



 Project No.:
 TM-2209000266P

 Report No.:
 TMTN2209001274NR

FCC ID: XEG-TN400BT-X

Page: 1 / 113 Rev.: 00

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

For

Analog Turntable

Model: TN-400BT-X

Data Applies To: N/A

Brand Name: 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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Page: 2 / 113 Rev.: 00

REVISION HISTORY

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



Page: 3 / 113 Rev.: 00

Report No.: TMTN2209001274NR **TABLE OF CONTENTS**

PAGE NO.

TITLE	PAGE NO
1. TEST REPORT CERTIFICATION	4
2. TEST RESULT SUMMARY	5
3. EUT DESCRIPTION	6
3.1 DESCRIPTION OF EUT & POWER	6
4. DESCRIPTION OF TEST MODES	7
5. TEST METHODOLOGY	9
6. FACILITIES AND ACCREDITATIONS	10
6.1 FACILITIES	10
6.2 EQUIPMENT	10
6.3 LABORATORY ACCREDITATIONS LISTINGS	10
6.4 TABLE OF ACCREDITATIONS AND LISTINGS	11
6.5 MEASUREMENT EQUIPMENT USED	12
6.6 MEASURING INSTRUMENT CALIBRATION	13
6.7 MEASUREMENT UNCERTAINTY	13
7. SETUP OF EQUIPMENT UNDER TEST	14
7.1 SETUP CONFIGURATION OF EUT	14
7.2 SUPPORT EQUIPMENT	15
8. APPLICABLE LIMITS AND TEST RESULTS	
8.1 20DB BANDWIDTH FOR HOPPING	
8.2 MAXIMUM PEAK OUTPUT POWER	
8.3 HOPPING CHANNEL SEPARATION	
8.4 NUMBER OF HOPPING FREQUENCY USED	40
8.5 DWELL TIME ON EACH CHANNEL	43
8.6 DUTY CYCLE	57
8.7 CONDUCTED SPURIOUS EMISSION	
8.8 RADIATED EMISSIONS	71
8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS 8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHZ	
8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHZ	
8.8.4 RESTRICTED BAND EDGES	
APPENDIX I PHOTOGRPHS OF TEST SETUP	
APPENDIX II PHOTOGRPHS OF EUT	103



Page: 4 / 113 Rev.: 00

Report No.: TMTN2209001274NR

1. TEST REPORT CERTIFICATION

Applicant	:	TEAC CORPORATION 1-47 Ochiai, Tama-shi, Tokyo 206-8530,Japan	
Manufacturer	:	 Ya Horng Electronic Co., Ltd No. 35, Shalun, Jon Sha Village, Anding Dist., Tainan City 745 Taiwan Ya Horng (Dongguan) Electronic Co.,Ltd. Room 201, Building #9, No.84 Gaoyu South Road, Tangxia Town,Dong Guan, Guangdong, China 	
Equipment Under Test	:	Analog Turntable	
Model Number	:	TN-400BT-X	
Data Applies To	:	N/A	
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	PASS		
Statements of Conformity			
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.			

We hereby certify that:

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

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

Approved by:

Eric Huang Section Manager



Page: 5 / 113 Rev.: 00

2. TEST RESULT SUMMARY

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



3. EUT DESCRIPTION

3.1 DESCRIPTION OF EUT & POWER

Product	Analog Turntable
Model Number	TN-400BT-X
Data Applies To	N/A
Brand Name	TEAC
Received Date	September 16, 2022
Reported Date	October 04, 2022
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK : -3.058dBm / 0.495mW 8DPSK: -0.098dBm / 0.978mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode:1 Mbps 4/πDQPSK Mode:2Mbps 8DPSK Mode:3Mbps
Modulation Type	GFSK、π/4DQPSK、8DPSK
Number of Channels	79 Channels
EUT Power Supply	DC 12V (Powered by adapter)
Antenna Type	Manufacturer: BRITO TECHNOLOGY Type: PCB Antenna Model: WF-EM-1510-0067-A (WF0EM12-I080) Gain: 2.31 dBi
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 production product and was provided by manufacturer.

- 2. This submittal(s) (test report) is intended for **FCC ID: XEG-TN400BT-X** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
- 3. For more details, please refer to the User's manual of the EUT.



4. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2402
Middle	2441
High	2480

Radiated Emission Test (Below 1 GHz):

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

Normal Operation

Radiated Emission Test (Above 1 GHz):

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

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



Page: 8 / 113 Rev.: 00

Bandedge Measurement :

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

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

Antenna Port Conducted Measurement :

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

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



Page: 9 / 113 Rev.: 00

5. TEST METHODOLOGY

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



Page: 10 / 113 Rev.: 00

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, ANSI C63.10 and CISPR Publication 22.

6.2 EQUIPMENT

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

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

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

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

6.3 LABORATORY ACCREDITATIONS LISTINGS

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



Page: 11 / 113 Rev.: 00

Report No.: TMTN2209001274NR

6.4 TABLE OF ACCREDITATIONS AND LISTINGS

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

Taiwan TAF

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

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



Page: 12 / 113 Rev.: 00

6.5 MEASUREMENT EQUIPMENT USED For §8.8.2~8.8.3

	C	hamber 1166 Roo	om (Radiation Test	t)	
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(\	/6.101222)	

For §8.1~8.7 8.8.4

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 §8.9

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)					



Page: 13 / 113 Rev.: 00

Report No.: TMTN2209001274NR

6.6 MEASURING INSTRUMENT CALIBRATION

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

6.7 MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 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



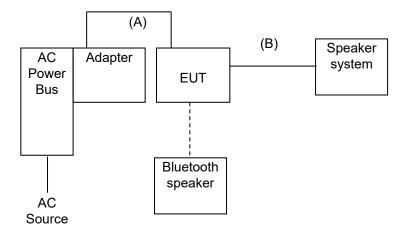
Page: 14 / 113 Rev.: 00

Report No.: TMTN2209001274NR

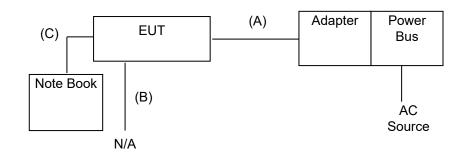
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

EMI



RF





7.2 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 description		
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



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

Page: 16 / 113 Rev.: 00



BT4.0、5.0

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.

Page: 17 / 113 Rev.: 00



Page: 18 / 113 Rev.: 00

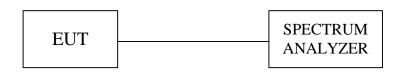
8. APPLICABLE LIMITS AND TEST RESULTS

8.1 20dB BANDWIDTH FOR HOPPING

<u>LIMIT</u>

None; for reporting purposes only.

TEST SETUP



TEST PROCEDURE

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

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



TEST RESULTS

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

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1122.00	0.75	PASS
Middle	2441	1122.00	0.75	PASS
High	2480	1118.00	0.75	PASS

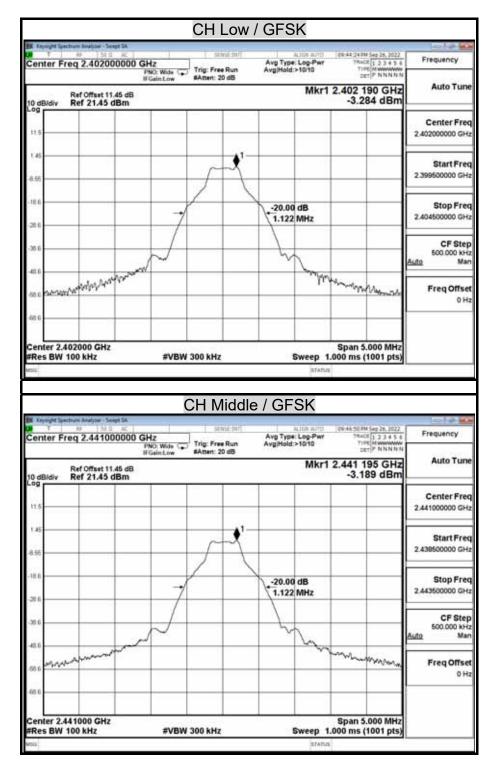
Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1396.00	0.94	PASS
Middle	2441	1395.00	0.93	PASS
High	2480	1395.00	0.94	PASS



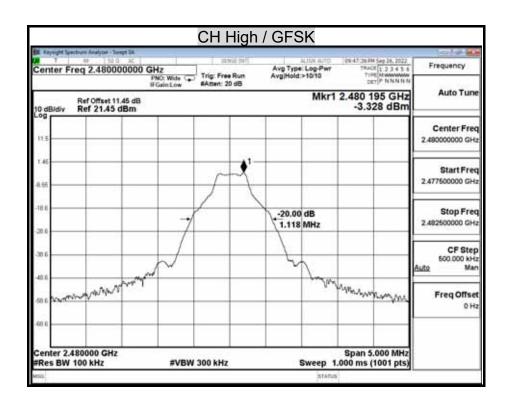
Page: 20 / 113 Rev.: 00

20dB BANDWIDTH



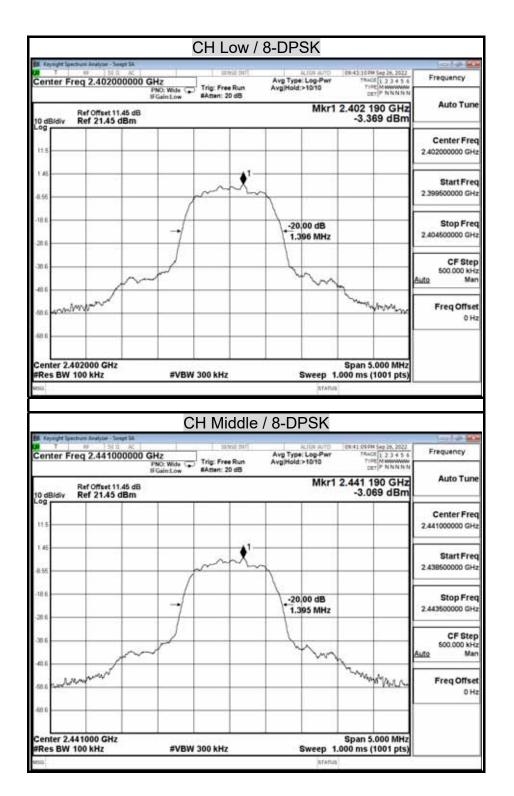


Page: 21 / 113 Rev.: 00



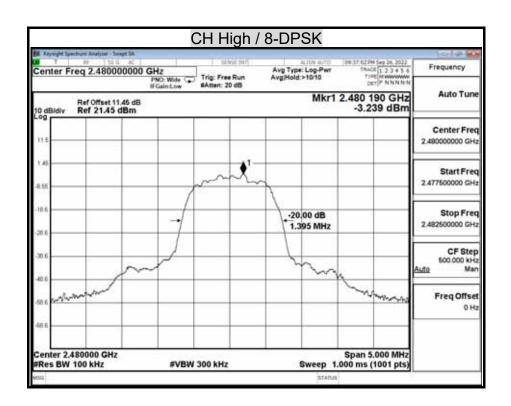


Page: 22 / 113 Rev.: 00





Page: 23 / 113 Rev.: 00





Page: 24 / 113 Rev.: 00

Report No.: TMTN2209001274NR

8.2 MAXIMUM PEAK OUTPUT POWER

<u>LIMIT</u>

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

Test Configuration



TEST PROCEDURE

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

Peak Power set:

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

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



Page: 25 / 113 Rev.: 00

Average power set:

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

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

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

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

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

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



TEST RESULTS

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

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-3.106	0.48910		PASS
Mid	2441	-3.058	0.49454	125	PASS
High	2480	-3.132	0.48618		PASS

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-0.170	0.96161		PASS
Mid	2441	-0.098	0.97769	125	PASS
High	2480	-0.214	0.95192		PASS



Page: 27 / 113 Rev.: 00

Average Power Data

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-4.528	1.10474	-3.42
Middle	2441	-4.418	1.10474	-3.31
High	2480	-4.522	1.10474	-3.42

Modulation Type: 8-DPSK / 3-DH5

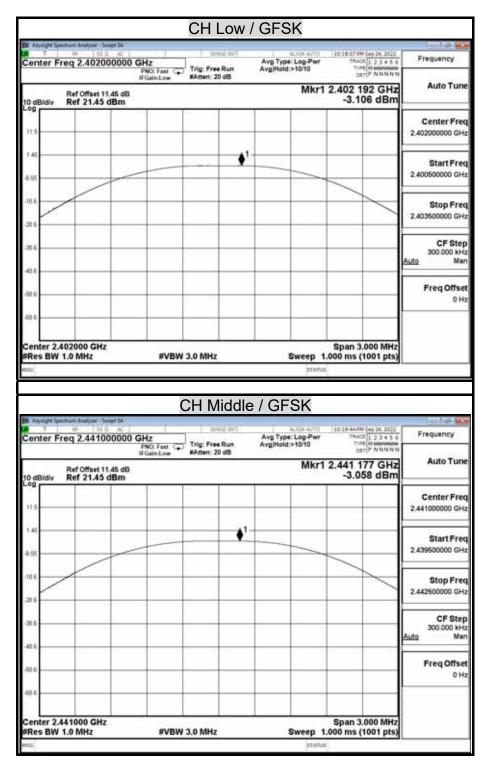
Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-4.696	1.10474	-3.59
Middle	2441	-4.639	1.10474	-3.53
High	2480	-4.744	1.10474	-3.64



