



FCC RADIO TEST REPORT

FCC ID	:	2AIWVN302
Equipment	:	Nanit Pro Baby Monitor
Brand Name	:	Nanit
Model Name	:	N302
Applicant	:	Udisense Inc. DBA: Nanit
		244 Fifth Avenue Suite #2702, New York, NY, United States 10001
Manufacturer	:	Udisense Inc. DBA: Nanit
		244 Fifth Avenue Suite #2702, New York, NY, United States 10001
Standard	:	FCC Part 15 Subpart C §15.247

The product was received on Feb. 18, 2022 and testing was performed from Mar. 03, 2022 to Mar. 31, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
FR221836A	01	Initial issue of report	May 03, 2022



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting only	-
3.5	15.247(b)(1)	Peak Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	4.95 dB under the limit at 2483.920 MHz
3.9	15.207	AC Conducted Emission	Pass	15.98 dB under the limit at 0.618 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Declaration of Conformity:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if

measurement uncertainty is include in test results.

2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation". **Comments and Explanations:**

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang Report Producer: Rachel Hsieh



1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac

Product Feature				
	WLAN			
A	<ant. 1="">: Dipole Antenna</ant.>			
Antenna Type	<ant. 2="">: Dipole Antenna</ant.>			
	Bluetooth: Dipole Antenna			
	Antenna information			

Remark: The EUT's information above is declared by manufacturer. Please refer to Comments and Explanations in report summary.

Peak Gain (dBi) 2.0

1.2 Modification of EUT

2400 MHz ~ 2483.5 MHz

No modifications made to the EUT during the testing.



1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
	No.52, Huaya 1st Rd., Guishan Dist.,
Test Site Location	Taoyuan City 333, Taiwan (R.O.C.)
	TEL: +886-3-327-3456
	FAX: +886-3-328-4978
Test Site No.	Sporton Site No.
Test Sile NO.	CO05-HY (TAF Code: 1190)
Remark	The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.
Test Site	Sporton International Inc. Wensan Laboratory
	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,
Test Site Lesstian	Taoyuan City 333010, Taiwan (R.O.C.)
Test Site Location	TEL: +886-3-327-0868
	FAX: +886-3-327-0855
Test Site No.	Sporton Site No.
1651 SILE NO.	TH05-HY, 03CH20-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW3786

1.4 Applicable Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

- 1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
- 2. The TAF code is not including all the FCC KDB listed without accreditation.

Test Configuration of Equipment Under Test 2

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	2411	36	2438	63	2465
	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
2400-2483.5 MHz	13	2415	40	2442	67	2469
	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	-	-
	26	2428	53	2455	-	-

2.2 Test Mode

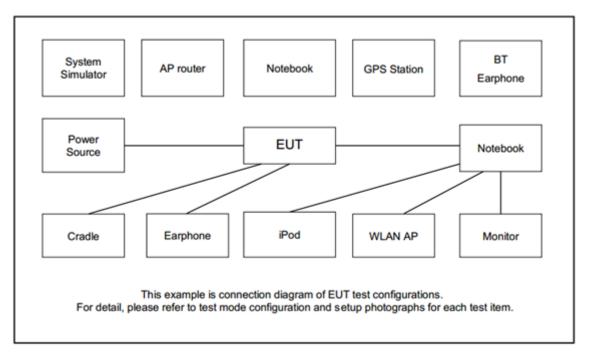
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find Z plane with Notebook as worst plane, and the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

	Summary table of Test Cases							
Test Item	Data Rate / Modulation							
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps π /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK					
Conducted	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz					
Test Cases	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz					
	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz					
	E	Bluetooth BR 1Mbps GFS	κ					
Radiated		Mode 1: CH00_2402 MHz						
Test Cases		Mode 2: CH39_2441 MHz						
		Mode 3: CH78_2480 MHz						
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (2.4GHz) Link + Multi Stand + Adapter (US)							
	Remark: For Radiated Test Cases, the worst mode data rate 1Mbps was reported only since the							
	RF output power in the prel	-						
	ted band edge measuremer		• •					
no othe	r significantly frequencies for	ound in conducted spurious	emission.					

The following summary table is showing all test modes to demonstrate in compliance with the standard.



2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	DELL	Latitude5310	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Mobile Phone	SAMSUNG	SM-A730F/DS	A3LSMA730F	N/A	N/A



2.5 EUT Operation Test Setup

The RF test items, utility "putty 0.7" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)



3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.3.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings: Span = the frequency band of operation;
 RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. The number of hopping frequency used is defined as the number of total channel.
- 7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



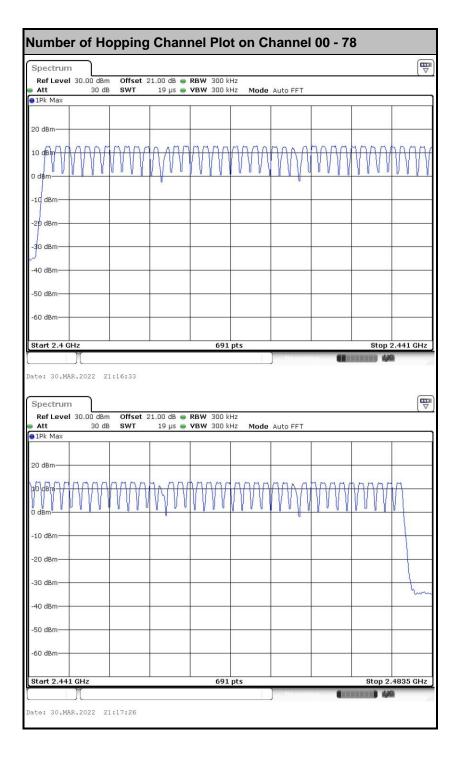
Spectrum Analyzer

EUT



3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.



3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.2.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.2.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peaks of two adjacent channels;
 RBW = 300 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

3.2.4 Test Setup



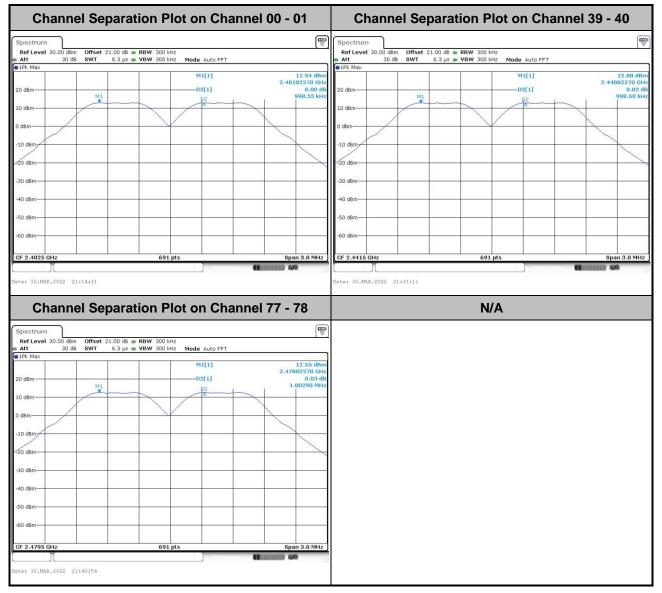
Spectrum Analyzer

3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.



<1Mbps>





<2Mbps>

Channel Separa	tion Plot on Chanr		Channel S	-			
ectrum			Spectrum				
ef Level 30.00 dBm Offset 21.00 dB tt 30 dB SWT 6.3 µs	RBW 300 kHz VBW 300 kHz Mode Auto FFT		Att 30 dB SWT	et 21.00 dB 🖷 RBW 30 6.3 µs 🖷 VBW 30	0 kHz 0 kHz Mode Auto	FFT	
dBm-	M1[1]	9.92 dBm 2.40182270 GHz 0.00 dB	0 1Pk Max		M1[1]		9.95 d 2.44115270 G 0.02
Bm M1	\$2	994.20 kHz	10 dBm	MI		D2	998.60
						Δ	
			0 dBm				
lm-			-10,dBm				
m			-20 dBm				
lm			-30 dBm				
			10 10 -				
m			-40 dBm-				
m			-50 dBm				
m			-60 dBm				
4025 GHz			CF 2.4415 GHz				Span 3.0 M
025 GHz	691 pts	Span 3.0 MHz		6	91 pts		span 3.0 M
30.MAR.2022 22:09:17	Maxanehoo	44	Date: 30.MAR.2022 22:38:28			10 A (1991) 10	
Channel Separa	tion Plot on Chan				N/A		ana ang ang ang ang ang ang ang ang ang
ctrum f Level 30.00 dBm Offset 21.00 dB =	• RBW 300 kHz	mel 77 - 78			N/A		449
Channel Separat	■ RBW 300 kHz ■ VBW 300 kHz Mode Auto FFT				N/A		444
Channel Separat	RBW 300 kHz VBW 300 kHz Mode Auto FFT M1[1]	9.66 dBm 2.47911360 GHz			N/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	(₩ ▽) 9.66 dBm			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			N/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			N/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			N/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		
Channel Separat	NBW 300 kHz Mode Auto FFT VBW 300 kHz M1[1] D2[1]	9.66 dBm 2.47911360 GHz 0.03 dB			V/A		



