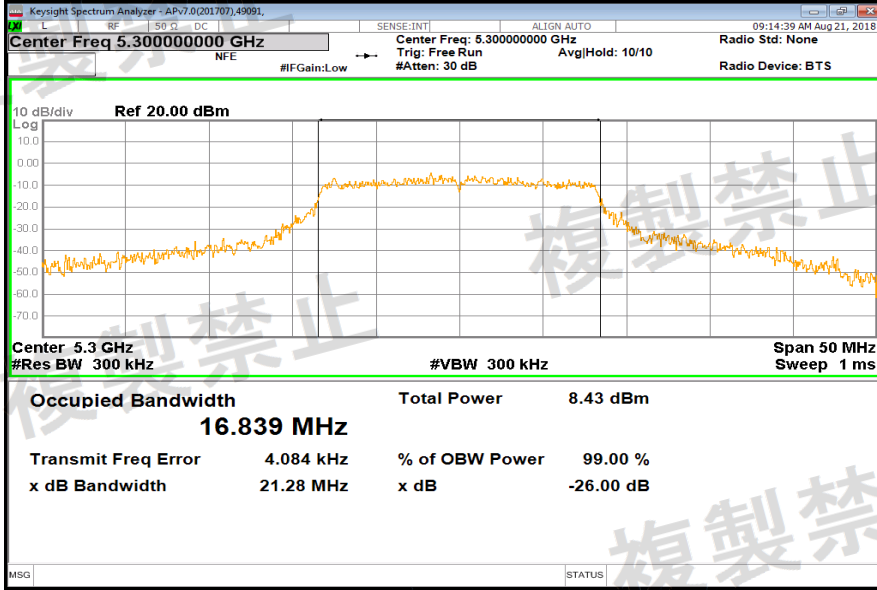
99% Occupied Frequency Bandwidth

Voltage	Freq. [MHz]	Result [MHz]	Limit [MHz]
AC100V	5260	16.8940	19
	5300	16.8390	19
	5320	16.8540	19

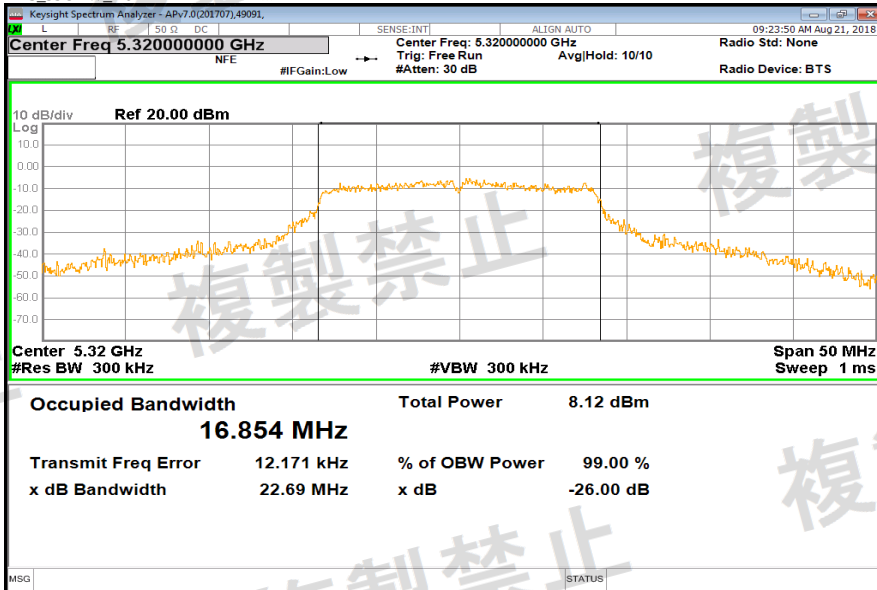
Tx1_99OBW_Nom



Tx2_990BW_Nom



Tx3_990BW_Nom



2.3.Unwanted Emission Strength (Normal Voltage)

Job No. 4788623965.3-5

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]	
AC100V	5260	865.00	-61.61	1.50	10.00	-50.11	0.010	2,500	♦1
		3880.00	-56.60	1.50	10.00	-45.10	0.031	2,500	♦1
		6733.00	-58.49	1.50	10.00	-46.99	0.020	2,500	♦2
		9496.00	-57.61	1.50	10.00	-46.11	0.024	2,500	♦2
		11100.00	-57.75	1.50	10.00	-46.25	0.024	2,500	♦2
		19488.00	-56.59	1.50	10.00	-45.09	0.031	2,500	♦2
		25905.00	-54.71	1.50	10.00	-43.21	0.048	2,500	♦2
	5300	852.10	-60.51	1.50	10.00	-49.01	0.013	2,500	♦1
		3800.00	-56.36	1.50	10.00	-44.86	0.033	2,500	♦1
		7192.00	-56.80	1.50	10.00	-45.30	0.030	2,500	♦2
		5129.00	-57.54	1.50	10.00	-46.04	0.025	2,500	♦1
		13608.00	-57.12	1.50	10.00	-45.62	0.027	2,500	♦2
		18833.00	-56.78	1.50	10.00	-45.28	0.030	2,500	♦2
		25675.00	-54.87	1.50	10.00	-43.37	0.046	2,500	♦2
	5320	862.60	-61.35	1.50	10.00	-49.85	0.010	2,500	♦1
		3807.00	-56.81	1.50	10.00	-45.31	0.029	2,500	♦1
		5942.00	-58.56	1.50	10.00	-47.06	0.020	2,500	♦2
		5188.00	-56.25	1.50	10.00	-44.75	0.033	2,500	♦1
		14117.00	-57.54	1.50	10.00	-46.04	0.025	2,500	♦2
		19138.00	-55.76	1.50	10.00	-44.26	0.037	2,500	♦2
		25890.00	-53.99	1.50	10.00	-42.49	0.056	2,500	♦2

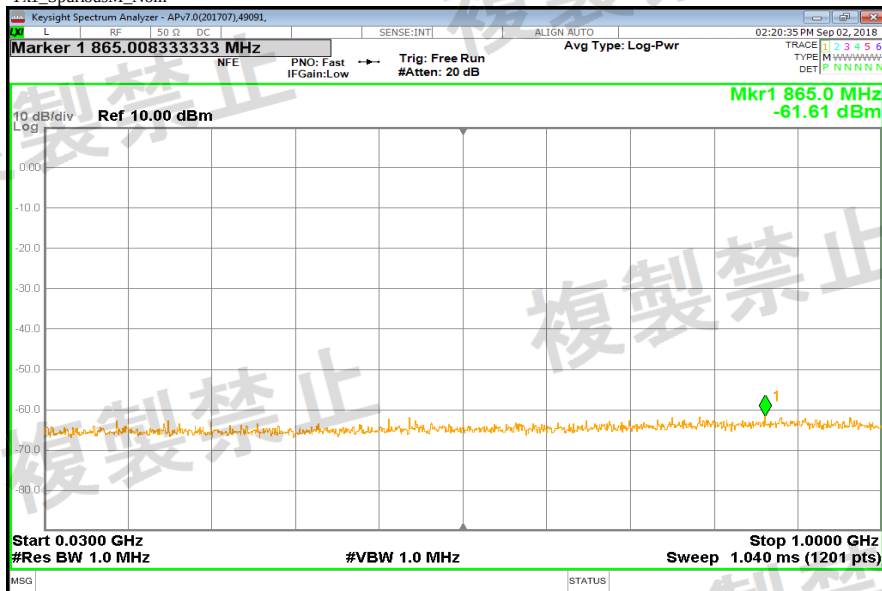
Sample Calculation :

Result = Reading + Cable Loss + Attenuator

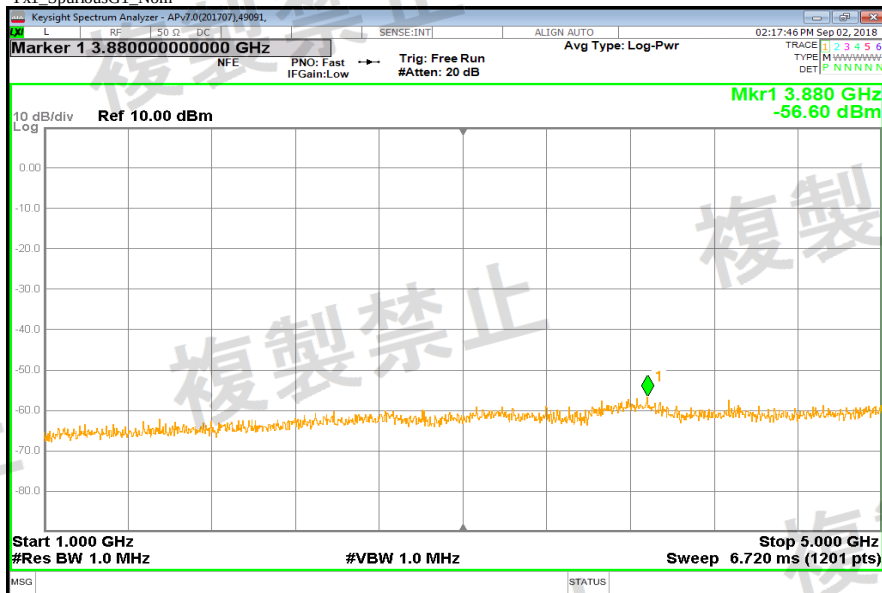
♦1:Freq Range1 (< 5,135MHz)

♦2:Freq Range2 (> 5,365MHz)

