



Project No.: TM-2209000266P Report No.: TMTN2209001273NR FCC ID: XEG-TN400BT-X

1 / 100 00 Rev.:

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

# TEST REPORT

For

Analog Turntable

Model: TN-400BT-X

# **Brand: TEAC**

Issued for

# TEAC CORPORATION

1-47 Ochiai, Tama-shi, Tokyo 206-8530, Japan

Issued by

**Compliance Certification Services Inc.** Tainan Lab. No.8, Jiucengling, Xinhua Dist., Tainan City, Taiwan Issued Date: November 17, 2022

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# **REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 17, 2022	Initial Issue	ALL	Polly Wang



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# **1. TEST REPORT CERTIFICATION**

Applicant Manufacturer	:	<ul> <li>TEAC CORPORATION</li> <li>1-47 Ochiai, Tama-shi, Tokyo 206-8530,Japan</li> <li>1.Ya Horng Electronic Co., Ltd</li> <li>No. 35, Shalun, Jon Sha Village, Anding Dist., Tainan City 745, Taiwan</li> <li>2. Ya Horng (Dongguan) Electronic Co.,Ltd.</li> <li>Room 201, Building #9, No.84 Gaoyu South Road, Tangxia Town,Dong Guan, Guangdong, China</li> </ul>
Equipment Under Test	:	Analog Turntable
Model Number	:	TN-400BT-X
Brand Name	:	TEAC
Date of Test	:	September 16, 2022 ~ September 23, 2022

APPLICABLE STANDARD				
STANDARD TEST RESULT				
FCC Part 15 Subpart C AND ANSI C63.10: 2013	No non-compliance noted			

## **Statements of Conformity**

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Approved by:

Eric Huang Section Manager



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# 2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.247(a)	9.1	6dB BANDWIDTH	Pass
15.247(b)	9.2	MAXIMUM PEAK OUTPUT POWER	Pass
-	9.3	DUTY CYCLE	-
15.247(e)	9.4	POWER SPECTRAL DENSITY	Pass
15.247(d)	9.5	CONDUCTED SPURIOUS EMISSION	Pass
15.209(a)	9.6	RADIATED EMISSIONS	Pass
15.207(a)	9.7	POWERLINE CONDUCTED EMISSIONS	Pass
15.203	10	ANTENNA REQUIREMENT	Pass



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# 3. EUT DESCRIPTION

## **3.1 DESCRIPTION OF EUT & POWER**

Product Name	Analog Turntable
Model Number	TN-400BT-X
Brand Name	TEAC
Received Date	September 16, 2022
Reported Date	October 04, 2022
Operating Frequency Range	GFSK(5.2) Mode: 2402MHz~2480MHz
Transmit Power	GFSK(4.0) Mode: -3.02dBm (0.499mW) GFSK(5.2) Mode: -2.96dBm (0.505mW)
Channel Spacing	GFSK(5.2) Mode: 2 MHz
Channel Number	GFSK(5.2) Mode: 40 Channels
Transmit Data Rate	GFSK(4.0) Mode: 1 Mbps GFSK(5.2) Mode: 2 Mbps
Type of Modulation	GFSK
Antenna Type	Manufacturer: BRITO TECHNOLOGY Type: PCB Antenna Model: WF-EM-1510-0067-A (WF0EM12-I080) Gain: 2.31 dBi
Power Source	DC 12V (Powered by adapter)
Firmware Version	PC15P032
Software Version	N/A

### **Power Adapter :**

Manufacturer	Model No.	Power Input	Power Output
GOLDEN PROFIT	GPE053A-V120050-Z	100~240V~ 50/60Hz 0.2A	12Vdc 0.5A 6.0W Max

#### **REMARK:**

- 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- This submittal(s) (test report) is intended for FCC ID: <u>XEG-TN400BT-X</u> 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 manual.



# 4. DESCRIPTION OF TEST MODES

The EUT is a Analog Turntable.

The RF Chip is manufactured by BRITO TECHNOLOGY

The antenna peak gain 2.31 dBi (highest gain) were chosen for full testing.

## GFSK(5.2) mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

GFSK(5.2) mode: 1Mbps long data rates (worst case) were chosen for full testing.

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# 5. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 and FCC CFR 47 15.207, 15.209 and 15.247 and KdB 558074.

# 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.)
- ⊠ No. 168, Ln. 523, Sec. 3, Zhongzheng Rd., Rende Dist., Tainan City 717, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.10: 2013 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, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors 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 accreditation body 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				



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# **6.5 MEASUREMENT EQUIPMENT USED**

### For §9.7

Chamber 1166 Room (Radiation Test)						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	08/29/2022	08/28/2023	
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 Attenator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A021306 & AT-N0682	10/07/2021	10/06/2022	
Cable	EMCI	EM102-KMKM	CB1166-01	06/20/2022	06/19/2023	
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/18/2022	03/17/2023	
EMI Test Receiver	R&S	ESCI 7	100856	06/21/2022	06/20/2023	
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	08/11/2022	08/10/2023	
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-788(98006)	04/19/2022	04/18/2023	
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	Com-Power	PAM-840A	461378	06/28/2022	06/27/2023	
Software	Excel(ccs-o6-2020 v1.1) , e3(v6.101222)					
For §9.1~9.6						

Chamber 1166 Room (Conducted Test)						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	08/11/2022	08/10/2023	
SMA Cable+10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/28/2022	01/27/2023	
Software	Excel(ccs-o6-2020 v1.1)					

## For §9.8

Conducted Emission room #1							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due		
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	07/15/2022	07/14/2023		
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(v6.101222)				



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# 7. CALIBRATION AND UNCERTAINTY

# 7.1 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.

# 7.2 MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 9kHz~30MHz Test Site : CB1166	±2.7dB
Radiated Emission, 30 MHz ~1GHz Test Site : CB1166	±3.76dB
Radiated Emission, 1GHz ~18GHz Test Site : CB1166	±4.43dB
Radiated Emission, 18GH~26.5GHz Test Site : CB1166	±4.79dB
Radiated Emission, 26.5GH~40GHz Test Site : CB1166	±4.72dB
Power Line Conducted Emission, 9kHz~30MHz	±1.83dB
Band Width	0.025%
Peak Output Power MU	±1.9dB
Band Edge MU	±0.264dBuV
Channel Separation MU	±361.69Hz
Duty Cycle MU	±0.2%
Frequency Stability MU	±0.493Hz
Temperature	±0.5
Humidity	±3%

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

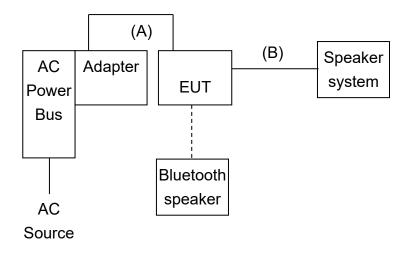


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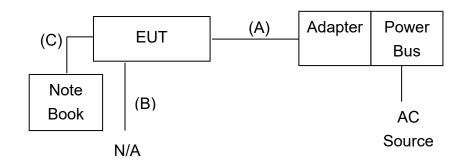
# 8. SETUP OF EQUIPMENT UNDER TEST

# **8.1 SETUP CONFIGURATION OF EUT**

EMI



RF





# **8.2 SUPPORT EQUIPMENT**

## For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Speaker System	T.C.STAR	TCS2285	DOC	N/A
2	Bluetooth speaker	KINYO	BTS-672	N/A	N/A

No.	Signal cable desc	ription
А	DC Power Cable	Unshielded, 1.6m 1 pcs.
В	Audio	Shielded, 0.7m 1 pcs.

### For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Note Book	Acer	Z5WE1	N/A	Unshielded, 1.8m 1 pcs with 1 core

No.	Signal cable description		
А	DC Power	Unshielded, 1.5m 1 pcs.	
В	Audio	Shielded, 0.8m 1 pcs.	
С	USB	Shielded, 1.8m 1 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



Report No.: TMTN2203000304NR **8.3 EUT OPERATING CONDITION RF** Setup 1. Set up all computers like the setup diagram. 2. The "Blue Test 3 V3.3.9.1137" software was used for testing 3. Choose Transport "DEBUG" and Device "USB DBG(106)" BT1.0 \ 3.0 TX Mode: PACKET TX Channel 1~5: 0,39,78 GFSK(DH1): Packet Type:DH1 > Packet Length 27 Power(0-9):6 GFSK(DH3): Packet Type:DH3 > Packet Length 183 Power(0-9): 6 GFSK(DH5): Packet Type:DH5 > Packet Length 339 Power(0-9): 6 8-DPSK(3DH1): Packet Type:3DH1 > Packet Length 83 Power(0-9): 6 8-DPSK(3DH3): Packet Type:3DH3 > Packet Length 552 Power(0-9): 6 8-DPSK(3DH5): Packet Type:3DH5 > Packet Length 1021 Power(0-9): 6 **RX Mode:** 

PACKET TX

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## TX Mode:

BLE TEST TX Channel : 0,20,39 (0-39) Length : 37 Bit pattern : Pseudo-rdm 9 PHY : 1M (2M)

## **RX Mode:**

BLE TEST RX Channel : 0 (0-39) PHY : 1M (2M)

- 4. All of the function are under run.
- 5. Start test.

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# 9. APPLICABLE LIMITS AND TEST RESULTS

# 9.1 6dB BANDWIDTH

### <u>LIMIT</u>

§ 15.207(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

### 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 6 dB relative to the maximum level measured in the fundamental emission.



### TEST RESULTS

No non-compliance noted.

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

### GFSK(4.0) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	721.00	500	PASS
Middle	2442	710.00	500	PASS
High	2480	709.00	500	PASS

**NOTE :** 1. At finial test to get the worst-case emission at1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

### GFSK(5.2) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	1275.00	500	PASS
Middle	2442	1270.00	500	PASS
High	2480	1260.00	500	PASS

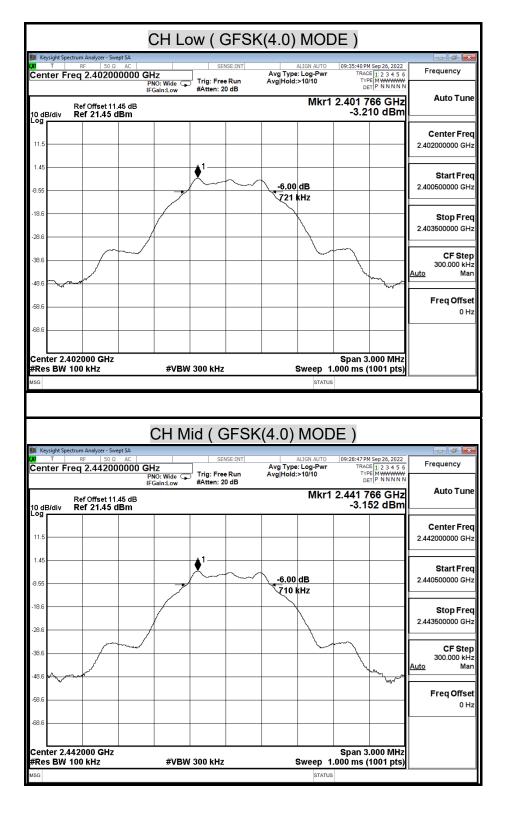
**NOTE :** 1. At finial test to get the worst-case emission at1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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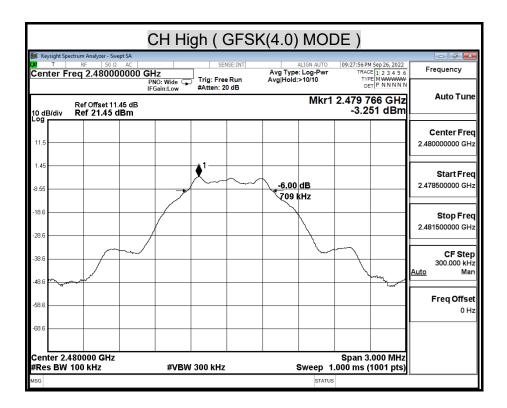


## 6dB BANDWIDTH ( GFSK(4.0) MODE)





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## 6dB BANDWIDTH ( GFSK(5.2) MODE)

			l Low ( GFS	\ /	/	
UT		Ω AC	SENSE:INT	ALIGN AUTO	09:19:45 PM Sep 26, 2022	Frequency
Center F	req 2.4020	100000 GHz PNO: W	Vide 🕞 Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN	Trequency
		IFGain:	Low #Atten: 20 dB	Mkr1	2.401 505 GHz	Auto Tune
10 dB/div	Ref Offset 1 Ref 21.45				-3.200 dBm	
11.5						Center Free
1.45			<b>∮</b> 1			2.402000000 GHz
-8.55			_ <del>}%3</del> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		-9.20 dBm	
-18.6			,			Start Free
-28.6						2.399500000 GH
-48.6	~	<u> </u>				
-58.6						Stop Fred 2.404500000 GH:
-68.6						
	402000 GH		#) (BW) 000 1-11-	<b>9</b>	Span 5.000 MHz	CF Step
#Res BW		×	#VBW 300 kHz	-	000 ms (1001 pts)	500.000 kH: <u>Auto</u> Mar
MKR MODE T 1 Ν 1 2 Δ3 1	1 f 1 f (Δ)	2.401 505 GH	Iz -3.200 dBm	UNCTION FUNCTION WIDTH		
2 Δ3 1 3 F 1 4	f	1.275 Mi 2.401 365 GH	Hz (Δ) -0.229 dB Hz -9.276 dBm			Freq Offse
5 6					E	0 H:
7 8						
9						
11						
11		Cŀ		status K(5.2) MOD	) PE )	
11 Keysight Spr T		wept SA Ω AC	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022	1
11 SG Keysight Sp 4 T	RF 50	wept SA Ω AC 1000000 GHz		K(5.2) MOD		Frequency
11 Keysight Sp T Center F 10 dB/div	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB		K(5.2) MOD Avg Type: Log-Pwr Avg Hold:>10/10	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M	Frequency
11 Keysight Sp X T Center F	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Avg Type: Log-Pwr Avg Hold:>10/10	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNN 2.441 505 GHz	Auto Tune
11       ISG       Keysight Sp       Z       T       Center F       10 dB/div	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Avg Type: Log-Pwr Avg Hold:>10/10	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	Frequency Auto Tune Center Freq
11 ISG II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II II	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNN 2.441 505 GHz	Frequency Auto Tune Center Freq
11 SG Keysight Sp X T Center F 10 dB/div C9 11.5 1.45 8.55 -18.6	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	Frequency Auto Tune Center Freq 2.44200000 GH; Start Freq
11	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	Frequency Auto Tune Center Freq 2.44200000 GH; Start Freq
11	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	Frequency Auto Tune Center Freq 2.44200000 GH: Start Freq 2.439500000 GH:
11 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	ſ
11	RF 50	wept SA Ω AC   000000 GHz PNO: W IFGain: 1.45 dB	H Mid ( GFS	K(5.2) MOD Aug Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 2.441 505 GHz -3.149 dBm	Frequency Auto Tune Center Freq 2.44200000 GH Start Freq 2.439500000 GH Stop Freq
11 SG Keysight Sp T Center F Center F 10 dB/div C9 11.5 1.45 8.65 -18.6 -28.6 -38.6 -58.6 -68.6 Center 2. #Res BW	RF 0ffset 1 Ref 0ffset 1 Ref 21.45	wept SA $\Omega$ AC 1000000 GHz PNO: W IFGain: 11.45 dB dBm 2	H Mid ( GFS SENSE:INT) Wide Trig: Free Run #Atten: 20 dB	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency           Auto Tune           Center Freq           2.442000000 GH           Start Freq           2.439500000 GH           Stop Freq           2.444500000 GH           CF Step           500.000 kH
11	Ref Offset 1 Ref Offset 1 Ref 21.45	wept SA Ω AC 1000000 GHz PNO: W IFGain: 1.45 dB dBm 2 2 2 2.441 505 GH	H Mid ( GFS	K(5.2) MOD Avg Type: Log-Pwr Avg Hold:>10/10 Mkr1	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm	Frequency           Auto Tune           Center Frequency           2.442000000 GH:           Start Frequency           2.439500000 GH:           Stop Frequency           2.444500000 GH:           CF Step 500.000 kH:
11 ISG Keysight Sp T Center F 10 dB/div 11.5 1.45 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .68.6 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7 .78.7	Ref Offset 1 Ref Offset 1 Ref 21.45	wept SA $\Omega$ AC 1000000 GHz PNO: W IFGain: 1.45 dB dBm c z z	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency Auto Tune Center Free 2.44200000 GH: Start Free 2.439500000 GH: Stop Free 2.444500000 GH: CF Step 500.000 kH: Auto Mar
11           ISG	Ref Offset 1 Ref 21.45	wept SA Ω AC 1000000 GHz PNO: W IFGain: 1.45 dB dBm 2441 505 GH 1.270 MI	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency           Auto Tune           Center Frequency           2.442000000 GH:           Start Frequency           2.439500000 GH:           Stop Frequency           2.444500000 GH:           CF Step 500.000 kH:
11	Ref Offset 1 Ref 21.45	wept SA Ω AC 1000000 GHZ PNO: W IFGain: 1.45 dB dBm 2441 505 GH 1.270 MF	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency Auto Tune Center Free 2.44200000 GH: Start Free 2.439500000 GH: Stop Free 2.444500000 GH: CF Step 500.000 kH: Auto Mar
11	Ref Offset 1 Ref 21.45	wept SA Ω AC 1000000 GHZ PNO: W IFGain: 1.45 dB dBm 2441 505 GH 1.270 MF	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency Auto Tune Center Freq 2.442000000 GH Start Freq 2.439500000 GH Stop Freq 2.444500000 GH CF Step 500.000 kH Auto Maa
11	Ref Offset 1 Ref 21.45	wept SA Ω AC 1000000 GHZ PNO: W IFGain: 1.45 dB dBm 2441 505 GH 1.270 MF	H Mid ( GFS	K(5.2) MOD	09:24:59 PM Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE MWWWW DET P NNNN 2.441 505 GHz -3.149 dBm -9.15 dbm -9.15 dbm -9.15 dbm -9.000 MHz 000 ms (1001 pts)	Frequency Auto Tune Center Free 2.44200000 GH: Start Free 2.439500000 GH: Stop Free 2.444500000 GH: CF Step 500.000 kH: Auto Mar