<3Mbps>

Channel Sep	aration Plot on	Channel 00 - 01	Channel Sepa	aration Plot on Char	nnel 39 - 40
Spectrum			Spectrum		
Att 30 dB SWT	00 dB 🖷 RBW 300 kHz 6.3 μs 🖷 VBW 300 kHz - Mode Aut	o FFT	Att 30 dB SWT 6.	0 dB 🖷 RBW 300 kHz 3 µs 🖶 VBW 300 kHz 🛛 Mode Auto FFT	
19k Max 20 dBm	M1[1] D2[1]	2.40215270 GHz 0.01 dB	1Pk Max 20 dBm	M1[1] D2[1]	9.98 dBm 2.44085750 GHz 0.02 dB
10 dBm	M1	998.60 kHz	10 dBm	D2	1.00290 MHz
0 dBm			0 dBm		
-10'dBm			-10 dBm-		
-20 dBm-			-20 dBm-		
-30 dBm			-30 dBm		
-40 dBm-			-40 dBm		
-50 dBm			-50 dBm		
-60 dBm-			-60 dBm		
CF 2.4025 GHz	691 pts	Span 3.0 MHz		691 pts	Span 3.0 MHz
Л		(11111) 44	CF 2.4415 GHz	21e - Alimina	E111111 4/9
ate: 30.MAR.2022 23:26:49		(Date: 30.MAR.2022 23:30:47	Stewaring	(IIIIII) 44
	paration Plot on (N/A	
Channel Sep				N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 Att 30 dB SWT	Daration Plot on (Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 d8m Offset 21 Att 30 d8 swT	.00 dB 🖷 RBW 300 kHz	Channel 77 - 78		N/A	
Channel Sep	.00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30 dB SWT	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30 dB SWT	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dbm Offset 21 30 db SWT DIPK Max 20 dBm M1 10 dBm M1	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30.dB SWT 1/Pk Max 20 dBm M1 10 dBm M1 0 dBm10 dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30 dB Offset 21 DFK Max 20 dBm M1 10 dBm M1 0 dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30 dB WW 1/Pk Max 20 dBm M1 10 dBm M1 0 dBm - 10 dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm Offset 21 30 dB Offset 21 DFK Max 20 dBm M1 10 dBm M1 0 dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Channel Sep Spectrum Ref Level 30.00 dBm 10 dBm 0 dBm 0 dBm 10 dBm -10'dBm -20 dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Spectrum Ref Level 30.00 dBm Offset 21 1Pk Max 0 dBm 10 dBm M1 -10'dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	
Spectrum Offset 21 Ref Level 30.00 dBm Offset 21 Att 30 dB 30 dB SWT IPk Max IPk Max 20 dBm MI 10 dBm MI -10/dBm	00 dB ● RBW 300 kHz 6.3 µs ● VBW 300 kHz Mode Aut M1[1]	Channel 77 - 78		N/A	



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

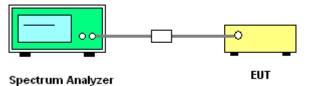
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.4.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Enable the EUT hopping function.
- 5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

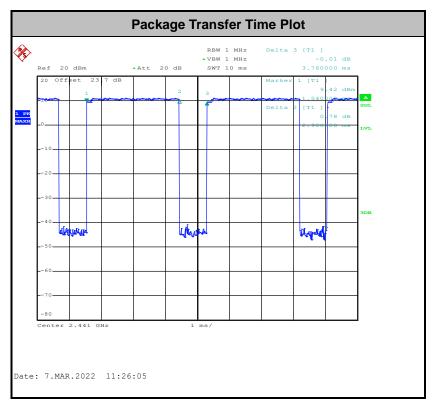
3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Please refer to Appendix A.





Remark:

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s),Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4×20) (s), Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$ hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time



3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

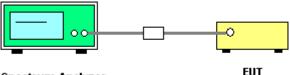
3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.4.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Use the following spectrum analyzer settings for 20 dB Bandwidth measurement.
 Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
 RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
 Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
 RBW ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- 6. Measure and record the results in the test report.

3.4.4 Test Setup



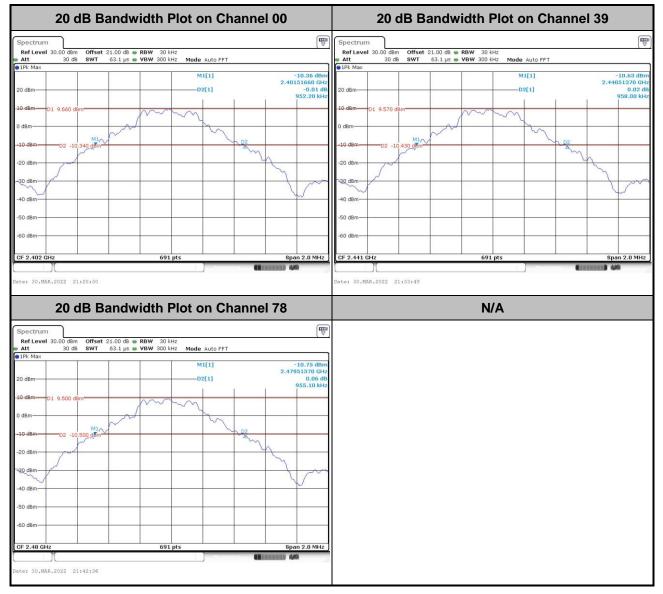
Spectrum Analyzer

3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.



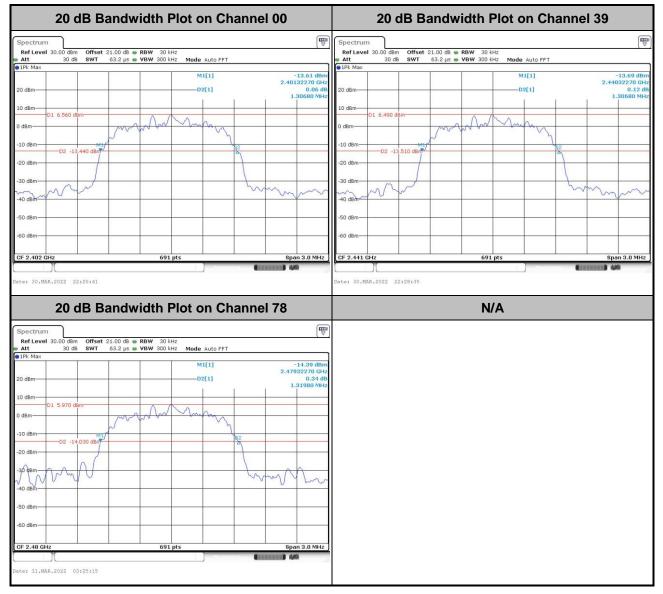
<1Mbps>



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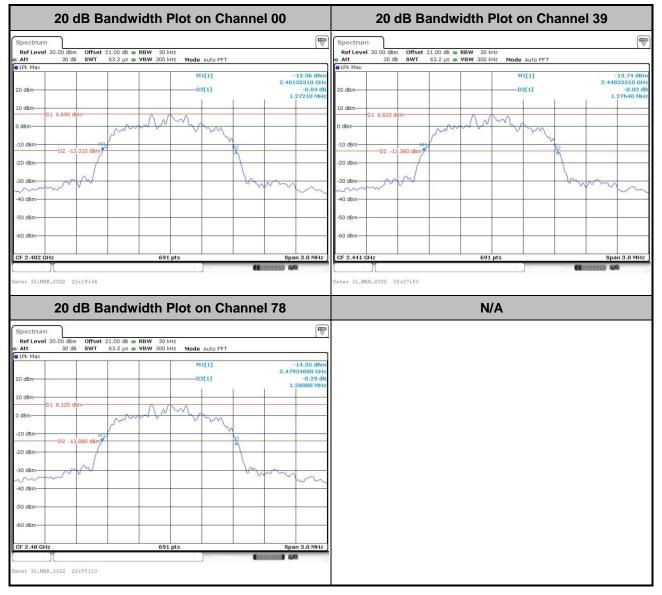


<2Mbps>





<3Mbps>

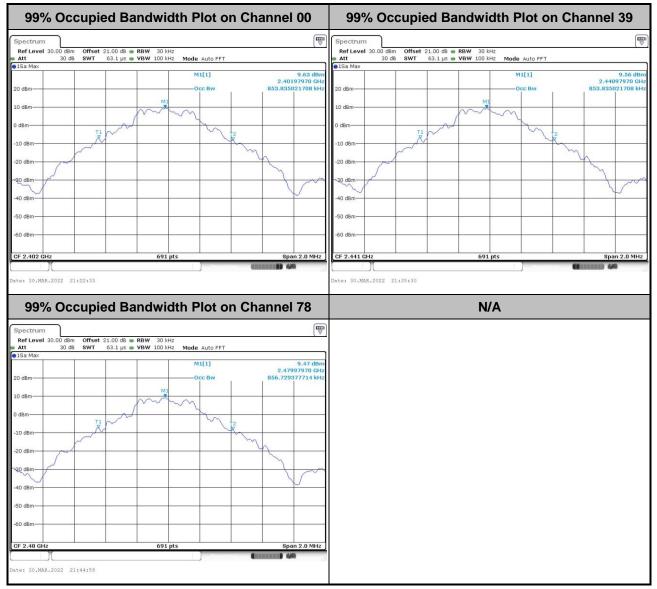




3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

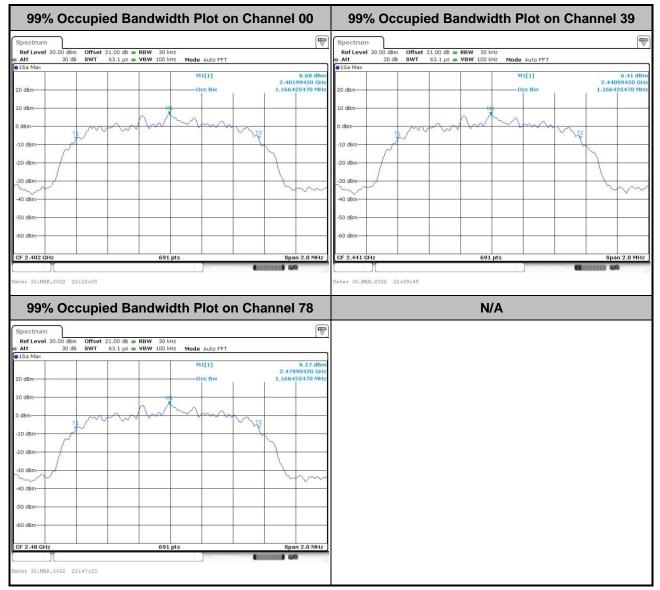
<1Mbps>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