Page: 28 / 113 Rev.: 00

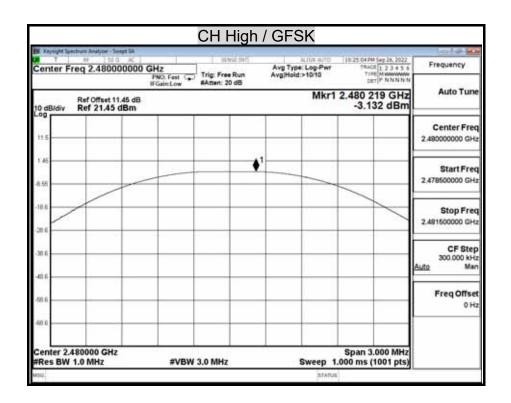
Report No.: TMTN2209001274NR

MAXIMUM PEAK OUTPUT POWER





Page: 29 / 113 Rev.: 00





Page: 30 / 113 Rev.: 00

		PSK	/ 8-	CH Lo			
Frequency	10-40 1824 Seg 25, 2022 TRACE 1 2 3 4 5 6 T195 M M M M	ype: Log-Pwr	Å	stast	GHz	g 2.402000000 G	enter Fr
Auto Tun	2.402 015 GHz -0.170 dBm	old:>10/10 Mkr1 2	~	Atten: 20 d	PNO: Fast G IFGain:Low	Ref Offset 11.45 dB Ref 21.45 dBm	dB/div
Center Fre 2.402000000 GH							1.5
Start Fre 2.399500000 GH			-	*	-		45 66
Stop Fre 2.404500000 GH							
CF Ste 500.000 kH Auto Ma			-				6
Freq Offse			_				6
	Span 5.000 MHz 00 ms (1001 pts)	STAPUS		V 5.0 MHz		2000 GHz 5 MHz	enter 2.4 Res BW
Frequency		DPSK		H Midd	С	5 MHz	Kes BW
Frequency Auto Tun	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO			C GHz PNO: Fast	5 MHz	tenter Fr
	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO		H Midd	C GHz PNO: Fast	5 MHz	dBidiv
Auto Tun Center Fre	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO			C GHz PNO: Fast	5 MHz	dBidiv 9
Auto Tun Center Fre 2.44100000 GH Start Fre	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO		H Midd	C GHz PNO: Fast	5 MHz	dB/div s
Auto Tun Center Fre 2.44100000 GH Start Fre 2.43850000 GH Stop Fre	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO		H Midd	C GHz PNO: Fast	5 MHz	dBidiv a a a a a a a a a a a a a
Auto Tun Center Fre 2.44100000 GH Start Fre 2.438500000 GH Stop Fre 2.443500000 GH	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO		H Midd	C GHz PNO: Fast	5 MHz	dBidiv g dBidiv g dBidiv g dBidiv
Auto Tu Center Fr 2.441000000 G Start Fr 2.439500000 G Stop Fr 2.443500000 G CF St Stop Stop St Stop Stop St Stop Stop Stop Stop Stop Stop Stop Stop	100 ms (1001 pts)	DPSK AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO AUDI AUTO		H Midd	C GHz PNO: Fast	5 MHz	dBidiv g dBidiv g dBidiv g dBidiv g dBidiv g dBidiv g dBidiv



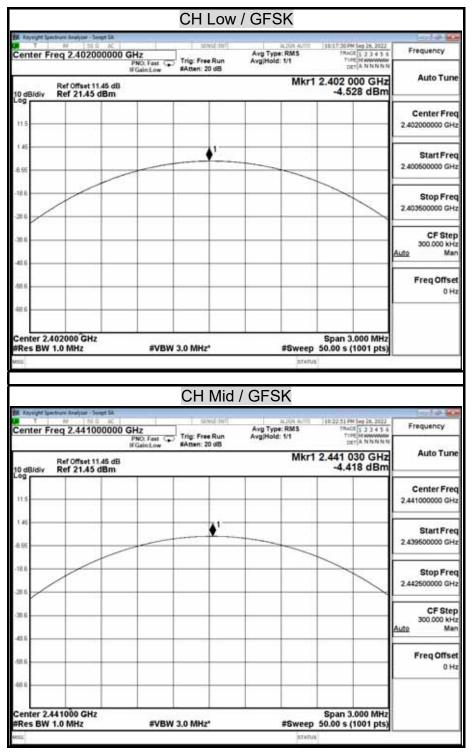
Page: 31 / 113 Rev.: 00

	CH High /	8-DPSK		
Keysight Spectrum Analyzer - Swept SA	I sind of	the street starts		
Center Freq 2.480000000	GHz PNO: Fast () Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>10/10	18:33:38 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TUPE MINIMUM DET P N N N N N	Frequency
Ref Offset 11.45 dB 10 dBidiy Ref 21.45 dBm	IFGainLow #Atten: 20 dB	Mkr1 :	2.480 020 GHz -0.214 dBm	Auto Tune
115				Center Fred 2.49000000 GHz
8.55				Start Free 2.477500000 GH
316				Stop Free 2.482500000 GH:
30.6				CF Step 500.000 kH Auto Mar
50.6				Freq Offse 0 H
68 5 Center 2.480000 GHz			Span 5.000 MHz	
#Res BW 1.5 MHz	#VBW 5.0 MHz	Sweep 1.0	000 ms (1001 pts)	



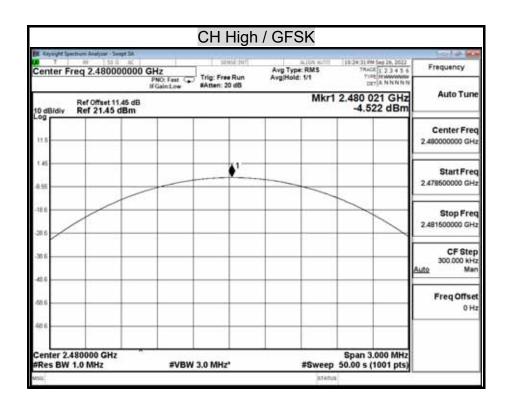
Page: 32 / 113 Rev.: 00

AVERAGE POWER



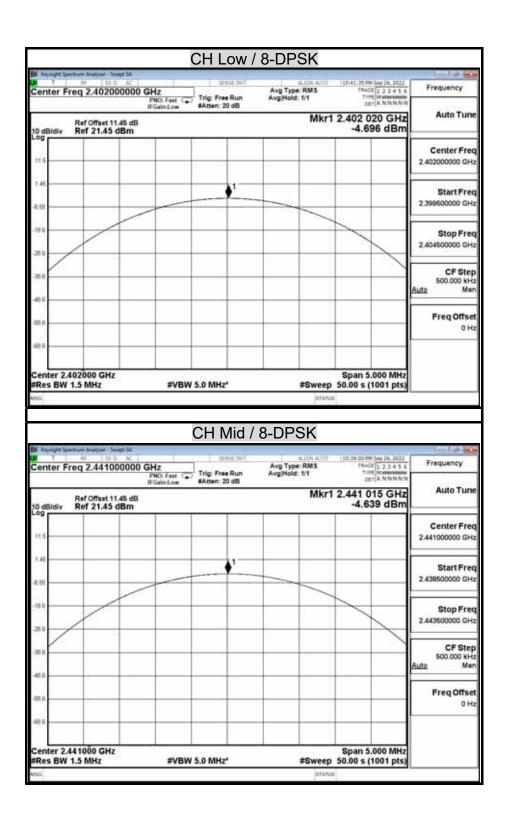


Page: 33 / 113 Rev.: 00



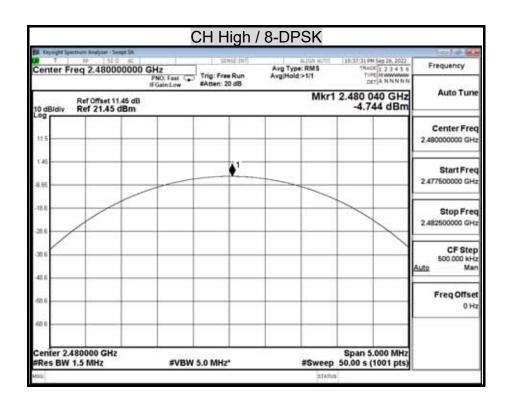


Page: 34 / 113 Rev.: 00





Page: 35 / 113 Rev.: 00





8.3 HOPPING CHANNEL SEPARATION

<u>LIMIT</u>

§15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo andomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST SETUP



TEST PROCEDURE

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

Page: 36 / 113 Rev.: 00



Page: 37 / 113 Rev.: 00

Report No.: TMTN2209001274NR TEST RESULTS

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

	GFSK	(Low)	
Keysight Spectrum Analyzer - So	Nept 1A	AUTO (09/52/55/PM Sep 26, 2	
enter Freq 2.4020	00000 GHz	Ave Type: Log-Per TRACE 1 2 3 4	5.4 Prequency
	PNO: Wide C Trig: Free Run IFGain:Low #Atten: 20 dB	Avg/Hold:>10/10 THE NWW DET P N NN	
Ref Offset 1 dB/div Ref 21.45		ΔMkr1 1.000 Mi 0.006 d	
5		102	Center Free
5			2.402000000 GH
6			Start Free
6 WWWWWW			Stop Free 2.403500000 GH
6			2.000000000
nter 2.402000 GHz es BW 100 kHz	#VBW 300 kHz	Span 3.000 M Sweep 1.000 ms (1001 p	300.000 kH
	1.000 MHz (Δ) 0.006 dB	NCTION FUNCTION MODEL	Auto Mar
FI	2.402.000 GHz -3.946 dBm		Freq Offse
			1
9 1 1 1		C20441 210	
		STATUS	10.0

HOPPING CHANNEL SEPARATION

	GFSK(I	Middle)		
enter Freq 2.44100000	PNO: Wide () Trig: Free Run	Auton Auto Avg Type: Log-Pwr Avg/Hold:>10/10	19 52 022H Sep 26, 2022 78ACE 1 2 3 4 5 6 71/PE N Manufacture	Frequency
Ref Offset 11.45 d dBidiv Ref 21,45 dBm	IFGainLow #Atten: 20 dB	ΔMk	r3 -1.000 MHz 0.025 dB	Auto Tur
P9 15 .45 ↓3Δ4				Center Fre 2.441000000 GH
				Start Fre 2.439500000 G
6 6 5				Stop Fr 2.442500000 G
enter 2.441000 GHz tes BW 100 kHz	#VBW 300 kHz	Sweep 1.0	Span 3.000 MHz 00 ms (1001 pts)	CF Ste 300.000 k
1 Δ2 (Δ)	1.000 MHz (Δ) -0.019 dB	NETION FUNCTION MOTO	TUNKTION VALUE	Auto M
Δ4 <u>f</u> (Δ) 4 F f 2.4 5 7 8	/41.000 GHz -3.852 dBm -1.000 MHz (Δ) -0.025 dB /41.000 GHz -3.862 dBm			Freq Offs 01
9		STARUS		



Page: 38 / 113 Rev.: 00

GFSK(High) Center Freq 2.480000000 GHz FNO: Wide Trig: Free Run If GainLow RAten: 20 dB 5 PM Sep 25, 2022 RACE 1 2 3 4 5 6 TUPE M WWWWWW DET P N N N N N Frequency Avg Type: Log-Pwr Avg/Hold:>10/10 ΔMkr1 -1.000 MHz -0.003 dB Auto Tune Ref Offset 11.45 dB Ref 21.45 dBm 11 Center Freq ♦142 2.48000000 GHz 1.4 3 84 tŔ. Start Freq 26.1 2.478500000 GHz 18 48. Stop Freq 681 2.481500000 GHz Center 2.480000 GHz #Res BW 100 kHz Span 3.000 MHz Sweep 1.000 ms (1001 pts) CF Step 300.000 kHz Man #VBW 300 kHz Lito I DESCRIPTION DESCRIPTION 1 (4) -1.000 MHz (Δ) 2.480 000 GHz A2 F -0.003 dB -4.007 dBm Freq Offset 0 Hz 10 11 STATUS