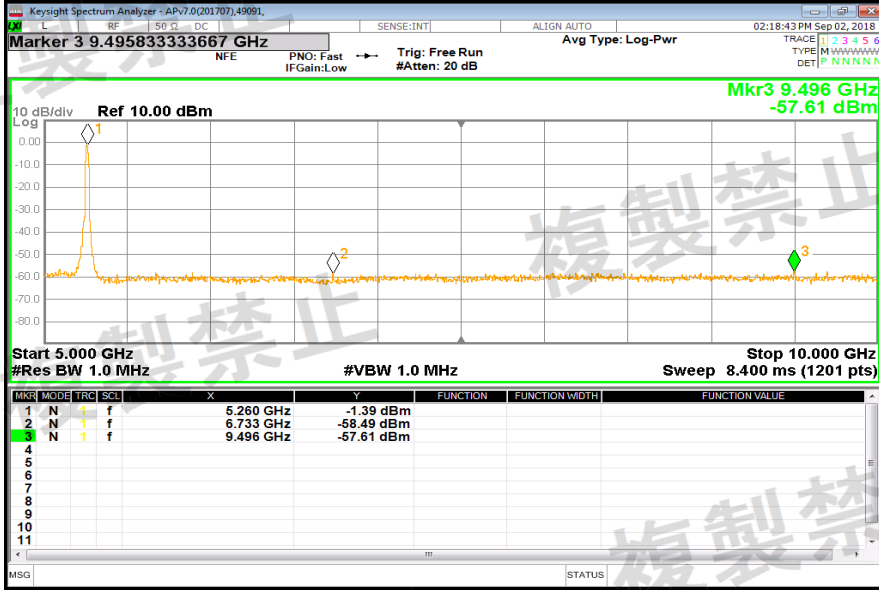
Tx1_SpuriousM_Nom



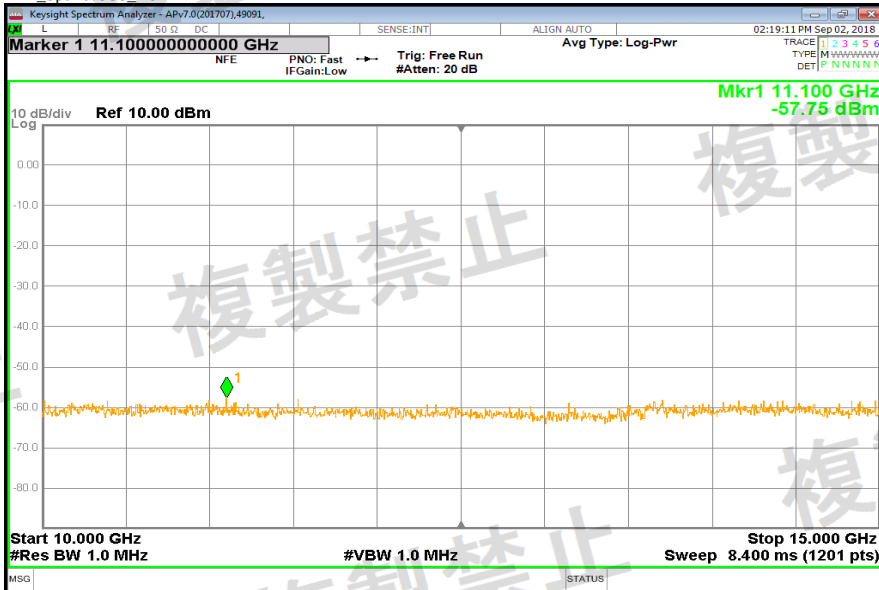
Tx1_SpuriousG1_Nom



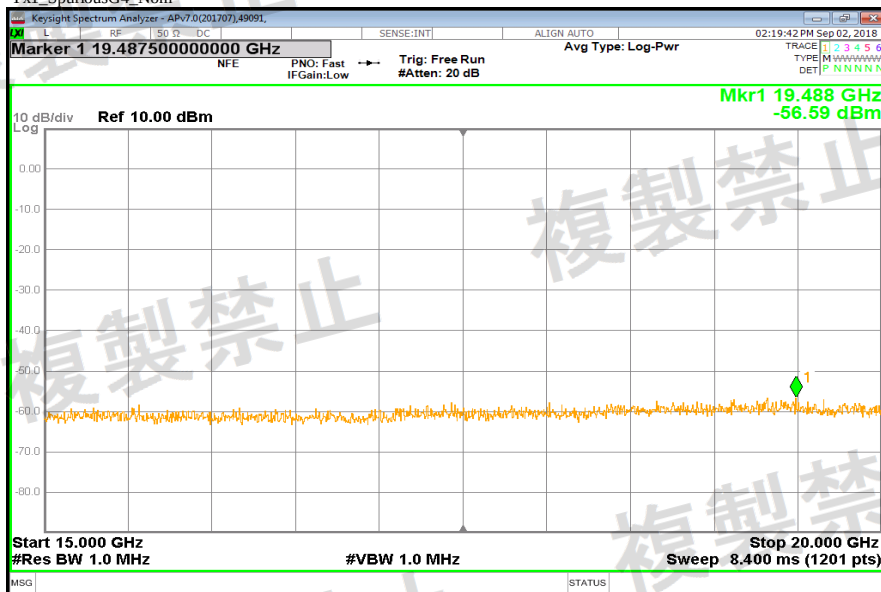
Tx1_SpuriousG2_Nom



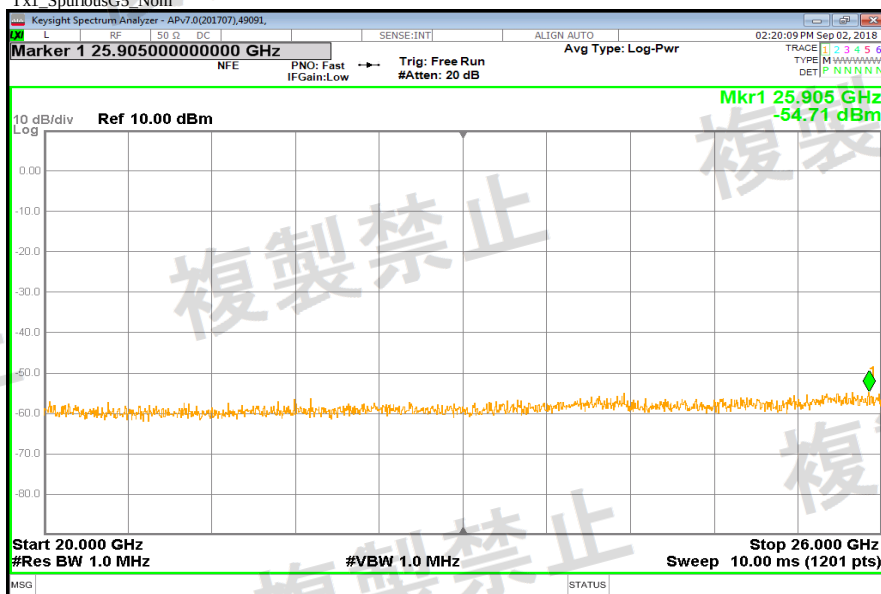
Tx1_SpuriousG3_Nom



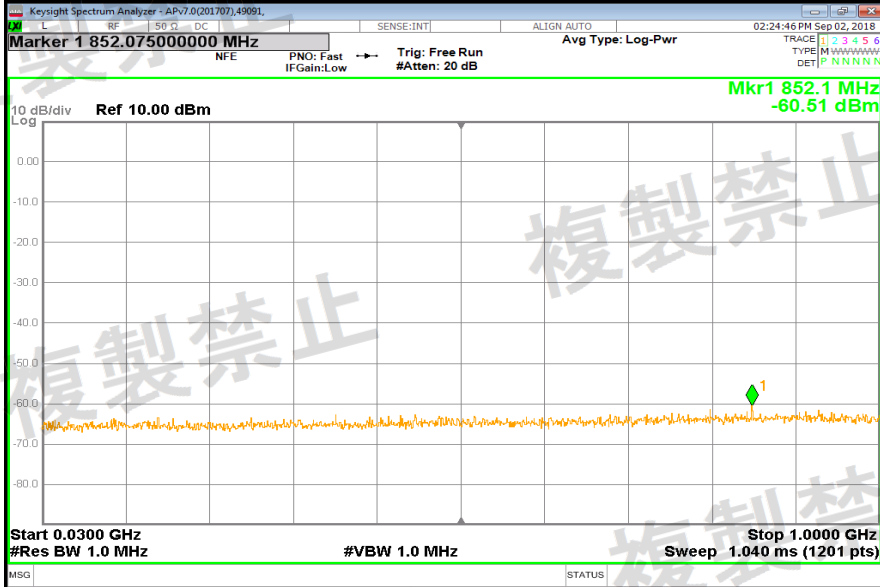
Tx1_SpuriousG4_Nom



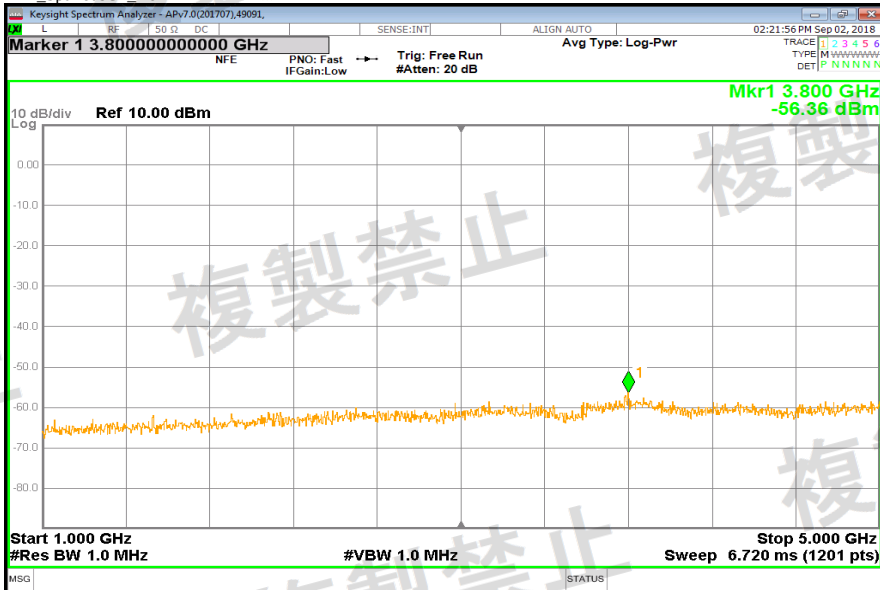
Tx1_SpuriousG5_Nom



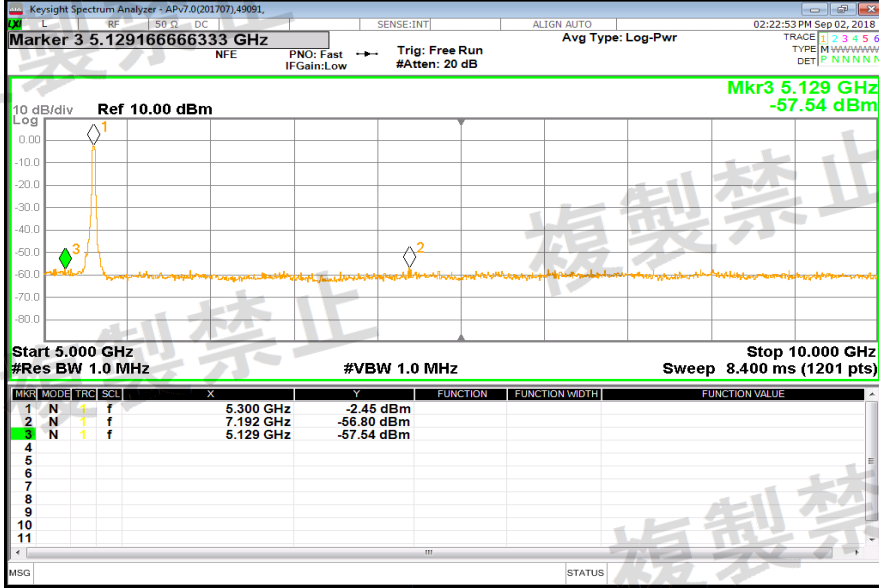
Tx2_SpuriousM_Nom



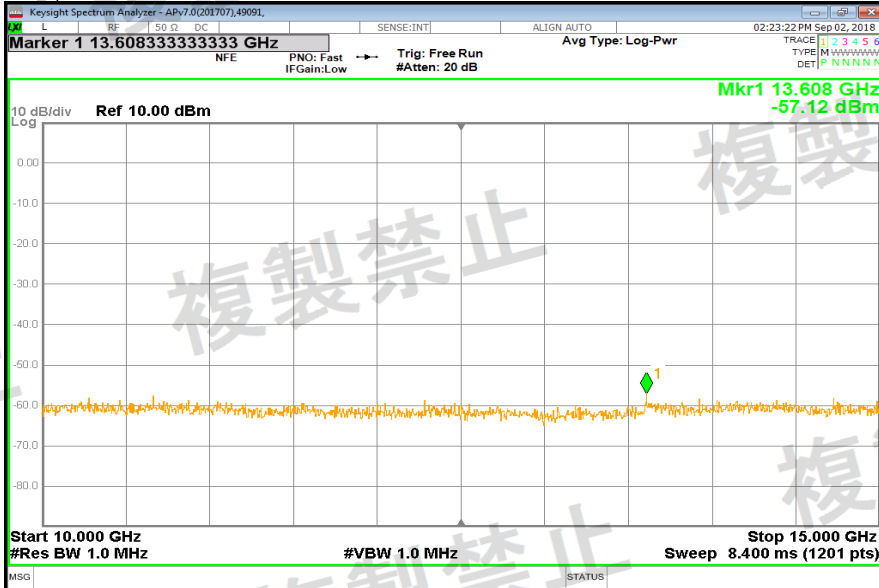
Tx2_SpuriousG1_Nom



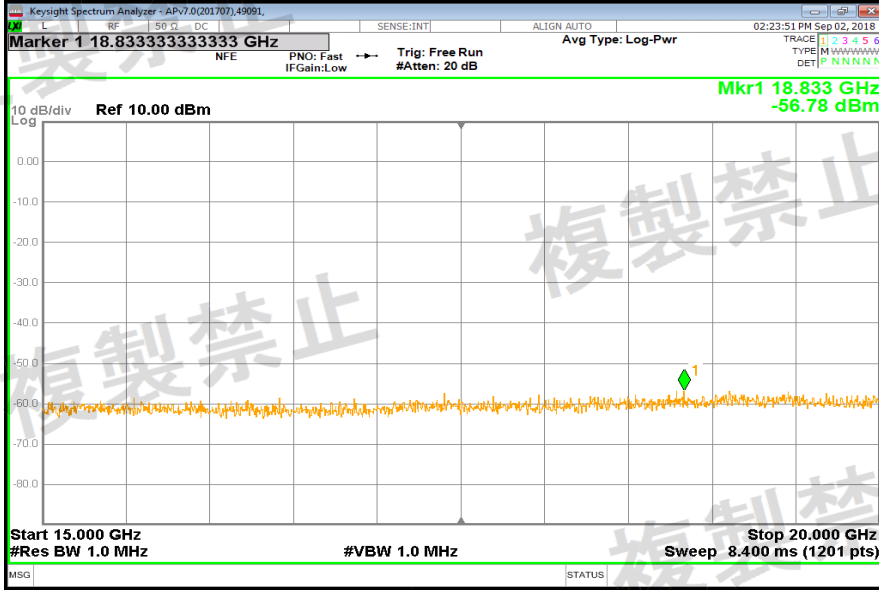
Tx2_SpuriousG2_Nom



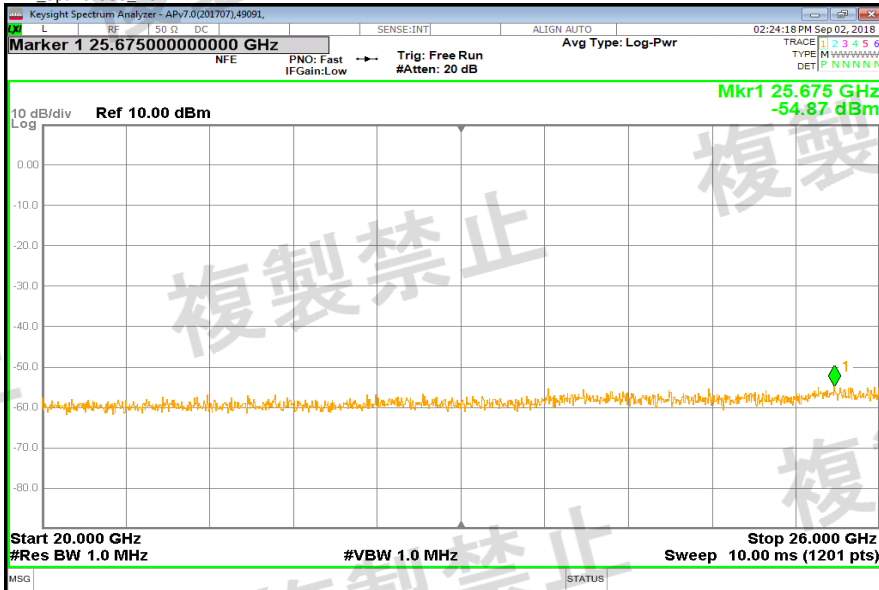
Tx2_SpuriousG3_Nom



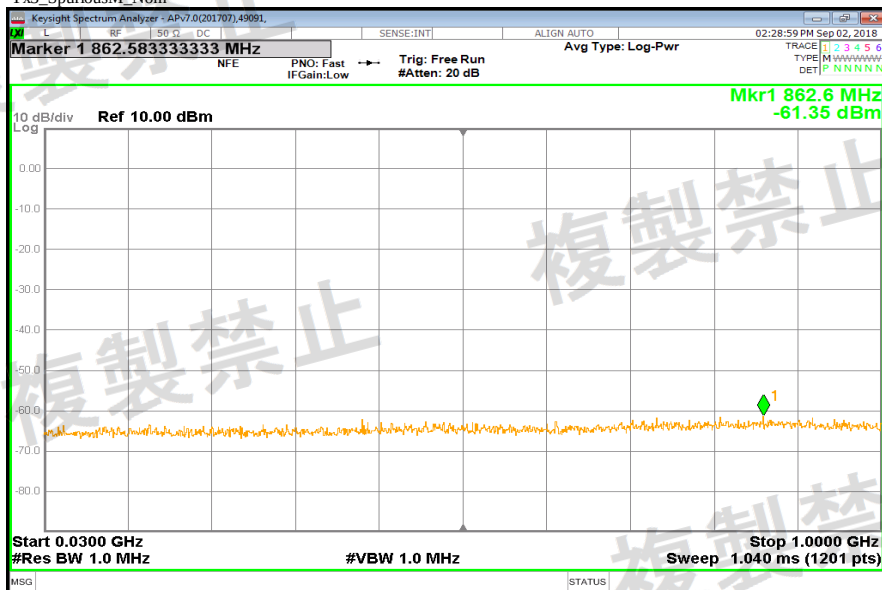
Tx2_SpuriousG4_Nom



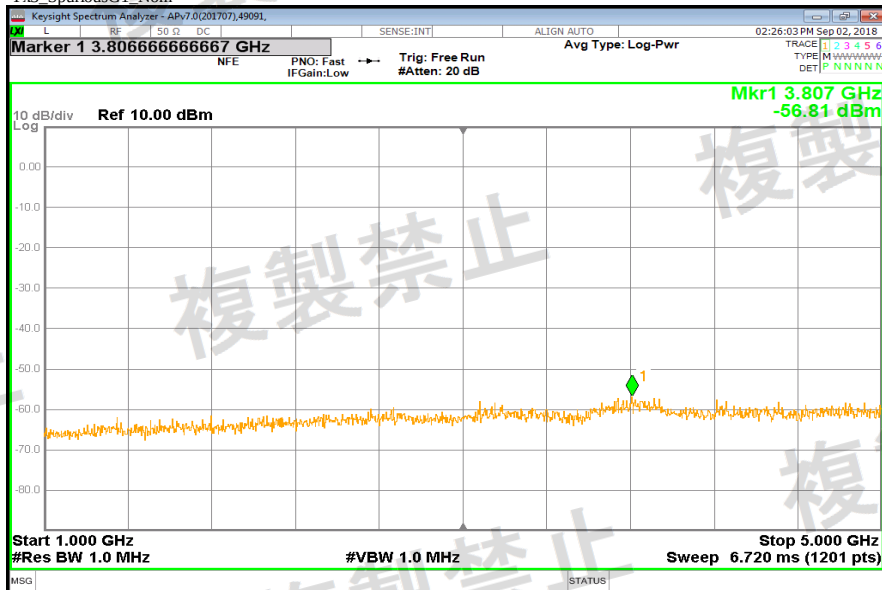
Tx2_SpuriousG5_Nom



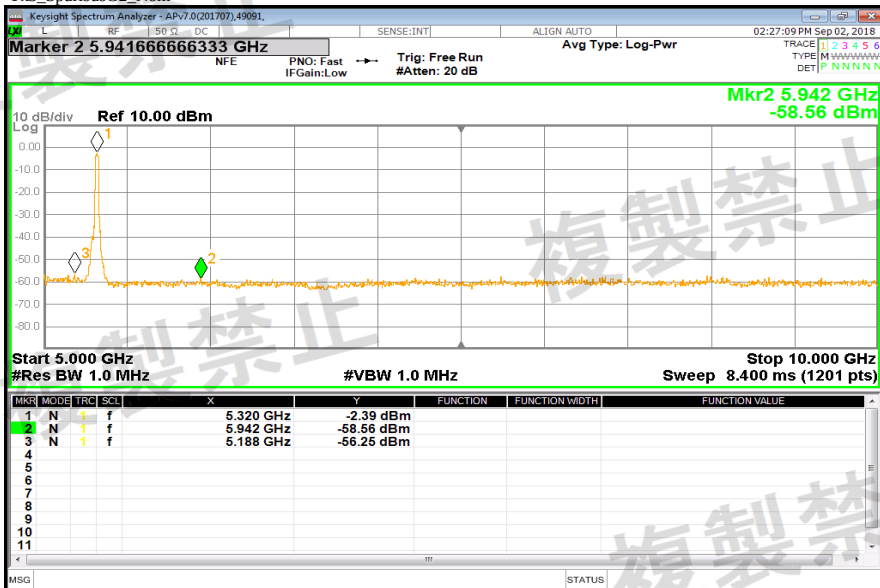
Tx3_SpuriousM_Nom



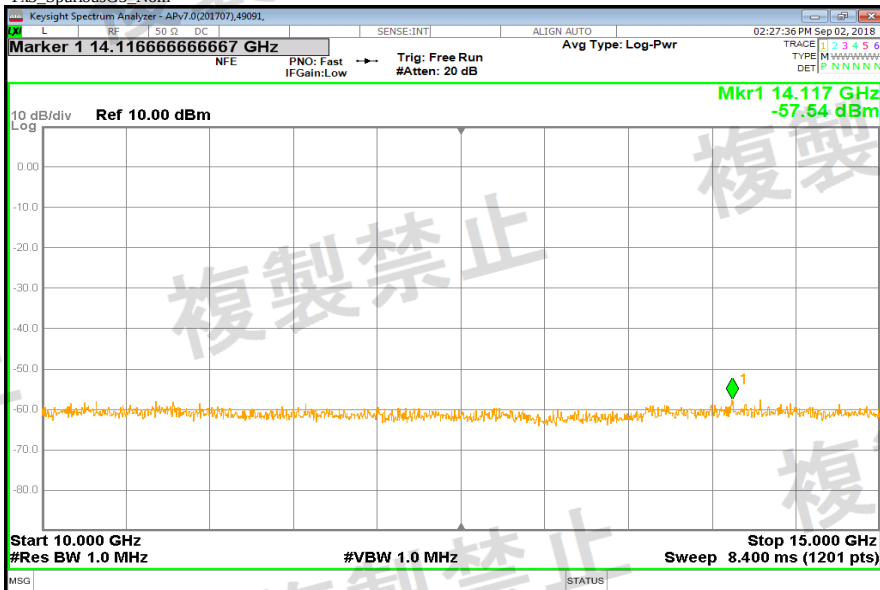