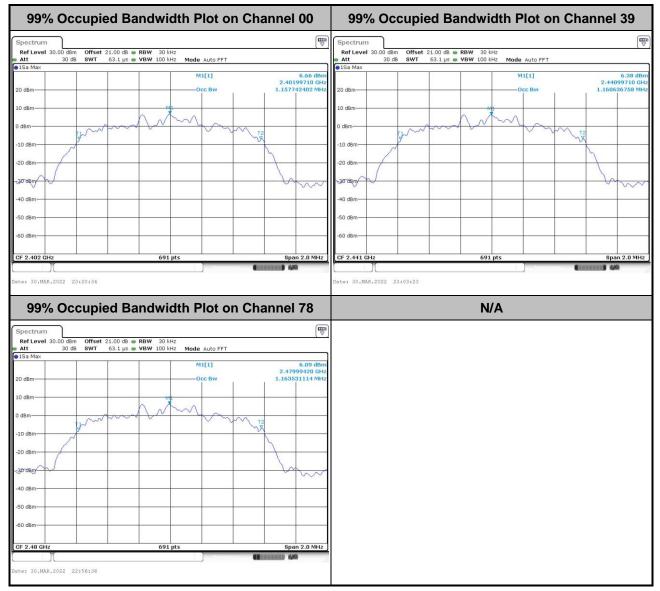
<2Mbps>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<3Mbps>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

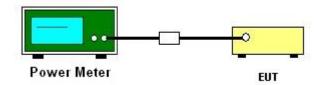
3.5.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.5.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.5.
- 2. The RF output of EUT is connected to the power meter by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Measure the conducted output power with cable loss and record the results in the test report.
- 5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.5.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.



3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

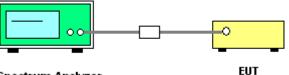
3.6.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.6.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.6.
- 2. Set the maximum power setting and enable the EUT to transmit continuously.
- 3. Set RBW = 100 kHz, VBW = 300 kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
- 4. Enable hopping function of the EUT and then repeat step 2 and 3.
- 5. Measure and record the results in the test report.

3.6.4 Test Setup

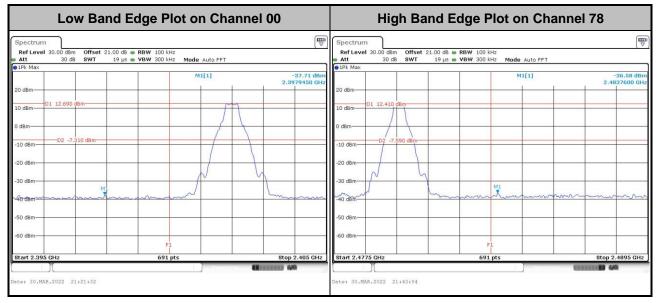


Spectrum Analyzer



3.6.5 Test Result of Conducted Band Edges

<1Mbps>



<2Mbps>

Low Band E	dge Plot on Chanr	nel 00	Hig	gh Band Edg	ge Plot on C	hannel 78
Spectrum Ref Level 30.00 dBm Offset 21.00 dB (30 dB SWT 19 µs (DIPk Max	RBW 100 kHz VBW 300 kHz Mode Auto FFT		Spectrum Ref Level 30.00 dBr Att 30 d		W 100 kHz W 300 kHz Mode Auto F	(₩) FT
20 dBm		-38.01 dBm 2.3959620 GHz	20 dBm	Bra	M1[1]	-36,74 dBm 2.4871640 GHz
0 dBm			0 dBm -10 dBm02 -11 -20 dBm	0.470 dBm		
-30 dBm ML -20 dBm		Lungamen	-30 dBm	fra	m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.	MI MI
-50 dBm -60 dBm Start 2.395 GHz	F1 691 pts	Stop 2.405 GHz	-60 dBm		F1 691 pts	Stop 2.4895 GHz
Date: 30.MAR.2022 22:21:23	Masairfina	(11111) 44	Date: 30.MAR.2022 2	2:46:37) Ne	



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Low Band Ed	High Band Edge Plot on Channel 78						
	BW 100 kHz BW 300 kHz Mode Auto FFT				RBW 100 kHz VBW 300 kHz Mode	e Auto FFT	
19k Max 20 dBm	M1[1]	-38.02 dBm 2.3955860 GHz	● 1Pk Max 20 dBm			м1[1]	-37.43 dBm 2.4890400 GHz
10 dBm D1 9.920 dBm	romy		-10-dBm-01 9.59	J dBm			
0 dBm				-10.410 dBm			
-20 dBm		han	-20 dBm	hy	mmm		M1
്ങ് ഷ്ട്രിന് പാരാഹാഹാന് പാരാണം -50 dBm			-40 dBm				
-60 dBm	F1	0hm 0.405.015	-60 dBm		F1		Stop 2.4895 GHz
Start 2.395 GHz	691 pts	Stop 2.405 GHz	Start 2.4775 GHz		691 pts	the state of the s	stop 2.4895 GHZ
Date: 30.MAR.2022 23:19:55			Date: 30.MAR.2022	22:55:57			



3.6.6 Test Result of Conducted Hopping Mode Band Edges

<1Mbps>

Ref Lavel 30.00 dBm Offset 21.00 dB RBW 100 Hz 0 dB 30 dB SWT 19 µs VBW 300 Hz Mode Auto FFT 0 IPK Max 0 dB M1[1] -37.50 dBm 91 µs VBW 300 Hz Mode Auto FFT 0 dB 0 1 12.640 Bm 0 1 12.640 dBm M1[1] -37.50 dBm 20 dBm 0 dBm 2.4891790 GI 10 dB 0 1 12.640 dBm 0 dB 0 dBm	Hopping Mode Low Band Edge Plot	Hopping Mode High Band Edge Plot					
20 dBm 2.3955270 GHz 2.4991790 GH 10 dBm 01 12.640 dBm 0 0 0 dBm 0 0 0 0 10 dBm 0 0 0 0 0 -10 dBm 0 0 0 0 0 0 -20 dBm 0 0 0 0 0 0 0 0 -30 dBm 0	RefLevel 30.00 dBm Offset 21.00 dB RBW 100 kHz Att 30 dB SWT 19 µs VBW 300 kHz Mode Auto FFT	RefLevel 30.00 dBm Offset 21.00 dB ■ RBW 100 kHz ■ Att 30 dB SWT 19 µs ■ VBW 300 kHz Mode Auto FFT					
Mexember (Annual	20 dBm 01 12.640	20 dBm 2.489 10 dBm 01 12.480 cBm 10 dBm 02 -7.520 dBm -10 dBm 02 -7.520 dBm -20 dBm 0 -30 dBm 0 -40 dBm -10 -50 dBm -10	M1				

<2Mbps>

Hopping Mode Lo	w Band Edge Plot	Hopping Mode High Band Edge Plot					
Spectrum Ref Level 30.00 dBm Offset 21.00 dB RBW 100 kl Att 30 dB SWT 19 us YBW 300 kl		Spectrum Ref Level 30.00 dBm Offset Att 30 dB SWT	21.00 dB	(IIII) → Auto FFT			
Pk Max		1Pk Max	to po e rom oco and mode				
20 dBm	M1[1] -37.71 dBm 2.3973520 GHz	20 dBm-	M	41[1] -36.75 dBm 2.4852190 GHz			
-10-dBm 01 9.810 dBm	- Manamana	19.48m 01 9.480 dBm					
0 dBm							
-10-dBm		-10-dBm D2 -10.520 dBm					
-30 dBm		-30 dBm	hA.	M1			
70 JBM anno 1		-40 dBm	- hannannen	- Manna market			
-50 dBm		-50 dBm					
Start 2.395 GHz 691		Start 2.4775 GHz	F1 691 pts	Stop 2.4895 GHz			
, in the second s) (571 PC				
Date: 30.MAR.2022 22:25:28		Date: 30.MAR.2022 22:49:42					



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Hopping Mode Low Band Edge Plot				Hopping Mode High Band Edge Plot				
Spectrum Ref Level 30.00 dBm Offset 21.00 dB Att 30 dB SWT 19 µs	BW 100 kHz BW 300 kHz Mode Auto FFT		Spectrum Ref Level 30.00		 RBW 100 kHz VBW 300 kHz Mod 	e Auto FFT		
19k Max 20 dBm	M1[1] -37.96 dBm 2.3956440 GHz			PPk Max M1[1]				
10 dBm 01 9.980 dBm	m	man	10ml pr h	i40 dBm				
-10-d8m 02 -10.020 d8m			-10 d8m-D	2 -10.360 dBm				
-30 dBm	man		-30 dBm	have	mmmm		M1	m
-50 d8m			-50 dBm					
-60 dBm	F1 691 pts	Stop 2.405 GHz	-60 dBm Start 2.4775 GHz	2	F1 691 pts			.4895 GHz
Date: 30.MAR.2022 23:16:59	Mexenting		Date: 30.MAR.202	2 22:50:44		21n Aurino		

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

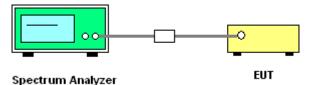
3.7.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.7.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.8.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurious must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