ALIDA ANTO TPE-Log-Pwr Id:>1010	Mkr1 1.00	123456 Muller PNNNNN	Frequency Auto Tune Center Frec 2.40200000 GH3 Start Frec 2.40050000 GH3
Ad:>10/10	Vikr1 1.00 0.1	P NNNNN	Auto Tune Center Frec 2.40200000 GHz Start Frec 2.40050000 GHz
	0.1		Center Free 2.40200000 GH Start Free 2.400500000 GH
	<u></u> <u> </u>		2.40200000 GH Start Fre 2.40050000 GH
			Start Fre 2.400500000 GH
			2.400500000 GH
		I	
			Stop Fre 2.403500000 GH
Sweep 1			CF Ste 300.000 kH
and in the local division in the	a local de la calendar de la calenda		Auto Ma
			Freq Offse 0 H
1.000		-	
	une convocu	Sweep 1.000 ms (1	



Page: 39 / 113 Rev.: 00

8-DPSK (Middle) Center Freq 2.441000000 GHz FNO: Wide (This Free Run If GainLow RAter: 20 dB 43 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 TIPE MWWWWW DET P NNNNN Frequency Avg Type: Log-Pwr Avg/Hold:>10/10 Auto Tune ΔMkr3 -1.000 MHz -0.045 dB Ref Offset 11.45 dB Ref 21.45 dBm Center Freq 0142 \$3∆4 2.441000000 GHz 1,4 5 84 tó Start Freq 26.1 2.439500000 GHz 18 48.9 Stop Freq 681 2.442500000 GHz Center 2.441000 GHz #Res BW 100 kHz Span 3.000 MHz Sweep 1.000 ms (1001 pts) CF Step 300.000 kHz Man #VBW 300 kHz Lito OF STATE STATE STATE † (Δ) † † (Δ) † 1,000 MHz (Δ) 2,441 000 GHz -1,000 MHz (Δ) 2,441 000 GHz 1 Δ2 2 F Δ4 4 F -0.011 dB -4.682 dBm -0.045 dB -4.682 dBm Freq Offset 0 Hz 10 11 STATUS

	8-DPSK	(High)		
Kaysight Spectrum Analyzer - Swept SA T	Street out		18-01-337M Sep 26, 2022	Frequency
Center Freq 2.480000000 GHz	Wide Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TYPE NNNNN DET PNNNNN	Prequency
Ref Offset 11.45 dB		ΔMkr	1 -1.000 MHz 0.057 dB	Auto Tun
				Center Fre
1.45				2.48000000 GH
486				Start Fre
28.6				2.478500000 GH
48.6			~~~	Stop Fre
68.6				2.481500000 GH
Center 2.480000 GHz			Span 3.000 MHz	CF Ste
#Res BW 100 kHz	#VBW 300 kHz	succession of the second se	00 ms (1001 pts)	300.000 kH Auto Ma
Δ2 f Δ3 -1,000 2 F f 2,480,000	MHz (Δ) 0.057 dB	NCISON FUNCTION MOTO	POWETICH WEDE	
3 4 5	5nz -4.620 05m			Freq Offse
6 7				
8 9 10				
11	-			
845		STATUS		



Page: 40 / 113 Rev.: 00

Report No.: TMTN2209001274NR

8.4 NUMBER OF HOPPING FREQUENCY USED

<u>LIMIT</u>

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

TEST SETUP



TEST PROCEDURE

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



TEST RESULTS

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

Modulation Type: GFSK / DH5

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

Modulation Type: 8-DPSK / 3-DH5

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



Page: 42 / 113 Rev.: 00

Report No.: TMTN2209001274NR

		n Analyzeri - Svet U 1,50 D	AC .		1 50	NR INT		ALIM N/TO	11:11:45 P			Frequency
Start	Freq 2	.400000	P	O: Fest	Trig: Fre		Avg Type Avg(Hold	Log-Pwr >10/10	1940	E 12345	**	riequency
10 dB/c	Re siv Re	of Offset 11. of 21.45 c	45 dB	ABIT:LOW				Mkr1 2	427 22		z	Auto Tun
11.5												Center Free 2.441750000 GH
8.55	MW	A MARAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				MIM	10101202	100000		100100		Start Fre 2.40000000 GH
-18.6	11111	111111	11111111	mmm	mm	((()))))	AN HIN	1111111	1111111	1111		Stop Fre 2.483500000 GH
38.6											Au	CF Stej 8.350000 MH 50 Ma
68.6										1		Freq Offse 0 H
48.6	2,40000	CHA							Stop 2.48	250 CH		

NUMBER OF HOPPING FREQUENCY USED

			8-DF	JSK			
Keysight Sa	AF 150 0. AC		T SANSE INT	A 120 M	20 III	12:14 PM Sep 26, 2022	1010
Start Fre	q 2.40000000 GH	PNC: Fast [+]	Trig: Free Run #Atten: 20 dB	Avg Type: Log-F Avg(Hold:>10/10	wr	THACE 1 2 3 4 5 1	Frequency
10 dB/div	Ref Offset 11.45 dB Ref 21.45 dBm			Mkr	1 2.41	3 193 0 GHz -3.068 dBm	
ns							Center Fre 2.441750000 GH
1.45 (8.55 M	annan hanna	www.	maanaa	mmmmm	wywy	uwwww	Start Fre 2.40000000 GH
20.6				-			Stop Fre 2.483500000 GH
38.6							CF Ste 8.350000 Mi Auto Ma
68.6						Ļ	Freq Offse
08.6					+	_	
	0000 GHz 100 kHz	#VBW 3	00 kHz	Swee		p 2.48350 GHz ms (1001 pts	
49G					TATUS	- 10 - 10 - 1	



Page: 43 / 113 Rev.: 00

8.5 DWELL TIME ON EACH CHANNEL

<u>LIMIT</u>

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

TEST SETUP



TEST PROCEDURE

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



Report No.: TMTN2209001274NR TEST RESULTS

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

Refer to the attached graph.

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

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

Modulation Type: GFSK / DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.400	128.00	400.00	PASS
2441MHz	DH3	1.640	262.40	400.00	PASS
2441MHz	DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS
DH1 Dwell tine= DH3 Dwell tine=		s×(1600÷2)÷79×3 s×(1600÷4)÷79×3			

 DH3 Dwell tine=
 1.640
 ms×(1600÷4)÷79×31.6=
 262.40
 (ms)

 DH5 Dwell tine=
 2.900
 ms×(1600÷6)÷79×31.6=
 309.33
 (ms)

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

Modulation Type: 8-DPSK / 3-DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	3DH1	0.400	128.00	400.00	PASS
2441MHz	3DH3	1.640	262.40	400.00	PASS
2441MHz	3DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS
3DH1 Dwell tine=	0.400 mg	x(1600÷2)÷70x	31.6 = 128.00 (ms)		

3DH1 Dwell tine=0.400ms×(1600÷2)÷79×31.6=128.00 (ms)3DH3 Dwell tine=1.640ms×(1600÷4)÷79×31.6=262.40 (ms)3DH5 Dwell tine=2.900ms×(1600÷6)÷79×31.6=309.33 (ms)AFH Dwell tine=2.900ms×(800÷6)÷20×8=154.67 (ms)

