



Project No.: TM-2108000150P Report No.: TMTN2205000765NR FCC ID: Y4O-NTT8

# FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10: 2013 TEST REPORT

For

# Turntable

# Model: STX

# Data Applies To: N/A

# **Brand Name: Stanton**

Issued for

# inMusic Brands, Inc. 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.

Issued By

**Compliance Certification Services Inc.** 

Tainan Lab. No.8, Jiucengling, Xinhua Dist., Tainan City, Taiwan Issued Date: August 02, 2022

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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#### **REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 02, 2022	Initial Issue	ALL	Gina Lin



TITLE

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# **1. TEST REPORT CERTIFICATION**

Applicant :	<b>inMusic Brands, Inc.</b> 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.
Manufacturer :	<b>inMusic Brands, Inc.</b> 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.
Equipment Under Test :	Turntable
Model Number :	STX
Data Applies To :	N/A
Brand Name :	Stanton
Date of Test :	March 14, 2022 ~ April 26, 2022

APPLICABLE STANDARD		
STANDARD	TEST RESULT	
FCC Part 15 Subpart C AND ANSI C63.10: 2013	PASS	
Statements of Conformity		
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.		

## We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

John Chen Supervisor



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# 2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	3	ANTENNA REQUIREMENT	Pass
15.247(a)(1)	8.1	20dB BANDWIDTH	Pass
15.247(b)(1)	8.2	MAXIMUM PEAK OUTPUT POWER	Pass
15.247(a)(1)	8.3	HOPPING CHANNEL SEPARATION	Pass
15.247(a)(1)(iii)	8.4	NUMBER OF HOPPING FREQUENCY USED	Pass
15.247(a)(1)(iii)	8.5	DWELL TIME	Pass
-	8.6	DUTY CYCLE	-
15.247(d)	8.7	CONDUCTED SPURIOUS EMISSION	Pass
15.247(d)	8.8	RADIATED EMISSIONS	Pass
15.207(a)	8.9	POWERLINE CONDUCTED EMISSIONS	Pass



# **3. EUT DESCRIPTION**

# **3.1 DESCRIPTION OF EUT & POWER**

Product	Turntable
Model Number	STX
Data Applies To	N/A
Brand Name	Stanton
Identify Number	TMTN2205000765NR
Received Date	August 16, 2021
Reported Date	May 26, 2022
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK : 0.36dBm / 1.086mW 8DPSK: 1.648dBm / 1.462mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode:1 Mbps 4/πDQPSK Mode:2Mbps 8DPSK Mode:3Mbps
Modulation Type	GFSK $\sim \pi/4DQPSK \sim 8DPSK$
Number of Channels	79 Channels
EUT Power Supply	DC 12V (Powered by adapter)
Antenna Type	Manufacturer: Brito Type: PCB Antenna Model: TNT200 Gain: 1.45 dBi
Firmware Version	NTT8_ICYH108M10_Y0
Software Version	N/A

Remark:

1. The sample selected for test was production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for **FCC ID: Y4O-NTT8** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.

3. For more details, please refer to the User's manual of the EUT.

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# 4. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2402
Middle	2441
High	2480

#### Radiated Emission Test (Below 1 GHz):

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Normal Operation

#### Radiated Emission Test (Above 1 GHz):

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Example Selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5



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#### Bandedge Measurement :

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Example Selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, High	FHSS	GFSK	DH5
Low, High	FHSS	8-DPSK	3-DH5

#### Antenna Port Conducted Measurement :

- ☑ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5



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# **5. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.10 : 2013 and FCC CFR 47 15.207, 15.209 and 15.247.



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# 6. FACILITIES AND ACCREDITATIONS

# 6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

# 6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

# 6.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW1109).



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# 6.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Taiwan TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada (ISED#: 2324H)
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com



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# 6.5 MEASUREMENT EQUIPMENT USED

Chamber 966 Room (Radiation Test)						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	09/06/2021	09/05/2023	
Attenuator	MCL	BW-S15W5	0535	01/28/2022	01/27/2023	
Band Reject Filter	MICRO-TRONICS	HPM13525	006	01/28/2022	01/27/2023	
Band Reject Filter	MICRO-TRONICS	HP50107-01	001	01/28/2022	01/27/2023	
Bilog Antenna With 6dB Attenuator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A070506-1 & AT-N0681	10/07/2021	10/06/2022	
Cable	Suhner	SUCOFLEX104PE A	20520/4PEA&O6	01/28/2022	01/27/2023	
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/18/2022	03/17/2023	
EMI Test Receiver	R&S	ESCI 7	100856	07/01/2021	06/30/2022	
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/22/2021	07/21/2022	
Horn Antenna	Com-Power	AH-118	071032	05/04/2021	05/03/2022	
Notch Filter	MICRO-TRONICS	BRM50702-01	018	01/28/2022	01/27/2023	
Pre-Amplifier	EMCI	EMC012645	980098	01/28/2022	01/27/2023	
Pre-Amplifier	HP	8447F	2443A01683	01/18/2022	01/17/2023	
Pre-Amplifier	Com-Power	PAM-840A	461378	07/05/2021	07/04/2022	
Type N coaxial cable	Suhner	CHA9513	6	01/18/2022	01/17/2023	
Software		Excel(ccs-	o6-2020 v1.1),e3(v	/6.101222)		

#### For §8.1~8.7 8.8.4

Chamber 966 Room (Conducted Test)							
Name of Equipment	Manufacturer         Model         Serial Number         Calibration Date         Calibration						
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/22/2021	07/21/2022		
SMA Cable+10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/28/2022	01/27/2023		
Software	Excel(ccs-o6-2020 v1.1)						

#### For §8.9

Conducted Emission room #1							
Name of Equipment	Manufacturer         Model         Serial Number         Calibration Date         Calibration I						
BNC Coaxial Cable	CCS	BNC50	11	01/20/2022	01/19/2023		
EMI Test Receiver	R&S	ESCS 30	100348	02/24/2022	02/23/2023		
LISN	FCC	FCC-LISN-50-32-2	08009	06/29/2021	06/28/2022		
LISN	SCHWARZBECK	NNLK8130	8130124	01/14/2022	01/13/2023		
Pulse Limiter	R&S	ESH3-Z2	100116	01/20/2022	01/19/2023		
Test S/W	e3(6.101222)						



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## 6.6 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

# 6.7 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : OATS-6	±3.3456dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±2.6828dB
Radiated Emission, 1 to 8 GHz	± 2.6485dB
Radiated Emission, 8 to 18 GHz	± 2.6852dB
Radiated Emission, 18 to 26.5 GHz	± 2.6485dB
Radiated Emission, 26 to 40 GHz	± 3.0295dB
Power Line Conducted Emission	±1.91dB
Band Width	136.49kHz
Peak Output Power MU	±1.904dB
Band Edge MU	±0.302dBuV
Channel Separation MU	361.69Hz
Duty Cycle MU	0.064ms
Frequency Stability MU	0.223kHz

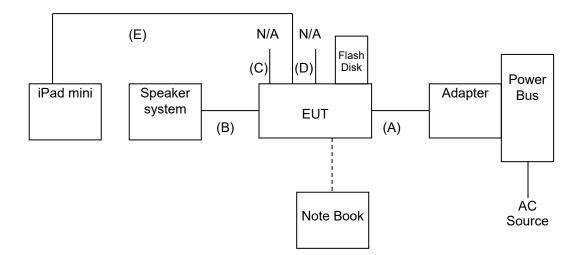
This measurement uncertainty is confidence of approximately 95%, k=2



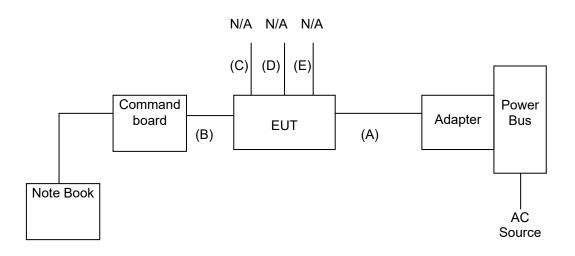
# 7. SETUP OF EQUIPMENT UNDER TEST

# 7.1 SETUP CONFIGURATION OF EUT

EMI [Normal Operation]



RF



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# 7.2 SUPPORT EQUIPMENT

#### For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	iPad mini	Apple	A1432	DOC	N/A
2	Speaker System	T.C.SATR	TCS2285	DOC	N/A
3	Note Book	TOSHIBA	PORTEGE R30-A	DOC	unshd, 1.4m
4	Flash Disk	Transcend	Jet Flash700	DOC	N/A
5	Adapter	GPE	GPE013B-050 240-2	N/A	N/A

No.	Signal cable description		
А	USB Type C	Shielded, 1.0m 1 pcs.	
В	Audio	Shielded, 1.4m 1 pcs.	
С	Audio	Shielded, 1.0m 1 pcs.	
D	Audio	Shielded, 0.1m 1 pcs.	
Е	Audio	Shielded, 1.1m 1 pcs.	

#### For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Adapter	GPE	GPE013B-05 0240-2	N/A	N/A
2	Note Book	Acer	Z5WE1	N/A	unshd, 1.8m, with 1 core

No.	Signal cable description		
А	USB Type C	Shielded, 1.0m 1 pcs.	
В	Command cable	Unshielded, 0.4m 1 pcs.	
С	Audio	Shielded, 1.0m 1 pcs.	
D	Audio	Shielded, 1.6m 1 pcs.	
Е	Audio	Shielded, 0.8m 2 pcs.	

#### Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3) shd. = shielded; unshd. = unshielded



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### EUT OPERATING CONDITION

#### **RF Setup**

- 1. Set up all computers like the setup diagram.
- 2. The "CSR BlueSuite 2.6.4", "Blue Test 3" software was used for testing.
- 3.Choose Transport "SPI" and Port "USB SPI (100327)".

#### TX Mode:

#### GFSK(DH1):

CFG PKT > Packet Type : 4 , Packet Type : 27

TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,35 , 255,25 , 241,0)

### GFSK(DH3):

CFG PKT > Packet Type : 11 , Packet Type : 183

TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,35 , 255,25 , 241,0)

#### GFSK(DH5):

CFG PKT > Packet Type : 15 , Packet Type : 339 TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,35 , 255,25 , 241,0)

#### 8-DPSK(3DH1):

CFG PKT > Packet Type : 24 , Packet Type : 83

TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,50 , 255,45 , 255,40)

### 8-DPSK(3DH3):

CFG PKT > Packet Type : 27, Packet Type : 552

TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,50 , 255,45 , 255,40)

### 8-DPSK(3DH5):

CFG PKT > Packet Type : 31 , Packet Type : 1021

TXDATA1 > LO Freq : 2402 (2402,2441,2480) , Power : 255,50 (255,50 , 255,45 , 255,40)

### DSSS:

BLE TEST TX > Channel :0 (0,20,39)

Length : 37

Bit pattern : 0

RX Mode:

GFSK , 8-DPSK:

RXDATA1

DSSS:

**BLE TEST RX** 

4. All of the function are under run.

5 .Start test.



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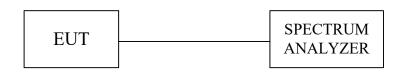
# 8. APPLICABLE LIMITS AND TEST RESULTS

# 8.1 20dB BANDWIDTH FOR HOPPING

#### <u>LIMIT</u>

None; for reporting purposes only.

### TEST SETUP



### TEST PROCEDURE

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\ge$  3 x RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.



### TEST RESULTS

Model Name	Model Name STX		Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

### Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	894.00	0.60	PASS
Middle	2441	894.00	0.60	PASS
High	2480	894.00	0.60	PASS

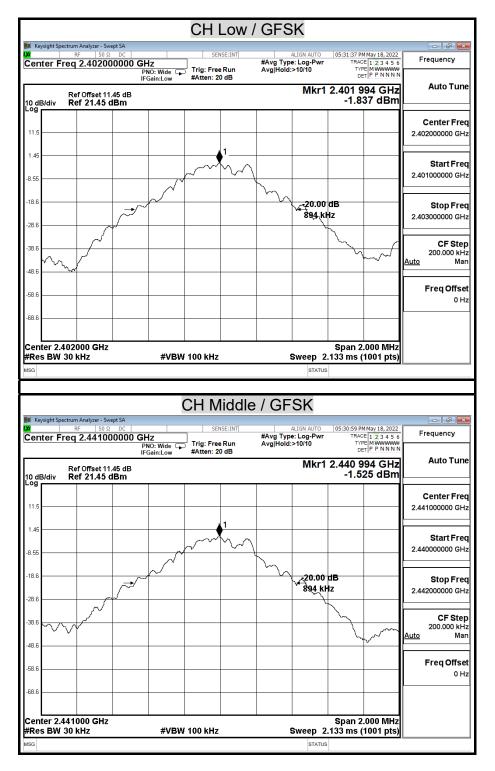
### Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1262.00	0.84	PASS
Middle	2441	1262.00	0.84	PASS
High	2480	1260.00	0.84	PASS



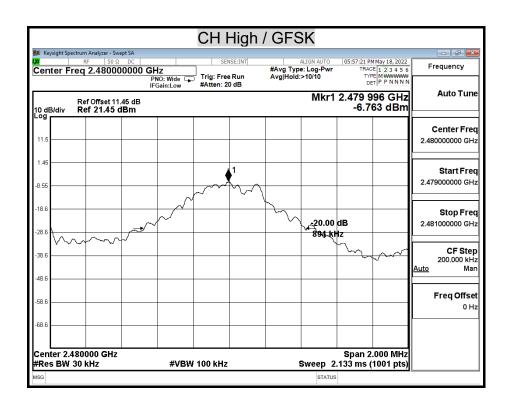
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#### 20dB BANDWIDTH



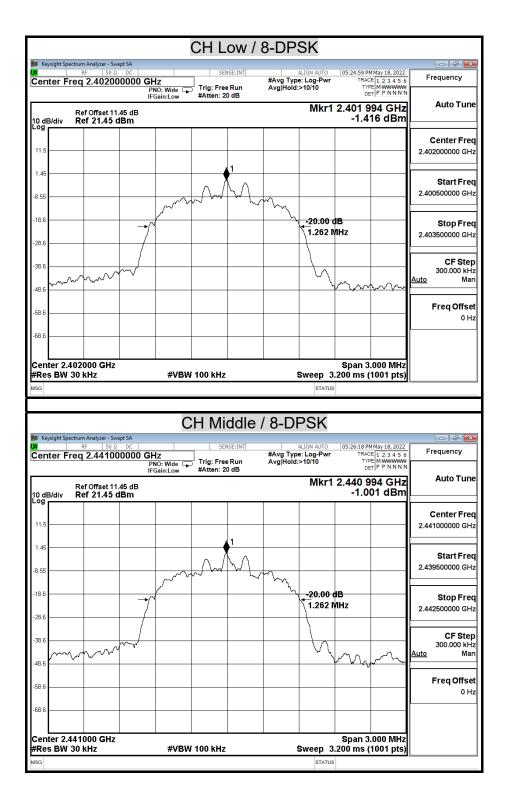


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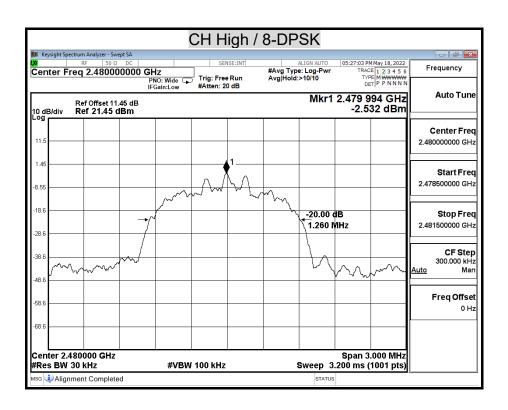


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## 8.2 MAXIMUM PEAK OUTPUT POWER

### <u>LIMIT</u>

§15.247(b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### Test Configuration



### TEST PROCEDURE

The RF power output was measured with a Spectrum Analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency.

Peak Power set:

- 1. Set the RBW = 1 MHz.
- 2. Set the VBW  $\geq$  [3 × RBW].
- 3. Set the span  $\geq$  [1.5 × DTS bandwidth].
- 4. Detector = peak.
- 5. Sweep time = auto couple.
- 6.Trace mode = max hold.
- 7. Allow trace to fully stabilize.

8. Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.



