

Report No.: NTC2302150FV00

FCC RADIO TEST REPORT

Applicant: Summit Electronics LLC
Address : 1 Rewe Street, Brooklyn, New York, 11211 United States
Manufacturer Summit Electronics LLC
Address 1 Rewe Street, Brooklyn,New York,11211 United States
Factory: Summit Electronics LLC
Address 1 Rewe Street, Brooklyn,New York,11211 United States
Product Name : True Wireless Speaker
Brand Name : COBY
Model No : CPA89FD, CPA895BK, CPA895 (For model difference refer to section 2)
FCC ID: 2AMSOCPA89FD
Measurement Standard : 47 CFR FCC Part 15, Subpart C (Section 15.247) Receipt Date of Samples : February 13, 2023
Date of Tested: February 14, 2023 to February 23, 2023
Date of Report: February 24, 2023

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by Alina Guo / Project Engineer



Dongguan Nore Testing Center Co., Ltd. Address: Building D, Gaosheng Science and Technology park, Hongtu road, Nancheng district, Dongguan city, Guangdong province, China Web: <u>www.ntc-c.com</u> <u>Tel:+86-769-2202 2444</u> Fax:+86-769-2202 2799



Table of Contents

1. Summary of Test Result	4
2. General Description of EUT	5
3. Test Channels and Modes Detail	8
4. Configuration of EUT	8
5. Modification of EUT	8
6. Description of Support Device	9
7. Test Facility and Location	10
8. Applicable Standards and References	11
9. Deviations and Abnormalities from Standard Conditions	11
10. Test Conditions	12
11. Measurement Uncertainty	13
12. Sample Calculations	14
13. Test Items and Results	15
13.1 Conducted Emissions Measurement	15
13.2 Radiated Spurious Emissions and Restricted Bands Measurement	19
13.3 Channel Separation test	26
13.4 20dB Bandwidth	29
13.5 Hopping Channel Number	32
13.6 Time of Occupancy (Dwell Time)	34
13.7 Maximum Peak Output Power	37
13.8 Band Edge Conducted Spurious Emission Measurement	40
13.9 Antenna Requirement	44
14. Test Equipment List	45



Revision History

Report Number	Description	Issued Date
NTC2302150FV00	Initial Issue	2023-02-24



1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.247(a)(1)	Channel Separation test	PASS	
§15.247(a)(1)	20dB Bandwidth	PASS	
§15.247(a)(1)(iii)	Hopping Channel Number	PASS	
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	PASS	
§15.247(b)	Max Peak output Power test	PASS	
§15.247(d)	Band edge test	PASS	
§15.207 (a)	AC Power Conducted Emission	PASS	
§15.247(d),§15.209, §15.205	Radiated Emission	PASS	
§15.203	Antenna Requirement	PASS	
§15.247(d)	Conducted Spurious Emission	PASS	



2. General Description of EUT

Product Information	
Product name:	True Wireless Speaker
Main Model Name:	CPA89FD
Additional Model Name:	CPA895BK ,CPA895
Model Difference:	These models have the same circuitry, electrical mechanical, PCB Layout and physical construction. The difference is model name due to marketing purpose.
S/N:	2302-0841
Brand Name	СОВҮ
Hardware version:	Not Stated
Software version:	Not Stated
Rating:	DC 5V come from USB port or DC 3.7V from internal battery
Classification:	Class B
Typical arrangement:	Tabletop
I/O Port:	Refer to the user manual.
Accessories Information	
Adapter:	N/A
Cable:	USB Line: 0.24m, unshielded, detachable
Other:	N/A
Additional Information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.



Technical Specification	
Bluetooth Version:	V5.3
Frequency Range:	2402-2480MHz
Modulation Type:	GFSK, π/4-DQPSK
Number of Channel:	79 (refer to following channel list for details)
Channel Space:	1MHz
Antenna Type:	PCB antenna
Antenna Gain:	-0.58 dBi (Declared by manufacturer)
Note:	The EUT does not support Bluetooth Low Energy feature in accordance with the manufacturer declaration.



	Channel List						
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2422	41	2442	61	2462
2	2403	22	2423	42	2443	62	2463
3	2404	23	2424	43	2444	63	2464
4	2405	24	2425	44	2445	64	2465
5	2406	25	2426	45	2446	65	2466
6	2407	26	2427	46	2447	66	2467
7	2408	27	2428	47	2448	67	2468
8	2409	28	2429	48	2449	68	2469
9	2410	29	2430	49	2450	69	2470
10	2411	30	2431	50	2451	70	2471
11	2412	31	2432	51	2452	71	2472
12	2413	32	2433	52	2453	72	2473
13	2414	33	2434	53	2454	73	2474
14	2415	34	2435	54	2455	74	2475
15	2416	35	2436	55	2456	75	2476
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461		

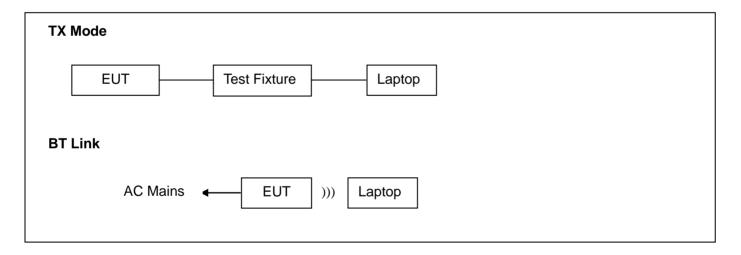


3. Test Channels and Modes Detail

No.	Mode	Channel	Frequency (MHz)	Modulation	
1	ТХ	Hopping	2402-2480	GFSK/π/4-DQPSK	
2	ТХ	Low	2402	GFSK/π/4-DQPSK	
3	ТХ	Mid 2441		GFSK/π/4-DQPSK	
4	ТХ	High	2480	GFSK/π/4-DQPSK	
5.	BT Link				

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

4. Configuration of EUT



5. Modification of EUT

No modifications are made to the EUT during all test items.



6. Description of Support Device

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks		
1.	Laptop	Lenovo	R720-151KBN	PF0Z35FH	Power cord, 1.8m,	Provided by the lab		
2.	Power supply (Laptop)	Delta	ADL135NDC3A		unshielded	unshielded F		Provided by the lab
3.	Test fixture					Provided by manufacturer		
4.	Adapter	HUWEI	HW-050200C01			Provided by the lab		

No.	Test Software	Modulation	Power Setting
1.	FCC assist 1022	GFSK	10
2.	FCC_assist_1.0.2.2	π/4-DQPSK	10





7. Test Facility and Location

Test Site	•	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)			
Accreditations and	:	The Laboratory has been assessed and proved to be in compliance with			
Authorizations		CNAS/CL01			
		Listed by CNAS, August 13, 2018			
		Certificate Registration Number is L5795.			
		The Certificate is valid until August 13, 2024			
		The Laboratory has been assessed and proved to be in compliance with ISO17025			
		Listed by A2LA, November 01, 2017			
		Certificate Registration Number is 4429.01			
		Listed by FCC, November 06, 2017			
		Test Firm Registration Number: 907417			
		Listed by Industry Canada, June 08, 2017			
		The Certificate Registration Number. Is 46405-9743A			
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng			
		District, Dongguan City, Guangdong Province, China			



8. Applicable Standards and References

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

Test Standards:

47 CFR Part 15, Subpart C, 15.247 ANSI C63.10-2013

References Test Guidance:

DTS KDB 558074 D01 15.247 Meas Guidance v05r02

Remark:

The EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.



