

3DH5_Ant1_Hop

Date: 8.JUN.2023 14:31:05



Date: 8.JUN.2023 14:31:16

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), 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. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

According to ANSI C63.10-2013, section 7.8.5

- 1. Place the EUT on a bench and set in TX mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	48%
ATM Pressure:	101.0kPa

The testing was performed by Matt Liang on 2023-06-08.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below table and plots:

Test Mode	Antenna	Channel	Conducted Peak Output Power [dBm]	Limit[dBm]	Verdict
		2402	0.98	≤20.97	PASS
DH5	Ant1	2441	2.33	≤20.97	PASS
		2480	2.54	≤20.97	PASS
		2402	3.69	≤20.97	PASS
2DH5	Ant1	2441	5.15	≤20.97	PASS
		2480	5.25	≤20.97	PASS
		2402	4.47	≤20.97	PASS
3DH5	Ant1	2441	5.94	≤20.97	PASS
		2480	6.02	≤20.97	PASS

Report No.: RA230602-31248E-RF



DH5_Ant1_2402

Date: 8.JUN.2023 14:33:59

DH5_Ant1_2441



Date: 8.JUN.2023 14:34:17

Report No.: RA230602-31248E-RF



DH5_Ant1_2480

Date: 8.JUN.2023 14:34:32

2DH5_Ant1_2402



Date: 8.JUN.2023 14:34:52

Report No.: RA230602-31248E-RF



2DH5_Ant1_2441

Date: 8.JUN.2023 14:35:10

2DH5_Ant1_2480



Date: 8.JUN.2023 14:35:27

Report No.: RA230602-31248E-RF



3DH5_Ant1_2402

Date: 8.JUN.2023 14:37:22

3DH5_Ant1_2441

Date: 8.JUN.2023 14:36:20

Report No.: RA230602-31248E-RF

3DH5_Ant1_2480

Date: 8.JUN.2023 14:36:35

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

According to ANSI C63.10-2013, section 7.8.6 and section 6.10

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in TX mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	48%
ATM Pressure:	101.0kPa

The testing was performed by Matt Liang on 2023-06-08.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the below plots:

DH5: Band Edge-Left Side Hopping

Date: 8.JUN.2023 14:22:43

Single

Spectrum								
Ref Level	20.00 dB	m Offset	11.93 dB	🖷 RBW 100 kHz				, , , , , , , , , , , , , , , , , , , ,
Att 🗧	30 d	B SWT	132.7 µs	👄 VBW 300 kHz	Mode	Auto I	FFT	
●1Pk View								
					M	1[1]		0.22 dBm
								2.4020950 GHz
10 0.0					M	2[1]		-49.59 dBm
0 dBm								2.400000 GHz
-10 dBm								
-20 dBm [1 -19.78	0 dBm						
-30 dBm								
10 10-								
-40 asm				M4				42
15 m da Marson	Law Marks	und a dust i	March .	Mr. I Amarala	AN - Price	Detro	nich The back of	www. and and the
So dom	v							
-60 dBm								
-70 dBm								
Start 2.35 G	Hz			691 pt	5			Stop 2.405 GHz
Marker								
Type Ref	Trc	X-value	.	Y-value	Func	tion	Eun	ction Result
M1	1	2.4020	95 GHz	0.22 dBm				
M2	1	2	.4 GHz	-49.59 dBm				
M3	1	2.	39 GHz	-49.97 dBm				
M4	1	2.37399	28 GHz	-47.02 dBm				
					Mela	suring		08.06.2023

