Report on the Radio Testing of:

Label printer

Model(s): M611

In accordance with
47 CFR FCC Part 15C

PSB Singapore

Add value.
Inspire trust.

Prepared for:
Brady Worldwide Inc.
6555 W. Good Hope Rd.
Milwaukee, WI 53223

COMMERCIAL-IN-CONFIDENCE

Document Number: 7191272895-EEC22/05 | Issue: 01
FCC ID: R17WE310F5 (WI-FI) & YCP-STM32WB5M001(Bluetooth)

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Song Zhi Qun	08 Apr 2022	
Authorised Signatory	Quek Keng Huat	07 Apr 2022	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD PSB document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with the mentioned standard(s).

TÜV SÜD PSB

ilac-MRA

Accredited Laboratory SAC-SINGLAS

LA-2007-0380-A LA-2007-0386-C
LA-2007-0381-F LA-2010-0464-D
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LA-2007-0383-G LA-2018-0703-G
LA-2007-0384-G LA-2020-0747-L
LA-2007-0385-E

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council. Inspections/Calibrations/Tests marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our inspection body/laboratory.

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	08 Apr 2022

1.2 Introduction

Applicant	:	Brady Worldwide Inc. 6555 W. Good Hope Rd. Milwaukee, WI 53223
Manufacturer	:	Same as applicant
Factory	:	Brady Technology Sdn Bhd Plot 6, Hilir Sungai Keluang 4, Bayen Lepas Free Industrial Zone, Phase IV, Bayen Lepas 11900 Pulau Pinang Malaysia
Model Number(s)	:	M611
Serial Number(s)	:	1. PGM6112133301014 (Bluetooth Unit) 2. PGM6112122901007 (WI-FI Unit)
Number of Samples Tested	:	2
Test Sample(s) Condition	:	Good
Quotation Reference	:	5587076
Test Specification/Issue/Date	:	FCC 47 CFR Part 15C
Test Sample(s) Received Date	:	13 Feb 2022
Start of Test	:	13 Feb 2022
Finish of Test	:	05 Apr 2022

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with specifications as shown below.

Specification Clause	Test Description	Result	Comments/Base Standard
47 CFR FCC Part 15			
15.107(a), 15.207	Conducted Emissions	Pass	ANSI C63.4: 2014 ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2018
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement)	Pass	ANSI C63.4: 2014 ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(a)(2)	Spectrum Bandwidth (6dB Bandwidth Measurement)	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(b)(3)	Maximum Peak Power	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(d)	RF Conducted Spurious Emissions (Non-Restricted Bands)	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(d)	RF Conducted Spurious Emissions (Restricted Bands)	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(d)	Band Edge Compliance (Conducted)	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(d)	Band Edge Compliance (Radiated)	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.247(e)	Peak Power Spectral Density	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
15.35(c)	Duty Cycle Factor Computation	Not Tested *See Note 2	ANSI C63.10: 2013 KDB 558074 D01 DTS Measurement Guidance V05R02: 2019
2.1091	Maximum Permissible Exposure	Pass	

Notes

1. The EUT is a Class A device when in non-transmitting state and meets the 47 CFR FCC Part15B Class A requirements

2. The product uses certified modules and the modules are implemented without any modification. The FCC ID for the wireless modules are as follows:

   a. For Bluetooth module: FCC ID: YCP-STM32WB5M001
   b. For WI-FI module: FCC ID: R17WE310F5

