

FCC RF Exposure Exemption report

for

Toast Terminal

Model No.: TT300

FCC ID: 2AMNG-TT300

of

Applicant: Toast, Incorporated

Address: 333 Summer Street, Boston, MA 02210 United States Of America

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

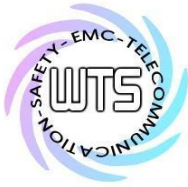
FCC Registration No.: TW1072, TW1140, TW1146, TW1477, TW0037

Industry Canada filed test laboratory Reg. No.: 20037, 31634



Report No.: W6M22411-23937-EE

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: wtst@wtst-lab.com

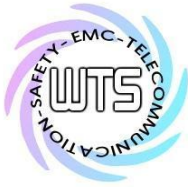


Registration number: W6M22411-23937-EE

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Worldwide Testing Services(Taiwan) Co., Ltd.

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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

Laboratory disclaimer-

1. The test results of this test report relate exclusively to the item tested as specified in 1.5.
2. The test report may only be reproduced or published in full.
3. Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.
4. Antenna gain is provided by applicant and laboratory issue relevant data and results.

Tester:

February 11, 2025

Ken Kang

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

February 11, 2025

Kevin Wang

Date

WTS

Name

Signature



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M22411-23937-EE

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1.2 Testing laboratory

1.2.1 Location

10m OATS

No.5-1, Lishui, Shuang Sing Village, Wanli Dist.,
New Taipei City 207, Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No. 99, Sec. 1, Balian Rd., Xizhi Dist.,
New Taipei City 221032, Taiwan (R.O.C.)

Worldwide Testing Services (Taiwan) Co., Ltd.
6F., No. 58, Ln. 188, Ruiguang Rd., Neihu Dist.,
Taipei City 114, Taiwan (R.O.C.)
Tel: 886-2-6606-8877

1.2.2 Details of accreditation status

Accredited testing laboratory

FCC filed test laboratory Reg. No.: TW1072, TW1140, TW1146, TW1477, TW0037

Industry Canada filed test laboratory Reg. No.: 20037, 31634

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name: ./.
Accredited no.: ./.
Street: ./.
Town: ./.
Country: ./.

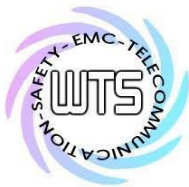
1.3 Application details

Approval holder

Name: Toast, Incorporated
Street: 333 Summer Street, Boston,
Town: MA 02210
Country: United States Of America

Manufacturer: (if applicable)

Name: Wistron Corporation
Street: 21F., No.88, Sec.1, Hsintai 5th Rd., HSICHH,
Town: NEW TAIPEI CITY 22181
Country: TAIWAN, R.O.C.



Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M22411-23937-EE

FCC ID: 2AMNG-TT300

Date of receipt of test item: January 07, 2025

Date of test: from January 08, 2025 to February 08, 2025

1.4 General information of Test item

Type of test item: Toast Terminal

Model number: TT300

Brand name: toast

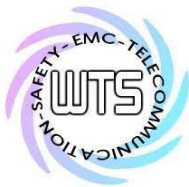
Multi-listing model number: ./.

Sample no.: #01

Technical data

Frequency band: UNII 3-4: 5.815 GHz-5.855 GHz,
UNII 4: 5.865 GHz-5.885 GHz

Band	Mode	Channel	Conducted Power (dBm)		
			ANT 1	ANT 2	Combine
UNII 3-4	802.11a	Ch 169 : 5845 MHz	13.45	14.13	--
	802.11n 20MHz	Ch 169 : 5845 MHz	12.97	13.70	16.36
	802.11ac 20MHz	Ch 169 : 5845 MHz	13.27	14.14	16.74
	802.11ax 20MHz	Ch 169 : 5845 MHz	13.59	14.56	17.11
	802.11n 40MHz	Ch 167 : 5835 MHz	12.06	12.56	15.33
	802.11ac 40MHz	Ch 167 : 5835 MHz	12.44	13.10	15.79
	802.11ax 40MHz	Ch 167 : 5835 MHz	12.79	13.64	16.25
	802.11ac 80MHz	Ch 171 : 5855 MHz	12.44	13.18	15.84
	802.11ax 80MHz	Ch 171 : 5855 MHz	13.02	13.83	16.46
	802.11ax 160MHz	Ch 163 : 5815 MHz	10.13	10.84	13.51
UNII 4	802.11a	Ch 173 : 5865 MHz	13.45	13.97	--
		Ch 177 : 5885 MHz	13.48	13.91	--
	802.11n 20MHz	Ch 173 : 5865 MHz	12.89	13.52	16.23
		Ch 177 : 5885 MHz	12.98	13.44	16.23
	802.11ac 20MHz	Ch 173 : 5865 MHz	13.26	14.03	16.67