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Average power set:

- 1. Measure the duty cycle D of the transmitter output signal
- 2. Set span to at least 1.5 times the OBW.
- 3. Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- 4. Set VBW  $\geq$  [3 × RBW].

5. Number of points in sweep  $\geq$  [2 × span / RBW]. (This gives bin-to-bin spacing  $\leq$  RBW / 2, so that narrowband signals are not lost between frequency bins.)

6. Manually set sweep time  $\geq$  [10 × (number of points in sweep) × (total ON/OFF period of the transmitted signal)].

- 7. Set detector = RMS (power averaging).
- 8. Perform a single sweep.

9. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW.

10. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.



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### TEST RESULTS

Model Name STX		Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

#### Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-0.07	0.98446		PASS
Mid	2441	0.36	1.08643	125	PASS
High	2480	-4.59	0.34786		PASS

#### Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	1.10	1.28677		PASS
Mid	2441	1.65	1.46150	125	PASS
High	2480	0.58	1.14209		PASS



## Average Power Data

### Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-0.37
Middle	2441	0.00
High	2480	-5.76

# Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Average Power (dBm)	
Low	2402	-2.09	
Middle	2441	-1.63	
High	2480	-3.18	

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## MAXIMUM PEAK OUTPUT POWER

				CHL	_0,000	GFC				
Keysight Sp	ectrum Analyze		1		T. TAIT			00.00.00	MM	
Center F		50 Ω DC 2000000 G	iHz		SE:INT	#Avg Typ	ALIGN AUTO	TR4	CE 1 2 3 4 5 6	Frequency
			PNO: Fast G	Trig: Free #Atten: 20		Avg Hold	l:>10/10	T) [	PET P P N N N N	
			Jam.LOW				Mkr1		141 GHz	Auto Tun
10 dB/div	Ref Offse Ref 21.4	et 11.45 dB 45 dBm							68 dBm	
	KCI ZIA	45 UDIII								
										Center Fre
11.5										2.402000000 GH
					1					
1.45										Start Fre
8.55										2.400500000 GH
0.55										
18.6										
										Stop Fre 2.403500000 GH
28.6										2.403500000 GH
-38.6				+ +						CF Ste 300.000 kH
										<u>Auto</u> Ma
48.6			1							
50 G										Freq Offse
-58.6										он
-68.6										
Contor 2	402000 G	-U-7							3.000 MHz	
Res BW		172								
	1.0 MHz		#VBV	V 3.0 MHz			Sweep 1			
ISG	1.0 MHz		#VBV	V 3.0 MHz			Sweep 1	.000 ms	(1001 pts)	
	1.0 MHz				iddle		STATUS	.000 ms		
ISG	pectrum Analyzer			СН М			STATUS	.000 ms	(1001 pts)	
ISG Keysight Sp	pectrum Analyzer RF	50 Ω DC 1000000 G	Hz		SE:INT	e / GF	STATUS SK ALIGN AUTO De: RMS	000 ms	(1001 pts)	Frequency
ISG Keysight Sp	pectrum Analyzer RF	50 Ω DC 1000000 G	HZ PNO: Fast		SE:INT	e / GF	STATUS SK ALIGN AUTO De: RMS	06:04:54	(1001 pts)	1
SG II Keysight Sp G	RF RF Treq 2.44	50 Ω DC 1000000 G	Hz		SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	000 ms	(1001 pts)	1
Keysight Sp Center F	RF RF Treq 2.44	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast		SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts)	Frequency
ISG Keysight Sp	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast		SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun
Keysight Sp Center F 0 dB/div	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast		SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre
Keysight Sp Center F	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun
Keysight Sp Center F 0 dB/div	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast		SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.441000000 GH
sg Keysight Sp 2 Center F 0 dB/div .og 11.5	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre
sc Keysight Sp Center F O dB/div O dB/div	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.441000000 GH
ISG	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre
Keysight Sp Center F 10 dB/div 00 11.5	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.439500000 GH Stop Fre
Keysight Sp           Center F           O dB/div           O'g           11.5           1.45           8.55           18.6	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.439500000 GH
sc Keysight Sp Center F 0 dB/div 11.5 1.45	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.439500000 GH Stop Fre
sc   Keysight Sp   Center F 0 dB/div 0 dB/div 11.5 1.45 8.55 18.6	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Step
sc Keysight Sp Center F 0 dB/div 0 d	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Stej           300.000 kH
sc Keysight Sp Center F 0 dB/div 0 d	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Step
sc	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 kH           Auto
sc	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M SEN: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 KH           Auto           Ma
SS         Keysight Sp           Center F         Center F           0 dB/div         S           11.5         1.45           1.45         S           28.6         S           38.6         S           58.6         S	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M sen: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 kH           Auto
SS         Keysight Sp           Center F         Center F           0 dB/div         S           11.5         1.45           1.45         S           28.6         S           38.6         S           58.6         S	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M sen: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 KH           Auto           Ma
Keysight Sp           Center F           0 dB/div           0 dB/div           11.5           1.45           3.55           28.6           38.6           38.6           58.6	Ref Offse	50 Ω DC 1000000 G I I I I I I I I I I I I I	HZ PNO: Fast	CH M sen: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS SK ALIGN AUTO DE: RMS I:>10/10	06:04:54	(1001 pts) (1001 pts) (123 4 5 6 (PE MWWWW ET P P N N N 817 GHz	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 KH           Auto           Ma
SS         SS           Center F         Center F           0 dB/div         SS           11.5         1.45           1.45         SS           28.6         SS           38.6         SS           68.6         SS           Center 2.         Center 2.	Ref Offse Ref Offse Ref 21.4	50 Ω DC 1000000 G st 11.45 dB 45 dBm	HZ PNO: Fast	CH M sen: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS	000 ms	(1001 pts)	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 KH           Auto           Ma
SS         SS           Center F         Center F           0 dB/div         SS           11.5         1.45           1.45         SS           28.6         SS           38.6         SS           68.6         SS           Center 2.         Center 2.	Ref Offse Ref 21.4	50 Ω DC 1000000 G st 11.45 dB 45 dBm	Hz PRO: Fast C FGain:Low	CH M sen: Trig: Free #Atten: 20	SE:INT	e / GF	STATUS	000 ms	(1001 pts)	Frequency           Auto Tun           Center Fre           2.441000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.442500000 GH           CF Ste           300.000 KH           Auto           Ma



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Report No.: TMTN2205000765NR

X	RF 50 Ω C	C	SENSE:INT	ALIGN AUTO #Avg Type: RMS Avg Hold:>10/10	06:05:26 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE M	Frequency
10 dB/div	Ref Offset 11.45 Ref 21.45 dBi	IFGain:Low	#Atten: 20 dB	Mkr1	2.479 775 GHz -4.586 dBm	
11.5						Center Fre 2.480000000 GH
8.55			▲1			<b>Start Fre</b> 2.478500000 GH
-18.6						<b>Stop Fre</b> 2.481500000 GH
-38.6						CF Ste 300.000 kH <u>Auto</u> Ma
58.6						Freq Offse 0 H
-68.6	480000 GHz				Span 3.000 MHz	



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s TRACE   12 3 4 5 6 0 TYPE   12 3 4 5 6 TYPE   1	#Avg Type: RMS Avg Hold:>10/10	Trig: Free Run #Atten: 20 dB	O GHz PNO: Fast ⊂	RF 50 Ω DC	
Center Free           2.40200000 GHz           Center Free           2.40200000 GHz           Start Free           2.39700000 GHz	Mkr1 2.			q 2.402000000 (	enter F
2.40200000 GH; Start Free 2.39700000 GH;				Ref Offset 11.45 dB Ref 21.45 dBm	0 dB/div
2.397000000 GH		<b>_</b> 1			11.5
					1.45 3.55
2.407000000 GH					18.6
CF Step 1.000000 MH <u>Auto</u> Mai					18.6
Freq Offse					18.6
	STATUS				Res BW
AUTO 06:08:08 PM May 18, 2022			CI	um Analyzer - Swept SA	G ( Keysight Spe
UTO 06:08:08 PM May 18, 2022 S TRACE [12] 3 4 5 6 O TYPE M WWWW DET P P N N N N	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT	) GHz PNO: Fast ⊂ IFGain:Low	RF 50 Ω DC Q 2.441000000 (	G Keysight Spe
AUTO 06:08:08 PM May 18, 2022 S TRACE   2 ] 3 4 5 6 O TYPE   WWWWW DET   P P N N N N	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT	) GHz PNO: Fast ⊂ IFGain:Low	RF 50 Ω DC	Keysight Spa enter F 0 dB/div
AUTO 06:08:08 PM May 18, 2022 S TRACE 12 3 4 5 6 0 TYPE [M WWWW DET /P P NNNN Mkr1 2.440 98 GHz] Auto Tun	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT	) GHz PNO: Fast ⊂ IFGain:Low	Ref Offset 11.45 dB	iG Keysight Spo enter F
MUTO 06:08:08 PM May 18, 2022 S TRACE 12 3 3 5 6 TYPE M WWWWW DET P P NN N N Mkr1 2.440 98 GHz 1.648 dBm Center Free	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT Trig: Free Run #Atten: 20 dB	) GHz PNO: Fast ⊂ IFGain:Low	Ref Offset 11.45 dB	6 dB/div
WTO         G6:06:08 PM May 18, 2022           Frequency           TRACE 112 3 4 5 6           Frequency           DET // P N N N           Mkr1 2.440 98 GHz         Auto Tun           1.648 dBm         Center Frequency           Center Frequency           Start Frequency           Start Frequency           Start Frequency           Start Frequency           Start Frequency	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT Trig: Free Run #Atten: 20 dB	) GHz PNO: Fast ⊂ IFGain:Low	Ref Offset 11.45 dB	Keysight Spa enter F
WTO         06:08:08 PM May 18, 2022           Frequency           TRACE [12] 3 4 5 6           Frequency           DET // P N N N           Mkr1 2.440 98 GHz         Auto Tun           1.648 dBm         Center Frequency           Start Frequency	ALIGN AUTO 06: #Avg Type: RMS Avg Hold:>10/10	SENSE:INT Trig: Free Run #Atten: 20 dB	) GHz PNO: Fast ⊂ IFGain:Low	Ref Offset 11.45 dB	ad Keysight Spot



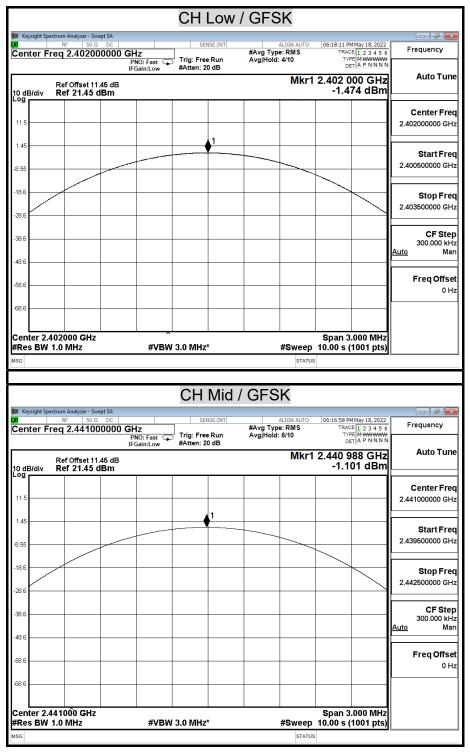
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			CH High /	8-DPSK		
	trum Analyzer - Swept SA					- 5 -
<mark>x</mark> Center Fr	RF 50 Ω DC eq 2.48000000	D GHz PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO #Avg Type: RMS Avg Hold:>10/10	06:07:06 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P N N N N	Frequency
10 dB/div	Ref Offset 11.45 dB Ref 21.45 dBm			Mkı	1 2.479 90 GHz 0.577 dBm	Auto Tune
11.5			<b>⊥</b> 1			Center Free 2.480000000 GH
-8.55						Start Free 2.475000000 GH
-18.6						<b>Stop Fre</b> 2.485000000 GH
38.6						<b>CF Stej</b> 1.000000 MH <u>Auto</u> Ma
58.6						Freq Offse 0 H
-68.6						
Center 2.4 #Res BW 3	80000 GHz 3.0 MHz	#VE	3W 5.0 MHz	Sweep 1	Span 10.00 MHz .000 ms (1001 pts)	
ISG				STATU	3	



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### **AVERAGE POWER**



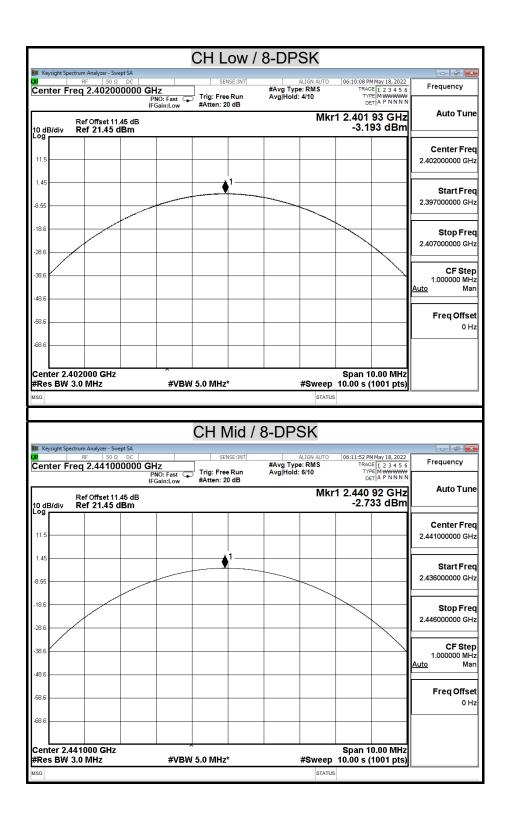


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	ectrum Analyzer - Swept									- 6
enter F	RF 50 Ω req 2.480000	0000 GHz	D: Fast 😱	Trig: Free #Atten: 2		#Avg Typ Avg Hold		TRA	MMay 18, 2022 CE 1 2 3 4 5 6 PE MWWWWW ET A P N N N N	Frequency
0 dB/div	Ref Offset 11.4 Ref 21.45 dE	5 dB	iin:Low	#Atten: 2	UdB		Mkr1	2.479 9	991 GHz 63 dBm	Auto Tun
11.5										Center Fre 2.480000000 GH
8.55					1					<b>Start Fre</b> 2.478500000 GH
28.6										<b>Stop Fre</b> 2.481500000 GH
18.6										CF Ste 300.000 kH Auto Ma
58.6										Freq Offse 0 H
68.6	480000 GHz			~					3.000 MHz	

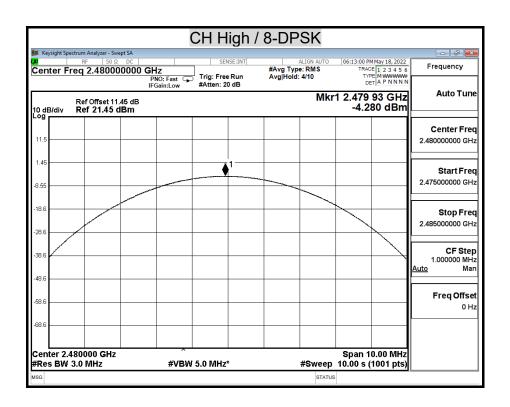


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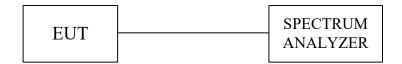
Report No.: TMTN2205000765NR

# 8.3 HOPPING CHANNEL SEPARATION

## <u>LIMIT</u>

§15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo andomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

## TEST SETUP



## TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- 3. By using the MaxHold function record the separation of adjacent channels.
- 4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
- 5. Repeat above procedures until all frequencies measured were complete.