Date: 8.JUN.2023 14:14:21

DH5: Band Edge- Right Side Hopping

Spectru	m	ſ													E
Ref Lev	el 20.0	DO dBm	Offset	11.93 dB	e RB	N 100	kHz								,
👄 Att		30 dB	SWT	1.1 ms	· VB	W 300	кНz	Mode	Auto	Swee	2				
●1Pk View															
							Τ	M	1[1]						1.82 dBn
10 dBm-														2.47	78280 GH
10 0011	M1							M	2[1]					-4	5.00 dBn
d den to t	Tat													2.48	33500 GH
IARDRAD	MIUE.														
And Adria				-	_		+					-		-	
00.40	D1 -	18,180	dBm												
-20 aBm-			di bi i i												
-30 dBm—															
So abiii	1.1														
-40 dBm—	+ +	M2 .			43		M	14		_					
		more	whether	al-aver	the	when when	other	knowledge	observes	nent	hunard	now	muhan	hurty	whendard
-50 dBm—	-						+					-		-	
co dom															
-60 aBm—															
-70 dBm-							_								
Start 2.4	7 CH2					60	Inte							Stop	2 55 CHz
Marker						091	. pts							stop	2.00 012
Type R	ef Tr	e	X-valu	e	Y-	value	1	Func	tion	1		Func	tion Re	sult	
M1		1	2.478	- 328 GHz		1.82 d	Bm								
M2		1	2.48	335 GHz	-	45.00 d	Bm								
M3		1		2.5 GHz	-	43.84 d	Bm								
M4		1	2.512	783 GHz	-	42.04 d	Bm								
								Mea	suring	-	11111		100	- 04	.06.2023

Date: 8.JUN.2023 14:25:21

Single

Spectrum										
Ref Level Att	20.00 dB 30 (Bm Offset dB SWT	11.93 dB 1.1 ms	 RBW 100 VBW 300 	kHz kHz	Mode	Auto S	Sweep		
●1Pk View										
					Τ	M	1[1]			1.90 dBn
10 dBm					\vdash					2.479900 GH
	M1					M:	2[1]			-44.41 dBm
0 dBm	1				+					2.483500 GH
	11									
-10 dBm	1				+					
-20 dBm	D1 -18.10	00 dBm			-					
20 00111										
-30 dBm-	-11	_			-					
	11								M4	
-40 dBm	M2	and and a second strength of the second stren	h 14 11	10		e al la ca			The second second	
50 dpm			Inner	and a second and	The			and the second sec	and the second	and the second
-50 aBm										
-60 dBm-					_					
-70 dBm					+					
Start 2.47	GHz			69:	l pts			I		Stop 2.55 GHz
Marker										
Type Ref	Trc	X-valu	e	Y-value		Func	tion		Function Re	sult
M1	1	2.47	99 GHz	1.90 d	Bm					
M2 M2	1	2.48	35 GHz	-44.41 d	Bm					
M4	1	2.5359	71 GHz	-44.55 d -42.06 d	Bm					
	1					Mea	surina.		449	08.06.2023

Date: 8.JUN.2023 14:15:26

2DH5: Band Edge-Left Side Hopping

Date: 8.JUN.2023 14:25:43

Single

Spectrum							
Ref Level	20.00 dB	m Offset	11.93 dB 📢	• RBW 100 kHz			,
Att	30 0	B SWT	132.7 µs (VBW 300 kHz	Mode Auto	o FFT	
●1Pk View							
					M1[1]		0.24 dBn
10 dBm							2.4020950 GH
					M2[1]		-48.49 dBn
0 dBm							2.400000 GH
-10 dBm							
00 40	10.76	O dD at					
-20 dbm-L	JI -19.76	U dBm					
-30 dBm							
oo abiii							
-40 dBm							
			M4			M3	Ma
ngo definante	mathan	the word	Apple april and	mall from a series	is no enderen	the lot of the state	1 Van Mana
-60 dBm		-					
TO down							
-70 dBm							
Start 2 35 (2117			691 pts			Stop 2 405 CHz
Marker	3112			051 pts	,		3(0p 2.400 driz
Type Ref	Tre	X-valu	e	Y-value	Function	Eu Fu	nction Result
M1	1	2.4020	- 195 GHz	0.24 dBm	. and ton		
M2	1		2.4 GHz	-48.49 dBm			
M3	1	2	.39 GHz	-50.53 dBm			
M4	1	2.36873	319 GHz	-47.26 dBm			
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Date: 8.JUN.2023 14:16:22