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		Ch 177 : 5885 MHz	13.28	14.02	16.68
	802.11ax 20MHz	Ch 173 : 5865 MHz	13.63	14.44	17.06
		Ch 177 : 5885 MHz	13.70	14.45	17.10
	802.11n 40MHz	Ch 175 : 5875 MHz	11.89	12.28	15.10
	802.11ac 40MHz	Ch 175 : 5875 MHz	12.24	12.77	15.52
	802.11ax 40MHz	Ch 175 : 5875 MHz	12.80	13.35	16.09

Operating modes: Duplex

Type of modulation: OFDM

Fixed point to point operation: Yes / No

Antenna: Dipole antenna

Antenna gain: UNII 3-4:
ANT 1: 4.4dBi
ANT 2: 2.5dBi
UNII 4:
ANT 1: 2.9dBi
ANT 2: 1.7dBi

Directional gain: UNII 3-4: 6.51dBi
UNII 4: 5.33dBi

Power supply: Adapter (I/P: 100-240V~50/60Hz 1.6A
O/P: 5.0V, 3.0A 15.0W/9.0V, 3.0A 27.0W
15.0V, 3.0A 45.0W/20.0V, 3.25A 65.0W Max.)

Classification:

Fixed Device	☐
Mobile Device (Human Body distance > 20cm)	☒
Portable Device (Human Body distance < 20cm)	☐
Modular Radio Device	☐



Registration number: W6M22411-23937-EE

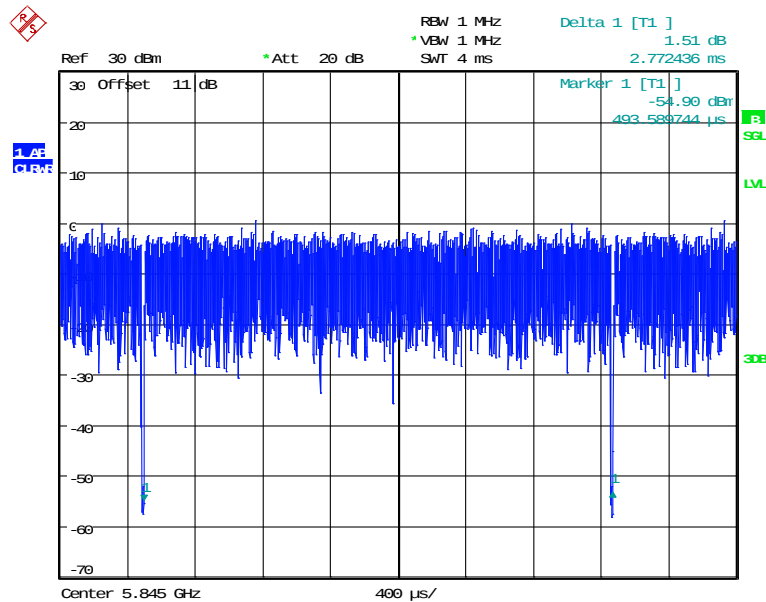
FCC ID: 2AMNG-TT300

1.5 Duty cycle and factor

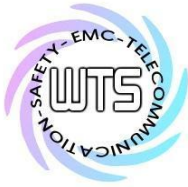
The duty factor is computed as $[10 \log (1 / D)]$, where D is the duty cycle.

Mode	T _{on} (ms)	T _{on} +T _{off} (ms)	Duty cycle (%)	Duty Factor (dB)	1/T – VBW (kHz)
802.11a	2.111378	2.115385	0.9981058	0.008	0.01
802.11n (HT20)	5.416667	5.416667	100	0	0.01
802.11ac (VHT20)	5.394231	5.394231	100	0	0.01
802.11ax (HE20)	2.766	2.772	99.77%	0.01	0.01
802.11n (HT40)	5.046	5.058	99.78%	0.01	0.01
802.11ac (VHT40)	5.417	5.417	100.00%	0.00	0.01
802.11ax (HE40)	1.426	1.433	99.55%	0.02	0.01
802.11ac (VHT80)	5.439	5.439	100.00%	0.00	0.01
802.11ax (HE80)	0.728	0.811	89.72%	0.47	1.37
802.11ax (HE160)	0.735	0.747	98.39%	0.07	0.01

