

Date : 2022-10-19 No. : HMD22100001				Page 1 of 83
Applicant	:		echnology (HK) Co., Ltd. our Crystal Centre, 100 Granville Hong Kong	Road, Tsim Sha
Supplier	:		echnology (HK) Co., Ltd. our Crystal Centre, 100 Granville Hong Kong	Road, Tsim Sha
Description of Sample(s)	:	Submitted samp Product: Brand Name: Model No.: FCC ID:	le(s) said to be Portable Bluetooth Radio Hearth & Hand with Magnolia AM29S 2AVTM-AM29S	
Date Samples Received	:	2022-10-12		
Date Tested	:	2022-10-12 to 20	022-10-18	
Investigation Requested	:	with FCC 47CFF	Magnetic Interference measureme R [Codes of Federal Regulations] FCC Certification.	
Conclusions	:	Communications The tests were pe	oduct <u>COMPLIED</u> with the requi Commission [FCC] Rules and Re erformed in accordance with the st ction 2.2 in this Test Report.	egulations Part 15.
Remarks	:		(GFSK / π /4-DQPSK/ 8DPSK) odel(s) details, please see page 3.	



The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19 No. : HMD22100001

Page 2 of 83

CONT	TENT:	
	Cover Content	Page 1 of 83 Page 2 of 83
<u>1.0</u>	<u>General Details</u>	
1.1	Test Laboratory	Page 3 of 83
1.2	Equipment Under Test [EUT] Description of EUT operation	Page 3-5 of 83
1.3	Date of Order	Page 5 of 83
1.4	Submitted Sample(s)	Page 5 of 83
1.5	Test Duration	Page 5 of 83
1.6	Country of Origin	Page 5 of 83
1.7	RF Module Details	Page 6 of 83
1.8	Antenna Details	Page 6 of 83
1.9	Channel List	Page 6 of 83
<u>2.0</u>	Technical Details	
2.1	Investigations Requested	Page 7 of 83
2.2	Test Standards and Results Summary	Page 8 of 83
2.3	Table for Test Modes	Page 9 of 83
<u>3.0</u>	Test Results	
3.1	Emission	Page 10-78 of 83
	ndix A f Measurement Equipment	Page 79 of 83
	ndix B graph(s) of Product	Page 80-83 of 83

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19

No. : HMD22100001

Page 3 of 83

<u>1.0</u> General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.EMC Laboratory10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong KongTelephone:852 2666 1888Fax:852 2664 4353

1.2 Equipment Under Test [EUT] Description of Sample(s)

Description of Sample(s)	
Product:	Portable Bluetooth Radio
Supplier:	SHENZHEN EASTPORT ELECTRONIC CO., LTD
	Block F, Junfeng Science Park, Lezhujiao, Jiuwei, Xixiang
	Town, 518126 Baoan District, Shenzhen City, China
Brand Name:	Hearth & Hand with Magnolia
Model Number:	AM29S
Additional Brand Name:	Gaumont
Rating:	5.0Vd.c. by USB Port
	3.7Vd.c. Built-in rechargeable Li-ion battery

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Portable Bluetooth Radio. The transmission signal is digital modulated with channel frequency range 2402-2480MHz. The R.F. signal was modulated by IC; the type of modulation used was frequency hopping spread spectrum Modulation.

1.3 Date of Order

2022-10-12

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2022-10-12 to 2022-10-18

1.6 Country of Origin

China

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 4 of 83

1.7 **RF Module Details**

N/A
N/A
Bluetooth V5.2 EDR
FHSS (GFSK / π /4-DQPSK/ 8DPSK)
1MBps: GFSK
2 MBps: π/4-DQPSK
3 MBps: 8DPSK
2400-2483.5MHz
2402MHz - 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Type:	PCB F antenna
Antenna Gain:	0 dBi

1.9 Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	42	2444
1	2403	43	2445
2	2404	44	2446
3	2405	45	2447
4	2406	46	2448
5	2407	47	2449
6	2408	48	2450
7	2409	•••	
8	2410	67	2469
9	2411	68	2470
		69	2471
33	2435	70	2472
34	2436	71	2473
35	2437	72	2474
36	2438	73	2475
37	2439	74	2476
38	2440	75	2477
39	2441	76	2478
40	2442	77	2479
41	2443	78	2480

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19

Page 5 of 83

No. : HMD22100001

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 Regulations and ANSI C63.10:2013 for FCC Certification. The device was realized by test software.

COMx Baudrate	
Classic BLE	
Test Mode	
FCC Test BT address Run	
DUT Test 🔿 5555555555	
RF Control	
RF Mode TX TEST • Packet Type DH1 •	
Hopping OFF TX Frequency 2480	
TX Power 7 RX Frequency 2402 -	
Scenario PRBS Pattern 🔹	
LOG: BR/EDR Test	
LOG: Test end	
LOG: BR/EDR Test	
LOG: Test end LOG: BR/EDR Test	
ERR: Timeout	
LOG: Test end	-
COM14 is open 1500000bps	

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 6 of 83

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class /	T Pass	est Result Failed	N/A
Maximum Peak Conducted Output Power	FCC 47CFR 15.247(b)(1)	ANSI C63.10: 2013	Severity N/A			
Radiated Spurious Emissions	FCC 47CFR 15.209, FCC 47CFR 15.205	ANSI C63.10: 2013	N/A	\boxtimes		
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	\boxtimes		
Conducted Spurious Emissions	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	\boxtimes		
Number of Hopping Frequency	FCC 47CFR 15.247 (b)(1)	ANSI C63.10: 2013	N/A	\boxtimes		
20dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10: 2013	N/A	\boxtimes		
Hopping Channel Separation	FCC 47CFR 15.247(a)(1)	ANSI C63.10: 2013	N/A	\boxtimes		
Band-edge measurement (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	\boxtimes		
Pseudorandom Hopping Algorithm	FCC 47CFR 15.247(a)(1)	N/A	N/A	\boxtimes		
Time of Occupancy (Dwell Time)	FCC 47CFR 15.247(a)(1)(iii)	ANSI C63.10: 2013	N/A	\boxtimes		
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	\boxtimes		

Note: N/A - Not Applicable

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 7 of 83

2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item.

Investigation has been done on all the possible configurations for searching the worst cases.

The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate
Maximum Peak Conducted Output Power	GFSK / π/4-DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Hopping Channel Separation	GFSK / π/4-DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Number of Hopping Frequency	GFSK / π/4-DQPSK / 8DPSK	1MBps / 2MBp / 3MBps
Time of Occupancy(Dwell Time)	8DPSK (3DH1 / 3DH3 / 3DH5)	3MBps
Radiated Spurious Emissions	GFSK / π/4-DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Band-edge compliance of Conducted Emission	GFSK / π/4-DQPSK / 8DPSK	1MBps / 2MBps / 3MBps



Date : 2022-10-19 No. : HMD22100001

Page 8 of 83

3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Conducted Output Power

Test Requirement:	FCC 47CFR 15.247(b) (1)
Test Method:	ANSI C63.10: 2013
Test Date:	2022-10-13
Mode of Operation:	Tx mode

Ambient Temperature: $25^{\circ}C$

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

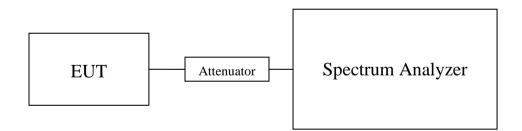
Test Method:

A temporary antenna connector was soldered to the RF output. The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

Spectrum Analyzer Setting:

RBW = 3 MHz, VBW= 3MHz, Sweep = Auto, Span: Approximately five times the 20 dB bandwidth Detector = Peak, Trace = Max. hold

Test Setup:



Note: a temporary antenna connector was soldered to the RF output.

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19 No. : HMD22100001 Page 9 of 83

Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits: For frequency hopping systems employing at least 75 hopping channels: 1 Watt For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of Bluetooth Communication mode (GFSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.000479
Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
	Muximum conducted output power (Watt)

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.000402

Results of Bluetooth Communication mode (π /4-DQPSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)			
2402	0.000736			
Transmitter Frequency (MHz)	Maximum conducted output power (Watt)			
2441	0.000702			
Transmitter Frequency (MHz)	Maximum conducted output power (Watt)			
2480	0.000623			

Results of Bluetooth Communication mode (8DPSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.000845

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441	0.000805

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)				
2480	0.000711				
Calculated measurement uncertainty	: 30MHz to 1GHz 1.7dB				

Calculated measurement uncertainty

30MHz to 1GHz : 1GHz to 18GHz 1.7dB

Remark:

1. All test data for each data rate were verified, but only the worst case was reported.

2. The EUT is programmed to transmit signals continuously for all testing.

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

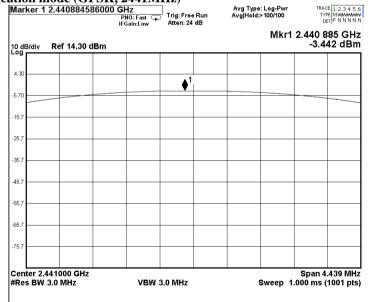
Page 10 of 83

Test plot of Maximum Peak Conducted Output Power:

Bluetooth Communication mode (GFSK, 2402MHz)

Narker 1 2.402000000000		.40200000000 GHz PNO: Fast IFGain:Low Atten: 24 dB		Avg Type: Log-Pwr Avg Hold≫100/100	TRACE 1 2 3 4 5 TYPE MWWWW DET P N N N N	
0 dB/div	Ref 14.30 dE	m		Mkr1	2.402 000 GH -3.194 dBr	
.09						
4.30			1			
5.70						
15.7						
25.7						
35.7						
15.7						
55.7						
65.7						
75.7						
enter 2.4 Res BW	102000 GHz 3.0 MHz	VBW	/ 3.0 MHz	Sweep 1	Span 4.433 MH .000 ms (1001 pt	

Bluetooth Communication mode (GFSK, 2441MHz)



The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 11 of 83

Bluetooth Communication mode (GFSK, 2480MHz) Avg Type: Log-Pwr Avg|Hold:>100/100 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N Mkr1 2.480 023 GHz -3.959 dBm 10 dB/div Ref 14.30 dBm 4.3 -5.70 -15.3 -25.7 -35. -45.7 -55.7 -65.7 -75. Span 4.619 MHz Center 2.480000 GHz #Res BW 3.0 MHz VBW 3.0 MHz Sweep 1.000 ms (1001 pts) Bluetooth Communication mode (π/4 DQPSK, 2402MHz) Avg Type: Log-Pwr Avg|Hold:>100/100 TRACE 123456 TYPE MWWWWW DET PNNNNN Mkr1 2.401 825 GHz -1.333 dBm Ref 14.00 dBm 10 dB/div 4.0 ¢ 6.00 16 | -26.0 -36. 46.1 -56.1 -66. 76. Center 2.402000 GHz Span 6.465 MHz #Res BW 3.0 MHz VBW 3.0 MHz Sweep 1.000 ms (1001 pts)

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

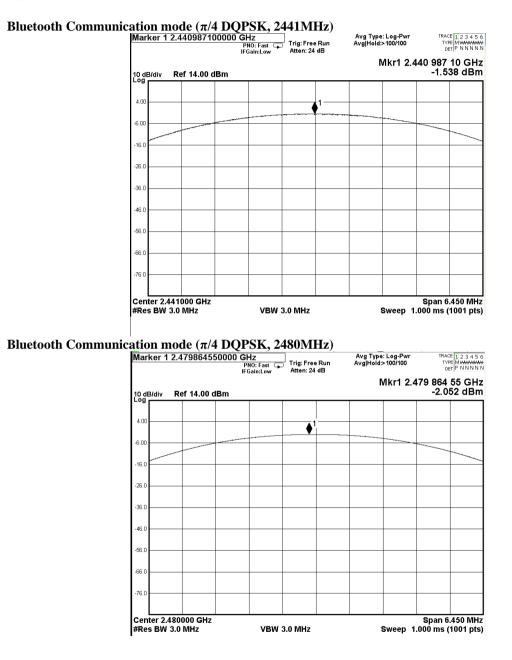
Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 12 of 83



The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

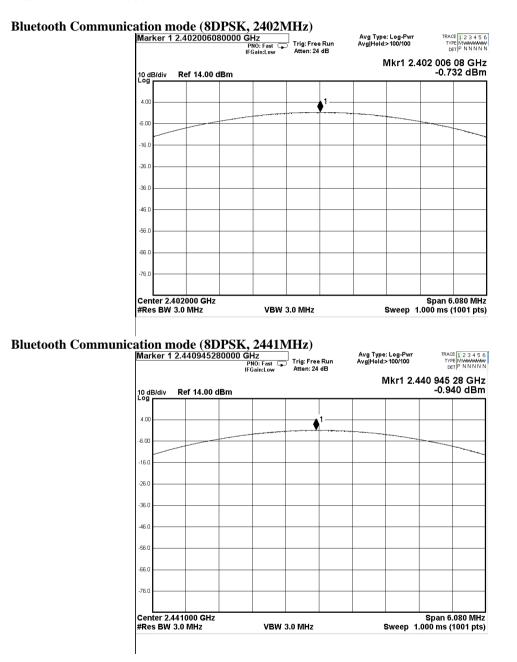
Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 13 of 83



The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

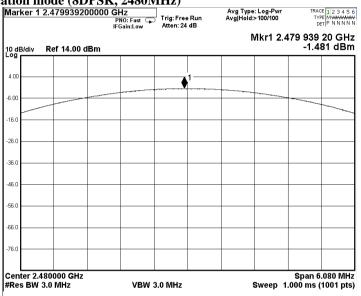
This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 14 of 83

Bluetooth Communication mode (8DPSK, 2480MHz)



The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19 No. : HMD22100001

Page 15 of 83

3.1.2 Radiated Spurious Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2022-10-12 to 2022-10-19
Mode of Operation:	Tx mode / Bluetooth play mode (GFSK)

Ambient Temperature: 26.8°C Relative Humidity: 43.9% Atmospheric Pressure: 100.8 kPa

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semianechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

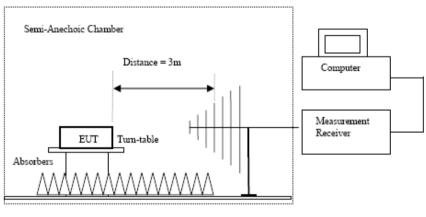


Date : 2022-10-19 No. : HMD22100001 Page 16 of 83

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & AVG)	RBW: VBW: Sweep: Span: Trace:	10kHz 30kHz Auto Fully capture the emissions being measured Max. hold
30MHz – 1GHz (QP)	RBW: VBW: Sweep: Span: Trace:	
Above 1GHz (Pk & AVG)	RBW: VBW: Sweep: Span: Trace:	

Test Setup:



Ground Plane

Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
 Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used,

9kHz to 30MHz loop antennas are used.

