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RADIO REPORT FOR CERTIFICATION to FCC PART 15 Subpart C (Section 15.231)

FCC ID: X4K-PAPTX5V101

Test Sample: Remote Control (Hand-held)
Model: PTX-5V2

Client: Automatic Technology Australia Pty. Ptd.

Report Number: M160424-3

Issue Date: 26 October 2016

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RADIO REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.231)

EMC Technologies Report No.: M160424-3

Issue Date: 26 October 2016

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RADIO REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.231)

Report Number:	M160424-3
Issue Date:	26 October 2016
Sample:	Remote Control (Hand-held)
Model:	PTX-5V2
Serial Number:	27707708
Manufacturer:	Automatic Technology Australia Pty Ltd
FCC ID:	X4K-PAPTX5V101
Equipment Type:	Periodically Operated Intentional Radiator (Transceiver)
Tested for:	Automatic Technology Australia Pty Ltd
Address:	6-8 Fiveways Boulevard, Keysborough, VIC 3173
Phone:	+61 3 9791 0200
Fax:	+61 3 9791 0250
Contact:	Nikolai Klepikov
Email:	nikolai.klepikov@ata-aust.com.au
Standard:	FCC Part 15 – *Radio Frequency Devices* Subpart C – *Intentional Radiators* Section 15.231 – *Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz.*
Test Dates:	26th and 31st August 2016
Test Engineer:	**Larry Phuah**
Attestation:	*I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*
Authorised Signatory:	**Chris Zombolas** **Technical Director** **EMC TECHNOLOGIES PTY LTD**

Issued by: EMC Technologies Pty. Ltd., 176 Harrick Road, Keilor Park, VIC 3042, Australia.
Phone : +61 3 9365 1000 **Fax:** +61 3 9331 7455 **Web:** www.emctech.com.au

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RADIO REPORT FOR CERTIFICATION
to
FCC PART 15 SUBPART C (SECTION 15.231)

1.0 INTRODUCTION

Test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations:

47 CFR, Part 15, Subpart C:	Rules for intentional radiators
Section 15.203:	Antenna requirements
Section 15.205:	Restricted bands of operation
Section 15.207:	Conducted Limits
Section 15.209:	Radiated Emission Limits (General requirements)
Section 15.231:	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.
Section 2.1093	Radiofrequency radiation exposure evaluation: portable devices.

The sample **complied** with the requirements of 47 CFR, Part 15 Subpart C - Section 15.231.

The measurement procedure used was in accordance with ANSI C63.10: 2013. The instrumentation conformed to the requirements of ANSI C63.2: 2009.

1.1 Summary of Results

FCC Part 15 Subpart C	Test Performed	Results
15.203	Antenna Requirement	**Complied**
15.205	Restricted bands of operation	**Complied**
15.207	Conducted limits	**Not applicable** Battery powered, no AC mains
15.209	Radiated Emissions Limits; General Requirements	**Complied**
15.231(a)	Periodic Operation	**Complied**
15.231(b)(2)	Fundamental Field Strength	**Complied**
15.231(b)(3)	Spurious Emissions	**Complied**
15.231(c)	Emission Bandwidth	**Complied**
2.1093	Radiofrequency radiation exposure evaluation: portable devices.	**Complied**

1.2 Modifications by EMC Technologies

No modifications were performed.

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2.0 GENERAL INFORMATION

2.1 EUT (Transmitter) Details

Test Sample:	Remote control (Handheld)
Model Number:	PTX-5V2
Operating Frequency Range:	433.47 – 434.37 MHz
Antenna Type:	Integral
Supply Rating:	3V (CR3032)
Manufacturer:	Automatic Technology Australia Pty Ltd

2.2 EUT (Host) Details

Test Sample:	Remote control (Handheld)
Model Number:	PTX-5V2
Serial Number:	27707708
Manufacturer:	Automatic Technology Australia Pty Ltd
Supply Rating:	3V (CR3032)
Highest operating Frequency:	434.37 MHz

2.3 Operational Description

The PTX-5V2 is a remote control for operating the garage door opener.