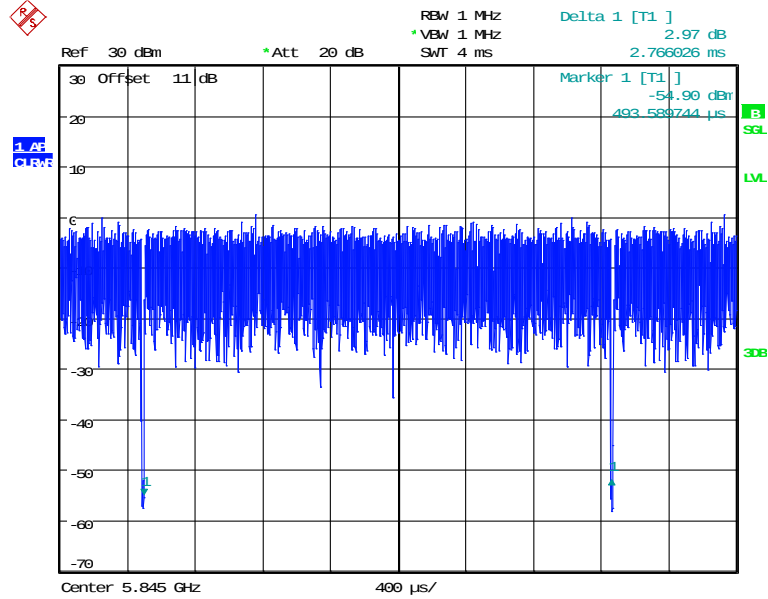
Duty cycle plot



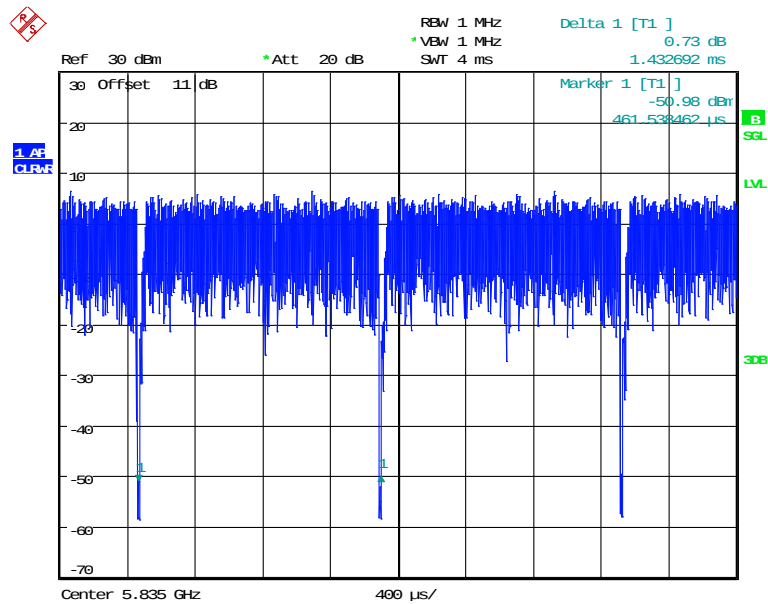
DUTY T AX20
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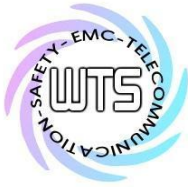
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FCC ID: 2AMNG-TT300



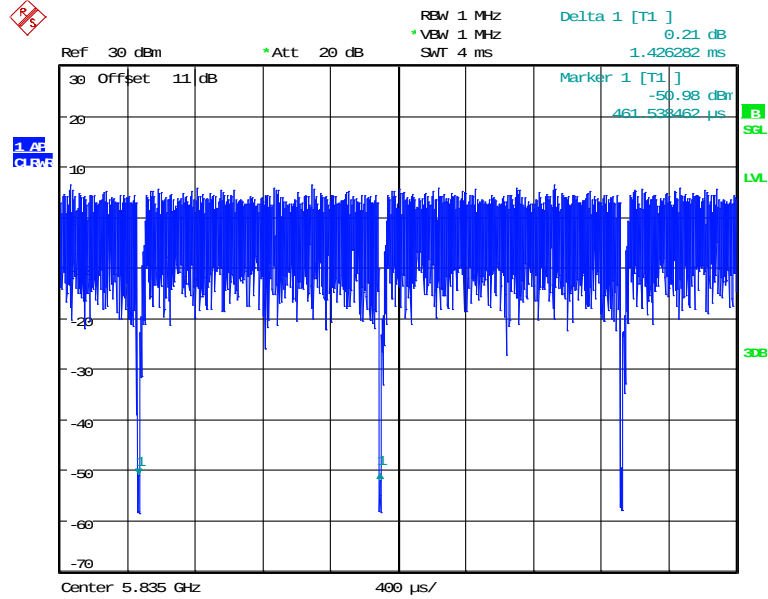
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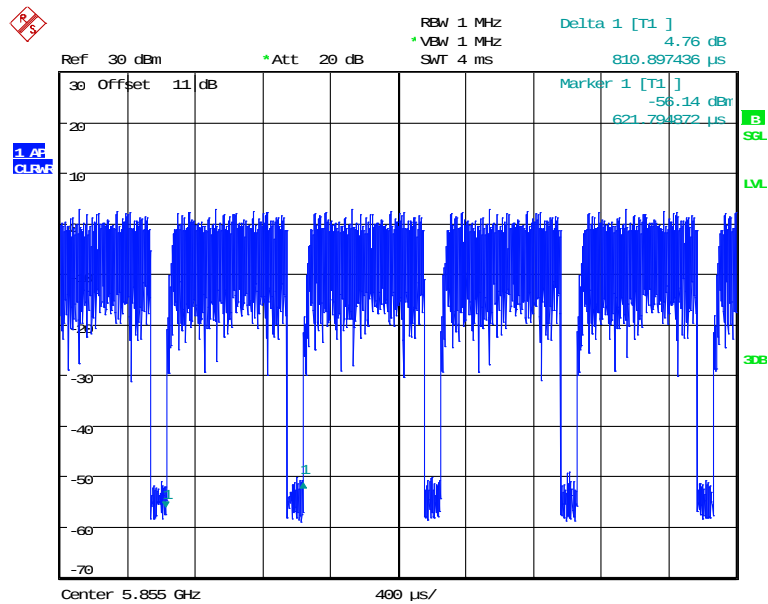
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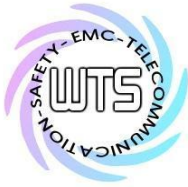
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FCC ID: 2AMNG-TT300



