

FCC RF Exposure Exemption report
for

Wireless Mouse

Model No.: MMY30

FCC ID: YWO-MMY30

of

Applicant: ELECOM CO., LTD.

Address: Fushimimachi 4-1-1, Chuo-ku, Osaka City, Osaka Japan 541-8765

Tested and Prepared

by

Worldwide Testing Services (Taiwan) Co., Ltd.

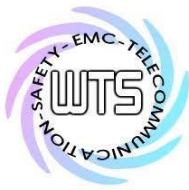
FCC Registration No.: TW1072, TW1140, TW1146, TW1477, TW0037

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



Report No.: W6M22411-23920-EE

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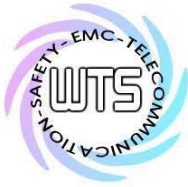


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1 General Information

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:

December 25, 2024

Ken Kang

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

December 25, 2024

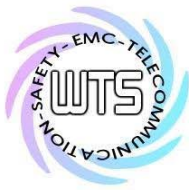
Kevin Wang

Date

WTS

Name

Signature



Worldwide Testing Services(Taiwan) Co., Ltd.

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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: ./.

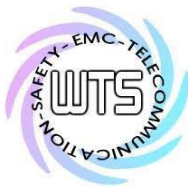
1.3 Application details

Approval holder

Name: ELECOM CO., LTD.
Street: Fushimimachi 4-1-1, Chuo-ku,
Town: Osaka City, Osaka
Country: Japan 541-8765

Manufacturer: (if applicable)

Name: ./.
Street: ./.
Town: ./.
Country: ./.



Registration number: W6M22411-23920-EE

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Application details

Date of receipt of test item: December 03, 2024

Date of test: from December 03, 2024 to December 24, 2024

1.4 General information of Test item

Type of test item: Wireless Mouse

Model no.: MMY30

Multi-listing model no.: ./.

Brand name: ELECOM

Power supply: Battery 1.5Vd.c.

Technical data

Mode	Channel	Conducted Power (dBm)
2.4G	Ch 1 : 2403 MHz	-0.38
	Ch 9 : 2441 MHz	-0.89
	Ch 16 : 2480 MHz	-1.07
BLE 1M	Ch 0 : 2402 MHz	-5.00
	Ch 19 : 2440 MHz	-5.35
	Ch 39 : 2480 MHz	-5.10

Type of antenna: PCB antenna

Antenna gain: -1.66 dBi

Operation modes: Duplex

Modulation type: GFSK

Sample no.: #07

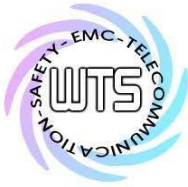
Classification:

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

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 (%)	1/T - VBW (kHz)
2.4G	0.240385	4.0641	5.91%	4.16
BLE 1M	0.432692	1.069712	40.45%	2.31