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Report No.: TMTN2205000765NR TEST RESULTS

Refer to section 8.1, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

Model Name	STX	Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

#### Modulation Type: GFSK / DH5

Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.60	25 KHz	PASS
2441MHz	1.00	0.60	25 KHz	PASS
2480MHz	1.00	0.60	25 KHz	PASS

### Modulation Type: 8-DPSK / 3-DH5

Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.84	25 KHz	PASS
2441MHz	1.00	0.84	25 KHz	PASS
2480MHz	1.00	0.84	25 KHz	PASS



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## **HOPPING CHANNEL SEPARATION**

		GFSk	K(Low)		
Keysight Spectrum Analyzer - Swe           Μ         RF         50 Ω           Center Freq 2.40200	DC 00000 GHz PNO: Wide C	SENSE:INT	ALIGN AUTO #Avg Type: RMS Avg Hold:>10/10	06:26:08 PM May 18, 2022 TRACE 1 2 3 4 5 TYPE MWWWW DET IP P N N N	Frequency
Ref Offset 11 10 dB/div Ref 21.45 c		#Atten: 20 dB	Δι	Mkr1 1.000 MHz 1.570 dE	Auto Tune
Log 11.5 1.45 -8.55		<u></u>		1∆2	Center Freq 2.402000000 GHz
-18.6					Start Freq 2.400500000 GHz
-48.6					<b>Stop Freq</b> 2.403500000 GHz
Center 2.402000 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 1	Span 3.000 MHz .000 ms (1001 pts	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.000 MHz (Δ) 2.402 000 GHz	1.570 dB -0.184 dBm		=	Freq Offset 0 Hz
7 8 9 10 11					
MSG		m	STATU	s	

		GFSK(N	/liddle)		
Keysight Spectrum Analyzer - Su RF 50 9 Center Freq 2.4410	DC DC	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO #Avg Type: RMS Avg Hold:>10/10	06:29:05 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P N N N N	Frequency
Ref Offset 1 10 dB/div Ref 21.45			Δι	4 Mkr3 1.000 MHz 0.090 dB	Auto Tun
11.5 1.45 8.55	Δ2	2		<b>3</b> ∆4	Center Fre 2.441000000 GH
18.6					Start Fre 2.439500000 G⊦
48.6					<b>Stop Fre</b> 2.442500000 GF
Center 2.441000 GHz Res BW 100 kHz	#VE	300 kHz		Span 3.000 MHz .000 ms (1001 pts)	CF Ste 300.000 kH Auto Ma
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	× -1.000 MHz( 2.441 000 GHz 1.000 MHz( 2.441 000 GHz	∆) -0.059 dB -0.079 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 0 ⊦
6 7 8 9 10 11					
<	·	m	STATU	s	



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GFSK(High) 🎵 Keysight Spectrum Analyzer - Swept SA - 6 
 ALIGN AUTO
 06:30:20 PM May 18,2022

 #Avg Type: RMS
 TRACE [1 2 3 4 5 6

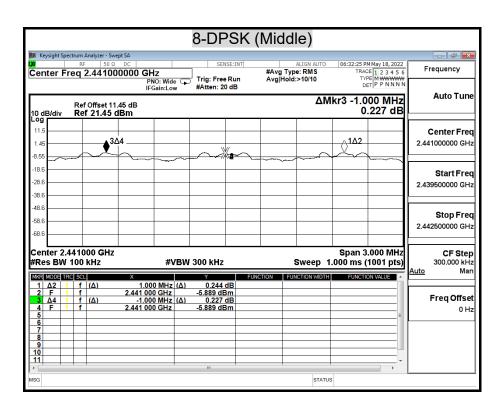
 Avg|Hold:>10/10
 TYPE MWWWWW

 DET [P P N N N N
 Center Freq 2.480000000 GHz PNO: Wide IFGain:Low #Atten: 20 dB Frequency ΔMkr1 -1.000 MHz -0.118 dB Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm l0 d \_1<u>Δ</u>2 113 **Center Freq** 2.480000000 GHz 1.4 6 8.58 18. Start Freq 28. 2.478500000 GHz 38.6 48. Stop Freq -58. 2.481500000 GHz 68.6 CF Step 300.000 kHz Man Span 3.000 MHz Sweep 1.000 ms (1001 pts) Center 2.480000 GHz #Res BW 100 kHz #VBW 300 kHz Auto MKR MODE TRC SCI f (Δ) -1.000 MHz (Δ) 2.480 000 GHz -0.118 dB -0.299 dBm Δ2 2 F 2 Freq Offset 0 Hz 9 10 11 STATUS

							8-D	PSI	K (Lo	cw)					
_	ght Spec		Analyzer - Sw												- 7 2
<mark>x</mark> Cente	er Fr	RF eq 2	50 £	00000	SHz PNO: Wide IFGain:Loy		Trig: Free #Atten: 20			AL Type: Hold:>'			3 PM May RACE 1 2 TYPE M₩ DET P P	3456	Frequency
10 dB/	div		Offset 1	I.45 dB	II Gam.Eo.						Δ	/kr1 1	.000 2.31		Auto Tun
	urr	1101	21.40												
11.5 - 1.45 -												1∆	2		Center Fre 2.402000000 GH
-8.55 —						$\sim$		2~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~	$\sim$	$\downarrow$	$\rightarrow$	~~~	
-18.6 -28.6															Start Fre 2.400500000 GF
38.6	~	~			_								_		
-48.6 -58.6					-										Stop Fre
68.6					_										2.403500000 GH
	er 2.4 BW 1		00 GHz kHz		#\	/BW	300 kHz			S	veep 1	Spar .000 m	n 3.000 s (100'		CF Ste 300.000 kH Auto Ma
	DDE TRO			x			Y		UNCTION	FUNCT	TION WIDTH	FUN	CTION VAL	UE 🔺	Auto Ma
1Δ 2 F		f	<u>(</u> Δ)		000 MHz 000 GHz	(Δ)	2.312 d -7.861 dB								E 05
3 4 5 6														E	Freq Offs 0 H
0 7 8 9								-						=	
9 10 11	-	F						-						—,	
< 🗀		1	1			ł	m			1		1		F.	
ISG											STATU	s			



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			8-DF	SK (Hi	gh)			
	trum Analyzer - Swept SA RF 50 Ω DC eq 2.48000000			#Avg un Avg	ALIGN AUTO Type: RMS Hold:>10/10	TYPEM	y 18, 2022 2 3 4 5 6 WWWW P N N N N	Frequency
10 dB/div	Ref Offset 11.45 c Ref 21.45 dBm				ΔN	1.000 - 1.000 0.02-	MHz 21 dB	Auto Tune
11.5 1.45 -8.55	1Δ2			~				Center Fre 2.480000000 GH
-18.6							~	Start Fre 2.478500000 G⊦
48.6 58.6 68.6								<b>Stop Fre</b> 2.481500000 G⊦
Res BW 1			BW 300 kHz	- FUNOTION	<u> </u>	Span 3.00 .000 ms (100	01 pts)	CF Ste 300.000 kH Auto Ma
MKR MODE TRO 1 Δ2 1 2 F 1 3 4 5 6	f (Δ)	× -1.000 MHz 480 000 GHz	(Δ) -0.021 dB -5.957 dBm		FUNCTION WIDTH	FUNCTION V		Freq Offs 0 ⊦
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ISG			m		STATU	s		



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Report No.: TMTN2205000765NR

## 8.4 NUMBER OF HOPPING FREQUENCY USED

#### <u>LIMIT</u>

§15.247(a)(1)(iii) For frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

## TEST SETUP



## TEST PROCEDURE

- 1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- 4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
- 5 Repeat above procedures until all frequencies measured were complete.



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## TEST RESULTS

Model Name	STX	Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

## Modulation Type: GFSK / DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

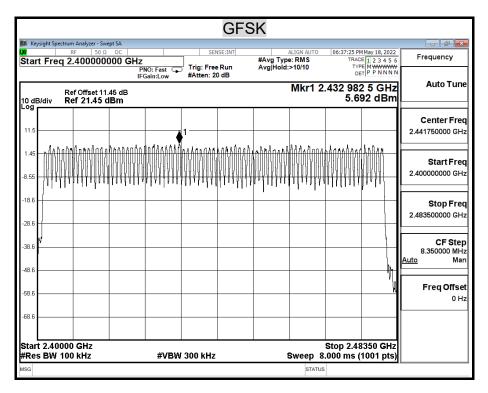
## Modulation Type: 8-DPSK / 3-DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS



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## NUMBER OF HOPPING FREQUENCY USED



a í	_	1	RF	yzer - Swe 50 Ω 00000	DC						ISE:INT	#Avg Typ Avg Hold		06:44:09 P TRA	CE 1 2 3	156	Frequency
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18.6 28.6																	<b>Stop Fre</b> 2.483500000 GF
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58.6		4000												Stop 2.4	0250 0		



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# 8.5 DWELL TIME ON EACH CHANNEL

## <u>LIMIT</u>

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

## TEST SETUP



## TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- 4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- 5. Repeat above procedures until all frequencies measured were complete.
- 6. The Bluetooth Headset has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second. The longer the payload is, the slower the hopping rate is.



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Report No.: TMTN2205000765NR TEST RESULTS

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate  $\div$  number of hop per channel × 31.6

Refer to the attached graph.

The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Model Name	STX	Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

# Modulation Type: GFSK / DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.400	128.00	400.00	PASS
2441MHz	DH3	1.650	264.00	400.00	PASS
2441MHz	DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS
DH1 Dwell tine= DH3 Dwell tine= DH5 Dwell tine=	1.650 m	s×(1600÷2)÷79×3 s×(1600÷4)÷79×3 s×(1600÷6)÷79×3	31.6= 264.00 (ms)		

DH5 Dwell tine=  $2.900 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 309.33 \text{ (ms)}$ 

AFH Dwell tine= 2.900 ms×(800÷6)÷20×8= 154.67 (ms)

#### Modulation Type: 8-DPSK / 3-DH5

Packet type		on the TV channel	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
3DH1	0.400	128.00	400.00	PASS
3DH3	1.650	264.00	400.00	PASS
3DH5	2.900	309.33	400.00	PASS
AFH	2.900	154.67	400.00	PASS
	type 3DH1 3DH3 3DH5	type(ms)3DH10.4003DH31.6503DH52.900	Packet typeDwell time (ms)on the TX channel in 31.6sec (ms)3DH10.400128.003DH31.650264.003DH52.900309.33	Packet typeDwell time (ms)on the TX channel in 31.6sec (ms)occupancy on the TX channel in 31.6sec (ms)3DH10.400128.00400.003DH31.650264.00400.003DH52.900309.33400.00

3DH1 Dwell tine=0.400ms×(1600÷2)÷79×31.6=128.00 (ms)3DH3 Dwell tine=1.650ms×(1600÷4)÷79×31.6=264.00 (ms)3DH5 Dwell tine=2.900ms×(1600÷6)÷79×31.6=309.33 (ms)AFH Dwell tine=2.900ms×(800÷6)÷20×8=154.67 (ms)



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## **DWELL TIME ON EACH PAYLOAD**

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																					Center Fre
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IX         Keysight           enter         IX           0         dB/div           1.45         IX           1.65         IX	Spectrum Reference Referen	Analyze	r - Swe 50 Ω 100 st 11. 45 d	pt SA DC ] 00000 45 dB Bm				C Trig: #Atte	Free n: 10	SE:INT Run dB		Avg		ALIGN J. Log		Image: sign of the sign	9:59 PI TRAC TYP DE r1 4 1		y 18, 2022 12 3 4 5 5 7 N NN N <b>).0 µs</b> <b>16 dB</b>	2.44 2.44	Auto Tun           Center Fre           1000000 GH           Start Fre           1000000 GH           Stop Fre           1000000 GH           COTO Stop           COTO Step           Freq Offsed
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a Cente		n Analy RF   <b>2.4</b>	50 Ω	DC	PN	O: Fast	••	]		A	vg Type	ALIGN AU : Log-P	wr TR	PM May 18, 2022 ACE 1 2 3 4 5 6 TYPE WWWWWW DET P P N N N N	Frequency
10 dB/			set 11. <b>1.45 d</b>		IFG	ain:Low		#Atten: 10	ab				ΔMkr1	400.0 µs 34.60 dB	Auto Tun
1.45								<b>▲</b> 1Δ2							Center Fre 2.480000000 G⊦
-8.55															Start Fre 2.480000000 GF
-28.6 -															Stop Fre 2.480000000 G⊦
48.6 —						>	《2								CF Ste 1.000000 M⊦ <u>Auto</u> Ma
58.6 — 68.6 —	/ <b>     </b>	(M)	(m,hpl	vW	Ņ	hlann halfahl		hallyfafylyd	<b>huhh</b> uh	14	<b>Vyrly</b> l	Hyraf Hyraf	nya Mayad	ymyylpyydd	Freq Offso 0 ⊦
78.6 —															



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	w(GFSK		0150	Current Cd	windet Core 1
ALIGN AUTO 04:42:39 PM May 18, 2022		SENSE:INT		50 Ω DC	rsight Spectrum An
Type: Log-Pwr TYPE WWWWW DET P P N N N N	Avg Type: Log-Pwr	ree Run	Fast 🛶 Trig: F	02000000 GH	ter Freq 2.
ΔMkr1 1.650 ms 10.13 dB		10 06	in:Low #Atten	set 11.45 dB .45 dBm	
			<sup>1∆2</sup>		
				*	
<u></u>					
huhami huhami	yllynnin flyhodry	W	Kravicyhł	(valgodini)	<b>1.</b> 1
Span 0 Hz Sweep 15.00 ms (1001 pts) status	STATU		#vвw 3.0 мі DH3 Cł	000 GHz	ter 2.40200 BW 1.0 MH
Sweep         15.00 ms (1001 pts)           STATUS           (GFSK)           ALIGN AUTO           04:43:35 PM May 18,2022           Type: Log-Pwr           TRADE[1] 23 4 5 6	dle ( GFSk	H Midd	DH3 CH	zer - Swept SA   50 Ω DC   41000000 GH	BW 1.0 MH
Sweep         15.00 ms (1001 pts)           STATUS           (GFSK)           ALIGN AUTO           04:43:35 PM May 18, 2022	STATL dle ( GFSk ALIGN AUTO Avg Type: Log-Pwr	H Midd	DH3 CH	xer - Swept SA  50 Ω DC   41000000 GH	BW 1.0 MH
Sweep 15.00 ms (1001 pts) status (GFSK) ALIGN AUTO 04:43:35 PM May 18, 2022 TRACE [1 2 3 4 5 6 TIPE IN NN N DET PP IN NN NN ΔMkr1 1.650 ms	STATL dle ( GFSk ALIGN AUTO Avg Type: Log-Pwr	H Midd	DH3 Ch	zer - Swept SA 50 Ω DC 41000000 GH PP IFC set 11.45 dB	BW 1.0 MH
Sweep 15.00 ms (1001 pts)           STATUS           (GFSK)           ALIGN AUTO           (04:43:35 PMMay 18, 2022)           Type: Log-Pwr           TRACE[12:3:4:5:6           TYPE[WWWWWW           DET P NNNN           ΔMkr1 1.650 ms           12.72 dB	STATL dle ( GFSk ALIGN AUTO Avg Type: Log-Pwr	H Midd	DH3 Ch	ter - Swept SA   50 Ω DC   41000000 GH   FC   FC   set 11.45 dB   .45 dBm	BW 1.0 MH
Sweep 15.00 ms (1001 pts)           status           (GFSK)           ALIGN AUTO           04:43:35 PM May 18, 2022           TRACE[12:34 5 6           TRACE[12:34 5 6           DET[P, P N N N N           ΔMkr1 1.650 ms           12.72 dB	STATL dle ( GFSk ALIGN AUTO Avg Type: Log-Pwr	H Midd	DH3 Ch	ter - Swept SA   50 Ω DC   41000000 GH   FC   FC   set 11.45 dB   .45 dBm	BW 1.0 MH
Sweep 15.00 ms (1001 pts)           status           (GFSK)           ALIGN AUTO           04-43:35 PM May 18, 2022           TRACE[12:34 5 6           TRACE[12:34 5 6           DET[P, P N N N N           ΔMkr1 1.650 ms           12.72 dB	STATL dle ( GFSk ALIGN AUTO Avg Type: Log-Pwr	H Midd	DH3 Ch	ter - Swept SA   50 Ω DC   41000000 GH   FC   FC   set 11.45 dB   .45 dBm	BW 1.0 MH
Sweep         15.00 ms (1001 pts)           status		H Midd	DH3 Ch	ter - Swept SA   50 Ω DC   41000000 GH   FC   FC   set 11.45 dB   .45 dBm	BW 1.0 MH