3. All the tests are conducted at the highest bit rate and maximum transmit power as they are deem to be the worse.

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1.4 Product Information

1.4.1 Technical Description

Description	:	The Equipment Under Test(s) (EUT(s)) is a **LABEL PRINTER.**
Microprocessor	:	TI AM3354
Operating Frequency	:	800MHz (Andromeda Card Engine), 2.4GHz (Wifi & BLE module)
Clock / Oscillator Frequency	:	i. CPU crystal @ 24MHz, ii. CPU core @ 800MHz, iii. DDR interface @ 303MHz, iv. RTC @ 32.768KHz v. USB internal to CPU @ 24MHz, vi. LCD clock @ 48MHz vii. Print head clock @ 12MHz, viii. Radio data SPI bus @ 10MHz ix. Telit WiFi WE310F5-I module @ 2.4GHz (2.412GHz – 2.462GHz) x. STM32WB5MMG BT LE module @ 2.4GHz (2.402GHz – 2.480GHz)
Modulation	:	i. 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation (WiFi) ii. 11g & 11n, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation (WiFi) iii. GFSK (BT LE)
Antenna Gain	:	i. WiFi 2.3 dBi (PCB trace antenna) ii. BT LE 2.0 dBi (PCB trace antenna)
Port / Connectors	:	i. 1x DC Inlet (IEC 60320 C14) ii. 1x USB 2.0 Host ports (USB type A) iii. 1x USB 2.0 Device port (USB type B)
Rated Power	:	External AC Adapter (CWT; KPL-065J-VI) Input 100V -240V 50Hz/ 60Hz 1.7A Output 18VDC 3.61A
Accessories	:	i. USB cable (no ferrite) ii. USB Flash drive iii. External AC Adapter (CWT; KPL-065J-VI)

1.4.2 Test Configuration and Modes of Operation

<table>
<tr><th>Mode(s) BLE</th><th>Description</th></tr>
<tr><td>Maximum RF power transmission</td><td>The EUT was exercised in the mode, transmitting at lower, middle and upper channels as shown below one at a time with all supported modulation schemes were evaluated. For Band Edge Compliance, only lower and upper channels were evaluated.

For Bluetooth Low Energy (BLE)
<table>
<tr><th>Transmit Channel</th><th>Frequency (GHz)</th></tr>
<tr><td>Channel 0 (Lower Channel)</td><td>2.402</td></tr>
<tr><td>Channel 19 (Middle Channel)</td><td>2.442</td></tr>
<tr><td>Channel 39 (Upper Channel)</td><td>2.480</td></tr>
</table>
For WI-FI
<table>
<tr><th>Transmit Channel</th><th>Frequency (GHz)</th></tr>
<tr><td>Channel 1 (Lower Channel)</td><td>2.412</td></tr>
<tr><td>Channel 5 (Middle Channel)</td><td>2.442</td></tr>
<tr><td>Channel 11 (Upper Channel)</td><td>2.472</td></tr>
</table>
</td></tr>
</table>

1.5 Deviations from the Standard

Nil.

1.6 EUT Modification Record

No modifications were made.

1.7 Test Location(s)

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
15 International Business Park
TÜV SÜD @ IBP
Singapore 609937

1.8 Test Facilities Registrations

Requirements	Registration Numbers
FCC	994109 (Test Firm Registration Number) SG0002 (Designation Number)
ISED	SGAP01 (CAB Identifier) 2932N-1 (10m Semi-Anechoic Chamber)
VCCI	R-13324 (10m ANC), G-10203 (10mANC) R-20151 (3m RF Chamber - Lab 7), G-20149 (3m RF Chamber - Lab 7) C-14933 (C.E @ CEIBP) T-12403 (Telecom Ports @ CEIBP)
BSMI	SL2-IS-E-6001R *[CNS-13803 (ISM Equipment)]* SL2-IN-E-6001R *[CNS-13438 (IT Equipment)]* SL2-R1/R2-E-6001R *[CNS-13439 (Broadcast Receivers)]* SL2-A1-E-6001R *[CNS-13783-1 (Household Appliances)]* SL2-L1-E-6001R *[CNS-14115 (Lighting Equipment)]*
SABS	SABS/A-LAB/0030/2018
ASCA	TL-86

1.9 Supporting Equipment

The EUT was tested as a stand-alone unit without any supporting equipment.

2 Test Details

2.1 Conducted Emissions

2.1.1 Test Limits

Frequency Range (MHz)	Limit Values (dBµV)	
	Quasi-peak (Q-P)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50
* Decreasing linearly with the logarithm of the frequency		

2.1.2 Test Setup

2.1.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.1.2.2 The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

2.1.2.3 The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

2.1.2.4 All other supporting equipment were powered separately from another LISN.

2.1.3 Test Method

2.1.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.1.3.2 A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.

