

8.240 dBm	JBm			M1[1] M2[1]	M	2.439	24 dBm 910 GHz 20 dBm 710 GHz
	dBm-			_	M	2.439	910 GHz 20 dBm
	IBm			M2[1]			
-D2 -11.760 c	dBm					1.74	/10 GH
-D2 -11.760 c	dBm						
-D2 -11.760 d	dBm						
			1				
				M2			
whether whether	indergentaries	why al		لينافح بمعادية ليعتمد فليعا حسابه	Web and a sugar and	Wartermourtend	warden
		man	holember-en-				_
	white	wanter and the second of the second sec	water of a second and a second a second a second a second a	non fledge of her and have been all and a start of the st			M2 M2

### CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 00:35:52

#### CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att 1Pk View	20 di	SWT	200 113	<b>VBW</b> 300 kH	iz Moue	Auto Sweep			
dBm—					M	11[1]			8.03 dBr 2.4490 GH
) dBm	D1 8.030 d	Bm			M	12[1]			-41.54 dBr 9.7720 GH
ubin									
10 dBm—	D2 -1	1.970 dBm-	_						
20 dBm—									
30 dBm—									
40 dBm—			M2						-
50 dBm—									
60 dBm-	whitewar	habele	warman	number	when wh	wood	Alleven	with some in	munde
70 dBm—									
30 dBm—									
tart 2.0	GHz			691	nts			Ste	op 25.0 GHz

Date: 10.JUL.2019 00:36:19



Att 🗧	20 dB	SWT	29.7 ms 👄	<b>VBW</b> 300 ki	Hz Mode	Auto Swee	p		
∋1Pk View	1			-	1				
10 dBm					M	1[1]		M1	7.20 dBm 2.48210 GHz
	D1 7.200 dl	Bm			M	2[1]			-62.37 dBm
0 dBm			_		_	1	1		2.80010 GHz
-10 dBm					-				
	D2 -12	2.800 dBm-							
-20 dBm									
-30 dBm		20	-		-				
-40 dBm	-		_	-		-			
-50 dBm							-		
-60 dBm			and the second						M2
	whenter	outstrikene	will we have been a find a first a fir	Mundukudun	phillippineterstersterstersterstersterstersterster	churchikan	della hallow how word	nun pro	materia
-70 dBm—							2	1	
-80 dBm	-		-	-		-		-	-

### CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 00:40:12

#### CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

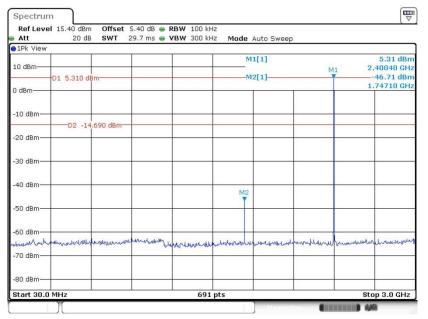
Att	20 dB	SWT	230 ms 👄 '	<b>VBW</b> 300 kH	z Mode	Auto Sweep	)		
1Pk View									
dBm-					M	1[1]			7.27 dBi 2.4830 GH
dom	D1 7.270 dB	m			M	2[1]			-42.17 dBi
dBm									9.9050 GH
10 dBm-			_	-					
	D2 -12.	730 dBm-					-		-
20 dBm—									
30 dBm—	+ +								
40 dBm—	+ +		M2				-		-
50 dBm—	-					-			
	17			1					
EO dBm-	www.whentowda	In dente be	moundar	manunge	my merch	for the hand	Award	hunder word	Monard
70 dBm—									
80 dBm—									
Start 2.0	GHz			691	nts			Sto	p 25.0 G