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	CH High ( GF	<sup>-</sup> SK(5.2) MOI	DE)	
Keysight Spectrum Analyzer - Sv T RF 50 S	2 AC SENSE:IN	T ALIGN AUTO	09:26:41 PM Sep 26, 2022	Frequency
enter Freq 2.4800	PNO: Wide Trig: Free Run IFGain:Low #Atten: 20 dB		TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	
Ref Offset 1 dB/div Ref 21.45		Mkr1	2.479 505 GHz -3.280 dBm	Auto Tu
g 1.5	<u> </u>			Center Fre
45 55		2Δ3	-9.28 dBm	2.48000000 G
1.6				Start Fro
1.6				2.477500000 G
.6				Stop Fr
1.6				2.482500000 G
enter 2.480000 GHz			Span 5.000 MHz	CF Ste
es BW 100 kHz	#VBW 300 kHz	Sweep 1 FUNCTION FUNCTION WIDTH	.000 ms (1001 pts)	500.000 kl <u>Auto</u> M
N 1 f 2 Δ3 1 f (Δ) 3 F 1 f	2.479 505 GHz -3.280 dBm 1.260 MHz (Δ) -0.062 dB 2.479 375 GHz -9.281 dBm			Freq Offs
	2.4/9 3/3 GHZ -9.261 dBm			01
5 7 3				
1				



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# 9.2 MAXIMUM PEAK OUTPUT POWER

### <u>LIMIT</u>

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST SETUP





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### TEST PROCEDURE

The tests were performed in accordance with KDB 558074 9.1.1

#### 9.2.1 Measurement Procedure PK2:

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.

#### **Average Power**

Connect the EUT to power meter, set the center frequency of the power meter to the channel center frequency.

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 ≥ [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.



### TEST RESULTS

No non-compliance noted.

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

#### GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-3.074	30.00	PASS
Middle	2442	-3.019	30.00	PASS
High	2480	-3.145	30.00	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	-3.033	30.00	PASS
Middle	2442	-2.963	30.00	PASS
High	2480	-3.122	30.00	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.



# Average Power Data

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Rev.:	00

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

## GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-3.51
Middle	2442	-3.44
High	2480	-3.58

# GFSK(5.2) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-3.59
Middle	2442	-3.55
High	2480	-3.67

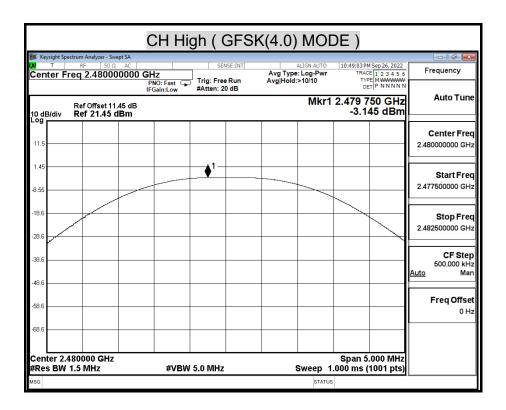


## MAXIMUM PEAK OUTPUT POWER ( GFSK(4.0) MODE)

		CH	Low (	GFSł	K(4.0)	MOE	DE)		
	ectrum Analyzer - Swept SA			ENCLIPT	1 .	LICN AUTO	10:42:41.2	M Cop 26, 2022	
	RF 50 Ω AC	00 GHz		ENSE:INT	Avg Type:		TRA	M Sep 26, 2022	Frequency
10 dB/div	Ref Offset 11.45 d Ref 21.45 dBn	PNO: Fas IFGain:Lo dB			Avg Hold:		2.402 2	245 GHz 74 dBm	Auto Tune
	Kei 21.45 dBii								
11.5									Center Free 2.402000000 GH
11.5									2.40200000 GH
1.45				<b>1</b> -					Otort From
0.55									Start Free 2.399500000 GH
-8.55									
18.6									Stop Free
									2.404500000 GH
28.6									
-38.6									CF Step 500.000 kH
									Auto Mar
-48.6				1					
-58.6									Freq Offse
				1					0 H:
-68.6				1					
	402000 GHz 1.5 MHz	#	VBW 5.0 MH	7		ween 1		.000 MHz (1001 pts)	
<b>NICO DI</b>	1.0 11112	"	- Dif 0.0 milli	-		meep i		1001 013)	
ISG			N 4: -1 / /			STATUS			
ISG			Mid (	GFSk	(4.0)				
ISG ISG Keysight Sp X	pectrum Analyzer - Swept SP RF 50 Ω AC	A C			4		)E)	M Sep 26, 2022	Frequency
SG Keysight Sp 4 T	vectrum Analyzer - Swept SA	a 00 GHz PNO: Fas	st 🕞 Trig: Fr	ense:INT			)E)	M Sep 26, 2022 E 1 2 3 4 5 6 PE M WWWWW	[
isg Ø Keysight Sp Ø T Center F	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st 🕞 Trig: Fr	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441	E 1 2 2 4 5 6	Frequency
isg Keysight Sp T Center F	vectrum Analyzer - Swept S2 RF S0 Ω AC Freq 2.4420000	A C OO GHz PNO: Fas IFGain:Lo dB	st 🕞 Trig: Fr	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun
Keysight Sp T Center F O dB/div O dB/div	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st 🕞 Trig: Fr	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free
Keysight Sp T Center F O dB/div O dB/div	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free
Keysight Sp T Center F O dB/div O S 11.5	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st 🕞 Trig: Fr	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Fre 2.442000000 GH
Keysight Sp T Center F 11.5 1.45	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free 2.44200000 GH
Keysight Sp T Center F 11.5 1.45	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free 2.44200000 GH
ISG ISG Keysight Sp X	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free 2.44200000 GH Start Free 2.43950000 GH
ISG Keysight Sp X T Center F 10 dB/div 0 dB/div 11.5 1.45 1.45 1.45 1.45	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency Auto Tun Center Free 2.44200000 GH Start Free 2.43950000 GH
ISG Keysight Sp X T Center F 10 dB/div 0 dB/div 11.5 1.45 1.45 1.45 1.45	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Freq           2.442000000 GH           Start Freq           2.439500000 GH           Stop Freq           2.444500000 GH
ItsG         ItsG           ItsG         T           ItsG         T           ItsG         ItsG	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Free           2.442000000 GH           Start Free           2.439500000 GH           Stop Free           2.444500000 GH           CF Step           500.000 kH
Keysight Sp           0         dB/div           00         dB/	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Free           2.442000000 GH           Start Free           2.439500000 GH           Stop Free           2.444500000 GH           CF Step
Keysight Sp           0         dB/div           00         dB/	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Fre           2.442000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.444500000 GH           CF Step           500.000 kH           Auto Tun
III.5 11.5 11.5 12.6 13.6 13.6 14.6 14.6 15.6 16.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Free           2.442000000 GH           Start Free           2.439500000 GH           Stop Free           2.444500000 GH           CF Step           500.000 kH
Keysight Sp           Image: Center F           Center F           Image:	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Fre           2.442000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.444500000 GH           CF Step           500.000 kH           Auto Mai           Freq Offse
Keysight Sp           0         dB/div           ************************************	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE) 10:45:35 P TRAI TY D 2.441		Frequency           Auto Tun           Center Fre           2.442000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.444500000 GH           CF Step           500.000 kH           Auto Mai           Freq Offse
SG Keysight Sp Q T Center F 0 dB/div °S 11.5 1.45 8.55 18.6 28.6 48.6 68.6 68.6	Ref Offset 11.45 d	A C OO GHz PNO: Fas IFGain:Lo dB	st Trig: Fr #Atten:	ense:INT	Avg Type:	MOC ALIGN AUTO : Log-Pwr >10/10	DE)	760 GHz 19 dBm	Frequency           Auto Tun           Center Fre           2.442000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.444500000 GH           CF Step           500.000 kH           Auto Mai           Freq Offse
sc Keysight Sp T Center F 0 dB/div 0 dD	RF 50Ω AG FC 50Ω AG FC 2.4420000 Ref Offset 11.45 α	A CONCRETE ON CONC	st Trig: Fr #Atten:	ENSE:INT	Avg Type Avg Hold:	MOE LIGN AUTO LOGP-Pwr >10/10 Mkr1	DE)		Frequency           Auto Tun           Center Fre           2.442000000 GH           Start Fre           2.439500000 GH           Stop Fre           2.444500000 GH           CF Step           500.000 kH           Auto Mai           Freq Offse



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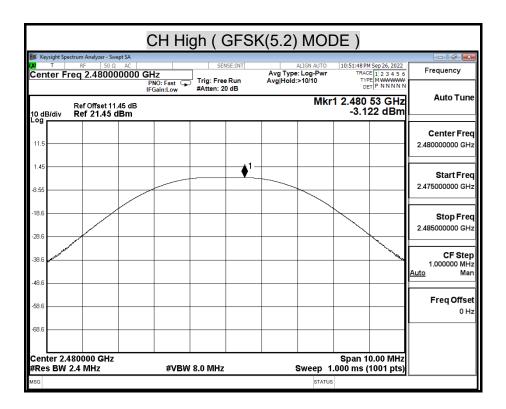


# MAXIMUM PEAK OUTPUT POWER ( GFSK(5.2) MODE)

1			(	CH Lo	ow ( 0	GFSk	K(5.2)	MOE	DE)		
🍺 Keysig	ght Spectrun	n Analyzer - Sw	ept SA								- 5 💌
<b>LXI</b> T		RF 50 Ω			SEI	NSE:INT		ALIGN AUTO	11:02:38 Pf	1 Sep 26, 2022	
Cente	er Freq	2.40200	00000 GH	NO: Fast 🕞	Trig: Free	e Run	Avg Type Avg Hold	e: Log-Pwr :>10/10	TYP	E 1 2 3 4 5 6 E M WWWW T P N N N N N	
			IF	Gain:Low	#Atten: 2				DE	T P N N N N N	
	D/	of Offset 11	45 dB					Mkr		47 GHz	Auto Tune
10 dB/c		ef 21.45 c							-3.0	33 dBm	
											Center Freq
11.5 —											2.402000000 GHz
1.45					<b></b> 1−						
											Start Freq
-8.55 —			/								2.397000000 GHz
-18.6			ſ						$\searrow$		Oton Erog
											<b>Stop Freq</b> 2.407000000 GHz
-28.6		/									2.407000000 GHZ
	and the second second									$\mathbf{X}$	
-38.6	N <sup>an</sup> an									Mr.	CF Step
-30.0											1.000000 MHz
											<u>Auto</u> Man
-48.6 —											
											Freq Offset
-58.6			1	1			1	1			0 Hz
-68.6											
	- 0 400								0	0.00 MU	
	r 2.402 BW 2.4	000 GHz		#\(D)A	( 8.0 MHz			Sweep 1		0.00 MHz	
	DVV 2.4			#VDV						1001 pts)	
MSG								STATUS	6		
1											
				сн м	lid ( C	SESK	(5.2)	MOF			
				СН М	lid ( G	GFSK	(5.2)	MOE	DE)		
		n Analyzer - Swo	ept SA	СН М						10 26 2022	
LXI T		RF 50 Ω	ept SA AC				-	ALIGN AUTO	10:58:24 Pf	1 Sep 26, 2022 E 1 2 3 4 5 6	
LXI T		RF 50 Ω	ept SA AC 00000 GH P	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	-	ALIGN AUTO	10:58:24 PI TRAC TYF	E 1 2 3 4 5 6	Frequency
LXI T		RF 50 Ω	ept SA AC 00000 GH P	Hz	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE	E 1 2 3 4 5 6 E MWWWW T P NNNNN	Frequency
Cente	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency
Cente Cente	er Freq	<sup>ε 50 Ω</sup> 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E MWWWW T P NNNNN	Frequency
Cente	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune
Cente Cente 10 dB/c Log	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq
Cente Cente	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune
10 dB/c Log	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq
Cente Cente 10 dB/c Log	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	SEI	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz
10 dB/c Log	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq
10 dB/c Log	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz
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10 dB/c Log 1.45	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz
10 dB/c 10 dB/c 11.5 1.45 -8.55	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz 2.437000000 GHz Stop Freq
10 dB/c Log 11.5 -8.55	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz
10 dB/c 10 dB/c 11.5 1.45 -8.55	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.437000000 GHz Stop Freq
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10 dB/c Log 11.5 -8.55 -18.6	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz CF Step 1.00000 MHz
10 dB/c 10 dB/c 11.5 -8.55 -18.6 -28.6 -38.6	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.43700000 GHz Stop Freq 2.44700000 GHz CF Step
10 dB/c Log 11.5 -8.55 -18.6 -28.6	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz CF Step 1.00000 MHz
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Image: Weight of the second	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man
11.5 -18.6 -28.6 -48.6 -58.6	er Freq	EF 50 Ω 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYF DE <b>1 2.441</b>	E 1 2 3 4 5 6 E M WWWW F P NNNNN 55 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.43700000 GHz CF Step 1.00000 MHz Auto Man Freq Offset
Dig         T           Cente         1           10.dB/c         1           11.5         -           -8.55         -           -18.6         -           -28.6         -           -38.6         -           -48.6         -           -68.6         -	Rediv R	er   50 2.44200	ept SA AC 00000 GH P IF .45 dB	<b>− IZ</b> NO: Fast ⊂	Trig: Free #Atten: 2	NSE:INT	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	10:58:24 PI TRAC TYP D 1 2.441 -2.9	55 GHz 63 dBm	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz 1.000000 MHz Auto Man
Image: matrix of the second secon	er 2.442	e   50 2.44200	ept SA AC 00000 GH P IF .45 dB	Hz NO: Fast Gein:Low	↓ SEI Trig: Free #Atten: 2	NSE:INT	Avg Type Avg Hold	ALIGN AUTO	10:58:24 PP TRAC TYP 1 2:441 -2:9	55 GHz 63 dBm	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz 1.000000 MHz Auto Man
10 dB/cc 10 dB/cc 11.5 -1.45 -28.6 -38.6 -48.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -68.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.6 -78.	Rediv R	e   50 2.44200	ept SA AC 00000 GH P IF .45 dB	Hz NO: Fast Gein:Low	Trig: Free #Atten: 2	NSE:INT	Avg Type Avg Hold	ALIGN AUTO	10:58:24 PP TRAC TYP 1 2:441 -2:9	55 GHz 63 dBm	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.43700000 GHz 2.44700000 GHz 1.00000 MHz Auto Man