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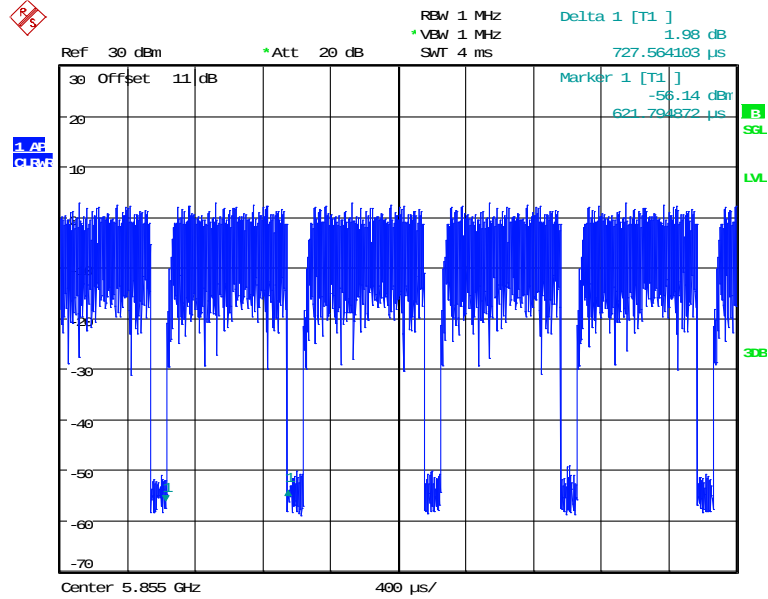


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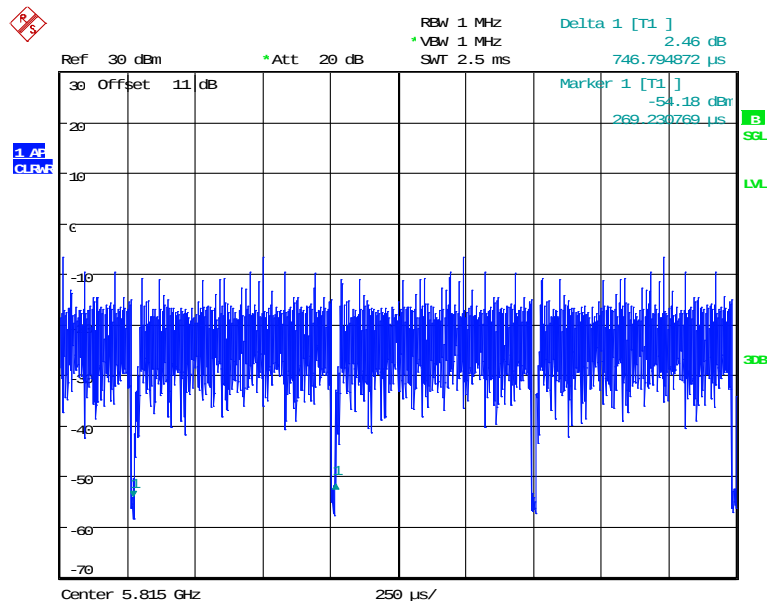


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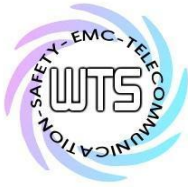
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FCC ID: 2AMNG-TT300



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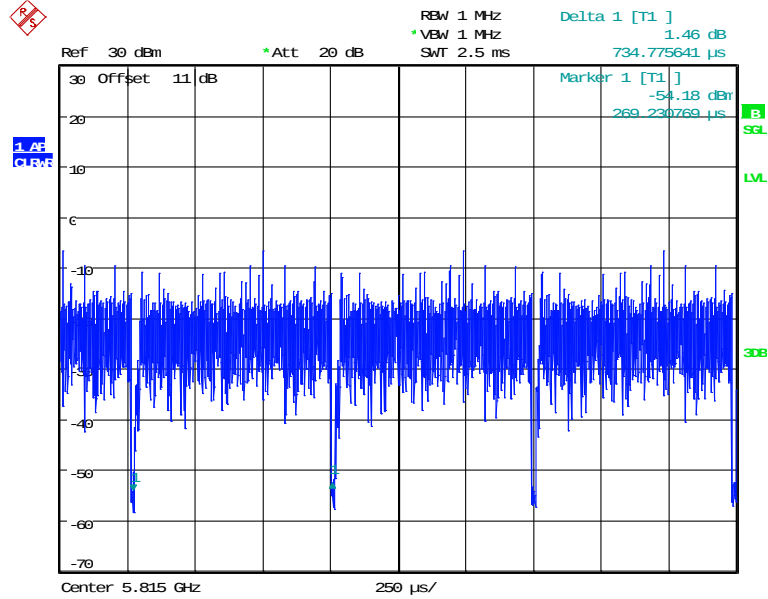