Date: 10.JUL.2019 00:40:39



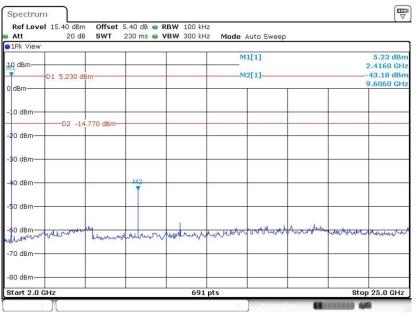
Test Mode :	2Mbps	Temperature :	<b>21~25</b> ℃
Test Channel :	00,39,78	Relative Humidity :	51~54%
		Test Engineer :	Aaron shen

#### CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 10.JUL.2019 00:45:42

#### CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 10.JUL.2019 00:46:16



Att 🛛	20 dE	SWT	29.7 ms 👄	<b>VBW</b> 300 ki	Hz Mode	Auto Sweep	)		
●1Pk View					1				
10 dBm					M	1[1]		M1 5	6.53 dBn 2.43910 GH;
	D1 6.530 d	Bm			M	2[1]			-58.38 dBn
0 dBm					-	11.210		1	1.74710 GHz
-10 dBm—									
	D2 -13	3.470 dBm-						-	-
-20 dBm—									
20 0.011									
-30 dBm									
-40 dBm									
-50 dBm—									
					M2				
-60 dBm					<b>T</b>				
	all mar and and and	manupper	Hunnarul.	a but he had been	unselle	the and how have had	Alberton	American	an walnut ward
-70 dBm—		and the second	· ·						
, e abiii									
-80 dBm									
00 0011								1	

## CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 00:49:54

#### CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att 1Pk View	20 dB SWT	230 ms 🥃 V	BW 300 KH	Z Mode A	uto Sweep			
				M1	[1]			1.00 dBr 2.4490 GH
11 dBmD1 1	.000 dBm=====			M2	[1]			40.58 dBi 9.7720 GH
2								
10 dBm								
0 dBm (	02 -19.000 dBm							
0 dBm	28 M							
-0 dBm		M2						-
0 dBm								
O dBm	much	manutur	www.	walnunder	www.	Auronau	water	moura
O dBm								
1								

Date: 10.JUL.2019 00:50:22



Att	el 15.40 dBm 20 dB		5.40 dB 👄 1 29.7 ms 👄 1			Auto Sweep	)		
1Pk View									
10 dBm						2[1]		M1	4.87 dBn 2.48210 GH: -52.58 dBn
D dBm	-D1 4.870 d	Bm				2[1]	1		1.75140 GH
-10 dBm—									
20 dBm—	D2 -15	5.130 dBm-							
-30 dBm—				· · · · · · · · · · · · · · · · · · ·					
-40 dBm—									_
-50 dBm—					M2				
-60 dBm—	and at March 11 and 14	Addid lates reat	helightens			d dha i Nata	and the sector	mellion at	wheneverenter
70 dBm—	an a drive fragment			hand a second	the provided and the	an reserved prove	a manager	product	
-80 dBm			_					-	

### CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 00:54:18

#### CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

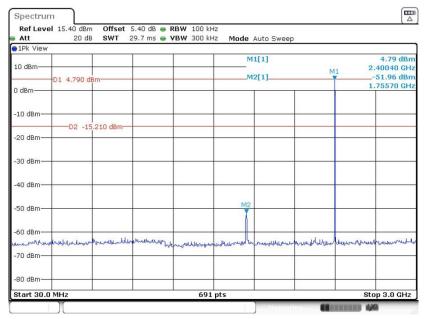
Att	20 dB	SWT	230 ms 🥌 🖌	<b>/BW</b> 300 kH	z Mode	Auto Sweep	i		
1Pk View					1				
LO dBm—					M	11[1]			4.07 dBn 2.4830 GH
11 V	D1 4.070 dB	100			M	2[1]			-41.13 dBr
dBm	DI 4.070 ut	5111	-				1	1	9.9050 GH
22									
10 dBm—						-			
0 dBm—	D2 -15	.930 dBm—							
o ubili-									
0 dBm—		· · · · ·							
			M2						
40 dBm—			T	-					-
0 dBm—									
o abiii									
0 dBm—	d . B. would	M	manument	1	IN & ARAPUA	when yeard	May we	abor Mana	Aunturk
howhat	and my marker	Unumer	www.www.	money and a	and have a				madel a
70 dBm—		0							-
30 dBm—									
bo ubili									1