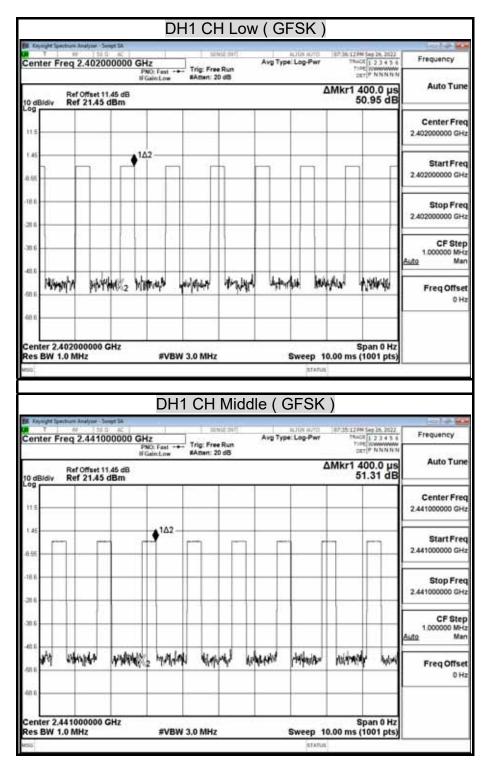
Page: 44 / 113 Rev.: 00



Page: 45 / 113 Rev.: 00

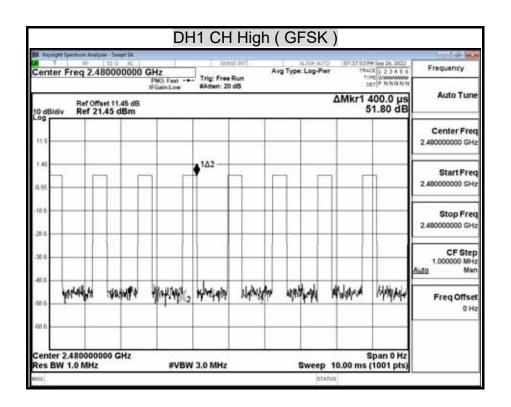
Report No.: TMTN2209001274NR

DWELL TIME ON EACH PAYLOAD



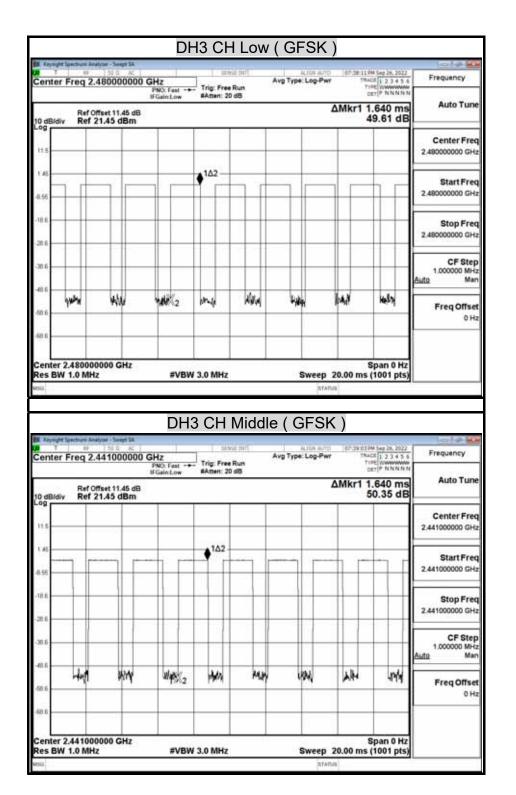


Page: 46 / 113 Rev.: 00



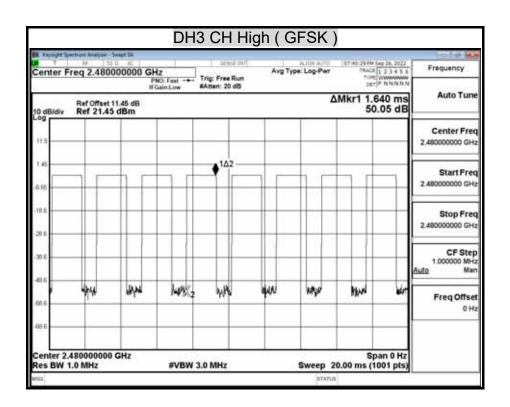


Page: 47 / 113 Rev.: 00





Page: 48 / 113 Rev.: 00



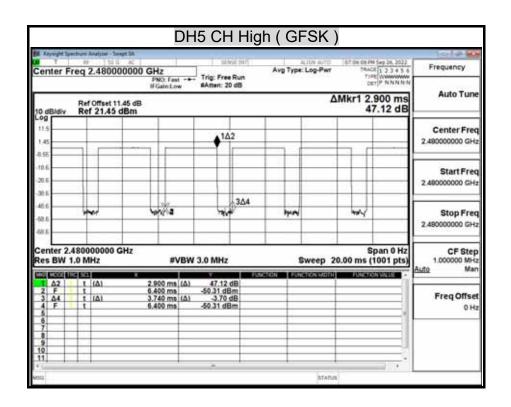


Page: 49 / 113 Rev.: 00

			DH5 CH				
Kaysight Spa	RF 158.0 A	A)	I sense:	INF.	ALIER AUTO [06:59]	42.9M Sep 28, 2022	E Constantino de la constant
enter F	req 2.402000	PNO: Fas	Trig: Free Ru	10	rpe: Log-Pwr	THACE 1 2 3 4 5 6 THE WWWWWW DET P NNNNN	Frequency
		IFGain:Lo	w #Atten: 20 di	8			Auto Tun
0 dB/div	Ref Offset 11.45 Ref 21.45 dB				AMKI	2.900 ms 50.77 dB	
00	Ner 21.45 46	1					1220-12-14-14-14-1
11.5			102				2.402000000 GH
855]]							2.402000000000
10.6	_						Start Fre
28.6		+ + -					2.402000000 GH
38.5			304				
40.6	44	×.	- United the second sec	10.00	une	4004	Stop Fre
58.6							2.40200000 GH
-	12 1 2						
Center 2. Res BW 1	402000000 GH: .0 MHz		/BW 3.0 MHz		Sweep 20.00 m	Span 0 Hz	CF Step 1.000000 MH
	Shall Sha		BIT GIO MILL			NACIONAL -	Auto Ma
1 42	t (Δ)	2.900 ms 4.860 ms					
2 F 3 A4 4 F	t (Δ)	3.740 ms 4.860 ms					FreqOffse
5 6		4.000 (110	50.00 4000				он
7 8							
9							
19							
11							
11		D	H5 CH M	liddle (GFSK)		
SSS K. Anyonght Spo T	churs Analyse - Swept 1 10 − 20 − 20 − 20 − 20 − 20 − 20 − 20 −	4 2	546	Avg Tr	GFSK)	54794 Sep 28, 2022	Marker
SSS Kaysogitt Spa T	# 1510 #	A.	Stand	Avg Ty	GFSK)	54784 Seg 25, 2022 RACE (1, 2, 3, 4, 5, 6 DET (P, N, N, N, 6, N	
Aarker 1	Δ 2.90000 ms	s PNO: Fast IFGainLor dB	Stand	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.3.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker
Arrent I Marker 1 0 dBJdiv	Δ 2.90000 ms	s PNO: Fast IFGainLor dB	Stand	Avg Ty	GFSK)	54784 Seg 25, 2022 RACE (1, 2, 3, 4, 5, 6 DET (P, N, N, N, 6, N	Marker
Arrent ler T Marker 1 0 dB/div	Δ 2.90000 ms	A S PNO: Fas IFGainLos dB m	Trig: Free Ru Atten: 20 db	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker Select Marker 1
0 dB/div 99	Δ 2.90000 ms	A S PNO: Fas IFGainLos dB m	Stand	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker Select Marker 1
0 dB/div 99 11 5 1 45 8 55	Δ 2.90000 ms	A S PNO: Fas IFGainLos dB m	Trig: Free Ru Atten: 20 db	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker Select Marker 1
Aarker 1 0 dB/div 115 145 185	Δ 2.90000 ms	A S PNO: Fas IFGainLos dB m	Trig: Free Ru Atten: 20 db	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker Select Marker 1 Norma
Aarker 1 0 dB/div 0 dB/div 11 5 1 45 355 10 6 28 5	Δ 2.90000 ms	A S PNO: Fas IFGainLos dB m	t → Trig: Free R #Atten: 20 dl	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker
0 dB/div 7 0 dB/div 11.5 1.45 1.45 1.6 28.6	A 2.90000 m Ref 0ffset 11.45 Ref 21.45 dB	A PNO: Fas IFGainLo dB.	Trig: Free R #Atten: 20 db	Avg Ty	GFSK)	2.900 db 50.000 dB	Marker Select Marker 1 Norma Delt
Arvent for 7 0 dB/div 0 dB/div 115 145 855 10.6 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5	Δ 2.90000 ms	A PNO: Fas IFGainLo dB.	t → Trig: Free R #Atten: 20 dl	Avg Ty	GFSK)	547M 549 24, 2022 RACE (2.2.3.4.5.4 DET (P. N.N.N.N. DET (P. N.N.N.N. 2.900 ms	Marker Select Marker 1 Norma Delt
Arvent for 7 0 dB/div 0 dB/div 115 145 855 10.6 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 28.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5	A 2.90000 m Ref 0ffset 11.45 Ref 21.45 dB	A PNO: Fas IFGainLo dB.	Trig: Free R #Atten: 20 db	Avg Ty	GFSK)	2.900 db 50.000 dB	Marker Select Marker 1 Norma Delt
Aarker 1 0 dB/div 115 145 285 285 285 285 285 285 285 285 285 28	Δ 2.90000 ms	s PNO: Fas IFGaint.o dB m	Trig: Free Ru #Atten: 20 df	Avg Ty	GFSK)	Separa Sep 28, 2022 TRACE [1 2 3 4 5 4 Trace December 2 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed
Aarker 1 0 dB/div 115 145 15 16 26 5 36 6 6 6 6 6 6 6 6 6 7 7 7 8 7 7 8 7 8 7	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB 40% a 41000000 GHz	s PNO: Fas IFGaint.o dB m	Trig: Free Ru #Atten: 20 df 1Δ2 3Δ4 New 3.0 MHz	Avg Ty	GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed
Aarward In Aarker 1 0 dBldiv -99 115 1.45 1.45 1.45 1.45 1.45 0.66 0.6 0.6 0.6 0.6 0.6 0.6 0.	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB 441000000 GH: .0 MHz 1 (Δ)	s PNO: Fas IFGainLo dB m	1 Trig: Free R #Atten: 20 dl 1Δ2 3Δ4 Nei /BW 3.0 MHz	Avg Ty B	GFSK) ALION AND STORE ΔMkr1	Separa Sep 28, 2022 TRACE [1 2 3 4 5 4 Trace December 2 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed
Aarker 1 0 dB/div 1 4 1 5 1 45 1 45 15 1 45 15 15 15 15 15 15 15 15 15 15 15 15 15	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB/ 4410000000 GH; .0 MHz 1 (Δ) t (Δ)	s PNO: Fast IFGainLo dB m	Stride Stride Trig: Free R: SAtten: 20 dl SA		GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed Of
1 Δ2 1 Δ2	Δ 2.90000 ms	s PNO: Fas IFGainLo dB m	Stride Stride Trig: Free R: SAtten: 20 dl SA		GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed Of
Arrived by Arrived by Arrived by Arrived by 0 dBJdfy 0 dBJdfy	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB/ 4410000000 GH; .0 MHz 1 (Δ) t (Δ)	s PNO: Fast IFGainLo dB m	Stride Stride Trig: Free R: SAtten: 20 dl SA		GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed Of Properties
Aarker 1 0 dB/div 10 dB/div 115 145 15 145 15 16 16 16 16 16 16 16 16 16 16 16 16 16	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB/ 4410000000 GH; .0 MHz 1 (Δ) t (Δ)	s PNO: Fast IFGainLo dB m	Stride Stride Trig: Free R: SAtten: 20 dl SA		GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed Of Properties More
0 dBJdiv 99 115 145 145 145 145 145 00 dBJdiv 99 115 145 145 00 dBJdiv 99 115 145 00 dBJdiv 90 115 145 00 dBJdiv 145 145 145 145 145 145 145 145	Δ 2.90000 ms Ref Offset 11.45 Ref 21.45 dB/ 4410000000 GH; .0 MHz 1 (Δ) t (Δ)	s PNO: Fast IFGainLo dB m	Stride Stride Trig: Free R: SAtten: 20 dl SA		GFSK) ALION AND STORE ΔMkr1	51700 509 28, 2022 TRACE [1 2 3 4 5 4 TYPE 1 2 3 4 5 4 TYPE 1 NINNEN 2.900 ms 50.00 dB 	Marker Select Marker 1 Norma Delt Fixed Ol Properties

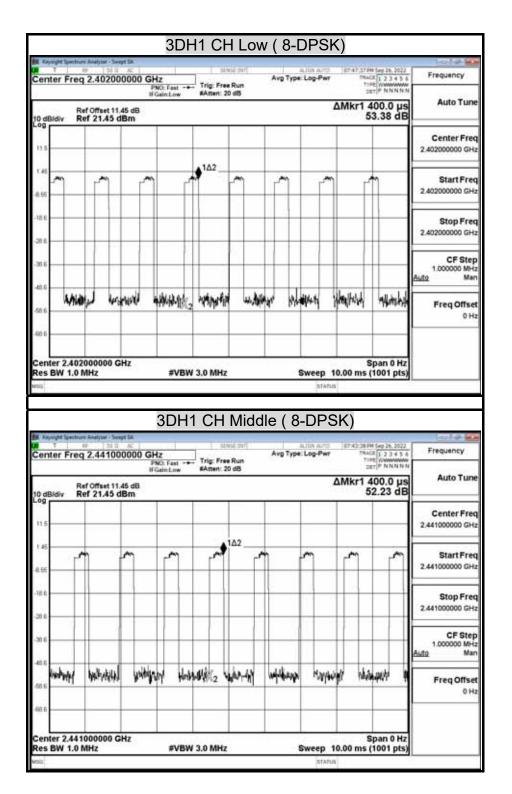


Page: 50 / 113 Rev.: 00



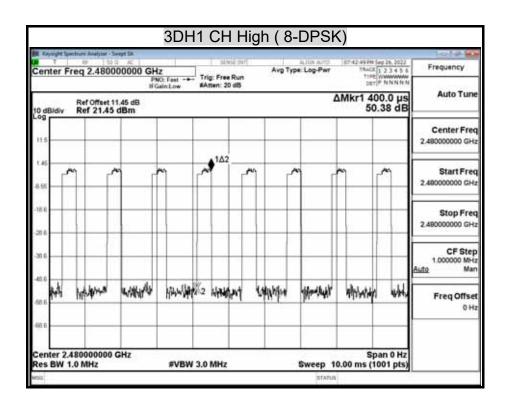


Page: 51 / 113 Rev.: 00



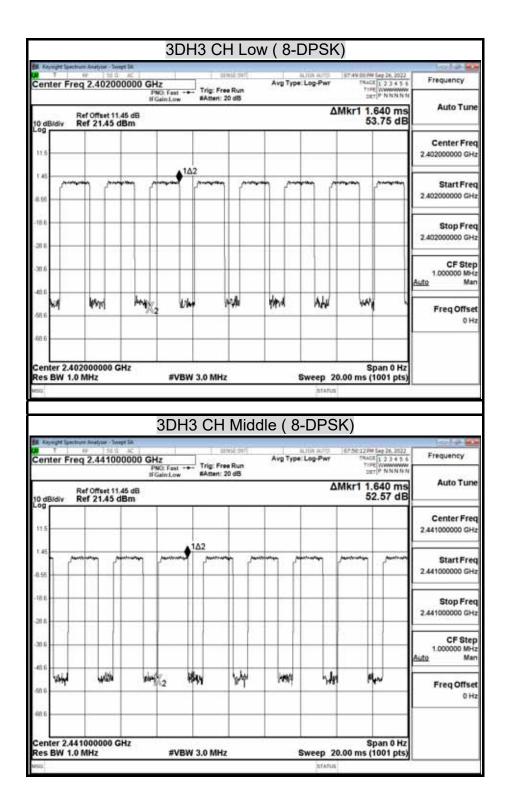


Page: 52 / 113 Rev.: 00



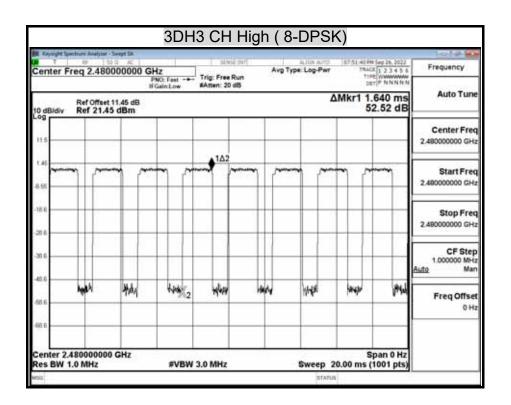


Page: 53 / 113 Rev.: 00



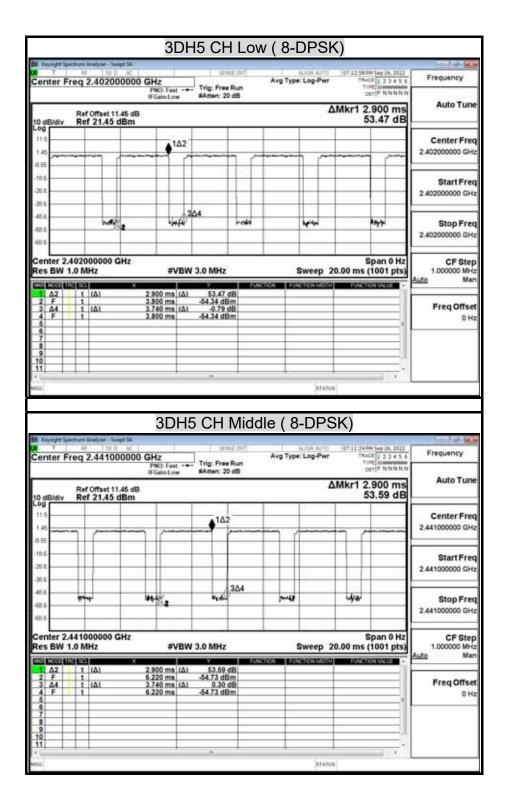


Page: 54 / 113 Rev.: 00



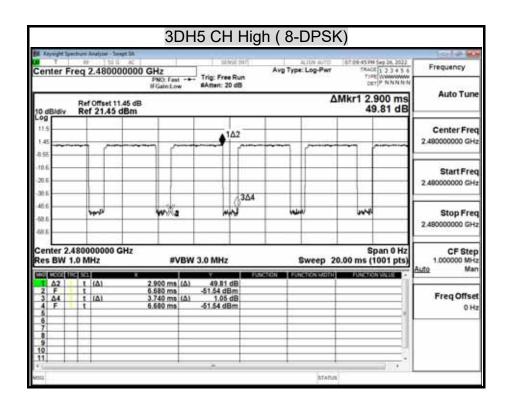


Page: 55 / 113 Rev.: 00





Page: 56 / 113 Rev.: 00





Page: 57 / 113 Rev.: 00

8.6 DUTY CYCLE

<u>LIMIT</u>

Nil (No dedicated limit specified in the Rules)

TEST SETUP



TEST PROCEDURE

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



TEST RESULTS

No non-compliance noted.