2.1.3.3 High peaks, relative to the limit line, were then selected.

2.1.3.4 The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.

2.1.3.5 The measurements were then repeated for the LIVE line.

Sample Calculation Example

At 20 MHz	Q-P limit = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB Q-P reading obtained directly from EMI Receiver = 40.0 dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 60.0 - 40.0 = 20.0	i.e. 20.0 dB below Q-P limit

2.1.4 Test Results

Test Input Power	120V 60Hz	Temperature	23ºC
Line Under Test	AC Mains	Relative Humidity	50%
Mode	BLE Transmit Channel 0	Atmospheric Pressure	1019mbar
		Tested By	Lim Chia Fa
		Test Date	21 Feb 2022

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line	Channel
0.1579	45.2	65.6	20.4	26.1	55.6	29.5	Neutral	0
0.1906	41.7	64.0	22.3	22.9	54.0	31.1	Live	0
2.6534	29.9	56.0	26.1	20.2	46.0	25.8	Neutral	0
9.6281	30.9	60.0	29.1	23.9	50.0	26.1	Live	0
10.1324	31.2	60.0	28.8	23.0	50.0	27.0	Neutral	0
28.4067	29.8	60.0	30.2	18.4	50.0	31.6	Live	0

Test Input Power	120V 60Hz	Temperature	23ºC
Line Under Test	AC Mains	Relative Humidity	50%
Mode	WI-FI Transmit Channel 1	Atmospheric Pressure	1019mbar
		Tested By	Lim Chia Fa
		Test Date	21 Feb 2022

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line	Channel
0.1595	45.0	65.5	20.5	26.4	55.5	29.1	Live	1
0.2055	39.3	63.4	24.1	20.9	53.4	32.5	Neutral	1
0.4137	39.7	57.6	17.9	34.2	47.6	13.4	Live	1
2.7340	30.6	56.0	25.4	22.3	46.0	23.7	Live	1
9.7752	31.2	60.0	28.8	22.9	50.0	27.1	Neutral	1
10.6440	31.0	60.0	29.0	23.6	50.0	26.4	Live	1

Notes

1.	All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 150kHz - 30MHz RBW: 9kHz VBW: 30kHz

2.2 Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement)

2.2.1 Test Limits

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m)
0.009 - 0.490 *	20 log [2400 / F (kHz)] @ 300m
0.490 - 1.705	20 log [24000 / F (kHz)] @ 30m
1.705 - 30.0	30.0 @ 30m
30 – 88	40.0 @ 3m
88 – 216	43.5 @ 3m
216 – 960	46.0 @ 3m
Above 960 *	54.0 @ 3m
* For frequency bands 9kHz – 90kHz, 110kHz – 490kHz and above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.	

Restricted Bands

MHz			MHz			MHz			GHz		
0.090	-	0.110	16.42	-	16.423	399.9	-	410	4.5	-	5.15
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	2690	-	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	-	3358	36.43	-	36.5
12.57675	-	12.57725	322	-	335.4	3600	-	4400	Above 38.6		
13.36	-	13.41									

2.2.2 Test Setup

2.2.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.2.2.2 The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

2.2.2.3 The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

2.2.3 Test Method

2.2.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.2.3.2 A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.

2.2.3.3 The test was carried out at the selected frequency points obtained from the pre-scan. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:

a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission

2.2.3.4 A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz.For frequency point in range of 9kHz – 90kHz, 110kHz – 49k0kHz and above 1GHz, both Peak and Average measurements were carried out.