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 17 of 83

Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx mode (2402.0 MHz) (GFSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions								
Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field		
	Level Factor Strength Strength Polarity							
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m			
	Emissions detected are more than 20 dB below the FCC Limits							

Result of Tx mode (2402.0 MHz) (GFSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m	C	Polarity	
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	-	
4804.0	57.1	0.8	57.9	74.0	16.1	Vertical	
4804.0	56.9	0.5	57.4	74.0	16.6	Horizontal	
7206.0	49.8	7.0	56.8	74.0	17.2	Vertical	
7206.0	48.3	6.5	54.8	74.0	19.2	Horizontal	
9608.0	46.5	8.5	55.0	74.0	19.0	Vertical	
9608.0	46.3	8.3	54.6	74.0	19.4	Horizontal	
12010.0	45.1	10.9	56.0	74.0	18.0	Vertical	
12010.0	45.3	10.8	56.1	74.0	18.0	Horizontal	

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m	_	Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB			
4804.0	40.5	0.8	41.3	54.0	12.7	Vertical		
4804.0	40.2	0.5	40.7	54.0	13.3	Horizontal		
7206.0	35.5	7.0	42.5	54.0	11.5	Vertical		
7206.0	33.1	6.5	39.6	54.0	14.4	Horizontal		
9608.0	31.7	8.5	40.2	54.0	13.8	Vertical		
9608.0	32.0	8.3	40.3	54.0	13.7	Horizontal		
12010.0	30.0	10.9	40.9	54.0	13.1	Vertical		
12010.0	29.5	10.8	40.3	54.0	13.7	Horizontal		

Result of Tx mode (2441.0 MHz) (GFSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions							
	Peak Value						
Frequency	Measured	Correction	Field	Field	Limit	E-Field	
	Level	Factor	Strength	Strength		Polarity	
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m		
	Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (GFSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4882.0	57.0	0.8	57.8	74.0	16.2	Vertical				
4882.0	56.8	0.5	57.3	74.0	16.7	Horizontal				
7223.0	48.9	7.0	55.9	74.0	18.1	Vertical				
7223.0	49.0	6.5	55.5	74.0	18.5	Horizontal				
9764.0	48.3	8.5	56.8	74.0	17.2	Vertical				
9764.0	47.2	8.3	55.5	74.0	18.5	Horizontal				
12205.0	45.1	10.9	56.0	74.0	18.1	Vertical				
12205.0	45.4	10.8	56.2	74.0	17.8	Horizontal				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 19 of 83

	Field Strength of Spurious Emissions Average Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB				
4882.0	40.1	0.8	40.9	54.0	13.1	Vertical			
4882.0	41.5	0.5	42.0	54.0	12.0	Horizontal			
7323.0	35.6	7.0	42.6	54.0	11.4	Vertical			
7323.0	35.8	6.5	42.3	54.0	11.7	Horizontal			
9764.0	33.1	8.5	41.6	54.0	12.4	Vertical			
9764.0	32.2	8.3	40.5	54.0	13.5	Horizontal			
12205.0	30.5	10.9	41.4	54.0	12.6	Vertical			
12205.0	30.1	10.8	40.9	54.0	13.1	Horizontal			

Result of Tx mode (2480.0 MHz) (GFSK) (9kHz - 30MHz): Pass

	Field Strength of Spurious Emissions								
Peak Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m				
	Emissions detected are more than 20 dB below the FCC Limits								

Result of Tx mode (2480.0 MHz) (GFSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m	-	Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	_				
4960.0	56.8	0.8	57.6	74.0	16.4	Vertical				
4960.0	56.7	0.5	57.2	74.0	16.8	Horizontal				
7440.0	50.3	7.0	57.3	74.0	16.7	Vertical				
7440.0	50.1	6.5	56.6	74.0	17.4	Horizontal				
9920.0	47.2	8.5	55.7	74.0	18.3	Vertical				
9920.0	47.0	8.3	55.3	74.0	18.7	Horizontal				
12400.0	45.5	10.9	56.4	74.0	17.6	Vertical				
12400.0	45.3	10.8	56.1	74.0	17.9	Horizontal				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m	-	Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	_			
4960.0	40.5	0.8	41.3	54.0	12.7	Vertical			
4960.0	41.0	0.5	41.5	54.0	12.5	Horizontal			
7440.0	34.9	7.0	41.9	54.0	12.1	Vertical			
7440.0	34.4	6.5	40.9	54.0	13.1	Horizontal			
9920.0	33.5	8.5	42.0	54.0	12.0	Vertical			
9920.0	31.8	8.3	40.1	54.0	13.9	Horizontal			
12400.0	30.1	10.9	41.0	54.0	13.0	Vertical			
12400.0	30.1	10.8	40.9	54.0	13.1	Horizontal			

Result of Tx mode (2402.0 MHz) (π /4-DQPSK) (9kHz – 30MHz): Pass

	Field Strength of Spurious Emissions								
Peak Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m								
	Emissions	detected are 1	nore than 20	dB below the	FCC Limits				

Result of Tx mode (2402.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m	C	Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4804.0	56.6	0.8	57.4	74.0	16.6	Vertical				
4804.0	57.0	0.5	57.5	74.0	16.5	Horizontal				
7206.0	50.1	7.0	57.1	74.0	16.9	Vertical				
7206.0	50.2	6.5	56.7	74.0	17.3	Horizontal				
9608.0	46.8	8.5	55.3	74.0	18.7	Vertical				
9608.0	47.8	8.3	56.1	74.0	17.9	Horizontal				
12010.0	45.3	10.9	56.2	74.0	17.9	Vertical				
12010.0	45.5	10.8	56.3	74.0	17.8	Horizontal				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB					
4804.0	41.2	0.8	42.0	54.0	12.0	Vertical				
4804.0	40.7	0.5	41.2	54.0	12.8	Horizontal				
7206.0	34.5	7.0	41.5	54.0	12.5	Vertical				
7206.0	35.0	6.5	41.5	54.0	12.5	Horizontal				
9608.0	32.7	8.5	41.2	54.0	12.8	Vertical				
9608.0	33.0	8.3	41.3	54.0	12.7	Horizontal				
12010.0	30.7	10.9	41.6	54.0	12.4	Vertical				
12010.0	31.1	10.8	41.9	54.0	12.1	Horizontal				

Result of Tx mode (2441.0 MHz) (π /4-DQPSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions								
Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field		
	Level	Factor	Strength	Strength		Polarity		
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m	-		
	Emissions detected are more than 20 dB below the FCC Limits							

Result of Tx mode (2441.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB					
4882.0	56.3	0.8	57.1	74.0	16.9	Vertical				
4882.0	57.1	0.5	57.6	74.0	16.4	Horizontal				
7323.0	49.8	7.0	56.8	74.0	17.2	Vertical				
7323.0	50.6	6.5	57.1	74.0	16.9	Horizontal				
9764.0	48.2	8.5	56.7	74.0	17.3	Vertical				
9764.0	47.9	8.3	56.2	74.0	17.8	Horizontal				
12205.0	45.4	10.9	56.3	74.0	17.7	Vertical				
12205.0	45.3	10.8	56.1	74.0	18.0	Horizontal				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value									
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB					
4882.0	41.2	0.8	42.1	54.0	11.9	Vertical				
4882.0	41.4	0.52	41.9	54.0	12.1	Horizontal				
7323.0	35.7	7	42.7	54.0	11.3	Vertical				
7323.0	35.3	6.5	41.8	54.0	12.2	Horizontal				
9764.0	32.2	8.5	40.7	54.0	13.3	Vertical				
9764.0	33.1	8.3	41.4	54.0	12.7	Horizontal				
12205.0	31.5	10.9	42.4	54.0	11.6	Vertical				
12205.0	30.6	10.8	41.4	54.0	12.6	Horizontal				

Result of Tx mode (2480.0 MHz) (π /4-DQPSK) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions								
Peak Value								
Frequency	Measured	Correction	Field	Field	Limit	E-Field		
	Level	Factor	Strength	Strength		Polarity		
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m	-		
	Emissions detected are more than 20 dB below the FCC Limits							

Result of Tx mode (2480.0 MHz) (π/4-DQPSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4960.0	56.9	0.8	57.7	74.0	16.3	Vertical
4960.0	57.4	0.5	57.9	74.0	16.1	Horizontal
7440.0	50.2	7.0	57.2	74.0	16.8	Vertical
7440.0	50.6	6.5	57.1	74.0	16.9	Horizontal
9920.0	47.7	8.5	56.2	74.0	17.8	Vertical
9920.0	47.9	8.3	56.2	74.0	17.8	Horizontal
12400.0	45.4	10.9	56.3	74.0	17.7	Vertical
12400.0	45.4	10.8	56.2	74.0	17.8	Horizontal

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m	-	Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	_
4960.0	41.0	0.8	41.8	54.0	12.2	Vertical
4960.0	41.8	0.5	42.3	54.0	11.7	Horizontal
7440.0	35.1	7.0	42.1	54.0	11.9	Vertical
7440.0	35.0	6.5	41.5	54.0	12.5	Horizontal
9920.0	33.2	8.5	41.7	54.0	12.3	Vertical
9920.0	32.8	8.3	41.1	54.0	12.9	Horizontal
12400.0	30.9	10.9	41.8	54.0	12.2	Vertical
12400.0	30.5	10.8	41.3	54.0	12.8	Horizontal

Result of Tx mode (2402.0 MHz) (8DPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency Measured Correction Field Field Limit E-Field						
	Level	Factor	Strength	Strength		Polarity
MHz dBuV dB/m dBuV/m uV/m uV/m						
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (8DPSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4804.0	57.5	0.8	58.3	74.0	15.7	Vertical
4804.0	57.1	0.5	57.6	74.0	16.4	Horizontal
7206.0	51.1	7.0	58.1	74.0	15.9	Vertical
7206.0	50.3	6.5	56.8	74.0	17.2	Horizontal
9608.0	47.8	8.5	56.3	74.0	17.7	Vertical
9608.0	47.7	8.3	56.0	74.0	18.1	Horizontal
12010.0	45.5	10.9	56.4	74.0	17.6	Vertical
12010.0	45.0	10.8	55.8	74.0	18.2	Horizontal

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m	_	Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4804.0	41.1	0.8	41.9	54.0	12.1	Vertical
4804.0	41.8	0.5	42.3	54.0	11.7	Horizontal
7206.0	35.2	7.0	42.2	54.0	11.8	Vertical
7206.0	35.3	6.5	41.8	54.0	12.2	Horizontal
9608.0	32.1	8.5	40.6	54.0	13.4	Vertical
9608.0	33.2	8.3	41.5	54.0	12.5	Horizontal
12010.0	31.5	10.9	42.4	54.0	11.6	Vertical
12010.0	30.4	10.8	41.2	54.0	12.8	Horizontal

Result of Tx mode (2441.0 MHz) (8DPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions						
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m					
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (8DPSK) (Above 1GHz): Pass

	Field Strength of Spurious Emissions Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m	_	Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4882.0	57.2	0.8	58.0	74.0	16.0	Vertical
4882.0	57.4	0.5	57.9	74.0	16.1	Horizontal
7223.0	50.3	7.0	57.3	74.0	16.7	Vertical
7223.0	50.4	6.5	56.9	74.0	17.1	Horizontal
9764.0	48.0	8.5	56.5	74.0	17.5	Vertical
9764.0	47.3	8.3	55.6	74.0	18.4	Horizontal
12205.0	45.2	10.9	56.1	74.0	17.9	Vertical
12205.0	45.5	10.8	56.3	74.0	17.7	Horizontal

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

	Field Strength of Spurious Emissions Average Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
4882.0	41.6	0.8	42.4	54.0	11.6	Vertical
4882.0	41.6	0.5	42.1	54.0	11.9	Horizontal
7323.0	34.8	7.0	41.8	54.0	12.2	Vertical
7323.0	35.7	6.5	42.2	54.0	11.8	Horizontal
9764.0	33.2	8.5	41.7	54.0	12.3	Vertical
9764.0	33.8	8.3	42.1	54.0	11.9	Horizontal
12205.0	30.9	10.9	41.8	54.0	12.2	Vertical
12205.0	30.5	10.8	41.3	54.0	12.7	Horizontal

Result of Tx mode (2480.0 MHz) (8FPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions						
	Peak Value					
Frequency	Measured	Correction	Field	Field	Limit	E-Field
	Level	Factor	Strength	Strength		Polarity
MHz	MHz dBuV dB/m dBuV/m uV/m uV/m					
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) (8DPSK) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4960.0	57.9	0.8	58.7	74.0	15.3	Vertical
4960.0	57.5	0.5	58.0	74.0	16.0	Horizontal
7440.0	50.1	7.0	57.1	74.0	16.9	Vertical
7440.0	50.0	6.5	56.5	74.0	17.5	Horizontal
9920.0	47.1	8.5	55.6	74.0	18.4	Vertical
9920.0	47.6	8.3	55.9	74.0	18.1	Horizontal
12400.0	45.3	10.9	56.2	74.0	17.8	Vertical
12400.0	45.4	10.8	56.2	74.0	17.8	Horizontal

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Field Strength of Spurious Emissions Average Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	
4960.0	41.2	0.8	42.0	54.0	12.0	Vertical
4960.0	40.7	0.5	41.2	54.0	12.8	Horizontal
7440.0	34.4	7.0	41.4	54.0	12.6	Vertical
7440.0	35.2	6.5	41.7	54.0	12.3	Horizontal
9920.0	31.6	8.5	40.1	54.0	13.9	Vertical
9920.0	32.5	8.3	40.8	54.0	13.2	Horizontal
12400.0	30.9	10.9	41.8	54.0	12.2	Vertical
12400.0	30.9	10.8	41.7	54.0	12.3	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

Denotes restricted band of operation. Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement	(9kHz-30MHz): 2.0dB
uncertainty	(30MHz -1GHz): 4.9dB
	(1GHz -6GHz): 4.02dB
	(6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 27 of 83

Radiated Emissions Measurement:

Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.205(c)).