2.4 Test Configuration

The remote control was tested as a standalone device with the button pressed to initiate transmission.

2.5 Test Facility

2.5.1 General

EMC Technologies Pty Ltd is listed by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies is listed as an FCC part 47CFR2.948 test lab and may perform the testing required under Parts 15 and 18 – **FCC Registration Number 90560**

EMC Technologies Pty Ltd has also been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies indoor open are test site (iOATS) have been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS-Gen, Issue 8 - **Industry Canada iOATS number - IC 3569B**

Measurements in this report were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.5.2 NATA Accreditation

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A^2LA).

EMC Technologies is accredited in Australia by the National Association of Testing Authorities (NATA). All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation.

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au

2.6 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yy	Due Date dd/mm/yy	Cal. Interval
Chamber	Frankonia SAC-10-2 (R-139)	8/01/2016	8/01/2017	1 Year, *1
EMI Receiver	R&S ESU40 20 Hz – 40 GHz Sn: 100392 (R-140)	19/11/2015	19/11/2016	1 Year, *2
	HP 85460A 9kHz-6.5 GHz Sn 3448A00287	10/11/2016	10/11/2017	1 Year, *2
Antennas	EMCO 6502 Active Loop 9kHz – 30MHz Sn. 9311-2801 (A-231)	20/07/2015	20/07/2018	3 Year, *1
	SUNOL JB6 BICONILOG 30 – 6000 MHz Sn. A012312 (A-363)	26/05/2016	26/05/2018	2 Year, *2
Cables	Room 12 inbuilt cable Panel 1 to 10m (C-422)	19/05/2016	19/05/2017	1 Year, *1
	Room 12 inbuilt cable Panel 1 to 3m (C-421)	09/05/2016	09/05/2017	1 Year, *1
	Room 12 Antenna cable (C-437)	09/05/2016	09/05/2017	1 Year, *1

Note *1. Internal NATA calibration.
Note *2. External NATA / A2LA calibration

3.0 TEST RESULTS

3.1 §15.203 Antenna Requirement

An internal, permanently attached antenna was incorporated within the PTX-5V2 Remote control ensuring it could not be replaced.

3.2 §15.205 Restricted Bands of Operation

The limits of §15.209 were applied across the applicable spectrum and therefore complied with the restricted band requirements.

3.3 §15.207 Conducted Limits

The device was not connected directly or indirectly to the AC mains network.

3.4 §15.209 Radiated emission limits; general requirements

The general requirement limits were applied to the measurements of §15.231(b)(3).

3.5 §15.231(a) Periodic Operation

The device only transmitted when the button was pressed.

3.6 §15.231(b)(2) Fundamental Field Strength

The field strength of the fundamental transmitted frequency was measured inside a compliant CISPR16-1-4 semi-anechoic chamber. The EUT was positioned on a test turn-table and rotated through 360° to determine the highest emissions. The measurement antenna was also varied between 1 and 4 metres height. A calibrated Biconilog antenna was used for measurement.

All measurements were made at a distance of 10 metres. The fundamental emissions were measured using a peak detector and compliance is demonstrated based on the average value of the measured emissions. The method of calculation was outlined in section 7.5 of ANSI C63.10:

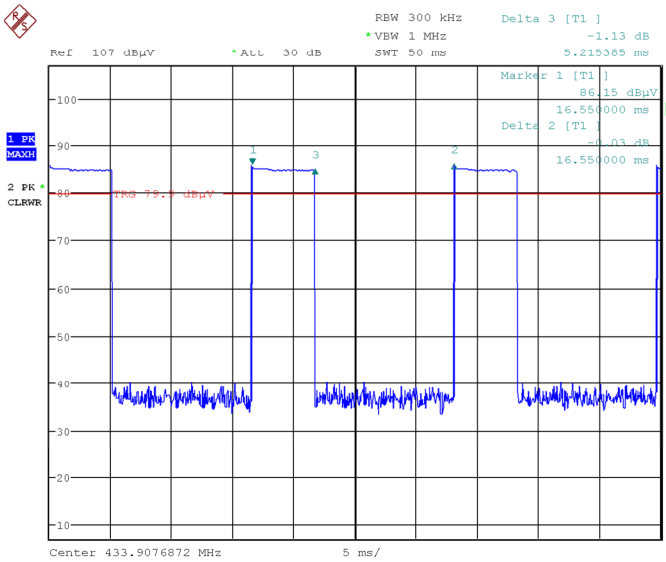
$$E_{ave} = E - \delta(dB)$$

Where:
E_{ave} = Average electric field (dBµV/m)
E = Peak electric field (dBµV/m)
δ = duty cycle correction factor(dB)

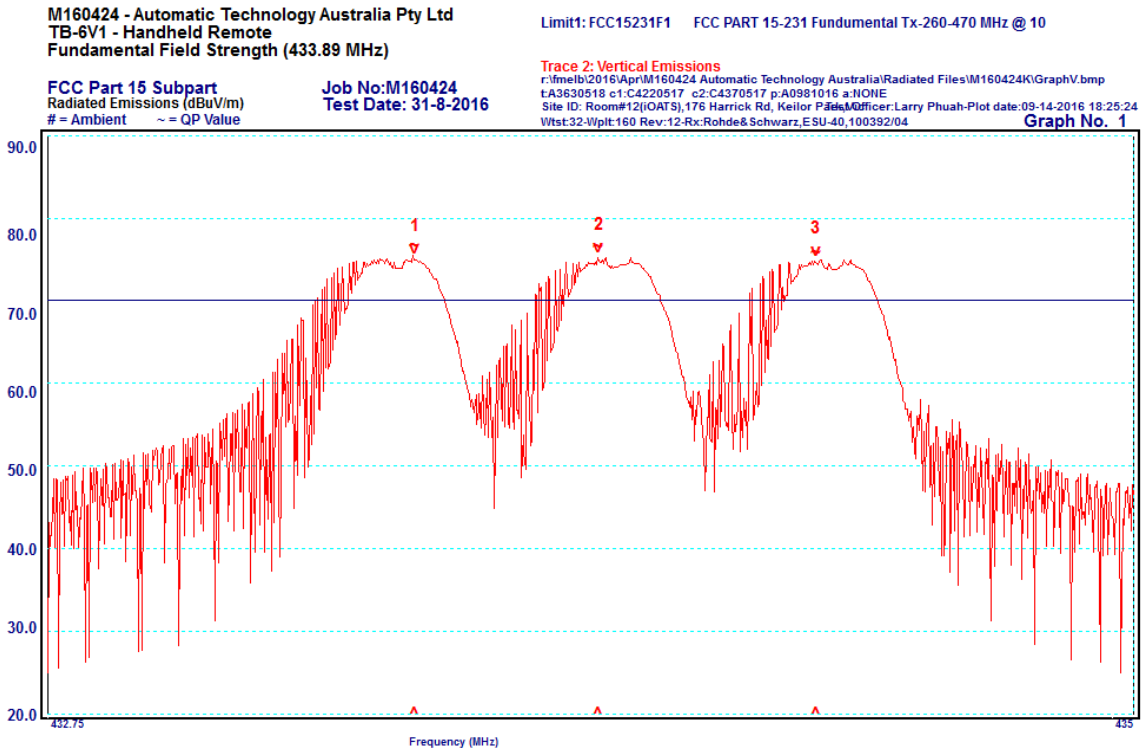
$$\delta = 20\log(\Delta)$$

Δ = Duty cycle

$$\boldsymbol{\delta = 20\log\left(\frac{5.215ms}{16.550ms}\right) = -10.03\ \mathrm{dB}}$$



3.6.1 Result



Frequency MHz	E(peak) dBµV/m	E(average) dBµV/m	10 m Limit dBµV/m	Result
433.51	76.6	66.6	70.1	Complied
433.89	76.5	66.5	70.1	Complied
434.34	75.7	65.7	70.1	Complied

3.6.2 Conclusion

The field strength of the fundamental transmitted signal complied with the limit of §15.231(b).