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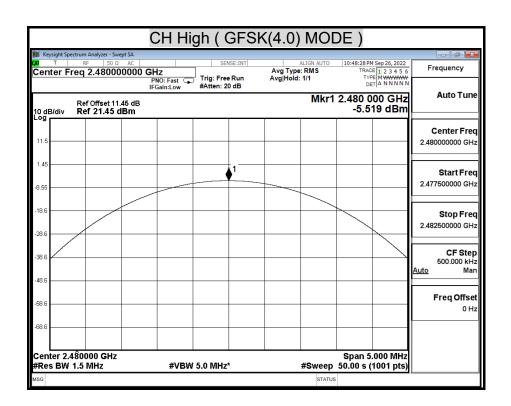
### MAXIMUM Average OUTPUT POWER ( GFSK(4.0) MODE)

1		CH Low ( GFS	K(4.0) MOE	DE)	
🎉 Keysight Sp	ectrum Analyzer - Swept SA				- 5 -
ເ <mark>¤</mark> ⊺ Center F	RF 50 Ω AC req 2.402000000 G	HZ PNO: Fast C Trig: Free Run	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:43:06 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW	Frequency
10 dB/div	ا Ref Offset 11.45 dB Ref 21.45 dBm	FGain:Low #Atten: 20 dB		2.401 995 GHz -5.446 dBm	Auto Tune
11.5					Center Freq 2.402000000 GHz
-8.55		<b>1</b>			Start Freq 2.399500000 GHz
-18.6					<b>Stop Freq</b> 2.404500000 GHz
-38.6					CF Step 500.000 kHz <u>Auto</u> Man
-48.6					Freq Offset 0 Hz
-68.6 Center 2.4 #Res BW	402000 GHz	#VBW 5.0 MHz*	#Sween	Span 5.000 MHz	
	1.3 MINZ	#VDW 3.0 IVINZ"	#Sweep	50.00 s (1001 pts)	
		CH Mid ( GFSI		. — `	
📖 Keysight Sp	ectrum Analyzer - Swept SA		K(4.0) MOL		
L <mark>XI</mark> T	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G	HZ PNO: Fast	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6	Frequency
Center F	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G	Hz	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022	Frequency
Center F	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G I Ref Offset 11.45 dB	HZ PNO: Fast	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency
Center F Center F 10 dB/div	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G I Ref Offset 11.45 dB	HZ PNO: Fast	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency Auto Tune Center Freq
10 dB/div 10 dB/div 11.5 1.45	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G I Ref Offset 11.45 dB	HZ Trig: Free Run FGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq
Image: Center F           10 dB/div           11.6           1.45           -18.6           -28.6           -38.6	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G I Ref Offset 11.45 dB	HZ Trig: Free Run FGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.439500000 GHz Stop Freq
10 dB/div 10 dB/div 11.5 1.45 -18.6 -28.6	ectrum Analyzer - Swept SA RF 50 Ω AC req 2.442000000 G I Ref Offset 11.45 dB	HZ Trig: Free Run FGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz 2.439500000 GHz 2.439500000 GHz 2.444500000 GHz CF Step 500.000 kHz
Image: Center F           10 dB/div           11.5           1.45           -8.65           -18.6           -28.6           -38.6           -68.6           -68.6	ectrum Analyzer - Swept SA RF   50 0, AC   req 2.4420000000   Ref Offset 11.45 dB Ref 21.45 dBm	HZ Trig: Free Run FGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:47:02 PM Sep 26, 2022 TRACE [] 2 3 4 5 6 TYPE M WWWW DET A NNN N 2.441 965 GHz -5.376 dBm	Frequency Auto Tune Center Freq 2.442000000 GHz 2.439500000 GHz 2.439500000 GHz 2.444500000 GHz 2.444500000 GHz CF Step 500.000 kHz Auto Man
Image: system         T         Center F           10 dB/div         11.5         1.45           11.5        655        78.6          78.6        38.6        48.6          68.6        68.6        68.6	ectrum Analyzer - Swept SA RF 50 0 AC req 2.442000000 G I Ref Offset 11.45 dB Ref 21.45 dBm I I I I I I I I I I I I I	HZ Trig: Free Run FGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1  Mkr1	10:47:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 2.441 965 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz 2.439500000 GHz 2.439500000 GHz 2.444500000 GHz 2.444500000 GHz CF Step 500.000 kHz Auto Man



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Report No.: TMTN2203000304NR





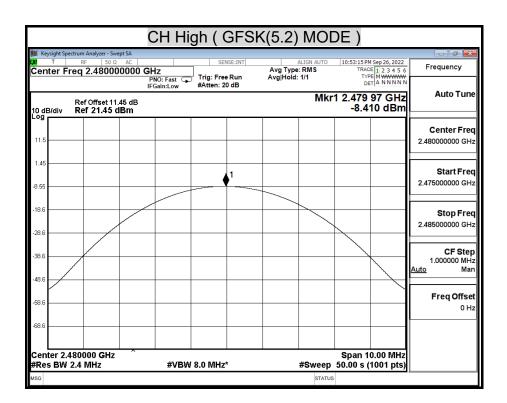
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### MAXIMUM Average OUTPUT POWER ( GFSK(5.2) MODE)

		CH Lo	ow ( GFSI	K(5.2) MOE	DE)	
🎉 Keysight Sp	ectrum Analyzer - Swept SA					
	RF 50 Ω AC		SENSE:INT	ALIGN AUTO Avg Type: RMS	11:01:22 PM Sep 26, 2022	Frequency
Center F	req 2.40200000	PNO: Fast	Trig: Free Run	Avg Hold:>1/1	TRACE 1 2 3 4 5 6 TYPE MWWWW DET A N N N N N	
		IFGain:Low	#Atten: 20 dB			Auto Tune
	Ref Offset 11.45 dB			Mkr	1 2.401 96 GHz	Auto Turie
10 dB/div Log	Ref 21.45 dBm				-8.331 dBm	
3						Center Freq
11.5						2.402000000 GHz
						2.40200000 0112
1.45						
			<b>1</b>			Start Freq
-8.55						2.397000000 GHz
-18.6						Stop Freq
						2.407000000 GHz
-28.6				+ +		
						CF Step
-38.6						1.000000 MHz
-48.6						<u>Auto</u> Man
-58.6						Freq Offset
						0 Hz
-68.6						
Conton 2	402000 GHz				Chan 10 00 MHz	
#Res BW		#VBW	/ 8.0 MHz*	#Sweep	Span 10.00 MHz 50.00 s (1001 pts)	
MSG				STATUS		
		CH M	lid ( GFSł	K(5.2) MOE	DE)	
💓 Keysight Sp	ectrum Analyzer - Swept SA	CH M				
LXI T	RF 50 Ω AC		IId ( GFSI		10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6	Frequency
<b>IXI</b> T		) GHz PNO: Fast	SENSE:INT	ALIGN AUTO	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6	
<b>IXI</b> T	RF 50 Ω AC	) GHz	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET A N N N N N	
⊠ ⊤ Center F	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency
<b>IXI</b> T	RF 50 Ω AC Treq 2.442000000	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET A N N N N N	Frequency
Warter F Center F 10 dB/div	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency
Warter F Center F 10 dB/div	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune
Center F	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq
02 TENDER F	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz
Center F	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq
Center F	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz
10 dB/div Log 11.5 1.45	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq
10 dB/div Log 11.5	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz Stop Freq
10 dB/div 10 dB/div 10 dB/div 11.5 1.45 -8.55 -18.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz
10 dB/div Log 11.5 1.45	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz Stop Freq
10 dB/div 10 dB/div 11.5 1.45 -8.65 -28.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.437000000 GHz Stop Freq 2.447000000 GHz
10 dB/div 10 dB/div 10 dB/div 11.5 1.45 -8.55 -18.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz
10 dB/div 10 dB/div 11.5 1.45 -8.65 -28.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.437000000 GHz Stop Freq 2.447000000 GHz
Image: Center F           10 dB/div           11.5           1.45           -8.55           -18.6           -28.6           -38.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz Stop Freq 2.447000000 GHz CF Step 1.000000 MHz Auto Man
Image: Center F           10 dB/div           11.5           1.45           -8.55           -18.6           -28.6           -38.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man
xy         T           Center F           10 dB/div           11.5           11.45          8.65          28.6          38.6          48.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz Stop Freq 2.447000000 GHz CF Step 1.000000 MHz Auto Man
xy         T           Center F           10 dB/div           11.5           11.45          8.65          28.6          38.6          48.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man
XX         T           Center F           10.dB/div           11.5           1.45           -8.55           -18.6           -28.6           -38.6           -48.6           -58.6	RF         50 Ω         AC           req 2.442000000         Ref Offset 11.45 dB	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man
XX         T           Center F           10.dB/div           11.5           1.45           -0.55           -18.6           -28.6           -38.6           -48.6           -66.6	RF         50 Q         AC           req         2.442000000           Ref Offset 11.45 dB           Ref 21.45 dBm	<b>) GHz</b> PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1	10:54:40 PM Sep 26, 2022 TRACE [] 2 3 4 5 6 TYPE M WWWWW 1 2.441 89 GHz -8.282 dBm	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man
Image: Center F           10 dB/div           11.5           1.45           -8.55           -18.6           -38.6           -48.6           -58.6           -68.6	RF         50 Q         AC           req 2.442000000         AC         AC           Ref Offset 11.45 dB         Ref 21.45 dBm         AC	) GHz PNO: Fast IFGain:Low	SENSE:INT Trig: Free Run #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1 Mkr	10:54:40 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET A NNNN 1 2.441 89 GHz	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset
Image: Center F           10 dB/div           11.5           1.45           -8.65           -8.66           -38.6           -48.6           -68.6           -68.6           Center 2.	Ref Offset 11.45 dB Ref 21.45 dBm	) GHz PNO: Fast IFGain:Low	SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 1/1 Mkr	110:54:40 PM Sep 26, 2022 TRACE [] 2 3 4 5 6 TYPE M WWWWW DET A NNNN N 1 2.441 89 GHz -8.282 dBm Span 10.00 MHz 50.00 s (1001 pts)	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.437000000 GHz 2.437000000 GHz 2.447000000 GHz CF Step 1.000000 MHz Auto Man



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# 9.3 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.

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

## GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	400.000	1	400	
Ton2		0	0	
Ton3			0	0.4
Тр				0.625

Ton	0.4
Tp(Ton+Toff)	0.625
Duty Cycle	0.64
Duty Factor	1.938

### GFSK(5.2) Mode

	us	Times	Ton	Total Ton time(ms)
Ton1	210.000	1	210	
Ton2		0	0	
Ton3			0	0.21
Тр				0.625

Ton	0.21
Tp(Ton+Toff)	0.625
Duty Cycle	0.336
Duty Factor	4.737

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## TEST PLOT

### Duty Cycle

	CH Low ( GF	SK(4.0) MOE	DE)				
Keysight Spectrum Analyzer - Swept SA           X         T         RF         50 Ω         AC           Center Freq 2.402000000	GHZ PNO: Fast ↔ Trig: Free Run	Avg Type: Log-Pwr	07:20:28 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency			
Ref Offset 11.45 dB 10 dB/div Ref 21.45 dBm	IFGain:Low #Atten: 20 dB		<sup>Det P</sup> NNNNN Mkr1 400.0 µs 54.00 dB	Auto Tune			
Log 11.5 1.45 -8.55	1Δ2			Center Freq 2.402000000 GHz			
-18.6				<b>Start Freq</b> 2.402000000 GHz			
-48.6 -58.6 -68.6	3∆4 Wnite	value number	untus unima	<b>Stop Freq</b> 2.402000000 GHz			
Center 2.402000000 GHz Res BW 1.0 MHz MKR MODE TRC SCL X	#VBW 3.0 MHz	Sweep 5	Span 0 Hz .000 ms (1001 pts) FUNCTION VALUE	CF Step 1.000000 MHz <u>Auto</u> Man			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	400.0 μs (Δ) 54.00 dB 1.110 ms -57.88 dBm 625.0 μs (Δ) 3.64 dB 1.110 ms -57.88 dBm			Freq Offset 0 Hz			
6 7 8 9 10 11							
MSG		STATUS	• •				
CH Mid ( GFSK(4.0) MODE )							
	CH Mid ( GF	SK(4.0) MOL	DE)				
Keysight Spectrum Analyzer - Swept SA	•	· /	•	- 6 -			
Image: Sectrum Analyzer - Swept SA         SA           Image: Solution Conter Freq 2.442000000         Solution Conter Freq 2.442000000	SENSE:IN	T ALIGN AUTO Avg Type: Log-Pwr	07:22:20 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N	Frequency			
24 T RF 50 Ω AC Center Freq 2.442000000 Ref Offset 11.45 dB 10 dB/div Ref 21.45 dBm	GHz PNO: Fast Trig: Free Run	T ALIGN AUTO Avg Type: Log-Pwr	07:22:20 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WAAAAAAAA	Frequency			
XI         T         RF         50.0         AC           Center Freq 2.442000000         Ref Offset 11.45 dB         Ac         Ac           10 dB/div         Ref Offset 11.45 dB         Ac         Ac         Ac           11.5         Ac         Ac         Ac         Ac         Ac	GHz PNO: Fast Trig: Free Run	T ALIGN AUTO Avg Type: Log-Pwr	07:22:20 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P NNNN	Frequency			
XI         T         RF         S0 R         AC           Center Freq 2.442000000         Ref Offset 11.45 dB         Ref Offset 11.45 dB         Ref Offset 11.45 dB           10 dB/div         Ref 21.45 dBm         Image: Compare the set of the set o	GHz PNO: Fast ↔ Trig: Free Run IFGain:Low #Atten: 20 dB	T ALIGN AUTO Avg Type: Log-Pwr	07:22:20 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P NNNN	Frequency Auto Tune Center Freq			
Image: square	GHz PNO: Fast ↔ Trig: Free Run IFGain:Low #Atten: 20 dB		07:22:20 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P NNNN	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq			
Ref         SO (2)         AC           Center Freq 2.442000000         Ref Offset 11.45 dB           Log         Ref Offset 11.45 dB           11.5         1.45           1.45	GHz PNO: Fast →→ IFGain:Low Trig: Free Run #Atten: 20 dB	T ALIGN AUTO Avg Type: Log-Pwr	07:22:00 M Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE WWWWWW DET P NNNN N SPACE P NNN N P P P P NNN N P P P P NNN N P P P P P P P P P P P P P P P P P P P	Frequency Auto Tune Center Freq 2.442000000 GHz Start Freq 2.442000000 GHz Stop Freq 2.442000000 GHz CF Step 1.000000 MHz			
T         RF         SO Q. AC           Center Freq 2.442000000         Ref Offset 11.45 dB           O dB/div         Ref 21.45 dBm           Instructure         Ref 21.42 dBm           Instructure         Ref 21.42 dBm           Instructure         Ref 21.42 dBm           Instructure         Ref 21.42 dBm           Instructure <th< td=""><td>GHz PNO: Fast →→ IFGain:Low 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2</td><td></td><td>07:22:00 M Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE WWWWWW DET P NNNN N SPACE P NNN N P P P P NNN N P P P P NNN N P P P P P P P P P P P P P P P P P P P</td><td>Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz Stop Freq 2.44200000 GHz CF Step</td></th<>	GHz PNO: Fast →→ IFGain:Low 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2		07:22:00 M Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE WWWWWW DET P NNNN N SPACE P NNN N P P P P NNN N P P P P NNN N P P P P P P P P P P P P P P P P P P P	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz Stop Freq 2.44200000 GHz CF Step			
Image: second	GHz PNO: Fast         Trig: Free Run #Atten: 20 dB           1Δ2         1           1Δ3Δ4         Μ           400.0 μs         (Δ)           400.0 μs         (Δ)	T ALIGN AUTO Avg Type: Log-Pwr	07:22:00 M Sep 26, 2022 TRACE [1 2 3 4 5 6 TYPE WWWWWW DET P NNNN N SPACE P NNN N P P P P NNN N P P P P NNN N P P P P P P P P P P P P P P P P P P P	Frequency Auto Tune Center Freq 2.44200000 GHz Start Freq 2.44200000 GHz 2.44200000 GHz CF Step 1.00000 MHz Auto Man Freq Offset			