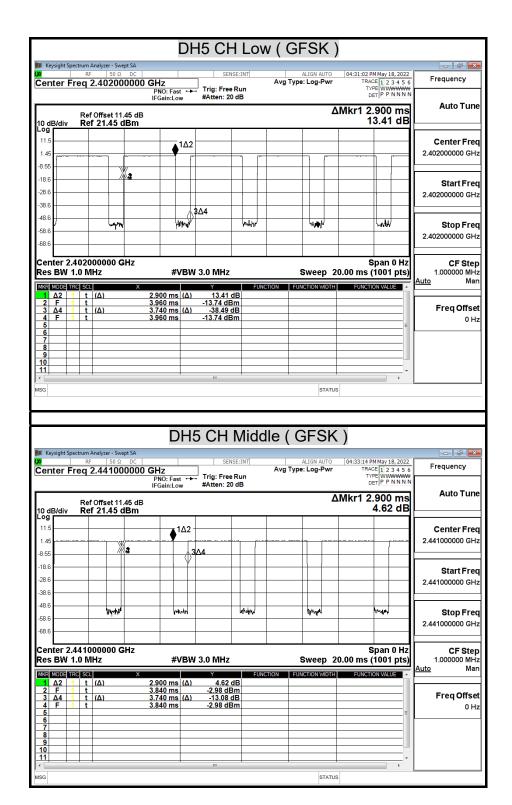


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R	2.48000000 GH	NO: Fast +++ Trig: I	SENSE:INT Free Run h: 10 dB	ALIGN AUTO Avg Type: Log-Pwr	04:44:17 PM May 18, 20 TRACE 1 2 3 4 5 TYPE DET P P N N	Frequency
Re 0 dB/div Re	f Offset 11.45 dB ef 11.45 dBm	Juniton		۵	Mkr1 1.650 m 15.94 d	
1.45			1Δ2			Center Fre 2.480000000 GF
8.6		2				Start Fre 2.480000000 GF
8.6						<b>Stop Fre</b> 2.480000000 GH
18.6						CF Ste 1.000000 MH Auto Ma
і8.6 Инн.Л	Multi	Harper .	limenti)	<b>U</b> prily <sup>1</sup> 41	Propulsion	Freq Offs
/8.6						



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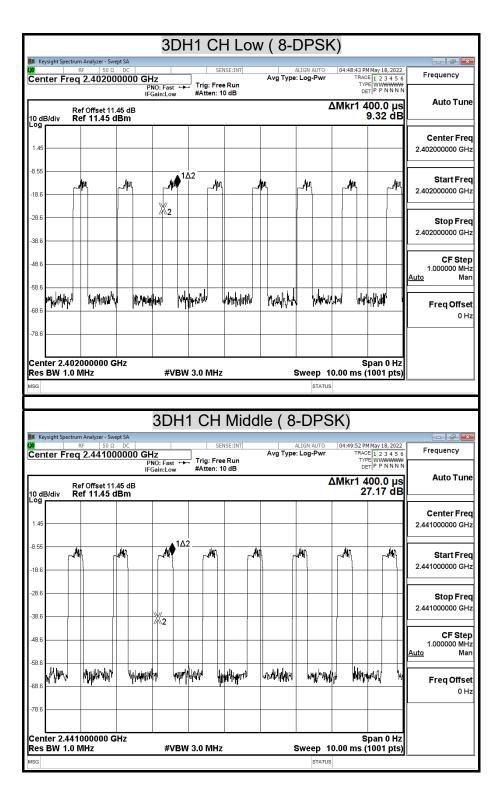


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Ref Offset 11.45 dB         mail	dB ΔMkr1 2.900 ms Auto 15.57 dB	r <b>Fre</b> i 10 GH
	2.4800000	00 GH
28.6		tFre
58.6	▲3△4	00 GH
88.6 (1997) (199		
Senter 2.48000000 GHz           Les BW 1.0 MHz         #VBW 3.0 MHz           Its:         MODE TRC [SCL]         Y	Sweep 20.00 ms (1001 pts) FUNCTION FUNCTION WIDTH FUNCTION VALUE ALLO	Ste 0 MH Ma
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	m Freq 0	Offse 0 H



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ø Cen	ter	Frec	RF <b>  2.</b> 4		Ω 000		0 G	Hz	2 ):Fast ←	••	Trig: Free			,	Avg T		ALIGN A : Log-f		TR/ T	ACE YPE	May 18, 2022 1 2 3 4 5 6 WWWWWWW P P N N N N	Frequency
10 dE	3/div	R R	ef Of ef 1	ffset I 1.4	:11. 5 d	45 de IBm	-	Ga	iin:Low		#Atten: 10	0 dB								4(	00.0 µs .39 dB	Auto Tur
<b>.og</b> 1.45																						Center Fre 2.480000000 GH
8.55	, April			. <b>/</b> P			_ <b>//</b>		Δ2 — 	Ņ					<b>.</b> /P			<b>_/</b> /m		Ņ	}	<b>Start Fre</b> 2.48000000 GH
28.6 38.6						)	×2															<b>Stop Fre</b> 2.48000000 GH
48.6																						CF Ste 1.000000 Mi <u>Auto</u> Mi
68.6 68.6		NHAM	Wyw/		₩₩	H.nnt	ļ	h	wtyopetly		Muddermalaa		MNW	٩		νiψ	-whyp		Muhamp		Warkholikah	Freq Offs
78.6										+										+		



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Keysight Spectrum	F 50 Ω	DC	lz		SENSE:INT	Avg Type	ALIGN AUTO : Log-Pwr	04:47:47 PM TRAC	E12345	6 Frequency
Re dB/div <b>R</b> e	f Offset 11.4	Pf IFC 45 dB	NO: Fast ↔ Gain:Low	≓ Trig: Fi #Atten:	ree Run 10 dB		Ĺ	Mkr1 1.		S Auto Tu
45										Center Fr 2.402000000 G
.55 <b>4</b> 1 <b>1/14/14/14/14</b> 8.6	Angentangen		Manning Manny of Manny	1 <u>0</u> 2 —	ningan ang ang ang ang ang ang ang ang ang	, iron without	Alintu	4/11/14/4/11/14/4/14/14/14	ur Pur	₩ Start Fr 2.402000000 G
3.6			2							<b>Stop Fr</b> 2.402000000 G
3.6										CF Ste 1.000000 M <u>Auto</u> M
3.6	hpul	why		<b>Willi</b> kan	W	hy h	eendar		viplenipl	Freq Offs
enter 2.4020 es BW 1.0 M <sup>G</sup>	/IHz			v 3.0 m⊧ 3 C⊦	Iz I Midd		STATU	5.00 ms (	pan 0 H 1001 pt	s)
es BW 1.0 M G Keysight Spectrum	AHZ Analyzer - Swej F 50 Ω	pt SA DC 0000 GH	3DH Iz NO: Fast ↔	3 CH	I Midd	lle(8	-DPS	5.00 ms (	1001 pt	22 Frequency
Keysight Spectrum Renter Freq 0 dB/div Re	AHZ Analyzer - Swej F 50 Ω	pt SA DC 0000 GH IFC 45 dB	3DH	3 CH	I Midd	lle(8	-DPS align auto : Log-Pwr	5.00 ms ( S SK) 04:47:01 PM TRAC TYP DE Mkr1 1.	1001 pt	22 6 Frequency
Keysight Spectrum Renter Freq dB/div Re	AHz Analyzer - Swej F 50 Ω 2.44100 f Offset 11.4	pt SA DC 0000 GH IFC 45 dB	3DH Iz NO: Fast ↔	3 CH	I Midd	Ile ( 8 Avg Type	-DPS align auto : Log-Pwr	5.00 ms ( S SK) 04:47:01 PM TRAC TYP DE Mkr1 1.	1001 pt 1001 pt E 1 2 3 4 5 E WWWW TP P N N 650 m	22 6 Frequency
Keysight Spectrum Renter Freq	1Hz 1 Analyzer - Sweg 1 50 Ω 2.441000 1 Offset 11.4 1 1.45 d	pt SA DC 0000 GH IFC 45 dB	3DH Iz NO: Fast ↔ Sain:Low	3 CH	H Midd	IIe ( 8	-DPS align auto : Log-Pwr	5.00 ms ( 3 (04:47:01 PP TRAC TVP DE 2 Mkr1 1. 21	1001 pt 1001 pt E 1 2 3 4 5 E WWWW TP P N N 650 m	S) Center Fr 2.44100000 G Start Fr
Keysight Spectrum enter Freq 0 dB/div Re	1Hz 1 Analyzer - Sweg 1 50 Ω 2.441000 1 Offset 11.4 1 1.45 d	pt SA DC PT IFC PT IFC 45 dB Bm	3DH Iz NO: Fast ↔ Sain:Low	3 CH	H Midc	IIe ( 8	STATU: -DPS ALIGN AUTO : Log-Pwr Z	5.00 ms ( 3 (04:47:01 PP TRAC TVP DE 2 Mkr1 1. 21	1001 pt	s) Frequency Auto Tur Center Fre
Keysight Spectrum Reysight Spectrum Renter Freq dB/div Re Re Re Re Re Re Re Re Re Re	1Hz 1 Analyzer - Sweg 1 50 Ω 2.441000 1 Offset 11.4 1 1.45 d	pt SA DC PT IFC PT IFC 45 dB Bm	3DH	3 CH	I Midd	IIe ( 8	STATU: -DPS ALIGN AUTO : Log-Pwr Z	5.00 ms ( 3 SK) 04:47:01 Pk TRAC	1001 pt	5) 22 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7
Keysight Spectrum enter Freq	1Hz 1 Analyzer - Sweg 1 50 Ω 2.441000 1 Offset 11.4 1 1.45 d	pt SA DC   0000 GH IFC 45 dB Bm	3DH Iz NO: Fast ↔ Sain:Low	3 CH	I Midd	IIe ( 8	STATU:	5.00 ms ( 3 (04:47:01 PP TRAC TVP DE 2 Mkr1 1. 21	1001 pt	5) 22 5 5 5 5 5 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7

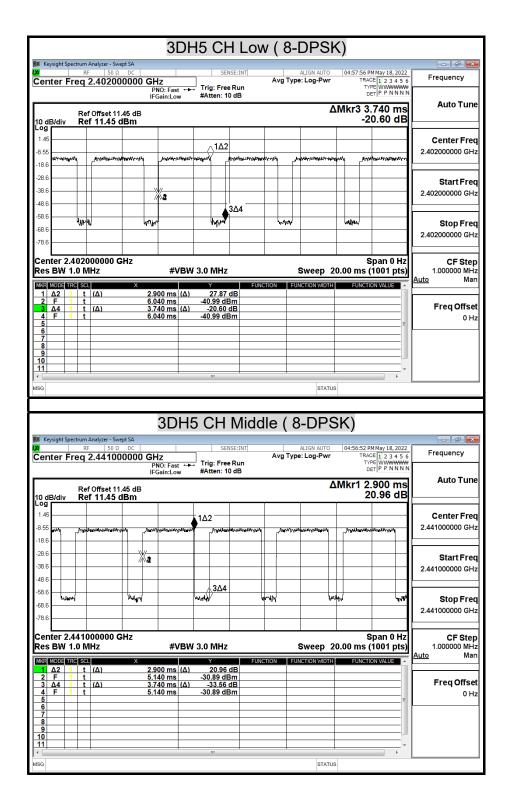


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a Cer	iter Freq		50 Ω 000		P	10:	Fast ↔		rig: Free		Avg		align aut : Log-Pv		04:45:38 PM May TRACE 1 TYPE W		Frequency
		ef Offse ef 11.4			IFC	Sair	:Low	#/	Atten: 1	U dB				ΔN	lkr1 1.65		Auto Tur
. <b>og</b> 1.45																	Center Fre 2.480000000 GH
8.55	lmurd fry de fysie	1	rippin_	ling-lings			_http://ftp/	պու	<sup>1Δ2</sup>	htyredittyre fywn		, <sup>d</sup> infr	Unf-Unfo		<b>!*TQ:Y-L\$PQ:V-L\$</b> P\$	u  [	<b>Start Fre</b> 2.48000000 GH
28.6 38.6																	<b>Stop Fre</b> 2.48000000 GF
48.6						>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	《 <sub>2</sub>										CF Ste 1.000000 Mł Auto Mł
58.6 58.6		Nijiliyaya			NH,	W			YNNN		Winvide			y <b>a</b> yilda	V	WARA	Freq Offs
78.6														_			



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Keysight Spe enter F	RF	- 50 Ω	DC			Tria: F	SENSE		Avg T		LIGN AUTO Log-Pwr	04:5	TRAC	MMay 18, 2022 E 1 2 3 4 5 6 E WWWWWW	Freq	uency
) dB/div		ffset 11 11.45 (		PNO: F IFGain:I	ast ↔ Low	#Atter					Δ	Mkr	DI 1 2.	.900 ms 8.02 dB		uto Tun
9 45 55 wawawa			the state of the s	۳ <b>۱</b>	lan de puter	wetrogen general	_1Δ2	) Joyulaya	and the second	4	Annullinuumuutu	radio state si a	[	Aryaling.com		nter Fre 00000 G⊦
3.6 3.6 3.6				*	2										-	tartFre 00000 G⊦
3.6 3.6 3.6	-144	hi		lpalatte			-	3∆4		₩			NHA			top Fre 00000 G⊢
enter 2. es BW 1	.0 MH	z	×			' 3.0 MI Y			CTION		weep 2		ns (	pan 0 Hz 1001 pts)	1.00 <u>Auto</u>	CF Ste 00000 M⊦ Ma
1         Δ2         1           2         F         1           3         Δ4         1           4         F         1           5         -         -           6         -         -           7         -         -	t (/ t t (/ t	∆) ∆)		2.900 m 6.560 m 3.740 m 6.560 m	1S 1S (Δ)	-38.81	30 dE	1							Fr	e <b>q Offs</b> o 0 ⊦
9 10 11																



# 8.6 DUTY CYCLE

#### <u>LIMIT</u>

Nil (No dedicated limit specified in the Rules)

#### TEST SETUP



## TEST PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

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#### **TEST RESULTS**

No non-compliance noted.

#### TEST DATA

Model Name	STX	Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

## Modulation Type: GFSK / DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

Ton	2.9
Tp(Ton+Toff)	3.74
Duty Cycle	0.775
10 * log (1/x) =	1.105

## Modulation Type: 8-DPSK / 3-DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.000	1	2900	
Ton2		0	0	
Ton3			0	2.9
Тр				3.74

Ton	2.9
Tp(Ton+Toff)	3.74
Duty Cycle	0.775
10 * log (1/x) =	1.105

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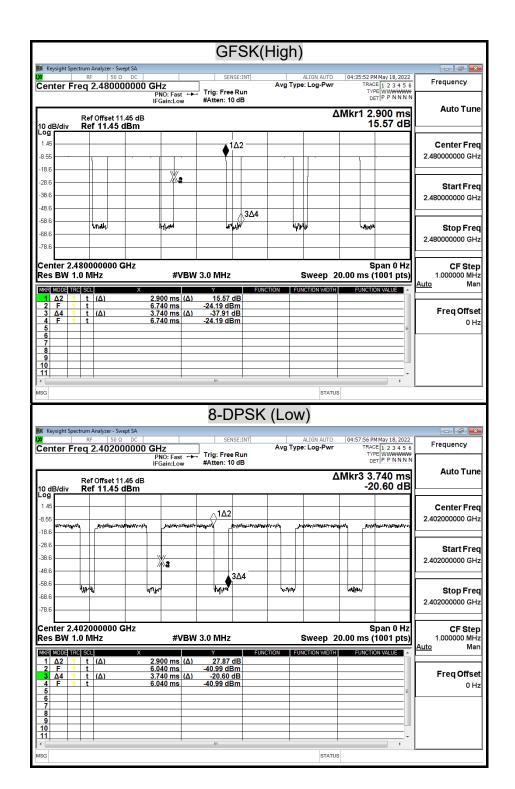
## TEST PLOT