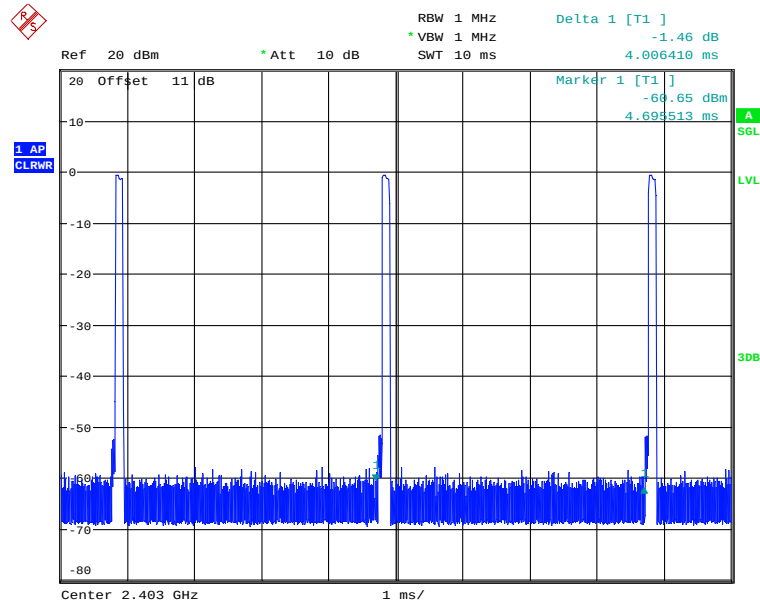


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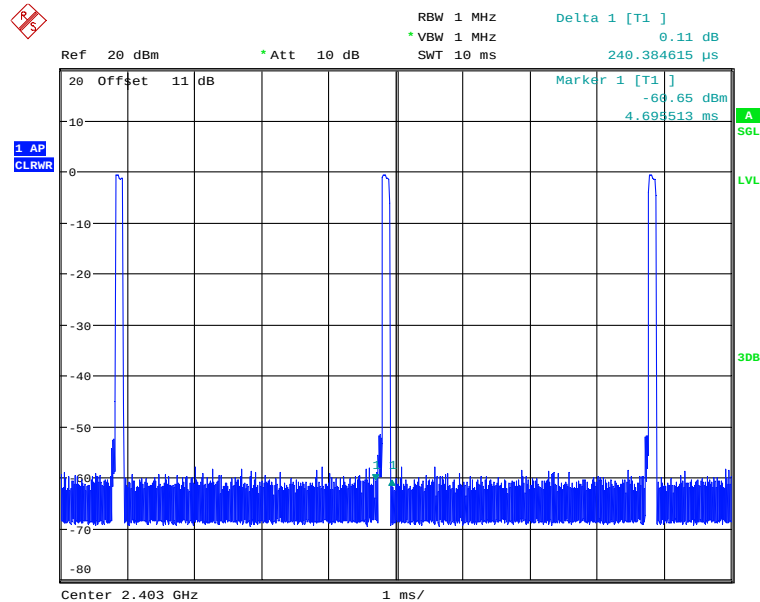
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Duty cycle plot

2.4G



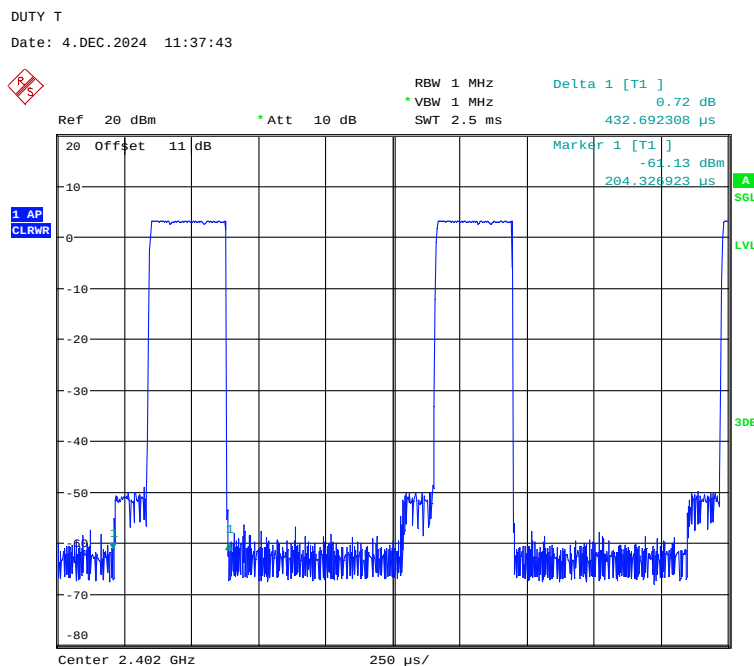
DUTY T 2403MHZ
Date: 19.DEC.2024 11:13:57

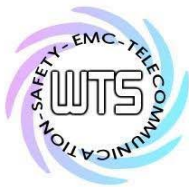


DUTY TON 2403MHZ
Date: 19.DEC.2024 11:13:35



BLE





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2 Test configuration

2.1 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Extreme conditions parameters: ./.