2.2.3.5 The measurements were repeated for the next frequency point, until all selected frequency points were measured.

2.2.3.6 The frequency range covered was from the lowest radio frequency signal generated from the EUT, without going below 9kHz to 10th harmonics of the EUT fundamental frequency, using the loop antenna for frequency below 30MHz, Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz	Q-P limit = 46.0 dBμV/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB Q-P reading obtained directly from EMI Receiver = 40.0 dBμV/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 46.0 - 40.0 = 6.0	i.e. 6.0 dB below Q-P limit

2.2.5 Test Results

Test Input Power	120V 60Hz	Temperature	21°C
Test Distance	10m (<30MHz) 3m (≥30MHz – 25GHz)	Relative Humidity	52%
Mode	BLE Transmit	Atmospheric Pressure	1019mbar
		Tested By	Li Chao Meng Dylan Lin Lim Kay Tak
		Test Date	13 Feb 2022 to 05 Apr 2022

Spurious Emissions ranging from 9kHz – 30MHz (for 9kHz – 90kHz, 110kHz – 490kHz) *See Note 8

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
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Spurious Emissions ranging from 9kHz – 30MHz *See Note 8

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Channel
1.4880	23.9	33.7	9.8	120	327	V	19
1.8310	22.7	32.5	9.8	120	250	V	19
1.5220	23.7	33.5	9.8	120	101	V	39
1.8860	22.7	32.5	9.8	120	175	V	39
2.0130	22.6	32.5	9.9	120	198	V	0
1.2180	25.0	35.4	10.4	120	79	V	39

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Channel
32.6130	17.9	40.0	22.1	100	320.1	V	0
40.7840	17.9	40.0	22.1	100	260.1	V	0
45.6560	20.3	40.0	19.7	100	190.1	V	0
215.2240	29.7	43.5	13.8	100	257.1	H	0
289.7900	41.6	46.0	4.4	100	18.9	H	0
291.5910	42.3	46.0	3.7	100	42	H	0

Spurious Emissions above 1GHz - 25GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
4.8039	48.0	74.0	26.0	40.1	54.0	13.9	128	66	V	0
4.8798	47.2	74.0	26.8	38.5	54.0	15.5	400	21	H	19
4.9595	49.6	74.0	24.4	43.9	54.0	10.1	100	290	V	39
5.4224	47.7	74.0	26.3	33.2	54.0	20.8	200	38	H	39
5.4295	46.7	74.0	27.3	33.1	54.0	20.9	399	14	V	19
5.9021	47.4	74.0	26.6	33.5	54.0	20.5	399	91	H	39

Test Input Power	120V 60Hz	Temperature	21°C
Test Distance	10m (<30MHz) 3m (≥30MHz – 25GHz)	Relative Humidity	52%
Mode	WI-FI Transmit	Atmospheric Pressure	1019mbar
		Tested By	Li Chao Meng Dylan Lin Lim Kay Tak
		Test Date	13 Feb 2022 to 05 Apr 2022

Spurious Emissions ranging from 9kHz – 30MHz (for 9kHz – 90kHz, 110kHz – 490kHz) *See Note 8

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
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Spurious Emissions ranging from 9kHz – 30MHz *See Note 8

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Channel
1.1820	25.3	35.7	10.4	120	331	V	5
1.2840	24.8	35.0	10.2	120	310	V	11
2.2160	22.0	32.5	10.5	120	148	V	5
2.3820	21.9	32.5	10.6	120	206	V	1
3.5850	21.3	32.5	11.2	120	209	V	1
5.2250	20.6	32.5	11.9	120	96	V	5

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Channel
202.1820	30.6	43.5	12.9	200	265	H	1
244.5750	32.3	46.0	13.7	131	283	H	1
286.9780	40.6	46.0	5.4	100	81	H	1
296.7360	40.8	46.0	5.2	100	78	H	1
332.6220	35.4	46.0	10.6	100	265	H	1
479.3630	42.2	46.0	3.8	190	271	H	1

Spurious Emissions above 1GHz - 25GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
5.3210	46.9	74.0	27.1	33.4	54.0	20.6	399	332	H	11
5.4784	47.6	74.0	26.4	33.9	54.0	20.1	101	299	V	5
5.9597	48.2	74.0	25.8	34.1	54.0	19.9	300	311	H	11
5.9991	47.6	74.0	26.4	33.8	54.0	20.2	400	327	H	5
17.5854	45.7	74.0	28.3	31.7	54.0	22.3	200	236	H	5
17.7533	45.0	74.0	29.0	31.3	54.0	22.7	200	314	V	1