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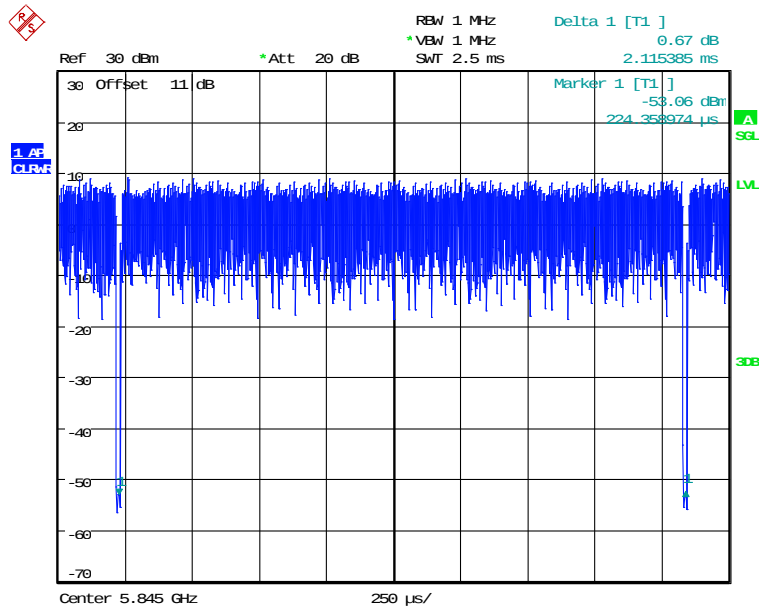
Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M22411-23937-EE
FCC ID: 2AMNG-TT300

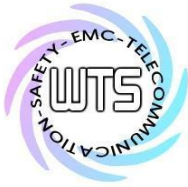


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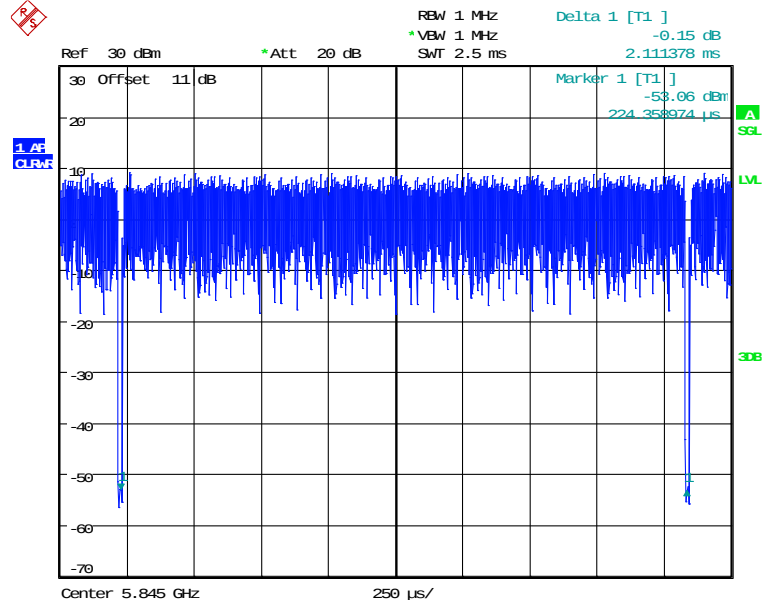
UNII 3-4
ANT 1