10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	Channel Separation test	1	DC 3.7V	Sean	See note ¹
2.	20dB Bandwidth	2-4	DC 3.7V	Sean	See note ¹
3.	Hopping Channel Number	1	DC 3.7V	Sean	See note ¹
4.	Time of Occupancy (Dwell Time)	1	DC 3.7V	Sean	See note ¹
5.	Max Peak output Power test	2-4	DC 3.7V	Sean	See note ¹
6.	Band edge test	1-4	DC 3.7V	Sean	See note ¹
7.	AC Power Conducted Emission	5	AC 120V 60Hz	Sean	See note ¹
8.		1-5	AC 120V 60Hz	Sean	See note ¹
0.	Radiated Emission	1-5	DC 3.7V	Sean	See note
9.	Antenna Requirement				
10.	Conducted Spurious Emission	1-4	DC 3.7V	Sean	See note ¹

Note:

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35 ℃, 30~70%, 86~106kPa

2. For test voltage AC 120V 60Hz was come from the Adapter, and only the worst case was recorded in this report.



11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	
		9kHz ~ 30MHz	±2.60 dB	
0	Radiated Emission Test	30MHz ~ 1GHz	±4.68 dB	
2.		1GHz ~ 18GHz	±5.14 dB	
		18GHz ~ 40GHz	±5.14 dB	
3.	RF Conducted Test	10Hz ~ 40GHz	±1.06 dB	
4.	RF Output Power	10Hz ~ 40GHz	±0.86 dB	
5.	Power Spectral Density	10Hz ~ 40GHz	±1.06 dB	
6.	Occupied Channel Bandwidth		±1.42 x10-4% MHz	
Note		1	1	

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. The measurement uncertainly levels above are estimated and calculated according to CISPR 16-4-2.

3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.



12. Sample Calculations

Conducted Emission												
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector						
0.1620	38.50	10.60	49.10	65.36	-16.26	QP						
Where,												
Freq.	= Emiss	ion frequency in M⊦	lz									
Reading Lev	rel = Spect	rum Analyzer/Recei	ver Reading									
Corrector Fa	ctor = Inserti	on loss of LISN + C	able Loss + RF Sv	itching Unit	attenuation							
Measuremer	nt = Readi	= Reading + Corrector Factor										
Limit	= Limit s	= Limit stated in standard										
Margin	= Measu	= Measurement - Limit										
Detector	= Readi	= Reading for Quasi-Peak / Average / Peak										

Radiated Spurious Emissions and Restricted Bands												
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector						
65.890	33.10	-7.90	25.20	40.00	-14.80	QP						
Where,	Where,											
Freq.	= Emiss	ion frequency in M⊦	lz									
Reading Lev	el = Spect	rum Analyzer/Recei [,]	ver Reading									
Corrector Fa	ctor = Anten	na Factor + Cable L	oss - Pre-amplifier									
Measuremer	nt = Readi	ng + Corrector Factor	or									
Limit	= Limit s	stated in standard										
Over	= Margi	= Margin, which calculated by Measurement - Limit										
Detector	= Readi	ng for Quasi-Peak /	Average / Peak									

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.



13. Test Items and Results

13.1 Conducted Emissions Measurement

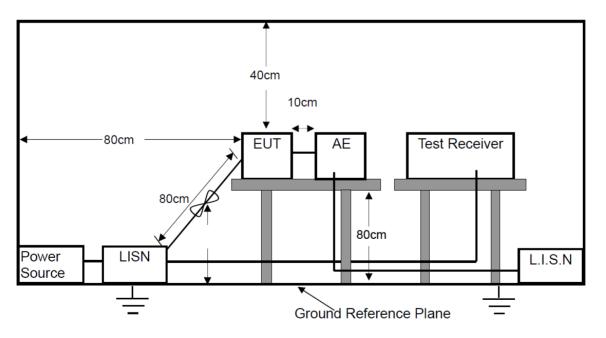
LIMIT

According to the requirements of FCC PART 15.207, the limits are as follows:

Frequency (MHz)	Quasi-peak	Average							
0.15 to 0.5	66 to 56	56 to 46							
0.5 to 5	56	46							
5 to 30	60	50							
Note: 1. If the limits for the average detector are met when using the quasi-peak detector, then the limits									
for the measurements with the average detector are considered to be met.									

- 2. The lower limit shall apply at the transition frequencies.
- 3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

BLOCK DIAGRAM OF TEST SETUP





TEST PROCEDURES

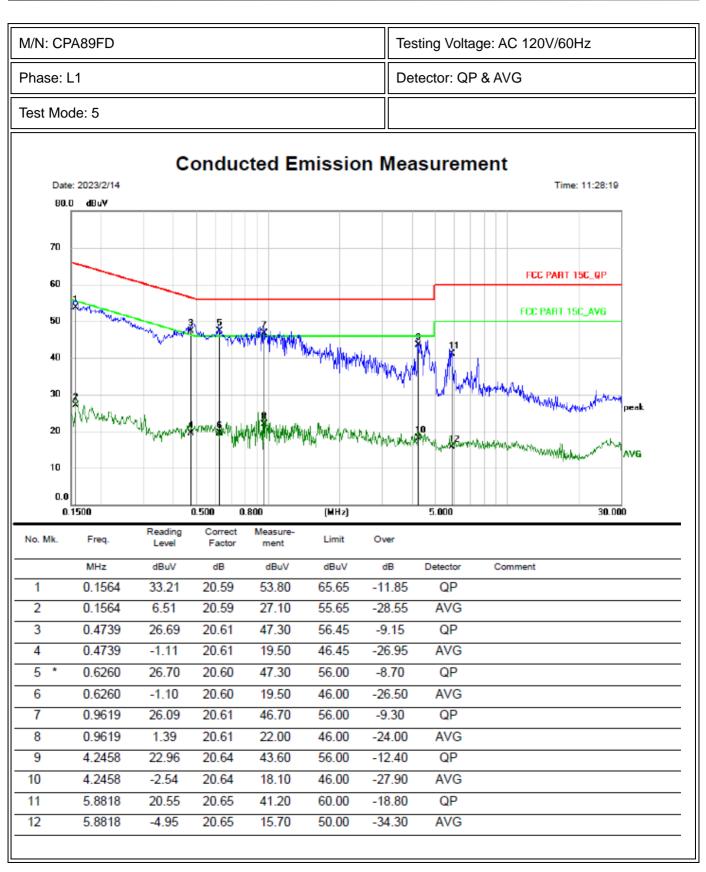
- a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.
- b. All I/O cables and support devices were positioned as per ANSI C63.10.
- c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).
- d. Connect all support devices to the other LISN and AAN, if needed.
- e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