2DH5: Band Edge- Right Side Hopping

Spectrum									₽
Ref Level	20.00 dBr	n Offset	11.93 dB 🦷	RBW 100 kH	z				
Att	30 di	B SWT	1.1 ms 🧉	VBW 300 kH	z Mode	Auto !	Sweep		
●1Pk View									
					M	1[1]		1.9	2 dBm
10 d8m								2.47203	O GHz
M1					M	2[1]		-43.0	0 dBm
			ļ					2.48350	O GHZ
Mahahad	PU								
-10 dBm	-								
	1 10 000	d d d d d d d d d d d d d d d d d d d							
-20 dBm	l -18.080	dBm							
-30 dBm	6								
40 dBm	M2		140	M4					
-40 ubiii	4 Julio	mound	unente	almenter	Marine	meno	non my wind	mingrain would be	and the second
-50 dBm	8	19.9	1.1.1.1		003	1	8 0.0.2	S 15 13 1	
-60 dBm				+		<u> </u>			
-70 dBm				++					
Start 2.47 G	Hz			691 p	ts			Stop 2.55	i GHz
Marker									
Type Ref	Trc	X-valu	e	Y-value	Func	tion	Fu	nction Result	
M1	1	2.472	03 GHz	1.92 dBm	1				
M2	1	2.48	35 GHz	-43.00 dBm	1				
M3	1	2	2.5 GHz	-44.56 dBm	1				
M4	1	2.5022	32 GHz	-41.76 dBm					
	Υ T				Mex	suring		140	023

Date: 8.JUN.2023 14:28:39

Single

Spectrum						
Ref Level	20.00 dBr	n Offset 11.93 dB	RBW 100 kHz			, , , , , , , , , , , , , , , , , , ,
Att	30 d	B SWT 1.1 ms	VBW 300 kHz	Mode Auto 9	Sweep	
1Pk View						
				M1[1]		1.87 dBn
10 dBm						2.480130 GH
	M1			M2[1]		-44.89 dBn
0 dBm	X					2.483500 GH
	1					
-10 dBm						
-20 dBm	D1 -18.130) dBm				
	11					
-30 dBm	1.					
	4 1			-		
-40 dBm	M2		43	M4		
some	hand	- marganer alla lan	Therementer	And from the most	hanner	unantitation
-50 dBm-						
-60 dBm-						
-70 dBm						
Start 2.47	GHz		691 pts			Stop 2.55 GHz
Marker						
Type Ref	Trc	X-value	Y-value	Function	Euni	ction Result
M1	1	2.48013 GHz	1.87 dBm			
M2	1	2.4835 GHz	-44.89 dBm			
M3	1	2.5 GHz	-44.37 dBm			
M4	1	2.518464 GHz	-42.22 dBm			
	T			1		# MA 08.06.2023

Date: 8.JUN.2023 14:17:15

3DH5: Band Edge-Left Side Hopping

Spectru	m										
Ref Lev	el 20	0.00 d	Bm Offset	11.91 dB	🖷 RBW	100 kHz					
Att		30	dB SWT	132.7 µs	VBW	300 kHz	Mode	Auto F	FT		
1Pk View	4										
							M	1[1]			0.25 dBm
10 dBm—	_									2.4	042440 GHz
							M	2[1]			-48.92 dBm
0 dBm-	+			+						2.9	FUUUUUU GHZ
											My/M
-10 dBm-	+										
20 dBm	01	-10.7	50 dBm								
-20 ubm-	UI	-19.7	JUUBIN								
-30 dBm-	+-				_	+					
-40 dBm-	+		Md								1
i mai tanà 1			And The			CARLES DO			M3		Ma
-90 dBm-	a france	- Vin	a day and and	diam'r	And a strange	Photos and	Mary Pros		mary haven	Mana and and and and and and and and and	1400 C
-60 dBm-											
oo abiii											
-70 dBm-	+-		_	+							
Start 2.3	5 GH	z				691 pt	5			Stor	2.405 GHz
Marker											
Type F	tef	Trc	X-valu	e	Y-v	alue	Func	tion	Fu	nction Resu	lt
M1		1	2.404	244 GHz	0	1.25 dBm					
M2		1		2.4 GHz	-48	1.92 dBm					
M3 M4		1	2 3636	39 GHZ	-49	7.60 dBm 7.64 dBm					
		<u> </u>	2.5050.		- 11	to r ubili	<u></u>	_		B 110	00.05.2022
		l					Mea			100	