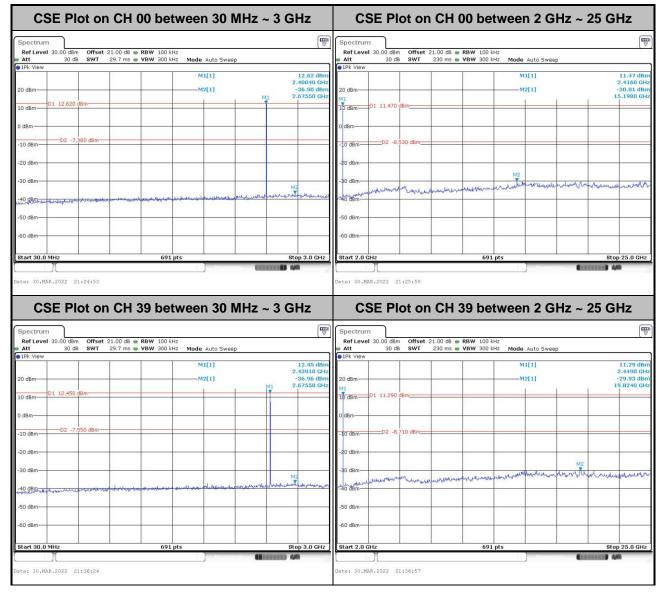
3.7.4 Test Setup





3.7.5 Test Result of Conducted Spurious Emission

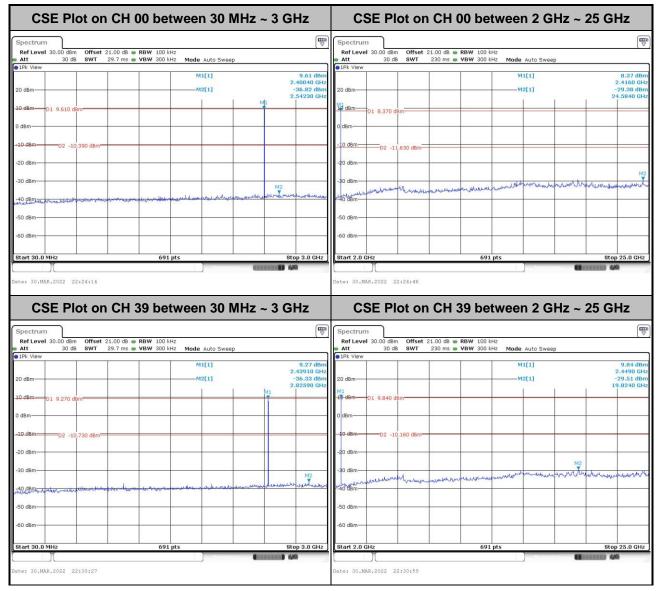
<1Mbps>



CSE Plot on CH 78	between 30 MH	z ~ 3 GHz	CSE Plot	on CH 78 be	tween 2 GF	lz ~ 25 GHz
Spectrum			Spectrum			
Ref Level 30.00 dBm Offset 21.00 dB ■ RB ● Att 30 dB SWT 29.7 ms ● VB ● 1Pk View			Ref Level 30.00 dBm Of Att 30 dB SV PIPk View	ifset 21.00 dB 👄 RBW 100 k WT 230 ms 👄 VBW 300 k	kHz KHz Mode Auto Sweep	
20 dBm	M1[1] M2[1]	12.21 dBm 2.48210 GHz -36.52 dBm M1 2.73570 GHz	20 dBm M1 10 dBm D1 12.160 dBm		M1[1] M2[1]	12.16 dBm 2.4830 GHz -30.01 dBm 19.0920 GHz
10 dBm 01 12.210 dBm 0 dBm						
-10 dBm			0 dBm	Bm		
-30 dBm				والعرب المرجعة المعالية والمراجعة المعالية والمعالية	and the states and the second	M2 Automation management of
-49.08000	neres and second se	· · · · · · · · · · · · · · · · · · ·	-50 dBm			
-60 dBm			-60 dBm			
Start 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHz	691	pts	Stop 25.0 GHz
Date: 30.MAR.2022 21:54:51	Mexauring	G RIEND 44	Date: 30.MAR.2022 21:55:	26	Мозанена	(IIIIII) 44



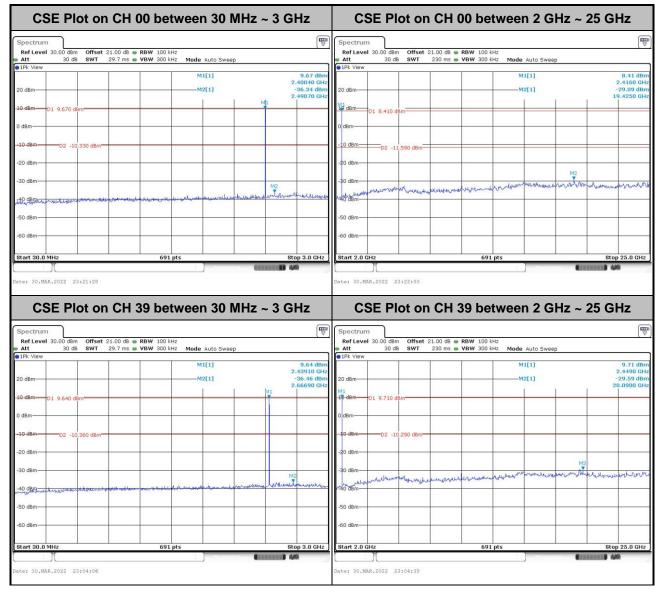
<2Mbps>



CSE Plot on CH 78	between 30 MH	lz ~ 3 GHz	CSE Plot o	n CH 78 betwe	een 2 GHz	~ 25 GHz
Spectrum			Spectrum			
Ref Level 30.00 dBm Offset 21.00 dB BB]	Ref Level 30.00 dBm Offset Att 30 dB SWT 1Pk View	21.00 dB RBW 100 kHz 230 ms VBW 300 kHz	Mode Auto Sweep	
20 dBm	M1[1] M2[1]	2.85600 GHz	20 dBm		M1[1] —M2[1]	8.89 dBm 2.4830 GHz -29.70 dBm 19.8570 GHz
10.dBm 01 9.190 dBm		M1	18 dBm D1 8.890 dBm			
-10.d8m			-10.dBm			
-20 dBm-		m2		ali and a share go have a for a shall be he proved	unduration	M2 Thur marker w
-10 dBm unter material and an and a second s	and the second	and dent have bell to high restriction of the state of the second s	-50 dBm			
-60 dBm			-60 dBm			
Start 30.0 MHz	691 pts	Stop 3.0 GHz	Start 2.0 GHz	691 pts		Stop 25.0 GHz
Date: 30.MAR.2022 22:48:26	1 SUB 5 (1947)		Date: 30.MAR.2022 22:48:59			



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CSE Plot on CH 7	78 between 30 MH	lz ~ 3 GHz	CSE Plot	on CH 78 between 2	GHz ~ 25 GHz
Spectrum RefLevel 30.00 dBm Offset 21.00 dB • Att 30 dB SWT 29.7 ms •	RBW 100 kHz VBW 300 kHz Mode Auto Sweep		Spectrum Ref Level 30.00 dBm Off Att 30 dB SW	fset 21.00 dB ● RBW 100 kHz /T 230 ms ● VBW 300 kHz Mode Auto 5	(mm ⊽ Sweep
20 dBm 10 dBm 01 9.300 dBm 0 dBm	M1[1] M2[1]	2.54230 GHz	20 dBm	M1[1] M2[1]	9,14 dBm 2.4830 GHz -29.02 dBm 19,0570 GHz
-10.dBm 02 -10,700 dBm -20 dBm -30 dBm -40.dBm	ng trades and the fact of the	M2 M2	-20 dBm-	an a	me me
-50 dBm	691 pts	Stop 3.0 GHz	-50 d8m	691.pts	Stop 25.0 GHz
Date: 30.MAR.2022 22:57:35	oar bra		Date: 30.MAR.2022 22:58:1	31	

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

Please refer to the measuring equipment list in this test report.



3.8.3 Test Procedures

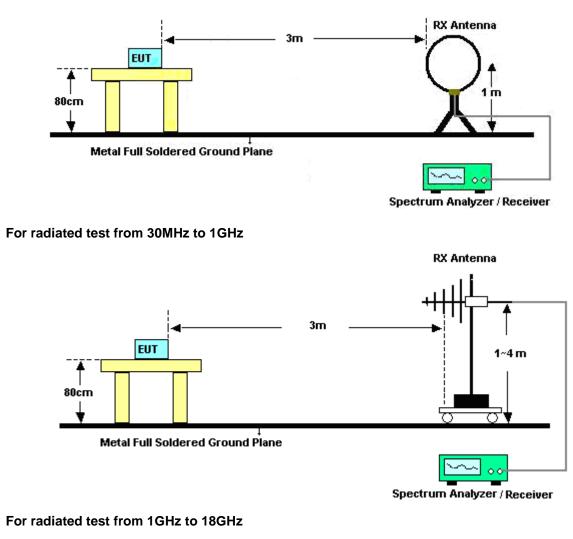
- 1. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
- 2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
- 3. For each suspected emission, the EUT is 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 the maximum power setting and enable the EUT to 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 = 1 MHz for f>1 GHz ; 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 = N₁*L₁+N₂*L₂+...+N_{n-1}*LN_{n-1}+N_n*L_n Where N₁ is number of type 1 pulses, L₁ 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. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".
- 8. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".