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Keysight Sp T	ectrum Analyzer - RF 50	Swept SA		SENSI	INT	ALIGN AUTO	07:25:29 PM	Sep 26, 2022	-
enter F	req 2.480	000000 GI	Hz NO: Fast ↔	Trig: Free F		Type: Log-Pwr	TYPE	1 2 3 4 5 6 WWWWW	Frequency
			Gain:Low	#Atten: 20 d	IB			PNNNNN	Auto Tur
0 dB/div	Ref Offset Ref 21.4						ΔMkr1 40 52	.28 dB	
.og 11.5									0
1.45			<b>▲</b> 1Δ2						Center Fre 2.480000000 G
8.55									
18.6							+		Start Fr
28.6									2.480000000 G
38.6			34	4					
48.6	Wall	wyty _	- Miles	HMMN	whe	Villey	wnyth		Stop Fr
58.6		<b>7</b>			164.14				2.48000000 G
	.480000000 1.0 MHz	) GHz	#VBW	3.0 MHz		Sweep :	Sp 5.000 ms (1	an 0 Hz	CF St 1.000000 M
IKR MODE 1	RC SCL	Х		Y	FUNCTION	FUNCTION WIDTH			<u>Auto</u> M
1 Δ2 2 F	1 t (Δ) 1 t		00.0 μs (Δ) 215 ms	52.28 dl					
3 Δ4 4 F	1 t (Δ)	63	25.0 μs (Δ) 215 ms	2.71 dl -56.05 dBn	3				Freq Offs 0
5								E	0
7 8									
9									



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# Duty Cycle

CH Low ( GFSł	((5.2) MODE )
Keysight Spectrum Analyzer - Swept SA         SENSE:INT           L         T         RF         50.Ω         AC         SENSE:INT           Center Freq 2.402000000 GHz         FN0: Fast -→→         Trig: Free Run	ALIGN AUTO 07:30:59 PM Sep 26, 2022 Avg Type: Log-Pwr TRACE [1 2 3 4 5 5 TYPE WWWWW
IFGain:Low #Atten: 20 dB Ref Offset 11.45 dB 10 dB/div Ref 21.45 dBm	ΔΜkr1 210.0 μs 50.18 dB
	Сепter Freq 2.402000000 GHz
	Start Freq 2.40200000 GHz
-48.6	มหู่เก่า <b>ห</b> ู่หนู่หนุ่น ผู้เห็นไม่ได้เห็น ด้างให้หน้า <b>Stop Freq</b> 2.402000000 GHz
Center 2.402000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Mire Model Tricliscu x y Fut	Span 0 Hz         CF Step           Sweep 5.000 ms (1001 pts)         1.000000 MHz           CTION         FUNCTION WIDTH         FUNCTION VALUE
1         Δ2         1         t         Δ10.0 μs         Δ4         50.18 dB           2         F         1         t         655.0 μs         -53.82 dBm           3         Δ4         1         t         (Δ)         622.0 μs         (Δ)         -0.69 dB           4         F         1         t         655.0 μs         -53.82 dBm         -53.82 dBm           5           6         -53.82 dBm         -53.82 dBm         -53.82 dBm	FreqOffset
6 7 8 9 9 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	
11 	STATUS
CH Mid ( GFSł	
Keysight Spectrum Analyzer - Swept SA     T RF 50.02 AC SENSE:INT     Center Freq 2.442000000 GHz     Trig: Free Run     IFGenint ow     #Atten: 20 dB	ALIGN AUTO 07:27:45 PM Sep 26, 2022 Avg Type: Log-Pwr TRACE [1:2:3:4:5:6 TYPE[WWWWWW beTF PN NN N N
IFGain:Low #Atten: 20 dB Ref Offset 11.45 dB 10 dB/div Ref 21.45 dBm Log	ΔMkr1 210.0 μs 53.59 dB
11.5 1.45 -8.55	Center Freq 2.442000000 GHz
-18.6	Start Freq           2.442000000 GHz
-38.6	
-48.6 3∆4	Arythian Industrie Industries Industries Stop Freq 2.442000000 GHz
-48.6 -58.6 -58.6 -58.6 	Span 0 Hz         2.442000000 GHz           Sweep 5.000 ms (1001 pts)         1.000000 MHz
-48.6     -3Δ4       -58.6     -58.6       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -68.6     -48.4       -69.7     -48.4       -69.7     -58.7       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07       -69.7     -57.07	2.442000000 GHz Span 0 Hz Sweep 5.000 ms (1001 pts) 1.000000 MHz
-48.6     -3Δ4       -58.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -68.6     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744       -744     -744	Span 0 Hz         2.442000000 GHz           Sweep 5.000 ms (1001 pts)         1.000000 MHz           CTION         FUNCTION WIDTH           FUNCTION WIDTH         FUNCTION VALUE           Freq Offset



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Т	RF 50 G	vept SA		<u> </u>	SE:INT		) MOC	07:26:36 PM Sep	26,2022	Frequency
0 dB/div	Ref Offset 1 Ref 21.45	PN0 IFGa 1.45 dB	Z O:Fast ↔→ ain:Low	Trig: Free #Atten: 20		A19174	-	TYPE DET P	NNNNN	Auto Tur
			<b>1</b> Δ2	·1		 	-1 1-	-1		<b>Center Fre</b> 2.480000000 Gi
28.6										<b>Start Fr</b> 2.480000000 G
48.6 58.6 <mark>/↓µ.↓</mark> 58.6	htm.lewat <sup>u</sup>	harlydryddydd y	2 Warnen	1 3 <b>24.0000</b>	Aypen	Handan (ngina	494AMMAGAM	npopelitystyvia	włu	<b>Stop Fr</b> 2.48000000 G
enter 2. tes BW		GHz	#VBW	3.0 MHz			Sweep 5.0	Spai 000 ms (100 FUNCTION V2	<u> </u>	CF Ste 1.000000 M <u>Auto</u> M
1 Δ2 2 F 3 Δ4 4 F 5 6	1 t (Δ) 1 t 1 t (Δ) 1 t	1.45 625	.0 μs (Δ) 0 ms .0 μs (Δ) 0 ms	52.26 c -55.80 dB -6.59 c -55.80 dB	m iB					Freq Offs 0
7 8 9 10										



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# 9.4 POWER SPECTRAL DENSITY

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

§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### TEST SETUP



#### TEST PROCEDURE

The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05

#### 10.2 Method PKPSD (peak PSD):

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS bandwidth.
- 3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- 4. Set the VBW  $\geq$  3 x RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



# **TEST RESULTS**

No non-compliance noted.

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

# GFSK(4.0) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-18.68	8.00	-26.68	PASS
Middle	2442	-18.56	8.00	-26.56	PASS
High	2480	-18.61	8.00	-26.61	PASS

**NOTE** : 1. At finial test to get the worst-case emission at 1Mbps long.

2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

#### GFSK(5.2) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-22.13	8.00	-30.13	PASS
Middle	2442	-22.22	8.00	-30.22	PASS
High	2480	-22.26	8.00	-30.26	PASS

**NOTE**: 1. At finial test to get the worst-case emission at 1Mbps long.

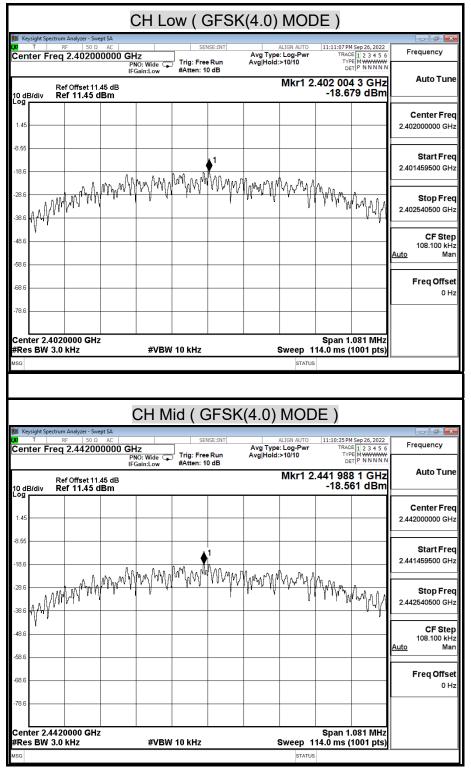
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

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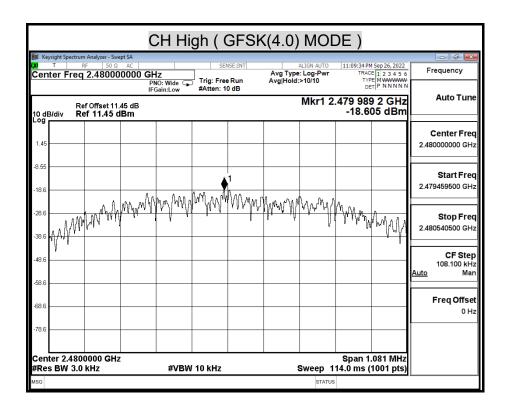
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#### POWER SPECTRAL DENSITY ( GFSK(4.0) MODE)





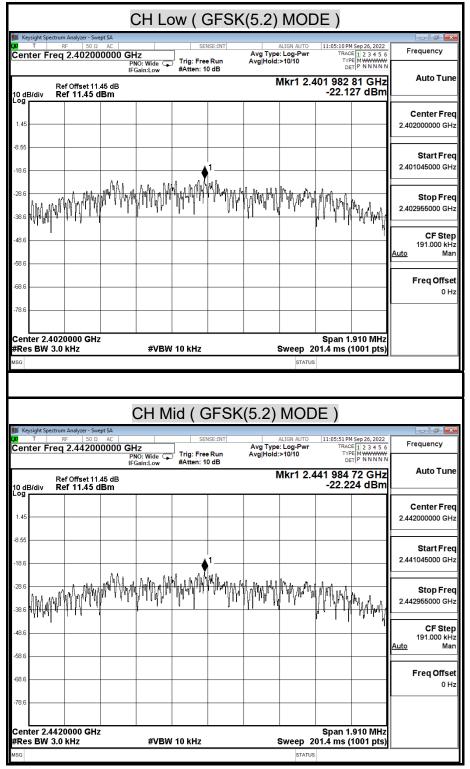
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# POWER SPECTRAL DENSITY ( GFSK(5.2) MODE)





#### Page: 45 / 100 Rev.: 00

CH High (GFSK(5.2) MODE) m Analyzer - Swept SA Center Freq 2.48000000 GHz PNO: Wide IFGain:Low #Atten: 10 dB 11:07:02 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N Frequency Avg Type: Log-Pwr Avg|Hold:>10/10 Mkr1 2.479 984 72 GHz -22.257 dBm Auto Tune Ref Offset 11.45 dB Ref 11.45 dBm 10 dB/div **Center Freq** 2.480000000 GH; 8.5 Start Freq 2.479045000 GH 18.1 Stop Freq 2.480955000 GHz 38.1 **CF Step** 191.000 kHz Man 48. Auto -58.1 Freq Offset 68.1 0 Hz 78 Span 1.910 MHz Sweep 201.4 ms (1001 pts) Center 2.4800000 GHz #Res BW 3.0 kHz #VBW 10 kHz SG STATUS



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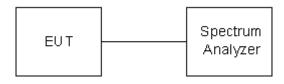
Report No.: TMTN2203000304NR

# 9.5 CONDUCTED SPURIOUS EMISSION

#### **LIMITS**

§ 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 100kHz <sup>,</sup> the video bandwidth is set to 300kHz.

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.

#### **TEST RESULTS**

No non-compliance noted.



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# TEST DATA

Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

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

		_	CH L	ow ( G	SFSk	K(4.0)	MO	DE)		
LXI T	RF         50 Ω           req         2.40200	AC 00000 GH P	NO: Wide 🔾				ALIGN AUTO e: Log-Pwr :>10/10	09:35:40 P TRAC TY	M Sep 26, 2022 CE 1 2 3 4 5 6 PE M WWWWW ET P N N N N N	Frequency
10 dB/div	Ref Offset 11 Ref 21.45 (	.45 dB	Gain:Low	#Atten: 20	db		Mkr1	2.401 7	766 GHz 10 dBm	
11.5										Center Freq 2.402000000 GHz
1.45 -8.55			7	<b>1</b>	$\sim$	-6.00 721				Start Freq 2.400500000 GHz
-18.6		,								<b>Stop Freq</b> 2.403500000 GHz
-38.6									hora and	CF Step 300.000 kHz <u>Auto</u> Man
-58.6									*****	Freq Offset 0 Hz
-68.6 Center 2. #Res BW	402000 GHz		#VB1	N 300 kHz			Sweep 1		.000 MHz (1001 pts)	
MSG							STATUS		,	
🎉 Keysight Sp <b>(X)</b> T	cectrum Analyzer - Sw RF 50 Ω 29 <b>Q 2.310000</b>	AC 000 GHz P	NO: Fast 🔾	Trig: Free			ALIGN AUTO	12:04:04 A TRAC TY	M Sep 27, 2022 CE 1 2 3 4 5 6 PE M WWWWW ET P N N N N	·
Keysight Sp XX ⊤ Start Fre 10 dB/div	RF 50 Ω	AC 000 GHz P IF			Run	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	12:04:04 A TRAI TY D .401 77	CE 1 2 3 4 5 6 PE M WWWW	Frequency
⊯ Keysight Sp (X) ⊤ Start Fre	RF 50 Ω eq 2.310000 Ref Offset 11	AC 000 GHz P IF	NO: Fast 🔾	Trig: Free	Run	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	12:04:04 A TRAI TY D .401 77	E 1 2 3 4 5 6 PE MWWWW ET P NNNN 4 1 GHz	Frequency
Keysight Sp           X         T           Start Fre           10 dB/div           Log           11.5           1.45	RF 50 Ω eq 2.310000 Ref Offset 11	AC 000 GHz P IF	NO: Fast 🔾	Trig: Free	Run	Avg Type	ALIGN AUTO e: Log-Pwr :>10/10	12:04:04 A TRAI TY D .401 77	4 1 GHz 03 dBm	Frequency       Auto Tune       Center Freq
Image: Constraint of the second sec	RF 50 Ω eq 2.310000 Ref Offset 11	AC   P P I-45 dB dBm	Gain:Low	Trig: Free #Atten: 20	Run ) dB	Avg Type AvgiHold	ALIGN AUTO e: Log-Pwr :>10/10	12:04:04 A TRAI TY D .401 77	4 1 GHz 03 dBm	Frequency Auto Tune Center Freq 2.35850000 GHz Start Freq
Image: Keysight Sp           10 dB/div           11.5           1.45           -8.55           -18.6           -28.6           -38.6           -48.6           -58.6           -58.6           -38.6           -48.6           -58.6           -38.6           -48.6           -58.6           -58.6           -48.6           -58.6           -58.6           -48.6           -58.6           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -78.8           -79.8	Ref Offset 11 Ref 21.45	AC 000 GHz P iF	#VB	Trig: Free #Atten: 20	Run dB	Avg Type Avg Hold	ALIGN AUTO 2: Log-Pwr >10/10 Mkr1 2 	12:04:04 A TRAI TRAI D .4011 77. -3.2 	4 1 GHz 03 dBm	Frequency Auto Tune Center Freq 2.358500000 GHz 2.310000000 GHz Stop Freq 2.407000000 GHz
Keysight Sp           00         T           Start Free         10 dB/div           Log         11.5           1.45	Ref Offset 11 Ref 21.45	AC   P P I-45 dB dBm	#VD: Fast Gain:Low #VB	Trig: Free #Atten: 20	Run dB db	Avg Type Avg Hold	ALIGN AUTO 2: Log-Pwr >10/10 Mkr1 2 	12:04:04 A TRAI TRAI D .4011 77. -3.2 	2 3 4 5 6 7 ET   2 3 4 5 6 7 ET   P NNNN 4 1 GHz 03 dBm 1 -22 1 dbm -22 3 0700 GHz 0001 pts	Frequency         Auto Tune         Center Freq         2.358500000 GHz         Start Freq         2.310000000 GHz         Stop Freq         2.407000000 GHz         CF Step         9.700000 MHz
Keysight Sp           10 dB/div           Log           11.5           1.45           -8.55           -18.6           -28.6           -38.6           -48.6           -56.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -87.6           -87.7           -87.8           -87.8           -87.8           -87.8           -97.9           -97.9           -97.9           -97.9           -10.1           -11.0           -12.0           -13.0           -14	Ref Offset 11 Ref 21.45	AC 000 GHz P P IF 145 dB dBm	#VD: Fast Gain:Low #VB	Trig: Free #Atten: 20	Run dB db	Avg Type Avg Hold	ALIGN AUTO 2: Log-Pwr >10/10 Mkr1 2 	12:04:04 A TRAI TRAI D .4011 77. -3.2 	2 3 4 5 6 7 ET   2 3 4 5 6 7 ET   P NNNN 4 1 GHz 03 dBm 1 -22 1 dbm -22 3 0700 GHz 0001 pts	Frequency         Auto Tune         Center Freq         2.358500000 GHz         Start Freq         2.310000000 GHz         Stop Freq         2.407000000 GHz         OF Stop Freq         9.700000 MHz         Auto Man