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3.7 §15.231(b)(3) Spurious Emissions

Radiated EMI tests were performed in a semi-anechoic chamber compliant with CISPR16-1-4. The chamber allows a 2m x 2m x 2m test volume up to 6 GHz, at a test distance of 3 metres and 10 metres.

The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks. Measurements between 9 kHz and 30 MHz were made at 10 metres using a 0.6 metre loop antenna and calibrated Biconilog antenna for measurements between 30 MHz and 1000 MHz. A calibrated EMCO 3115 horn antenna was used for measurements between 1 to 6 GHz.

The EUT was slowly rotated with the spectrum analyser was set to Max-Hold. This was performed for two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. The procedure was repeated with the device orientated in three orthogonal axis to further maximise the emission.

Each significant peak was investigated with the Quasi-Peak Detector for below 1000 MHz and Peak/Average Detectors for above 1000 MHz. The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

3.7.1 Calculation of field strength

The field strength was calculated automatically by the software using the pre-stored calibration data. The method of calculation is shown below:

$$E = V + AF - G + L$$

Where:

E = Radiated Field Strength in dBµV/m.
V = EMI Receiver Voltage in dBµV/m.
AF = Antenna Factor in dB. (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

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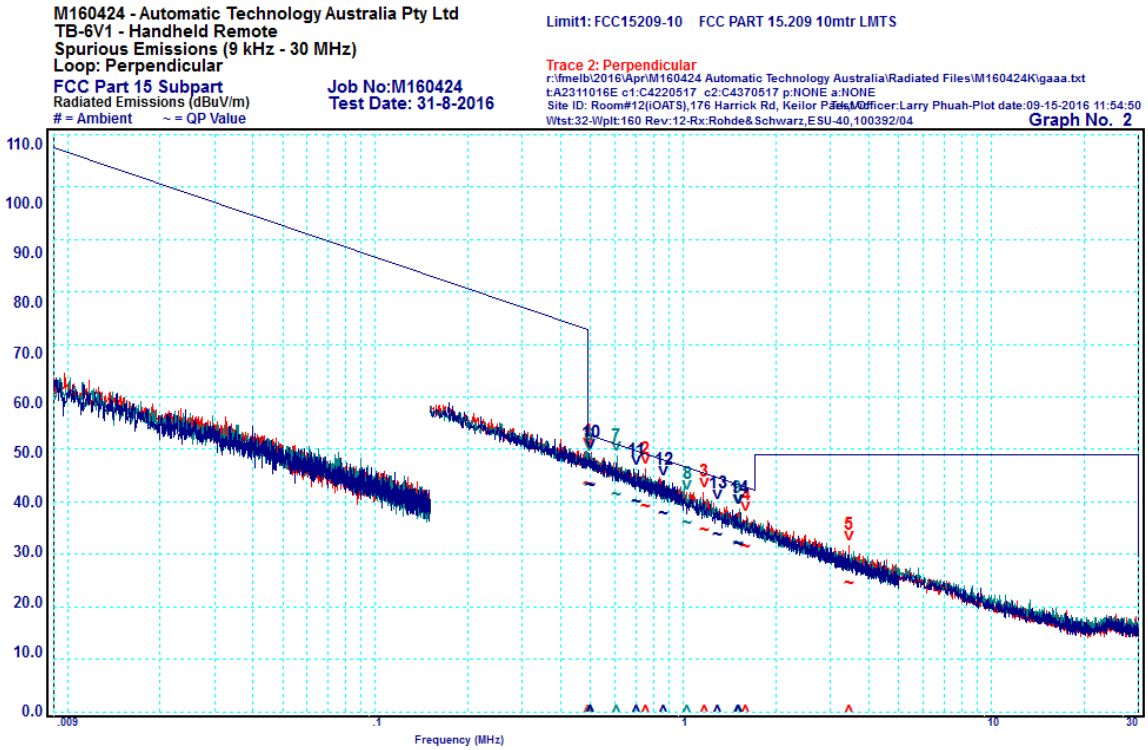
3.7.2 Frequency Band: 9 kHz - 30 MHz