TEST DATA

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

Modulation Type: GFSK / DH5

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

Ton	2.900
Tp(Ton+Toff)	3.740
Duty Cycle	0.775
Duty Factor	1.105

Modulation Type: 8-DPSK / 3-DH5

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

Ton	2.900
Tp(Ton+Toff)	3.740
Duty Cycle	0.775
Duty Factor	1.105

Page: 58 / 113 Rev.: 00



Page: 59 / 113 Rev.: 00

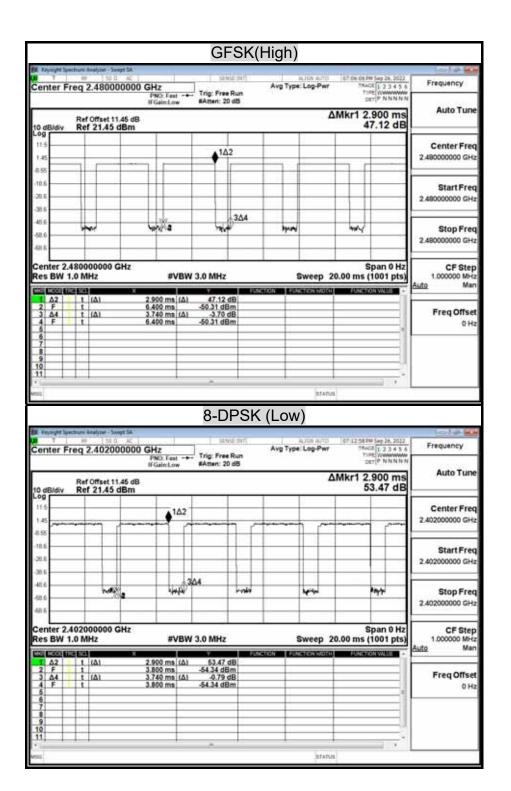
TEST PLOT

Duty Cycle

Image: 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10
Auto Tune Trace (2.2.43.6 Trace (2.40.6) Auto Tune 50.77 dB Center Free 2.40200000 GH3 Start Free 2.40200000 GH3 Start Free 2.40200000 GH3
Auto Tune 50.77 dB Center Free 2.40200000 GH Start Free 2.40200000 GH
Auto Tune 50.77 dB Center Free 2.40200000 GHz Start Free 2.40200000 GHz Start Free 2.40200000 GHz Stop Free
50.77 dB Center Free 2.40200000 GHz Start Free 2.40200000 GHz Start Free 2.40200000 GHz Stop Free
Center Free 2.40200000 GHz Start Free 2.40200000 GHz Stop Free
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01:04:547M 54g 26, 2022
State 1 2 3 4 5 6 Marker
DET PNNNNN Select Marker
1 Mkr1 2.900 ms
50.00 dB
Norma
Delta
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Span 0 Hz
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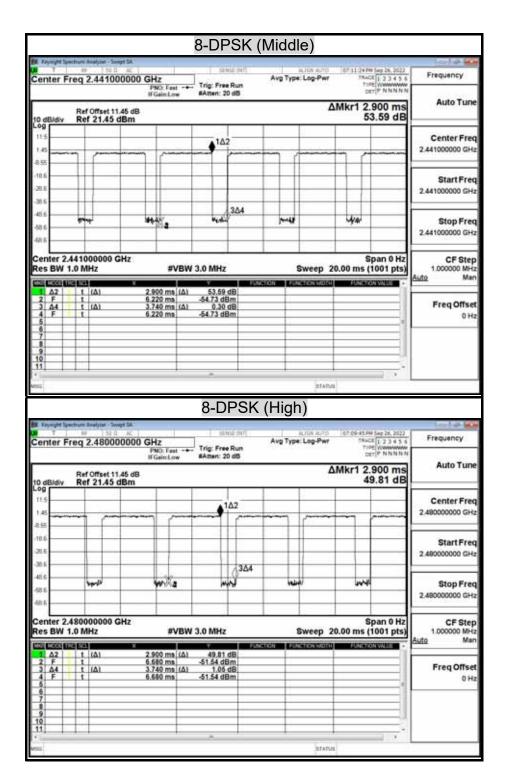


Page: 60 / 113 Rev.: 00





Page: 61 / 113 Rev.: 00





Page: 62 / 113 Rev.: 00

8.7 CONDUCTED SPURIOUS EMISSION

<u>LIMITS</u>

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

TEST SETUP



TEST PROCEDURE

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

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

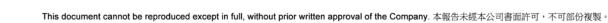


Report No.: TMTN2209001274NR
TEST RESULTS

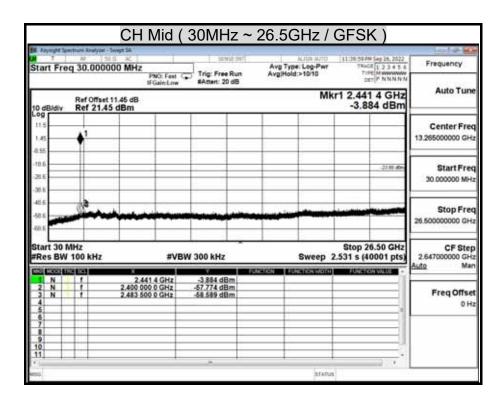
Model Name	TN-400BT-X	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/09/16

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

	• • •			· 26.5GHz /	Gron)	
Keysight Spectrum	n Analyzer - Swept SA		Table Science & Inclusion	an a		
start Freq 2	.310000000 G	Hz PNO: Fast	Trig: Free Run	Avg Type: Log-Pwr Avg/Hold:>10/10	11:127:16 PM Sep 26, 2022 TRACE 1 2 3 4 5 6 T/PE M WWWWWW	Frequency
	ef Offset 11.45 dB	IFGainLow	#Atten: 20 dB	20052/2010 - 2010 - 20	.402 196 1 GHz -3.176 dBm	Auto Tun
-09	ef 21.45 dBm	1	15 5		-0.110 0.011	
11.5		-			*	Center Fre 2.358500000 GH
-10.6 					-73 32 dBn	Start Fre 2.31000000 GH
40.6 50.6 60.5					Jel 3	Stop Free 2.407000000 GH
Start 2.31000	0 kHz	#VB	W 300 kHz		Stop 2.40700 GHz 0.67 ms (40001 pts)	CF Step 9.700000 MH Auto Mar
2 N 1 3 N 1 4 5 6	2,402	196 1 GHz 000 0 GHz 500 0 GHz	-3.176 dBm -57 259 dBm dBm	UNCTION MOTO		Freq Offse 0 H
tro Koysight Spectrum T				STAPU	5	
	0.000000 MH2	PNO: Fast (IFGain:Low	Trig: Free Run #Atten: 20 dB	AJDA APD Avg Type: Log-Pwr Avg Hold:>1019	11:38-45.9M Sep 28, 2022 5R4CE[1:2:3:4:5:6 7:9E] P N N N N N 2017 P N N N N N 2017 P N N N N N	Frequency Auto Tun
10 dB/div R	ef Offset 11.45 dB ef 21.45 dBm	PNO: Fast (IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	TRACE 1 2 3 4 5 6 TIPE NWWWW	1000
10 dB/div R	ef Offset 11.45 dB	PNO: Fast (IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	THE NNNN DET PNNNNN (r1 2.401 7 GHz	Auto Tun Center Fre
R0 dB/div R 99 115 1.45 455 455 455 455 455 455	ef Offset 11.45 dB ef 21.45 dBm	PNO: Fast (IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	THE NNNN DET PNNNNN (r1 2.401 7 GHz	Auto Tun Center Fre 13.26500000 GH Start Fre
10 dBJdiv R 99 11.5 1.45 455	ef Offset 11.45 dB ef 21.45 dBm	PNO: Fast (IFGain:Low	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>10/10	19426 [12.3.4.5.6 THE NAMENON THE NUMBER (r1 2.401 7 GHz -3.563 dBm	Auto Tun Center Fre 13.26500000 GH Start Fre 30.00000 MH Stop Fre
10 dB/div R -99 115 115 115 115 115 115 115 1	ef Offset 11.45 dBm	PMC Feat (IFGainLow	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Par Avg Hold:>19/19 Mi	тися (1.2.4.5.6 тися) рет Р NNN N (r1 2.401 7 GHz -3.563 dBm 	Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 25.50000000 GH
Bidiv R Bidiv R S S S S S S S S S S S S S S S S S S S	ef Offset 11.45 dBm	PMC Feat (IFGainLow	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>19/19 Mł	тися (1.2.4.5.6 тися) рет Р NNN N (r1 2.401 7 GHz -3.563 dBm 	Auto Tune Center Free 13.26500000 GH Start Free 30.000000 MH Stop Free 25.50000000 GH CF Step 2.54700000 GH
10 dB/div R 	ef Offset 11.45 dBm	#VB #FGainLow #VB	Trig: Free Run #Attent: 20 dB W 300 kHz 3.563 dBm	Avg Type: Log-Pwr Avg Hold:>19/19 Mł	тися (1.2.4.5.6 тися) рет Р NNN N (r1 2.401 7 GHz -3.563 dBm 	Auto Tune Center Free 13.26500000 GH Start Free 26.50000000 GH 2.54700000 GH 2.54700000 GH Auto Mar