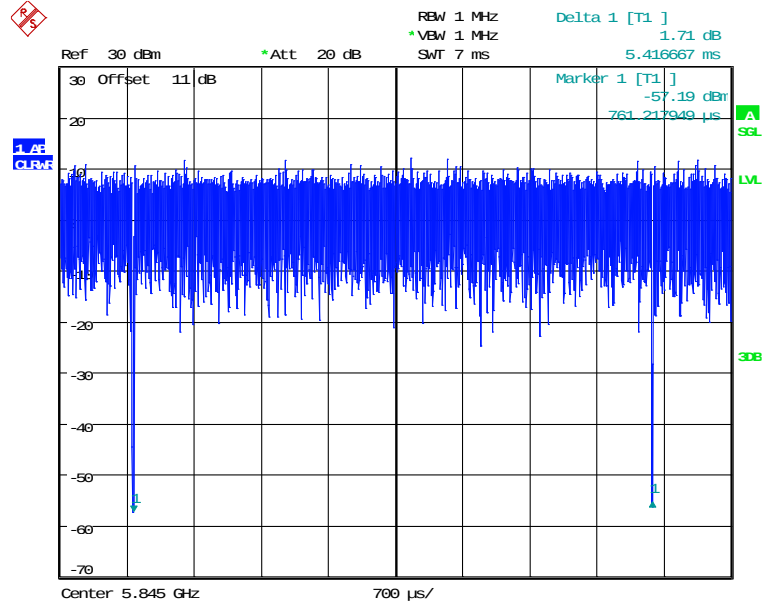
DUTY A T
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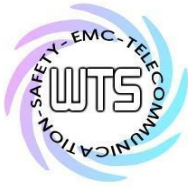
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FCC ID: 2AMNG-TT300



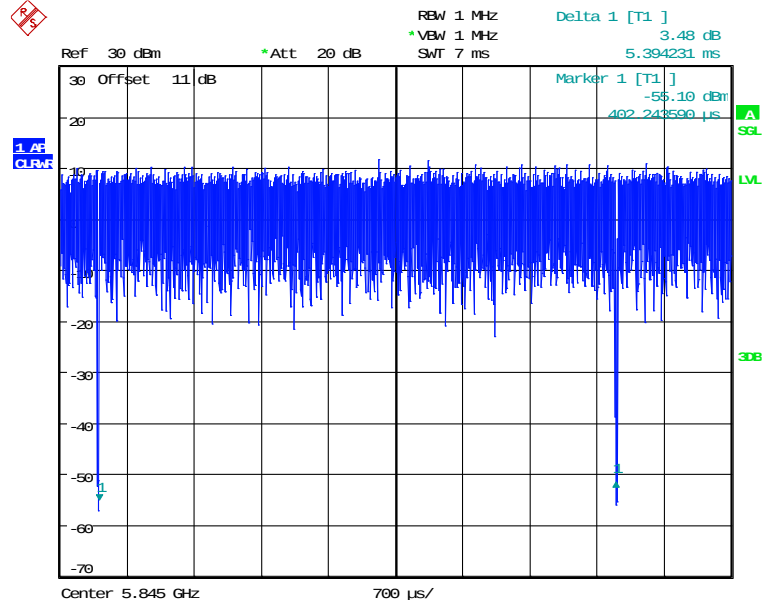
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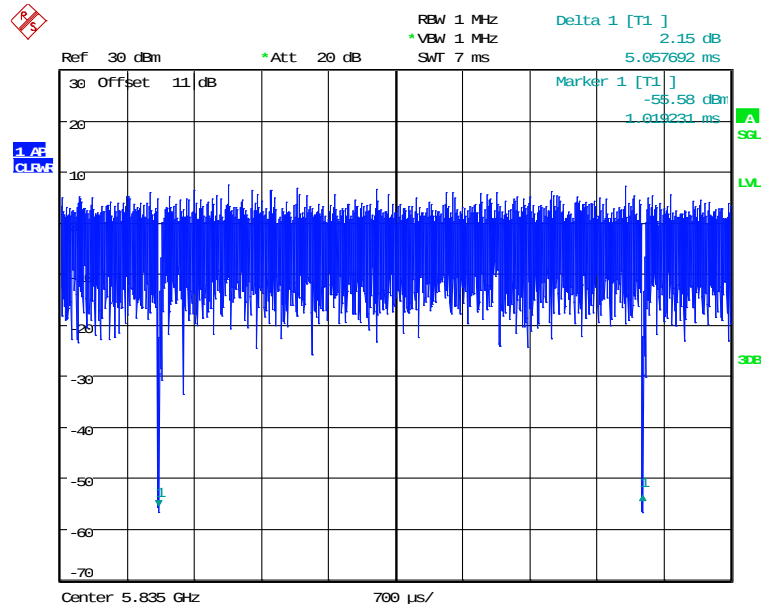
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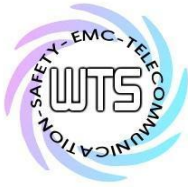
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FCC ID: 2AMNG-TT300