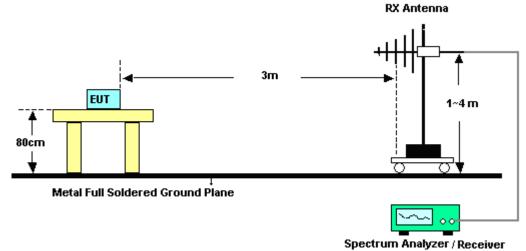
Note: The average levels are calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent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



3.8.4 Test Setup

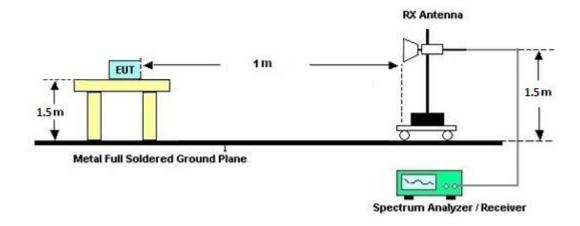
For radiated test below 30MHz







For radiated test above 18GHz



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

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

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result comes out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.



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

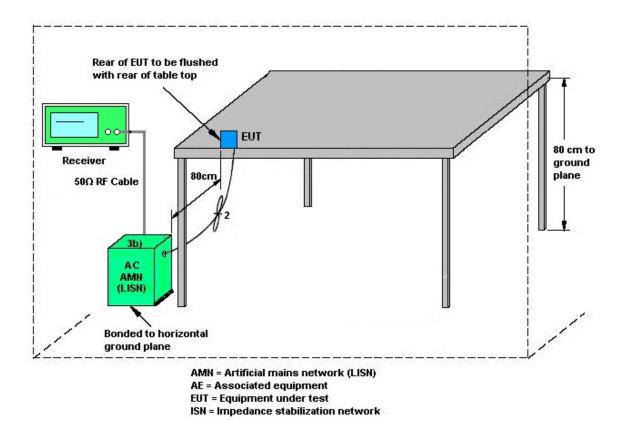
Please refer to the measuring equipment list in this test report.

3.9.3 Test Procedures

- 1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is 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 shall be used.
- 6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
- 7. The frequency range from 150 kHz to 30 MHz is scanned.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9 kHz) 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 B.

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FAX : 886-3-327-0855	Issue Date	: May 03, 2022
Report Template No.: BU5-FR15CBT Version 2.4	Report Version	: 01



3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. 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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 03, 2022	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2021	Mar. 03, 2022	Nov. 30, 2022	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 17, 2021	Mar. 03, 2022	Nov. 16, 2022	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 03, 2021	Mar. 03, 2022	Dec. 02, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Mar. 03, 2022	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBE CK	VTSD 9561-F N	00691	N/A	Jul. 28, 2021	Mar. 03, 2022	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 30, 2021	Mar. 03, 2022	Dec. 29, 2022	Conduction (CO05-HY)
EMI Test Receicver	Keysight	N9010B	MY60241055	10Hz~44GHz	Jul. 12, 2021	Mar. 15, 2022~ Mar. 26, 2022	Jul. 11, 2022	Radiation (03CH20-HY)
Preamplifier	COM-POWER	PAM-103	18020201	1MHz-1000MHz	Jan. 03, 2022	Mar. 15, 2022~ Mar. 26, 2022	Jan. 02, 2023	Radiation (03CH20-HY)
Amplifier	EMCI	EMC118A45S E	980792	N/A	Nov. 15, 2021	Mar. 15, 2022~ Mar. 26, 2022	Nov. 14, 2022	Radiation (03CH20-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Mar. 15, 2022~ Mar. 26, 2022	Jun. 21, 2022	Radiation (03CH20-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 07, 2022	Mar. 15, 2022~ Mar. 26, 2022	Jan. 06, 2023	Radiation (03CH20-HY)
Bilog Antenna	TESEQ	CBL 6111D&00802 N1D01N-06	55606 & 08	30MHz~1GHz	Oct. 17, 2021	Mar. 15, 2022~ Mar. 26, 2022	Oct. 16, 2022	Radiation (03CH20-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-02294	1GHz~18GHz	Jun. 23, 2021	Mar. 15, 2022~ Mar. 26, 2022	Jun. 22, 2022	Radiation (03CH20-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA9170	00993	18GHz-40GHz	Nov. 30, 2021	Mar. 15, 2022~ Mar. 26, 2022	Nov. 29, 2022	Radiation (03CH20-HY)
Hygrometer	TECPEL	DTM-303B	TP200889	N/A	Sep. 30, 2021	Mar. 15, 2022~ Mar. 26, 2022	Sep. 29, 2022	Radiation (03CH20-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	519229/2,804 015/2,804027 /2	N/A	Jan. 19, 2022	Mar. 15, 2022~ Mar. 26, 2022	Jan. 18, 2023	Radiation (03CH20-HY)
Software	Audix	E3 6.2009-8-24	RK-002156	N/A	N/A	Mar. 15, 2022~ Mar. 26, 2022	N/A	Radiation (03CH20-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Mar. 15, 2022~ Mar. 26, 2022	N/A	Radiation (03CH20-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Mar. 15, 2022~ Mar. 26, 2022	N/A	Radiation (03CH20-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Mar. 15, 2022~ Mar. 26, 2022	N/A	Radiation (03CH20-HY)
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 16, 2021	Mar. 07, 2022~ Mar. 31, 2022	Nov. 15, 2022	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1036004	N/A	Aug. 01, 2021	Mar. 07, 2022~ Mar. 31, 2022	Jul. 31, 2022	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GH z	Aug. 01, 2021	Mar. 07, 2022~ Mar. 31, 2022	Jul. 31, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	15I00041SNO 10 (NO:248)	10MHz~6GHz	Dec. 29, 2021	Mar. 07, 2022~ Mar. 31, 2022	Dec. 28, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	Mar. 07, 2022~ Mar. 31, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUME NT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	Mar. 07, 2022~ Mar. 31, 2022	Aug. 11, 2022	Conducted (TH05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence	3.1 dB
of 95% (U = 2Uc(y))	3.1 UB

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

Measuring Uncertainty for a Level of Confidence	5.9 dB
of 95% (U = 2Uc(y))	5.9 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2 dB
of $95\% (U = 2UC(y))$	

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

Measuring Uncertainty for a Level of Confidence	5.7 dB
of 95% (U = 2Uc(y))	5.7 dB

Report Number : FR221836A

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ching Chen Tempe	erature: 21~25	· ·
Test Date: 2022	2/3/7-2022/3/31 Relativ	re Humidity: 51~54	4 %

						TEST RES	SULTS DATA		
			20dB	and 99	<u> Оссир</u>	ied Bandwid	Ith and Hopping	Channel Separ	ation
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.952	0.854	0.999	0.6348	Pass
DH	1Mbps	1	39	2441	0.958	0.854	0.999	0.6387	Pass
DH	1Mbps	1	78	2480	0.955	0.857	1.003	0.6367	Pass
2DH	2Mbps	1	0	2402	1.307	1.166	0.994	0.8712	Pass
2DH	2Mbps	1	39	2441	1.307	1.166	0.999	0.8712	Pass
2DH	2Mbps	1	78	2480	1.320	1.166	1.033	0.8799	Pass
3DH	3Mbps	1	0	2402	1.272	1.158	0.999	0.8481	Pass
3DH	3Mbps	1	39	2441	1.276	1.161	1.003	0.8509	Pass
3DH	3Mbps	1	78	2480	1.281	1.164	0.994	0.8539	Pass

<u>TEST RESULTS DATA</u> Dwell Time							
	Hopping Channel	Hops Over	Package	Dwell Time	Limits		
Mod.	Number Rate	Occupancy Time(hops)	Transfer Time (msec)	(sec)	(sec)	Pass/Fail	
Nomal	79	106.67	2.90	0.31	0.4	Pass	
AFH	20	53.33	2.90	0.15	0.4	Pass	

					<u>T RESUL</u> eak Powe
DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
	0	1	13.61	20.97	Pass
DH1	39	1	13.35	20.97	Pass
	78	1	13.00	20.97	Pass
	0	1	12.60	20.97	Pass
2DH1	39	1	12.40	20.97	Pass
	78	1	12.27	20.97	Pass
	0	1	12.85	20.97	Pass
3DH1	39	1	12.61	20.97	Pass
Ē	78	1	12.53	20.97	Pass

				Ave	ST RESULTS DATA erage Power Table (Reporting Only)
DH	CH.	NTX	Average Power (dBm)	Duty Factor (dB)	
	0	1	13.16	5.16	
DH1	39	1	12.99	5.16	
	78	1	12.74	5.16	
	0	1	10.39	5.12	
2DH1	39	1	10.19	5.12	
	78	1	10.14	5.12	
	0	1	10.42	5.16	1
3DH1	39	1	10.40	5.16]
	78	1	10.20	5.16]

<u>TEST RESULTS DATA</u> Number of Hopping Frequency								
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail					
79	20	> 15	Pass	I				

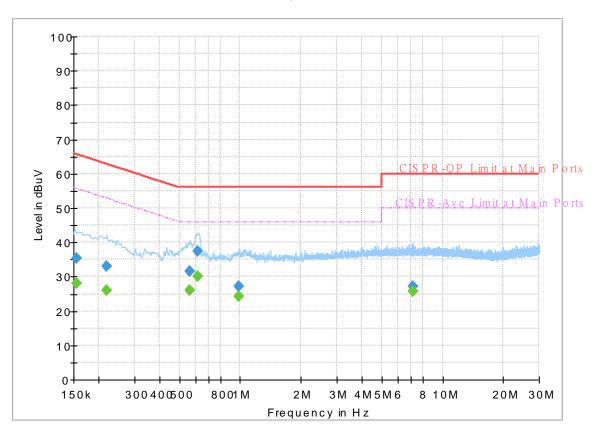


Appendix B. AC Conducted Emission Test Results

Test Engineer :		Temperature :	23~26 ℃
Test Engineer .	Calvin Wang	Relative Humidity :	45~55%