Date: 10.JUL.2019 00:54:46



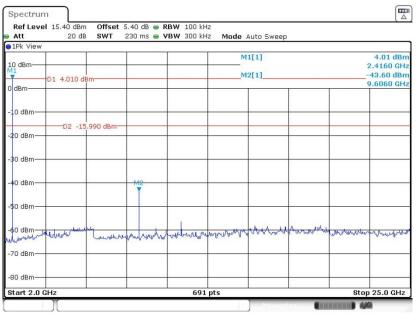
Test Mode :	3Mbps	Temperature :	<b>21~25</b> ℃
Test Channel :	00,39,78	Relative Humidity :	51~54%
		Test Engineer :	Aaron shen

#### CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 10.JUL.2019 00:59:21

#### CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 10.JUL.2019 00:59:49



	SWT	29.7 ms 🖷 1	VBW 300 kH	z Mode	Auto Sweep	)		
		~						
01 6 010 di			-				M1	6.21 dBn 2.43910 GH
DI 0.210 U	2011			IVI.	2[1]	1		-62.04 dBm 2.97640 GHz
	700 10							
	.790 dBm-							
			x x					-
		_						
		ht e - e - e - e - e - e - e - e - e - e						M
rafistional	Norderwork	and a second and a	porter monthland	reparedurally	land level and	Mundung	and Verthouter	
		-						-
	——D2 -13	D1 6.210 dBm-		D2 -13.790 dBm	D1 6.210 dBmM	D2 -13.790 dBm	D1 6.210 dBm M2[1] D2 -13.790 dBm	D1 6.210 dBm M1

### CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 01:05:25

#### CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att 1Pk View	20 di	B SWT	230 ms 🖷	<b>VBW</b> 300 kH	12 MOUE	Auto Sweep	5		
1PK VIEW			Ĩ		M	11[1]			6.00 dBr
AdBm-	-	1							2.4490 GH
	D1 6.000 d	IBm			M	12[1]			-41.29 dBi 9.7720 GF
dBm							[		5.7720 Gr
10 dBm—									
	D2 -14	4.000 dBm-							
20 dBm—									
30 dBm—									
0 dBm—			M2						
0 dBm—									
0 dBm-	under and the owner of	lug .	wante	A. L. A. din est of	he he down hand yet	watertown	Augustu	Mariam	the washet
money		burdenered	M. C. Marine	- m ranged r					
70 dBm—									
30 dBm—			-						
tart 2.0	011-			691				Otor	25.0 GHz

Date: 10.JUL.2019 01:05:55



Att 1Pk View	20 dB	SWT		<b>VBW</b> 300 kH		Auto Sweep	-		
10 dBm						1[1]		M1	5.18 dBm 2.48210 GHz
0 dBm	D1 5.180 dl	3m			M	2[1]	Т	Ť	-49.07 dBn 1.75570 GH
-10 dBm—									
-20 dBm—	D2 -14	.820 dBm-							
30 dBm—		~					-		
40 dBm—									
-50 dBm—					M2			_	
-60 dBm—		a contractor	te a state						
70 dBm—	www.	enter another	and and a second	Jude Martine	and and a second	profiliant and some	dh'allinikan	plan an com	an warantikal

## CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 10.JUL.2019 01:10:20

#### CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

Att	20 dB	SWT	230 ms 🥃 🖌	<b>'BW</b> 300 kH	z Mode	Auto Sweep	0		
1Pk View			Ĩ		N	11[1]			4.35 dBn
10 dBm						12[1]			2.4830 GH
dBm	D1 4.350 dE	lm				12[1]			9.9050 GH
asm									
10 dBm-									
	D2 -15	.650 dBm-							
20 dBm—									
30 dBm				÷					+
			M2						
40 dBm									
0 dBm-		_							
0 dBm	he harden	LAG	mounder	. st. Mark M.	muhrura	wwwwww	Augura	a entretation	Maryn
Mannana		Annillererer	Waltena an				100		
70 dBm—									-
80 dBm									
BO UBIII									

Date: 10.JUL.2019 01:10:47



# 3.8 Radiated Band Edges and Spurious Emission Measurement

# 3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

## 3.8.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.



# 3.8.3 Test Procedures

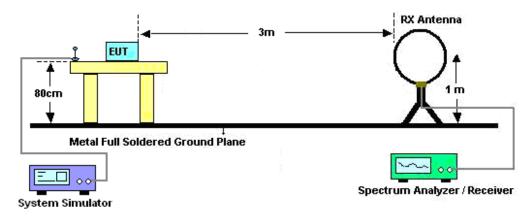
- 1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 4. Set to the maximum power setting and enable the EUT transmit continuously.
- 5. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = N<sub>1</sub>\*L<sub>1</sub>+N<sub>2</sub>\*L<sub>2</sub>+...+N<sub>n-1</sub>\*LN<sub>n-1</sub>+N<sub>n</sub>\*L<sub>n</sub> Where N<sub>1</sub> is number of type 1 pulses, L<sub>1</sub> is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20\*log(Duty cycle)
- 6. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
- 8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

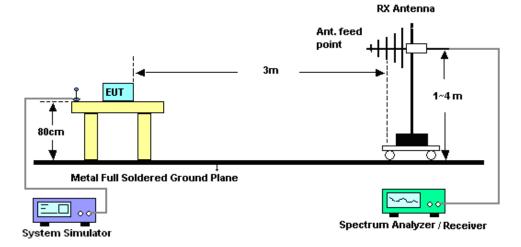


# 3.8.4 Test Setup

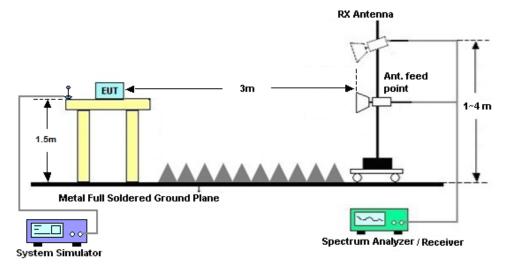
For radiated emissions below 30MHz



#### For radiated emissions from 30MHz to 1GHz



#### For radiated emissions above 1GHz



**Sporton International (Kunshan) Inc.** TEL : +86-512-57900158 FAX : +86-512-57900958 FCC ID: 2APJ4-SLM758



# 3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

## 3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

# 3.8.7 Test Result of Radiated Spurious Emission (30MHz ~ 10<sup>th</sup> Harmonic)

Please refer to Appendix B.

## 3.8.8 Duty cycle correction factor for average measurement

Please refer to Appendix C.



# 3.9 AC Conducted Emission Measurement

# 3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of omission (MHz)	Conducted limit (dBµV)						
Frequency of emission (MHz)	Quasi-peak	Average					
0.15-0.5	66 to 56*	56 to 46*					
0.5-5	56	46					
5-30	60	50					

\*Decreases with the logarithm of the frequency.