Result: RF Radiated Emissions (Lowest)-GFSK

	Field Strength of Band-edge Compliance								
			Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB				
2390.0	2390.0 48.2 -4.8 43.4 74.0 30.6 Vertical								
2390.0	48.1	-4.7	43.4	74.0	30.6	Horizontal			

	Field Strength of Band-edge Compliance Average Value							
Frequency Measured Correction Field Limit Margin E-Field								
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	-		
2390.0	42.1	-4.8	37.3	54.0	16.7	Vertical		
2390.0	41.0	-4.7	36.3	54.0	17.7	Horizontal		

	Field Strength of Band-edge Compliance								
	Peak Value								
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB				
2483.5	53.2	-4.8	48.4	74.0	25.6	Vertical			
2483.5	52.5	-4.7	47.8	74.0	26.2	Horizontal			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 28 of 83

Field Strength of Band-edge Compliance Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dBµV	dB/m	$dB\mu V/m$	dBµV/m	dB		
2483.5	42.6	-4.8	37.8	54.0	16.2	Vertical	
2483.5	43.0	-4.7	38.3	54.0	15.7	Horizontal	

Result: RF Radiated Emissions (Lowest)- $\pi/4$ -DQPSK

	Field Strength of Band-edge Compliance								
			Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB				
2390.0	48.3	-4.8	43.5	74.0	30.5	Vertical			
2390.0	47.6	-4.7	42.9	74.0	31.1	Horizontal			

Field Strength of Band-edge Compliance Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB		
2390.0	42.6	-4.8	37.8	54.0	16.2	Vertical	
2390.0	43.0	-4.7	38.3	54.0	15.7	Horizontal	

Result: RF Radiated Emissions (Highest) - $\pi/4$ -DQPSK

	Field Strength of Band-edge Compliance							
			Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB			
2483.5	56.1	-4.8	51.3	74.0	22.7	Vertical		
2483.5	55.9	-4.7	51.2	74.0	22.8	Horizontal		

Field Strength of Band-edge Compliance								
		A	verage Valu	e				
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB			
2483.5	45.1	-4.8	40.3	54.0	13.7	Vertical		
2483.5	44.6	-4.7	39.9	54.0	14.1	Horizontal		

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 29 of 83

Result: RF Radiated Emissions (Lowest)- 8DPSK

Field Strength of Band-edge Compliance								
			Peak Value					
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB			
2390.0	48.1	-4.8	43.3	74.0	30.8	Vertical		
2390.0	48.5	-4.7	43.8	74.0	30.2	Horizontal		

Field Strength of Band-edge Compliance Average Value								
Frequency								
	Level @3m	Factor	Strength	@3m	8	Polarity		
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	2		
2390.0	42.7	-4.8	37.9	54.0	16.1	Vertical		
2390.0	43.3	-4.7	38.6	54.0	15.5	Horizontal		

Result: RF Radiated Emissions (Highest) -8DPSK

	Field Strength of Band-edge Compliance								
			Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field			
	Level @3m	Factor	Strength	@3m		Polarity			
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB				
2483.5	55.6	-4.8	50.8	74.0	23.2	Vertical			
2483.5	56.0	-4.7	51.3	74.0	22.7	Horizontal			

	Field Strength of Band-edge Compliance											
	Average Value											
Frequency	Measured	Correction	Field	Limit	Margin	E-Field						
	Level @3m	Factor	Strength	@3m		Polarity						
MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB							
2483.5	45.9	-4.8	41.1	54.0	13.0	Vertical						
2483.5	45.7	-4.7	41.0	54.0	13.0	Horizontal						

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



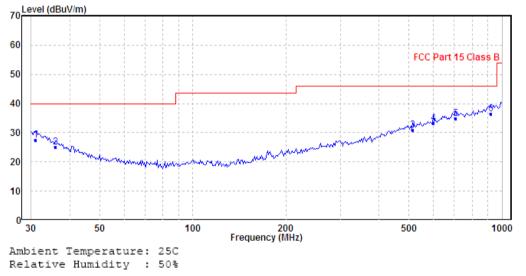
Date : 2022-10-19 No. : HMD22100001 Page 30 of 83

Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Bluetooth+ charge mode (connect to PC) (GFSK 2402.0 MHz) (30MHz – 1GHz): Pass Horizontal



Limit Over Line Limit Remark Freq Level Pol/Phase MHz dBuV/m dBuV/m dB 27.34 40.00 -12.66 QP 31.071 Horizontal 1 2 36.001 25.03 40.00 -14.97 QP Horizontal 3 513.633 30.91 46.00 -15.09 QP Horizontal 4 599.321 33.19 46.00 -12.81 QP Horizontal 709.182 34.99 46.00 -11.01 QP 5 Horizontal 6 919.287 36.54 46.00 -9.46 QP Horizontal

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 : HMD22100001 No.

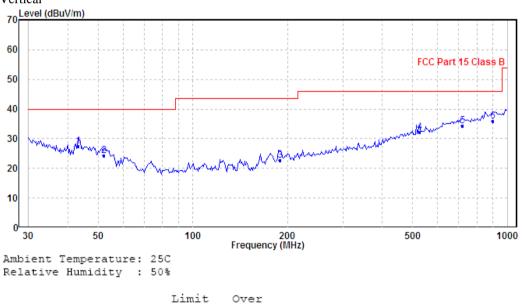
Page 31 of 83

Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Bluetooth+ charge mode (connect to PC) (GFSK 2402.0 MHz) (30MHz - 1GHz): Pass Vertical



	Freq	Level	Line	Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	43.202	27.38	40.00	-12.62	QP	Vertical
2	52.208	24.23	40.00	-15.77	QP	Vertical
3	189.739	22.65	43.50	-20.85	QP	Vertical
4	524.554	32.13	46.00	-13.87	QP	Vertical
5	719.200	34.25	46.00	-11.75	QP	Vertical
6	900.147	35.96	46.00	-10.04	QP	Vertical

Remarks: Calculated measurement uncertainty (30MHz - 1GHz): 4.9dB Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 32 of 83

3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2022-10-14
Mode of Operation:	Charge mode
Test Voltage:	120Va.c. 60Hz

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

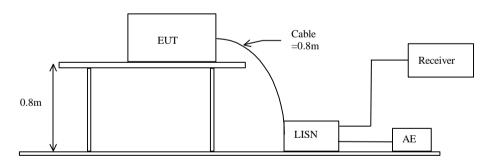
Test Method:

The test was performed in accordance with ANSI ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Receiver Setting:

Bandw. = 9 kHz, Meas. Time= 10.0 ms, Step Width = 5.0kHz Detector = MaxPeak and CISPR AV

Test Setup:



Limits for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range	Quasi-Peak Limits	Average
[MHz]	[dBµV]	[dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Remarks:

Calculated measurement uncertainty (0.15MHz - 30MHz): 3.25dB

-*- Emission(s) that is far below the corresponding limit line.

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

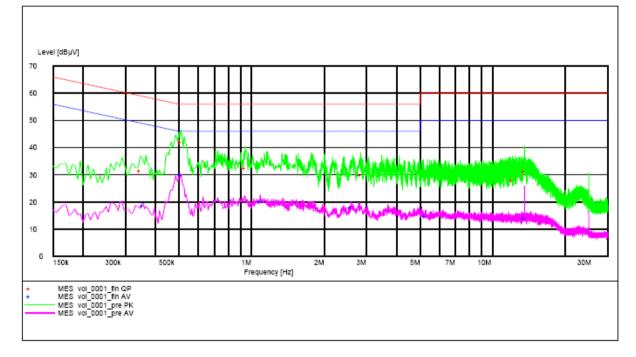


Page 33 of 83

Date : 2022-10-19 No. : HMD22100001

Results of Bluetooth +Charge mode (connect to PC) (L): PASS

Please refer to the following diagram for individual results.



MEASUREMENT R	ESULT:	"vol 000	1 fin Q	P"		
Frequency	Level	Transd	Limit	Margin	Line	ΡE
MHz	dBµV	dB	dBµV	dB		
0.345000	31.5	9.7	59.1	27.6	L1	GND
0.510000	42.0	9.7	56.0	14.0	L1	GND
0.940000	32.3	9.7	56.0	23.7	L1	GND
2.835000	30.0	9.8	56.0	26.0	L1	GND
12.105000	27.8	10.1	60.0	32.2	L1	GND
13.560000	31.3	10.2	60.0	28.7	L1	GND

MEASUREMENT	RESULT:	"vol_000	1_fin A	V"		
Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	: dBµV	dB	dBµV	dB		
0.355000	18.6	9.7	48.8	30.3	L1	GND
0.510000	29.9	9.7	46.0	16.1	L1	GND
1.085000	20.3	9.7	46.0	25.7	L1	GND
2.585000	17.9	9.8	46.0	28.1	L1	GND
5.255000	14.8	9.9	50.0	35.2	L1	GND
13.560000	14.1	10.2	50.0	35.9	L1	GND

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

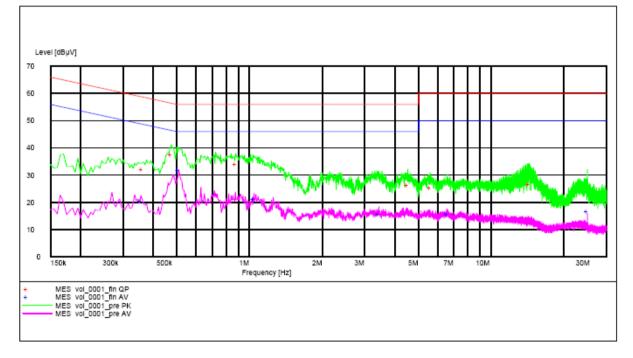


Page 34 of 83

Date : 2022-10-19 No. : HMD22100001

Results of Bluetooth +Charge mode (connect to PC) (N): PASS

Please refer to the following diagram for individual results.



MEASUREMENT R	ESULT:	"vo1_000	1_fin Q	P"		
Frequency	Level	Transd	Limit	Margin	Line	ΡE
MHz	dBµV	dB	dBµV	dB		
0.360000	32.0	9.7	58.7	26.7	N	GND
0.475000	37.5	9.7	56.4	18.9	N	GND
0.880000	34.2	9.7	56.0	21.8	N	GND
4.530000	26.3	9.8	56.0	29.7	N	GND
5.605000	25.4	9.9	60.0	34.6	N	GND
14.385000	26.7	10.2	60.0	33.3	N	GND
MEASUREMENT R		_				
D	T	m	T	M	T	

Frequency	Level	Transd	Limit	Margin	Line	ΡE
MHz	dBµV	dB	dBµV	dB		
0.355000	20.5	9.7	48.8	28.3	N	GND
0.510000	31.9	9.7	46.0	14.1	N	GND
1.045000	21.2	9.7	46.0	24.8	N	GND
3.435000	15.9	9.8	46.0	30.1	N	GND
6.60000	15.6	9.9	50.0	34.4	N	GND
25.060000	16.6	10.7	50.0	33.4	N	GND

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 35 of 83

3.1.4 Number of Hopping Frequency

Ambient Temperature: 25°C Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

Limit of Number of Hopping Frequency

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

Test Method:

The RF output of the EUT was connected to the spectrum analyzer by a low loss cable.

Spectrum Analyzer Setting:

RBW = 300kHz, $VBW \ge RBW$, Sweep = Auto, Span = the frequency band of operation Detector = Peak, Trace = Max. hold

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Measurement Data: GFSK: 79 of 79 Channel

Spectrum									E.
Ref Level Att	18.00 dBm 30 dB		ns RBW	300 kHz 300 kHz	Mode Auto	Sweep			
●1Pk Max			1	r					
10 dBm								-	
0 dBm								-	
	WWW	MMMM		MMM	hhhhh	MMM	MMM	MMM	
-20 dBm							020 . 187(1		
30 dBm									
40 dBm								0	$\left \right $
-50 dBm									
-60 dBm									
-70 dBm				2					
-80 dBm Start 2.4 GI				691					.4835 GHz

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

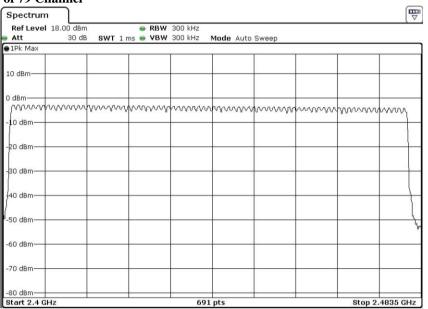
This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001