TEST RESULTS

PASS

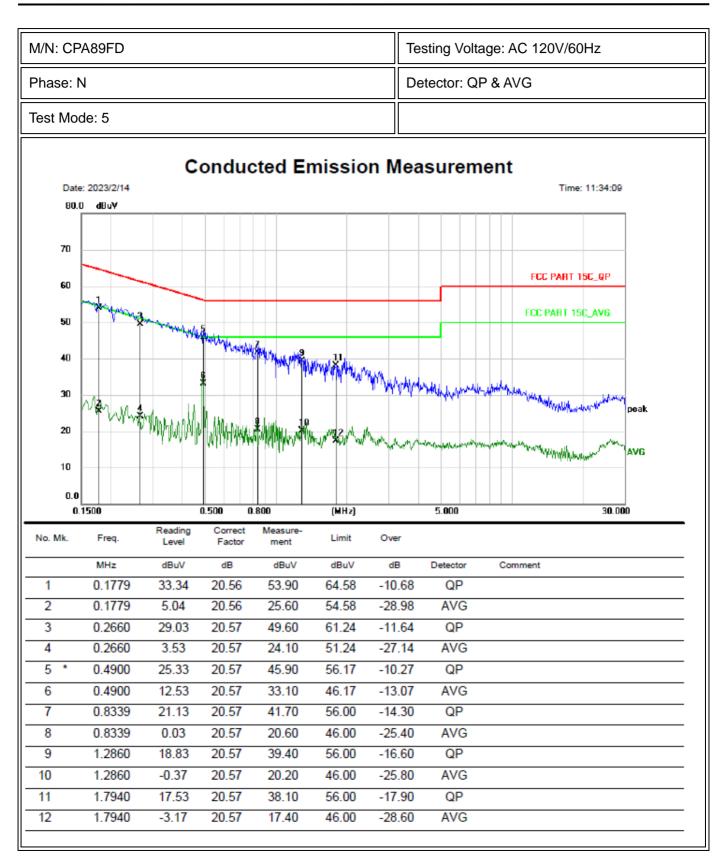














13.2 Radiated Spurious Emissions and Restricted Bands Measurement

LIMIT

Frequency range	Distance Meters	Field Strengths Limit (15.209)		
MHz	Distance meters	μV/m		
0.009 ~ 0.490	300	2400/F(kHz)		
0.490 ~ 1.705	30	24000/F(kHz)		
1.705 ~ 30	30	30		
30 ~ 88	3	100		
88 ~ 216	3	150		
216 ~ 960	3	200		
Above 960	3	500		

Remark: (1) Emission level (dB) μ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

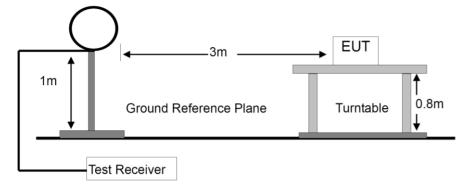
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

- (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
- (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

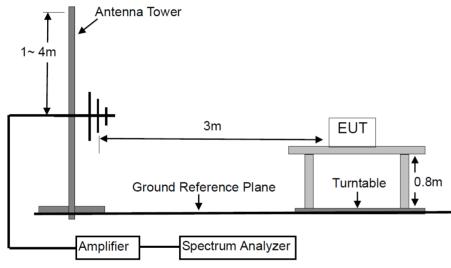


BLOCK DIAGRAM OF TEST SETUP

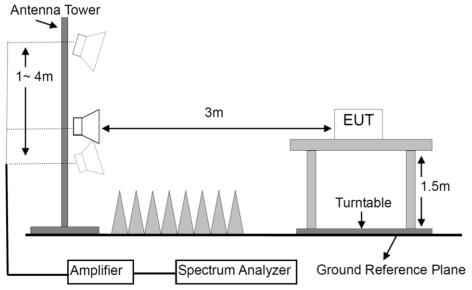
For Radiated Emission below 30MHz



For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.





TEST PROCEDURES

- a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi- anechoic chamber room.
- b. For the radiated emission test above 1GHz:

The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.



During the radiated emission test, the spectrum analyzer was set with the following configurations:

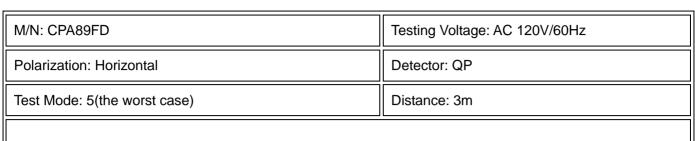
Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

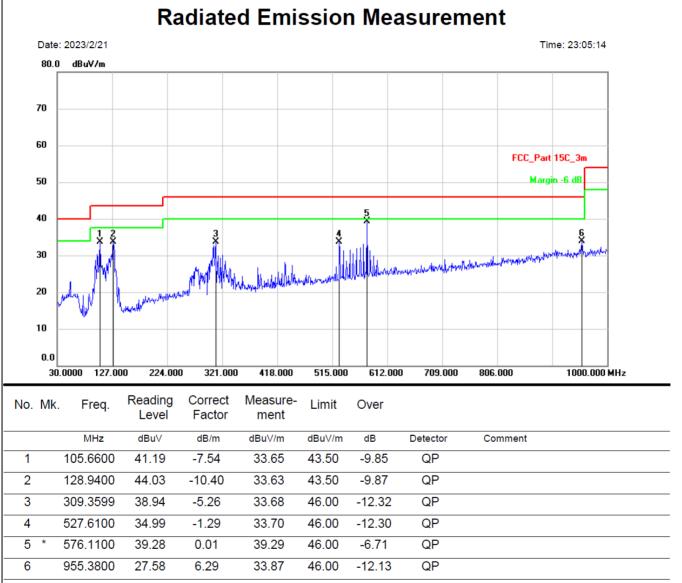
TEST RESULTS

PASS





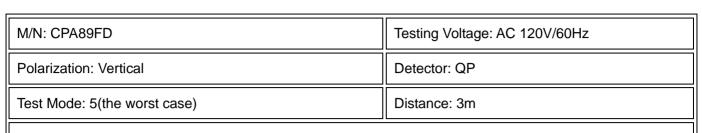


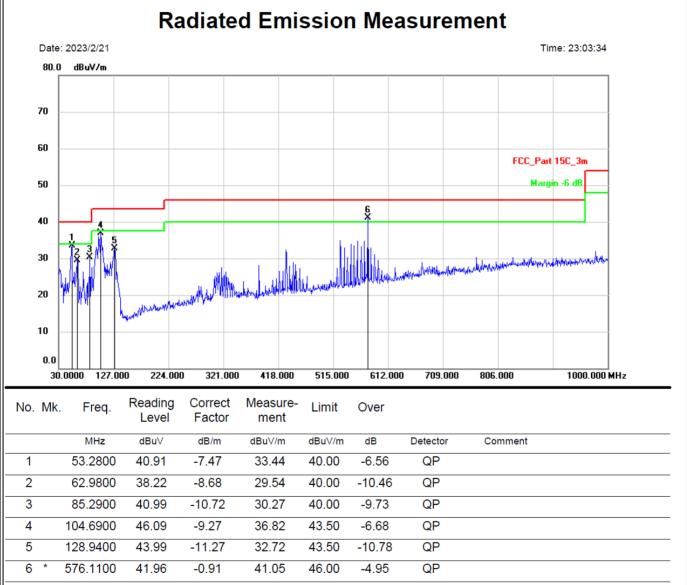


Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.









Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



Modulation:	π/4-DQPSI	K (the wore	st case)	Test Result: PASS			Test frequency range: 1-25GHz			
Freq.	Ant. Pol.	Read Level(d	-	Factor (dB/m)		Limit 3m (dBuV/m)		Margin (dB)		
(MHz)	(H/V)	PK	AV	(dB/m)	PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
4804	V	47.99	37.35	6.30	54.29	43.65	74.00	54.00	-19.71	-10.35
7206	V	45.93	36.47	10.44	56.37	46.91	74.00	54.00	-17.63	-7.09
4804	Н	47.79	39.60	6.30	54.09	45.90	74.00	54.00	-19.91	-8.10
7206	Н	45.88	36.51	10.44	56.32	46.95	74.00	54.00	-17.68	-7.05
			Ope	eration Mod	de: TX Moo	le (Mid)	-			
4882	V	47.85	40.18	6.60	54.45	46.78	74.00	54.00	-19.55	-7.22
7323	V	45.57	35.48	10.55	56.12	46.03	74.00	54.00	-17.88	-7.97
4882	Н	48.34	41.19	6.60	54.94	47.79	74.00	54.00	-19.06	-6.21
7323	Н	46.26	36.37	10.55	56.81	46.92	74.00	54.00	-17.19	-7.08
			Ope	ration Mod	le: TX Mod	e (High)	-			
4960	V	48.48	41.06	6.89	55.37	47.95	74.00	54.00	-18.63	-6.05
7440	V	45.57	35.48	10.60	56.17	46.08	74.00	54.00	-17.83	-7.92
4960	Н	48.46	41.96	6.89	55.35	48.85	74.00	54.00	-18.65	-5.15
7440	Н	45.70	36.18	10.60	56.30	46.78	74.00	54.00	-17.70	-7.22
			Spurio	us Emissio	on in restric	cted band	:			
2390.000	V	54.17	35.98	0.09	54.26	36.07	74.00	54.00	-19.74	-17.93
2390.000	Н	53.30	34.96	0.09	53.39	35.05	74.00	54.00	-20.61	-18.95
2483.500	V	54.28	41.54	0.34	54.62	41.88	74.00	54.00	-19.38	-12.12
2483.500	Н	54.75	40.98	0.34	55.09	41.32	74.00	54.00	-18.91	-12.68
Remark:	Data of m reading of			•						ans the



13.3 Channel Separation test

LIMIT

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.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Enable the EUT hopping function.
- d. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 7.8.2.

TEST RESULTS

PASS



Modulation	Channel	Frequency (MHz)	Hopping Separation Measurement (MHz)	Hopping Separation Limit (MHz)	Test Result
	Low	2402	1.005	>0.640	Pass
GFSK	Mid	2441	1.002	>0.639	Pass
	High	2480	0.999	>0.637	Pass
	Low	2402	1.002	>0.855	Pass
π/4-DQPSK	Mid	2441	0.999	>0.856	Pass
	High	2480	0.999	>0.855	Pass



GFSł	GFSK / Mid Channel					
Spectrum Analyzer 1						
KEYSIGHT Input RF Input Z: 50 Ω R ↔ Align: Auto Freq Ref: Int (S)	PNO. Best Wide #Avg Type: Power (RMS] 1 2 3 4 5 6 Gate: 0ff Avg Hold >100/100 M W W W W W M W W W W W W W W W W W W W<		KEYSIGHT Input: RF R ↔ Couping: DC Align: Auto	Input Z: 50 Ω #Atten: 30 dB Corr CCorr Freq Ref: Int (S)	PNO: Best Wide #Avg Type: Power (RMS 1 2 3 4 5 6 Gate: Off Avg]Hold > 100/100 IF Gain: Low Trig: Free Run Sig Track Off P N N N N N	
1 Spectrum V Scale/Div 10 dB	Ref Lvi Offset 8.19 dB Ref Level 20.00 dBm	ΔMkr1 1.005 MHz -0.03 dB	1 Spectrum v Scale/Div 10 dB		Ref Lvl Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 1.002 MHz -0.03 dB
Log		1Δ2	Log 10.0			1Δ2
-100 -200 -300 -400	X2		-10.0 -20.0 -30.0 -40.0		X2	
-50.0			-50.0			
Center 2.402000 GHz #Res BW 100 kHz 5 Marker Table •	≇Video BW 300 kHz	Span 3.000 MHz Sweep 1.00 ms (1001 pts)	Center 2.441000 GHz #Res BW 100 kHz 5 Marker Table		#Video BW 300 kHz	Span 3.000 MHz Sweep 1.00 ms (1001 pts)
Mode Trace Scale X 1 Δ2 1 f (Δ) 1.005 MHz (Δ) 2 F 1 f 2.401 898 GHz 3 2.401 898 GHz	Y Function Function Width -0.03285 dB -2.917 dBm	Function Value	Mode Trace Scale 1 Δ2 1 f (Δ) 2 F 1 f (Δ) 3	X Δ) 1.002 MHz (Δ) 2.440 901 GHz	Y Function Function Width -0.02521 dB -4.328 dBm	Function Value
4 5 6			4 5 6			
Feb 14, 2023 P			1 ?	Feb 14, 2023		
GFSk	(/ High Channel			π/4-DQP	SK / Low Channel	
Spectrum Analyzer 1			Spectrum Analyzer 1 Swept SA	• +		
KEYSIGHT Input RF Input Z.50 Ω #Atten: 30 dB R → Coupling DC Corr CCorr Align: Auto Freq Ref. Int (S)	PNO. Best Wide #Avg Type: Power (RMS] 2 3 4 5 6 Gate: Off AvgH-bid >100/100 M W W W W W W W W W W W Sig Track: Off M W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W		KEYSIGHT Input: RF R ↔ Coupling: DC Align: Auto	Input Z: 50 Ω #Atten: 30 dB Corr CCorr Freq Ref: Int (S)	PNO: Best Wide #Avg Type: Power (RMS 1 2 3 4 5 6 Gate: Off Avg Hold: 100/100 IF Gain: Low Trig: Free Run Sig Track: Off P N N N N N	
1 Spectrum Scale/Div 10 dB	Ref Lvi Offset 7.79 dB Ref Level 20.00 dBm	ΔMkr1 999 kHz 0.00 dB	1 Spectrum v Scale/Div 10 dB		Ref Lvi Offset 8.19 dB Ref Level 20.00 dBm	ΔMkr1 1.002 MHz -0.01 dB
Log 100 000 -100 -200	1/1/2		Log 10.0 -10.0 -20.0		X2	1Δ2
300 400 500 700 Conter 2,480000 GHz #Res BW 100 KHz	#Video BW 300 kHz	Soan 3.000 MHz	-30 0 -40 0 -50 0 -70 0 Center 2.402000 GHz #Res BW 100 kHz		#Video BW 300 kHz	Span 3.000 MHz Sweep 1.00 ms (1001 pts)
#Res BW 100 kHz 5 Marker Table V		Span 3.000 MHz Sweep 1.00 ms (1001 pts)	#Res BW 100 kHz 5 Marker Table Y			Sweep 1.00 ms (1001 pts)
Mode Trace Scale X 1 Δ2 1 f (Δ) 999 6H2 (Δ) 2 F 1 f Δ2-478 502 GHz 3 4 5 6 6	Y Function Function Width -0.001/218 dB -3.829 dBm	Function Value	Mode Trace Scale 1 Δ2 1 f (// 2 F 1 f // 3 4 5 6 6	X Δ) 1.002 MHz (Δ) 2.402 219 GHz	Y Function Function Width -0.01031 dB -3.016 dBm	Function Value
E C C Feb 14, 2023			₹ 2	Feb 14, 2023		
· · · · · · · · · · · · · · · · · · ·	PSK / Mid Channel				SK / High Channel	
Spectrum Analyzer 1 + Swept SA + KEYSIGHT Input RF Input Z 50 0 R + Coupling DC Corr CCorr R + Align Auto Freq Ref. Int (S)	PNO. Best Wide #Avg Type. Power (RMS 1 2 3 4 5 6) Gate. Off AvgHold >100 100 IF Gain Low Trig. Free Run Sig Track: Off P N N N N N		Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω #Atten: 30 dB Corr CCorr Freq Ref: Int (S)	PNO Best Wide #Avg Type: Power (RMS 2 3 4 5 6 Gate Off Avg Hold > 100 100 IF Gain: Low M W W W W Sig Track: Off P N N N N N N	
1 Spectrum Scale/Div 10 dB	Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 999 kHz -0.01 dB	1 Spectrum v Scale/Div 10 dB		Ref Lvi Offset 7.79 dB Ref Level 20.00 dBm	ΔMkr1 999 kHz 0.01 dB
Log 100 0.00 .100 .200	X_2	1Δ2	Log 10.0 .000 .10.0 .20.0	X ₂	¢1Δ2	
-360 -400 -560 -600 -700			-30.0 -40.0 -50.0 -60.0 -70.0			
Center 2.441000 GHz #Res BW 100 kHz 5 Marker Table	≇Video BW 300 kHz	Span 3.000 MHz Sweep 1.00 ms (1001 pts)	Center 2.480000 GHz #Res BW 100 kHz 5 Marker Table		#Video BW 300 kHz	Span 3.000 MHz Sweep 1.00 ms (1001 pts)
Mode Trace Scale X 1 42 1 f (b) 999 bHz (b) 2 F 1 f 2.441 222 GHz 4 5 5 6	Y Function Function Width -0.008121 dB -4.358 dBm	Function Value	Mode Trace Scale <u>1 Δ2 1 f (</u> 2 F 1 f 3 4 5 6	X Δ) 999 kHz (Δ) 2.479 223 GHz	Y Function Function Width 0.01385-dB -3.913 dBm	Function Value
Feb 14, 2023				Feb 14, 2023		