# 3.9.2 Measuring Instruments

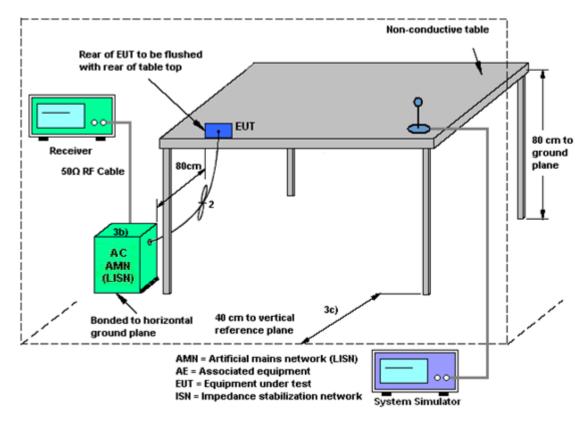
The measuring equipment is listed in the section 4 of this test report.

## 3.9.3 Test Procedures

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



# 3.9.4 Test Setup



# 3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



# 3.10 Antenna Requirements

# 3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

# 3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

# 3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



# 4 List of Measuring Equipment

Instrument	Manufacturer	ufacturer Model No. Serial No. Charact		Characteristics	Calibration Date Test Date		Due Date	Remark	
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Jul. 10, 2019~ Jul. 24, 2019	Aug. 06, 2019	Conducted (TH01-KS)	
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GH z	Jan. 14, 2019	Jul. 10, 2019~ Jul. 24, 2019	Jan. 13, 2020	Conducted (TH01-KS)	
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Jul. 10, 2019~ Jul. 24, 2019	Jan. 13, 2020	Conducted (TH01-KS)	
EMI Test Receiver	Keysight	N9038A	MY564000 04	3Hz~8.5GHz;M ax 30dBm	Oct. 12, 2018	Aug. 01, 2019	Oct. 11, 2019	Radiation (03CH05-KS)	
EXA Spectrum Analyzer	Keysight	N9010A	MY553705 28	10Hz-44GHz	Oct. 09, 2018	Aug. 01, 2019	Oct. 08, 2019	Radiation (03CH05-KS)	
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Aug. 01, 2019	Oct. 18, 2019	Radiation (03CH05-KS)	
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 28, 2018	Aug. 01, 2019	Dec. 27, 2019	Radiation (03CH05-KS)	
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Aug. 01, 2019	Jan. 26, 2020	Radiation (03CH05-KS)	
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Aug. 01, 2019	Jan. 04, 2020	Radiation (03CH05-KS)	
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Aug. 01, 2019	Aug. 05, 2019	Radiation (03CH05-KS)	
Amplifier	MITEQ	TTA1840-35- HG	2014749	18~40GHz	Jan. 14, 2019	Aug. 01, 2019	Jan. 13, 2020	Radiation (03CH05-KS)	
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Aug. 17, 2018	Aug. 01, 2019	Aug. 16, 2019	Radiation (03CH05-KS)	
Amplifier	Keysight	83017A	MY532703 16	500MHz~26.5G Hz	Dec. 22, 2018	Aug. 01, 2019	Dec. 21, 2019	Radiation (03CH05-KS)	
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Aug. 01, 2019	NCR	Radiation (03CH05-KS)	
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Aug. 01, 2019	NCR	Radiation (03CH05-KS)	
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Aug. 01, 2019	NCR	Radiation (03CH05-KS)	
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 16, 2019	Jul. 17, 2019	Apr. 15, 2020	Conduction (CO01-KS)	
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Jul. 17, 2019	Oct. 11, 2019	Conduction (CO01-KS)	
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Jul. 17, 2019	Nov. 18, 2019	Conduction (CO01-KS)	
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Jul. 17, 2019	Oct. 11, 2019	Conduction (CO01-KS)	

NCR: No Calibration Required



# 5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

#### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.9dB
of 95% (U = 2Uc(y))	2.908

#### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	5.0dB
of 95% (U = 2Uc(y))	3.00B

#### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

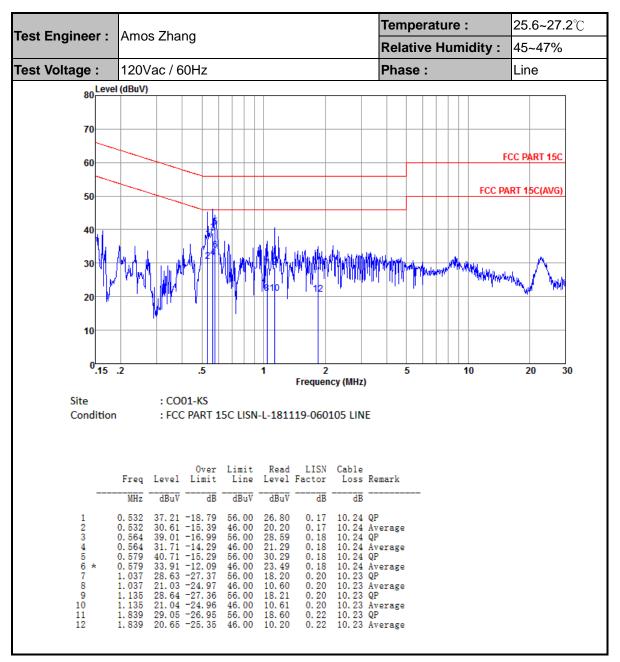
Measuring Uncertainty for a Level of Confidence	5.0dB
of 95% (U = 2Uc(y))	3.00B

#### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

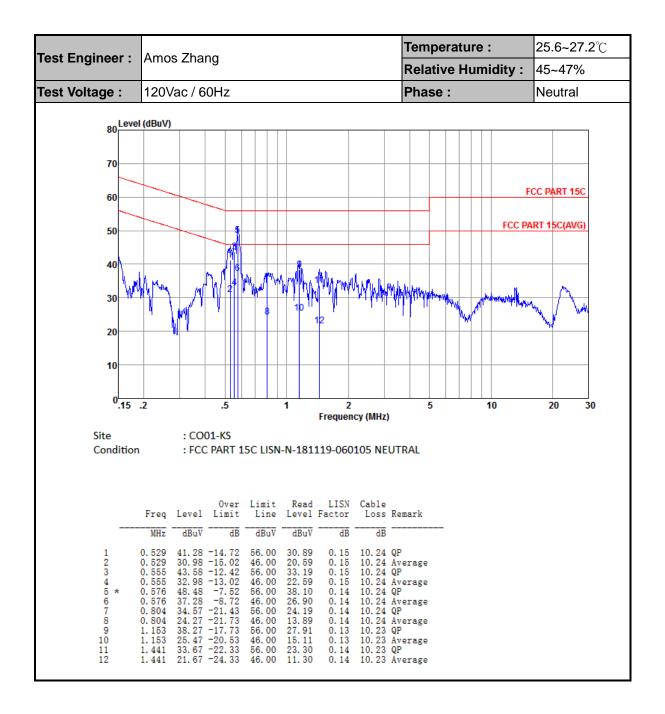
Measuring Uncertainty for a Level of Confidence	5.0dB
of 95% (U = 2Uc(y))	3.00B