Page 36 of 83

π /4-DQPSK: 79 of 79 Channel



8DPSK: 79 of 79 Channel

Ref Level	18.00 dBm		RBW	300 kHz					
Att	30 dB	SWT 1	ns . VBW		Mode Auto	Sweep			
1Pk Max	67								
~~~									
10 dBm									
0 dBm									
mm	mm	nnnn	wwww	mm	mm	mm	mm	mm	mm
-10 dBm									
bo down									
-20 dBm									
-30 dBm									
40 dBm									<u>+ +</u>
-50 dBm									
roor Ectober									1 5
-60 dBm			e;						
70 d0m									
-70 dBm			5 A					2	8
-80 dBm									<u> </u>
Start 2.4 GH	z			691	pts			Stop 2	.4835 GHz

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 37 of 83

### 3.1.5 20dB Bandwidth

Test Requirement:	FCC 47CFR 15.247(a)(1)
Test Method:	ANSI C63.10:2013
Test Date:	2022-10-12
Mode of Operation:	Tx mode

Ambient Temperature:  $25^{\circ}$ C Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

#### **Remark:**

The result has been done on all the possible configurations for searching the worst cases.

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

### **Spectrum Analyzer Setting:**

RBW = 30kHz,  $VBW \ge RBW$ , Sweep = Auto, Span = two times and five times the OBW Detector = Peak, Trace = Max. hold

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.



#### Date : 2022-10-19 No. : HMD22100001

Page 38 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2402	0.8862	Within 2400-2483.5

#### (Lowest Operating Frequency) - (GFSK)

f Value 1	8.00 dBi	m			er Freq: 2.402 Free Run		∃Hz   Hold:>10	1/10	Radio Sto	i: None
		#	IFGain:Lov		n: 10 dB	~ Y9		<i>,</i> 10	Radio De	vice: BTS
dB/div g	Ref 18.0	00 dBm		·						
9 10		_								
0										
0					$\sim \sim \sim$					
0				N		$\sim$				
0			~				m			
0			$\mathcal{I}$				2	~		
0	~	- Annand						J		
and and a second								00	han han	
0										
0										
nter 2.40										oan 3 M
es BW 30	0 kHz			#	VBW 100	kHz			Sweep	4.133
Occupie	ed Band	dwidth			Total	Power	r	3.15	ō dBm	
		83	8.81	kHz						
Transmit	Freq Er	ror	10.99	95 kHz	OBW	Powe	r	99	9.00 %	
x dB Ban	ndwidth		886	.2 kHz	x dB			-20.	00 dB	

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



### Date : 2022-10-19 No. : HMD22100001

Page 39 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2441	0.8878	Within 2400-2483.5

(Middle Operating Frequency) - (GFSK)

Center Fre	eq 2.4410000	100 GHz #IFGain:Lo	Trig: F	r Freq: 2.44100 'ree Run :: 10 dB	0000 GHz Avg Hold	>10/10	Radio Std Radio De	
I0 dB/div	Ref 18.00 d	Bm						
-og 8.00								
2.00						ļ		
12.0			$\mid \uparrow \uparrow$	$\sim$				
22.0					$h \rightarrow -$			
32.0					- m	<u></u>		-
42.0		~				<u>}</u>		
52.0		- <b>M</b>				<u>├</u> `~	a martine a	
62.0								
72.0								
Center 2.4 #Res BW			#	VBW 100 k	Hz			an 3 MH 4.133 m
Occup	ied Bandwi	dth		Total P	ower	2.6	1 dBm	
		839.60	kHz					
Transm	it Freq Error	10.8	91 kHz	OBW P	ower	9	9.00 %	
v dD Da	andwidth	007	7.8 kHz	x dB		20	.00 dB	

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 40 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2480	0.9238	Within 2400-2483.5

(Highest Operating Frequency) - (GFSK)

Center Fre	eq 2.4800000	<b>DO GHz</b> #IFGain:Lov	Trig: F	r Freq: 2.4800000 iree Run :: 10 dB	00 GHz Avg Hold:	>10/10	Radio Std Radio De	
I0 dB/div	Ref 18.00 di	Bm			÷			
-og 8.00								
2.00								
12.0			$- \gamma$	$\rightarrow \sim$				
22.0					-			
32.0						~		
42.0						~		
52.0						<u> </u>	m_	
62.0								
72.0								
Center 2.4 #Res BW			#	VBW 100 kH	z		Sp Sweep	an 3 M 4.133 r
Occup	ied Bandwid	dth		Total Por	wer	1.6	9 dBm	
		840.84	kHz					
Transm	it Freq Error	10.80	9 kHz	OBW Po	wer	9	9.00 %	
v dB Ba	ndwidth	923	.8 kHz	x dB		-20	.00 dB	

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



#### Date : 2022-10-19 No. : HMD22100001

Page 41 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2402	1.292	Within 2400-2483.5

### (Lowest Operating Frequency) - (π/4 DQPSK)

	q 2.402000	0000 GHz	Z Center Freq: 2.402000000 GHz Trig: Free Run Avg Hold:			Radio Std: None d:>10/10		
		#IFGain:Low	#Atten: 10 d			Radio Dev	ice: BTS	
I0 dB/div	Ref 18.00	dBm						
- <b>og</b> 8.00								
2.00								
12.0			L	$\wedge$				
2.0		~~~~	$\sim$ ·	- Winn	$\sim$			
12.0		~~			$\overline{\}$			
42.0								
52.0	کر جس	~~			~~	Juny		
52.0 M							and all all all all all all all all all al	
/2.0								
Center 2.4 Res BW 3			#VBW	100 kHz			an 3 MH 4.133 m	
Occupi	ed Bandv	vidth	т	otal Power	3.9	6 dBm		
		1.1603 M	Hz					
Transmi	it Freq Erro	or 10.067	kHz C	BW Power	9	9.00 %		
x dB Ba	ndwidth	1.292	MHz xdB		-20.00 dE			

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



### Date : 2022-10-19 No. : HMD22100001

Page 42 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2441	1.290	Within 2400-2483.5

(Middle Operating Frequency) - ( $\pi/4$  DQPSK)

enter Fre	q 2.44100000	0 GHz #IFGain:Low	Center Fro Trig: Free #Atten: 10		0000 GHz Avg Hold:	>10/10	Radio Std Radio Dev	
0 dB/div	Ref 18.00 dB	m						
.og 8.00								
2.00								
12.0			A	$\sim \Lambda$	~~~			
22.0			7.4		· ····	L		
32.0								
42.0		/						
52.0		/				w~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
62.0 × · · · ·	-mar						~	
72.0								
Center 2.44 Res BW 3			#VB	W 100 k	Hz		Sp Sweep	an 3 M⊦ 4.133 m
Occupi	ed Bandwid	th		Total Po	ower	3.49	dBm	
	1	.1614 MH	z					
Transmi	t Freq Error	10.133 kł	Ηz	OBW P	ower	99	.00 %	
x dB Ba	ndwidth	1.290 MH	Ηz	x dB		-20.	00 dB	

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 43 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2480	1.290	Within 2400-2483.5

(Highest Operating Frequency) - ( $\pi/4$  DQPSK)

enter Fre	eq 2.48000		<b>1z</b> Gain:Low	Center F Trig: Free #Atten: 1		0000 GHz Avg Hold:	>10/10	Radio Std Radio Dev	
) d <u>B/div</u>	Ref 18.00	0 dBm							
og .00									
2.0			~~~	$\sqrt{1}$	$\sim$	m			
2.0		~					have a second		
2.0		/							
2.0	~	$\sim$					have		
	ment								
2.0	_								
enter 2.4 Res BW 3				#VE	3W 100 k	Hz		Sp Sweep	an 3 MH 4.133 n
Occupi	ed Band	width			Total P	ower	2.49	dBm	
		1.16	02 MH	z					
Transmi	it Freq Erre	or	10.414 k	Hz	OBW P	ower	99	.00 %	
x dB Bandwidth 1.			4 000 8	290 MHz x dB			-20.		

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

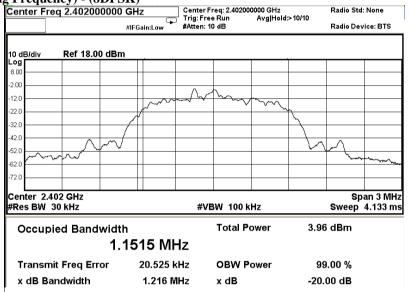


#### Date : 2022-10-19 No. : HMD22100001

Page 44 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2402	1.216	Within 2400-2483.5

#### (Lowest Operating Frequency) - (8DPSK) Center Freq 2.402000000 GHz



The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.

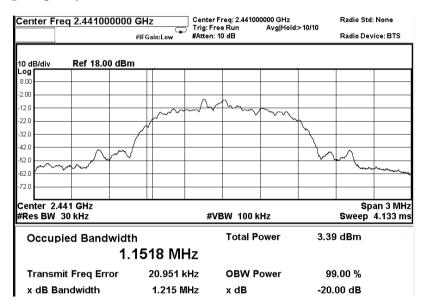


### Date : 2022-10-19 No. : HMD22100001

Page 45 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2441	1.216	Within 2400-2483.5

(Middle Operating Frequency) - (8DPSK)



The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 46 of 83

Fundamental Frequency	20dB Bandwidth	FCC Limits
[MHz]	[MHz]	[MHz]
2480	1.216	Within 2400-2483.5

(Highest Operating Frequency) - (8DPSK)

req Offse	et 0 Hz	#16	Gain:Low	Trig: F	Center Freq: 2.480000000 GHz Trig: Free Run Avg Hold:>10/10 #Atten: 10 dB				Radio Std: None Radio Device: BTS		
0 dB/div	Ref 18.00	0 dBm									
.og 8.00											
2.00											
12.0				L-A	Ann	~					
2.0			~~~-	-	`	- www	1				
12.0		- /	/-				$\lambda$				
2.0	$\wedge$	$\sim$									
2.0	monut	, <u>,</u>					Ť	ha ha			
2.0											
									0.041		
enter 2.4 Res BW				#	VBW 100	ĸHz			oan 3 MH 4.133 m		
Occup	ied Band	width			Total F	ower	2.4	8 dBm			
		1.1	532 M	Hz							
Transm	it Freq Err	or	21.358	kHz	Hz OBW Power			99.00 %			
x dB Bandwidth 1.216 MH			กาม	lz xdB -20			).00 dB				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 47 of 83

### **3.1.6 Hopping Channel Separation**

Ambient Temperature: 25°CRelative Humidity: 51%Atmospheric Pressure: 101 kPa

#### **Requirements:**

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, provided the systems operate with an output power no greater than 125 mW.

### **Spectrum Analyzer Setting:**

RBW = 300kHz,  $VBW \ge RBW$ , Sweep = Auto, Span = Wide enough to captur the peaks of two adjacent channels Detector = Peak, Trace = Max. hold

#### Limit:

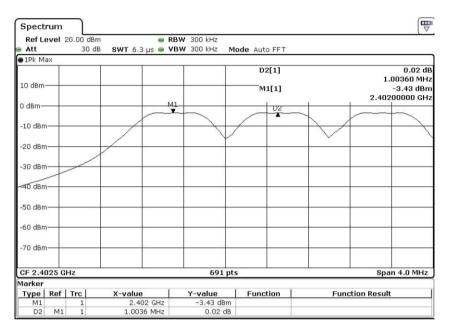
The measured maximum bandwidth=1359 kHz

The measured maximum bandwidth *2/3 = 1292KHz *2/3 = 861.33kHz



### Date : 2022-10-19 No. : HMD22100001

Page 48 of 83



## Channel separation = 1MHz (>861.33kHz) (Lowest) (GFSK)

Channel separation = 1MHz (>861.33kHz) (	(Mid)	) (GFSK)
------------------------------------------	-------	----------

Spectrum						
Ref Level 3	20.00 dBm	🖷 R	BW 300 kHz			
Att	30 dB	SWT 6.3 µs 👄 V	BW 300 kHz	Mode Auto FFT		
●1Pk Max			15 974			
10 dBm				D2[1]		0.01 dB 1.00360 MHz -4.08 dBm
0 dBm		м		D2		2.44100000 GHz
-10 dBm			4	- De		
		$\sim$				
-20 dBm					-	
-30 dBm						
-40 dBm					_	
-50 dBm			_		_	
-60 dBm						
-70 dBm					_	
CF 2.4415 G	Hz		691	ots		Span 4.0 MHz
Marker						
Type   Ref	Trc	X-value	Y-value	Function	Functi	ion Result
M1	1	2.441 GHz	-4.08 dBr			
D2 M1	1	1.0036 MHz	0.01 d	В		

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

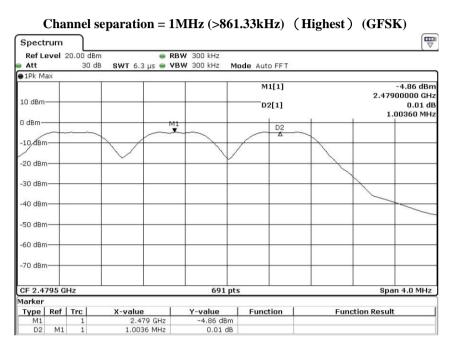
Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 49 of 83



### Channel separation = 1MHz (>861.33kHz) (Lowest) ( $\pi/4$ DQPSK)

M1[1]           D2[1]           D2           A		-3.38 c 2.4020000 1.00360 l
M1[1]		2.40200000 0.00
D2[1]		2.40200000 0.00
		1.00360
	-	
8		Span 4.0 M
		• • • • • • • • • • • • • • • • • • • •
Function	Func	ction Result
	s Function	

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Page 50 of 83

### Date : 2022-10-19 No. : HMD22100001

Channel separation = 1MHz (>861.33kHz) (Mid) ( $\pi/4$  DQPSK) **T** Spectrum ● RBW 300 kHz SWT 6.3 µs ● VBW 300 kHz Ref Level 20.00 dBm Mode Auto FFT Att 30 dB • 1Pk Max M1[1] 4.11 dBm 2.44100000 GHz 10 dBm 0.04 dB 1.00360 MHz D2[1] 0 dBm-M1 D2 -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm-CF 2.4415 GHz 691 pts Span 4.0 MHz Marker Type | Ref | Trc | Y-value Function Function Result X-value .441 GHz 4.11 dBm 0.04 dB 1 M1 1.0036 MHz D2 Channel separation = 1MHz (>861.33kHz) (Highest) ( $\pi/4$  DQPSK) **B** Spectrum Ref Level 20.00 dBm RBW 300 kHz 30 dB SWT 6.3 µs 👄 VBW 300 kHz Mode Auto FFT Att •1Pk Max -4.88 dBm M1[1] 2.47900000 GHz 10 dBm D2[1] 0.02 dE 1.00360 MH 0 dBm M1 D2 -10 dBm -20 dBm -30 dBm -40 dBn -50 dBm -60 dBm -70 dBm CF 2.4795 GHz 691 pts Span 4.0 MHz Marker Type | Ref | Trc | Function Result Function X-value Y-value 2.479 GHz 1.0036 MHz 1.88 dBm 0.02 dB D2 M1

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 51 of 83

Ref Level         20.00 dBm         RBW         300 kHz         Mode         Auto FFT           1Pk Max         0 dB         SWT 6.3 µs         VBW 300 kHz         Mode         Auto FFT           1Pk Max         D2[1]         0.03 d0 MHz         -3.09 dBm         -3.98 dBm           0 dBm         M1[1]         -3.99 dBm         -3.99 dBm         -3.99 dBm           0 dBm         M1         D2         -44100000 GH         -3.99 dBm           -10 dBm         M1         D2         -44100000 GH         -3.99 dBm           -20 dBm         -30 dBm         -40 dBm </th <th>Spectrum</th> <th></th> <th><b></b></th>	Spectrum															<b></b>
Att         30 db         SWT 6.3 µs         VBW 300 kHz         Mode Auto FFT           0 fbh Max         0 dbm         0 dbm         0.01 dbm         -0.01 dbm	Ref Level	20.00 d	Bm			RBW	/ 300 kHz									<u> </u>
61Pk Max         -3.30 dm         -3.30 dm         -3.30 dm         -0.01 d           10 dm         M1[1]         2.4020000 cF         -0.01 d         -0.01 d           0 dm         M1         D2[1]         0.030 dm         -0.01 d           -10 dm         M1         D2         -0.01 d         -0.01 d           -20 dm         M1         D2         -0.01 d         -0.01 d           -30 dm         M1         D2         -0.01 d         -0.01 d           -30 dm         M1         D2         -0.01 d         -0.01 d           -40 dm         M1         -0.01 d         -0.01 d         -0.01 d           -50 dm         M1         1         2.402 CH2         691 pts         Spon 4.0 MHz           Morker         M1         1         1.0036 MHz         -3.00 dm         -3.00 dm           Type         Ref         Trc         X-value         Y-value         Function Result           M1         1         1.0036 MHz         -0.01 de         -0.01 de         -0.01 de           Spectrum         RBW 300 HHz         Mode Auto FFT         -3.00 dm         -3.00 dm         -3.00 dm           10 dm         M1         1         0.035 dt <t< td=""><td></td><td></td><td></td><td>F 6.3</td><td>µs 👄 '</td><td>VBW</td><td>/ 300 kHz</td><td>Mod</td><td>le Auto</td><td>FFT</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>				F 6.3	µs 👄 '	VBW	/ 300 kHz	Mod	le Auto	FFT						
10 dBm       0.01 d       0.00 d	●1Pk Max							145								