EUT Information

Report NO : Test Mode : Test Voltage : Phase : 221836 Mode 1 120Vac/60Hz Line



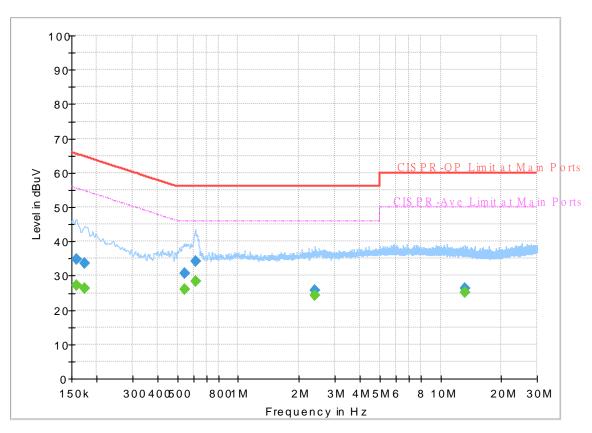
Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154500		27.94	55.75	27.81	L1	OFF	19.6
0.154500	35.32		65.75	30.43	L1	OFF	19.6
0.217500		25.90	52.91	27.01	L1	OFF	19.6
0.217500	32.96		62.91	29.95	L1	OFF	19.6
0.564000		25.97	46.00	20.03	L1	OFF	19.6
0.564000	31.56		56.00	24.44	L1	OFF	19.6
0.618000		30.02	46.00	15.98	L1	OFF	19.6
0.618000	37.45		56.00	18.55	L1	OFF	19.6
0.982500		24.22	46.00	21.78	L1	OFF	19.6
0.982500	27.10		56.00	28.90	L1	OFF	19.6
7.158750		25.62	50.00	24.38	L1	OFF	19.9
7.158750	27.10		60.00	32.90	L1	OFF	19.9

EUT Information

Report NO : Test Mode : Test Voltage : Phase : 221836 Mode 1 120Vac/60Hz Neutral



FullSpectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000		27.26	55.52	28.26	Ν	OFF	19.6
0.159000	34.89		65.52	30.63	Ν	OFF	19.6
0.174750		26.19	54.73	28.54	Ν	OFF	19.6
0.174750	33.51		64.73	31.22	Ν	OFF	19.6
0.546000		25.93	46.00	20.07	Ν	OFF	19.6
0.546000	30.85		56.00	25.15	Ν	OFF	19.6
0.613500		28.32	46.00	17.68	Ν	OFF	19.6
0.613500	34.07		56.00	21.93	Ν	OFF	19.6
2.379750		24.21	46.00	21.79	Ν	OFF	19.7
2.379750	25.73		56.00	30.27	Ν	OFF	19.7
13.260750		25.01	50.00	24.99	Ν	OFF	20.2
13.260750	26.32		60.00	33.68	Ν	OFF	20.2



Appendix C. Radiated Spurious Emission

Test Engineer :	Bill Chang、JC Liang、Bigshow Wang	Temperature :	18~20°C
rest Engineer.	Bin Chang • 3C Liang • Bigshow Wang	Relative Humidity :	68~70%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

ВТ	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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)
		2386.02	39.8	-34.2	74	40.19	27.24	8.64	36.27	325	193	Р	Н
		2386.02	15.04	-38.96	54	-	-	-	-	-	-	Α	Н
	*	2402	97.25	-	-	97.55	27.31	8.67	36.28	325	193	Ρ	н
	*	2402	72.49	-	-	-	-	-	-	-	-	А	Н
вт													Н
CH00													н
2402MHz		2381.82	50.09	-23.91	74	50.49	27.23	8.64	36.27	100	248	Ρ	V
240211112		2381.82	25.33	-28.67	54	-	-	-	-	-	-	А	V
	*	2402	109.33	-	-	109.63	27.31	8.67	36.28	100	248	Ρ	V
	*	2402	84.57	-	-	-	-	-	-	-	-	А	V
													V
													V
		2337.44	42.83	-31.17	74	43.42	27.1	8.56	36.25	400	168	Ρ	Н
		2337.44	18.07	-35.93	54	-	-	-	-	-	-	А	Н
	*	2441	97.92	-	-	98	27.46	8.75	36.29	400	168	Ρ	н
	*	2441	73.16	-	-	-	-	-	-	-	-	А	Н
		2488.8	39.43	-34.57	74	39.25	27.66	8.84	36.32	400	168	Ρ	Н
ВТ СН 39		2488.8	14.67	-39.33	54	-	-	-	-	-	-	А	Н
сп зэ 2441MHz		2338.42	53.64	-20.36	74	54.23	27.1	8.56	36.25	146	201	Ρ	V
244111172		2338.42	28.88	-25.12	54	-	-	-	-	-	-	А	V
	*	2441	110.94	-	-	111.02	27.46	8.75	36.29	146	201	Ρ	V
	*	2441	86.18	-	-	-	-	-	-	-	-	А	V
		2498.04	46.55	-27.45	74	46.32	27.69	8.86	36.32	146	201	Ρ	V
		2498.04	21.79	-32.21	54	-	-	-	-	-	-	А	V

Page Number : C1 of C9



ВТ	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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)
	*	2480	97.97	-	-	97.84	27.62	8.82	36.31	343	182	Р	Н
	*	2480	73.21	-	-	-	-	-	-	-	-	А	Н
		2483.52	51.66	-22.34	74	51.51	27.63	8.83	36.31	343	182	Ρ	Н
		2483.52	26.9	-27.1	54	-	-	-	-	-	-	А	Н
													Н
BT													Н
CH 78 2480MHz	*	2480	111.64	-	-	111.51	27.62	8.82	36.31	202	192	Р	V
24000012	*	2480	86.88	-	-	-	-	-	-	-	-	А	V
		2483.92	69.05	-4.95	74	68.89	27.64	8.83	36.31	202	192	Р	V
		2483.92	44.29	-9.71	54	-	-	-	-	-	-	А	V
													V
													V
	1. No	o other spurious	s found.										
Remark													
	<u>د</u> . ۲۱۱	Tesuits are FA	oo ayamst r	ear anu	Average IIII								



2.4GHz 2400~2483.5MHz

вт	Note		Level	Over	Limit	Read	-	Deth	Dreeman	Ant	Table	Peak	Del
ы	Note	Frequency	Levei	Limit	Limit	Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Pos	Peak Avg.	POI.
		(MHz)	(dBµV/m)		(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	. –	(H/V)
		4804	43.76	-30.24	74	36.05	32.22	13.03	37.54	-	-	Р	Н
		4804	19	-35	54	-	-	-	-	-	-	А	Н
		13395	53.77	-20.23	74	35.05	39.99	21.9	43.17	-	-	Ρ	Н
		13395	29.01	-24.99	54	-	-	-	-	-	-	А	Н
		14475	53.77	-20.23	74	35.31	39.88	22.77	44.19	-	-	Р	Н
		14475	29.01	-24.99	54	-	-	-	-	-	-	А	Н
		17835	54.28	-19.72	74	34.33	40.51	24.79	45.35	-	-	Р	Н
		17835	29.52	-24.48	54	-	-	-	-	-	-	А	Н
													Н
													Н
вт													Н
CH 00													Н
2402MHz		4804	50.83	-23.17	74	43.12	32.22	13.03	37.54	-	-	Р	V
240211112		4804	26.07	-27.93	54	-	-	-	-	-	-	А	V
		13350	52.87	-21.13	74	34.27	39.9	21.86	43.16	-	-	Р	V
		13350	28.11	-25.89	54	-	-	-	-	-	-	Α	V
		14475	53.52	-20.48	74	35.06	39.88	22.77	44.19	-	-	Р	V
		14475	28.76	-25.24	54	-	-	-	-	-	-	А	V
		17985	55.34	-18.66	74	34.23	41.69	24.88	45.46	-	-	Р	V
		17985	30.58	-23.42	54	-	-	-	-	-	-	А	V
													V
													V
													V
													V

BT (Harmonic @ 3m)



BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	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)	(H/V)
		4882	43.38	-30.62	74	35.39	32.59	13	37.6	-	-	Р	Н
		4882	18.62	-35.38	54	-	-	-	-	-	-	А	Н
		7323	48.59	-25.41	74	34.44	36.75	15.93	38.53	-	-	Р	Н
		7323	23.83	-30.17	54	-	-	-	-	-	-	А	Н
		13320	53.85	-20.15	74	35.33	39.84	21.84	43.16	-	-	Р	Н
		13320	29.09	-24.91	54	-	-	-	-	-	-	А	Н
		14475	52.77	-21.23	74	34.31	39.88	22.77	44.19	-	-	Р	Н
		14475	28.01	-25.99	54	-	-	-	-	-	-	А	Н
		17955	56.02	-17.98	74	35.11	41.49	24.86	45.44	-	-	Р	Н
		17955	31.26	-22.74	54	-	-	-	-	-	-	А	Н
													Н
BT													Н
CH 39		4882	45.56	-28.44	74	37.57	32.59	13	37.6	-	-	Р	V
2441MHz		4882	20.8	-33.2	54	-	-	-	-	-	-	А	V
		7323	48.14	-25.86	74	33.99	36.75	15.93	38.53	-	-	Р	V
		7323	23.38	-30.62	54	-	-	-	-	-	-	А	V
		13365	53	-21	74	34.37	39.93	21.87	43.17	-	-	Р	V
		13365	28.24	-25.76	54	-	-	-	-	-	-	А	V
		14490	52.8	-21.2	74	34.32	39.89	22.78	44.19	-	-	Р	V
		14490	28.04	-25.96	54	-	-	-	-	-	-	А	V
		17970	54.53	-19.47	74	33.52	41.59	24.87	45.45	-	-	Ρ	V
		17970	29.77	-24.23	54	-	-	-	-	-	-	А	V
													V
													V