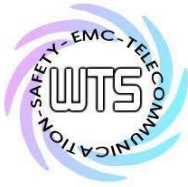
2.2 Measurement uncertainty

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

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 RF Exposure Test Exemptions

3.1 1-mW Test Exemption

$$P \leq 1\text{mW}$$

When the aggregate maximum available power of all transmitting antennas is $\leq 1\text{ mW}$ in the same time-averaging period.

3.2 SAR-Based Exemption

Max. time-averaged power(conducted power) or $ERP \leq P_{th}$

$$P_{th}(\text{mW}) = ERP_{20\text{cm}} \left(\frac{d}{20} \right)^x \text{ for distance } d \leq 20\text{cm}$$

$$P_{th}(\text{mW}) = ERP_{20\text{cm}} \text{ for distance } 20\text{cm} < d \leq 40\text{cm}$$

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{cm}} \sqrt{f}} \right)$$

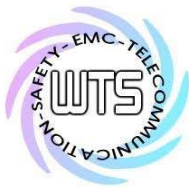
$$ERP_{20\text{cm}}(\text{mW}) \begin{matrix} 0.3\text{GHz} \leq f < 1.5\text{GHz}: 2040 * f \\ 1.5\text{GHz} \leq f \leq 6\text{GHz}: 3060 \end{matrix}$$

d: cm

f: GHz

Table B.2 – Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
		5	10	15	20	25	30	35	40	45	50
300		39	65	88	110	129	148	166	184	201	217
450		22	44	67	89	112	135	158	180	203	226
835		9	25	44	66	90	116	145	175	207	240
1900		3	12	26	44	66	92	122	157	195	236
2450		3	10	22	38	59	83	111	143	179	219
3600		2	8	18	32	49	71	96	125	158	195
5800		1	6	14	25	40	58	80	106	136	169



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3.3 MPE-Based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 to support an exemption from further evaluation from 300 kHz through 100 GHz.

>300kHz & distance $R > \lambda/2\pi$, MPE-based exemption

Table B.1 –Thresholds for single RF sources subject to routine environmental evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz	-	f_H MHz	$\lambda_L / 2\pi$	-	$\lambda_H / 2\pi$	W
0.3	-	1.34	159 m	-	35.6 m	$1,920 R^2$
1.34	-	30	35.6 m	-	1.6 m	$3,450 R^2/f^2$
30	-	300	1.6 m	-	159 mm	$3.83 R^2$
300	-	1,500	159 mm	-	31.8 mm	$0.0128 R^2/f^2$
1,500	-	100,000	31.8 mm	-	0.5 mm	$19.2 R^2$

f: MHz

R: m

$\lambda/2\pi$

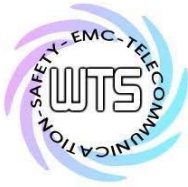
$v=f\lambda$

v: speed of light = $3 \times 10^8 m/s$

f: frequency (Hz)

λ : wavelength

f (MHz)	$\lambda / 2\pi$ (m)	$\lambda / 2\pi$ (mm)
0.125	382	381,972
13.56	3.52	3,521
300	0.159	159
918	0.052	52
2400	0.020	19.9
5250	0.009	9.09
5600	0.009	8.53
5825	0.008	8.20
6000	0.008	7.96
7000	0.007	6.82
10000	0.005	4.77



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4 Exemption calculation

1-mW Test Exemption

2.4G-

The maximum power is -0.38 dBm (0.9162 mW)

$0.9162 \text{ mW} \leq 1\text{mW}$

BLE 1M-

The maximum power is -5 dBm (0.3162 mW)

$0.3162 \text{ mW} \leq 1\text{mW}$

The device is qualify for simultaneous transmission SAR exemption.