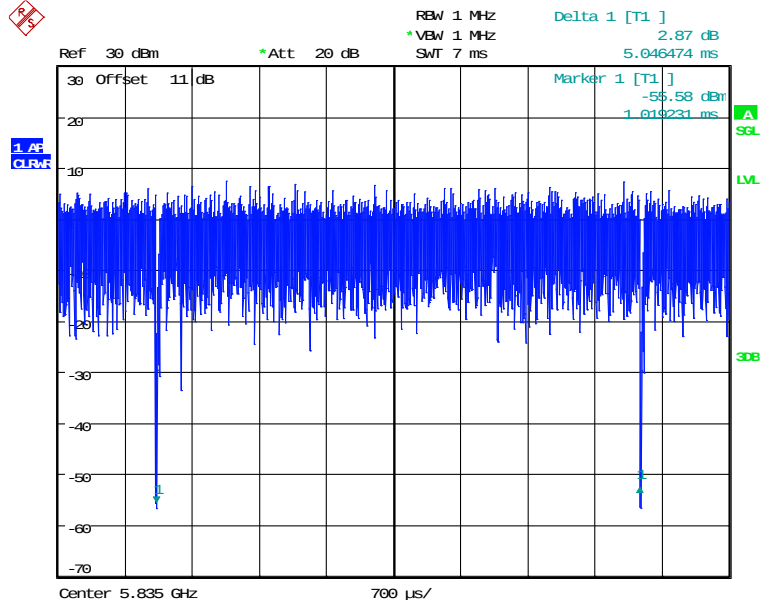
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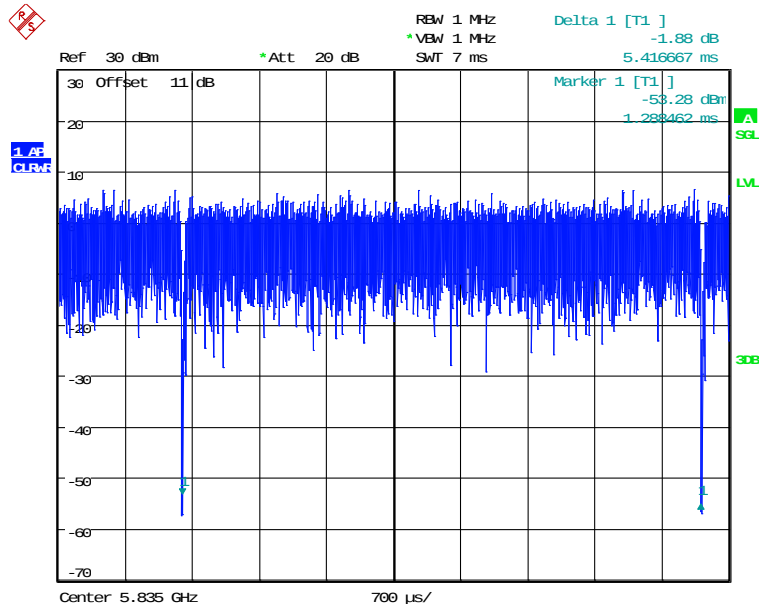
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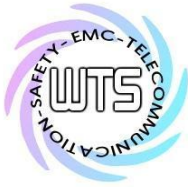
Registration number: W6M22411-23937-EE
FCC ID: 2AMNG-TT300



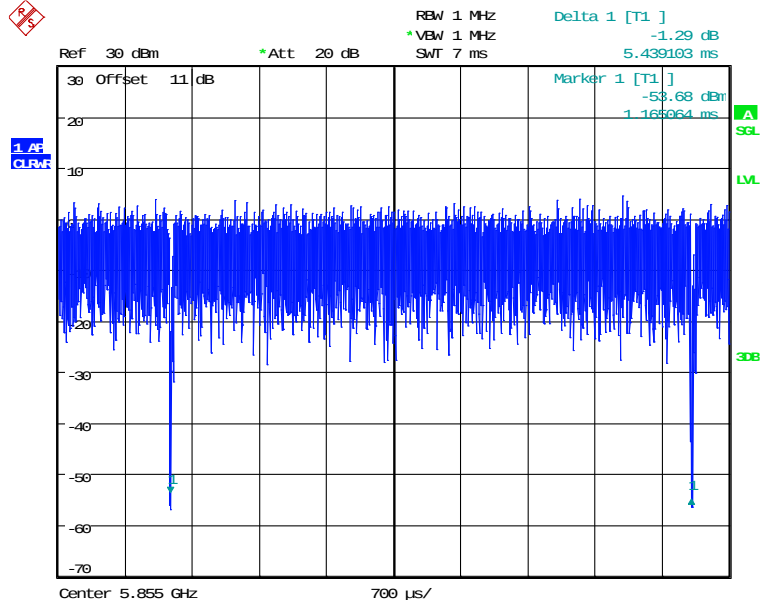
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DUTY AC40
Date: 8.FEB.2025 13:22:38



Registration number: W6M22411-23937-EE
FCC ID: 2AMNG-TT300



DUTY AC80
Date: 8.FEB.2025 13:25:27

1.6 Test standards

FCC KDB Publication
447498 D01 General RF Exposure Guidance v06



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2 Test configuration

2.1 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Extreme conditions parameters: ./.

2.2 Measurement uncertainty

Test item Name	Uncertainty
Estimation Result of Uncertainty of Conducted Output Power Measurement (Peak Output Power (transmitter))	Expanded Uncertainty : 1.64 dB

The decision rule is: Measurement uncertainty is not included in the calculation of test results.