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tart Fre	RF 5 9q 30.000	PN	D: Fast G	Trig: Free R #Atten: 20 c	un A		ALIGN AUTO : Log-Pwr >10/10	TRAC	M Sep 27, 2022 E 1 2 3 4 5 6 E M WWWW ET P N N N N N	Frequency
0 dB/div	Ref Offset Ref 21.4	t 11.45 dB	an:Low	#Atten: 20 C	.0		Mk		2 4 GHz 42 dBm	Auto Tu
og	Rei 21.4									
11.5 1.45	<b>▲</b> 1									Center Fre
3.55	Y									13.265000000 G
8.6										
28.6									-23.21 dBm	Start Fr
8.6										30.000000 M
18.6										
8.6	N.	المحريفين بتزيرين أسلينا	in a second state	المرجع والمحادية والمحاد	وروار والمروانية والمقالسة وا	الدير والماشول ب	لمحاجب والعبر	أقمط الشرطية أنشاء الاعد	he an an a la la statut	Stop Fr
8.6										26.50000000 G
0.0										
					^				6.50 GHz	
Res BW	100 kHz		#VBV	V 300 kHz	~			2.531 s (4	0001 pts)	2.647000000 G
Res BW	100 kHz	X 2.402.4		Y	FUNCTION		Sweep 2	2.531 s (4		2.647000000 G
Res BW KR MODE T 1 N 2 N	100 kHz 176 SCL 1 f 1 f	<u>2.402 4</u> 2.400 000 0	GHz GHz	- <u>3.742 dBn</u> -55.492 dBn	1			2.531 s (4	0001 pts)	2.647000000 G <u>Auto</u> M
Res BW	/ 100 kHz RC SCL	2.402 4	GHz GHz	Y -3.742 dBm	1			2.531 s (4	0001 pts)	2.647000000 G <u>Auto</u> M Freq Offs
Res BW 1 N 2 N 3 N 4 5	100 kHz 176 SCL 1 f 1 f	<u>2.402 4</u> 2.400 000 0	GHz GHz	- <u>3.742 dBn</u> -55.492 dBn	1			2.531 s (4	0001 pts)	2.647000000 G <u>Auto</u> M Freq Offs
Res         BW           1         N           2         N           3         N           4         5           6         7	100 kHz 176 SCL 1 f 1 f	<u>2.402 4</u> 2.400 000 0	GHz GHz	- <u>3.742 dBn</u> -55.492 dBn	1			2.531 s (4	0001 pts)	CF Str 2.64700000 G <u>Auto</u> M Freq Offs 0
Res BW KR Mode II 1 N 2 N 3 N 4 5 6 7 8 9	100 kHz 176 SCL 1 f 1 f	<u>2.402 4</u> 2.400 000 0	GHz GHz	- <u>3.742 dBn</u> -55.492 dBn	1			2.531 s (4	0001 pts)	2.647000000 G <u>Auto</u> M Freq Offs
KR MODE I 1 N 2 N 3 N 4 5 6 7	100 kHz 176 SCL 1 f 1 f	<u>2.402 4</u> 2.400 000 0	GHz GHz	- <u>3.742 dBn</u> -55.492 dBn	1			2.531 s (4	0001 pts)	2.647000000 G <u>Auto</u> M Freq Offs



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CH Mid (GFSK(4.0) MODE) Revisiont spectrum and the sol of 📜 Keysight Spectrum Analyzer - Swept SA 67 09:28:47 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N Frequency Avg Type: Log-Pwr Avg|Hold:>10/10 Auto Tune Mkr1 2.441 766 GHz Ref Offset 11.45 dB Ref 21.45 dBm -3.152 dBm 10 dB/div **Center Freq** 11 2.442000000 GHz 1.4 **∮**<sup>1</sup> Start Freq -6.00 dB 2.440500000 GHz B.5 710 kHz 18. Stop Freq 2.443500000 GHz 28. CF Step 300.000 kHz 38. Auto Mar 48 Freq Offset 58 0 Hz Center 2.442000 GHz #Res BW 100 kHz Span 3.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz STATUS 🔰 Keysight Spectrum Analyzer - Swept SA 12:08:09 AM Sep 27, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N ALIGN AUTO Avg Type: Log-Pwr Avg|Hold:>10/10 SENSE:IN Start Freq 30.000000 MHz Frequency PNO: Fast Trig: Free Run IFGain:Low #Atten: 20 dB Mkr1 2.442 1 GHz -3.702 dBm Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 10 dB/div Log r 11. **Center Freq** 13.265000000 GHz 1.4 8.5 18.6 -23.15 df Start Freq 28.6 30.000000 MHz 38.6 48 P Stop Freq -58.6 26.50000000 GHz -68.6 Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) CF Step 2.647000000 GHz #VBW 300 kHz <u>Auto</u> Mar MKR MODE TRC SCL INCTION VALUE -3.702 dBm -57.101 dBm -57.888 dBm 2.442 1 GHz 2.400 000 0 GHz 2.483 500 0 GHz Ν f **Freq Offset** 0 Hz STATUS

F .

0 Hz

Mar

0 Hz

Frequency

Report No.: TMTN2203000304NR

11

Keysight Spectrum Analyzer - Swept SA

#### 09:27:56 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N Avg Type: Log-Pw Avg|Hold:>10/10 Center Freq 2.480000000 GHz PNO: Wide C IFGain:Low Trig: Free Run #Atten: 20 dB Mkr1 2.479 766 GHz -3.251 dBm Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 10 dB/div **Center Freq** 11 2.48000000 GH 1.4 **≬**¹ Start Freq -6.00 dB 2.478500000 GHz 8.5 709 kHz 18. Stop Freq 2.481500000 GHz 28.0 CF Step 300.000 kHz Man 38.1 Auto 48 Freq Offset 58. Center 2.480000 GHz Span 3.000 MHz Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) STATUS ight Spectrum Analyzer - Swept S Start Freq 2.477000000 GHz PR0: Fast IFGain:Low Trig: Free Run #Atten: 20 dB ALIGN AUTO Avg Type: Log-Pwr Avg|Hold:>10/10 12:12:10 AM Sep 27, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N Frequency Auto Tune Mkr1 2.479 769 775 GHz Ref Offset 11.45 dB Ref 21.45 dBm -3.232 dBm 10 dB/div Log Center Fred 11. 1.4 2.488500000 GHz 8.55 18.6 -23.25 dB Start Freq 28. 2.477000000 GHz -38.6 48.8 Stop Freq 58.6 2.50000000 GHz 68 1 Stop 2.50000 GHz Sweep 2.667 ms (40001 pts) Start 2.47700 GHz #Res BW 100 kHz CF Step 2.300000 MHz #VBW 300 kHz Auto MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 2.479 769 775 GHz 2.400 000 0 GHz 2.483 500 0 GHz -3.232 dBm ---- dBm -60.939 dBm Freq Offset

CH High (GFSK(4.0) MODE)

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STATUS



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- 6					or wet				Analyzer - Sv		Keysigh
Frequency	M Sep 27, 2022 E 1 2 3 4 5 6 PE M WWWWW	TRAC	ALIGN AUTO :: Log-Pwr >10/10			Trig: Free	IO: Fast	0 MHz	50 s 0.00000	req 30	art F
Auto Tur	9 8 GHz 57 dBm	r1 2.479	Mk		dB	#Atten: 20	ain:Low	.45 dB	f Offset 1 f 21.45		) dB/d
Center Fre											1.5
13.265000000 GI									1	<b>Å</b>	.45 —
											.55 —
Start Fro	-23.25 dBm										8.6
30.000000 M											8.6
											8.6 —
Stop Fr	والعدوقوم إرجازته	والمستحد والمستحد والم	فسيلقد وبالعمر	مراجع والمراجع			Landa - nd -		<del>2</del> اندر مطمعات		8.6
26.50000000 G											8.6
CF Ste 2.647000000 Gł Auto Mi	6.50 GHz 0001 pts)		Sweep 2			/ 300 kHz	#VB\		kHz	0 MHz W 100	
	DN VALUE	FUNCTION	ICTION WIDTH	TION FUI	FUN	-3.457 dB	CHa	× 2.479 8		TRC SC	KR MOD
Freq Offs					m	-59.073 dE -57.609 dE	) GHz	2.400 000 0		1 f	2 N 3 N
0					m	-07.009 dE	GHZ	2.483 500 0			4
											5 6
											7 8
											9 0
											1
			STATUS								3



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Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

# OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

			C	CHL	_ow ( (	GFS	K(5.2)	) Moe	DE)		
🎉 Keysight Sp											- 5 <b>- X</b>
Center F	req 2		0000 GH	IZ IO: Wide Gain:Low			Avg Typ Avg Hold	ALIGN AUTO be: Log-Pwr d:>10/10	TRAC	E 1 2 3 4 5 6 E M WWWW T P N N N N N	Frequency
10 dB/div		Offset 11	.45 dB					Mkr1	2.401 5 -3.20	05 GHz 00 dBm	Auto Tune
Log 11.5											Center Freq
1.45					1		242				2.402000000 GHz
-8.55						<u> </u>	2Δ3			-9.20 dBm	
-18.6				~^^/	\\ <b>3</b>		<u> </u>	<u> </u>			Stort From
-28.6					_						Start Freq 2.399500000 GHz
-38.6	-A	June	$\checkmark$					$\rightarrow$	$\sim$		
-48.6	~									~~~	Oton From
-58.6											<b>Stop Freq</b> 2.404500000 GHz
-68.6											2.10100000 0112
Center 2	.4020	00 GHz	1	1		1		1	Span 5	.000 MHz	CF Step
#Res BW				#VE	300 kHz			Sweep 1			500.000 kHz
MKR MODE T			X		Y		INCTION FL	INCTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Man
1 N 2 Δ3	1 f 1 f	<b>(</b> Δ)		5 MHz (/		dB					Ere # Offert
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💓 Keysight Sp					SE	NSE:INT				4 Sep 27, 2022	
⊯ Keysight Sp ⊯ ⊤ Start Fre	RF	50 Ω	AC DOO GHz			NSE:INT		ALIGN AUTO	12:25:22 A	1 Sep 27, 2022 E 1 2 3 4 5 6	Frequency
LXI T	RF	50 Ω	AC DOO GHz Pt	NO: Fast Gain:Low	Trig: Free #Atten: 2	e Run	Avg Typ Avg Hold	ALIGN AUTO	12:25:22 A		Frequency
LXI T	₽ <b>q 2</b> .3	50 Ω 3100000	AC DOO GHZ PI IFC	NO: Fast Gain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 MWWWW T P NNNN 2 2 GHz	
Start Fre	R⊧ Pq 2.: Ref	50 Ω	AC DOO GHZ PT IFC	NO: Fast Sain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 E M WWWWW T P N N N N N	Frequency
Start Fre	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast Gain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 MWWWW T P NNNN 2 2 GHz	Frequency Auto Tune
022 ⊤ Start Fre 10 dB/div	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 MWWWW T P NNNN 2 2 GHz	Frequency
10 dB/div	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast Gain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 MWWWW T P NNNN 2 2 GHz	Frequency Auto Tune Center Freq
10 dB/div Log 11.45	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 MWWWW T P NNNN 2 2 GHz	Frequency Auto Tune Center Freq
10 dB/div Log 11.5 1.45 -8.55	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	2 GHz 11 dBm	Frequency Auto Tune Center Freq 2.358500000 GHz
T         T           Start Free         10 dB/div           10 dB/div         11.5           11.5	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast Sain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	2 GHz 11 dBm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq
T         T           Start Free         10 dB/div           Log         11.5           1.45         -           -8.55         -           -18.6         -           -38.6         -           -48.6         -	R⊧ Pq 2.: Ref	50 Ω 3100000	AC DOO GHZ PT IFC	NO: Fast Gain:Low	Trig: Free	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	2 GHz 11 dBm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz
20 T Start Fre 10 dB/div Log 11.5 1.45 -8.55 -18.6 -28.6 -38.6 -48.6 -58.6 -58.6 -58.6	R⊧ Pq 2.: Ref	50 £ 3100000 7 Offset 11 f 21.45 c	AC DOO GHZ PT IFC	Gain:Low	Trig: Free #Atten: 2	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 EM WINNINN 2 2 GHz 11 dBm 1 2 3 2 dbm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq
Image: 10 dB/div           10 dB/div           Log           11.5           1.45           -8.55           -8.65           -38.6           -48.6           -6.65	Ref Ref	50 £ 3100000 7 Offset 11 f 21.45 c	AC   PP PIEC IFC 45 dB IBM	Gain:Low	Trig: Free #Atten: 2	e Run		ALIGN AUTO be: Log-Pwr d:>10/10	12:25:22 AP	E 1 2 3 4 5 6 EM WINNINN 2 2 GHz 11 dBm 1 2 3 20 dBm 2 4 5 6 1 8 7 6 1 8 7 6 1 8 7 7 7 1 8 7 8 7 7 1 8 7 8 7 7 1 8 7 7 7 1 8 7 7 7 1 8 7 7 1 8 7 7 1 8 7 7 7 7 1 8 7 7 7 7 1 8 7 7 7 7 7 1 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz Stop Freq
T         Start Fre           10 dB/div         Log           Log         11.5           1.45         -           -8.55         -           -8.66         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -	Ref Ref Re	50 £ 310000( 70ffset11 f 21.45 c	AC   PP PIEC IFC 45 dB IBM	Sain:Low	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr di>10/10 Mkr1 2	12:25:22 AV TRAC TYP 0 .401 511 -3.2 	2 2 GHz 11 dBm 2330 dbm 22 45 6 6 11 dBm 24 7 11 dBm 24 7 11 dBm 24 7 11 dBm 24 7 11 dBm 26 7 11 dBm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz Stop Freq 2.407000000 GHz
T         T           Start Fre         10 dB/div           Log         11.5           1.6         -           -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         -	Ref Ref Ref 10000	50 £ 3100000 0ffset 11 f 21.45 c	AC   PP PIEC IFC 45 dB IBM	Sain:Low	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 GHz 11 dBm 11 dBm 23 dbm 22 dHz 11 dBm 12 dbm	Frequency Auto Tune Center Freq 2.358500000 GHz 2.310000000 GHz 2.407000000 GHz 2.407000000 GHz 9.700000 MHz
Image: start         T           10 dB/div         1           10 dB/div         1           1 dB/div         1           2 dB/div         1           2 dB/div         1           3 dB/div         1           4 dB/div         1           3 dB/div         1           4 dB/div         1           4 dB/div         1           4 dB/div         1           5 dB/div         1	Ref Ref Re 10000	50 £ 3100000 0ffset 11 f 21.45 c	AC   D000 GHZ PT IFC 45 dB IBM 	#VE	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 GHz 11 dBm 11 dBm 23 dbm 22 dHz 11 dBm 12 dbm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz Stop Freq 2.407000000 GHz
T         Start Fre           Start Fre         10 dB/div           Log         11.5           1.6         -           -8.55         -           -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         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.7         -           -8.8         -      -7         N	Ref Ref Re 10000 1000 1000 1100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 GHz 11 dBm 11 dBm 23 dbm 22 dHz 11 dBm 12 dbm	Frequency Auto Tune Center Freq 2.358500000 GHz 2.310000000 GHz 2.407000000 GHz Stop Freq 2.407000000 GHz Stop Stop Stop 9.700000 MHz <u>Auto</u> Man
T         Start Fre           10 dB/div         Log           Log         11.5           1.45         -           -8.55         -           -18.6         -           -28.6         -           -38.6         -           -48.6         -           -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         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.7         -           -8.8         -           -9.8         -           -1.0         -           -2.0         -      -3.0         - <td>Ref Ref Re 10000 1000</td> <td>50 £ 3100000 0ffset 11 f 21.45 c</td> <td>AC   D00 GHZ PT IFC 46 dB IBM </td> <td>#VE 2 GHz 0 GHz</td> <td>Trig: Fre: #Atten: 2</td> <td>e Run 0 dB</td> <td></td> <td>ALIGN AUTO e: Log-Pwr d:&gt;10/10 Mkr1 2</td> <td>12:25:22 AV TRAC TRAC 00 .401 511 -3.2</td> <td>2 2 GHz 11 dBm 23306m 22 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>Frequency Auto Tune Center Freq 2.358500000 GHz 2.310000000 GHz 2.407000000 GHz 2.407000000 GHz 9.700000 MHz</td>	Ref Ref Re 10000 1000	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PT IFC 46 dB IBM 	#VE 2 GHz 0 GHz	Trig: Fre: #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 2 GHz 11 dBm 23306m 22 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Frequency Auto Tune Center Freq 2.358500000 GHz 2.310000000 GHz 2.407000000 GHz 2.407000000 GHz 9.700000 MHz
T         Start Fre           10 dB/div         Log           Log         11.5           1.45         -           -8.65         -           -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         -           -8.6         -           -8.6         -           -8.6         -           -8.6         -           -8.7         -           -8.8         -           -8.7         -           -8.8         -           -9.7         -           -9.8         -           -1.7         -           -1.8         -           -1.8         -	Ref Ref Re 10000 1000 1000 1100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 GHz 11 dBm 11 dBm 23 dbm 22 dHz 11 dBm 12 dbm	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz 2.407000000 GHz CF Step 9.700000 MHz Auto Man Freq Offset
x         T           Start Fre           10 dB/dlv           Log           11.5           1.45           -8.55           -18.6           -28.6           -38.6           -48.6           -68.6           -58.6           -58.6           -58.6           -58.6           -68.6           -7           -8	Ref Ref Re 10000 1000 1000 1100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 2401 512 : 2.400 500 1512 :	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 2 GHz 11 dBm 23306m 22 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz 2.407000000 GHz Stop Freq 2.407000000 GHz GF Step 9.700000 MHz Auto Man
Image: second	Ref Ref Ref 10000 1 1000 1 100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 2401 512 : 2.400 500 1512 :	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 2 GHz 11 dBm 23306m 22 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz 2.407000000 GHz CF Step 9.700000 MHz Auto Man Freq Offset
Image: start free           10 dB/div           10 dB/div	Ref Ref Ref 10000 1 1000 1 100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 2401 512 : 2.400 500 1512 :	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TRAC 00 .401 511 -3.2	2 GHz 11 dBm 2 GHz 1	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz 2.407000000 GHz CF Step 9.700000 MHz Auto Man Freq Offset
x         T           Start Fre           Log           10 dB/div           Log           11.5           1.45           -8.55           -16.6           -28.6           -38.6           -48.6           -58.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -86.6           -7           -8           9           10	Ref Ref Ref 10000 1 1000 1 100	50 £ 3100000 0ffset 11 f 21.45 c	AC   D00 GHZ PP IFC 45 dB IBm 2401 512 : 2.400 500 1512 :	#VE 2 GHz 0 GHz	Trig: Free #Atten: 2	e Run 0 dB		ALIGN AUTO e: Log-Pwr d:>10/10 Mkr1 2	12:25:22 AV TRAC TYPE .401 51: -3.2	2 2 GHz 11 dBm 23306m 22 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Frequency Auto Tune Center Freq 2.358500000 GHz Start Freq 2.310000000 GHz 2.407000000 GHz Stop Freq 2.407000000 GHz GF Step 9.700000 MHz Auto Man



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uxu ⊺ Start	r Frea	RF 30.	50	Ω AC DO MH	z				NSE:INT			ALIGN AUTO e: Log-Pwr	12:36:	TRACE 1	p 27, 2022 2 3 4 5 6	Frequency
					PN	O: Fast ain:Low		rig: Free Atten: 2		4	vg Hold	l:>10/10		DET	NNNNN	Auto Tur
10 dB/			Offset 1 21.45	1.45 dB <b>dBm</b>	3							M			GHz dBm	
Log 11.5																Center Fre
1.45 —		<b>∲</b> <sup>1</sup>		_			_							_		13.265000000 GH
-8.55 —		-Ì-		_			_						-	_		
-18.6				_										+	-23.20 dBm	Start Fre
-28.6 —		-¶ <sup>€</sup>		-									<u> </u>	-		30.000000 MH
-38.6		. 2														
-58.6		, Qu		يشتعيك	محتافتين					instal Line	ومعارفهم ورد	-				Stop Fre
-68.6 -				_			_							_		26.50000000 GH
L Start	30 M	Hz											Sto	p 26.5	i0 GĤz	CF Ste
#Res	BW 1	00	kHz			#VE	3W 30	0 kHz				Sweep				2.647000000 GH Auto Ma
MKR MC		SCL		X 2	2.401 7	GHz		Y 3.196 dE		FUNCTIO	N FU	NCTION WIDTH	FUN	NCTION V	ALUE ^	Adto
2 N 3 N	N 1	f		2.400	000 0	GHz	-34	.209 dE	3m							Freq Offs
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MSG												STATU	s			



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CH Mid (GFSK(5.2) MODE) 📜 Keysight Spectrum Analyzer - Swept SA 09:24:59 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N Frequency Avg Type: Log-Pwr Avg|Hold:>10/10 Center Freq 2.442000000 GHz PNO: Wide Trig: Free Run IFGain:Low #Atten: 20 dB Mkr1 2.441 505 GHz -3.149 dBm Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 10 dB/div Log 11. **Center Freq** 2.442000000 GHz 1.4 2Δ3 -9.15 dl <del>∦3</del> 8.5 18.6 Start Freq -28.6 2.439500000 GHz 38.6 48. Stop Freq 58.6 2.444500000 GHz -68. Span 5.000 MHz Sweep 1.000 ms (1001 pts) Center 2.442000 GHz CF Step 500.000 kHz #Res BW 100 kHz #VBW 300 kHz Auto Mar MKR MODE TRC SCL FUNCTION VALUE FUNCTION FUNCTION W 
 2.441 505 GHz
 -3.149 dBm

 1.270 MHz
 (Δ)
 -0.003 dB

 2.441 365 GHz
 -9.197 dBm
 N ∆3 F f f (Δ) f Freq Offset 0 Hz STATUS Keysight Spectrum Analyzer - Swept SA 12:21:14 AM Sep 27, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N ALIGN AUTO Avg Type: Log-Pwr Avg|Hold:>10/10 Start Freq 30.000000 MHz Frequency PNO: Fast Trig: Free Run IFGain:Low #Atten: 20 dB Auto Tune Mkr1 2.441 4 GHz Ref Offset 11.45 dB Ref 21.45 dBm -3.503 dBm 10 dB/div \_og r **Center Freq** 11. 13.265000000 GHz 1.4 3.5 18.6 -23.15 df Start Freq 28.6 30.000000 MHz 38.6 48 P Stop Freq 58. 26.50000000 GHz -68.6 Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep 2.531 s (40001 pts) CF Step 2.647000000 GHz #VBW 300 kHz <u>Auto</u> Mar MKR MODE TRC SCL -3.503 dBm -57.288 dBm -57.152 dBm 2.441 4 GHz 2.400 000 0 GHz 2.483 500 0 GHz Ν Freq Offset 0 Hz STATUS



10m		High ( GFS	SK(5.2) MOI	JE)							
Keysight Spectrum Analyzer	- Swept SA 50 Ω AC	SENSE:INT	ALIGN AUTO	09:26:41 PM Sep 26, 2022							
Center Freq 2.480	000000 GHz PNO: Wide	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE M WWWW	Frequency						
	IFGain:Lov	#Atten: 20 dB		DET P NNNNN	Auto Tune						
Ref Offse 10 dB/div Ref 21.4 Log	t 11.45 dB I <b>5 dBm</b>		Mkr1	2.479 505 GHz -3.280 dBm							
11.5					Center Freq						
1.45		<b>∮</b> 1	2Δ3		2.480000000 GHz						
-8.55		₩3`~~~		-9.28 dBm							
-18.6					Start Freq						
-28.6	2				2.477500000 GHz						
-38.6											
-40.0				~	Stop Freq						
-68.6					2.482500000 GHz						
Contor 3 480000 C				Onen 6 000 Milia	0.5.01						
Center 2.480000 G #Res BW 100 kHz		/BW 300 kHz	Sweep 1	Span 5.000 MHz .000 ms (1001 pts)	CF Step 500.000 kHz						
MKR MODE TRC SCL	X		UNCTION FUNCTION WIDTH	, ,	<u>Auto</u> Man						
1 N 1 f 2 Δ3 1 f (Δ)	2.479 505 GHz 1.260 MHz	-3.280 dBm (Δ) -0.062 dB									
3 F 1 f	2.479 375 GHz	-9.281 dBm			Freq Offset						
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MSG		m	STATUS	*							
Discrete Spectrum Analyzer	- Swent SA										
L <mark>XI</mark> T RF 5											
	50 Ω AC	SENSE:INT	ALIGN AUTO	12:13:10 AM Sep 27, 2022	Frequency						
Start Freq 2.4770	00000 GHz PNO: Fast	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6	Frequency						
Start Freq 2.4770	00000 GHz	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	[						
Ref Offse	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6	Frequency						
Ref Offse 10 dB/div Ref 21.4	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 79 506 425 GHz	Frequency Auto Tune						
Ref Offse 10 dB/div Ref 21.4 Log	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 79 506 425 GHz	Frequency Auto Tune Center Freq						
Ref Offse 10 dB/div Ref 21.4 Log	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 79 506 425 GHz	Frequency Auto Tune						
Ref Offse 10 dB/div Ref 21.4 Log 11.5 1.45	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	79 506 425 GHz -3.237 dBm	Frequency Auto Tune Center Freq 2.488500000 GHz						
10 dB/div Ref 21.4 Log 11.5 1.45 8.55	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN 79 506 425 GHz	Frequency Auto Tune Center Freq						
10 dB/div Ref 21.4 Log 11.5 1.45 8.55 -18.6	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	79 506 425 GHz -3.237 dBm	Frequency Auto Tune Center Freq 2.488500000 GHz Start Freq						
10 dB/div Ref 21.4 Log 11.5 1.45 8.55 18.6 28.6 38.6 48.6	00000 GHz PNO: Fast IFGain:Lov t 11.45 dB	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	79 506 425 GHz -3.237 dBm	Frequency Auto Tune Center Freq 2.488500000 GHz Start Freq 2.477000000 GHz						
Ref Offse 10 dB/div Ref 21.4 115 145 145 18.6 -28.6 -28.6 -38.6 -48.6 -68.6	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 55 dBm	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>10/10	78ACE [1] 2 3 4 5 6 TYPE MWWWW DET  P NNNN 79 506 425 GHz -3.237 dBm	Frequency Auto Tune Center Freq 2.488500000 GHz Start Freq						
10 dB/div Ref 21.4 Log 11.5 1.45 8.55 18.6 28.6 38.6 48.6	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 55 dBm	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>10/10	78ACE [1] 2 3 4 5 6 TYPE MWWWW DET  P NNNN 79 506 425 GHz -3.237 dBm	Frequency Auto Tune Center Freq 2.48850000 GHz Start Freq 2.47700000 GHz Stop Freq						
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Ref Offse           10 dB/div         Ref 21.4           Log         1           11.5         1           1.45         1           -8.55         -           -8.65         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.66         -           -8.67         -           -8.68         -           -8.68         -           -8.68         -           -8.68         -           -8.68         -           -8.68	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 55 dBm 45 dBm 44 44 44 44 44 44 44 44 44 44 44 44 44	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.488500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.50000000 GHz           CF Step           2.300000 MHz						
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Ref Offse           10 dB/div         Ref 21.4           11.5         1           14.6         1           14.6         1           14.6         1           14.6         1           14.6         1           14.6         1           14.6         1           14.6         1           14.6         1           28.6         1           -86.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           58.6         1           6         1	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.488500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.5000000 GHz           CF Step           2.300000 MHz           Man           Freq Offset						
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Ref Offse           10 dB/div         Ref 21.4           Log         11.5           11.5         1           14.6         4           -28.6         -           -28.6         -           -28.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -86.6         -           -87.7         1           -9         -           -7         -           -88         -           -7         -           -7         -           -7         -           -7         -           -7         -           -7         - <tr td="">           -7         <td< td=""><td>00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4</td><td>Trig: Free Run #Atten: 20 dB</td><td>Avg Type: Log-Pwr Avg Hold&gt;10/10</td><td>7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3</td><td>Frequency           Auto Tune           Center Freq           2.488500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.5000000 GHz           CF Step           2.300000 MHz           Man           Freq Offset</td></td<></tr> <tr><td>Ref Offse           10 dB/div         Ref 21.4           Log         11.5           11.5         1           145         1           28.6         -           -28.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -7         -           -7         -           -7         -           -7         -</td><td>00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4</td><td>Trig: Free Run #Atten: 20 dB</td><td>Avg Type: Log-Pwr Avg Hold&gt;10/10</td><td>7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3</td><td>Frequency           Auto Tune           Center Freq           2.489500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.50000000 GHz           CF Step           2.300000 MHz</td></tr>	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.488500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.5000000 GHz           CF Step           2.300000 MHz           Man           Freq Offset	Ref Offse           10 dB/div         Ref 21.4           Log         11.5           11.5         1           145         1           28.6         -           -28.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -7         -           -7         -           -7         -           -7         -	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.489500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.50000000 GHz           CF Step           2.300000 MHz
00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.488500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.5000000 GHz           CF Step           2.300000 MHz           Man           Freq Offset							
Ref Offse           10 dB/div         Ref 21.4           Log         11.5           11.5         1           145         1           28.6         -           -28.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -88.6         -           -7         -           -7         -           -7         -           -7         -	00000 GHz PNO: Fast IFGain:Lov t11.45 dB 15 dBm 45 dBm 4	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold>10/10	7840E [1] 2 4 5 6 TYPE MWWWW DET   NNNN 79 506 425 GHz -3.237 dBm -3.237 dBm -3.238 dBm -3.23.8 dBm -3.23.9 dBm -3.23.8 dBm -3	Frequency           Auto Tune           Center Freq           2.489500000 GHz           Start Freq           2.477000000 GHz           Stop Freq           2.50000000 GHz           CF Step           2.300000 MHz						





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Frequency	M Sep 27, 2022 E 1 2 3 4 5 6 E M WWWW	TRAC	ALIGN AUTO		E:INT	Trig: Free		0 MHz		Freq 3	tart
		D	>10/10	Avg Hold		#Atten: 20	IO: Fast ⊂ Gain:Low				
Auto Tur	98 GHz 44 dBm		Mk						f Offset 1 f 21.45		0 dB
Contor Fra											.og 11.5
Center Fre 13.265000000 GH									1	Â	1.45 -
10.20000000 01											8.55 -
Start Fre	-23.28 dBm										18.6 -
30.000000 MH											28.6
											38.6 -
Stop Fre	ومقاصمت المرابع	ومعالية والمراجع							8		48.6 -
26.50000000 GI											58.6
											68.6
CF Ste 2.647000000 GH	6.50 GHz 0001 pts)		Sweep 2			300 kHz	#VBV	^	kHz	30 MHz BW 100	
<u>Auto</u> Ma	DN VALUE	FUNCTION	ICTION WIDTH	ION FUN		Y		X		DE TRC SC	
Erog Offo					n	-4.344 dB -59.384 dB	) GHz	2.479		1 <b>f</b>	1   2
Freq Offs ۱					n	-58.581 dB	GHz	2.483 500 (		1 f	3 I 4
											5 6
											7
											9 10
											11



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# 9.6 RADIATED EMISSIONS

# 9.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

§ 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 <b>-</b> 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.:** TMTN2203000304NR 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.