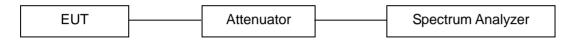


13.4 20dB Bandwidth

LIMIT

N/A

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 6.9.2.

TEST RESULTS

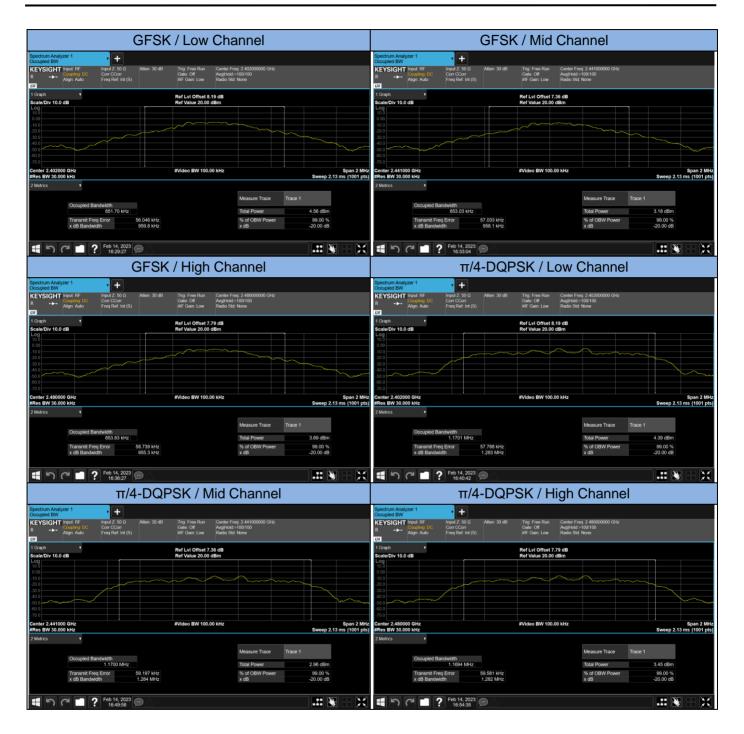
PASS





Modulation	Channel	Frequency (MHz)	20dB Measurement (MHz)	Limit (MHz)	Remark
	Low	2402	0.960		
GFSK	Mid	2441	0.958		
	High	2480	0.955		Reporting
	Low	2402	1.283		only
π/4-DQPSK	Mid	2441	1.284		
	High	2480	1.282		





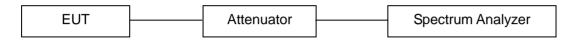


13.5 Hopping Channel Number

LIMIT

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

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Enable the EUT hopping function.
- d. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 7.8.3.

TEST RESULTS

PASS



Modulation		Hopping Channels asurement	5	Limit	Test Result
GFSK		79		≥15	PASS
π/4-DQPSK		79		≥15	PASS
	The wors	st case: π/4-DQPS	SK		
Spectrum Analyzer 1	•				
KEYSIGHT Input: RF Input: Z: 1 R ↔ Coupling: DC Corr CCC Align: Auto Freq Ref	rr G Int (S) IF	NO: Fast #Avg Type: Po late: Off Avg[Hold:>100 Gain: Low Trig: Free Run ig Track: Off	וא M	3 4 5 6 / ₩ ₩ ₩ ₩ I N N N N	
1 Spectrum v Scale/Div 10 dB		f Lvi Offset 8.19 dB f Level 20.00 dBm		ΔMkr1	78.490 0 MHz 1.35 dB
Log 10.0 -10.0 -10.0	4-row Multille Maria	JAJA JAM Mary Marker Con	ᡧᠴᡵᠨ᠘᠕ᢩᡘᠼᠺᢂ	ᢂᢞ᠕ᡔᠰᢦᡎ᠇ᢛᠰᢣᡘᡆ᠆ᢛᢂᡁᠰᢧᠰᢛᡮᢧ	<u>1</u> ∆2.
-20.0 -30.0 -40.0					
-50.0 ⁴ -60.0 -70.0					
Start 2.40000 GHz #Res BW 100 kHz	#	Video BW 300 kHz		Swee	Stop 2.48350 GHz p 8.00 ms (1001 pts)
5 Marker Table v Mode Trace Scale	X	Y Function	Eunctio	n Width Fu	inction Value
$\begin{array}{c cccc} \text{Mode} & \text{Irace Scale} \\ \hline 1 & \Delta 2 & 1 & f & (\Delta) \\ \hline 2 & F & 1 & f \\ \hline 3 & & & \\ 4 & & & \\ 5 & & & & \\ 6 & & & \\ \end{array}$	X 78.490 0 MHz (Δ) 2.401 753 5 GHz	Y Function 1.346 dB -7.832 dBm	Functio	m waa Fu	
E 5 C I ? Feb 14 17:13	2023 3:09				

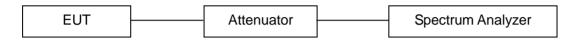


13.6 Time of Occupancy (Dwell Time)

LIMIT

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.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Enable the EUT hopping function.
- d. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 7.8.4.