# **Appendix A. AC Conducted Emission Test Results**









# Appendix B. Radiated Spurious Emission

## 15C 2.4GHz 2400~2483.5MHz

DT		-				-	-	0.11	-			<b>_</b>	
BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table		Pol.
		(MHz)	(dBµV/m)	Limit (dB)	Line (dBµV/m)	Level (dBµV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	
		2360.31	51.05	-22.95	<u>(αδμ</u> γ/m) 74	47.38	31.21	5.43	32.97	377	341	P	н Н
	*	2360.31	26.29	-27.71	54	-	-	-	-	-	-	A	н
		2402	102.39	-	-	98.64	31.3	5.48	33.03	377	341	Р	Н
BT		2402	77.63	-	-	-	-	-	-	-	-	Α	Н
CH00 2402MHz		2351.73	51.72	-22.28	74	48.05	31.21	5.43	32.97	286	100	Р	V
240211172	*	2351.73	26.96	-27.04	54	-	-	-	-	-	-	Α	V
		2402	99.79	-	-	96.04	31.3	5.48	33.03	286	100	Р	V
		2402	75.03	-	-	-	-	-	-	-	-	А	V
		2480	102.89	-	-	98.24	31.59	5.55	32.49	308	352	Р	Н
	*	2480	78.13	-	-	-	-	-	-	-	-	Α	Н
		2495.45	52.84	-21.16	74	47.96	31.64	5.55	32.31	308	352	Р	Н
BT		2495.45	28.08	-25.92	54	-	-	-	-	-	-	Α	Н
CH 78 2480MHz		2480	97.94	-	-	93.29	31.59	5.55	32.49	336	283	Р	V
240010112	*	2480	73.18	-	-	-	-	-	-	-	-	Α	V
		2498.53	52.19	-21.81	74	47.31	31.64	5.55	32.31	336	283	Р	V
		2498.53	27.43	-26.57	54	-	-	-	-	-	-	Α	V
Remark		o other spurio I results are P		st Peak	and Averag	ge limit lin	е.						

#### BT (Band Edge @ 3m)



	BT (Harmonic @ 3m)												
BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	( dBµV/m )	(dB)	( $dB\mu V/m$ )	(dBµV)	( dB/m )	( dB )	(dB)	( cm )	(deg)	(P/A)	(H/V)
вт		4804	41.56	-32.44	74	60.71	34.88	8.1	62.13	100	0	Р	н
CH 00		100.1		00	74	00.45	04.00	0.4	00.40	100	•		V
2402MHz		4804	41	-33	74	60.15	34.88	8.1	62.13	100	0	Р	
		4884	40.18	-33.82	74	59.3	34.92	8.07	62.11	100	0	Р	Н
BT	*	7323	38.73	-35.27	74	56.45	35.3	9.75	62.77	100	0	Ρ	н
CH 39 2441MHz		4882	38.97	-35.03	74	58.09	34.92	8.07	62.11	100	0	Р	V
244 10112	*	7323	39.52	-34.48	74	57.24	35.3	9.75	62.77	100	0	Р	V
		4962	39.3	-34.7	74	58.36	34.97	8.05	62.08	100	0	Р	н
ВТ СН 78		7440	38.37	-35.63	74	55.94	35.37	9.84	62.78	100	0	Р	н
2480MHz		4960	39.62	-34.38	74	58.68	34.97	8.05	62.08	100	0	Р	V
240010172		7440	38.69	-35.31	74	56.26	35.37	9.84	62.78	100	0	Р	V
Remark		o other spurio I results are P		st Peak	and Averag	e limit lin	е.						

#### 15C 2.4GHz 2400~2483.5MHz



# 2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	( dBµV/m )	( dB )	( dBµV/m )	(dBµV)	( dB/m )	( dB )	( dB )	( cm )	(deg)	(P/A)	(H/V)
		183.26	28.97	-14.53	43.5	43.53	15.8	1.55	31.91	-	-	Р	н
		201.69	30.91	-12.59	43.5	45.92	15.24	1.65	31.9	100	0	Р	Н
		301.6	30.68	-15.32	46	41.35	19.35	1.98	32	-	-	Р	Н
		352.04	29.65	-16.35	46	38.97	20.65	2.11	32.08	-	-	Р	Н
		403.45	29.45	-16.55	46	37.32	21.99	2.26	32.12	-	-	Р	Н
2.4GHz		858.38	30.51	-15.49	46	29.59	29.28	3.37	31.73	-	-	Р	Н
BT LF		63.95	28.44	-11.56	40	47.2	12.22	0.95	31.93	100	0	Р	V
		134.76	28.15	-15.35	43.5	41.92	16.89	1.28	31.94	-	-	Р	V
		200.72	26.81	-16.69	43.5	41.9	15.17	1.64	31.9	-	-	Р	V
		658.56	25.1	-20.9	46	27.91	26.62	2.93	32.36	-	-	Ρ	V
		857.41	29.73	-16.27	46	28.82	29.28	3.37	31.74	-	-	Ρ	V
		959.26	31.02	-14.98	46	27.54	30.82	3.56	30.9	-	-	Р	V
Remark	<ol> <li>No other spurious found.</li> <li>All results are PASS against limit line.</li> </ol>												