Measurements were made at a distance of 10 metres. The measurement of emissions between 9 kHz – 150 kHz were made with a resolution bandwidth (RBW) of 200 Hz and the video bandwidth (VBW) of 3 kHz, 150 kHz – 30 MHz were measured with the resolution bandwidth (RBW) of 9 kHz and the video bandwidth (VBW) of 30 kHz.

3.7.2.1 Results

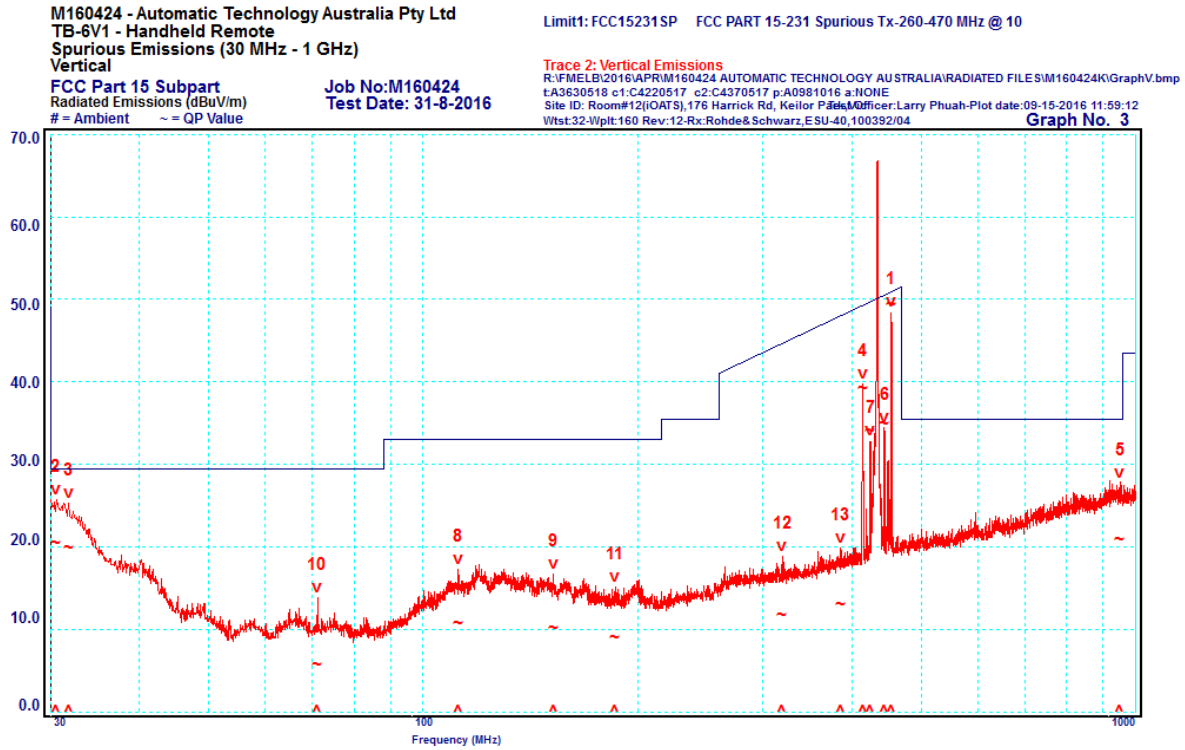


Point	Frequency (MHz)	Loop Orientation	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	0.492	Perpendicular	43.3	52.9	-9.6
2	0.756	Perpendicular	39.2	49.1	-9.9
3	1.171	Perpendicular	34.6	45.4	-10.8
4	1.602	Perpendicular	31.5	42.6	-11.1
5	3.455	Perpendicular	24.4	49.0	-24.6
6	0.495	Parallel	43.2	52.8	-9.6