Tx3_SpuriousG1_Nom



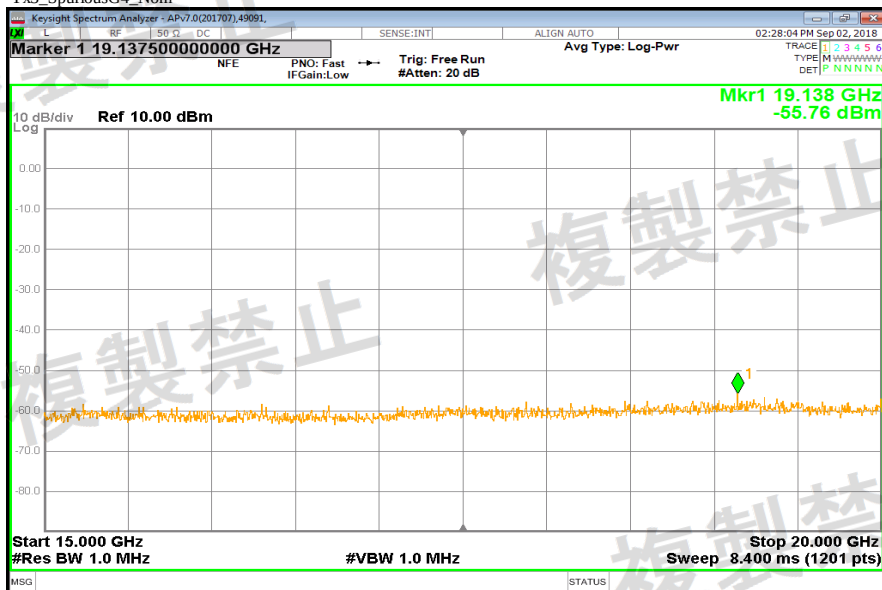
Tx3_SpuriousG2_Nom



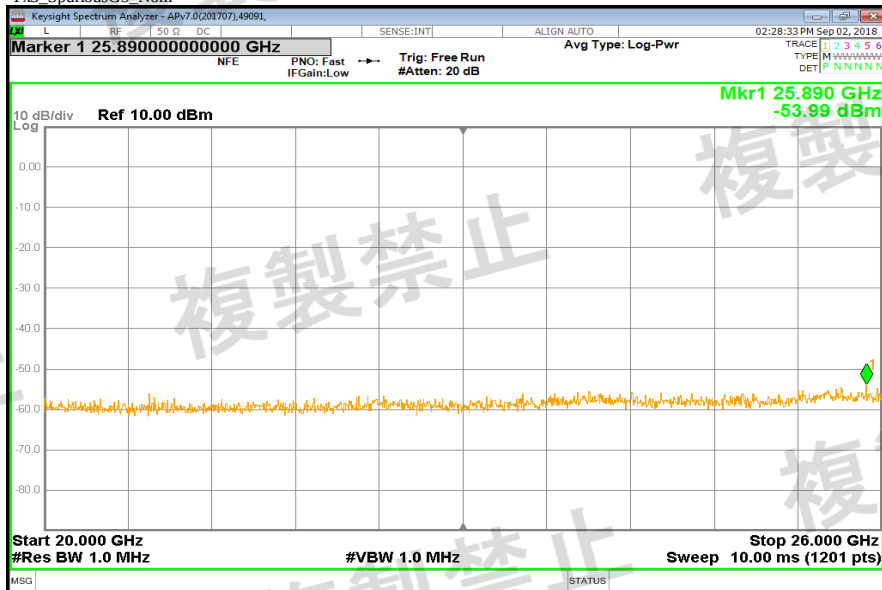
Tx3_SpuriousG3_Nom



Tx3_SpuriousG4_Nom



Tx3_SpuriousG5_Nom



2.4. Output Power/ E.I.R.P

Job No. 4788623965.3-5

Remark1

Remark2

[DATA]

Voltage	Port No.	Freq.	Reading	Cable Loss	Atten. Loss	Burst Rate	Output Power	Antenna Gain	E.I.R.P.
		[MHz]	[dBm]	[dB]	[dB]		(A) [W/MHz]	[dBi]	(A) [W/MHz]
AC100V	0	5260	-9.16	1.50	10.00	1.07	0.001836	3.40	0.004016
		5300	-9.31	1.50	10.00	1.07	0.001773	3.40	0.003880
		5320	-9.64	1.50	10.00	1.07	0.001644	3.40	0.003596

Sample Calculation :

Output Power (A) = { Reading + Cable Loss + Atten. Loss } * Burst Rate

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

[Total Power / Result and Limit]

Voltage	Freq.	Output Power				E.I.R.P.	