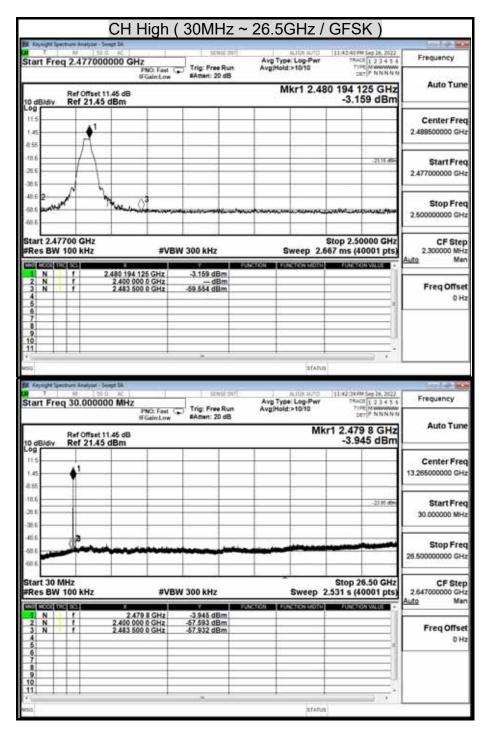






Page: 65 / 113

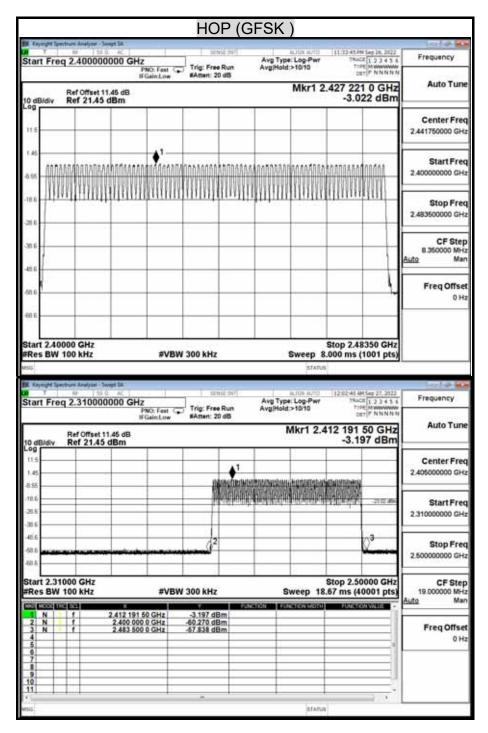
Rev.: 00





Page: 66 / 113

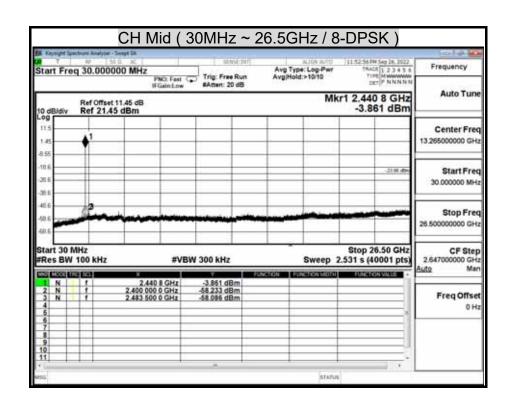
Rev.: 00



Page: 67 / 113 Rev.: 00

Frequency	11:58:00 PM Sep 25, 2022 TRACE 1 2 3 4 5 6 TUPE M WWWWWW DET P N N N N N	Avg Type: Log-Pwr Avg Hold:>10/10	Trig: Free Run	0 GHz PNC: Fast C	req 2.31000	Start Fr
Auto Tun	402 193 7 GHz -3.166 dBm	Mkr1 2.4	#Atten: 20 dB	IFGainLow	Ref Offset	10 dB/div
Center Fre 2.358500000 GH	*					11.5 1.45
Start Fre 2.310000000 GH	-2: 7 dbn					-10.6 -20.6 -36.6
Stop Fre 2.407000000 GH	(2)_3					40.6 50.6
CF Ste 9.700000 MH Auto Ma	Stop 2.40700 GHz 57 ms (40001 pts)		/ 300 kHz	#VB	31000 GHz W 100 kHz	Start 2.3
Freq Offse			-3.166 dBm -67 233 dBm dBm	402 193 7 GHz 400 000 0 GHz 483 500 0 GHz	1	N N N N N N N N N N N N N N N N N N N
						6 7 8
						9 10 11
		STATUS				9 10 11
Frequency	11.56.572M Sep 26, 2022 TRACE [2 3 4 5 6 709E M NOVEMBER		Trig: Free Run	WHZ PNO: Fast	Teetium Andpar	9 10 11 11 155 555 8 Kaysett
Frequency	1 2.402 4 GHz	Avg Type: Log-Pwr Avg Hold:>1010	i sinicont	MHZ PNO: Fast C IFGainLow	req 30.0000 Ref Offset	9 10 11 Start Fr
Frequency Auto Tur Center Fre	THE NUMBER	Avg Type: Log-Pwr Avg Hold:>1010	Trig: Free Run	MHZ PNO: Fast C IFGainLow	req 30.0000 Ref Offset	9 10 11 555 555 555 555 555 555 555 555 5
Frequency Auto Tur Center Fre 13.26500000 GH Start Fre	1 2.402 4 GHz	Avg Type: Log-Pwr Avg Hold:>1010	Trig: Free Run	MHZ PNO: Fast C IFGainLow	Ref Offset	9 10 11 11 11 11 11 11 11 11 11 11 11 11
Frequency Auto Tur Center Fre 13.26500000 GH Start Fre 30.00000 MH Stop Fre	1 2.402 4 GHz -3.666 dBm	Avg Type: Log-Pwr Avg Hold:>1010	Trig: Free Run	MHZ PNO: Fast C IFGainLow	Ref Offset	9 9 9 10 10 11 5 5 5 5 5 10 15 145 30 5 115 145 30 5 10 6 30 6 30 6 30 6 30 6 40 6 30 6 30 6 3
Frequency Auto Tur Center Fre 13.265000000 GH 30.000000 MH 25.50000000 GH 25.50000000 GH 25.50000000 GH	-3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm	Augument Avg Type: Log-Pwr Avg Hold:>1010 Mkr1	/ Structure Trig: Free Run #Atten: 20 dB	#VB	Ref Offset Ref 21.43	9 9 10 10 11 10 10 11 10 11 10 11 10 11 10 11 15 145 145 145 145 145 145
Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 26.50000000 GH 2.647000000 GH Auto Ma	-3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm	AUBINATO	/ Structure Trig: Free Run #Atten: 20 dB	MHz PNO: Feat C IFGainLow	0000	Ref 0.0 Ref 2
Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH 2.647000000 GH Auto Tun Auto Tun	-3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm -3.666 dBm	Augument Avg Type: Log-Pwr Avg Hold:>1010 Mkr1	/ 300 kHz	#VB2 PNO: Fast C IFGainLow #VB #VB	Ref Offset Ref 21.43	9 9 10 10 11 10 10 11 10 11 10 11 10 11 10 11 15 145 145 145 145 145 145







Frequency	11:44:57 PM Sep 25, 2022 TRACE 1:2:3:4:5:6 TUPE N MANAGE DET P N N N N N	Auton auro (1) Avg Type: Log-Pwr Avg/Hold:>1010	Trig: Free Run #Atten: 20 dB	000000 GHz IFGainLow	art Freq 2.477
Auto Tun	0 194 125 GHz -3.194 dBm	Mkr1 2.480		set 11.45 dB .45 dBm	dBidly Ref 21
Center Fre 2.488500000 GH				1	
Start Fre 2.477000000 GH	-21.18 after				55
Stop Fre 2.50000000 GH			-	The second second	16 2 m²
CF Ste 2.300000 MH Auto Ma	Stop 2.50000 GHz 57 ms (40001 pts)		W 300 kHz		art 2.47700 GH tes BW 100 kH
Freq Offse 0 H			-3.194 dBm dBm -40.176 dBm	2.480 194 125 GHz 2.400 000 0 GHz 2.483 500 0 GHz	N f 2 N f 3 N f 4 5 6 7
]				8
		(224)			
-148		STATUS		or - Swept SA	
Frequency	11 49 05 544 549 15, 2022 TRACE 1 2 3 4 5 6 TRACE 1 2 3 4 5 6 TRACE 1 P N N N N	tion to	Trig: Free Run #Atten: 20 dB	er - Swept SA 55:0. AC 00000 MHz FGainLow	
Frequency		Autor Auto Avg Type: Log-Pwr Avg [Hold:>10/10	Trig: Free Run	PNO: Fast 4 IFGain:Low	art Freq 30.00 Ref Offi
Frequency Auto Tur Center Fre	11-49 05 9M Sep 26, 2022 7ACCE 1 2 3 4 5 6 779E A SHOWN WHE DET P NNNNN 1 2.480 5 GHz	Autor Auto Avg Type: Log-Pwr Avg [Hold:>10/10	Trig: Free Run	PNO: Fast - IFGainLow	art Freq 30.00
Frequency Auto Tur Center Fre 13.26500000 GH	11-49 05 9M Sep 26, 2022 7ACCE 1 2 3 4 5 6 779E A SHOWN WHE DET P N N N N M	Autor Auto Avg Type: Log-Pwr Avg [Hold:>10/10	Trig: Free Run	PNO: Fast 4 IFGain:Low	art Freq 30.00
Frequency Auto Tur Center Fre 13.26500000 GF Start Fre 20.00000 MF	11.44039M Sep 28, 2022 78ACE 12.3.4.5.6 7798 MANNAN 12.480 5 GHz -3.216 dBm	Autor Auto Avg Type: Log-Pwr Avg [Hold:>10/10	Trig: Free Run	PNO: Fast 4 IFGain:Low	Ref Office
Frequency Auto Tur Center Fre 13.26500000 GH Start Fre 30.00000 MH Stop Fre 26.50000000 GH	11-44 05 944 (sep 24, 2022) 71-62 (1 2 3 4 5 6 71-62 (1 2 3 4 5	AUDR AUTO III Avg Type: Log-Pwr Avg/Hold:>1018 Mkr1	Trig: Free Run #Atten: 20 dB	PRC: Feat IFGaint.ow	Approx 2 = 1 = 2 = 2 = 2 = 2 = 2 = 2 = 2 = 2 =
Frequency Auto Tun Center Fre 13.26500000 GH Start Fre 30.00000 MH Stop Fre 26.5000000 GH CF Step 2.54700000 GH	11-44 05 944 (sep 24, 2022) 71-62 (1 2 3 4 5 6 71-62 (1 2 3 4 5	Augrand Type: Log-Pwr Avg/Hold>1018 Mkr1	Trig: Free Run #Atten: 20 dB	PRC: Feat IFGaint.ow	v Ref om Ref 21
Frequency Auto Tun Center Fre 13.265000000 GH Start Fre 30.000000 MH Stop Fre 26.50000000 GH 2.647000000 GH Auto Ma	11-44 05 944 (sep 24, 2022) 71-62 (1 2 3 4 5 6 71-62 (1 2 3 4 5	Augrand Type: Log-Pwr Avg/Hold>1018 Mkr1	Trig: Free Run #Atten: 20 dB W 300 kHz 	2 #VE 2.460 5 GHz	Ref Office art Freq 30.00 rdBJdiv Ref 21



Page: 70 / 113

Rev.: 00

HOP (8-DPSK) T R SS C AC Start Freq 2.400000000 GHz Froin Low 11:12:14 PM Sep 25, 2022 TRACE 1 2 3 4 5 6 TUPE M MWWWW DET P NNNNN Avg Type: Log-Pwr Avg|Hold:>10/10 Frequency Trig: Free Run #Atten: 20 dB Auto Tun Mkr1 2.413 193 0 GHz Ref Offset 11.45 dB Ref 21.45 dBm -3.068 dBm 10 dBidiv Center Freq 2.441750000 GHz Start Freq 2.40000000 GHz 8.6 臣 Stop Freq 2.483500000 GHz 20.4 CF Step 8.350000 MHz Man 101 Suto ii i Freq Offset 0 Hz Stop 2.48350 GHz Sweep 8.000 ms (1001 pts) Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Start Freq 2.310000000 GHz FRO: Fest () IFGainLow IFGainLow 12:01:15 AR(Sep 27, 2022 TRACE 1 2 3 4 5 6 TUPE M MANAGE DET P N N N N N Frequency Avg Type: Log-Pwr Avg/Hold:>10/10 Auto Tune Mkr1 2.424 194 75 GHz -3.099 dBm Ref Offset 11.45 dB Ref 21.45 dBm 11 Center Freq 1 2.40500000 GHz 8.52 10.4 21 (P a Start Freq 26.1 2.31000000 GHz . 48.9 Ŀ 13 Stop Freq an i 2.50000000 GHz Start 2.31000 GHz Stop 2.50000 GHz CF Step 19.000000 MHz 2 Man Res BW 100 kHz #VBW 300 kHz Sweep 18.67 ms (40001 pts) uto COST ALL AND A 2,424 194 75 GHz 2,400 000 0 GHz 2,483 500 0 GHz -3.099 dBm -59.438 dBm -59.619 dBm NNN Freq Offset 0 Hz 11 STATUS



8.8 RADIATED EMISSIONS

8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

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

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

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² 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.



Page: 72 / 113 Rev.: 00

Report No.: TMTN2209001274NR

§ 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.

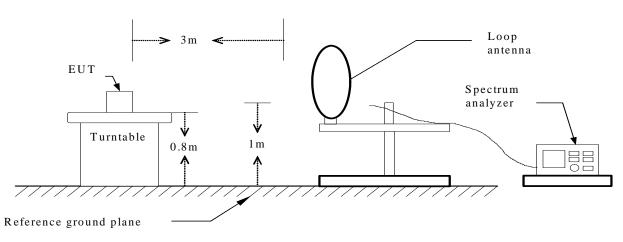
§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.