7	0.605	Parallel	41.2	51.1	-9.9
8	1.030	Parallel	35.9	46.5	-10.6
9	1.497	Parallel	32.1	43.2	-11.1
10	0.502	Horizontal	43.1	52.7	-9.6
11	0.702	Horizontal	39.9	49.8	-9.9
12	0.865	Horizontal	37.7	48.0	-10.3
13	1.293	Horizontal	33.6	44.5	-10.9
14	1.516	Horizontal	31.9	43.1	-11.2

3.7.3 Frequency Band: 30 - 1000 MHz

Measurements were made at a distance of 10 metres. The measurement of emissions between 30 - 1000 MHz were made with a resolution bandwidth (RBW) of 120 kHz and the video bandwidth (VBW) of 300 kHz.

3.7.3.1 Vertical Polarisation

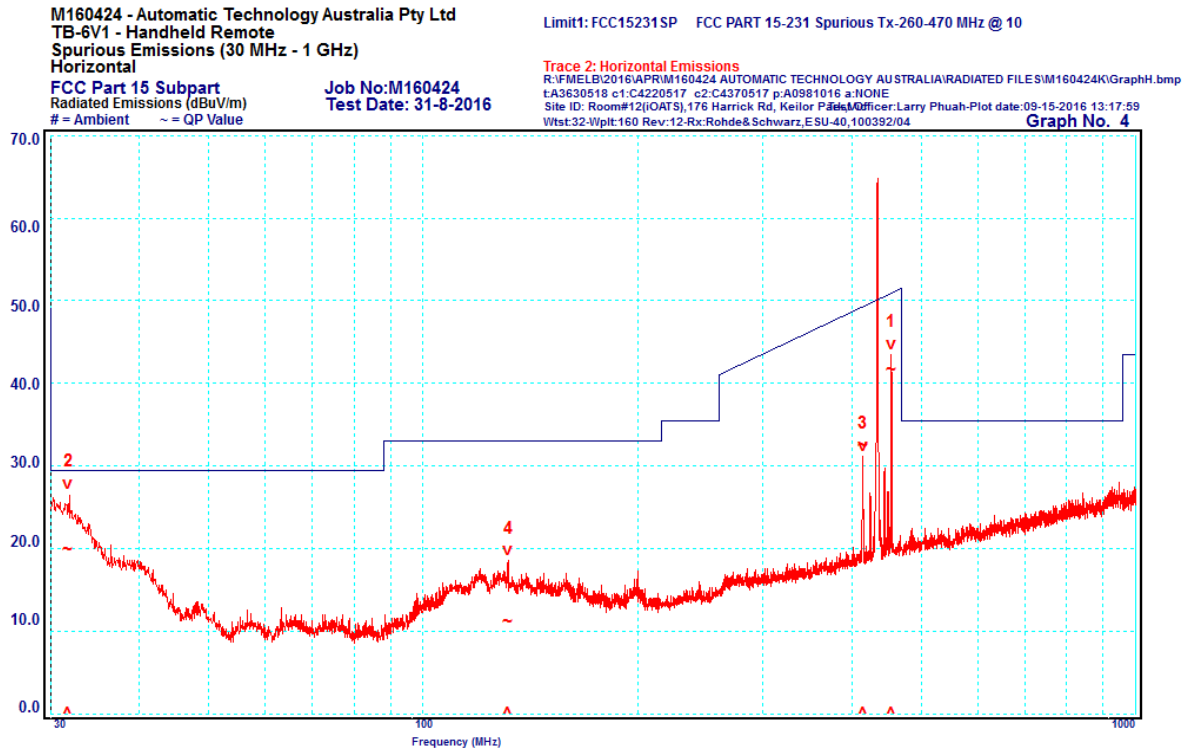


Transmission at the fundamental frequency (peak above limit) was not subjected to the spurious emission limit.