		Result (B) [W/MHz]	Tolerance Result [%]	Limit [W/MHz]	Tolerance Limit [%]	Result (B) [W/MHz]	Limit [W/MHz]
AC100V	5260	0.001836	-14.7	0.010000	+20 ~ -80	0.004016	0.005000
	5300	0.001773	-17.6	0.010000	+20 ~ -80	0.003880	0.005000
	5320	0.001644	-23.6	0.010000	+20 ~ -80	0.003596	0.005000

Sample Calculation :

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

[Declared Output Power]

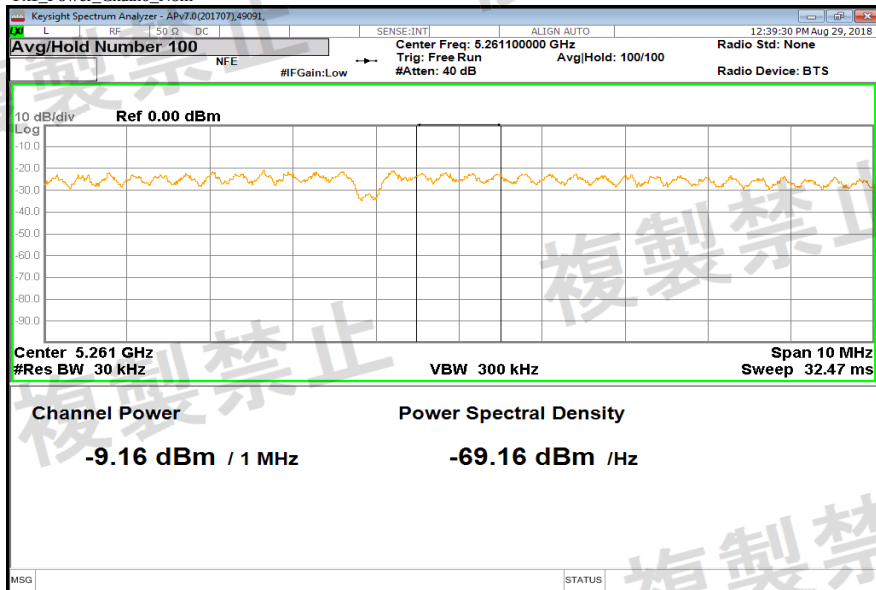
Average of Output Power Result (B)	0.001751	W/MHz	Average of E.I.R.P. Result(B)	0.003830	W/MHz
Declared Output Power	0.002151	W/MHz	E.I.R.P. for Declared Output Power	0.004706	W/MHz
+20	0.002581	W/MHz			
Middle (Declared Output Power -30%)	0.001506	W/MHz			
-80	0.000430	W/MHz			

Sample Calculation :

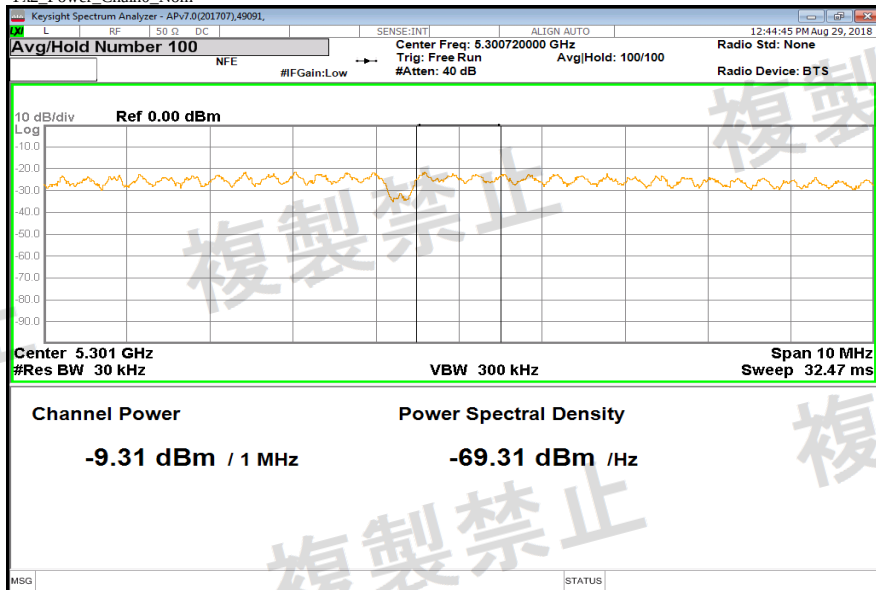
E.I.R.P. for Declared Output Power

= Average of E.I.R.P. Result (B) * (Declared Output Power / Average of Output Power Result (B))