TEST RESULTS

PASS



Modulation	Packet	Frequency (MHz)		Dwell Time Measurement (msec)	Limit (msec)	Test Result	
	DH1	2441	0.375	(ms)*(1600/(2*79))*31.6=	120.00	400	Pass
GFSK	DH3	2441	1.630	(ms)*(1600/(4*79))*31.6=	260.80	400	Pass
	DH5	2441	2.878	(ms)*(1600/(6*79))*31.6=	306.99	400	Pass
	2-DH1	2441	0.385	(ms)*(1600/(2*79))*31.6=	123.20	400	Pass
π/4-DQPSK	2-DH3	2441	1.635	(ms)*(1600/(4*79))*31.6=	261.60	400	Pass
	2-DH5	2441	2.885	(ms)*(1600/(6*79))*31.6=	307.73	400	Pass



GFSK / DH1			GFSK / DH3			
Spectrum Analyzer 1		s	Spectrum Analyzer 1	•		
	an: 30 dB PNO: Fast #Avg Type: Power (RMS 1 2 3 4 5 6 Gate: Off Ting: Video IF Gain: Low Ting Detay: -500 0 µs W W W W W W Sig Track: Off	F	KEYSIGHT Input: RF Input: Z: 5 Coupling: DC Corr CCo Align: Auto Freq Ref:	0 Ω #Atten: 30 dB PNO: Fast #Avg Type: Power (RMS 1 2 rr Gate: Off Trig: Video με (S) με Gain: Low Tring Video 0 με	3456 VWWW INNN	
1 Spectrum v Scale/Div 10 dB	Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm		I Spectrum V Scale/Div 10 dB	Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 1.630 ms -0.04 dE	
100 -200 X21 W 1	η1Δ2	TRIS LVL	100 0.00 10.0 20.0	1Δ2	TRIG LV	
-30.0 40.0 -50.0 -50.0 -50.0	ในกระดูสารสารกระบาทการการการการการการการการการการการการการก	าร์กไปประเทศสารการสารการสารการสาร	40 0 50 0 50 0 70 0	าร _{าการ} ปลุดุมาร์ปูกกระสงคมประชาวการประสาชรูปสุดราชรู	อุรามปัญปัตร์อีนที่สุดทุกที่มีที่มูปการที่สารที่ได้ได้ที่สาง	
Center 2.441000000 GHz Res BW 1.0 MHz 5 Marker Table T	≇Video BW 3.0 MHz		Center 2.441000000 GHz Res BW 1.0 MHz 5 Marker Table Y	#Video BW 3.0 MHz	Span 0 H Sweep 5.00 ms (1001 pts	
Mode Trace Scale X 1 Δ2 1 t Δ) 375. 2 F 1 t 481.3 3 4 5 6	Y Function Function Width 0 µs (A) 3 122 08 9 416 33 dBm	Function Value	Mode Trace Scale 1 Δ2 1 t (Δ) 2 F 1 t 3 3 4 5 6 6	X Y Function Function 1.630 ms (Δ) -0.040/2 dB -4442 dBm 485.0 μs -4.442 dBm -4442 dBm	Width Function Value	
E h c i ? Feb 14, 2023		X - 8 = X	Feb 14, 17:13	2023		
	GFSK / DH5			π/4-DQPSK / 2-DH1		
Spectrum Analyzer 1 Swept SA			Spectrum Analyzer 1 v 🕴			
KEYSIGHT Input RF Input Z 50 Ω R → Coupang DC Align: Auto Freq Ref. Int (S)	ип. 30 dB PNO. Fast #Avg Type. Power (RMS 1 2 3 4 5 6 Gate: Off Ting Video IF Gain: Low Sig Track: Off PN N N N N	F	KEYSIGHT Input RF Input Z: 5 Coupling: DC Corr CCo Align: Auto Freq Ref:	0 0 #Atten: 30 dB PNO: Fast #Avg Type: Power (RMS 1 2 rr Gate: Off Ting Video W W IF Gain: Low Ting Delay-500 0 µs W W Sig Track: Off P N	N N N N	
1 Spectrum V Scale/Div 10 dB	Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm		1 Spectrum v Scale/Div 10 dB Log	Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 385.0 μs 1.00 dE	
0000 X2	1Δ2	TRIO LVL -	200 100 200 300	Nursempland 102	TRICLY	
40.0 50.0 Fristation -70.0	journeyn of control of the first of the first of the second of the secon		40.0 50.0 มีมรุกมีปรูจณ์ใช้อา_{าอรู}รได้สารุงกมรุงใ 60.0 70.0	โรยมีสามารถในที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดที่สุดท 	hadaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa	
Center 2.441000000 GHz Res BW 1.0 MHz 5 Marker Table v	#Video BW 3.0 MHz	Sweep 7.53 ms (1001 pts)	Center 2.441000000 GHz Res BW 1.0 MHz 5 Marker Table	#Video BW 3.0 MHz	Span 0 H Sweep 2.53 ms (1001 pts	
Mode Trace Scale X 1 Δ2 1 t (Δ) 2 878 2 F 1 t 474.0 3 6 6 6	Y Function Function Width I ms (Δ) 0.03507 dB 0	Function Value	Mode Trace Scale 1 Δ2 1 t (Δ) 2 F 1 t 3 3 4 5 5 6	X Y Function Function 388.5 μg (Δ) 0.9951 dB -	Width Function Value	
E つ C I ? Feb 14, 2023 🗩	7		E 5 C 14, 17:13	2023 🗩 🛆		
	4-DQPSK / 2-DH3			π/4-DQPSK / 2-DH5		
KETOIGHT AND	an: 30 dB PNO. Fast #Avg Type: Power (RMS]] 2 3 d 5 6 Gate: Off Trig Valeo IF Gam: Low Trig Delay: 500 0 µs Sig Track: Off P N. N. N. N.	s s k	Sectrum Analyzer 1 Sector Analyzer 1 Sector Analyzer 1 Sector Coupling: DC Angin: Auto Coupling: DC Angin: Auto Creq Ref:	0.0 #Atten: 30 dB PNO: Fast #Ava Type: Power (BMS	3456	
Lui 1 Spectrum V	IF Gain: Low Ting Delay: -5000 µs P N N N N Sig Track: Off Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 1.635 ms 1	N TSpectrum	Int (S) IF Gain: Low Trig Delay -500 0 µs P N Sig Track: Off Ref Lvi Offset 7.36 dB Ref Level 20.00 dBm	ΔMkr1 2.885 ms	
Scale/Div 10 dB	Ref Level 20.00 dBm	-1.71 dB s	Scale/Div 10 dB	Ref Level 20.00 dBm	-1.70 dE	
0 00 -10 0 -220 0 -30 0			0.00 X ₂ 20 0 30 0			
-40.0 -50.0 44% / 15 Jun 1.4 -60.0 -70.0	ummutertangunyngtruumgatitalmandalutristanitenaithader (gen	ultionepurauppinguepoing.communuel	50.0 <mark>- сінд-ніл</mark> 60.0 70.0	konsensel prodeser filderer stanspillet i officier sendered filte	enterimitismetterik filosofisepetisetettenegterikkensekeskonen	
Center 2.44100000 GHz Res BW 1.0 MHz 5 Marker Table v	#Video BW 3.0 MHz		Center 2.441000000 GHz Res BW 1.0 MHz 5 Marker Table	#Video BW 3.0 MHz	Span 0 H Sweep 7.53 ms (1001 pts	
Mode Trace Scale X 1 Δ2 1 t (Δ) 1.635 2 F 1 t 4.850 3 4 5 5 6	Y Function Function Width 5 ms (Δ) -1.711 dB 0 μs -4.413 dBm	Function Value	Mode Trace Scale 1 Δ2 1 t (Δ) 2 F 1 t 4 3 4 5 6 6	X Y Function Function 2.885 ms (Δ) -1.701 dB -1.701 dB 474.6 μs -4.439 dBm -1.439 dBm	Width Function Value	
• • • • • • • • • • • • • • • • • • •	$\Delta = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$		€ 5 C ■ ? Feb 14, 17:12	2023		