Point	Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	453.890	49.3	50.9	-1.6*
2	30.560	20.4	29.5	-9.1
3	31.830	19.8	29.5	-9.7
4	414.400	39.2	49.3	-10.1
5	949.820	20.9	35.5	-14.6
6	444.340	34.8	50.5	-15.7
7	424.340	34.0	49.7	-15.7
8	111.980	10.7	33.0	-22.3
9	152.320	10.2	33.0	-22.8
10	70.950	5.7	29.5	-23.8
11	186.180	9.0	33.0	-24.0
12	319.190	11.6	44.6	-33.0
13	385.450	12.9	48.0	-35.1

* This result falls within the laboratory's measurement uncertainty. Refer to Section 6.0.

3.7.3.2 Horizontal Polarisation



Transmission at the fundamental frequency (peak above limit) was not subjected to the spurious emission limit.

Point	Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	453.470	41.6	50.9	-9.3
2	31.780	19.9	29.5	-9.6
3	414.340	32.4	49.3	-16.9
4	131.590	11.1	33.0	-21.9

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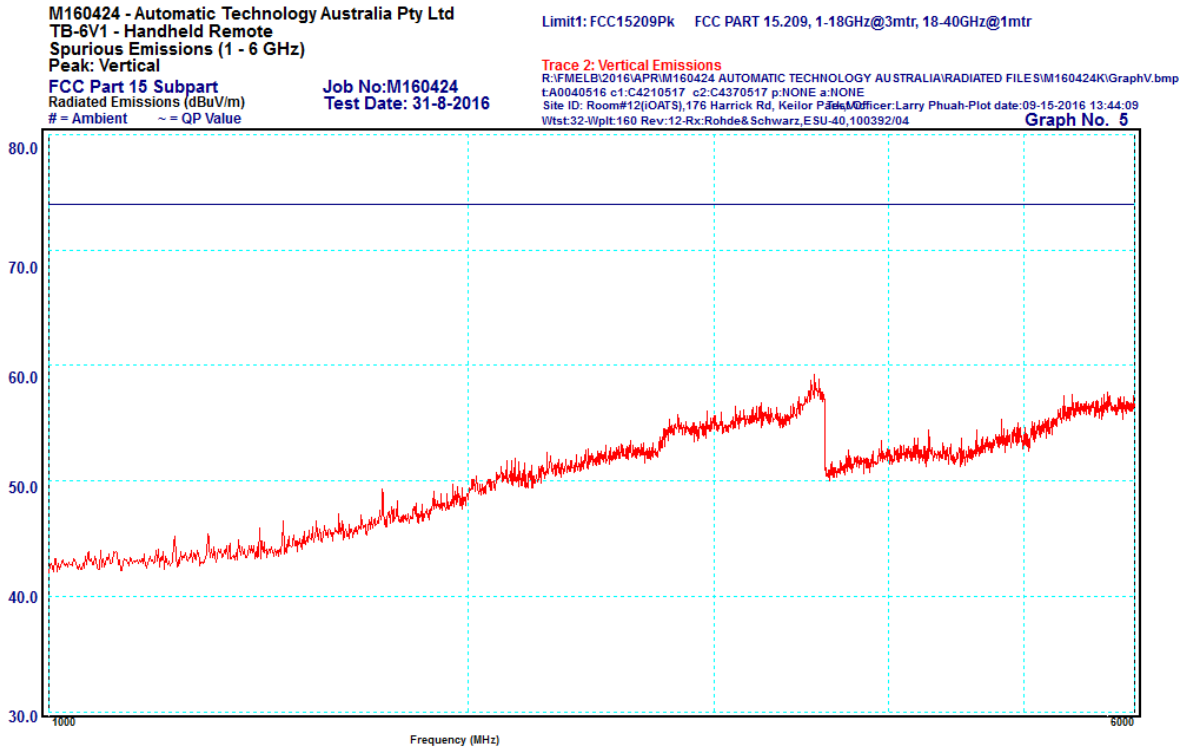
3.7.4 Frequency Band: 1 – 6 GHz