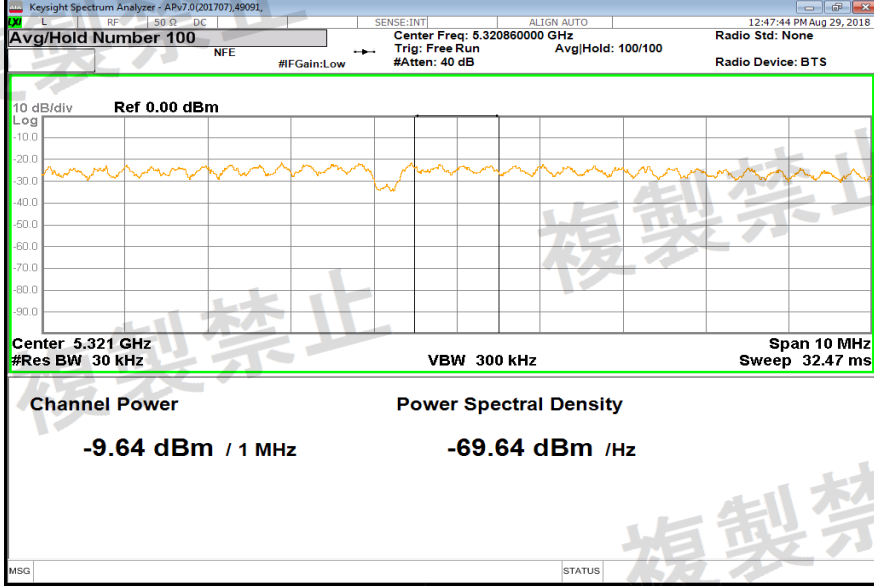
Tx1 Power Chain0 Nom



Tx2 Power Chain0 Nom



Tx3_Power_Chain0_Nom



2.5.Secondary Radiated Emission Strength(Normal Voltage)

Job No. 4788623965.3-5

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]	
AC100V	5300	947.5	-81.67	1.50	0.00	-80.17	0.010	4.000	◆8
		3533.0	-62.46	1.50	0.00	-60.96	0.802	20.000	◆9
		5300.0	-66.10	1.50	0.00	-64.60	0.347	20.000	◆9
		10617.0	-78.27	1.50	0.00	-76.77	0.021	20.000	◆9
		19379.0	-76.21	1.50	0.00	-74.71	0.034	20.000	◆9
		25605.0	-74.05	1.50	0.00	-72.55	0.056	20.000	◆9

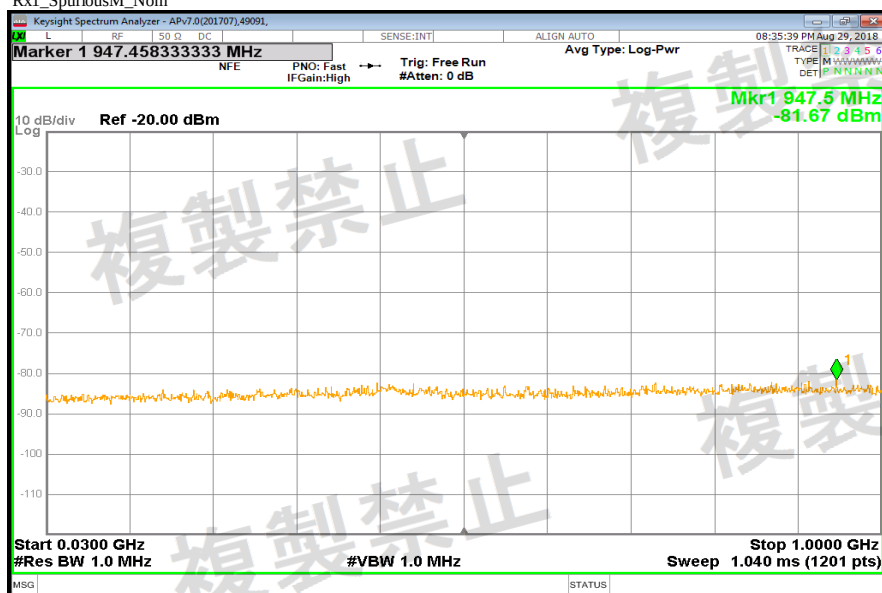
Sample Calculation :

Result = Reading + Cable Loss

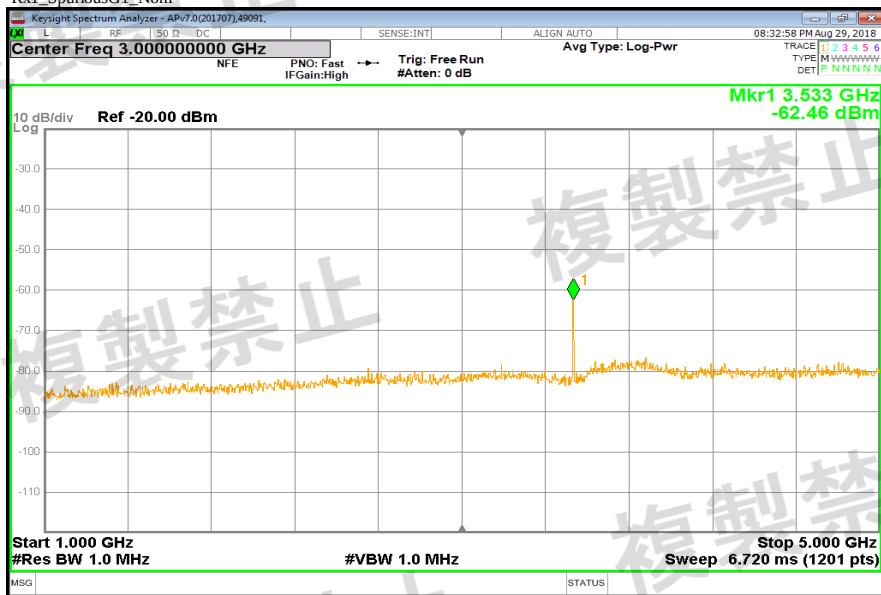
◆8:Freq Range8 (< 1GHz)

◆9:Freq Range9 (≥ 1GHz)

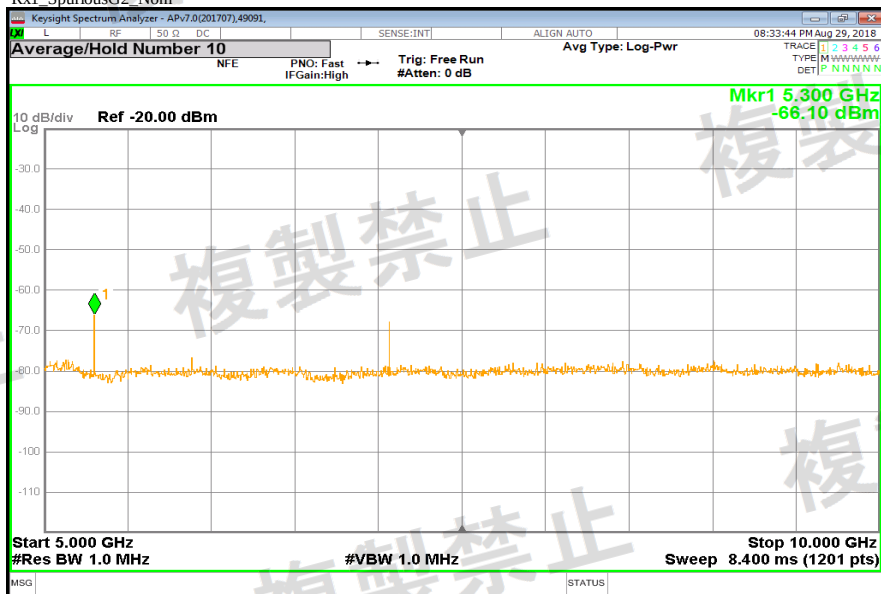
Rx1_SpuriousM_Nom

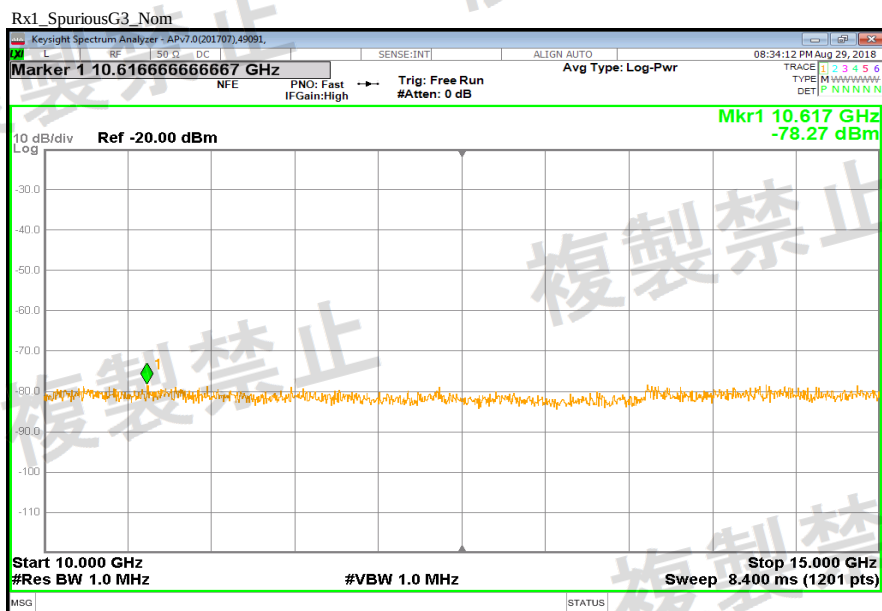
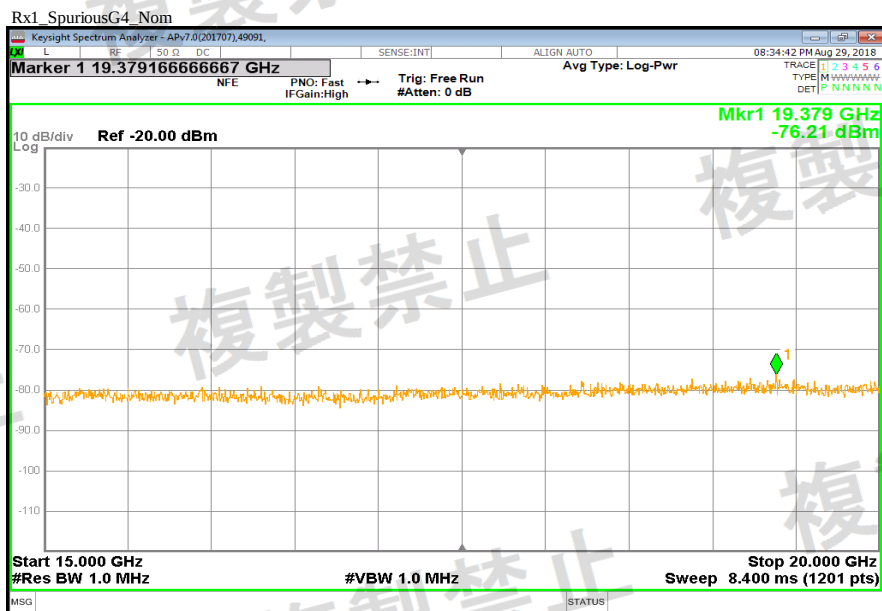