Notes

1.	All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 9kHz – 150kHz RBW: 200Hz VBW: 1kHz 150kHz – 30MHz RBW: 9kHz VBW: 30kHz 30MHz - 1GHz RBW: 120kHz VBW: 1MHz >1GHz RBW: 1MHz VBW: 3MHz
4.	"--" indicates no emissions were found and shows compliance to the limits
5.	Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
6.	The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33 (a) for intentional radiators & Section 15.33 (b) for unintentional radiators.
7.	The channel in the table refers to the transmit channel of the EUT.
8.	The measurement was done at 10m. The measured results were extrapolated to the specified test limits as specified in § 15.209 (a) based on 40dB/decade.

2.3 Maximum Permissible Exposure (MPE)

2.3.1 Test Limits

The EUT shows compliance to the requirements of this section, which states the MPE limits for general population / uncontrolled exposure are as shown below:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (min)
0.3 - 1.34	614	1.63	100 Note 2	30
1.34 - 30	824 / f	2.19 / f	180 / f^2 Note 2	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f / 1500	30
1500 - 100000	-	-	1.0	30
Notes				
1. f = frequency in MHz				
2. Plane wave equivalent power density				

Maximum Permissible Exposure Computation

The power density at 20cm distance was computed from the following formula:

$S = (30GP) / (377d^2)$

where S = Power density in W/m^2
P = 0.005420
d = Test distance at 0.2m
G = Numerical isotropic gain, 1.70 (2.3dBi)

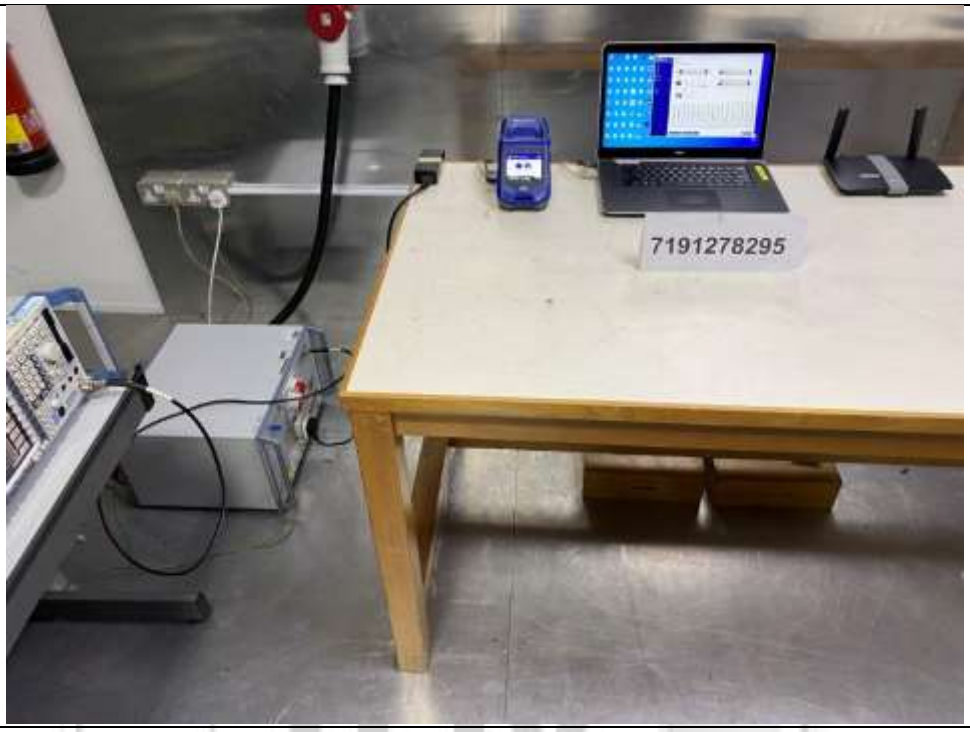
Substituting the relevant parameters into the formula:

$S = [(30GP) / 377d^2]$
$= 0.18\ W/m^2$
$= 0.018\ mW/cm^2$

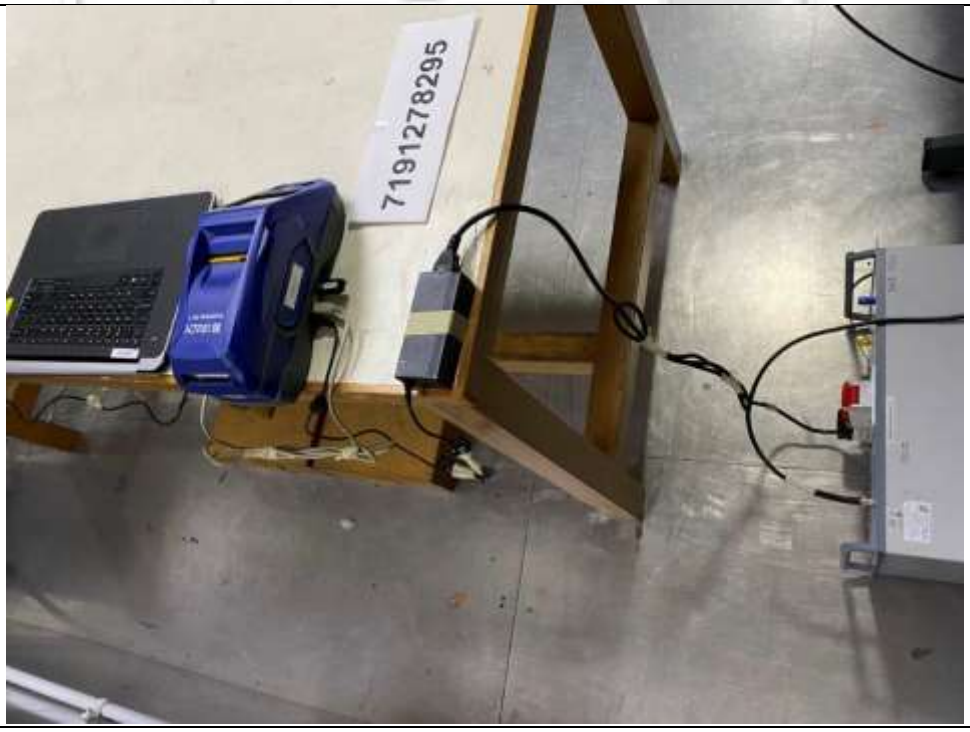
∴ The power density of the EUT at 20cm distance is $0.018mW/cm^2$ based on the above computation and found to be lower than the power density limit of $1.0mW/cm^2$.

3 Photographs

TEST SETUP



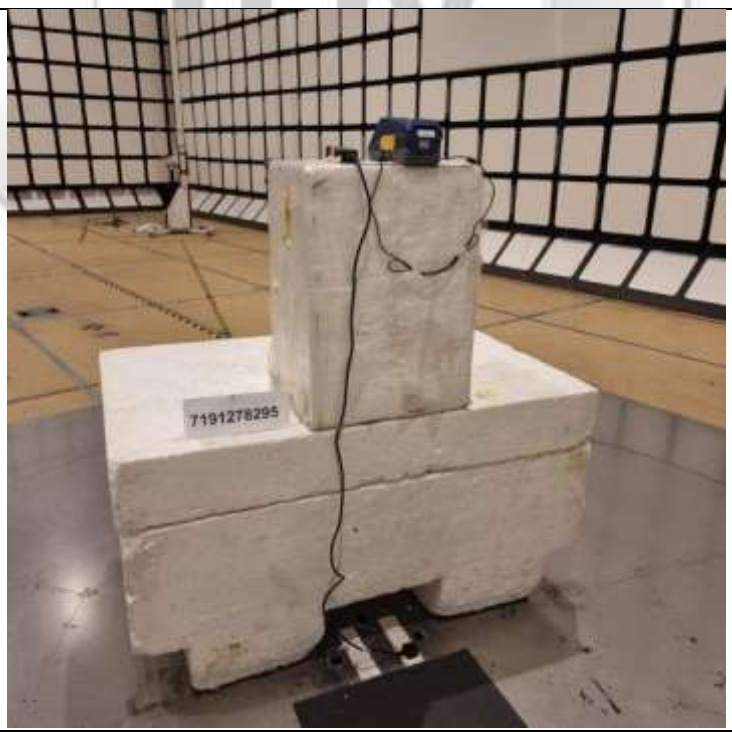
Conducted Emissions Test Setup (Front View)