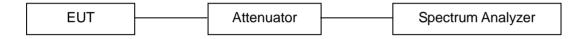


13.7 Maximum Peak Output Power

LIMIT

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.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 7.8.5.

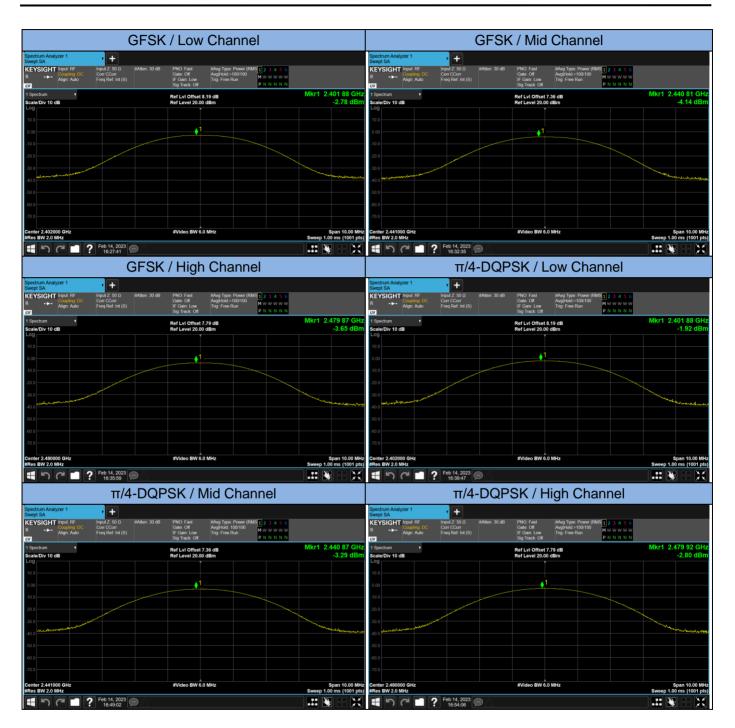
TEST RESULTS

PASS



Modulation	Frequency (MHz)	Peak Power output Measurement (dBm)	Peak Power output Measurement (mW)	Peak Power Limit (dBm)	Test Result
GFSK	2402.00	-2.78	0.53	21	Pass
	2441.00	-4.14	0.39	21	Pass
	2480.00	-3.65	0.43	21	Pass
π/4-DQPSK	2402.00	-1.92	0.64	21	Pass
	2441.00	-3.29	0.47	21	Pass
	2480.00	-2.80	0.53	21	Pass





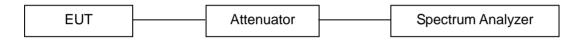


13.8 Band Edge Conducted Spurious Emission Measurement

LIMIT

In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- a. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- b. Set to the maximum power setting and enable the EUT transmit continuously.
- c. Set spectrum analyzer and perform testing according to ANSI C63.10-2013 clause 7.8.6 and 6.10.
- d. Enable hopping function of the EUT and then repeat steps above.

TEST RESULTS

PASS

Please refer to the following test plots.



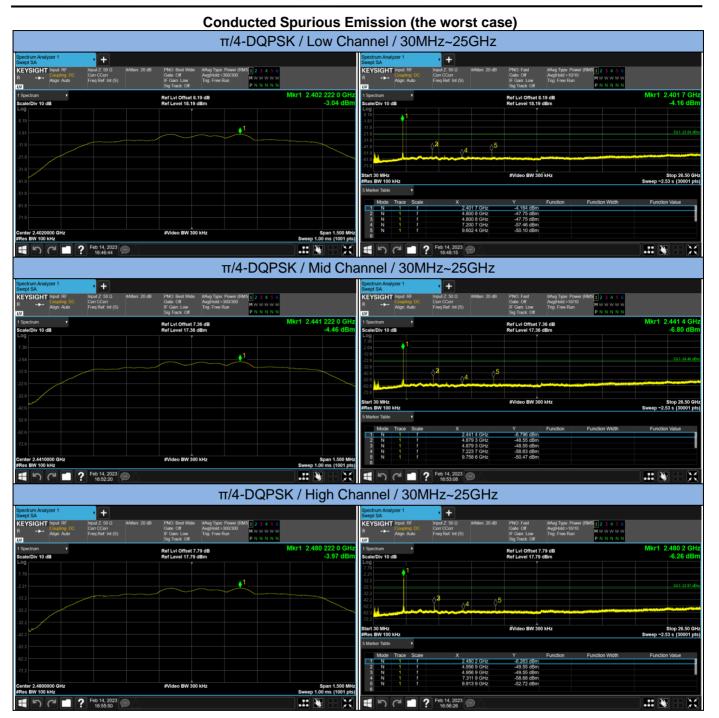
		Band E	dge			
GFSK / Low / 2402			GFSK / Hopping			
Spectrum Analyzer 1 Swept SA KEVSIGHT Input: RF R → Cooping DC R → Align: Auto KT	30 dB PNO Best Wide #Avg Type Power (RMS) 2 3 4 5 6 Gate Off AvgHod -300300 IF Gain Low Trg Free Run M W W W W Sa Track Off PN N N N N	Swept	trum Analyzer 1 pt SA YSIGHT Input: RF Coupling DC Align: Auto Freq Ref: Int (Gate: Off Avg Hold:>300/300	RMS 1 2 3 4 5 6 M W W W W W P N N N N N	
1 Spectrum v Scale/Div 10 dB	Ref Level 20.00 dBm	Mkr1 2.401 91 GHz 1 Spec	ectrum v le/Div 10 dB	Ref Lvi Offset 8.19 dB Ref Level 20.00 dBm	Mkr1 2.401 91 GHz -2.85 dBm	
100	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				
700 Center 2.400000 GHz #Res BW 100 kHz 5 Marker Table	≢Video BW 300 kHz	Sweep 1.00 ms (1001 pts) #Res	ter 2.400000 GHz s BW 100 kHz urker Table T	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	
Mode Trace Scale X 1 N 1 f 2.401 91 G 2 N 1 f 2.401 91 G 3 4 f 5 6	Y Function Function Width Hz -2.944.dBm Hz -41.10.dBm	Function Value	2 N 1 f 3	Y Function 2.401.91 GHz -2.848 dBm 2.399 15 GHz -41.42 dBm	Function Watth Function Value	
	2		Feb 14, 202 16:32:15	3	X - 12 II.	
GFSK	/ High Channel / 2480			GFSK / Hopping		
Spectrum Analyzer 1 Swept SA KEYSIGHT Imput: RF R → Coupling DC Align: Auto Corr CCorr Freq Ret. Int (S) CO	. 30 dB PNO Best Wide #Avg Type-Power (RMS) 1 2 3 4 5 6 Gate Off AvgHod - 300/300 IF Gain Low Trg. Free Run M ₩ ₩ ₩ ₩ ₩ Sta Track Off N N N N N	Swept	trum Analyzer 1 t SA YSIGHT Input: RF Coupling DC Align: Auto Align: Auto Align: Auto Align: Auto Align: Auto Align:	Gate: Off Avg Hold:>300/300	(RMS] 1 2 3 4 5 6 M ₩ ₩ ₩ ₩ ₩ P N N N N N	
1 Spectrum Scale/DV 10 dB Log 10 0 10	Ref Lvi Offset 7.79 dB Ref Level 20.00 dBm	Mkr1 2.479 91 GHz 1 Spec	ectum • ectivities ectivitities ectivities ectivities ectivities ectivities ectivities e	Ref Level 20.00 dBm	Mkr1 2.479 91 GHz -3.81 dBm 	
Center 2.483500 GHz #Res BW 100 kHz	#Video BW 300 kHz	Sweep 1.00 ms (1001 pts) #Res	ter 2.483500 GHz s BW 100 kHz	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	
5 Marker Table Mode Trace Scale X Mode Trace Scale X 1 N 1 7 2479 91 G 2 N 1 7 2483 55 G 3 4 5 6	Y Function Function Width Hz -3.809 gBm +tz -45.27 dBm	5 Mart Function Value	2 N 1 f 3 4 5 5	Y Function 2.479 91 (0Hz 3.813 dBm 2.483 54 GHz 46.05 dBm	Function Width Function Value	
E C C C C C C C C C C C C C C C C C C C			Feb 14, 202 16:37:45			