BT	Not	e Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos		Avg.	
		(MHz)	(dBµV/m)	. ,	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)		
		4960	44.3	-29.7	74	35.98	33.02	12.96	37.66	-	-	Ρ	Н
		4960	19.54	-34.46	54	-	-	-	-	-	-	A	Н
		7440	48.27	-25.73	74	34.7	36.22	15.98	38.63	-	-	Р	Н
		7440	23.51	-30.49	54	-	-	-	-	-	-	А	Н
		13350	53.49	-20.51	74	34.89	39.9	21.86	43.16	-	-	Ρ	Н
		13350	28.73	-25.27	54	-	-	-	-	-	-	А	Н
		14490	53.18	-20.82	74	34.7	39.89	22.78	44.19	-	-	Р	Н
		14490	28.42	-25.58	54	-	-	-	-	-	-	А	Н
		17985	54.87	-19.13	74	33.76	41.69	24.88	45.46	-	-	Ρ	Н
		17985	30.11	-23.89	54	-	-	-	-	-	-	А	Н
57													Н
BT													н
CH 78 2480MHz		4960	45.32	-28.68	74	37	33.02	12.96	37.66	-	-	Ρ	V
240011112		4960	20.56	-33.44	54	-	-	-	-	-	-	А	V
		7440	47.29	-26.71	74	33.72	36.22	15.98	38.63	-	-	Ρ	V
		7440	22.53	-31.47	54	-	-	-	-	-	-	А	V
		13290	53.55	-20.45	74	35.11	39.79	21.8	43.15	-	-	Ρ	V
		13290	28.79	-25.21	54	-	-	-	-	-	-	А	V
		14499	53.05	-20.95	74	34.56	39.9	22.78	44.19	-	-	Р	V
		14499	28.29	-25.71	54	-	-	-	-	-	-	А	V
		17970	54.95	-19.05	74	33.94	41.59	24.87	45.45	-	-	Ρ	V
		17970	30.19	-23.81	54	-	-	-	-	-	-	А	V
													V
													V
	1.	No other spuriou	s found.										
	2.	All results are PA	SS against F	Peak and	l Average lim	it line.							
Remark	3.	The emission pos	sition marked	las "-" m	eans no sus	pected em	ission found	d with suf	ficient mar	gin agai	inst limit	line or	noise
		floor only.											
	4.	The emission lev	el close to 18	BGHz is	checked that	the average	ge emissior	n level is i	noise floor	only.			



Emission above18GHz

2.4GHz BT (SHF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBµV/m)		(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)		(H/V)
		24965	42.14	-31.86	74	36.38	39.17	19.71	53.12	-	-	Р	н
													Н
													Н
													Н
													н
													н
													н
													н
													Н
													н
													Н
2.4GHz													н
BT		24734	41.87	-32.13	74	36.66	39.01	19.46	53.26	-	-	Р	V
SHF													V
													V
													V
													V
													v
													v
													v
													v
													V
													V
	1 N	o othor opuriou	e found										V
		o other spuriou Il results are PA		mit line									
Remark		ne emission pos			aans no suo	nacted am	ission found	1 with out	ficient mar	ain agai	inst limit	line or	noiso
		oor only.		103 - 11	6413 110 505	Jecleu elli			noiont mai	yin aya	nət ill ill		10156
	IIC	Joi Uniy.											



Emission below 1GHz

					2.4602	BT (LF)							
BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table		
		(MHz)	(dBµV/m)	Limit (dB)	Line (dBµV/m)	Level (dBµV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	
		38.73	24.59	-15.41	<u>(авруля)</u> 40	(авµv) 38.96	(UB /III) 19.93	<u>(ub)</u> 1.33	35.63	(cm) -	(ueg)	P	(п/v) Н
		112.45	26.91	-16.59	43.5	43.03	17.26	2.14	35.52	-	-	P	н
		148.34	25.97	-17.53	43.5	41.64	17.35	2.45	35.47	-	-	Р	н
		351.07	28.04	-17.96	46	39.02	20.44	3.58	35	-	-	Р	н
		720.64	39.23	-6.77	46	41.25	26.79	5.05	33.86	-	-	Р	Н
		899.12	35.88	-10.12	46	34.38	28.73	5.89	33.12	-	-	Р	Н
													н
													Н
													Н
													н
2.4GHz													H H
вт		30.97	24.44	-15.56	40	35	23.9	1.2	35.66	-	-	Р	п V
LF		73.65	30.67	-9.33	40	51.93	12.56	1.76	35.58	-	-	Р	V
		134.76	28.24	-15.26	43.5	43.98	17.43	2.34	35.51	-	-	Р	V
		600.36	33.94	-12.06	46	38.16	25.47	4.69	34.38	-	-	Р	V
		717.73	39.85	-6.15	46	42.01	26.68	5.03	33.87	-	-	Р	V
		849.65	35.37	-10.63	46	34.32	28.76	5.62	33.33	-	-	Р	V
													V
													V
													V
													V
													V
	4												V
		o other spurious		mit line									
Remark		results are PA	-		aans no suc	nacted ar	nission foun	d and om	ission low	al has at	loast 60	IR mai	rain
		ainst limit or er				Peoled ell				zi nas di		וחוו סי	Sin
	ay				onny.								

2.4GHz BT (LF)



Note symbol

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



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

вт	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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)
ВТ		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	Р	н
CH 00													
2402MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	А	Н

- 1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
- 2. Level($dB\mu V/m$) =

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

3. Over Limit(dB) = Level(dB μ V/m) – Limit Line(dB μ V/m)

For Peak Limit @ 2390MHz:

- 1. Level(dB μ V/m)
- = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBµV) Preamp Factor(dB)
- $= 32.22(dB/m) + 4.58(dB) + 54.51(dB\mu V) 35.86 (dB)$
- = 55.45 (dBµV/m)
- 2. Over Limit(dB)
- = Level(dB μ V/m) Limit Line(dB μ V/m)
- $= 55.45(dB\mu V/m) 74(dB\mu V/m)$
- = -18.55(dB)

Peak measured complies with the limit line, so test result is "PASS".



Appendix D. Radiated Spurious Emission Plots

Toot Engineer	Bill Chang、JC Liang、Bigshow Wang	Temperature :	18~20°C
Test Engineer :		Relative Humidity :	68~70%

2.4GHz 2400~2483.5MHz

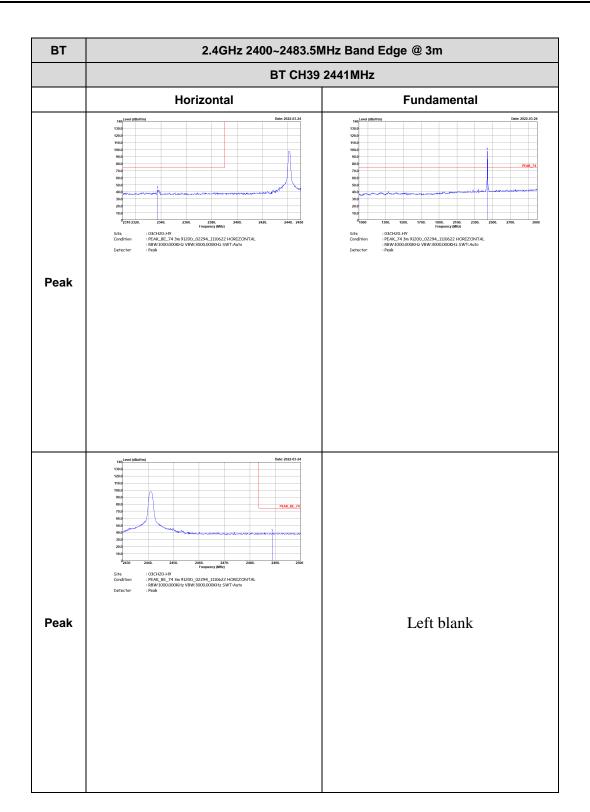
BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m										
	BT CH00 2402MHz										
	Horizontal	Fundamental									
Peak	image: state in the state sta	Less Dess X22.5.24 130 1									

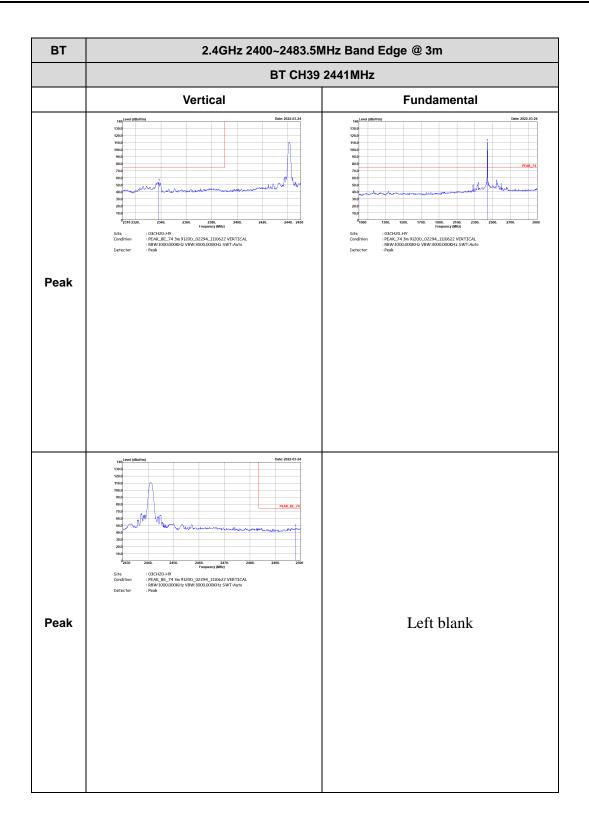


вт	2.4GHz 2400~2483.5N	IHz Band Edge @ 3m
	BT CH00	2402MHz
	Vertical	Fundamental
Peak	mer xill and a second s	per certe attaining meter constrained of the second of the