10 dBm       D2[1]       -0.01 dial         0 dBm       MI       D2[1]       -0.0360 Mi         -10 dBm       X       X       X         -20 dBm       X       X       X         -30 dBm       X       X       X         -30 dBm       X       X       X         -30 dBm       X       X       X         -40 dBm       X       X       X         -50 dBm       X       X       Y         -70 dBm       X       X       Y         -70 dBm       X       -0.01 dial       X         Marker       Yeal       Function       Function Result         M1       1       2.402 GHz       -3.00 dBm       -0.01 dial         Type       Fef       Trc       X-value       Function Result         M1       1       2.402 GHz       -3.00 dBm       -0.01 dial         Channel separation = 1MHz (>S61.33kHz)       (Mid) (SDPSK)       Spectrum         Spectrum       Ret Level 2.00 dBm       M1[1]       -0.02 dial         10 dBm       0       M1[1]       -0.03 dial       -0.01 dial         10 dBm       0       0       0       -0.01 dial									M1	[1]						
0 dBm         M1         U2         1.00360 Mi           -10 dBm         20 dBm         2         0         2           -20 dBm         20 dBm         2         0         2         0           -30 dBm         -20 dBm         -20 dBm         -20 dBm         -30 dBm         -20 dBm         -30 dBm         -20 dBm         -30 dBm	10 dBm													2.40		
0.d8m       M1       U2         -10 d8m       -20 d8m         -20 d8m       -30 d8m         -30 d8m       -40 d8m         -40 d8m       -40 d8m         -50 d8m       -50 d8m         -60 d8m       -60 d8m         -70 d8m       -70 d8m         -710 d8m       -710 d8m         -70 d8m       -710 d8m	10 UBIII								D2	[1]						
10 dBm         11 1 1.0036 MHz         691 pts         Span 4.0 MHz         Span 4.0 MHz         Span 4.0 MHz         10 dBm         10	0 dBm					M1					3		1	1	.00360 1	MHZ
20 dBm       -20 dBm       -30 dBm       -30 dBm         -30 dBm       -30 dBm       -30 dBm       -30 dBm         -50 dBm       -50 dBm       -50 dBm       -50 dBm         -60 dBm       -60 dBm       -60 dBm       -60 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm         D2 M1 1       1.0036 MHz       -3.00 dBm       -70 dBm         D2 M1 1       1.0036 MHz       -70 dBm       -70 dBm         D dBm       BW 300 kHz       Mode Auto FFT       -70 dBm         D1 dBm       -70 dBm       -70 dBm       -70 dBm         -20 dBm       -70 dBm       -70 dBm       -70 dBm         -30 dBm       -70 dBm       -70 dBm       -70 dBm         -20 dBm       -70 dBm       -70 dBm       -70 dBm         -30 dBm       -70 dBm       -70 dBm       -70 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm       -70 dBm	o donn			-		*		_		D2		~	-		+	-
20 dBm       -20 dBm       -30 dBm       -30 dBm         -30 dBm       -30 dBm       -30 dBm       -30 dBm         -50 dBm       -50 dBm       -50 dBm       -50 dBm         -60 dBm       -60 dBm       -60 dBm       -60 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm         D2 M1 1       1.0036 MHz       -3.00 dBm       -70 dBm         D2 M1 1       1.0036 MHz       -70 dBm       -70 dBm         D dBm       BW 300 kHz       Mode Auto FFT       -70 dBm         D1 dBm       -70 dBm       -70 dBm       -70 dBm         -20 dBm       -70 dBm       -70 dBm       -70 dBm         -30 dBm       -70 dBm       -70 dBm       -70 dBm         -20 dBm       -70 dBm       -70 dBm       -70 dBm         -30 dBm       -70 dBm       -70 dBm       -70 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm         -70 dBm       -70 dBm       -70 dBm       -70 dBm       -70 dBm	-10 dBm									- 225						
-30 dBm       -40 dBm       -40 dBm       -40 dBm       -50 dBm	10 00.00		X													
-30 dBm       -40 dBm       -40 dBm       -40 dBm       -50 dBm	-20 dBm		/													
-40 dBm         -50 dBm         -60 dBm         -60 dBm         -70 dBm         Marker         Type Ref Trc       X-value       Y-value       Function       Function Result         Marker         Type Ref Trc       X-value       Y-value       Function Result         Marker         Channel separation = 1MHz (>861.33kHz) (Mid) (8DPSK)         Spectrum         RBW 300 kHz         Att       30 dB       Marker         OdBm       D2[1]       0.0303 MH         0 dBm       Mit 1         0 dBm       Mit 1       0 dBm         -20 dBm       -20 dBm       -20 dBm         -20 dBm       -20 dBm       -20 dBm       -20 dBm     <		/														
-40 dBm         -50 dBm         -60 dBm         -60 dBm         -70 dBm         Marker         Type Ref Trc       X-value       Y-value       Function       Function Result         Marker         Type Ref Trc       X-value       Y-value       Function Result         Marker         Channel separation = 1MHz (>861.33kHz) (Mid) (8DPSK)         Spectrum         RBW 300 kHz         Att       30 dB       Marker         OdBm       D2[1]       0.0303 MH         0 dBm       Mit 1         0 dBm       Mit 1       0 dBm         -20 dBm       -20 dBm       -20 dBm         -20 dBm       -20 dBm       -20 dBm       -20 dBm     <	-30 dBm												_			
-50 dBm															1	
-50 dBm	-40.d8m												_			
-60 dBm         -70 dBm <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																
-70 dBm         -73 dBm         <	-50 dBm		_	_	2			-					-		-	
-70 dBm         -73 dBm         <																
GF 2.4025 GHz         Span 4.0 MHz           Marker         Y-value         Function         Function Result           M1         1         2.402 GHz         -3.30 dBm         -0.01 dB         -0.01 dB           D2         M1         1         2.402 GHz         -3.30 dBm         Function         Function Result           M1         1         2.402 GHz         -3.30 dBm         -0.01 dB         Function Result         Function Result           D2         M1         1         0.036 MHz         -0.01 dB         Function Result         Function Result           Channel separation = 1MHz (>861.33kHz)         (Mid) (8DPSK)         Spectrum         Function Result         Function Result           Spectrum         @ RBW 300 kHz         Mode Auto FFT         Out of the separation of the separatis of the separation of the separation of the separatis of the sep	-60 dBm		_					-					_		+	_
GF 2.4025 GHz         Span 4.0 MHz           Marker         Type Ref Trc         X-value         Y-value         Function         Function Result           M1         1         2.402 GHz         -3.30 dBm         -0.01 dB         -0.03																
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         1.0036 MHz         -3.30 dBm         -3.00 dBm         -0.01 dB         -0.03 dB	-70 dBm		-					-							+	
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         1.0036 MHz         -3.30 dBm         -3.00 dBm         -0.01 dB         -0.03 dB																
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         1.0036 MHz         -3.30 dBm         -3.00 dBm         -0.01 dB         -0.03 dB	CE 2 4025 C	LI-7		_			601	nte			_		_	- en	an 4.0 M	
Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.402 GHz         -3.30 dBm         -3.90 dBm         -0.01 dB         -0.03 dB         -0.04 B		112		_		_	091	prs		_	_		_	əp	an 4.0 M	112
M1         1         2.402 GHz         -3.30 dBm           D2         M1         1         1.0036 MHz         -0.01 dB           Channel separation = 1MHz (>861.33kHz) (Mid) (8DPSK)           Spectrum           Ref Level 20.00 dBm         RBW 300 kHz           Att         30 dB SWT 6.3 µs         VBW 300 kHz           Att         30 dB           O 2[1]         0.03 d           ID (III)         0.03 d           0 dBm         D2[1]         0.03 d           0 dBm         D2[1]         0.03 d           0 dBm         D2           -0.01 dB         D2[1]         0.03 d           -0.03 dBm           -0.03 dBm         D2[1]         0.03 d           -0.03 dBm         D2           -0.03 dBm         -0.03 dBm           -0.04 Bm         -0.04 Bm           -0.04 Bm         -0.04 Bm           -0.04 Bm         -0.04 Bm <th< td=""><td></td><td>Tre</td><td>¥-u</td><td>مىرام</td><td>5</td><td>1</td><td>Y-valuo</td><td>1</td><td>Euncti</td><td>ion  </td><td></td><td>Eu</td><td>nctio</td><td>n Pocu</td><td>l+</td><td>1</td></th<>		Tre	¥-u	مىرام	5	1	Y-valuo	1	Euncti	ion		Eu	nctio	n Pocu	l+	1
D2         M1         1         1.0036 MHz         -0.01 dB           Channel separation = 1MHz (>861.33kHz) (Mid) (8DPSK)           Spectrum           Ref Level 20.00 dBm         RBW 300 kHz         Mode Auto FFT           • 1Pk Max         D2[1]         0.03 d           10 dBm         M1         D2[1]         0.03 d           0 dBm         M1         D2[1]         0.03 d           0 dBm         M1         D2         0.03 d           0 dBm         M1         D2         0.03 d           0 dBm         M1         D2         0.44100000 GH           0 dBm         M1         D2         0.44100000 GH           -10 dBm         M1         D2         0           -20 dBm         Gam         Gam         Gam         Gam           -20 dBm         Gam         Gam         Gam         Gam           -30 dBm         Gam         Gam         Gam         Gam           -0 dBm         Gam         Gam         Gam         Gam           -70 dBm         Gam         Gam         Gam         Gam         Gam           Type Ref Trc			<u> </u>					3m	Funct	UII		Fu	nctio	ii kesu		
Spectrum         Ref Level 20.00 dBm         RBW 300 kHz           Att         30 dB         SWT 6.3 µs         VBW 300 kHz         Mode Auto FFT           ●1Pk Max         D2[1]         0.03 d0         1.00360 MH           10 dBm         M1[1]         -3.99 dBs         2.44100000 GH           0 dBm         M1         D2         -4.44100000 GH           -10 dBm         M1         D2         -4.44100000 GH           -20 dBm         -         -         -         -           -30 dBm         -         -         -         -         -           -20 dBm         -         -         -         -         -         -           -30 dBm         -         -         -         -         -         -         -           -20 dBm         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -<																
Att         30 dB         SWT         6.3 µs         VBW         300 kHz         Mode         Auto         FFT                • IPk Max               • D2[1]             • 0.03 di             • 1.00360 MH             • -3.98 dBa             • -3.98 dBa             • 2.44100000 GH             • 0             • 0		1		1.003		: 1ľ	-0.01	and the second s	.33k	Hz)	(1	/lid)	(81	OPSI	<u>()</u>	
	Ch Spectrum	anne	el sepa	1.003	ion =		-0.01 MHz (>	and the second s	.33k	Hz)	(1	/lid)	(81	OPSI	<b>X</b> )	
10 dBm     1.00360 MH       0 dBm     3.98 dBm       0 dBm     M1[1]       -10 dBm     D2       -10 dBm     D2       -20 dBm     A       -30 dBm     A       -40 dBm     A       -50 dBm     A       -70 dBm     A<	Ch Spectrum Ref Level	1 anne 20.00 c	el sepa:	1.003 rati	ion =	RBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	y 965 65		( N	/lid)	(81	DPSI	ζ)	
10 dBm     M1[1]     -3.98 dBn       -10 dBm     M1     D2       -10 dBm     V     D2       -20 dBm     V     V       -30 dBm     V     V       -50 dBm     V     V       -70 dBm     V <td< td=""><td>Ch Spectrum Ref Level Att</td><td>1 anne 20.00 c</td><td>el sepa:</td><td>1.003 rati</td><td>ion =</td><td>RBW</td><td>-0.01 MHz (&gt; / 300 kHz</td><td>•<b>86</b>1</td><td>y 965 65</td><td></td><td>(1</td><td>/lid)</td><td>(81</td><td>DPSI</td><td><b>X</b>)</td><td></td></td<>	Ch Spectrum Ref Level Att	1 anne 20.00 c	el sepa:	1.003 rati	ion =	RBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	y 965 65		(1	/lid)	(81	DPSI	<b>X</b> )	
0 dBm     M1     D2     2.4410000 GH       -10 dBm     D2     D2     0       -20 dBm     -20 dBm     -20 dBm     -20 dBm       -30 dBm     -30 dBm     -30 dBm     -30 dBm       -30 dBm     -30 dBm     -30 dBm     -30 dBm       -40 dBm     -40 dBm     -40 dBm     -40 dBm       -50 dBm     -40 dBm     -40 dBm     -40 dBm       -50 dBm     -40 dBm     -40 dBm     -40 dBm       -50 dBm     -40 dBm     -40 dBm     -40 dBm       -70 dBm     -40 dBm     -40 dBm     -40 dBm </td <td>Ch Spectrum Ref Level Att</td> <td>1 anne 20.00 c</td> <td>el sepa:</td> <td>1.003 rati</td> <td>ion =</td> <td>RBW</td> <td>-0.01 MHz (&gt; / 300 kHz</td> <td>•<b>86</b>1</td> <td><b>le</b> Auto</td> <td>FFT</td> <td>( N</td> <td>/lid)</td> <td>(81</td> <td>DPSI</td> <td></td> <td></td>	Ch Spectrum Ref Level Att	1 anne 20.00 c	el sepa:	1.003 rati	ion =	RBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	<b>le</b> Auto	FFT	( N	/lid)	(81	DPSI		
0 dBm	Ch Spectrum Ref Level Att 1Pk Max	1 anne 20.00 c	el sepa:	1.003 rati	ion =	RBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FF T	( N	/lid)	(81		0.03	3 dB MHz