## **Duty Cycle**

	GFSK	(Low)		
Keysight Spectrum Analyzer - Swept S				
RF 50 Ω D		ALIGN AUTO	04:31:02 PM May 18, 2022	Frequency
Center Freq 2.4020000	PNO: Fast +++ Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW	
	IFGain:Low #Atten: 20 dB		DET P P N N N N	A
Ref Offset 11.45	dB	Δ	Mkr1 2.900 ms	Auto Tun
10 dB/div Ref 21.45 dBI			13.41 dB	
-og 11.5				
	▲1∆2			Center Fre
1.45			····	2.402000000 GH
-8.55				
-18.6				Start Fre
28.6				2.402000000 GH
-38.6				
48.6	3∆4			
-58.6	fathing? bouldies	₩ <b>₽</b> /	5an₩	Stop Fre
68.6				2.402000000 GH
-00.0				
Center 2.402000000 GHz			Span 0 Hz	CF Ste
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 20	0.00 ms (1001 pts)	1.000000 MH
MKR MODE TRC SCL	X Y FL	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
1 Δ2 1 t (Δ)	2.900 ms (Δ) 13.41 dB			
2 F 1 t 3 Δ4 1 t (Δ)	3.960 ms -13.74 dBm 3.740 ms (Δ) -38.49 dB			Freq Offse
4 F 1 t	3.960 ms -13.74 dBm			0 H
6				
8				
9				
10 11				
*[	+ +		•	
ISG		STATUS		
🕱 Keysight Spectrum Analyzer - Swept S	GFSK(	Middle)		
			04-33-14 PM May 18, 2022	
α RF 50 Ω D	DOO GHZ	ALIGN AUTO Avg Type: Log-Pwr	04:33:14 PM May 18, 2022 TRACE 1 2 3 4 5 6	Frequency
	DOO GHZ PNO: Fast ↔→→ Trig: Free Run	ALIGN AUTO	04:33:14 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWW DET P P N N N N	Frequency
Center Freq 2.4410000	C SENSE:INT DOO GHZ PNO: Fast ↔ IFGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P N N N N	Frequency
RF 50 Ω D Center Freq 2.4410000 Ref Offset 11.45	IC SENSE:INT DO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low #Atten: 20 dB dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	
Center Freq 2.4410000	IC SENSE:INT DO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low #Atten: 20 dB dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P N N N N	Frequency
Center Freq 2.4410000 Ref Offset 11.45 10 dB/div Ref 21.45 dB	IC SENSE:INT DO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low #Atten: 20 dB dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun
Center Freq 2.4410000     Ref Offset 11.45     OdB/div Ref 21.45 dBi     11.5     1.45	IC SENSE:INT DOO GHZ PNO: Fast →→ IFGain:Low dB m	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Fre
RF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref Offset 11.45           10 dB/div         Ref 21.45 dBr         Ref 21.45 dBr	IC SENSE:INT DOO GHZ PNO: Fast →→ IFGain:Low dB m	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency
Center Freq 2.4410000     Center Freq 2.4410000     Ref Offset 11.45     Ref 21.45 dBr     11.5     1.45	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low dB m 1Δ2	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Free 2.441000000 GH
№         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBr           10 dB/div         Ref 21.45 dBr         Ref 21.45 dBr           -09         11.5         1.45         4.65           -0.55	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low dB m 1Δ2	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Free 2.44100000 GH Start Free
Rf         50.0         D           Center         Freq 2.4410000           Ref Offset 11.45         Ref 21.45 dBr           10 dB/divi         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low dB m 1Δ2	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Free 2.44100000 GH Start Free
Ref Offset 11.45           Ref Offset 11.45           Conter Freq 2.4410000           Ref Offset 11.45           Ref 21.45 dBr           11.5           1.45           8.55           8.65           8.6	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low dB m 1Δ2	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Free
Ref Offset 11.45           Conter Freq 2.4410000           Ref Offset 11.45           10 dB/div           Ref 21.45 dBr           11.5           1.45           1.45           8.55           18.6           28.6           38.6           48.6	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run IFGain:Low dB m 1Δ2	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P NNNN	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre
Ref Offset 11.45         Ref Offset 11.45           10 dB/div         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast →→ Trig: Free Run #Atten: 20 dB dB m 1Δ2 3Δ4		TRACE [1 2 3 4 5 6 TYPE WWWWWW DET   P P NNNN Mkr1 2.900 ms 4.62 dB	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre
Ref Offset 11.45         Ref Offset 11.45           10 dB/div         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast →→ Trig: Free Run #Atten: 20 dB dB m 1Δ2 3Δ4		TRACE [1 2 3 4 5 6 TYPE WWWWWW DET   P P NNNN Mkr1 2.900 ms 4.62 dB	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre
Image: black state	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run #Atten: 20 dB dB m 1Δ2 3Λ4 rts/n rt		TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB	Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.441000000 GH Stop Fre 2.441000000 GH
Ref Offset 11.45         Ref Offset 11.45           10 dB/div         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run #Atten: 20 dB dB m 1Δ2 3Λ4 rts/n rt	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET   P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.441000000 GH Stop Fre 2.441000000 GH CF Ste 1.000000 MH
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBr           10 dB/div         Ref 21.45 dBr         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 3Δ4 C SENSE:INT #Atten: 20 dB dB m 1Δ2 2 #VBW 3.0 MHz	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.441000000 GF 2.441000000 GF 2.441000000 GF 2.441000000 GF CF Ste 1.000000 MF
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref Offset 11.45           0.0 dB/div         Ref Offset 11.45         Ref Offset 11.45           0.9         11.5         145         145           1.45         145         145         145           8.55         145         145         145           8.56         146         146         146           8.66         146         146         146           8.66         146         146         146           8.66         146         146         146           8.66         146         146         146           8.66         146         146         146           8.66         146         146         146           8.68         146         146         146           8.68         146         146         146           8.68         146         146         146           8.68         146         146         146           8.68         146         146         146	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHZ 2.900 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.441000000 GH Stop Fre 2.441000000 GH CF Ste 1.000000 MH
PF         50 0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBr           0 dB/div         Ref 21.45 dBr         Ref 21.45 dBr	C SENSE:INT DOO GHZ PNO: Fast ↔ Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 3Δ4 4 2 #VBW 3.0 MHz X 2.900 ms (Δ) 3.840 ms -2.98 dBm	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.441000000 GH 2.441000000 GH 2.441000000 GH 2.441000000 GH CF Ste 1.000000 MH Auto Ma
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBr           10 dB/div         Ref 21.45 dBr         Ref 21.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHZ 2.900 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 1.000000 MH Auto Ma
PF         50.0         D           Center Freq 2.4410000         Center Freq 2.4410000         Center Freq 2.4410000           0.0         B/div         Ref Offset 11.45         Center 2.45 dBr           11.5	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 1.000000 MH Auto Ma
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45           0 dB/div         Ref Offset 11.45           0 dB/div         Ref 21.45 dBr           1.45         Ref 21.45 dBr           0 dB/div         Re	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency           Auto Tun           Center Fre           2.441000000 GF           Start Fre           2.441000000 GF           Stop Fre           2.441000000 GF           Stop Fre           2.441000000 GF           CF Ste           1.000000 MH           Auto           Ma           Freq Offse
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBI           10 dB/div         Ref 21.45 dBI         Ref 21.45 dBI           .00         .00         .00         .00           .00         .00         .00         .00           .00         .01         .01         .01           .00         .02         .01         .01           .00         .02         .01         .02           .01         .02         .01         .02           .02         .01         .01         .01           .02         .01         1         .01           .02         .01         1         .01           .03         .04         1         1           .03         .04         1         1           .04         .01         .01         .01           .04         .01         1         .01           .04         .01         .01         .01           .03         .04         1         .01           .04         .01         .01         .01           .05         .01         .01         .01 <td>C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB</td> <td>ALIGN AUTO Avg Type: Log-Pwr</td> <td>TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB </td> <td>Frequency           Auto Tun           Center Fre           2.441000000 GF           Start Fre           2.441000000 GF           Stop Fre           2.441000000 GF           Stop Fre           2.441000000 GF           CF Ste           1.000000 MH           Auto           Ma           Freq Offse</td>	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency           Auto Tun           Center Fre           2.441000000 GF           Start Fre           2.441000000 GF           Stop Fre           2.441000000 GF           Stop Fre           2.441000000 GF           CF Ste           1.000000 MH           Auto           Ma           Freq Offse
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref Offset 11.45           I0 dB/div         Ref Offset 11.45         Ref Offset 11.45           Og         I         I         I         I           145         Ref Offset 11.45         Ref Offset 11.45         Ref Offset 11.45           145         I <th< td=""><td>C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr</td><td>TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB </td><td>Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 1.000000 MH Auto Ma</td></th<>	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z 2.990 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB 3.840 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.44100000 GH Start Fre 2.44100000 GH Stop Fre 2.44100000 GH CF Ste 1.000000 MH Auto Ma
PF         50.0         D           Center Freq 2.4410000         Ref Offset 11.45         Ref 21.45 dBI           Od B/div         Ref 21.45 dBI         Ref 21.45 dBI           Og         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 01         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 01         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 01         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 01         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 01         Interview         Ref 21.45 dBI         Ref 21.45 dBI           Ref 010000000000000000000000	C SENSE:INT DOO GHZ PNO: Fast → Trig: Free Run #Atten: 20 dB dB m 1Δ2 1Δ2 1Δ2 1Δ2 2 #VBW 3.0 MHz Z #VBW 3.0 MHz Z #VBW 3.0 MHz Z 13.840 ms (Δ) 4.62 dB 3.740 ms (Δ) 4.62 dB 3.740 ms (Δ) 4.62 dB 3.740 ms (Δ) 4.62 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE [1 2 3 4 5 6 TYPE WWWWWW DET  P P NNNN Mkr1 2.900 ms 4.62 dB 	Frequency Auto Tun Center Fre 2.441000000 GH Start Fre 2.441000000 GH Stop Fre 2.441000000 GH



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XI RF	r - Swept SA	8-DPSK	(1111410)		- 7
Center Freq 2.44	50 Ω DC 1000000 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	04:56:52 PM May 18, 2022 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔ IFGain:Low	⊥ Trig: Free Run     #Atten: 10 dB		DET P P N N N N	
Ref Offs	et 11.45 dB		Δ	Mkr1 2.900 ms	Auto Tur
	45 dBm	<del>,                                     </del>		20.96 dB	
1.45		1Δ2			Center Fre
-8.55 Mar Maria	ของได้ๆ เห็นรับ (ถึงสามาร์สามาร์สามาร์สามาร์	Analization adversariation	มายาวการสารแห่งการสารแห่งการสารแห่งการสาร	july 1990 1990 1990 1990 1990 1990 1990 199	2.441000000 GH
-18.6					04
-38.6	<b>A</b>				Start Fre 2.441000000 GH
-48.6		3∆4			
-58.6	Wayn	water SZ4	endly Loid	n	Stop Fre
-78.6					2.441000000 GH
Center 2.4410000	0 GH7			Span 0 Hz	0E 0%
Res BW 1.0 MHz		/ 3.0 MHz	Sweep 20	).00 ms (1001 pts)	CF Ste 1.000000 MH
MKR MODE TRC SCL 1 $\Delta 2$ 1 t ( $\Delta$ )	× 2.900 ms (Δ)	Y FU 20.96 dB	INCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	5.140 ms 3.740 ms (Δ)	-30.89 dBm -33.56 dB			Freq Offs
4 F 1 t	5.140 ms	-30.89 dBm			01
6 7					
8					
9 10					
11					
ISG			STATUS		
		8-DPSk	(High)		
📕 Keysight Spectrum Analyze	r - Swept SA	0 BI CI	(ingii)		
	50 Ω DC	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	04:55:44 PM May 18, 2022 TRACE 1 2 3 4 5 6	Frequency
Senter Fred 2.40	PNO: Fast + IFGain:Low	Trig: Free Run #Atten: 10 dB		TYPE WWWWWW DET P P N N N N	
			Δ	Mkr1 2.900 ms	Auto Tur
Def Offe				28.02 dB	
Ref Offs 10 dB/div Ref 11.	45 dBm				
10 dB/div Ref 11.	45 dBm	1/2			Center Fre
10 dB/div <b>Ref 11.</b> Log 1.45			การใกรสาราวมีๆ <sub>เกิ</sub> กกระด้างเป็นกระด้าง	ารังกฎษาย <sup>ะ</sup> ก	Center Fre 2.480000000 Gł
10 dB/div Ref 11. Log 1.45 -8.55 				14/11/14/14/14/14/14/14/14/14/14/14/14/1	
10 dB/div Ref 11. 1.45 8.55 <sup>14</sup> / <sub>104</sub> /			กรรณ์การเห็ญ 		2.480000000 GF
10 dB/div Ref 11. 1.45 4.55 4.65 4.55					2.480000000 GH
10 dB/div Ref 11. 0 dB/div Ref 11. 145 186 		антонария лучира лучир лучир лучир лучир лучир лучир лучир лучир лучир лучир			2.480000000 Gł Start Fre 2.480000000 Gł
10 dB/div Ref 11. 1.45 -8.55 					2.480000000 Gi Start Fre 2.480000000 Gi Stop Fre
10 GB/div Ref 11. 145 145 145 18.6 28.6 -38.6 -48.6 -58.6 -58.6 -58.6		антонария лучира лучир лучир лучир лучир лучир лучир лучир лучир лучир лучир			2.480000000 GF
10 dB/div Ref 11. 145 145 146 146 146 146 146 146 146 146		антонария лучира лучир лучира лучира лучира лучира лучира лучира лучира лучир лучир лучир лучира лучира лучира лучира лучира лучир лучир луч	jan	WHM Span 0 Hz	2.48000000 GH Start Fre 2.48000000 GH Stop Fre 2.48000000 GH
10         Eldiv         Ref 11.           Og	yulaufeyyifeydeyyife yulaufeyyifeydeyyife yulaufeyyifeydey yulaufeyde yulaufe	44μμ 1 3.0 MHz	Sweep 20		2.48000000 Gi Start Fre 2.48000000 Gi Stop Fre 2.48000000 Gi CF Ste 1.00000 Mi
10 dB/div Ref 11. Cog 145 145 145 146 146 146 146 146 146 146 146		4444 43.0 MHz 28.02 dB	jan	Урап 0 Hz 0.00 ms (1001 pts)	2.48000000 GH Start Fre 2.48000000 GH Stop Fre 2.48000000 GH
10 dB/div Ref 11. Log 14.5 14.5 14.5 14.5 14.6	ریادی کی	илиниций луулиции 3Δ4 14444 1 3.0 MHz	Sweep 20		2.48000000 Gi Start Fre 2.48000000 Gi Stop Fre 2.48000000 Gi CF Ste 1.00000 Mi
10 dB/div         Ref 11.           Cog		4444 4444 4444 430 MHz 28.02 dB 38.81 dB 180 m	Sweep 20		2.48000000 Gi Start Fre 2.48000000 Gi Stop Fre 2.48000000 Gi CF Ste 1.00000 Mi Auto Mi
10 dE/div         Ref 11.           Corr         -           -8.55         -           -8.66         -           -38.6         -           -48.6         -           -68.6         -           -68.6         -           -78.6         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -78.6         -           -8.6         -           -8.7         -           -1         t           -1         t			Sweep 20		2.48000000 Gi Start Fre 2.480000000 Gi 2.480000000 Gi 2.480000000 Gi CF Ste 1.00000 Mi Auto Mi
10         close         Ref         11.           Log         -         <			Sweep 20		2.48000000 Gi Start Fre 2.480000000 Gi 2.480000000 Gi 2.480000000 Gi CF Ste 1.00000 Mi Auto Mi



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Report No.: TMTN2205000765NR

# 8.7 CONDUCTED SPURIOUS EMISSION

## <u>LIMITS</u>

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and 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 § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

## TEST SETUP



## TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.



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Report No.: TMTN2205000765NR TEST RESULTS

Model Name	STX	Test By	Peter Chu
Temp & Humidity	26.8°C, 62%	Test Date	2022/04/15