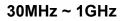
Page: 73 / 113 Rev.: 00

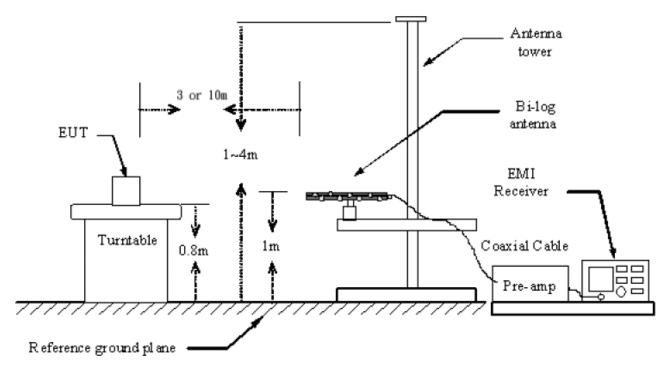
TEST SETUP

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



9kHz ~ 30MHz



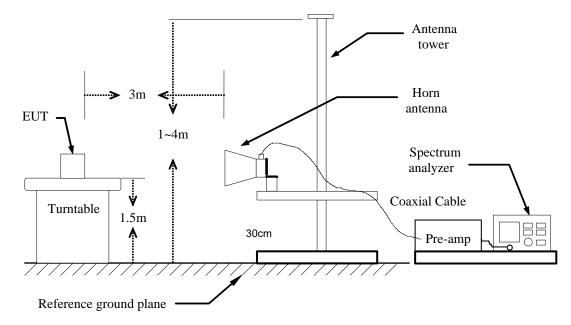




Page: 74 / 113 Rev.: 00

Report No.: TMTN2209001274NR

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



TEST PROCEDURE

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

Note :

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



Page: 75 / 113 Rev.: 00

Report No.: TMTN2209001274NR

8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

BELOW 1 GHz (9kHz ~ 30MHz)

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

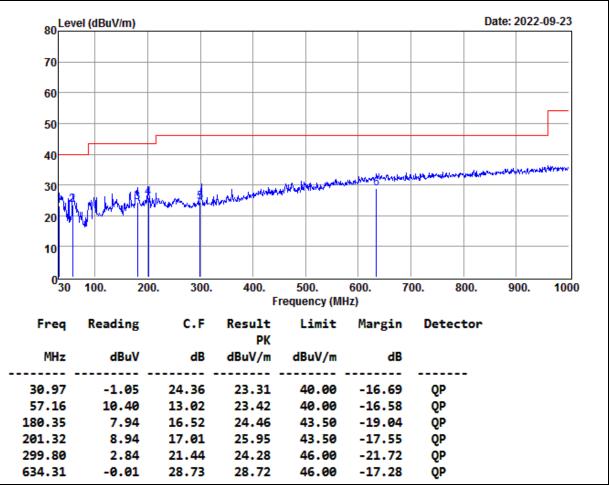


Report No.: TMTN2209001274NR BELOW 1 GHz (30MHz ~ 1GHz)

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%

Vertical

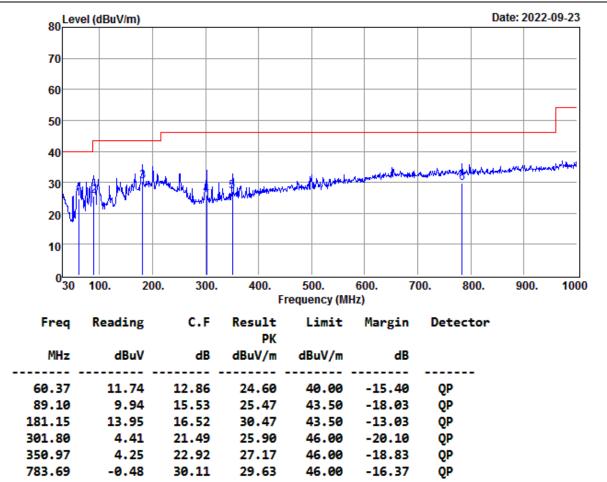


- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
- 2. Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required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



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%

Horizontal



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



Page: 78 / 113 Rev.: 00

Report No.: TMTN2209001274NR

8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Product Nam	е	Analog Turntable			Test	Date	2022/09/22		
Model		TN	-400BT-X		Test	t By	Peter Chu		
Test Mode		CH Lov	w TX / GFS	SK	TEMP& H	lumidity	21.5°C,	48%	
Horizontal									
100 Level	(dBuV/m)			1 1			Date: 2022-	09-22	
90									
80									
70									
60	6								
50									
40									
30									
20									
10									
0 <mark>1000</mark>	4000.	6000. 8000		000. 14000. Tequency (MI). 20000. 22	2000. 24000.	26500	
Freq	Reading	C.F	Result PK	Limit	Margin	Detecto	r		
MHz	dBuV	dB	dBuV/m	dBuV/m	dB				
1204.14	50.71	-13.13	37.58	54.00	-16.42	Averag	e		
1204.14	63.28				-23.85 -1.69		-		
1925.71 1925.71	61.46 50.43				-1.69		e		
4804.11	46.22				-5.84		e		
4804.11	57.05			74.00	-15.01	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



Page:	79 /	113
Rev.:	00	

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

Vertical 100 Level (dBuV/m) Date: 2022-09-22 90 80 70 6 60 50 40 30 20 10 8000. 10000. 12000. 14000. 16000. 18000. 20000. 22000. 24000. 26500 1000 4000. 6000. Frequency (MHz) Reading C.F Result Margin Freq Limit Detector PK MHz dBuV dB dBuV/m dBuV/m dB 1157.42 52.11 -12.94 39.17 54.00 -14.83 Average 1157.42 63.38 -12.94 74.00 -23.56 50.44 Peak 1963.49 50.50 -8.76 41.74 54.00 -12.26 Average 1963.49 60.85 -8.76 52.09 74.00 -21.91 Peak 4804.20 46.13 -5.93 1.94 48.07 54.00 Average 4804.20 56.71 1.94 -15.35 58.65 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



Page: 80 / 113 Rev.: 00

Report No.:	TMTN2209001274NR
Report No	1W11W2209001274WK

Product Name		Anal	og Turntable	;	Test I	Date	2022/0	9/22
Model		TN-400BT-X			Test	Ву	Peter Chu	
Test Mode		CH M	id TX / GFS	SK	TEMP& H	umidity	21.5°C,	48%
lorizontal								
100 Level (c	iBuV/m)						Date: 2022	-09-22
90								
80								
70								
60	6							
50 ²								
40								
30								
20								
10								
01000	4000.	6000. 800	0. 10000. 12	2000. 14000. (Frequency (MI		. 20000. 22	2000. 24000.	26500
Freq R	eading	C.F		Limit	Margin	Detecto	r	
MHz	dBuV	dB	3 dBuV/m	dBuV/m	dB			
1237.14	51.36	-12.90	38.46	54.00	-15.54	Averag	e	
1237.14			49.18		-24.82			
2120.81 2120.81			42.44 52.06				e	
	46.04			54.00		Averag	e	
4882.11	56.89	2.15			-14.96	Peak		

- 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



Page:	81 /	113
Rev.:	00	

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

100 Lev	el (dBuV/m)					Da	ite: 2022-09-2
90							
80		_			_		
70							
60	6	_			_		
50 ²	4 5						
40	3						
30							
20							
10							
0 <mark>100</mark>	0 4000. (6000. 8000 .		000. 14000. 1 requency (MH		. 20000. 22000	. 24000. 265
Freq	Reading	C.F	Result PK	Limit	Margin	Detector	
MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1121.89	50.42	-13.26	37.16	54.00		Average	
1121.89	62.41	-13.26	49.15		-24.85	Peak	
2102.88	49.11	-7.23	41.88	54.00		Average	
		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	51.18	74.00	-22.82	Peak	
2102.88 2102.88 4881.97	58.41 45.72	-7.23 2.15	47.87		-6.13	Average	

- 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



Page: 82 / 113 Rev.: 00

Report No.: TMTN2209001274NR

Product Nam	ie	Analo	og Turntable		Test I	Date	2022/09	9/22	
Model		TN	-400BT-X		Test	Ву	Peter Chu		
Test Mode		CH Hig	jh TX / GFS	SK	TEMP& H	umidity	21.5°C, 4	48%	
lorizontal									
100	l (dBuV/m)						Date: 2022	-09-22	
90									
80									
70									
	e	5							
60	- -								
50	1								
40									
30									
20									
10									
0 <mark>1000</mark>	4000.	6000. 800	0. 10000. 12	2000. 14000. Frequency (M). 20000. 2	2000. 24000.	26500	
Freq	Reading	; C.F	Result PK	Limit	Margin	Detect	or		
MHz	dBuV	/ dE	dBuV/m	dBuV/m	dB				
1118.29	52.41	-13.31	39.10	54.00	-14.90	Avera	ge		
1118.29		-13.31			-23.57				
2104.78 2104.78	51.15 61.42				-10.05 -19.78		ge		
4960.04	47.41				-4.07		ge		
4960.04	57.09	2.52	59.61	74.00	-14.39	Peak			

- 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



Page: 83 / 113 Rev.: 00

Report No.:	TMTN2209001274NR
Report No	11/11/11/22090012741/16

Product Name		Analog	g Turntable		Test	Date	2022/09/22		
Model		TN-4	400BT-X		Tes	t By	Peter Chu		
Test Mode		CH High	۲X / GFs	SK	TEMP& I	lumidity	21.5°C, 48%		
Vertical									
100 Level (dB	uV/m)				Date: 2022-09-				
90									
80									
70									
60 4	6								
50									
40									
30									
20									
10									
0 <mark>1000</mark>	4000. 60	000. 8000.		00. 14000. 1 equency (MH		. 20000. 220	000. 24000. 26500		
Freq Rea	ading	C.F	Result PK	Limit	Margin	Detector			
MHz	dBuV	dB	dBuV/m	dBuV/m	dB				
	50.16	-12.77	37.39			Average	2		
	52.14 50.44	-12.77 -7.24	49.37 43.20		-24.63 -10.80	Peak			
				74.00		Average Peak	•		
		2.52		54.00		Average	2		
4960.08	57.89	2.52	60.41	74.00	-13.59	Peak			

- 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



Product Name	•	Anal	og Turntable	е	Test	Date	2022/09/22		
Model		TN	I-400BT-X		Test	t By	Peter Chu		
Test Mode		CH Lov	v TX / 8-DF	PSK	TEMP& H	lumidity	21.5°C, 4	48%	
lorizontal									
100 Level	(dBuV/m)						Date: 2022	-09-22	
90									
80									
70									
60	6								
502									
5									
40									
30									
20									
10									
01000	4000.	6000. 80	00. 10000. 1	2000. 14000. Frequency (M		0. 20000. 2	2000. 24000.	26500	
Freq	Reading	C.	F Result PK		Margin	Detect	or		
MHz	dBuV	d d			dB				
1091.24	49.78	-13.6	4 36.14		-17.86	Avera	ge		
1091.24		-13.64			-28.13				
1955.39 1955.39	49.63 60.96	-8.8			-13.21 -21.88		ge		
4804.38	46.33			54.00			ge		
4804.38	57.52				-14.54	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



Page: 85 / 113 Rev.: 00

Report No.:	TMTN2209001274NR

Product Name		Analog	Turntable		Test Date 2022/09/2			
Model		TN-40	0BT-X		Test	Ву	Peter Chu	
Test Mode		CH Low T	X / 8-DPS	K	TEMP& Hu	umidity	21.5°C, 48%	þ
Vertical								
100 Level	(dBuV/m)	BuV/m) Date: 202						
90								_
80								_
70								_
60	6							_
50								_
40								_
30								_
20								_
10								_
0 <mark>1000</mark>	4000.	6000. 8000.		000. 14000. requency (M		. 20000. 2	22000. 24000. 26	500
Freq	Reading	C.F	Result PK	Limit	Margin	Detect	or	
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1080.75		-13.74			-15.88	Avera	ge	
1080.75 2102.08		-13.74 -7.24	48.84 40.72		-25.16 -13.28		g e	
2102.08		-7.24	52.44	74.00	-21.56	Peak	8-	
4803.59	46.10			54.00	-5.96	Avera	ge	
4803.59	57.97	1.94	59.91	74.00	-14.09	Peak		

- 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



Page: 86 / 113 Rev.: 00

Report No.:	TMTN2209001274NR

Product Name		Analog T	urntable		Test [Date	2022/09/22		
Model		TN-400)BT-X		Test	Ву	Peter Chu		
Test Mode	C	H Mid TX	/ 8-DPS	κ	TEMP& H	umidity	21.5°C,	48%	
lorizontal									
Lough (d	Dul/ma)						Date: 2022	00 22	
100 Level (d	Buv/m)							-03-22	
90									
80									
70									
60 4	6								
50									
40									
30									
20									
10			_						
0									
⁰ 1000	4000. 6000). 8000. 1		00. 14000. 1 equency (MH	6000. 18000	. 20000. 22	2000. 24000.	26500	
					-	.			
Freq R	eading	C.F I	PK	Limit	Margin	Detecto	r		
MHz	dBuV	dB d	dBuV/m	dBuV/m	dB				
1145.29	50 42 -	12 97	37 45	54 00	-16.55	Averag	•		
1145.29	63.48 -		50.51		-23.49	Peak	,e		
2123.44	50.04					Averag	e		
2123.44	61.85				-19.03	Peak			
	46.01					-	e		
4882.06	56.83	2.15	58.98	74.00	-15.02	Peak			

- 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



Page: 87 / 113 Rev.: 00

Report No.:	TMTN2209001274NR

Product Nan	ne	A	nalog T	urntable		Test	Date	2022/09/22		
Model			TN-40	0BT-X		Tes	t By	Peter Chu		
Test Mode	!	CH	Mid TX	(/ 8-DP	SK	TEMP& H	lumidity	21.5°C	, 48%	
/ertical										
Leve	l (dBuV/m)							Date: 202	2-09-22	
100										
90										
80										
70										
60	6									
4										
50										
40				_						
30										
20										
10										
01000	4000.	6000.	B000. 1			16000. 18000). 20000. 22	2000. 24000). 26500	
_	_				requency (M		-			
Freq	Reading	. (C.F	Result PK	Limit	Margin	Detecto	r		
MHz	dBuV	,	dB (dBuV/m	dBuV/m	dB				
1120.40					54.00		Averag	e		
1120.40 2029.17		-13. -8.			74.00 54.00		Peak Averag	e		
2029.17						-22.41	-	-		
4882.23						-5.28		e		
4882.23	56.95	2.	.15	59.10	74.00	-14.90	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