-10 dBm     -20 dBm       -20 dBm     -30 dBm       -30 dBm     -30 dBm       -40 dBm     -30 dBm       -50 dBm     -30 dBm       -50 dBm     -30 dBm       -60 dBm     -30 dBm       -70 dBm     -39 dBm	Ch Spectrum Ref Level Att 1Pk Max	1 anne 20.00 c	el sepa:	1.003 rati	ion =	RBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FF T	( N	/lid )	(81	1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-20 dBm -30 dBm -40 dBm -40 dBm -50 dBm -50 dBm -70	Ch Spectrum Ref Level Att 10 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]	( N	/lid )	(81	1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-20 dBm -30 dBm -40 dBm -40 dBm -50 dBm -50 dBm -70	Ch Spectrum Ref Level Att 10 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]	( N	/lid )	(81	1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-30 dBm -40 dBm -50 dBm -50 dBm -60 dBm -70	Ch Spectrum Ref Level Att 10 dBm 0 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]	( N	/lid )	(81	1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-30 dBm -40 dBm -50 dBm -50 dBm -60 dBm -70	Ch Spectrum Ref Level Att 10 dBm 0 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )	(81	1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-40 dBm -50 dBm -50 dBm -60 dBm -70	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-40 dBm -50 dBm -50 dBm -60 dBm -70	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-50 dBm -60 dBm -70	Ch Spectrum Ref Level Att • 1Pk Max 0 dBm -10 dBm -20 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-50 dBm -60 dBm -70	Ch Spectrum Ref Level Att • 1Pk Max 0 dBm -10 dBm -20 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-60 dBm -70	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-60 dBm         -70 dBm         691 pts         Span 4.0 MHz           -70 dBm         691 pts         Span 4.0 MHz           Type         Ref         Trc         X-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         Function         Function Result	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/lid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
-70 dBm -70 dBm CF 2.4415 GHz 691 pts Span 4.0 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.441 GHz -3.98 dBm	Ch Spectrum Ref Level Att • 1Pk Max • 10 dBm - 0 dBm - 20 dBm - 30 dBm - 40 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/id )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
CF 2.4415 GHz         691 pts         Span 4.0 MHz           Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         Function         Function	Ch Spectrum Ref Level Att • 1Pk Max • 10 dBm - 0 dBm - 20 dBm - 30 dBm - 40 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/id )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
CF 2.4415 GHz         691 pts         Span 4.0 MHz           Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         Function         Function	Ch           Spectrum           Ref Level           Att           10 dBm           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = µs ●	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/id )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         -3.98 dBm <td>Ch           Spectrum           Ref Level           Att           10 dBm           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm</td> <td>1 anne 20.00 c</td> <td>el sepa:</td> <td>1.003 rati</td> <td>ion = </td> <td>RBW VBW</td> <td>-0.01 MHz (&gt; / 300 kHz</td> <td>•<b>86</b>1</td> <td>le Auto D2</td> <td>FFT [1] [1]</td> <td></td> <td>/fid )</td> <td></td> <td>1</td> <td>0.03 .00360 f -3.98 c</td> <td>3 dB MHz dBm</td>	Ch           Spectrum           Ref Level           Att           10 dBm           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = 	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/fid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         -3.98 dBm <td>Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm</td> <td>1 anne 20.00 c</td> <td>el sepa:</td> <td>1.003 rati</td> <td>ion = </td> <td>RBW VBW</td> <td>-0.01 MHz (&gt; / 300 kHz</td> <td>•<b>86</b>1</td> <td>le Auto D2</td> <td>FFT [1] [1]</td> <td></td> <td>/id )</td> <td></td> <td>1</td> <td>0.03 .00360 f -3.98 c</td> <td>3 dB MHz dBm</td>	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = 	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/id )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         -3.98 dBm <td>Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm</td> <td>1 anne 20.00 c</td> <td>el sepa:</td> <td>1.003 rati</td> <td>ion = </td> <td>RBW VBW</td> <td>-0.01 MHz (&gt; / 300 kHz</td> <td>•<b>86</b>1</td> <td>le Auto D2</td> <td>FFT [1] [1]</td> <td></td> <td>/fid )</td> <td></td> <td>1</td> <td>0.03 .00360 f -3.98 c</td> <td>3 dB MHz dBm</td>	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	1 anne 20.00 c	el sepa:	1.003 rati	ion = 	RBW VBW	-0.01 MHz (> / 300 kHz	• <b>86</b> 1	le Auto D2	FFT [1] [1]		/fid )		1	0.03 .00360 f -3.98 c	3 dB MHz dBm
Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.441 GHz         -3.98 dBm         -3.98 dBm         -3.98 dBm         -3.98 dBm	Ch Spectrum Ref Level Att 10 dBm 10 dBm -10 dBm -20 dBm -20 dBm -30 dBm -50 dBm -60 dBm -70 dBm	1 20.00 c 30	el sepa:	1.003 rati	ion = 	RBW VBW	-0.01 MHz (> / 300 kHz / 300 kHz		le Auto D2	FFT [1] [1]		/fid )		2.44		3 dB MHz JBm GHz
M1 1 2.441 GHz -3.98 dBm	Ch Spectrum Ref Level Att 10 dBm 10 dBm -10 dBm -20 dBm -20 dBm -30 dBm -50 dBm -70 dBm -70 dBm -70 dBm -70 dBm	1 20.00 c 30	el sepa:	1.003 rati	ion = 	RBW VBW	-0.01 MHz (> / 300 kHz / 300 kHz		le Auto D2	FFT [1] [1]		/fid )		2.44		3 dB MHz JBm GHz
	Ch Spectrum Ref Level Att 10 dBm 10 dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm -70 dBm -70 dBm -70 dBm -70 dBm	1 20.00 c 20.00 c 20.0	el sepa:	rati	μs •	RBW VBW	-0.01 MHz (> / 300 kHz / 300 kHz / 300 kHz / 691		de Auto D2 M1	FFT [1] [1] D2				1 2.44	0.0360 f -3.98 c 100000 f	3 dB MHz JBm GHz
D2 M1 1 1.0036 MHz 0.03 dB	Ch Spectrum Ref Level Att 10 dBm 0 dBm -10 dBm -20 dBm -20 dBm -30 dBm -50 dBm -60 dBm -70	1 anno 20.00 c 3 30 Hz Hz	el sepa:	r 6.3	μs •	RBW VBW	-0.01 MHz (> / 300 kHz / 300 kHz / 300 kHz / 300 kHz / 691 Y-value	×861	de Auto D2 M1	FFT [1] [1] D2				1 2.44	0.0360 f -3.98 c 100000 f	3 dB MHz JBm GHz

# Channel separation = 1MHz (>861.33kHz) (Lowest) (8DPSK)

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 52 of 83

Matt         30 dB         SWT 6.3 µs         VBW         300 kHz         Mode Auto FFT           1Pk Max         Image: Strain St	-4.76 dBr 2.47900000 GH 0.02 d 1.00360 MH
1Pk Max     10 dBm     10 d	2.47900000 GH 0.02 d
M1[1]           10 dBm         D2[1]           0 dBm         M1           -10 dBm         D2           -20 dBm	2.47900000 GH 0.02 d
10 dBm D2[1] 0 dBm M1 D2 -10 dBm20 dBm	2.47900000 GH 0.02 d
-10 dBm -20 dBm -30 dBm -40 dBm	
-20 dBm -20 dBm -30 dBm -40 dBm	
-30 dBm	
-40 dBm	$\land$
-50 dBm	
-60 dBm	
-70 dBm	
CF 2.4795 GHz 691 pts	Span 4.0 MHz
1arker	
	nction Result
M1         1         2.479 GHz         -4.76 dBm           D2         M1         1         1.0036 MHz         0.02 dB	

The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19 No. : HMD22100001 Page 53 of 83

### 3.1.7 Band-edge Compliance of RF Conducted Emissions Measurement:

Ambient Temperature: 25°C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

#### Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required. According to the test method DA 00-705.

### **Spectrum Analyzer Setting:**

RBW = 100kHz, VBW= 300kHz, Sweep = Coupled,

Span = Wide enough to captur the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation. Detector = Peak, Trace = Max. hold

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report



### Date : 2022-10-19 No. : HMD22100001

Page 54 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2402)	-3.46	-2346	-51.31	PASS

### Band-edge Compliance of RF Emissions – Lowest (GFSK) (Hopping on)

Spect	rum					[0]
	evel	20.00 dBn		W 100 kHz	47 V 0 Process	
Att		30 de	3 SWT 76 µs 🖷 VB	W 300 kHz Mo	de Auto FFT	
∎1Pk M	ax		Î Î	1	M1[1]	-3.46 dB
					MILI	2.4018390 G
10 dBm	+				M2[1]	-54.67 dB
-						2.400000 GI
0 dBm-						The second secon
-10 dBn				2		
-10 080						
-20 dBn	-					
-30 dBn	n-+-					
-40 dBn	n			0		
M3 -50gdBn						
-SUCABN	n					M2/
⇔eo dBri			man manan		-	m ranhor
-eo ubn	100	0-00 00 0-0			\$	
-70 dBn	n					
CF 2.3	895 G	Hz	1	691 pts		Span 29.0 MH
Marker						
Туре	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.401839 GHz	-3.46 dBm		
M2		1	2.4 GHz	-54.67 dBm		
MЗ		1	2.376028 GHz	-51.31 dBm		

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 55 of 83

#### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2400 – Lowest Fundamental (2402)	-3.45	-23.45	-51.72	PASS

### Band-edge Compliance of RF Emissions – Lowest (GFSK) (Hopping off)

Spect									
	evel	20.00 dBr			W 100 kHz				
Att 1Pk M		30 d	B SWT 76	ha 🖲 AB	300 kHz	Mode Auto	D FFT		
●15K M	ax		1	2		M	1[1]		-3.45 dBm
							1[1]		2.4018390 GHz
10 dBm						M	2[1]		-53.85 dBm
0 dBm-							-		2.4000000 GHz
o abin									Mn.
-10 dBn			-	0					
-20 dBn	<del>ا –</del> ۱							-	<u> </u>
-30 dBn									
-30 UBI	-			7					
-40 dBn	-		-	2		-		_	
								M3	. 1
-50 dBn			- · · ·	ω h .	m en hi	No. 19. 19			M2/
M	1.IN	MN	$n \wedge n$	1	แก่มาก	MAG	MN	תהתו	$M^{\gamma}$
-60 dBn		en her er	- 10 Pro 2						
-70 dBn				1		-			
CF 2.3	895 G	Hz			691	pts			Span 29.0 MHz
Marker									
Type	Ref	Trc	X-value		Y-value	Func	tion	Fund	ction Result
M1		1	2.4018		-3,45 dl				
M2		1		.4 GHz	-53.85 di				
M3		1	2.3978	52 GHz	-51.72 di	3m			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 56 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2483.5 - Highest Fundamental (2480)	-4.81	-24.81	-57.97	PASS

### Band-edge Compliance of RF Emissions – Highest (GFSK) (Hopping on)

0-61		0.00 dBr	-	RBW 100 kHz			1
Att	ever 2	0.00 abr 30 d	the second second second		ada Auto FFT		
1Pk Ma		30 u	P 2MI 20'A 12 -	YBW SUUKHZ IY	DUE AULO FFI		
10 dBm	37				M1[1]		-4.81 dBm 2.4798630 GHz -57.97 dBm 2.4835000 GHz
0 dBm—	MI						
-10 dBm	$\mathbb{H}$						
-20 dBm -30 dBm							
-40 dør		5					
-50 dBm -60 dBm		Z	M2	manage		mannam	marahan and an a daw
-70 dBm	_						
Start 2	.478 G	Hz		691 pts			Stop 2.5 GHz
Marker							
Type	Ref	Trc	X-value	Y-value	Function	Fund	ction Result
M1		1	2.479863 GHz	-4.81 dBm			
M2		1	2.4835 GHz	-57.97 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 57 of 83

#### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2483.5 - Highest Fundamental (2480)	-5.0	-25.0	-50.95	PASS

### Band-edge Compliance of RF Emissions – Highest (GFSK) (Hopping off)

					DUL COOLU					
	evel 3	20.00 dBm			BW 100 kHz	55 NW 51				
Att		30 dE	SWT 56.	9 µs 😑 🕻	<b>'BW</b> 300 kHz	Mode Au	ito FFT			
1Pk M	ах		φ		2					
						M	1[1]			-5.00 dBn
10 dBm										798630 GH;
LO UBIII						M	2[1]			-59.21 dBn
d name									2.48	335000 GH
0 dBm—	MI									
m	5									
10 dBn	יון וי									
$\langle 1 \rangle$	1 N									1
ą́ф dBh	×++	1						-		
	· [1									1
30 dBn					-			-	-	
40 dBn		1						_		
		1.								
-50 dBn	-	4			M3			_		L
	·	Lm.	M2 .	A M	1	0	0		100000 000	
-60 dBn		2 Mu	WM2	Man	month	And	Lasy 1	"how how	mon	Marm
-00 ubii		90		V		97			1	
70 40-										1
70 dBn										
Start 2	.478 (	GHz			691 pt	s		0.	Ste	p 2.5 GHz
1arker										
Type	Ref	Trc	X-value	1	Y-value	Func	tion	Eun	ction Resul	÷
M1	1.01	1	2,47986		-5.00 dBm	· une		i un	otton Robul	
M2		1		IS GHZ	-59.21 dBm					
M3		1	2.48915		-50.95 dBm					

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 58 of 83

#### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2400 – Lowest Fundamental (2402)	-3.59	-23.59	-53.38	PASS

#### Band-edge Compliance of RF Emissions – Lowest (π/4 DQPSK) (Hopping on)

Ref L	evel 3	20.00 dBn	n 🖷 RB	W 100 kHz				
Att		30 dB			de Auto FFT			
●1Pk M	ах			60545 - 200				
					M1[1]			-3.59 dBm 18320 GHz
10 dBm					M2[1]		-:	56.41 dBm 00000 GHz
0 dBm-	-					1	1 1	M1
								M
-10 dBn	1							
-20 dBn								
-20 UDII	1							
-30 dBn	-						-	
	°							$\left\{ \right\}$
-40 dBn				-			+ +	<u> </u>
								4
-50 ⁴ 3Bn	1						M2	1
460 dBA			600 Day 6			and man market	mare of	
*60 GB/N	10.000	100-00 Clico	And a worker	- damana and a	and a free of the second	C. Contra- and a		
-70 dBn	-						-	
	· ·							
Start 2	.375	GHz		691 pts			Stop 2	.404 GHz
larker								
Type	Ref	Trc	X-value	Y-value	Function	Fur	nction Result	
M1		1	2.401832 GHz	-3.59 dBm				
M2		1	2.4 GHz	-56.41 dBm				
M3		1	2.376112 GHz	-53.38 dBm				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 59 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2400 – Lowest Fundamental (2402)	-3.58	-23.58	-52.90	PASS

# Band-edge Compliance of RF Emissions – Lowest ( $\pi/4$ DQPSK) (Hopping off)

Spect	rum									
	evel	20.00 dBr			₩ 100 kHz	55 N. 777 P	1222			
Att		30 d	B SWT 76	µs 🖷 VB	<b>W</b> 300 kHz	Mode Aut	D FFT			
DIAK M	ax			1	Т	N	1[1]			-3.58 dBn
10 dBm	_					M	2[1]			18320 GH 54.68 dBr
0 dBm-	_			<i>a</i>				1	2.40	00000 GH
o abiii										Ju m
-10 dBm	-									1 mm
-20 dBm										