Rx1_SpuriousG1_Nom

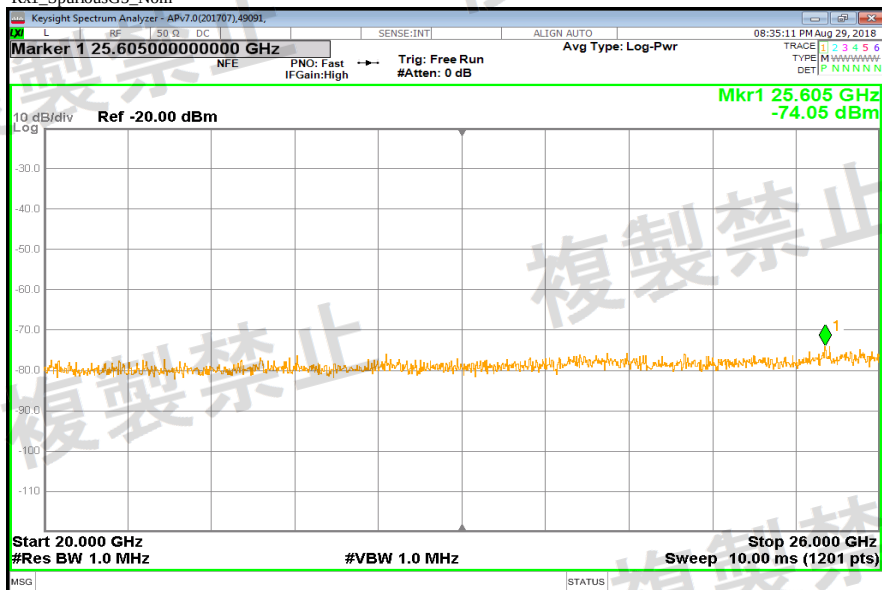


Rx1_SpuriousG2_Nom





Rx1_SpuriousG5_Nom



2.6. Burst Length / Duty

Job No. 4788623965.3-5

Remark1

Remark2

[DATA]

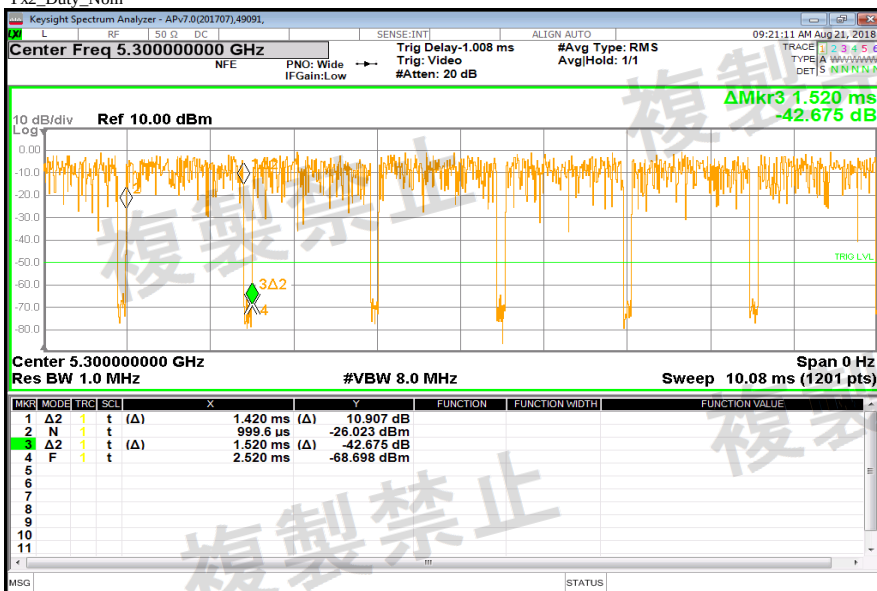
Voltage	Freq.	On Time	Period	Result (Duty)	Result (Burst Rate)	Limit
[V]	[MHz]	[msec]	[msec]	[%]		[msec]
AC100V	5300	1.420	1.520	93.4	1.071	4

Sample Calculation :

Result(Duty) = On Time / Period * 100

Result(Burst Rate) = Period / On Time

Tx2_Duty_Nom



2.7. Adjacent Channel Power

Job No. 4788623965.3-5

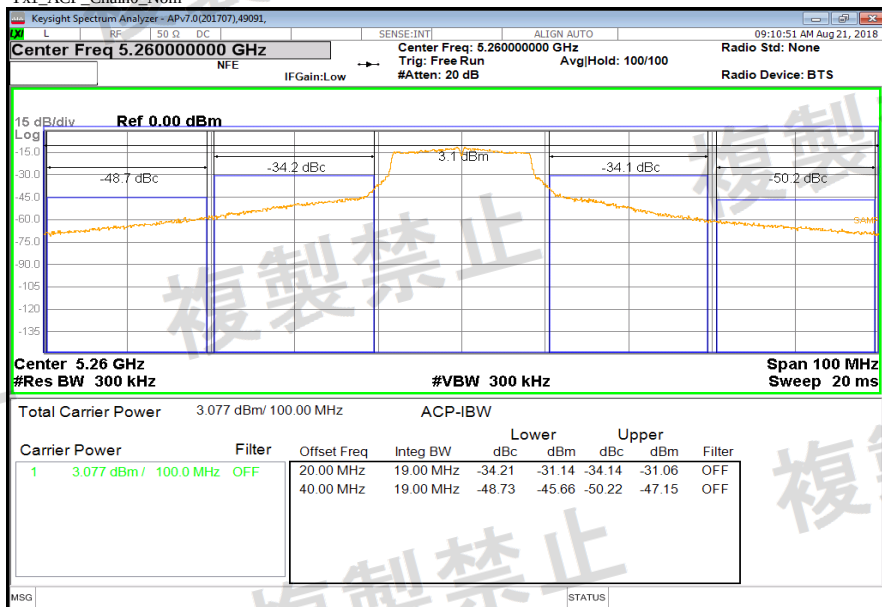
Remark1 Chain 0

Remark2

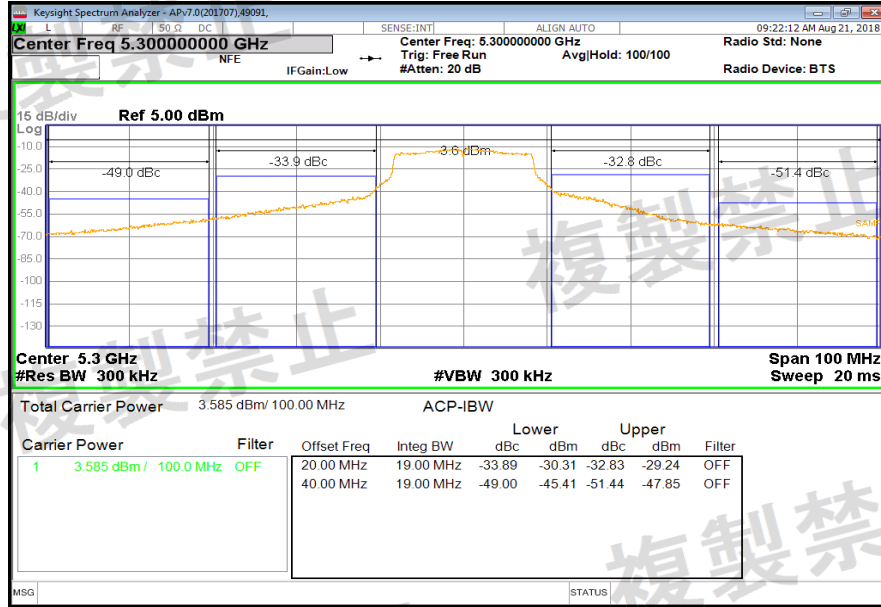
[DATA]

Voltage	Freq.	Separation	Lower Side Result	Upper Side Result	Limit	Remark
[V]	[MHz]	[MHz]	[dBc]	[dBc]	[dBc]	
AC100V	5260	20	-34.21	-34.14	-25.00	
		40	-48.73	-50.22	-40.00	
	5300	20	-33.89	-32.83	-25.00	
		40	-49.00	-51.44	-40.00	
	5320	20	-32.62	-31.73	-25.00	
		40	-47.46	-50.30	-40.00	

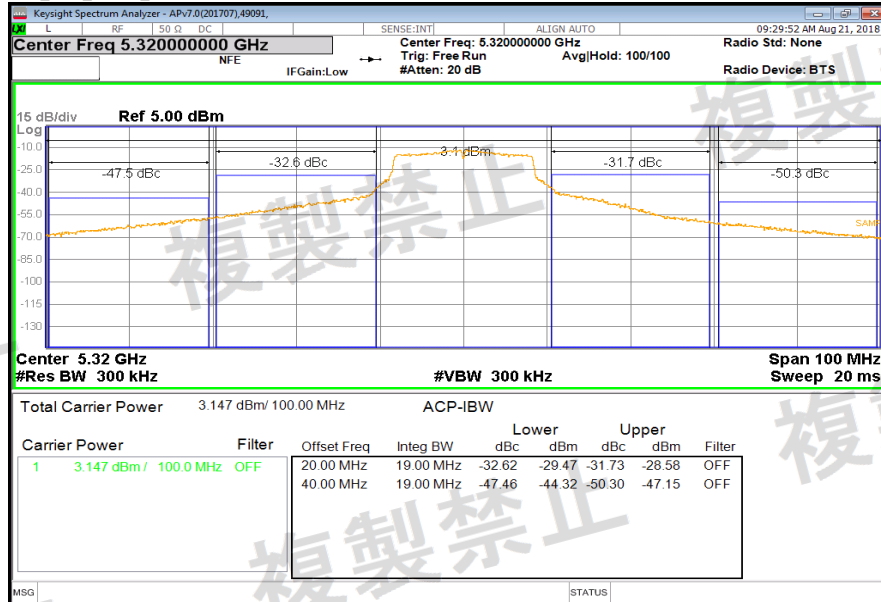
Tx1_ACP_Chain0_Nom



Tx2_ACP_Chain0_Nom



Tx3_ACP_Chain0_Nom



2.8. Outband Leakage Power Strength (Normal Voltage)

Job No. 4788623965.3-5

Remark1

Remark2

[DATA]