Date: 8.JUN.2023 14:29:14

Single

Spectr	rum								
Ref Le	evel	20.00 de 30	3m Offset dB SWT	11.93 dB 132.7 µs	 RBW 100 kH VBW 300 kH 	z z Mode	Auto F	FT	
⊖1Pk Vie	ew								
						м	1[1]		0.26 dBr
10 dBm-	\rightarrow						0[1]		2.4020950 GH
						DATE:	2[1]		2 400000 GF
0 dBm—	+								
10 dBm									
-10 UBII	Т								
-20 dBm		1 -19.74	40 dBm		_				
-30 dBm	+			<u> </u>					
40 dD-									V Y
M4								M2	M2
ASO UBM	hund		and marken by	manna	un work hanne	المتعور معامله ومعالي	wellan-	and the state	And man burners
					- C				
-60 dBm	+			<u> </u>					
70 40-									
-70 aBm									
Obart O									01-01-01-01-01-01-01-01-01-01-01-01-01-0
Start 2	.35 G	HZ			041 t	JIS			Stup 2.405 GH2
Type	Ref	Tre	X-yalu	p	Y-value	Euro	tion	Eur	nction Result
M1		1	2,4020	95 GHz	0.26 dBn	n		1 41	action result
M2		1		2.4 GHz	-47.57 dBn	n			
MЗ		1	2	39 GHz	-50.12 dBn	n			
M4		1	2.35167	'39 GHz	-47.19 dBn	n			
		Τ				Mela	suring.		08.06.2023

Date: 8.JUN.2023 14:17:55

3DH5: Band Edge- Right Side Hopping

Spectrum									l □ □
Ref Level	20.00 dBr	m Offset 1	1.93 dB	• RBW 100 kHz					(
Att 🗧	30 d	B SWT	1.1 ms 🧃	VBW 300 kHz	Mode Au	uto Swe	ер		
●1Pk View									
					M1[:	1]			1.92 dBm
10 dBm								2.	479090 GHz
M	1				M2[:	1]			-44.40 dBm
0.dBm								2.	483500 GHz
Compart from the	~]								
-10 dBm									
-20 dBm	1 -18.080	0 dBm							
-30 dBm	6			+					
	1			M4					
-40 dBm	ME	to be used for the start	Market Market	have a lock of the	the base is b	web at .	a har and	where which a	A him dature
50 d0m				al a mar a mar and mar					
-50 dBm									
-60 dBm									
-oo abiii		1 1							
-70 dBm								_	
Start 2.47 G	Hz			691 pt:	s			Sto	p 2.55 GHz
Marker									
Type Ref	Trc	X-value		Y-value	Functio	n	Fur	nction Resu	lt
M1	1	2.4790	9 GHz	1.92 dBm					
M2	1	2.483	35 GHz	-44.40 dBm					
M3	1	2	5 GHz	-44.30 dBm					
M4	1	2.50582	6 GHz	-41.74 dBm					
					Measu	ring		144	08.06.2023

Date: 8.JUN.2023 14:32:52

Single

Spectrum												
Ref Level Att	20.00 d 30	Bm Offset dB SWT	11.93 dB 1.1 ms	RBWVBW	100 kHz 300 kHz	Mode	Auto S	Sweep			\	
●1Pk View												
					M1[1]					1.84 dBm		
10 dBm		_					2.480130 GHz					
	M1			M2[1]					-44.29 dBm			
0 dBm	A	-								2.4	83500 GH2	
10 d0 m												
-10 dBm												
-20 dBm-	01 -18.1	60 dBm		_								
	1											
-30 dBm	54	-										
-40 dBm	Ma			43	M4							
mour	LAR	moundaries	in mon	Kingerman	unterm	mark	hhuhu	manne	munipol	wars	moun	
-50 dBm					-		~ ~					
-60 dBm												
oo abiii												
-70 dBm												
Start 2.47 (GHz				691 pt	5				Stop	2.55 GHz	
Marker												
Type Ref	Trc	X-value		Y-value		Func	Function		Function Result			
M1	1	2.48013 GHz		1.84 dBm								
M2	1	2.4835 GHz		-44.29 dBm								
M3	1	1 2.5 GHz		-44.10 dBm								
M14	1	2.507	97 GHZ	-42	JUS dBm		_	I				
	M.					Mea	suring			0	8.06.2023	

Date: 8.JUN.2023 14:18:49

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Version 7: 2023-01-30