-30 dBm			-							
-40 dBm	-		r:		+		-			ļ
-50 dBm	-				мз				Man	
-60 dBm		whith	mymu	munu	horm	mon	whore	man	WH W	
-00 001						Í				
-70 dBm	1									
Start 2	.375	GHz		0	691	pts			Stop 2	2.404 GHz
Marker										
Type	Ref	Trc	X-value		Y-value	Fund	tion	Fun	ction Result	
M1		1	2.40183	32 GHz	-3.58 dB	m				
M2		1	2	4 GHz	-54.68 dB	m				
M3		1	2.387	L5 GHz	-52.90 dB	m				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 60 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2483.5 - Highest Fundamental (2480)	-4.99	-24.99	-60.05	PASS

### Band-edge Compliance of RF Emissions – Highest ( $\pi/4$ DQPSK) (Hopping on)

Ref Le	evel 20	.00 dBm		RBW 100 kHz			
Att		30 dB	<b>SWT</b> 56.9 µs 👄	VBW 300 kHz r	Node Auto FFT		
●1Pk Ma 10 dBm-	ax				M1[1] M2[1]		-4.99 dBi 2.4801590 GH -60.05 dBi 2.4835000 GH
0 dBm—	N.L.						
-10 dBm							
-20 dBm	11						
-30 dBm -40 dBm							
-40 dBm		5					
-60 dBm		J.	m M2 mm m	Jagman And	and and the second second	mann	and a second
-70 dBm							
Start 2	.478 GF	Ηz		691 pt:	5		Stop 2.5 GHz
1arker							
Type	Ref   1	Frc	X-value	Y-value	Function	Fund	ction Result
M1		1	2.480159 GHz	-4.99 dBm			
M2		1	2.4835 GHz	-60.05 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 61 of 83

#### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result	
[MHz]	[dBµV]	[dBµV]	[dBµV]		
2483.5 - Highest Fundamental (2480)	-5.02	-25.02	-59.65	PASS	

### Band-edge Compliance of RF Emissions – Highest ( $\pi/4$ DQPSK) (Hopping off)

Spectru	m					
	el 20.00 dB		RBW 100 kHz			×
Att 🗧	30 c	ів <b>SWT</b> 56.9 µs 👄	VBW 300 kHz N	lode Auto FFT		
●1Pk Max						
				M1[1]		-5.02 dBm 2.4801590 GHz
10 dBm	-	-		M2[1]		-59.65 dBm
				M2[1]		2.4835000 GH
0 dBm	1					
1 June 1 10	3					
-Jafabhar-	4	-				
-20 dBm—	++					
	14					
-30 dBm—	+ \				-	
	11					
-40 dBm—	++-					
-50 dBm—		ectran .	-			
	3	M2 man no man	mannan	ma m	American mar	munumerally
-60 dBm—		approximate our		a contraction	/ - · · · · · · · · ·	
-70 dBm—						
Start 2.4	78 GHz	* *	691 pts			Stop 2.5 GHz
4arker						
	ef Trc	X-value	Y-value	Function	Fun	ction Result
M1	1	2.480159 GHz	-5.02 dBm			
M2	1	2.4835 GHz	-59.65 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 62 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result	
[MHz]	[dBµV]	[dBµV]	[dBµV]		
2400 – Lowest Fundamental (2402)	-3.53	-23.53	-52.31	PASS	

### Band-edge Compliance of RF Emissions – Lowest (8DPSK) (Hopping on)

Pofl	ovol	20.00 dBm	PB	W 100 kHz			(
Att	ever	30 dE	20 Sector Contraction Contraction		de Auto FFT		
1Pk M	ах						
					M1[1]		-3.53 dBn 2.4018740 GH
10 dBm					M2[1]		-53.07 dBn 2.4000000 GH
0 dBm–	-				1	1	
-10 dBn	1		· ·				L A
-20 dBn	1						
-30 dBn	1-						
-40 dBn							
-50 dBn							M2 M2
-SU dBn							
-60 dBa	***	<del>and and and and and and and and and and </del>	the company of the co	monorman	warner	and marker	him
-70 dBn							
Start 2	.375	GHz		691 pts	8		Stop 2.404 GHz
1arker							
Type	Ref		X-value	Y-value	Function	Fun	ction Result
M1		1	2.401874 GHz	-3.53 dBm			
M2		1	2.4 GHz	-53.07 dBm			
M3		1	2.376028 GHz	-52.31 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 63 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range			The highest conducted band edge emission	Result
[MHz]	[dBµV]	[dBµV]	[dBµV]	
2400 – Lowest Fundamental (2402)	-3.53	-23.53	-53.12	PASS

### Band-edge Compliance of RF Emissions – Lowest (8DPSK) (Hopping off)

Spect	rum								
	evel	20.00 dBr		<b>BW</b> 100 kHz	en værd i sta en s	oarara			
Att		30 d	В 🛚 SWT 76 µs 👄 V	BW 300 kHz N	1ode Auto	FFT			
●1Pk M	ax			403-00					
					M1	[1]			-3.53 dBn
10 dBm	_								18740 GH 54.51 dBr
					IM12	[1]			54.51 aBn 00000 GH
0 dBm-	_						1	2.40	M1 GH
									A M
-10 dBn	n							-	1 mr w
									1
-20 dBn	n						-		1
-30 dBn	n						-	-	
									1
-40 dBn	n			-			-		
								1 1	
-50 dBn			¥13					M2 /v	
C.I	3.1	mon	ma. A.h. M.	mmm	Mr. a.a.	Malla	M. M. M.L	m. N	
-150 UBn	n <del>wor</del>	~ ~ v		1 . W A		,	1 2		
-70 dBn	n —						-		
Start 2	.375	GHz		691 p	its			Stop 2	2.404 GHz
Marker									
Type	Ref	Trc	X-value	Y-value	Funct	ion	Fund	tion Result	
M1		1	2.401874 GHz	-3.53 dBm	1				
M2		1	2.4 GHz	-54.51 dBm					
MЗ		1	2.383876 GHz	-53.12 dBm	1				

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 64 of 83

#### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result	
[MHz]	[dBµV]	[dBµV]	[dBµV]		
2483.5 - Highest Fundamental (2480)	-4.71	-24.71	-59.15	PASS	

### Band-edge Compliance of RF Emissions – Highest (8DPSK) (Hopping on)

Spect		20.00 d8		-	RBW 100 kHz					
Att	ever 2	20.00 at 30								
		30	UB SWI 55.	.9 µs 📟	VBW 300 kHz	Mode Au	Ito FF I	0		
∎1Pk Ma	ax T									-4.71 dBn
						IVI	1[1]		24	-4.71 aBh 800220 GH:
10 dBm-	-		-	-		M	2[1]			-59.15 dBn
						100	~[~]			835000 GH
0 dBm—	MI		-				-		-	1
	X									
-10 dBm	r h	-	-							-
-20 dBm	+		-		-		-			
1		1								
-30 dBm	+	<u> </u>			-		-			-
J		}								
-40 d8m		5					-			
J		1								
-50 dBm		/								
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		2	M2 Maran	. A.m	mannen.			and the man of	a	allow out and
-60 dBm							-	V		
-70 dBm										
-70 UBII										
Start 2	478 (	GHz			691 p	ts			St	op 2.5 GHz
Marker										
	Ref		X-value		Y-value	Func	tion	Fu	nction Resu	t
M1		1	2.48002		-4.71 dBm					
M2		1	2.483	35 GHz	-59.15 dBm					

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 65 of 83

### Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	V Range Reference level Limit		The highest conducted band edge emission	Result	
[MHz]	[dBµV]	[dBµV]	[dBµV]		
2483.5 - Highest Fundamental (2480)	-4.73	-24.73	-58.91	PASS	

### Band-edge Compliance of RF Emissions – Highest (8DPSK) (Hopping off)

Spect	rum						
	evel 20	0.00 dBr		RBW 100 kHz			
Att		30 d	B SWT 56.9 µs 👄 '	<b>VBW</b> 300 kHz N	lode Auto FFT		
●1Pk M	ах		<u>и</u>				
					M1[1]		-4.73 dBm
10 dBm							2.4800220 GHz
10 0011					M2[1]		-58.91 dBm 2.4835000 GHz
0 dBm—	MI				1	1	2.4835000 GHz
o abiii	.V						
VLD dBM	Mr.						
- NO GDIN	1						
-20 dBm							
-20 000	° 14						
-30 dBm							
-50 000	. 11						
-40 dBm		2					
io abii		la					
-50 dBm		U I					
-50 000		h	M2				
-60 dBm		in	mminnen m	mound	manum	mannin	mm Mon meller
-00 001	5 I I						
-70 dBm							
-70 ubii				2018			
Start 2	.478 G	Hz	317 - FG	691 pts	15 ²²		Stop 2.5 GHz
Marker							
Type	Ref	Trc	X-value	Y-value	Function	Fun	ction Result
M1		1	2.480022 GHz	-4.73 dBm			
M2		1	2.4835 GHz	-58.91 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



Date : 2022-10-19 No. : HMD22100001 Page 66 of 83

#### **Compliance of RF Conducted Emissions Measurement:**

#### Limit :

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. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

Spect	rum						
Ref Le	evel 7	.00 dBm	👄 RE	W 100 kHz			
Att 🗧		30 dB	SWT 250 ms 🖷 VE	W 300 kHz N	1ode Auto Swee	ep	
●1Pk Ma	эх						
	0.00				M1[1]		-3.61 dBn
0 dBm-	- <u>M1</u>			-			2.4020 GH
	1				M2[1]		-46.41 dBn
-10 dBm							4.8180 GH
-20 dBm							
-30 dBm							
-30 UBII							
-40 dBm							
-to ubii	· II -	M		4			
-50 dBm			МЗ				
		musoned	menning	and my the way of	manner	white	manumum
-60 381	por an	Addres -		Caro we e e			
-70 dBm				-			
-80 dBm				-			
-90 dBm	_					<u></u>	
Start 3	0.0 MI	Hz		691 p	ts		Stop 25.0 GHz
Marker							
Туре	Ref		X-value	Y-value	Function	Fu	nction Result
M1		1	2.402 GHz	-3.61 dBm			
M2		1	4.818 GHz	-46.41 dBm			
M3 M4		1	7.203 GHz 9.624 GHz	-53.27 dBm -46.29 dBm			
1914		1	9.024 GHZ	-40.29 UBM	ST		

Compliance of RF Emissions – (GFSK 2402MHz) (the worst case)

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 67 of 83

Spect	rum						₩ ₩
Ref L	evel 7	.00 dBm	👄 RE	3W 100 kHz			· · · · · · · · · · · · · · · · · · ·
Att		30 dB	SWT 250 ms 👄 VI	3W 300 kHz M	ode Auto Sweep	D	
●1Pk M	ах						
					M1[1]		-3.75 dBn
0 dBm-	_M1			-			2.4020 GH
	- T				M2[1]		-46.08 dBr
-10 dBn	∩ <u>  </u>			-			4.8180 GH
						1	
-20 dBn	∩						
-30 dBn	וויי						
-40 dBn							
-40 aBn		M:	a N	14			
-50 dBn			M3	Ť			
-50 001		1.1	Mushammen T	1	homan with	monthean	which a manutur
-eorden	paul u	munitioned	bloth water toth	In a market and	p. 0		ware approximite
-70 dBn	n——						
-80 dBn	n <del>  </del>						
-90 dBn							
Start 3	0.0 MI	lz		691 pt	s		Stop 25.0 GHz
Marker							
Type	Ref	Trc	X-value	Y-value	Function	Fui	nction Result
M1		1	2.402 GHz	-3.75 dBm			
M2		1	4.818 GHz	-46.08 dBm			
M3		1	7.203 GHz	-53.07 dBm			
M4		1	9.624 GHz	-46.32 dBm			

#### ..

Compliance of RF Emissions - (8DPSK 2402MHz) (the worst case) Spectrum

Speci	rum						
	evel	7.00 dBr		3W 100 kHz			
Att 🗧		30 d	B SWT 250 ms 🖷 VE	3W 300 kHz M	ode Auto Sweep	0	
●1Pk M	ax		12 - 23	12			
					M1[1]		-3.62 dBm
0 dBm-							2.4020 GHz
					M2[1]		-45.08 dBm
-10 dBr	n-  -					а 1	4.8180 GHz
-20 dBr	n				9-		
-30 dBr	∩_						
-40 dBr	n-  -		Ma	14			
-50 dBr	∩_#		мз	<b>T</b>		nd As And	
-et det	menthe	plen Magnilia	in many to a hyperson	paranterio	mitrian .		when when the
-70 dBr	n+						
-80 dBr	n+						-
-90 dBr	n						
Start 3	0.0 M	IHz		691 pt	s		Stop 25.0 GHz
Marker							
Туре	Ref	Trc	X-value	Y-value	Function	Fur	nction Result
M1		1	2.402 GHz	-3.62 dBm			
M2		1	4.818 GHz	-45.08 dBm			
M3		1	7.203 GHz	-54.03 dBm			
M4		1	9.624 GHz	-45.93 dBm			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 68 of 83

### 3.1.8 Time of Occupancy (Dwell Time)

Ambient Temperature: 25°C Relative Humidity: 51% Atmospheric Pressure: 101 kPa

#### **Requirements:**

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 channel employed. No requirements for Digital Transmission System.

#### **Spectrum Analyzer Setting:**

RBW = 300kHz,  $VBW \ge RBW$ , Sweep = A longer sweep time to show two successive hops on a channel, Span = Zero, Detector = Peak, Trace = Max. hold

Dwell Time = Pulse Duration * hop rate / number of channel * observation duration Observed duration:  $0.4s \ge 79 = 31.6s$ 

#### Measurement Data:

#### **Channel Occupied in GFSK: 79 of 79 Channel**

Spectrum											
Ref Level	18.00 dBm				300 kHz		-				_
Att 1Pk Max	30 dB	SWI	1 ms 🖷	<b>ADM</b>	300 kHz	Mode Auto	Sweep				
TPK Max		r		-	1	1	1	í		r	
10 dBm											
0 dBm											
	www	mm	www	ww	www	hum	hunn	mm	mm	mm	
-10 dBm		-									
-20 dBm-											
Lo dom											
-30 dBm					-					-	-
											ł
40 dBm			10			1					╘
/ -50 dBm											1
-30 ubiii											4
-60 dBm		¢			-						
-70 dBm			-						2		
-80 dBm			_								
Start 2.4 GI	Hz				691	pts			Stop 2	.4835 GF	Ηz

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 69 of 83

### **3DH5 Packet:**

3DH5 Packet permit maximum 1600/79/6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds

Spect	rum								
Ref L	evel	20.00 dB	m 🖷 🛚	BW 1 MHz					`
Att		30 d	IB 🖷 SWT 5 ms 🖷 V	BW 1 MHz					
SGL									
●1Pk Cl	rw								
					M1[1]			-	17.91 dBr
									710.14 µ
10 dBm					D2[1]				13.40 d
o						12		, s	.91304 m
0 dBm—		m	way many man -	manyrounder	mynon	month	2		manner
-10 dBm						1	•		
-10 aBn	1	M1							
-20 dBr		*						[ [	
-20 ubii	1								
-30 dBm									
-50 001	· .								
-40 dBm									
ie dell	S								
-50 dBm									
NUMBER	with M	shini.					h.W.H.H.h.	phymetrikel	
<b>իայոհվի</b> -60 dBn	1 14	0. 0					0.40 0	- U	
-70 dBm	1-		-			-			
CF 2.4	02 GH	z		691 pts				L	500.0 µs/
Marker									
Type	Ref	Trc	X-value	Y-value	Function		Fund	tion Result	
M1		1	710.14 µs	-17.91 dBm					
D2	M1	1	2.91304 ms	13.40 dB					

#### Fig. A [Pulse duration of Lowest Channel]

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 70 of 83

Spect	rum										T I
Ref L	evel 3	20.00 0	Bm		🖷 R	BW 1 MHz					1
Att		30	dB	SWT 5	ms 🕳 V	BW 1 MHz					
SGL											
●1Pk Cl	rw										
							M1[1]			-17.58	8 dB
										1.681	16 n
10 dBm							D2[1]			5.	.00 d
								27		2.913	04 n
0 dBm-	mon	min				apparquerante	mound	muniteren	mangueren	moren	
10 10-											
-10 dBm					M1					102	
-20 dBm					*					I T	
-20 aBn											
-30 dBm											
-30 aBn											
-40 dBm											
-40 ubii											
-50 dBm											
-50 051	2		. ML	4. ANTONIA	Abol					uk pts	all h
-60 dBm			AL TO	And A alle	<b>N</b>					- IF	.08.0.
00 001											
-70 dBm											
- 70 abii	8										
CF 2.4	41 GH	z				691 p	ts			500.0	J µs
Marker	n (	- 1					1	1			
Туре	Ref	Trc		X-value		Y-value	Function	_	Function I	lesult	
M1 D2	M1	1			16 ms	-17.58 dBm 5.00 dB					
DZ	1411	1		2.913	04 ms	5.00 UB	C1.				

#### Fig. B [Pulse duration of Middle Channel]

Fig. C [Pulse duration of Highest Channel]

Spect	rum						
Ref L	evel :	20.00 dBi	m 😑 RE	W 1 MHz			
Att		30 d	IB 🖷 SWT 5 ms 🖷 VE	3W 1 MHz			
SGL							
●1Pk Cl	rw						
10 dBm					M1[1]		-21.81 dBm 347.83 µs 16.97 dB
0 dBm-							2.91304 ms
-	mar	sumanion	warden war warden w	monorenand	mangenergenerge	2	mangentermentalist
-10 dBm	┝┼┼		-			T	
-20 dBn	1						
-30 dBn							
-40 dBn							
-50 dBn խկեր						JANI MARINE MARINE	w. A
-60 dBn						Indian and a willing	Maria
-70 dBn				_			
CF 2.4	B GHz			691 pt:	5		500.0 μs/