# Note symbol

	Fundamental Frequency which can be ignored. However, the level of any						
*	unwanted emissions shall not exceed the level of the fundamental frequency per						
	15.209(c).						
!	Test result is <b>over limit</b> line.						
P/A	Peak or Average						
H/V	Horizontal or Vertical						



# A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	( dB )	(dBµV/m)	(dBµV)	( dB/m )	( dB )	( dB )	( cm )	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	Р	н
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	А	н

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

#### For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

```
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)
```

```
= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) - 35.86 (dB)
```

- = 55.45 (dBµV/m)
- 2. Over Limit(dB)
- = Level(dBµV/m) Limit Line(dBµV/m)
- $= 55.45(dB\mu V/m) 74(dB\mu V/m)$
- = -18.55(dB)

#### For Average Limit @ 2390MHz:

- 1. Level(dBµV/m)
- = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 42.6(dB\mu V) 35.86 (dB)$
- = 43.54 (dBµV/m)
- 2. Over Limit(dB)
- = Level(dBµV/m) Limit Line(dBµV/m)
- $= 43.54(dB\mu V/m) 54(dB\mu V/m)$
- = -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

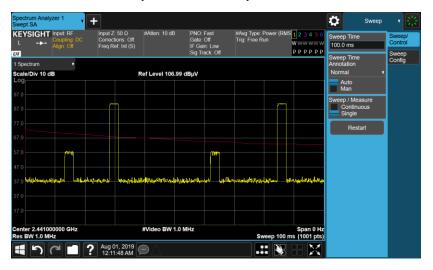


# Appendix C. Duty Cycle Plots

3DH5 on time (One Pulse) Plot on Channel 39

Spectrum Analyzer 1 Swept SA	• +					Marker	- * 影
KEYSIGHT L ↔ Align: Off		#Atten: 10 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RM: Trig: Free Run	S <mark>123456</mark> WWWWWW PPPPP	Select Marker Marker 2	
1 Spectrum V			oig made on	ΔMkr2	2.890 ms	Marker ∆ Time 2.89000 ms	Settings
Scale/Div 10 dB		ef Level 106.99			0.05 dB	Marker Mode	Peak Search
97.0	1	2∆1 -	γ3Δ1			Normal	Pk Search Config
67.0						<ul> <li>Delta (Δ)</li> </ul>	Properties
57.0 47.0 37.0						Fixed	Marker Function
37.0 27.0 17.0		ine Menti			24 	Off	Function Marker→
Center 2.441000000 GHz	2	#Video BW 1.0 I	MHz		Span 0 Hz ms (1001 pts)		Counter
Res BW 1.0 MHz 5 Marker Table 🔹	Marker Table On Off	Counter					
Mode Trace So 1 N 1 2 A1 1	cale X t 1.570 ms t (Δ) 2.890 ms (	Υ 89.30 dBµV Δ) 0.04851 dB	Function Fu	unction Width Fund	tion Value	Marker Settings Diagram	
	t (Δ) 3.750 ms (					All Markers Off Couple Markers	
6						On Off	
101	Aug 01, 2019 12:11:00 AM	$\mathbf{D}$					

3DH5 on time (Count Pulses) Plot on Channel 39



Note:

- 1. Worst case Duty cycle = on time/100 milliseconds =  $2 \times 2.89 / 100 = 5.78 \%$
- 2. Worst case Duty cycle correction factor = 20\*log(Duty cycle) = -24.76 dB
- 3. 3DH5 has the highest duty cycle worst case and is reported.