		Band	Edge			
π/4-DQPSK / Low / 2402			π/4-DQPSK / Hopping			
Spectrum Analyzer 1 + Swept SA KEVSIGHT Input RF R → Cooping CC Cooping CC Cooping CC Key Ref Int (S) Key Ref Int (S) Key Ref Int (S) Key Ref Int (S) Key Ref Int (S)	0 dB PNO Best Wide #Avg Type: Power (RMS 1 2 3 4 5 0 Gate Off Augitudz-300000 IF Gain Low Tog Free Run P № N N N N Stg Track Off P N N N N N		Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF R Coopeng DC Align: Auto Corr Freq Ref. Int (S) Col		123456 www.ww PNNNNN	
1 Spectrum Scale/Div 10 dB	Ref Lvi Offset 8.19 dB Ref Level 20.00 dBm	Mkr1 2.402 22 GHz -3.03 dBm	1 Spectrum v Scale/Div 10 dB	Ref LvI Offset 8.19 dB Ref Level 20.00 dBm	Mkr1 2.401 91 GHz -2.92 dBm	
		DL1-23.03 @	200 100 100 200 200 200 200 200		D.1 +22 37 dbm	
Center 2.400000 GHz #Res BW 100 kHz 5 Marker Table	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	700 Center 2.400000 GHz #Res BW 100 kHz 5 Marker Table v	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	
Mode Trace Scale X 1 N 1 F 2,402.22 GHz 2 N 1 f 2,399.10 GHz 3 1 c 2,399.10 GHz 6	Y Function Function Width -3.027 dBm -41.44 dBm	Function Value	Mode Trace Scale X 1 N 1 f 2 2 N 1 f 2 3 4 5 6 6	401 91 GHz -2 919 dBm 399 92 GHz -41.36 dBm	ction Width Function Value	
目 りで 回 ? Feb 14, 2023 (回)人			E 5 6 14, 2023 16:44:33	ØA		
π/4-D	QPSK / High / 2480		1	π/4-DQPSK / Hopping	g	
Spectrum Analyzer 1			Spectrum Analyzer 1 Swept SA			
KEYSIGHT Input: RF Input: Z: 50 Ω #Alten: 3 R → Cougling DC Corr CCorr Align: Auto Freq Ref: Int (S)	0 dB PNO: Best Wide #Avg Type: Power (RMS 1 2 3 4 5 6 Gate: Off AvgHold > 300/300 M W W W W IF Gain: Low Trig: Free Run P N N N N N Sig Track: Off P N N N N N		KEYSIGHT Input: RF Input: Z: 50 Ω R → Coupling: DC Corr CCorr Align: Auto Freq Ref: Int (S)		1 2 3 4 5 6 M W W W W W P N N N N N	
1 Spectrum * Scale/Div 10 dB Log 000 -000 -000	Ref Lvi Offset 7.79 dB Ref Level 20.00 dBm	Mkr1 2.479 91 GHz -3.83 dBm	1 Spectrum v Scale/Div 10 dB Log 0 0 0 0.00 .00 .00	Ref Lvi Offset 7.79 dB Ref Level 20.00 dBm	Mkr1 2.479 91 GHz -3.85 dBm	
300 400 500 700	^2		30 0 40 0 50 0 .60 0 .70 0	2		
Center 2.483500 GHz #Res BW 100 kHz	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	Center 2.483500 GHz #Res BW 100 kHz	#Video BW 300 kHz	Span 10.00 MHz Sweep 1.00 ms (1001 pts)	
5 Marker Table Mode Trace Scale X 1 N 1 2 N 1 2 N 1 2 N 1 2 A179 91 GHz 3 4 6 6		Function Value		470 91 GHz Y 840 gBm Function Fun 485 53 GHz 48.46 gBm	ction Width Function Value	
E C C Feb 14, 2023 D A			Feb 14, 2023 16:55:29	\square	## 💽 - 💥	



Report No.: NTC2302150FV00





13.9 Antenna Requirement

STANDARD APPLICABLE

According to of FCC part 15C section 15.203 and 15.247:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

ANTENNA CONNECTED CONSTRUCTION

The antenna is PCB antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is -0.58 dBi, Therefore, the antenna is considered to meet the requirement.



14. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2022	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2022	1 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2022	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2022	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2022	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 23, 2022	2 Year
7.	Power Sensor	DARE	RPR3006W	15l00041SNO 64	Mar. 13, 2022	1 Year
8.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2022	1 Year
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2022	1 Year
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2022	1 Year
11.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2022	1 Year
12.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2022	1 Year
13.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2022	1 Year
14.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 13, 2022	1 Year
15.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
16.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.