Marker							
Type	Ref	Trc	X-value	Y-value	Function	Fur	nction Result
M1		1	347.83 µs	-21.81 dBm			
D2	M1	1	2.91304 ms	16.97 dB			

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 71 of 83

### **3DH3 Packet:**

3DH3 Packet permit maximum 1600/79/4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds

Spect		20.00 dB	m	👄 RBW	1 M	H7							
Att	ever		iB 👄 SWT 5										
SGL		30 0	10 <b>- 3</b> - 3- 44 1 - 5		T IVI	F12							
1Pk Cl	P1.0												
FILLY CI	1 11		1		-		м	1[1]				-10.0	6 dBn
							141	1[1]					0.72 μs
10 dBm	-		-		-		D	2[1]					.74 dE
													67 m
0 dBm-	1 22	Marin	1 martine heyere	ورجاروقام المحرور لمعرو برسالي	John		-	10-25-107	www	- when the server	1	1	
												1	]
-10 dBm	1				-			1				-	
	M	L											
-20 dBm	١	<u>.</u>			-			1	-			-	
-30 dBm	ו++											-	
	- II												
-40 dBm	דד י												
-50 dBm							3						
						philippe	ut til de			2			With
Multury/	Annull					Edam Augura	sillines das	v					MARAN
-00 080													
-70 dBm													
-70 081													
CF 2.4	02 GH	z				691 pts						500.	0 µs/
Marker	_												
Type	Ref	Trc	X-value			alue	Func	tion		Fund	ction Resul	t	
M1		1		.72 µs		9.06 dBm							
D2	M1	1	1.660	67 ms	-	38.74 dB							

Fig. D [Pulse duration of Lowest Channel]

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

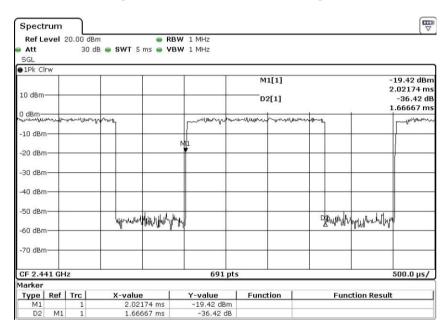
Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.



### Date : 2022-10-19 No. : HMD22100001

Page 72 of 83



### Fig. E [Pulse duration of Middle Channel]

Fig. F [Pulse duration of Highest Channel]

Spect		20.00 dBr		🖷 RBW	1.64115						7
Att			n B 👄 SWT 5								
SGL		30 u	5 <b> 5</b> WI 5		1 MHZ						
1Pk Ch											
JIPK CI			1				54	l[1]			-22.15 dBr
							141.1	L[ I]			3.14493 m
10 dBm·	-						n2	[1]			-31.71 d
							02	L+1			1.66667 m
) dBm—	-						- 1				1
		[	- Arran - Arren	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	many			[~~~!	entrythestream and the contraction of	human	mound
10 dBm	+	1				_					
								M1			
20 dBm	+	1				_		-		-	
00000											
-30 dBm							-				
40 dBm											
40 aBm											
50 dBr	J. H.	Le.				MAN MAN	rlahustus	Alle			
-60 dBm	unite	4)				had the off.	lo ale p	L0.			2010
oo abii											
-70 dBm	_										
CF 2.48	GHZ					691 pts					500.0 µs/
larker			2011 - 2010-2000							-	NU 42/5
Type	Ref		X-value		Y-valu		Funct	ion	E	unction Res	ult
M1 D2	M1	1		193 ms 667 ms	-22.1	5 dBm 71 dB					

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



### Date : 2022-10-19 No. : HMD22100001

Page 73 of 83

### **3DH1 Packet:**

3DH1 Packet permit maximum 1600/79/2 = 10.12 hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds

Spect		20.00 dB	201	- 0	3W 1 M								
Att	evera		m iB 👄 SWT 5										
SGL		50 0	0 - 341 3	115 - 11	344 I 14	112							
1Pk Cl	rw												
							M	1[1]				-20.8	5 dBm
10 dBm													i94 m
TO OPIU							D2	2[1]					.01 di
0 dBm—	_			7	_							1	0.04 µ
		Freedow	~		-extreme	~		5	Harryman [	12	1 1	-erben	7
-10 dBm	-	<u> </u>	-				-			4		_	-
								M1					
-20 dBm	·+-	f			-	-		+				-	+
-30 dBm													
-30 ubn													
-40 dBm		-	-		_	_						_	_
-50 dBm		-	Lu	Lulu			Ind. Tale .			աներին եր		-	
philling	winder	N.	Well working	erenter alder		humbles	Havernan	Libra		wayalan	MANAMARA		MH
-60 dBm													
-70 dBm				-									
70 abii													
CF 2.4	12 CH	7				691 pt:	-					500	0 µs/
larker	52 GT	2				091 pt	,					500.	0 µ37
Type	Ref	Trc	X-value	1	Y-value		Funct	tion	1	Fun	ction Res	ult	
M1		1		94 ms		0.85 dBm				1 411			
D2	M1	1	413	.04 µs		14.01 dB							

#### Fig. G [Pulse duration of Lowest Channel]

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



### Date : 2022-10-19 No. : HMD22100001

Page 74 of 83

Spectr		0.00 dBm			W 1 MHz					
Att	vei 2		SWT 5 n							
SGL		00 40	•••••••							
1Pk Clr	W									
							M1[1]		-	27.87 dB
10 dBm-									2	2.70290 m
10 UBIII-							D2[1]			23.99 0
0 dBm—					_		1.00			413.04
	ween	r -	rt-	within		ptr	MMR2	- I - H	- weber	
-10 dBm		-			-					
						1 1				
-20 ¢Bm						M1		-+		
						¥				
-30 dBm										
-40 dBm										
-50 dBm								1 ml man meno		
-50 dBm VV(4)		Wind wind	MANNAN	V	work where we have	<b>AANAN</b> ^M	Hickedge	Artigraphican	1	howward
-60 dBm		1	1.00.0		1 00. 0		-			
-70 dBm										<u> </u>
CF 2.44	1 GH	z			6	91 pts				500.0 µs/
1arker										
	Ref	Trc	X-value		Y-value		nction	Func	tion Result	
M1 D2	MI	1		29 ms	-27.87					
0.0	M1	1	413.	04 µs	23.9	9 dB				

### Fig. H [Pulse duration of Middle Channel]

Fig. I [Pulse duration of Highest Channel]

Spect		20.00 dB	-		V 1 MHz						l	
Att	ever		in ib 👄 SWT 5									
SGL		50 0	10 <b>- 3</b> 41 3		A T MILE							
1Pk Cl	rw											_
						M	1[1]	1			-19.38 d	Bm
10 dBm-											1.87681	
TO OBIII-						D	2[1]				-36.99	
0 dBm—							-				413.04	ŧ μs
		- www	m,	٣	when		_"	- provingen	4	r I	webanny	
-10 dBm					+ +							
		[		M1			1 1				1	
-20 dBm	<u>+</u>	<u> </u>					1					
		ſ										
-30 dBm	1						1 f					
-40 dBm												
-10 001	·											
-50 dBm						l,						
, July when	Undand	N I	Wrond phy you	小小山川	DEryph	Aleraport	MN.		here physical and a second	mondal	r	Sent
-60 dBm		า	- J		Δ	· ())	1.01			· vally		
-70 dBm	1				+		-				-	
CF 2.48	B GHz	5			691	pts			1		500.0 µ	s/
4arker												_
Type	Ref	Trc	X-value		Y-value	Func	tion		Func	tion Resu	ilt	
M1		1		81 ms	-19.38 di							
D2	M1	1	413	.04 µs	-36.99	dB						_

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



### Date : 2022-10-19 No. : HMD22100001

Page 75 of 83

#### Time of occupancy (Dwell Time):

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test Results
	(MHz)	( <b>ms</b> )	<b>(s)</b>	<b>(s)</b>	
3DH5	2402	2.91304	0.310	0.400	Complies
3DH5	2441	2.91304	0.310	0.400	Complies
3DH5	2480	2.91304	0.310	0.400	Complies
3DH3	2402	1.66667	0.266	0.400	Complies
3DH3	2441	1.66667	0.266	0.400	Complies
3DH3	2480	1.66667	0.266	0.400	Complies
3DH1	2402	0.41304	0.132	0.400	Complies
3DH1	2441	0.41304	0.132	0.400	Complies
3DH1	2480	0.41304	0.132	0.400	Complies



Date : 2022-10-19 No. : HMD22100001 Page 76 of 83

#### **3.1.9 Channel Centre Frequency**

Ambient Temperature: 25°C	Relative Humidity: 51%	Atmospheric Pressure: 101 kPa
---------------------------	------------------------	-------------------------------

#### **Requirements:**

Frequency hopping system in the 2400-2483.5MHz band shall use at least 79 (Channel 1 to 79) non-overlapping channels.

The EUT operates in according with the Bluetooth system specification within the 2400 - 2483.5 MHz frequency band.

RF channels for Bluetooth systems are spaced 1 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 2.0 MHz and a higher frequency guard band of 3.5MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 2400MHz + 2MHz guard band = 2402MHz Frequency of RF Channel = 2402+k MHz, k = 0,...,78 (Channel separation = 1MHz)



Date : 2022-10-19 No. : HMD22100001 Page 77 of 83

### 3.1.10 Pseudorandom Hopping Algorithm

Ambient Temperature: 25°C Relative Humidity: 51% Atmospheric Pressure: 101 kPa

#### **Requirements:**

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

#### EUT Pseudorandom Hopping Algorithm

The EUT is a Bluetooth device, the Pseudo-random hopping pattern; hopping characteristics and algorithm are based on the Bluetooth specification.



Date : 2022-10-19 No. : HMD22100001 Page 78 of 83

#### 3.1.11 Antenna Requirement

Ambient Temperature:  $25^{\circ}$ C

Relative Humidity: 51%

Atmospheric Pressure: 101 kPa

#### Test Requirements: § 15.203

#### **Test Specification:**

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 shall be considered sufficient to comply with the provisions of this section. 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.

#### **Test Results:**

This is PCB antenna. There is no external antenna, the antenna gain = 0 dBi. User is unable to remove or changed the Antenna.



### Date : 2022-10-19 No. : HMD22100001

Page 79 of 83

#### Appendix A

#### **List of Measurement Equipment**

Radiated Emission								
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL		
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A		
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A		
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2019/04/16	2024/04/16		
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A		
EM293	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	N9020A	MY50510152	2020/11/25	2022/11/25		
EM299	BROADBAND HORN ANTENNA	ETS-LINDGREN	3115	00114120	2020/11/24	2022/11/24		
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2020/11/25	2022/11/25		
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2020/11/25	2022/11/25		
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2020/06/10	2023/09/10		
EM355	Biconilog Antenna	ETS-Lindgren	3143B	00094856	2020/06/17	2023/09/17		
EM200	DUAL CHANNEL POWER METER	R & S	NRVD	100592	2019/10/11	2023/10/11		
EM012	PRE-AMPLIFIER	HP	HP8448B	3008A00262	2019/11/08	2022/11/08		
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A		

#### Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL	
EM232	LISN	SCHAFFNER	NNB41	04/100082	2021/07/20	2023/07/20	
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2022/05/30	2023/05/30	
EM233	PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100314	2021/01/18	2023/01/18	
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2022/02/02	2027/02/02	
N/A	MEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	BSIB-K1	V1.20	N/A	N/A	

Remarks:-

СМ CORRECTIVE MAINTENANCE

NOT APPLICABLE TO BE DETERMINED N/A

TBD

#### List of Ancillary Equipment

ITEM NO.	DESCRIPTION	MODEL NO.	REMARK
1	Adapter	YH-12WA050200EU	Provided by the laboratory

The Hong Kong Standards and Testing Centre Limited

10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong

Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group

This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited.

For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.



Date : 2022-10-19 No. : HMD22100001 Page 80 of 83

Appendix B

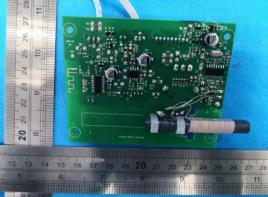
Photographs of EUT



Inner circuit view



Inner circuit top view

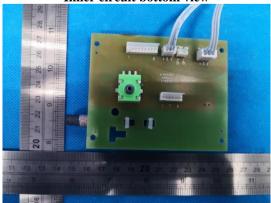




View of battery



Inner circuit bottom view

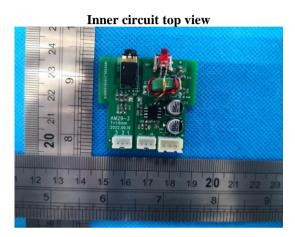




### Date : 2022-10-19 No. : HMD22100001

Page 81 of 83

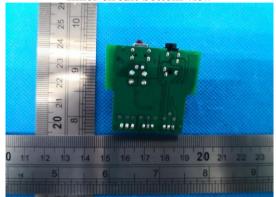
**Photographs of EUT** 



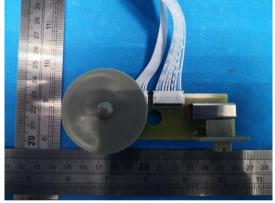
Inner circuit top view



Inner circuit bottom view



Inner circuit bottom view

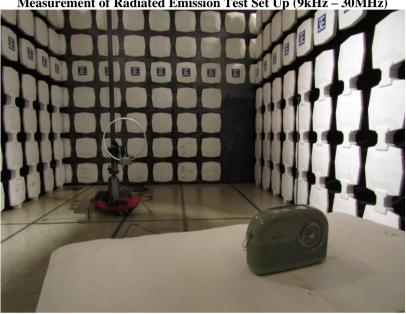




Page 82 of 83

Date : 2022-10-19 No. : HMD22100001

**Photographs of EUT** 



Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)



The Hong Kong Standards and Testing Centre Limited 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong Tel: +852 2666 1888 Fax: +852 2664 4353 Email: hkstc@stc.group Website: www.stc.group This report shall not be reproduced unless with prior written approval from The Hong Kong Standards and Testing Centre Limited. For Conditions of Issuance of this test report, please refer to "Conditions of Issuance of Test Reports" section or Website.

Measurement of Radiated Emission Test Set Up (9kHz - 30MHz)



Date : 2022-10-19 No. : HMD22100001 Page 83 of 83

**Photographs of EUT** 



Measurement of Conducted Emission Test Set Up



***** End of Test Report *****

### **Conditions of Issuance of Test Reports**

- 1. All samples and goods are accepted by The Hong Kong Standards & Testing Centre Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").
- 2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. Subject to clause 3, the Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
- 3. The Company shall be at liberty to disclose the testing-related documents and/or files anytime to any third-party accreditation and/or recognition bodies for audit or other related purposes. No liabilities whatsoever shall attach to the Company's act of disclosure.
- 4. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
- 6. When a statement of conformity to a specification or standard is provided, the ILAC-G8 Guidance document (and/or IEC Guide 115 in the electrotechnical sector) will be adopted as a decision rule for the determination of conformity unless it is inherent in the requested specification or standard, or otherwise specified in the Report.
- 7. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 8. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 9. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 10. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 11. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.
- 12. Issuance records of the Report are available on the internet at www.stc.group. Further enquiry of validity or verification of the Reports should be addressed to the Company.