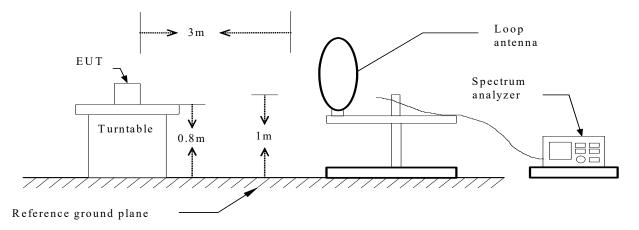


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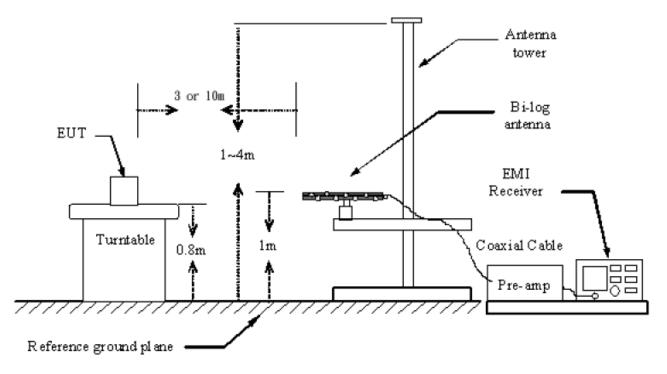
#### TEST SETUP

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

#### 9kHz ~ 30MHz

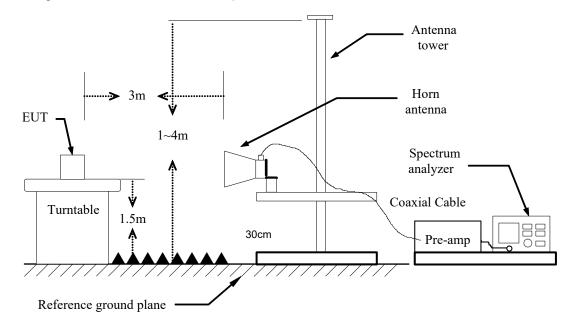


30MHz ~ 1GHz





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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 meter chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 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 spectrum analyzer was set to Peak 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.
- g. The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05



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#### NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test spectrum analyzer is 1MHz, the video bandwidth is 3MHz and detector is Peak for Peak detection and frequency above 1GHz.
- 3. The resolution bandwidth of test spectrum analyzer is 1 MHz and the video bandwidth is more than 1/T for Average detection (AV) at frequency above 1GHz.
- No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)

#### **TEST RESULTS**

No non-compliance noted.

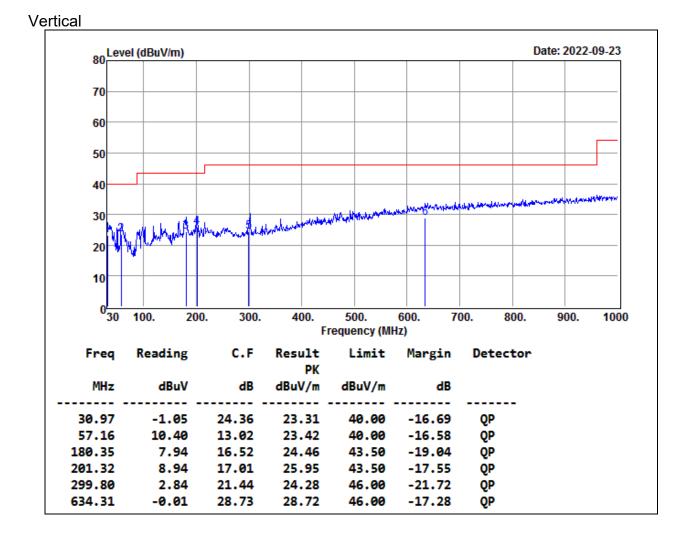


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# Report No.: TMTN2203000304NR 9.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

# Test Voltage: AC 120V, 60Hz

Product Name	Analog Turntable	Test Date	2022/09/23
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	21.5°C, 48%



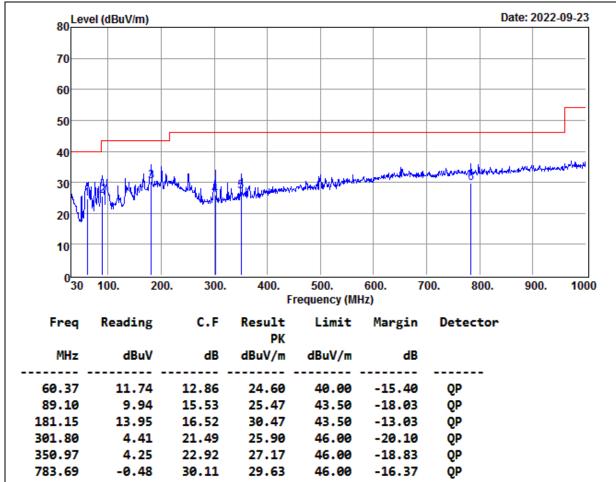
Note: 1. QP= Quasi-peak Reading.

2. The other emission levels were very low against the limit



Product Name	Analog Turntable	Test Date	2022/09/16
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	ТХ	Temp & Humidity	21.5°C, 48%

#### Horizontal



Note: 1. QP= Quasi-peak Reading.

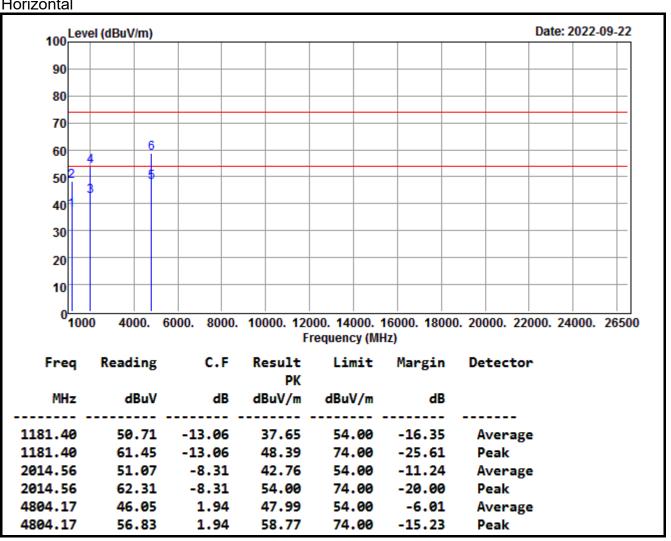
2. The other emission levels were very low against the limit



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# Report No.: TMTN2203000304NR 9.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	21.5°C, 48%
Horizoptol		·	



#### **REMARK:**

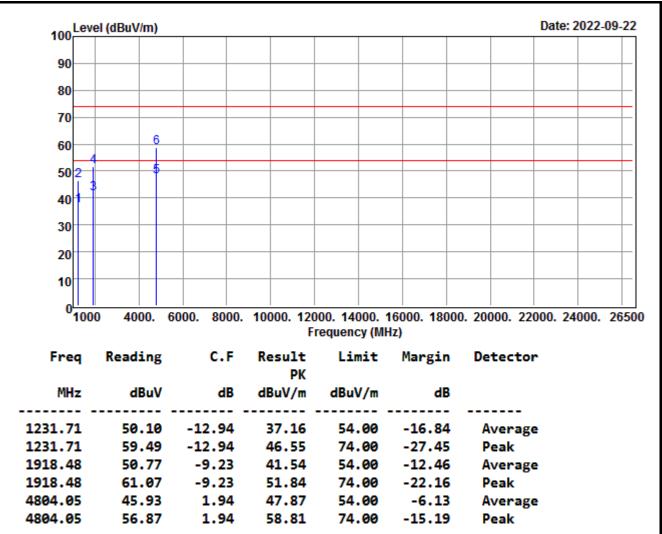
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW ≥ 1/T
- 3. The result basic equation calculation is as follow:
- Level = Reading + AF + Cable Preamp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



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	21.5°C, 48%

Vertical



#### **REMARK:**

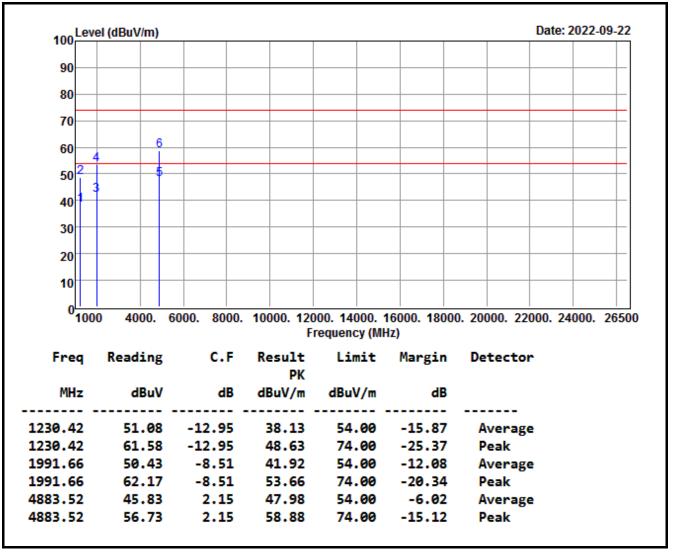
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW $\geq$ 1/T
- The result basic equation calculation is as follow: Level = Reading + AF + Cable –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



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	21.5°C, 48%

Horizontal



#### Remark:

- 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  $\geq$  1/T
- 3. The result basic equation calculation is as follow:

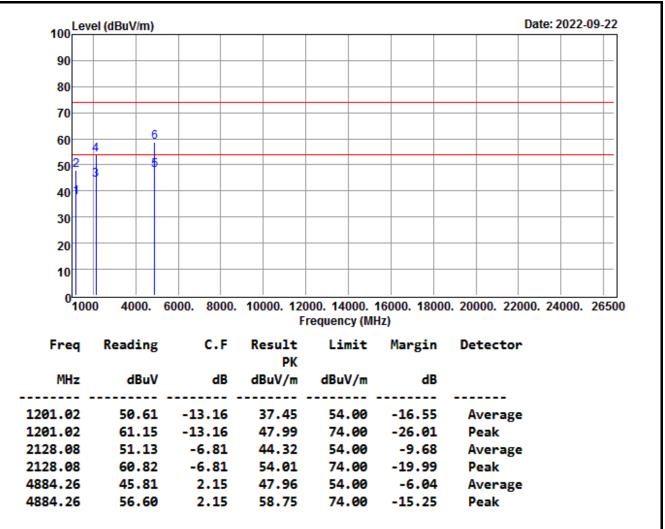
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	21.5°C, 48%

Vertical



#### Remark:

- 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:

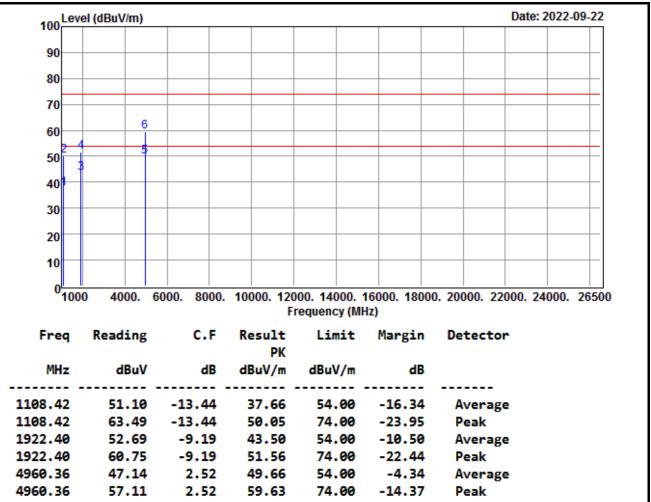
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	21.5°C, 48%

Horizontal



#### Remark:

- 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:

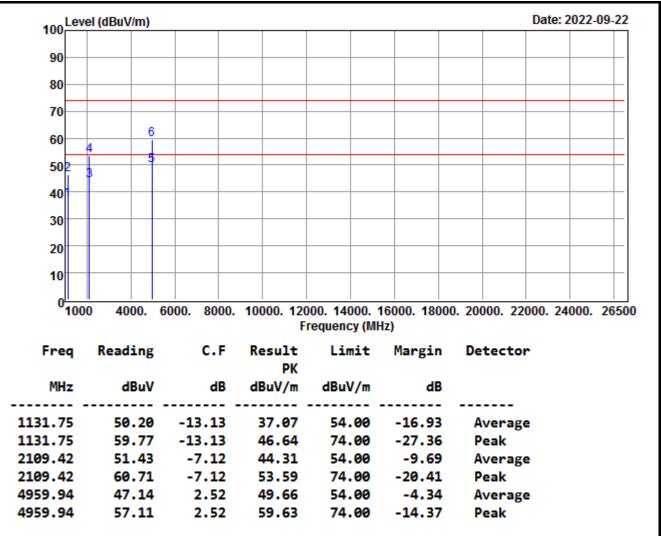
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	21.5°C, 48%

Vertical



#### Remark:

- 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:

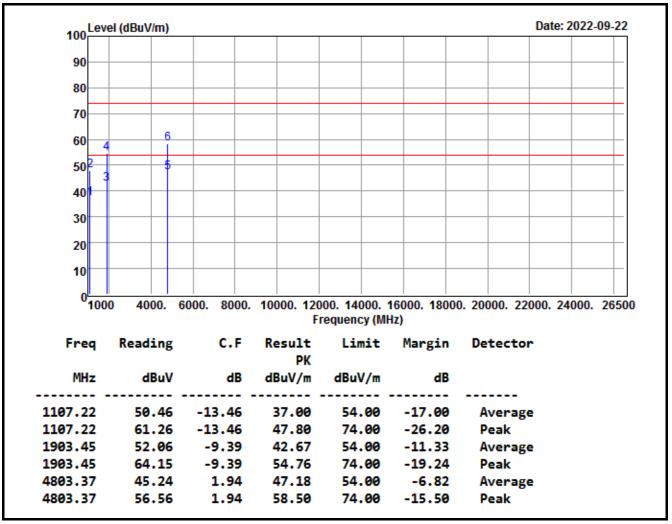
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	21.5°C, 48%