#### **OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**

	CH Lov	w(30MH	lz ~ 26.50	GHz / GF	SK)	
🗾 Keysight Spectrum Ana	alyzer - Swept SA					- 6 -
xart Freq 2.31	PNO: F	Fast Trig: Free	#Avg Typ Run Avg Hold	e: RMS	27 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P N N N N	Frequency
10 dB/div Ref 2	IFGain: ffset 11.45 dB 21.45 dBm	Low #Atten: 20	dB	Mkr1 2.402 -(		Auto Tune
Log 11.5						Center Freq
1.45					∳ <sup>1</sup>	2.358500000 GHz
-18.6					-20 29 dBm	Start Freq
-28.6						2.310000000 GHz
-48.6						Stop Freq
-58.6	wester, das bien anderster des			a filling an an ar	water in the	2.407000000 GHz
Start 2.31000 G	Hz			Stop 2	2.40700 GHz	CF Step
#Res BW 100 kl		#VBW 300 kHz		weep 10.67 m	s (40001 pts)	9.700000 MHz <u>Auto</u> Man
MKR MODE TRC SCL 1 N 1 f 2 N 1 f	× 2.402 157 3 GF 2.400 000 0 GF	Hz -0.290 dBi Hz -53.771 dBi	FUNCTION FUN m	ICTION WIDTH FU	NCTION VALUE	
3 N 1 f 4 5	2.483 500 0 GH	Hz dB				Freq Offset 0 Hz
6 7					E	
8 9 10						
11		III				
MSG						
				STATUS		
Keysight Spectrum Ana	50 Ω DC	SENS		ALIGN AUTO 06:54	:07 PM May 18, 2022	Frequency
🇾 Keysight Spectrum Ana	50 Ω DC 000000 MHz	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54	07 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P N N N N	Frequency
Keysight Spectrum Ana RF Start Freq 30.0	50 Ω DC 000000 MHz PNO: F	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TRACE 1 2 3 4 5 6	
Keysight Spectrum Ana W RF Start Freq 30.0	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TYPE MWWWW DET P P N N N N 401 7 GHz	Frequency
Keysight Spectrum Ana RE Start Freq 30.0 10 dB/div Ref 2 11.5 1.45	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TYPE MWWWW DET P P N N N N 401 7 GHz	Frequency Auto Tune
Start Freq 30.0	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TYPE MWWWW DET P P N N N N 401 7 GHz	Frequency Auto Tune Center Freq
Keysight Spectrum Ann           R           Start Freq 30.0           10 dB/div           Ref 0           1.5           1.45           8.55	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TRACE 12 3 4 5 6 TYPE MWWWW DET P P NNNN 0.419 dBm	Frequency Auto Tune Center Freq 13.26500000 GHz
Keysight Spectrum Ana     F     Start Freq 30.0     Cog     10 dB/div Ref 2     11.5     1.45     8.55     18.6     28.6     38.6     48.6     28.6     38.6     48.6     38.6	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TRACE 12 3 4 5 6 TYPE MWWWW DET P P NNNN 0.419 dBm	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz
Keysight Spectrum Ana     F     Start Freq 30.0     Ref 0     dB/div Ref 2     11.5     1.45     8.55     -18.6     -28.6     -38.6     02	50 Ω DC 000000 MHz PNO: F IFGain: ffset 11.45 dB	Fast Trig: Free	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2.	TRACE 12 3 4 5 6 TYPE MWWWW DET P P NNNN 0.419 dBm	Frequency Auto Tune Center Freq 13.26500000 GHz Start Freq
Keysight Spectrum Ana     F     Start Freq 30.0     Control     Contro     Control     Control     Control	50 2 DC   000000 MHz PNO: F IFGain: ffset 11.45 dB 21.45 dBm	Fast Low #Atten: 20	#Avg Typ Run Avg Hold	ALIGN AUTO 06:54 e: RMS :>10/10 Mkr1 2. -(	TRACE [12 24 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz CF Step
Keysight Spectrum Ana           Ref O           O dB/div         Ref O           Log         1           1.45         1           8.55         1           1.46         1           28.65         1           38.65         1           48.65         1           58.66         1           Start 30 MHz         Here 30 MHz           #Res BW 100 kl         10 kl	50 2 DC   000000 MHz PNO: F IFGain: ffset 11.45 dB 21.45 dBm	Fast Trig: Free	Avg Typ Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [12 24 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz .419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz
Keysight Spectrum And           Ref O           Start Freq 30.0           Ref O           10 dB/div         Ref 2           11.5         1           1.45         1           1.45         1           1.45         1           1.45         1           1.46         1           28.6         1           39.7         1           30.8         1           30.8         1           30.8 <t< td=""><td>S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon</td><td>Trig: Free #Atten: 20</td><td>#Avg Typ Run Avg Hold dB</td><td>ALIGN AUTO 06:54 e: RMS &gt;&gt;10/10 Mkr1 2 -( </td><td>TRACE [12 24 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm </td><td>Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.64700000 GHz Auto Man</td></t<>	S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon	Trig: Free #Atten: 20	#Avg Typ Run Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [12 24 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.64700000 GHz Auto Man
Keysight Spectrum And           Ref O           Start Freq 30.0           Ref O           Io dB/div         Ref 2           Io da         Io da           Io da         Io da	50 00000 MHz           PNO: F           IFGein:           ffset 11.45 dB           21.45 dBm	Trig: Free #Atten: 20	#Avg Typ Run Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [12 24 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz .419 dBm 	Frequency           Auto Tune           Center Freq           13.265000000 GHz           Start Freq           30.000000 MHz           Stop Freq           26.50000000 GHz           CF Step           2.64700000 GHz
Keysight Spectrum Analysis           Ref O           10 dB/div         Ref O           10 dB/div         Ref J           11.5         1           1.6         1           1.6         1           1.6         1           28.6         28.6           38.6         28.6           48.6         28.6           58.6         28.6           58.6         28.6           58.6         28.6           38.8         100 kHz           #Res BW 100 kHz         1           2         N         1           3         N         1           3         N         1           4         1         1           5         1         1	S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon	Trig: Free #Atten: 20	#Avg Typ Run Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [1 2 3 4 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.647000000 GHz Auto Man
Keysight Spectrum Ane           Ref O           Its         Ref O           Its         Its           Its         Its         Its           Its         Its         Its         Its           Its         Its         Its         Its           Its         Its         Its         Its           Its         Its         Its         Its           Its         Its         Its         Its           Its         Its         Its         Its           Its         Its         Its <th< td=""><td>S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon</td><td>Trig: Free #Atten: 20</td><td>#Avg Typ Run Avg Hold dB</td><td>ALIGN AUTO 06:54 e: RMS &gt;&gt;10/10 Mkr1 2 -( </td><td>TRACE [1 2 3 4 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm </td><td>Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.647000000 GHz Auto Man</td></th<>	S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon	Trig: Free #Atten: 20	#Avg Typ Run Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [1 2 3 4 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.647000000 GHz Auto Man
Keysight Spectrum Analysis           Ref O           10 dB/div         Ref O           10 dB/div         Ref J           11.5         1.5           1.6         1           1.6         1           28.6         28.6           38.6         28.6           48.6         28.6           58.6         28.6           58.6         28.6           38.8         1           7         1           3         N           7         7           8         9	S0 @ DC         PNO: F           J000000 MHz         PNO: F           PRO: F         IFGain:           ffset 11.45 dB         21.45 dBm           21.45 dBm         Image: Comparison of the second secon	Trig: Free #Atten: 20	#Avg Typ Run Avg Hold dB	ALIGN AUTO 06:54 e: RMS >>10/10 Mkr1 2 -( 	TRACE [1 2 3 4 5 6 7 TYPE[M WWWW DET P P NNNN 401 7 GHz ).419 dBm 	Frequency Auto Tune Center Freq 13.265000000 GHz Start Freq 30.000000 MHz Stop Freq 26.50000000 GHz 2.647000000 GHz Auto Man



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📕 Keysight Sp 🛙	ectrum Analyzer - RF 51		· · ·	30MH	E:INT		ALIGN AUTO		May 18, 2022	-
Start Fre	q 30.0000	PNO	:Fast G n:Low	Trig: Free #Atten: 20		#Avg Typ Avg Hold		TYP	1 2 3 4 5 6 MWWWW P P N N N N	Frequency
10 dB/div	Ref Offset Ref 21.4						Mk	r1 2.440 -2.09	8 GHz 1 dBm	Auto Tur
-og										
11.5	<b>∮</b> <sup>1</sup>									Center Fre 13.265000000 GH
8.55										
18.6									-22.09 dBm	Start Fre
28.6										30.000000 MH
38.6										
48.6	12 martin	adde and a contract of	ن محمد بالير ا		all the second		تدريعه ويقر وغر والقالا ويقر	والمعرفة ومعاد		Stop Fre
58.6 68.6										26.50000000 GH
Start 30 I	au								5.50 GHz	
	100 kHz		#VB۱	N 300 kHz			Sweep 3	2.531 s (4)		CF Ste 2.647000000 Gi
MKR MODE T	RC SCL	Х		Y	FUI	ICTION FU	NCTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Ma
1 N <sup>1</sup> 2 N	f	2.440 8 0		-2.091 dB						
3 N	f	2.483 500 0 0		-57.116 dB						Freq Offs
4 5										01
6 7										
8										
10										
••• • •					-				•	



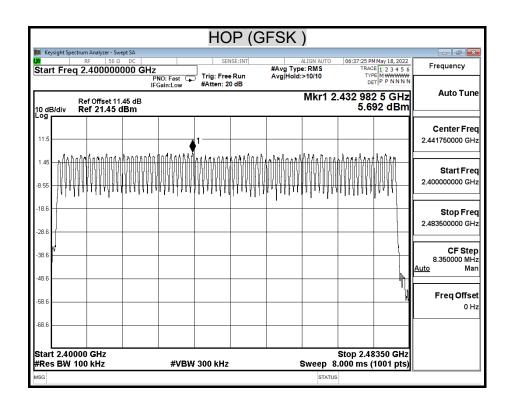
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Keysight Spectrum An RF	alyzer - Swept SA 50 Ω DC		SENSE:INT	AL	IGN AUTO	06:59:46 PM Ma		- <i>-</i>
tart Freq 2.4	74000000 GHz	IO: Fast 😱	Trig: Free Run	#Avg Type: Avg Hold:>		TRACE 1 TYPE N	23456 WWWWW PNNNN	Frequency
0 dB/div Ref	IFG Offset 11.45 dB 21.45 dBm	iain:Low	#Atten: 20 dB	М	kr1 2.48		5 GHz	Auto Tur
0g 11.5 1.45 8.55	1							Center Fre 2.487000000 GH
18.6 28.6 38.6	AN W	A _3					-25.70 dBm	<b>Start Fre</b> 2.474000000 GF
48.6 2 V V 58.6 58.6 58.6		- Win	1 marine marine	****	Wollenagleans	hoffer game and be a polynow	*****	<b>Stop Fre</b> 2.50000000 GF
Start 2.47400 G Res BW 100 k	:Hz ×				eep 2.66	op 2.5000 7 ms (400	01 pts)	CF Ste 2.600000 MH <u>Auto</u> Ma
1         N         1         f           2         N         1         f           3         N         1         f           4         -         -         -           5         -         -         -           6         -         -         -         -	2.480 156 15 2.400 000 0 2.483 500 0	) GHz	-5.704 dBm dBm -54.004 dBm					Freq Offs 0 F
8 1 1 1								
8 9 10 11 56			III		STATUS			
9 10 10 56 Keysight Spectrum Art RF	50 Ω DC		III SENSE:INT		IGN AUTO	06:59:12 PM M		Frequency
9 10 11 36 Keysight Spectrum An RF itart Freq 30.	50 Ω DC 000000 MHz PN IFG	IO: Fast C		AL #Avg Type: Avg Hold:>	IGN AUTO RMS 10/10	TRACE 1	23456 1000000 2900000000000000000000000000000	Frequency
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9 9 10 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	50 Ω DC 0000000 MHz PN IFG Dffset 11.45 dB	IO: Fast C	SENSE:INT	#Avg Type:	IGN AUTO RMS 10/10	TRACE 1 TYPE M DET F	2 3 4 5 6 P N N N N B GHz	
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9 9 9 10 11 11 12 14 Keysight Spectrum Arr Freq 30. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	150 C C PN IFG	#vBW	SENSE:INT]	#Avg Type: Avg Hold:>	IGN AUTO RMS 10/10 Mkr1	5.960	2345 6 7 PNNN 3 GHz dBm -25 96 dbn -25 96 dbn 50 GHz 01 pts)	Frequency Auto Tur Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre
9 9 9 10 11 12 12 14 15 14 15 14 1 1 1 1 1 1 1 1 1 1 1 1	150 2 DC 000000 MHz PN IFG Dffset 11.45 dB 21.45 dBm 1.45 dB	#VBW	SENSE:INT	#Avg Type: Avg Hold:>	IGN AUTO RMS 10/10 Mkr1	5 Stop 26.3 31 s (400	2345 6 7 PNNN 3 GHz dBm -25 96 dbn -25 96 dbn 50 GHz 01 pts)	Frequency Auto Tur Center Fre 13.265000000 GF Start Fre 30.000000 MF 26.50000000 GF 26.50000000 GF
9 9 10 11 11 12 13 14 14 14 14 14 14 14 14 14 14	150 2 DC 000000 MHz PN IFG 21.45 dB 21.45 dB 1.45 d	#VBW	SENSE:INT]	#Avg Type: Avg Hold:>	IGN AUTO RMS 10/10 Mkr1	5 Stop 26.3 31 s (400	2345 6 P NNN P NNN 3 GHz dBm -25.96 dBm -25.96 dBm -25.96 dBm -25.96 dBm -25.96 dBm	Frequency           Auto Tur           Center Fre           13.265000000 GF           Start Fre           30.000000 MF           Stop Fre           26.50000000 GF           2.647000000 GF           Auto           Kart Fre           2.647000000 GF           CF Ste           2.647000000 GF           Auto           Kart Fre           2.647000000 GF           CF Ste           Auto           Kart Fre



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CH Low ( 30MHz ~ 26.5GHz / 8-DPSK ) 📕 Keysight Spectrum Analyzer - Swept SA - 6 × 07:06:30 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P N N N N ALIGN AUTO #Avg Type: RMS Avg|Hold:>10/10 Frequency Start Freq 2.310000000 GHz Trig: Free Run #Atten: 20 dB PNO: Fast IFGain:Low Auto Tune Mkr1 2.401 828 8 GHz Ref Offset 11.45 dB Ref 21.45 dBm 10 di Log -0.988 dBm dB/div 11.5 **Center Freq** 1.4 2.358000000 GHz -8.5 18. Start Freq 28.E 2.310000000 GHz 38. 48. Stop Freq 58. 2.406000000 GHz 68.6 Start 2.31000 GHz Stop 2.40600 GHz CF Step 9.600000 MHz #VBW 300 kHz #Res BW 100 kHz Sweep 10.67 ms (40001 pts) Man <u>Auto</u> MKR MODE TRC SCL FUNCTION WIDTH FUNCTION VALUE 2.401 828 8 GHz 2.400 000 0 GHz 2.483 500 0 GHz -0.988 dBm -41.188 dBm --- dBm N N N f f Freq Offset 0 Hz STATUS 鱦 Keysight Spectrum Analyzer - Swept SA TO 07:05:27 PM May 18, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P N N N N #Avg Type: RMS Avg|Hold:>10/10 Frequency Start Freq 30.000000 MHz PNO: Fast IFGain:Low #Atten: 20 dB Auto Tune Mkr1 2.401 7 GHz -1.384 dBm Ref Offset 11.45 dB Ref 21.45 dBm 10 dB/div .og **r** 11.5 **Center Freq** 13.265000000 GHz 8.55 18.6 Start Freq 28. 30.000000 MHz 38. 48. Stop Freq 58. 26.50000000 GHz -68. Start 30 MHz Stop 26.50 GHz **CF Step** 2.647000000 GHz <u>auto</u> Man #Res BW 100 kHz #VBW 300 kHz Sweep 2.531 s (40001 pts) Auto MKR MODE TRC SCL FUNCTION EUNCTION VALUE EUNCTION 2.401 7 GHz 2.400 000 0 GHz 2.483 500 0 GHz -1.384 dBm -42.535 dBm -59.391 dBm N N N f f 2 Freq Offset 0 Hz 10 11 STATUS