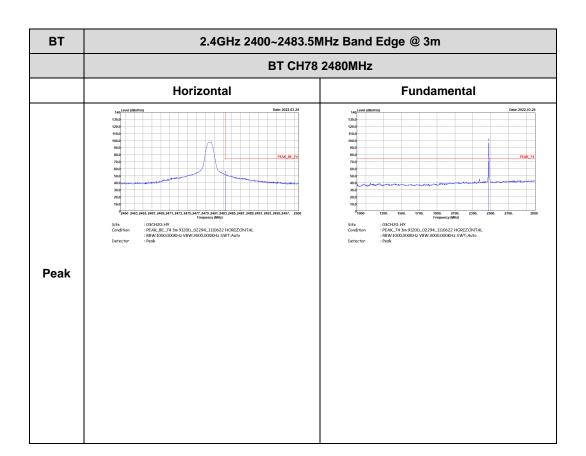




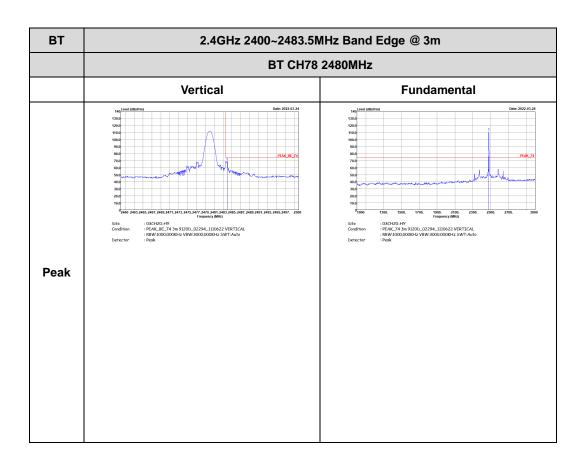








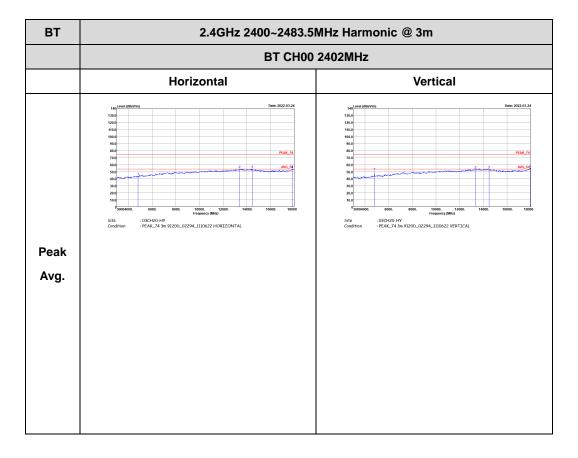




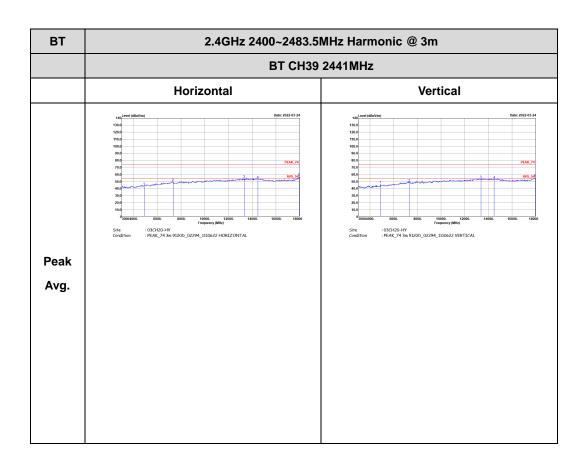


2.4GHz 2400~2483.5MHz

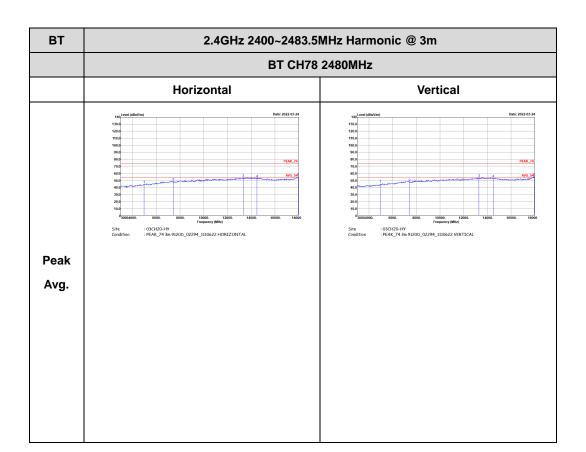
BT (Harmonic @ 3m)





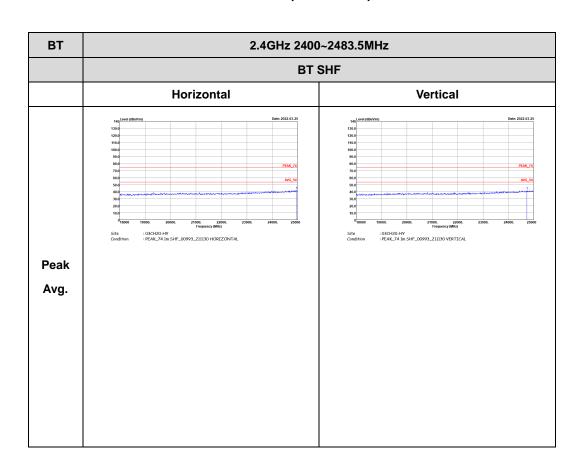








Emission above 18GHz

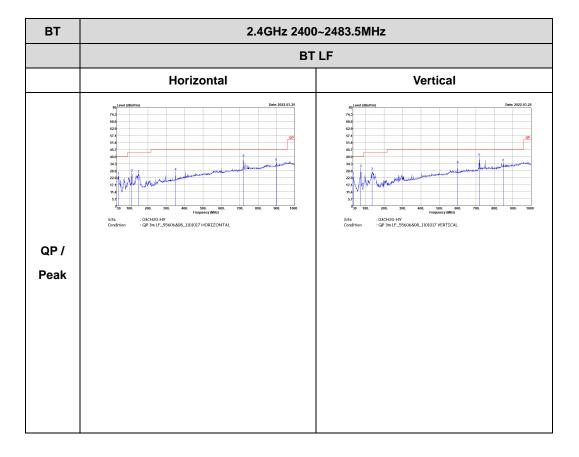


2.4GHz BT (SHF @ 1m)



Emission below 1GHz







Appendix E. Duty Cycle Plots

DH5 on	n time (One Pulse)) Plot on Ch	annel 39	on time (Count Pulses) Plot on Channel 39						
Spectrum Analyzer 1	+		🗱 Marker 🔹 👬	Spectrum Analyzer 1			Marker	- *		
KEYSIGHT Input RF RL + Align: Off	Input Z 50 Ω #Atten: 20 dB PNO: Fast Corr CCorr Gale: Off Freq Ref: Int (S) IF Gain: Low Sig Track: Off		Select Marker Marker 3	Coupling DC	Input Z: 50 0 #Atten: 20 dB PNO: Fast Corr CCorr Gate: Off Freq Ref: Int (S) IF Gain: Low Sig Track. Off		Select Marker Marker 1			
1 Spectrum v		ΔMkr3 3.750 ms	Marker ∆ Time Settings 3.75000 ms	1 Spectrum •		Mkr1 89.00 ms	Marker Time 89.0000 ms	Settings		
Scale/Div 10 dB	Ref Level 116.99 dBµV	-0.08 dB	Marker Mode Peak Search	Scale/Div 10 dB Log	Ref Level 116.99 dBµV	89.19 dBµV	Peak Search	Peak Search		
97.0			Normal Pk Search Config	107			Next Peak	Pk Search Config		
87.0 77.0			Delta (Δ) Properties	97.0			Next Pk Right	Properties		
67.0 57.0			Fixed Marker	87.0		M	Next Pk Left	Marker		
47.0 37.0	ique (160-94)	ميتوريدو ويه ا	Off Function	77.0				Function		
27.0			Deita Marker Marker→	67.0			Minimum Peak	Marker-+		
Center 2.441000000 GHz Res BW 1.0 MHz		Span 0 Hz Sweep 10.0 ms (1001 pts)	(Reset Delta) Marker Table Counter	57.0			Pk-Pk Search	Counter		
5 Marker Table 🔹			On Off	47.0	han water the second of the second	the substant software in a software	Marker Delta			
Mode Trace Scale	X Y Function Fu Δ) 2.890 ms (Δ) 3.375 dB	nction Width Function Value	Marker Settings	37.0	and the scheme second study and descriptions	terberentainstructure harrieller	Mkr→CF			
2 F 1 t	Δ) 3.750 ms (Δ)-0.07864 dB		All Markers Off	27.0			Mkr→Ref Lvi			
4 F 1 t	1.740 ms 84.77 dBµV		Couple Markers				Continuous Peak			
6			On On	Center 2.441000000 GHz Res BW 1.0 MHz		Span 0 Hz Sweep 100 ms (1001 pts)	On			
1 ° C I ?	Mar 24, 2022			1 ° C 1 ?	Mar 24, 2022 3:14:55 AM		Off			

Note:

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

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the on time period to have DH5 packet completing one hopping sequence is

2.89 ms x 20 channels = 57.8 ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100 ms / 57.8 ms] = 2 hops Thus, the maximum possible ON time:

2.89 ms x 2 = 5.78 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

 $20 \times \log(5.78 \text{ ms}/100 \text{ ms}) = -24.76 \text{ dB}$