Horizontal



#### **Remark:**

- 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:

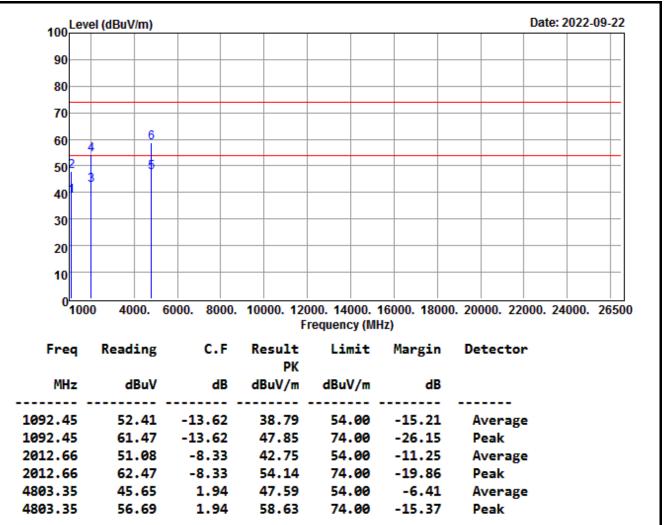
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Low)	TEMP& Humidity	21.5°C, 48%

Vertical



#### Remark:

- 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:

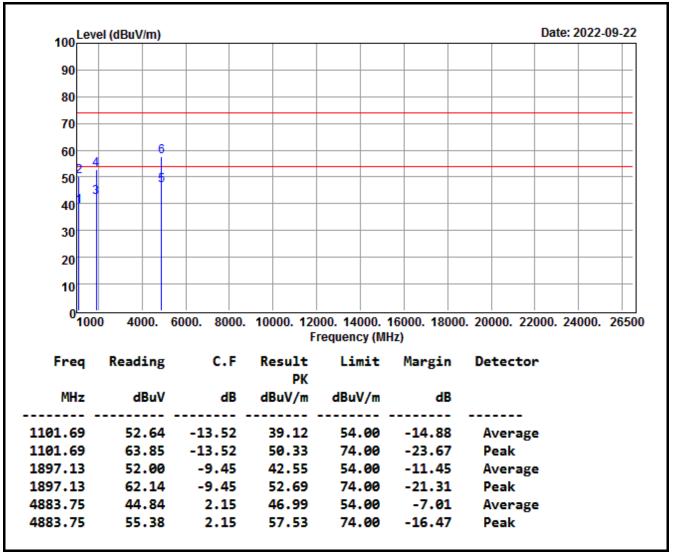
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Middle)	TEMP& Humidity	21.5°C, 48%

Horizontal



#### Remark:

- 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:

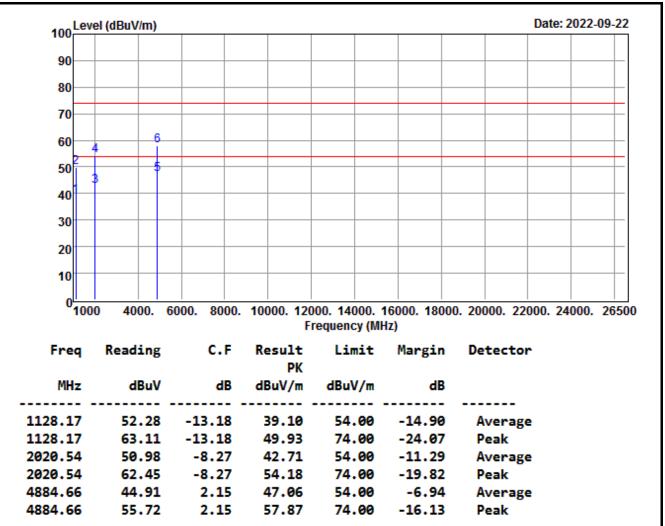
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Middle)	TEMP& Humidity	21.5°C, 48%

Vertical



#### Remark:

- 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

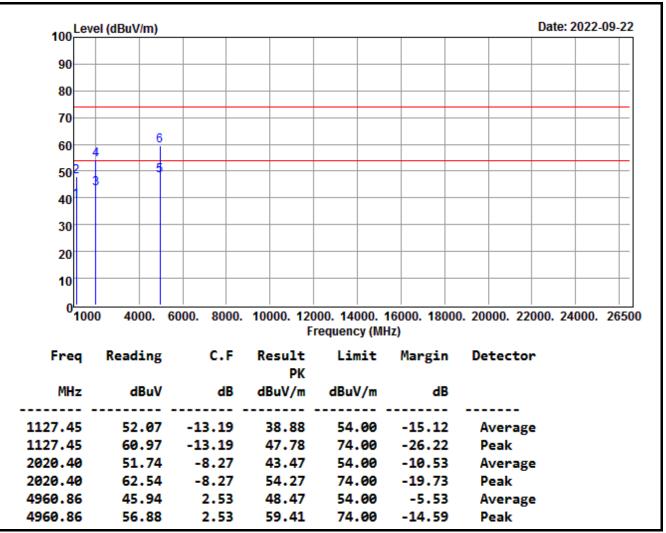
- 4. The other emission levels were 10dB below the limit
- 5. The test distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH High)	TEMP& Humidity	21.5°C, 48%

Horizontal



#### Remark:

- 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 distance is 3m.
- 6. \*=Restricted bands of operation



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Product Name	Analog Turntable	Test Date	2022/09/22
Model	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH High)	TEMP& Humidity	21.5°C, 48%

Vertical

100	el (dBuV/m)					Dat	e: 2022-09-22
90							
80							
70							
60	4						
50 <sup>2</sup>	3						
40							
30							
20							
10							
0 <mark>//</mark> 100	0 4000.	6000. 8000.		00. 14000. 1 equency (MH		0. 20000. 22000.	24000. 26500
Freq	Reading	C.F	Result PK	Limit	Margin	Detector	
MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
127.16	50.87	-13.19	37.68	54.00	-16.32	Average	
127.16	62.47 51.93	-13.19 -6.80	49.28 45.13	74.00 54.00	-24.72	Peak	
128.45	60.40	-6.80	45.13 53.60		-8.87 -20.40	Average Peak	
959.23	46.18	2.51	48.69	54.00	-5.31	Average	
959.23	57.00	2.51	59.51	74.00		Peak	

## Remark:

- 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 distance is 3m.
- 6. \*=Restricted bands of operation

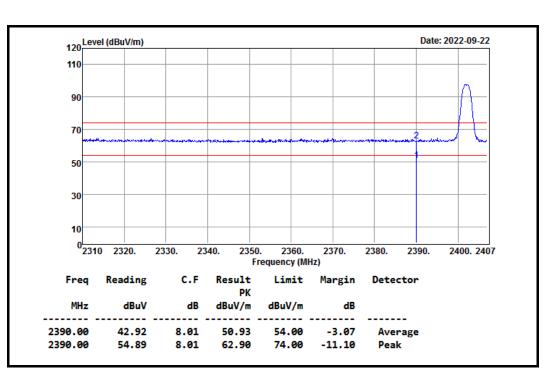


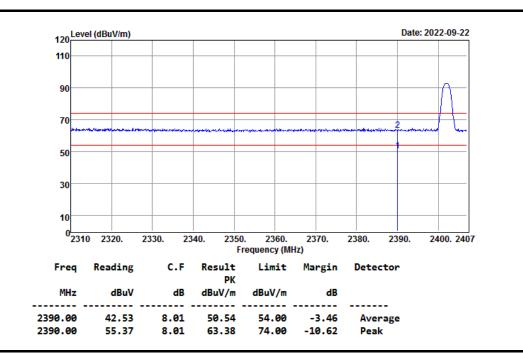
## Report No.: TMTN2203000304NR 9.6.4 RESTRICTED BAND EDGES

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Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	Temp & Humidity	21.5°C, 48%

## Horizontal



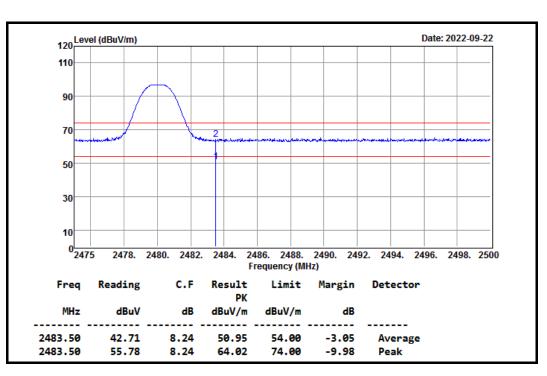


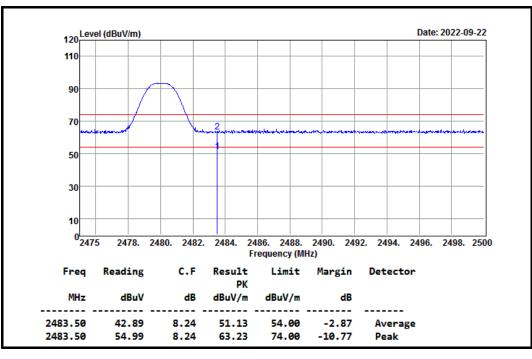


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Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	Temp & Humidity	21.5°C, 48%

#### Horizontal



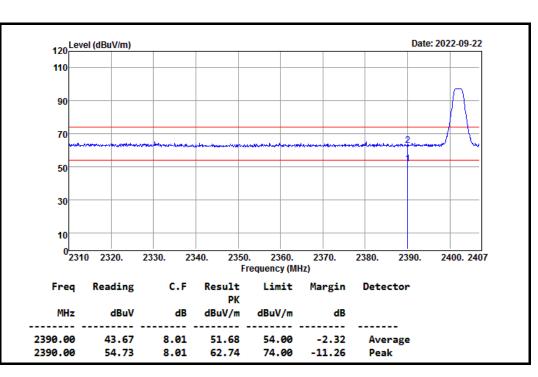


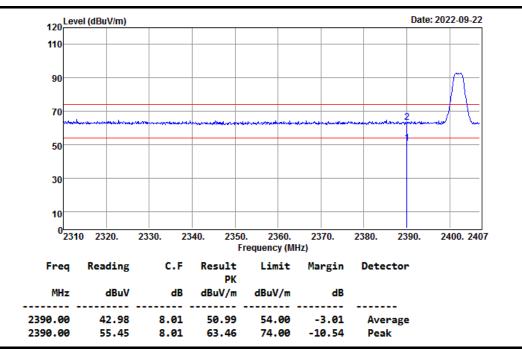


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Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH Low)	Temp & Humidity	21.5°C, 48%

#### Horizontal



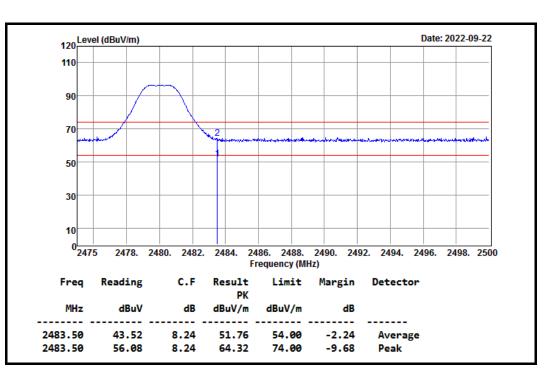


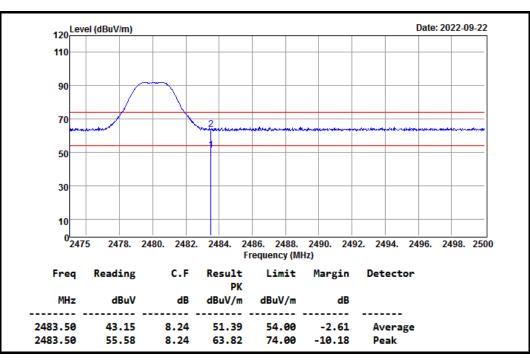


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Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	GFSK(5.2) TX (CH High)	Temp & Humidity	21.5°C, 48%

#### Horizontal







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#### Report No.: TMTN2203000304NR

## 9.7 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.

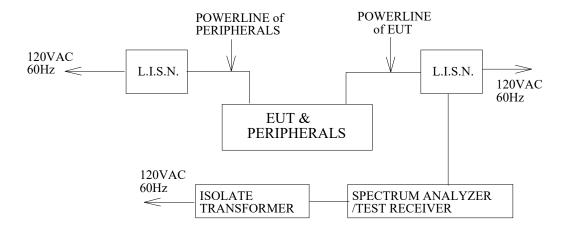
The lower limit applies at the boundary between the frequency ranges.

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.: TMTN2203000304NR 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.

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

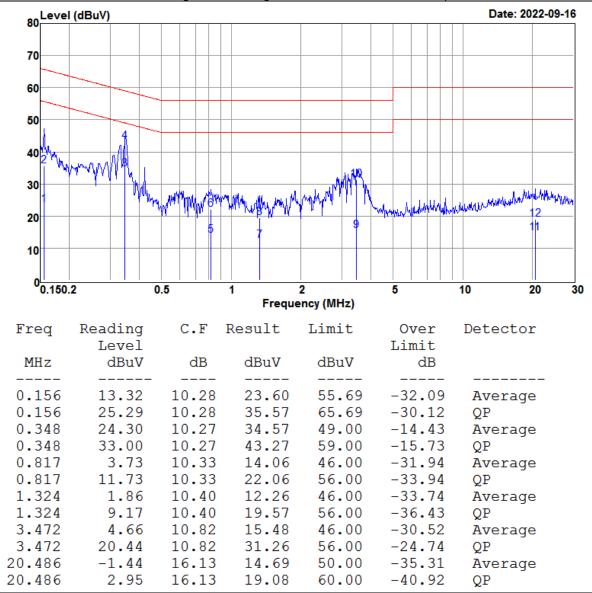
No non-compliance noted.

## Test Voltage: AC 120V, 60Hz

Model No.	TN-400BT-X	Test Mode	Normal Operation
Environmental Conditions		Resolution Bandwidth	9 kHz
Tested by	Leo Wang		

### LINE

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



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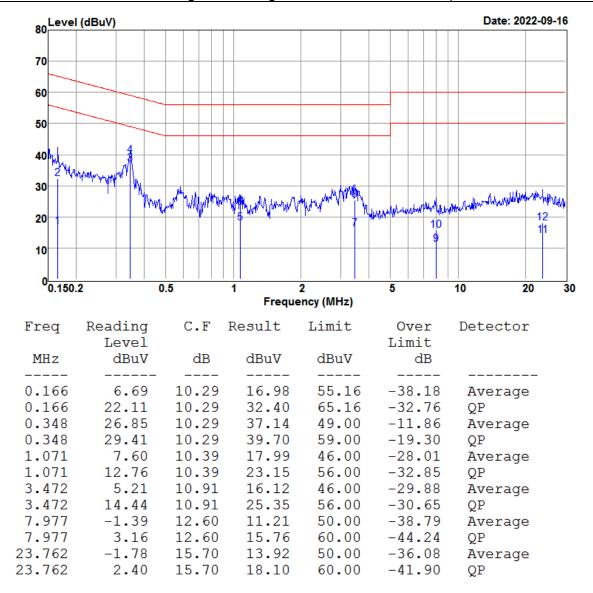


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Model No.	TN-400BT-X	Test Mode	Normal Operation
Environmental Conditions		Resolution Bandwidth	9 kHz
Tested by	Leo Wang		

#### NEUTRAL

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





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# **10. ANTENNA REQUIREMENT**

# **10.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

## **10.2 ANTENNA CONNECTED CONSTRUCTION**

Manufacturer: BRITO TECHNOLOGY Type: PCB Antenna Model: WF-EM-1510-0067-A (WF0EM12-I080) Gain: 2.31 dBi

=== END of Report ===