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📕 Keysight Sp 🕻	ectrum Analyzer - S RF 50			SEN	SE:INT		ALIGN AUTO	07:03:55 P	4 May 18, 2022	
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	RC SCL	× 2.440 8	CHA	Y -3.272 dB		CTION FU	NCTION WIDTH	FUNCTION	DN VALUE	
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3 N *	f	2.483 500 0	GHz	-57.423 dB	m					01
5 6										•••
7 8										
9										
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📕 Keysight Spectrum An								6
a RF Start Freq 2.47	50 Ω DC 4000000 GHz		SENSE:IN	#Avg Type		TRAC	May 18, 2022 E 1 2 3 4 5 6	Frequency
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9 10 11 11 15 15 16 17 17 17 17 17 17 17 17 17 17	50 Ω DC 000000 MHz PI	NO: Fast C	SENSE:IN	#Avg Type	ILIGN AUTO :: RMS >10/10	TRAC TYP DE r1 2.479	E 1 2 3 4 5 6 E M WWWW T P P N N N N	Frequency
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9 9 10 10 11 10 11 10 11 10 11 11	50 Ω DC 000000 MHz IFC Iffset 11.45 dB	NO: Fast C	SENSE:IN	#Avg Type	ILIGN AUTO :: RMS >10/10	TRAC TYP DE r1 2.479	8 GHz 7 dBm	Frequency Auto Tur Center Fre 13.265000000 Gl Start Fre 30.000000 Mi
9 9 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 10	50 2 C 000000 MHz PI IFG IFSet 11.45 dB 21.45 dBm 	Sain:Low	SENSE IN Trig: Free Run #Atten: 20 dB	#Avg Type Avg Hold:>	LIGN AUTO :: RMS >10/10 Mk	rrac TRAC TRAC TRAC TRAC TRAC TRAC TRAC TRAC	E [12 a 4 5 6 E [12 a 4 5 6 E MWWWWW TP P NNNN D 8 GHz 27 dBm -24 53 dBm -24 53 dBm 6.50 GHz	Frequency Auto Tur Center Fre 13.265000000 Gi Start Fre 30.000000 Mi Stop Fre 26.50000000 Gi
9 9 10 11 10 11 10 11 10 11 10 11 11	50 2 C 000000 MHz PI IFG IFSet 11.45 dB 21.45 dBm 	Sain:Low	SENSE:IN Trig: Free Run #Atten: 20 dB	#Avg Type Avg Hold:	LIGN AUTO :: RMS >10/10 Mk Sweep 2	rrac rrac rr1 2.479 -4.52 -4.52 -4.52 -4.52 -4.52 -4.52 -4.53 -4.52 -4.53	E[12 3 4 5 6	Frequency           Auto Tur           Center Fre           13.265000000 Gl           Start Fre           30.000000 Ml           Stop Fre           26.50000000 Gl           CF Ste           2.647000000 Gl
9 9 10 11 11 12 13 14 14 14 14 14 14 14 14 14 14	50 Q. DC 000000 MHz PI IF3 IF3 IF3 IF3 IF3 IF3 IF3 IF	#VBM	SENSE:IN Trig: Free Run #Atten: 20 dB	#Avg Type Avg Hold:>	LIGN AUTO :: RMS >10/10 Mk Sweep 2	rrac rrac rr1 2.479 -4.52 -4.52 -4.52 -4.52 -4.52 -4.52 -4.53 -4.52 -4.53	E [12 a 4 5 6 E [12 a 4 5 6 E MWWWWW TP P NNNN D 8 GHz 27 dBm -24 53 dBm -24 53 dBm 6.50 GHz	Frequency           Auto Tur           Center Fre           13.265000000 Gl           Start Fre           30.000000 Ml           Stop Fre           26.50000000 Gl           CF Ste           2.647000000 Gl
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9 9 10 11 10 11 10 11 10 11 10 10	150 Q. DC 1000000 MHz PI IF3 PI PI PI PI PI PI PI PI PI PI	#VBM 8 GHz 0 GHz	SENSE IN Trig: Free Run #Atten: 20 dB	#Avg Type Avg Hold:	LIGN AUTO :: RMS >10/10 Mk Sweep 2	rrac rrac rr1 2.479 -4.52 -4.52 -4.52 -4.52 -4.52 -4.52 -4.53 -4.52 -4.53	E [1 2 4 5 6	Frequency           Auto Tur           Center Fre           13.265000000 Gl           Start Fre           30.000000 Ml           Stop Fre           26.50000000 Gl           CF Ste           2.647000000 Gl



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u .		rum Analyzer - Swe RF 50 Ω 2.4000000	DC 000 GHz Pl	NO: Fast G			#Avg Typ Avg Hold:		TYP	May 18, 20 E 1 2 3 4 E M WWW T P P N N	5 6	Frequency
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18.6 -											2.4	<b>Stop Fre</b> 83500000 GH
38.6 <b>₽</b> 48.6 -										ł	Auto	CF Ste 8.350000 MH Ma
*0.0 -											Ň.	Freq Offs
68.6 -												



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# 8.8 RADIATED EMISSIONS

# 8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

## **LIMITS**

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	(2)
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



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**Report No.:** TMTN2205000765NR Rev.: 00 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

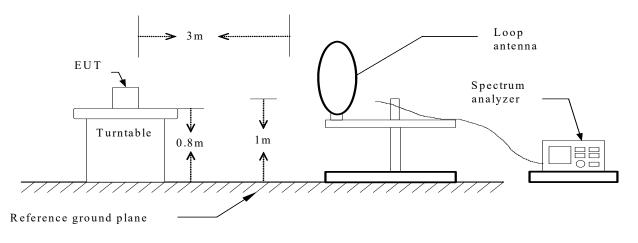


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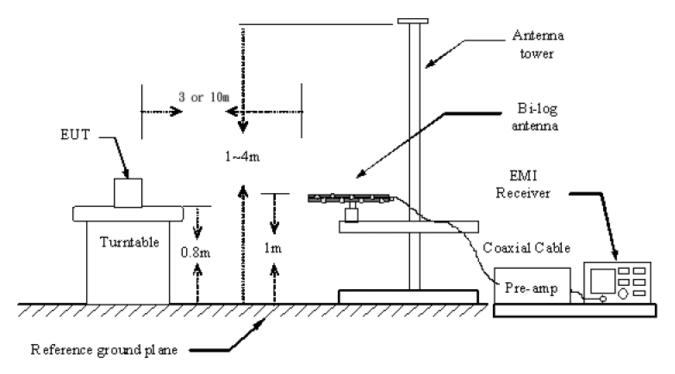
# TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

## 9kHz ~ 30MHz



30MHz ~ 1GHz

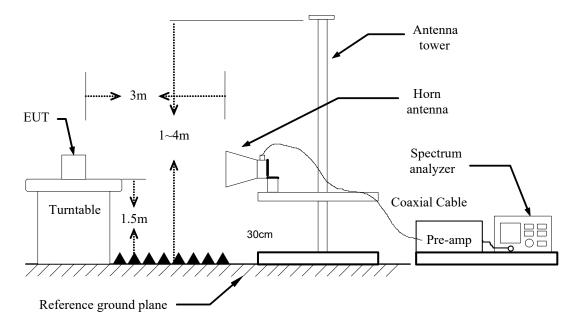




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The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



# TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 or 10 meter open site/chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. White measuring the radiated emission below 1GHz, the EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 or 10 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to QUASIPEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note :

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 510 Hz for Average detection (AV) at frequency above 1GHz.



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# 8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

### BELOW 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.



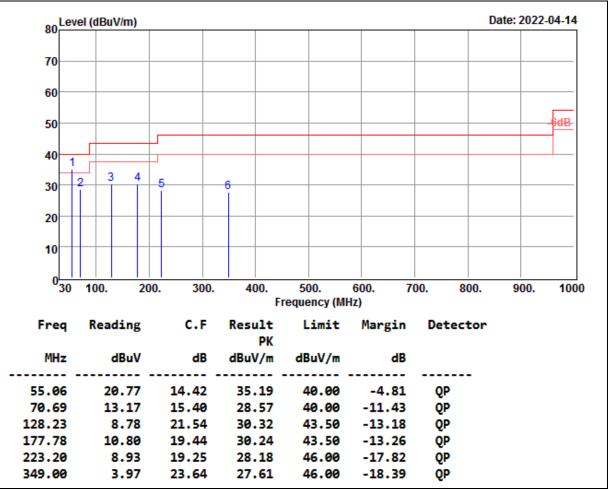
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### Report No.: TMTN2205000765NR BELOW 1 GHz (30MHz ~ 1GHz)

#### Test Voltage: AC 120V, 60Hz

Product Name	Turntable	Test Date	2022/04/14
Model Name	STX	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	27.5°C, 54%

#### Vertical



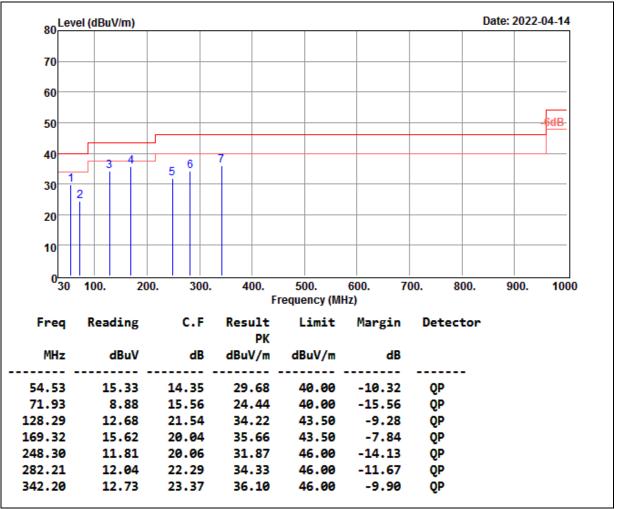
- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).



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Product Name	Turntable	Test Date	2022/04/14
Model Name	STX	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	27.5°C, 54%

#### Horizontal



- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- 4. Margin (dB) = Remark result (dBuV/m) Quasi-peak limit (dBuV/m).



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Report No.: TMTN2205000765NR

# 8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

<b>Product Name</b>	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH Low TX / GFSK	Temp & Humidity	26.8°C, 62%

Horizontal

		TX mode	e / CH Low		Measurement Distance at 3m Horizontal pola					arity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1723.51	61.15	28.39	2.81	44.31	0.96	48.99	74.00	-25.01	Р
	1723.51	52.10	28.39	2.81	44.31	0.96	39.94	54.00	-14.06	А
*	4804.32	59.37	33.07	4.38	42.51	0.57	54.89	74.00	-19.11	Р
*	4804.32	53.74	33.07	4.38	42.51	0.57	49.26	54.00	-4.74	А
	7206.48	55.89	38.68	5.47	42.36	0.42	58.10	74.00	-15.90	Р
	7206.48	48.36	38.68	5.47	42.36	0.42	50.57	54.00	-3.43	А

Vertical

	TX mode / CH Low				Measurement Distance at 3m Vertical polarity					rity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1711.24	60.52	28.29	2.80	44.33	0.95	48.23	74.00	-25.77	Р
	1711.24	52.05	28.29	2.80	44.33	0.95	39.76	54.00	-14.24	А
*	4804.02	60.27	33.07	4.38	42.51	0.57	55.79	74.00	-18.21	Р
*	4804.02	56.52	33.07	4.38	42.51	0.57	52.04	54.00	-1.96	А
	7206.34	56.72	38.68	5.47	42.36	0.42	58.92	74.00	-15.08	Р
	7206.34	49.41	38.68	5.47	42.36	0.42	51.61	54.00	-2.39	А

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≥1/T
- 3. The result basic equation calculation is as follow:
  - Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



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Report No.: TMTN2205000765NR

Product Name	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH Mid TX / GFSK	Temp & Humidity	26.8°C, 62%

#### Horizontal

		TX mode	e / CH Mid		Measu	rement D	)istance at 3	3m Hori	izontal pola	arity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1727.19	59.70	28.42	2.81	44.31	0.97	47.58	74.00	-26.42	Р
	1727.19	51.02	28.42	2.81	44.31	0.97	38.90	54.00	-15.10	А
*	4881.80	60.51	33.32	4.43	42.50	0.57	56.33	74.00	-17.67	Р
*	4881.80	55.39	33.32	4.43	42.50	0.57	51.21	54.00	-2.79	А
*	7323.35	55.95	39.13	5.53	42.21	0.43	58.83	74.00	-15.17	Р
*	7323.35	47.81	39.13	5.53	42.21	0.43	50.69	54.00	-3.31	А

#### Vertical

		TX mod	e / CH Mid		Measurement Distance at 3m Vertical polarity					rity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1705.96	61.32	28.25	2.80	44.34	0.94	48.97	74.00	-25.03	Р
*	1705.96	51.66	28.25	2.80	44.34	0.94	39.31	54.00	-14.69	А
*	4881.62	60.80	33.32	4.43	42.50	0.57	56.61	74.00	-17.39	Р
*	4881.62	55.73	33.32	4.43	42.50	0.57	51.54	54.00	-2.46	А
*	7323.35	56.37	39.13	5.53	42.21	0.43	59.25	74.00	-14.75	Р
*	7323.35	48.85	39.13	5.53	42.21	0.43	51.73	54.00	-2.27	A

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



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Report No.: TMTN2205000765NR

Product Name	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH High TX / GFSK	Temp & Humidity	26.8°C, 62%

#### Horizontal

		TX mode	e / CH High		Measu	irement I	Distance at	3m Hor	izontal pol	arity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1728.84	61.71	28.43	2.81	44.31	0.97	49.61	74.00	-24.39	Р
	1728.84	50.69	28.43	2.81	44.31	0.97	38.59	54.00	-15.41	А
*	4959.66	56.66	33.57	4.47	42.49	0.56	52.77	74.00	-21.23	Р
*	4959.66	47.18	33.57	4.47	42.49	0.56	43.29	54.00	-10.71	А
*	7440.41	55.69	39.57	5.59	42.05	0.44	59.24	74.00	-14.76	Р
*	7440.41	47.37	39.57	5.59	42.05	0.44	50.92	54.00	-3.08	А

#### Vertical

		TX mode	e / CH High		Meas	urement	Distance a	t3m Ve	ertical pola	rity
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1712.53	61.47	28.30	2.80	44.33	0.95	49.19	74.00	-24.81	Р
	1712.53	51.35	28.30	2.80	44.33	0.95	39.07	54.00	-14.93	А
*	4960.01	57.63	33.57	4.47	42.49	0.56	53.74	74.00	-20.26	Р
*	4960.01	49.83	33.57	4.47	42.49	0.56	45.94	54.00	-8.06	А
*	7439.48	57.06	39.57	5.59	42.05	0.44	60.60	74.00	-13.40	Р
*	7439.48	48.60	39.57	5.59	42.05	0.44	52.14	54.00	-1.86	А

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



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Report No.: TMTN2205000765NR

Product Name	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	Temp & Humidity	26.8°C, 62%

#### Horizontal

	TX mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1722.55	62.11	28.38	2.81	44.32	0.96	49.94	74.00	-24.06	Р
	1722.55	50.94	28.38	2.81	44.32	0.96	38.77	54.00	-15.23	А
*	4804.27	57.12	33.07	4.38	42.51	0.57	52.64	74.00	-21.36	Р
*	4804.27	50.21	33.07	4.38	42.51	0.57	45.73	54.00	-8.27	А
	7206.25	55.59	38.68	5.47	42.36	0.42	57.79	74.00	-16.21	Р
	7206.25	46.77	38.68	5.47	42.36	0.42	48.97	54.00	-5.03	А

#### Vertical

	TX mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1711.52	61.25	28.29	2.80	44.33	0.95	48.96	74.00	-25.04	Р
	1711.52	62.34	28.29	2.80	44.33	0.95	50.05	54.00	-3.95	А
*	4803.83	57.89	33.07	4.38	42.51	0.57	53.41	74.00	-20.59	Р
*	4803.83	51.86	33.07	4.38	42.51	0.57	47.38	54.00	-6.62	А
	7206.23	56.10	38.68	5.47	42.36	0.42	58.30	74.00	-15.70	Р
	7206.23	47.77	38.68	5.47	42.36	0.42	49.97	54.00	-4.03	А

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



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Report No.: TMTN2205000765NR

Product Name	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH Mid TX / 8-DPSK	Temp & Humidity	26.8°C, 62%

#### Horizontal

		TX mode / CH Mid				Measurement Distance at 3m Horizontal polarity				
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1722.28	60.03	28.38	2.81	44.32	0.96	47.86	74.00	-26.14	Р
	1722.28	50.51	28.38	2.81	44.32	0.96	38.34	54.00	-15.66	А
*	4882.09	58.32	33.32	4.43	42.50	0.57	54.14	74.00	-19.86	Р
*	4882.09	51.84	33.32	4.43	42.50	0.57	47.66	54.00	-6.34	А
*	7323.72	54.31	39.13	5.53	42.21	0.43	57.19	74.00	-16.81	Р
*	7323.72	45.55	39.13	5.53	42.21	0.43	48.43	54.00	-5.57	А