Conducted Emissions Test Setup (Rear View)

TEST SETUP (9kHz – 30MHz)

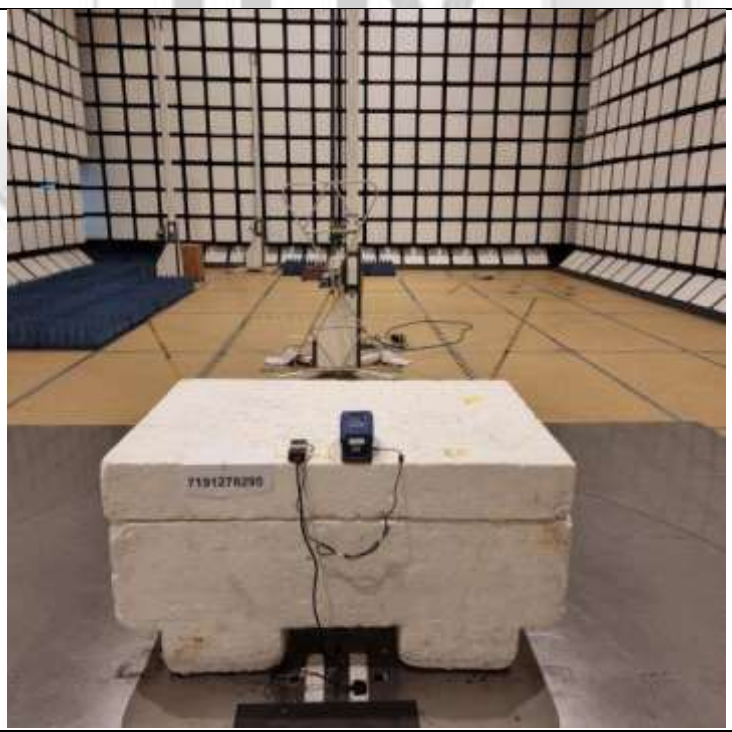
Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Front View)



Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Rear View)

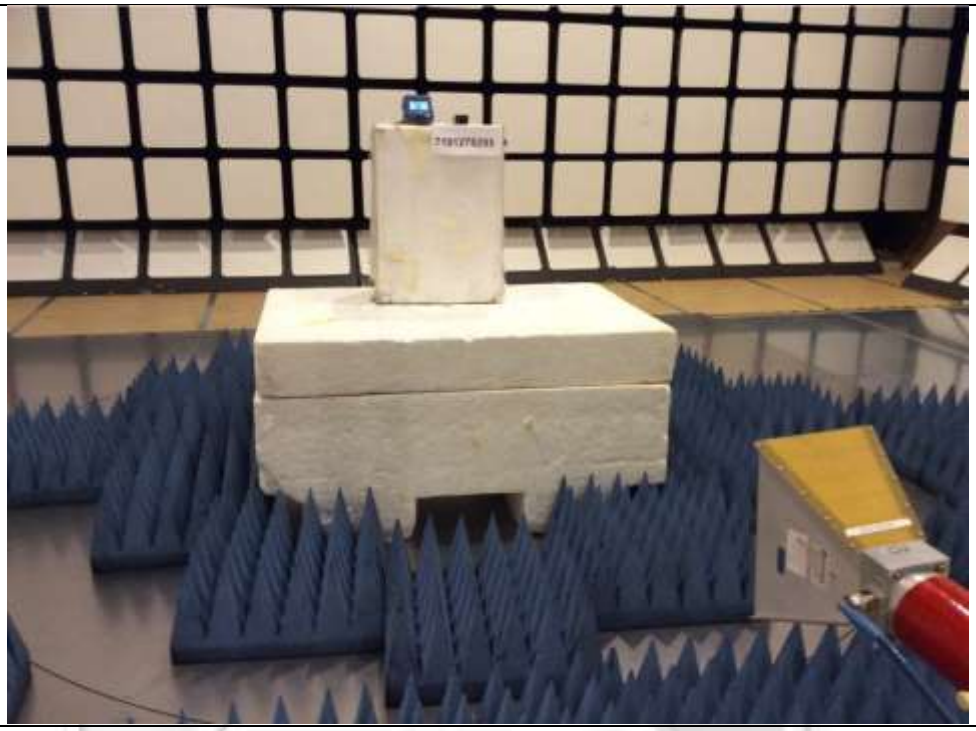
TEST SETUP (30MHz to 1GHz)

Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Front View)



Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Rear View)

TEST SETUP (Above 1GHz)



Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Front View)

Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement) Test Setup (Rear View)

PSB Singapore

EUT PHOTOGRAPHS

View 1

View 2

EUT PHOTOGRAPHS

View 3

View 4

EUT PHOTOGRAPHS

RF Module Circuit with RF Shield Removed

4 Test Equipment

Instrument	Model	S/No	Cal Due Date
Conducted Emissions			
Rohde & Schwarz EMI Test Receiver	ESCI	100477	11 Oct 2022
AFJ LISN	AFJ LT32C/10	32031929295	27 Aug 2022
Radiated Emissions (Spurious Emissions Inclusive Restricted Bands Requirement)			
R&S EMI Test Receiver (9kHz - 26.5GHz)	ESR26	101714	11 May 2022
Sonoma Preamplifier (1MHz – 1GHz)	310	254719	05 Jan 2023
TDK-RF Horn Antenna (1GHz - 18GHz)	HRN-0118	130256	18 Apr 2022
Miteq Preamplifier (1GHz – 6GHz)	AMF-2D-00500800-25-13P	2011153	19 Oct 2022
Schwarzbeck Horn Antenna / Pre-amplifier (2GHz – 18GHz)	BBHA 9120 C / HAP06-18W	372 / 0000004	18 Apr 2022
Schwarzbeck Horn Antenna(1GHz- 18GHz)	BBHA9120D	02574	28 Dec 2022
EM Horn Antenna (1GHz – 6GHz)	EM-6961	6553	16 Mar 2023
TDK Bilog Antenna (30MHz – 1GHz)	HLP-3003C	130237	12 Mar 2023
Schwarzbeck Active Loop Antenna (9 kHz – 30 MHz)	FMZB 1519 B	196	02 Nov 2022
ETS Horn Antenna (18GHz - 40GHz)	3116	0004-2474	09 Oct 2022
Agilent Preamplifier (1GHz - 26.5GHz)	8449B	3008A02305	24 Sep 2022

5 Measurement Uncertainty

All measured results are traceable to the SI units. The uncertainty of the measurement is at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted Emissions at Mains Terminals	1.0dB (9kHz to 30MHz)
Radiated Emissions	10m Anechoic Chamber (Lab 4) 2.6dB (9kHz to 30MHz @ 10m) 3.5dB (30MHz to 1GHz @ 10m) 4.0dB (30MHz to 1GHz @ 3m) 4.8dB (>1GHz to 40GHz @ 3m) 3m RF Chamber (Lab7) 4.0dB (30MHz to 1GHz @ 3m) 4.5dB (>1GHz to 40GHz @ 3m)
Maximum Permissible Exposure	15% (0.1MHz – 18GHz)

6 Annex A – FCC Label and Position

Labelling requirements per Section 2.925 & 15.19

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.

Sample Label
Physical Location of FCC Label on EUT

Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.

2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.

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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, 15 International Business Park TÜV SÜD @ IBP Singapore 609937.

6. The tests carried out by TÜV SÜD PSB and this report are subject to TÜV SÜD PSB's General Terms and Conditions of Business and the Testing and Certification Regulations of the TÜV SÜD Group.

Effective 26 January 2021

End of the Test Report