Voltage	Freq.	Freq.	S/A Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	Result	Limit	Remark
[V]	[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[uW/MHz]	[uW/MHz]	
AC100V	5260	5233.30	-53.55	1.50	10.00	3.40	-38.65	0.136	2.500	◆3
		5237.89	-50.13	1.50	10.00	3.40	-35.23	0.300	8.847	◆4
		5249.00	-38.85	1.50	10.00	3.40	-23.95	4.027	100.000	◆5
		5249.99	-31.94	1.50	10.00	3.40	-17.04	19.770	977.237	◆6
	5320	5356.77	-41.59	1.50	10.00	3.40	-26.69	2.143	2.500	◆7

Sample Calculation :

Result = Reading + Cable Loss + Attenuator+Antenna Gain

◆3:Freq Range3 ($\geq 5,135\text{MHz}$, $\leq 5,233.3\text{MHz}$)

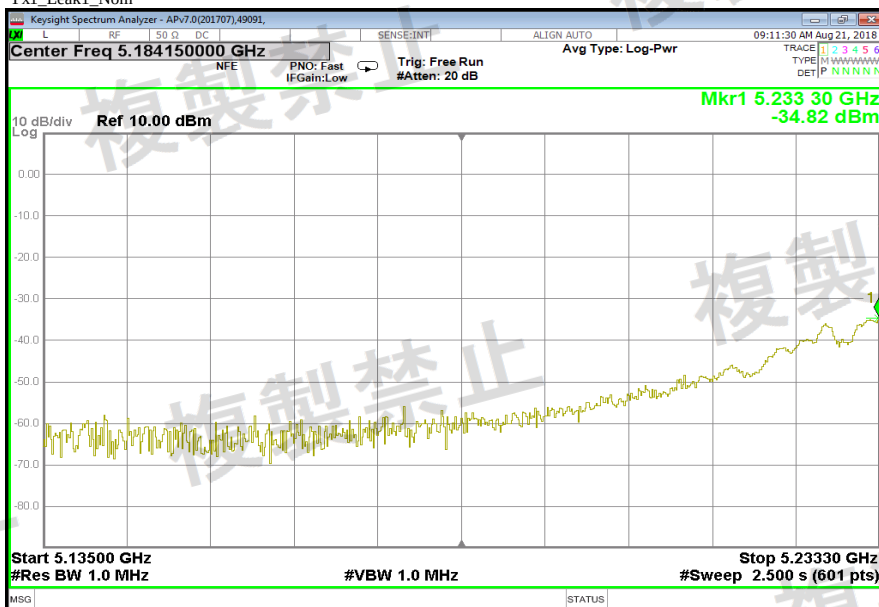
◆4:Freq Range4 ($> 5,233.3\text{MHz}$, $\leq 5,240\text{MHz}$)

◆5:Freq Range5 ($> 5,240\text{MHz}$, $\leq 5,249\text{MHz}$)

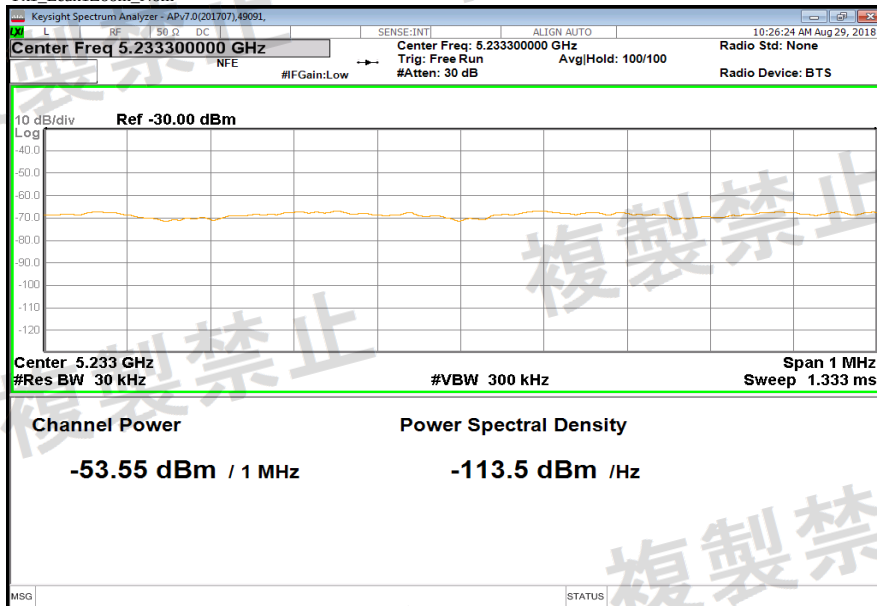
◆6:Freq Range6 ($> 5,249\text{MHz}$, $\leq 5,250\text{MHz}$)

◆7:Freq Range7 ($\geq 5,350\text{MHz}$, $\leq 5,365\text{MHz}$)