Page: 88 / 113 Rev.: 00

Report No.:	TMTN2209001274NR
Report No	1W11W2209001274WK

Product Nam	ne		Analo	og Turnta	able		Test Date 2022				22/09/2	22
Model			TN	-400BT-2	Х			Test	Ву	Peter Chu		u
Test Mode		C	CH High	n TX / 8-	DPSł	<	TEN	IP& H	umidity	21.5	5°C, 48	3%
Iorizontal												
100 Lev	el (dBuV	/m)								Date	: 2022-0	9-22
90											_	
80												
70												
60		6									_	
50 ²	4	5										
40	5											
30												
20												
10											_	
0 <mark> </mark> 100	0 400	00. 60	000. 800	0. 1000)0. 14000 equency (I		. 18000). 20000. 2	2000. 2	24000.	26500
Freq	Read	ing	C.F	Res	ult PK	Limit	: Mai	rgin	Detect	or		
MHz	di	BuV	dE	3 dBu	V/m	dBuV/m	1	dB				
1205.98	50	.41	-13.11	L 37	.30	54.00	-1	6.70	Avera	ge		
1205.98 2105.72		.37 .17	-13.11		.26		-24 -1			~-		
2105.72			-7.18		.99		-2			ge		
4959.56	46	.62	2.52	2 49	.14	54.00) -4	4.86	Avera	ge		
4959.56	56	.98	2.52	2 59	.50	74.00	-1/	4.50	Peak			

- 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



Page: 89 / 113 Rev.: 00

Report No.:	TMTN2209001274NR
Report No	1W11W2209001274WK

Product Name	•	Anal	og Tur	ntable			Test	Date	20)22/09/	22
Model		TN-400BT-X Test By		Peter Chu							
Test Mode		CH High TX / 8-DPSK TEMP& Humidity 21.5°C, 48			8%						
/ertical											
100 Level	(dBuV/m)								Da	te: 2022	09-22
90											
80											
70											
60 4	6										
502	5										
40											
30											
20											
10											
0 <mark>1000</mark>	4000.	6000. 8	000. 10		000. 140 requency			00. 20000.	22000.	24000.	26500
Freq	Reading	C	.F R	esult PK	Lim	it	Margin	Detec	tor		
MHz	dBuV		dB d	BuV/m	dBuV	/m	dB		_		
1124.18	50.12			36.89			-17.11		-		
1124.18 2117.20	59.47			46.24		00 00					
2117.20	50.19 61.47			43.20 54.48			-10.80		-		
4960.09	47.82			50.34		00					
4960.09	57.31	2.	52	59.83	74.	00	-14.17	Peak			

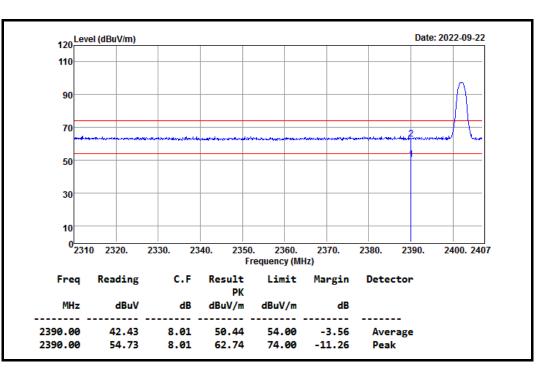
- 1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
- 2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW 1/T
- 3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + 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

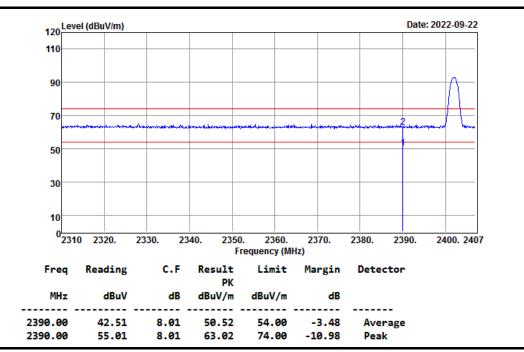


8.8.4 RESTRICTED BAND EDGES

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

Horizontal



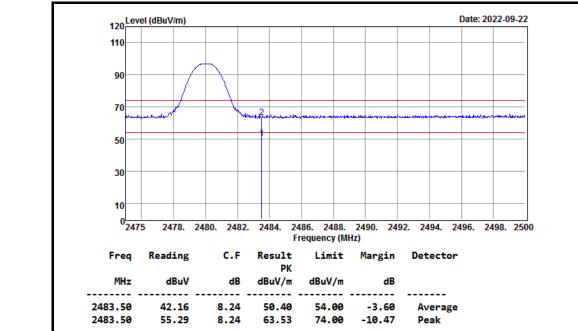


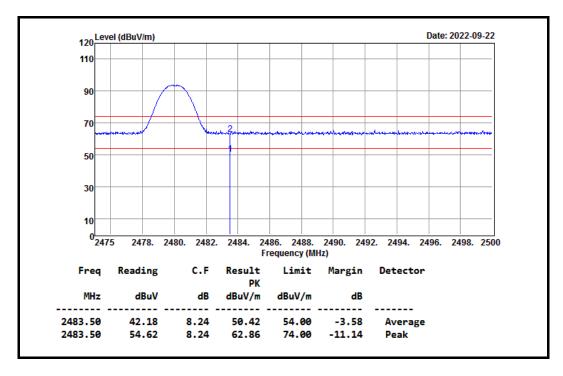


Page:	91 /	113
Rev.:	00	

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

Horizontal



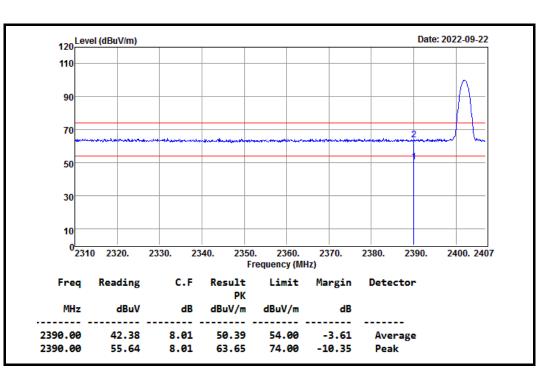


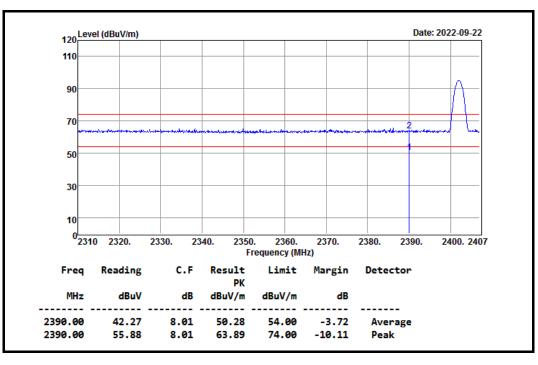


Page: 92 / 113 Rev.: 00

Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	CH Low TX / 8-DPSK	Temp & Humidity	21.5°C, 48%

Horizontal



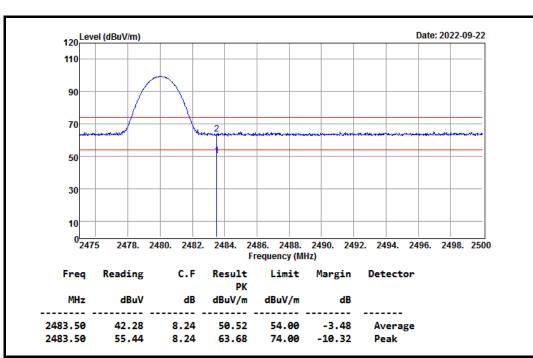


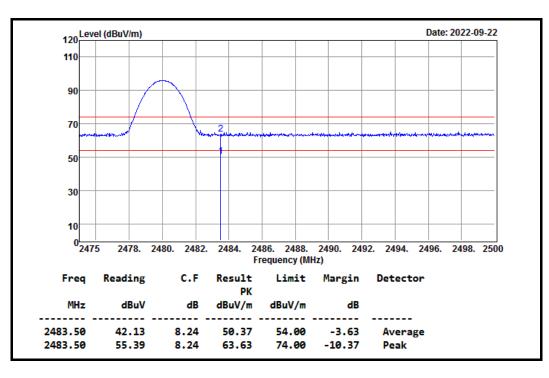


Page: 93 / 113 Rev.: 00

Product Name	Analog Turntable	Test Date	2022/09/22
Model Name	TN-400BT-X	Test By	Peter Chu
Test Mode	CH High TX / 8-DPSK	Temp & Humidity	21.5°C, 48%

Horizontal







Page: 94 / 113 Rev.: 00

Report No.: TMTN2209001274NR

8.9 POWERLINE CONDUCTED EMISSIONS

LIMITS

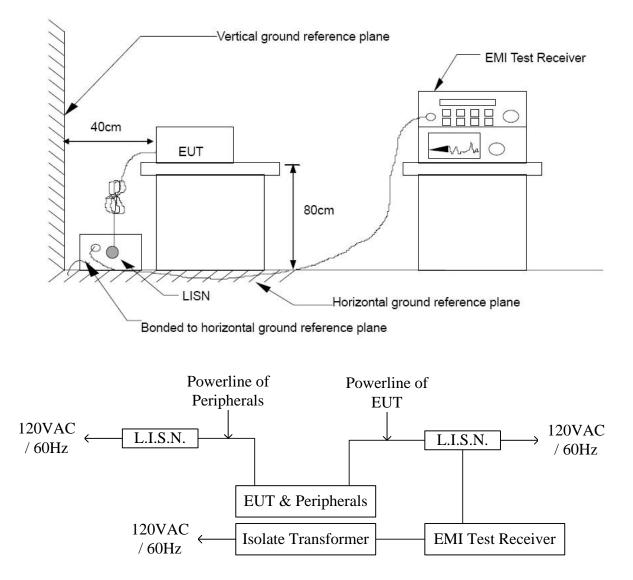
§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ 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	



Report No.: TMTN2209001274NR TEST SETUP Page: 95 / 113 Rev.: 00



TEST PROCEDURE

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

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

Line conducted data is recorded for both NEUTRAL and LINE.



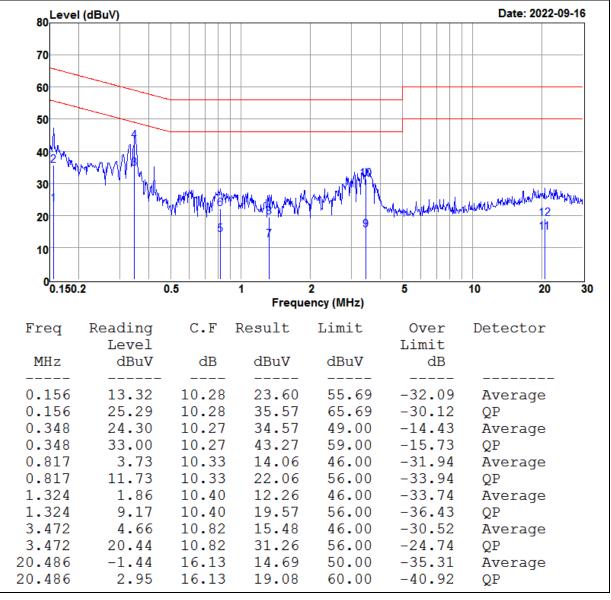
TEST RESULTS

Test Voltage: AC 120V, 60Hz

Model No.	TN-400BT-X	Test Mode	Normal Operation
Environmental Conditions	25.5 ,48% RH	Resolution Bandwidth	9 kHz
Tested by	Leo Wang		

LINE

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



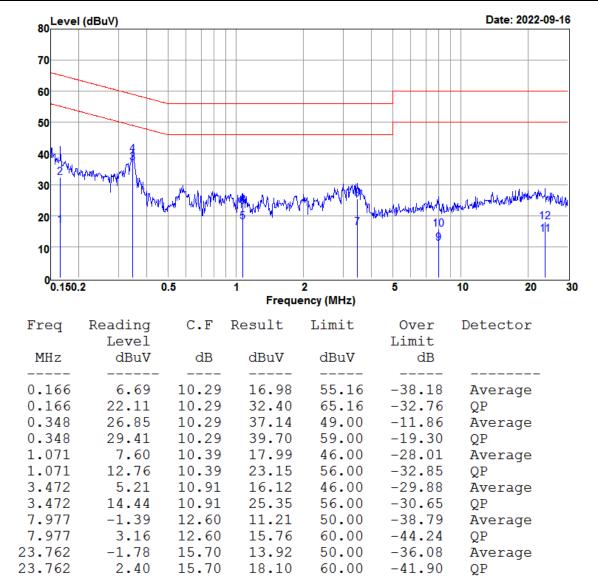


Page: 97 / 113 Rev.: 00

Model No. TN-400BT-X		Test Mode	Normal Operation
Environmental Conditions	25.5 , 48% RH	Resolution Bandwidth	9 kHz
Tested by	Leo Wang		

NEUTRAL

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



=== END of Report ===