#### Vertical

	TX mode / CH Mid				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1709.52	61.47	28.28	2.80	44.34	0.95	49.16	74.00	-24.84	Р
*	1709.52	53.08	28.28	2.80	44.34	0.95	40.77	54.00	-13.23	А
*	4882.38	59.28	33.32	4.43	42.50	0.57	55.10	74.00	-18.90	Р
*	4882.38	53.60	33.32	4.43	42.50	0.57	49.42	54.00	-4.58	А
*	7323.10	56.09	39.13	5.53	42.21	0.43	58.96	74.00	-15.04	Р
*	7323.10	47.57	39.13	5.53	42.21	0.43	50.44	54.00	-3.56	А

- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



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Report No.: TMTN2205000765NR

Product Name	Turntable	Test Date	2022/04/15
Model Name	STX	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	Temp & Humidity	26.8°C, 62%

#### Horizontal

	TX mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
	1725.59	60.18	28.40	2.81	44.31	0.97	48.04	74.00	-25.96	Р
	1725.59	52.01	28.40	2.81	44.31	0.97	39.87	54.00	-14.13	А
*	4959.49	58.85	33.57	4.47	42.49	0.56	54.96	74.00	-19.04	Р
*	4959.49	49.63	33.57	4.47	42.49	0.56	45.74	54.00	-8.26	А
*	7440.30	54.82	39.57	5.59	42.05	0.44	58.37	74.00	-15.63	Р
*	7440.30	44.25	39.57	5.59	42.05	0.44	47.80	54.00	-6.20	А

#### Vertical

		TX mode	e / CH High	l	Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/Q/A)
*	1720.20	60.83	28.36	2.81	44.32	0.96	48.64	74.00	-25.36	Р
*	1720.20	54.77	28.36	2.81	44.32	0.96	42.58	54.00	-11.42	А
*	4960.08	58.22	33.57	4.47	42.49	0.56	54.33	74.00	-19.67	Р
*	4960.08	50.64	33.57	4.47	42.49	0.56	46.75	54.00	-7.25	А
*	7440.36	56.73	39.57	5.59	42.05	0.44	60.28	74.00	-13.72	Р
*	7440.36	47.80	39.57	5.59	42.05	0.44	51.35	54.00	-2.65	А

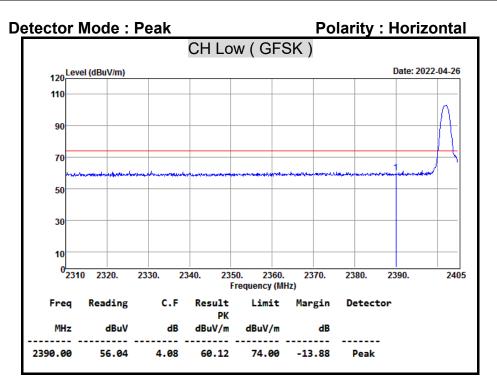
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp + Filter, Margin = Level-Limit
- 4. The other emission levels were 10dB below the limit
- 5. The test limit distance is 3m limit.
- 6. \*=Restricted bands of operation



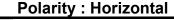
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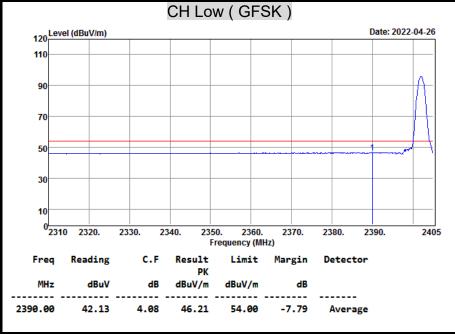
# 8.8.4 RESTRICTED BAND EDGES

Model Name	STX	Test By	Peter Chu
Temp & Humidity	27.6°C, 54%	Test Date	2022/04/26



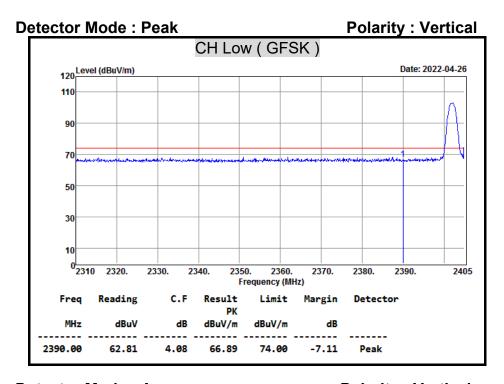


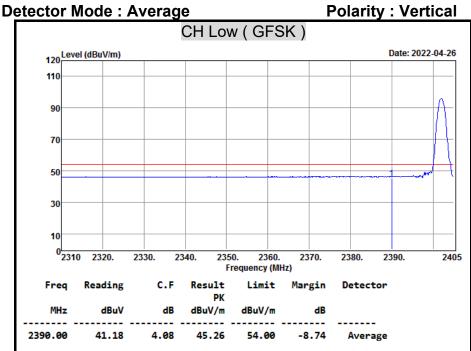






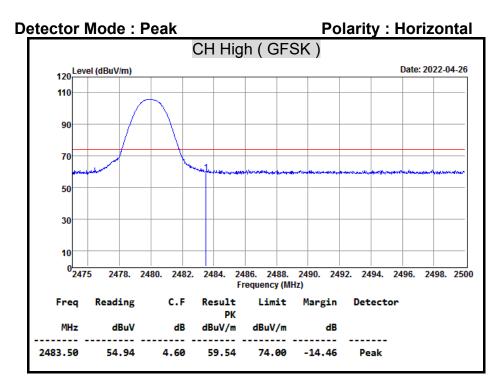
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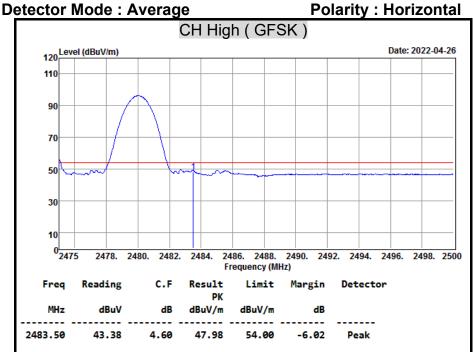






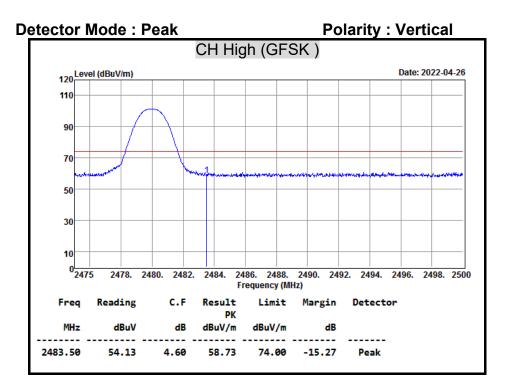
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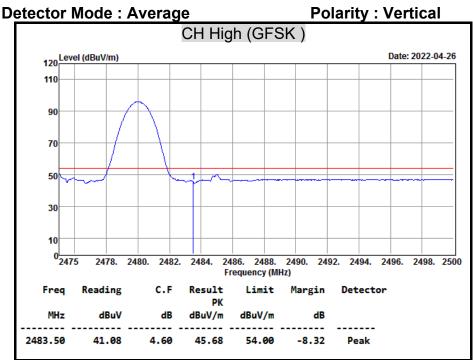






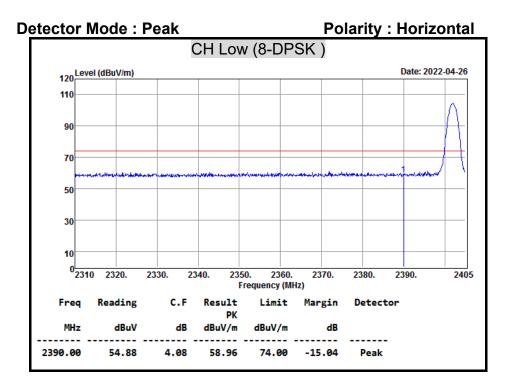
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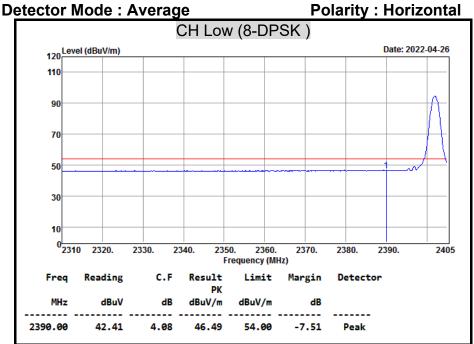






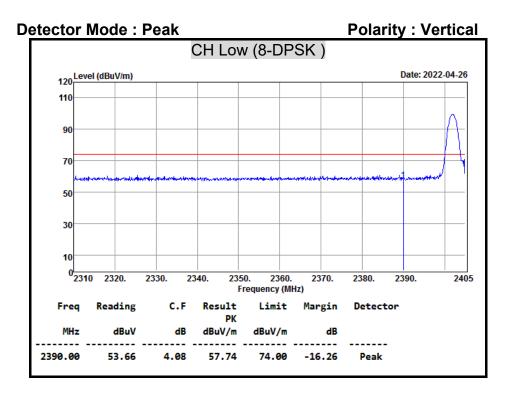
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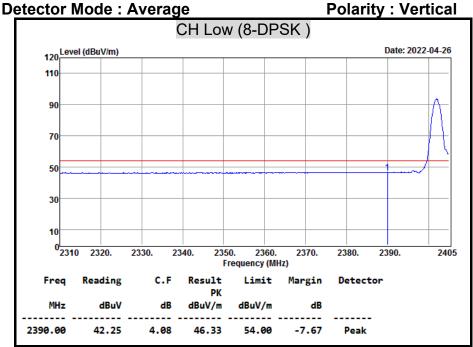






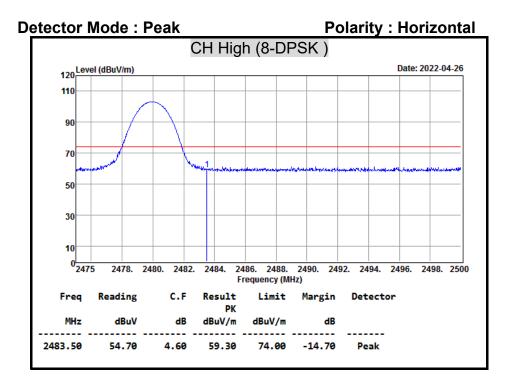
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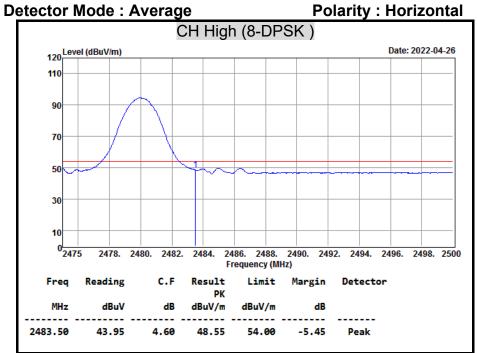






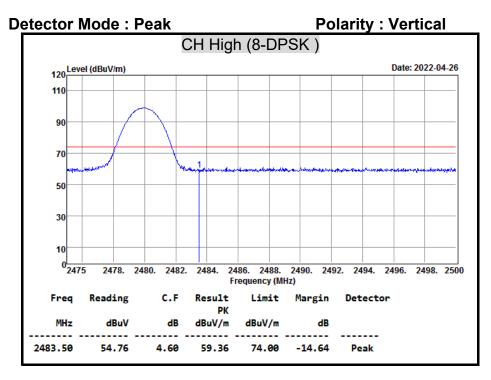
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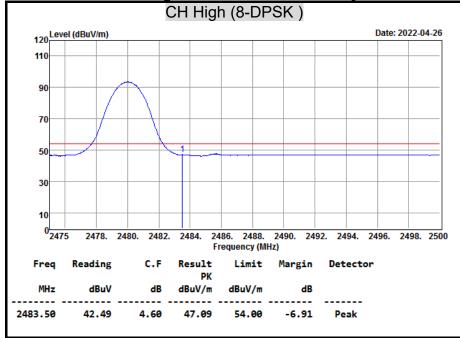




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# 8.9 POWERLINE CONDUCTED EMISSIONS

# LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

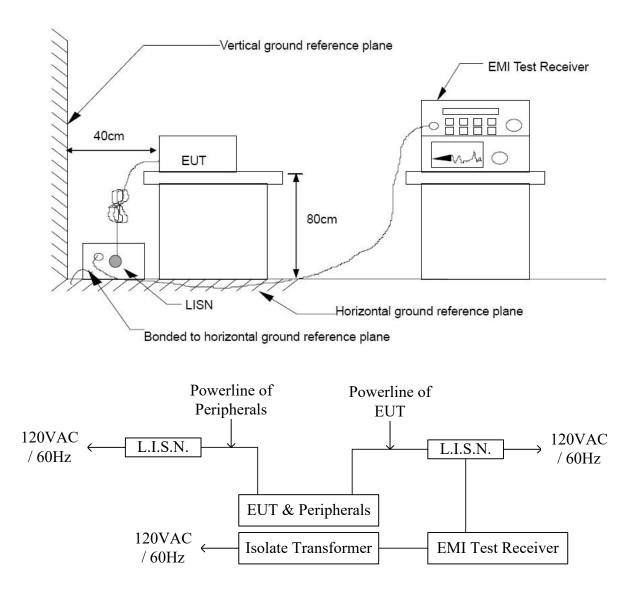
The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBµv)			
	Quasi-peak	Average		
0.15 - 0.5	66 to 56	56 to 46		
0.5 - 5	56	46		
5 - 30	60	50		



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Report No.: TMTN2205000765NR TEST SETUP



# TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.10 : 2013.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.



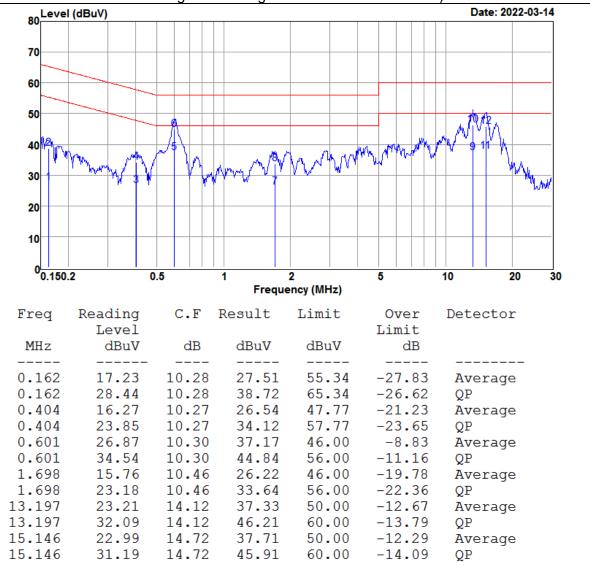
## TEST RESULTS

#### Test Voltage: AC 120V, 60Hz

Model No.	STX	Test Mode	Normal Operation
Environmental Conditions	25 3 C 63% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

#### LINE

(The chart below shows the highest readings taken from the final data.)



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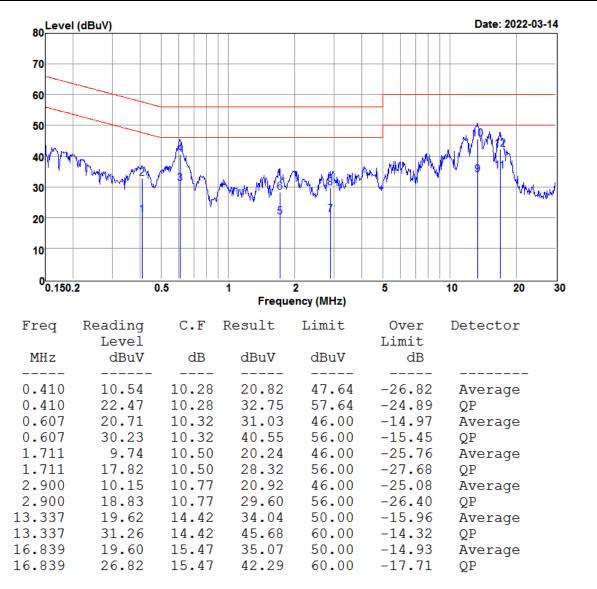


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Model No.	STX	Test Mode	Normal Operation
Environmental Conditions	125 3 ( 63% RH	Resolution Bandwidth	9 kHz
Tested by	Oz Ding		

#### NEUTRAL

(The chart below shows the highest readings taken from the final data.)



=== END of Report ===