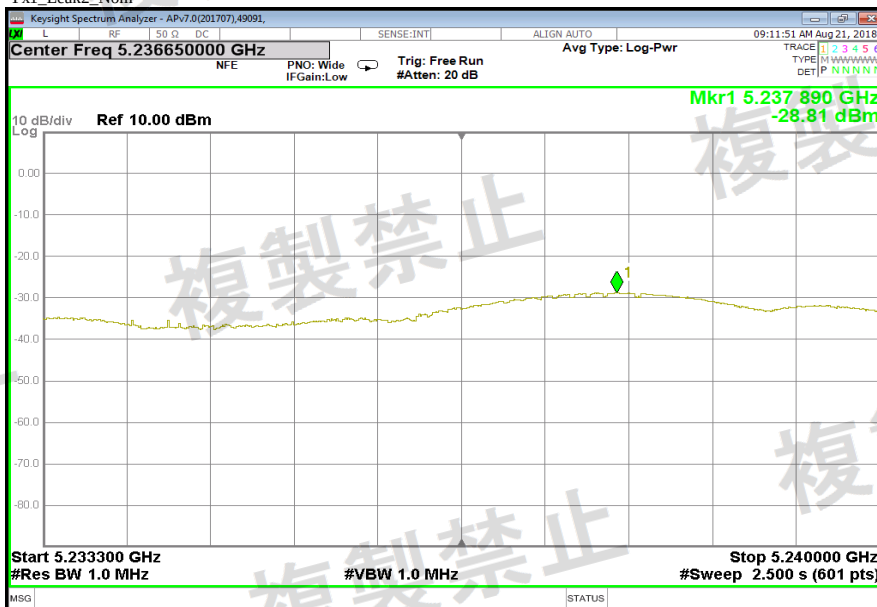
Tx1_Leak1_Nom



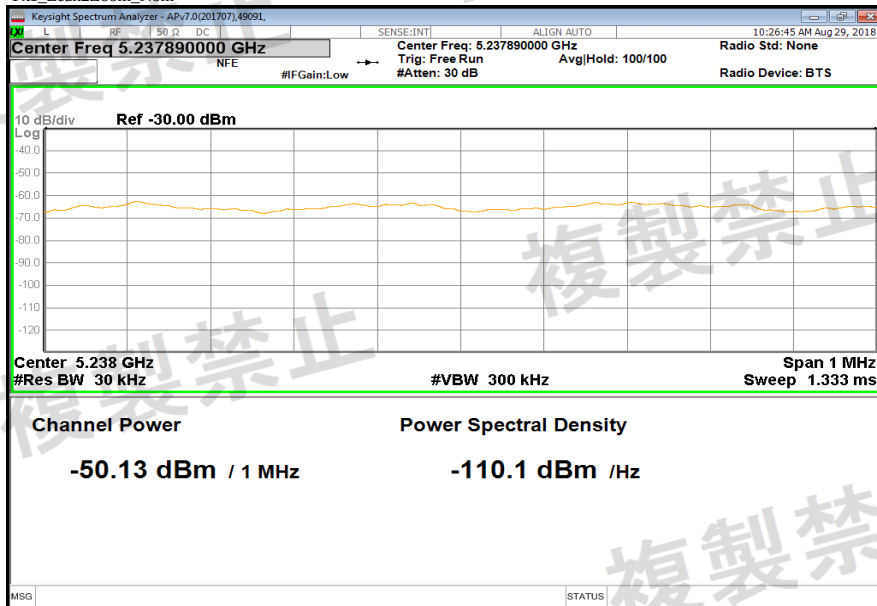
Tx1_Leak1Zoom_Nom



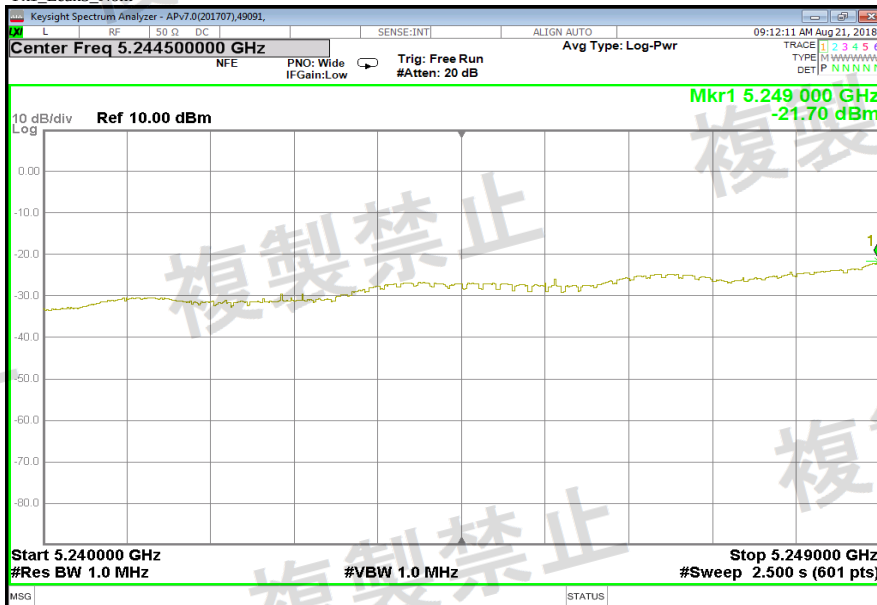
Tx1_Leak2_Nom



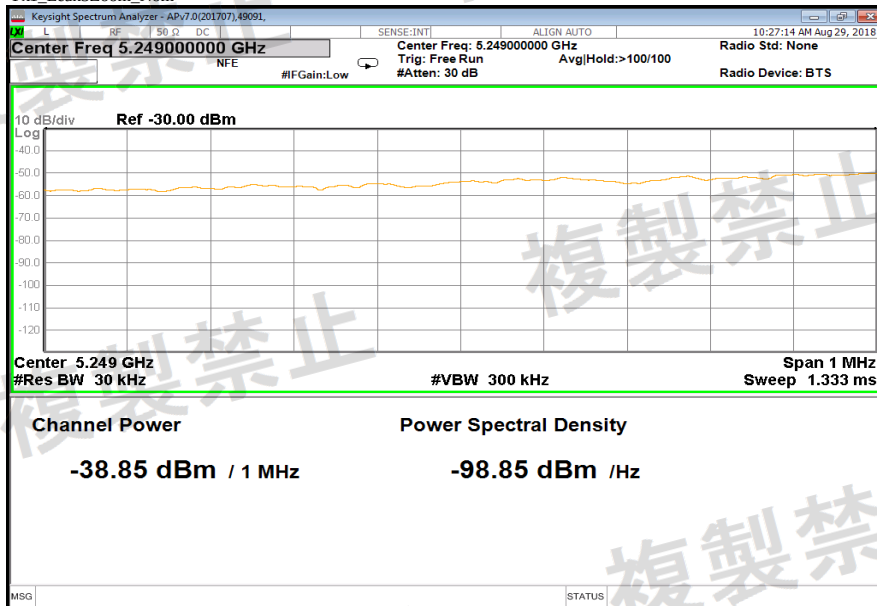
Tx1_Leak2Zoom_Nom



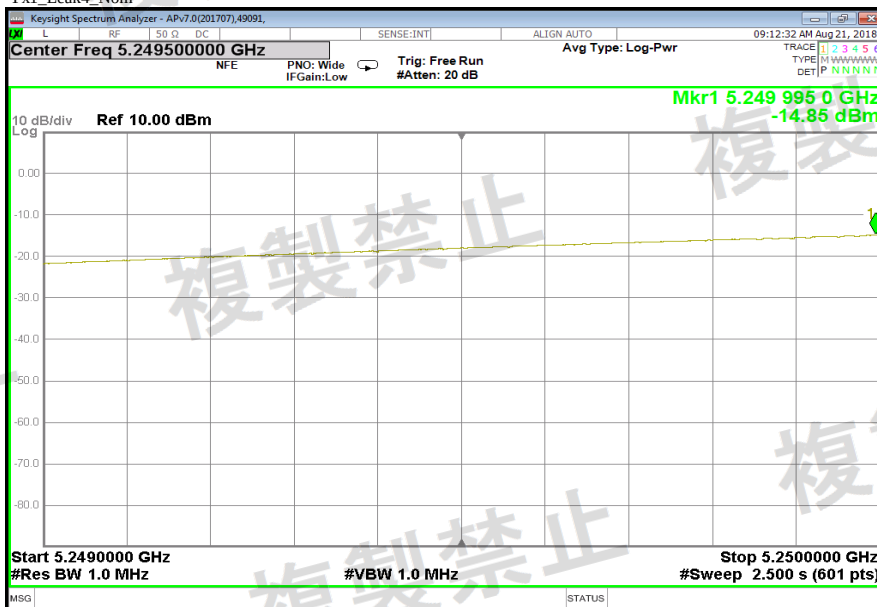
Tx1_Leak3_Nom



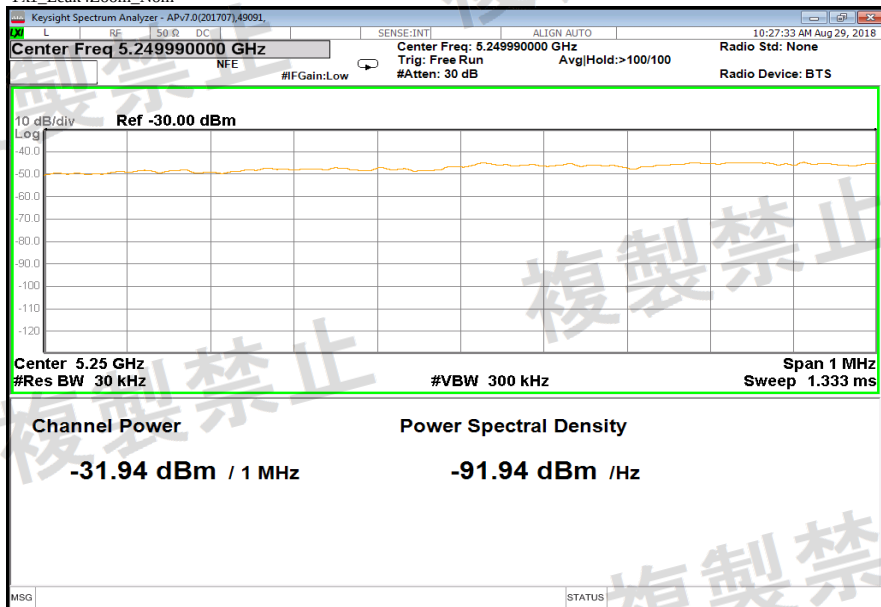
Tx1_Leak3Zoom_Nom



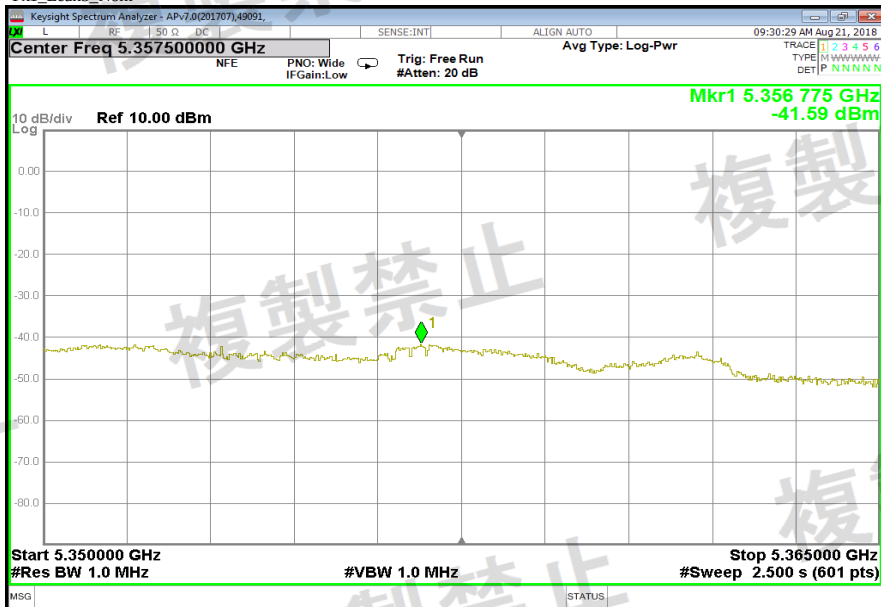
Tx1_Leak4_Nom



Tx1_Leak4Zoom_Nom



Tx1_Leak5_Nom



2.9.Carrier sense

Job No. 4788623965.3-5

Remark1

Remark2

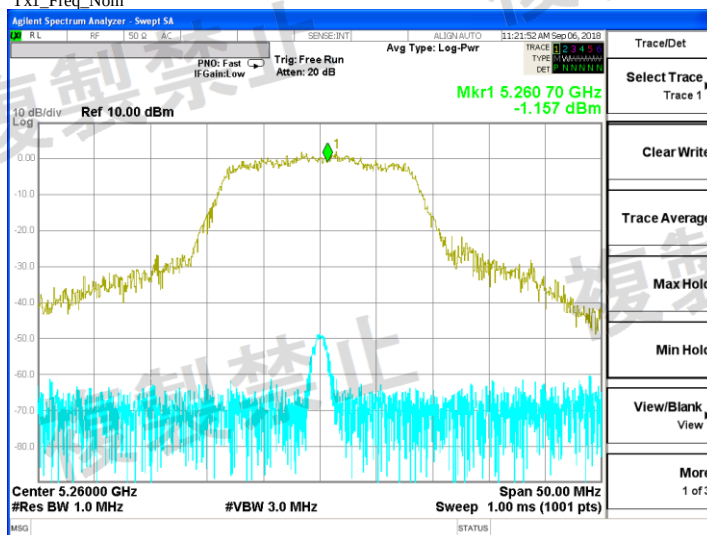
[DATA]

Voltage	Freq.	Pcs	Result
[v]	[MHz]	[dBm]	
AC100V	5260	-48.230	Pass
	5320	-48.328	Pass

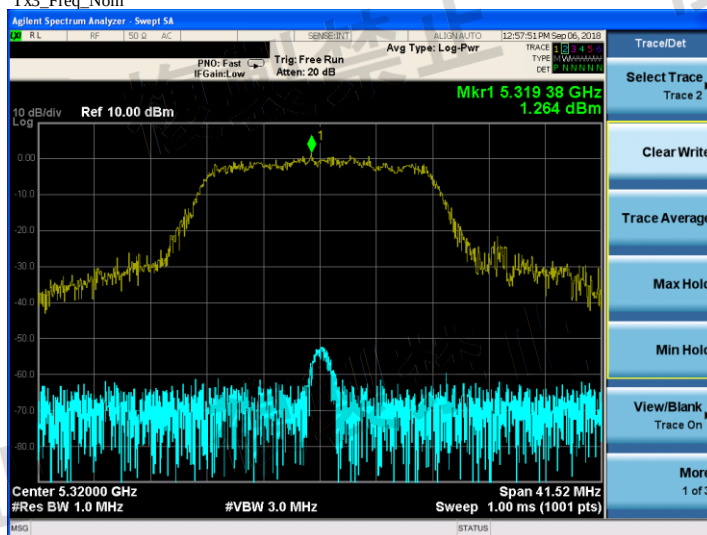
Sample Calculation :

Pcs [dBm] = 22.79 - 20*log(fMHz)+Antenna Gain

Tx1 Freq_Nom



Tx3 Freq_Nom



NOTE: Test is carried out with 802.11a in representation because there are no differences between modes.

Orange Line: Communication status

Blue Line: Communication stop state

3. Measurement Equipment

Use	Int. No.	Kind of Equipment	Model No.	Manufacturer	Serial No.	Calibration Authority	Calibration Date	Remark
X	0	PXA signal analyzer	N9030A	Keysight	MY55410512	CEPREI	12-Dec-17	Note1
	0	Horn Antenna	HRN-0118	TDK	130939	CEPREI	09-Jan-16	Note2
	0	Horn Antenna	HRN-0118	TDK	130940	CEPREI	11-Aug-18	Note2
X	0	Signal Generator	SMB100A	R&S	178553	CEPREI	12-Dec-17	Note1

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

4. Test Condition

Test Item	Date	Temp	Hum	Engineer	Test Room
Frequency Tolerance	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Occupied Bandwidth	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Unwanted Emission Strength	2-Sep-2018	23.3°C	52%	Kebo	Shielding Room A
Output Power/ E.I.R.P	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Secondary Radiated Emission Strength	29-Aug-2018	24.3°C	50%	Kebo	Shielding Room A
Burst Length / Duty	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Adjacent Channel Power	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Outband Leakage Power Strength	20-Aug-2018	23.5°C	54%	Kebo	Shielding Room A
Carrier Sense	6-Sep-2018	24.1°C	57%	Kebo	Chamber A

5. TEST CONFIGURATION

PHOTO