2.3 Test Equipment List

Max Output Power & Power density & OBW & 6DB Bandwidth

Code No.	Test equipment	Mode No.	Serial No.	Brand	Cal. Date	Next Cal. Date
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2024/2/16	2025/2/15
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2024/3/7	2025/3/6
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2024/2/16	2025/2/15
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2024/2/16	2025/2/15



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3 Equivalent Isotropic Radiated Power (EIRP)

FCC Rule: 15.247

UNII 3-4, UNII 4

EIRP = max. conducted output power + antenna gain

EIRP = 17.11 dBm + (6.51 dBi [antenna gain claimed by manufacturer]) = 23.62dBm = 230.14mW

BT

EIRP = max. conducted output power + antenna gain

EIRP = 13.87 dBm + (3.3 dBi [antenna gain claimed by manufacturer]) = 17.17dBm = 52.12mW

3.1 Exemption Limits for Routine Evaluation

according to 47 CFR FCC Part 2 Subpart J, section 2.1091

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field but will over-predict power density in the near field, where it could be used for walking a “worst case” or conservative prediction.

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

MPE Calculation Method

(A) Limits for Occupational/Controlled Exposure

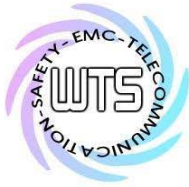
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz

*Plane-wave equivalent power density



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E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{3770 \times d^2}$$

mW/cm².

UNII 3-4

Channel/Frequency (MHz)	Channel/Frequency (MHz)	Conducted Power (dBm)	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)	Directional gain (dBi)	Power density (mW/cm ²)	Limit (mW/cm ²)	Ratio
802.11a	Ch 169 : 5845 MHz	14.13	--	2.5	--	0.0092	1	0.0092
802.11n 20MHz	Ch 169 : 5845 MHz	16.36	--	--	6.51	0.0386	1	0.0386
802.11ac 20MHz	Ch 169 : 5845 MHz	16.74	--	--	6.51	0.0420	1	0.0420
802.11ax 20MHz	Ch 169 : 5845 MHz	17.11	--	--	6.51	0.0458	1	0.0458
802.11n 40MHz	Ch 167 : 5835 MHz	15.33	--	--	6.51	0.0304	1	0.0304
802.11ac 40MHz	Ch 167 : 5835 MHz	15.79	--	--	6.51	0.0338	1	0.0338
802.11ax 40MHz	Ch 167 : 5835 MHz	16.25	--	--	6.51	0.0376	1	0.0376
802.11ac 80MHz	Ch 171 : 5855 MHz	15.84	--	--	6.51	0.0342	1	0.0342
802.11ax 80MHz	Ch 171 : 5855 MHz	16.46	--	--	6.51	0.0395	1	0.0395
802.11ax 160MHz	Ch 163 : 5815 MHz	13.51	--	--	6.51	0.0200	1	0.0200

UNII 4

Channel/Frequency (MHz)	Channel/Frequency (MHz)	Conducted Power (dBm)	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)	Directional gain (dBi)	Power density (mW/cm ²)	Limit (mW/cm ²)	Ratio
802.11a	Ch 173 : 5865 MHz	13.97	--	1.7	--	0.0073	1	0.0073
	Ch 177 : 5885 MHz	13.91	--	1.7	--	0.0072	1	0.0072
802.11n 20MHz	Ch 173 : 5865 MHz	16.23	--	--	5.33	0.0285	1	0.0285
	Ch 177 : 5885 MHz	16.23	--	--	5.33	0.0285	1	0.0285
802.11ac 20MHz	Ch 173 : 5865 MHz	16.67	--	--	5.33	0.0316	1	0.0316
	Ch 177 : 5885 MHz	16.68	--	--	5.33	0.0316	1	0.0316
802.11ax 20MHz	Ch 173 : 5865 MHz	17.06	--	--	5.33	0.0345	1	0.0345
	Ch 177 : 5885 MHz	17.10	--	--	5.33	0.0348	1	0.0348
802.11n 40MHz	Ch 175 : 5875 MHz	15.10	--	--	5.33	0.0220	1	0.0220
802.11ac 40MHz	Ch 175 : 5875 MHz	15.52	--	--	5.33	0.0242	1	0.0242
802.11ax 40MHz	Ch 175 : 5875 MHz	16.09	--	--	5.33	0.0276	1	0.0276



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BT

Channel/Frequency (MHz)	Channel/Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Power density (mW/cm ²)	Limit (mW/cm ²)	Ratio
BT	Ch 0 : 2402 MHz	13.05	3.3	0.0086	1	0.0086
	Ch 19 : 2440 MHz	13.87	3.3	0.0104	1	0.0104
	Ch 39 : 2480 MHz	12.73	3.3	0.0080	1	0.0080

From the peak EUT RF output power, the minimum mobile separation distance, $d = 20$ cm, as well as the gain of the used antenna, the RF power density can be obtained.

Simultaneous evaluation-

$$0.0458 \text{ (UNII 3-4, UNII 4)} + 0.0104 \text{ (BT)} = 0.0562 < 1$$