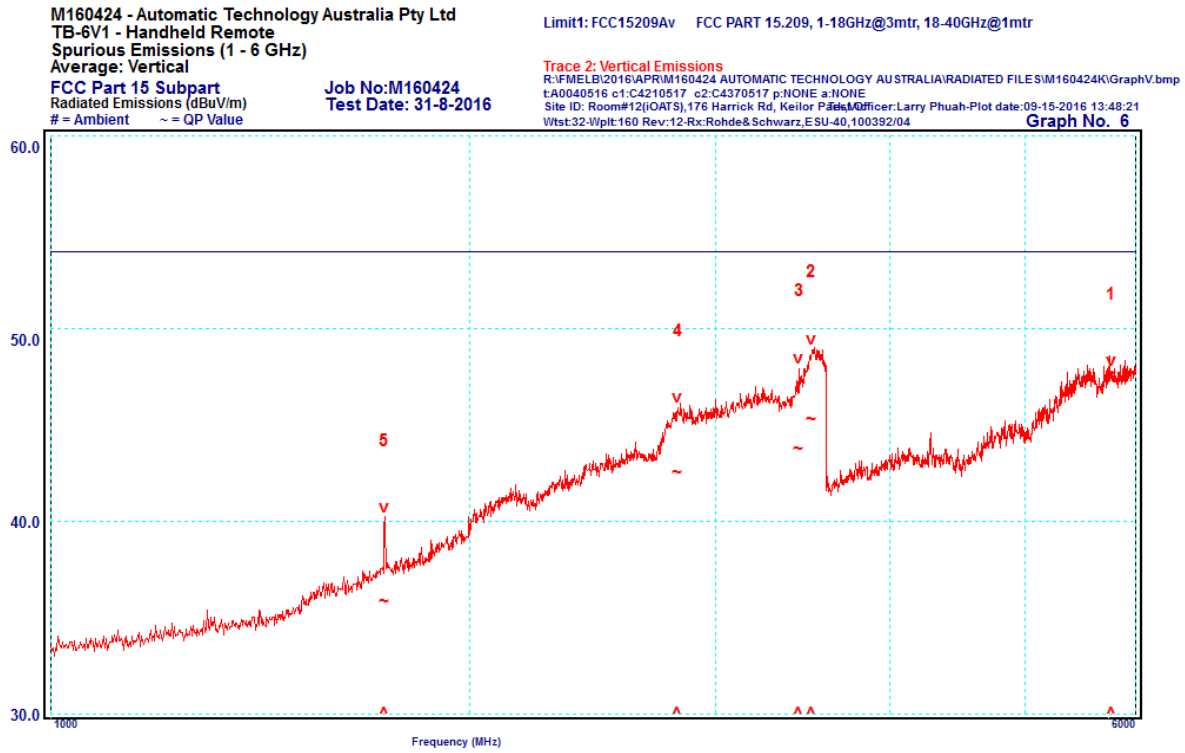
Measurements were made at a distance of 3 metres. The measurement of emissions above 1000 MHz were made with a resolution bandwidth (RBW) of 1 MHz and the video bandwidth (VBW) of 1 MHz.

3.7.4.1 Vertical Polarisation; Peak Detector



No emissions were measured within 10 dB of the limit.

3.7.4.2 Vertical Polarisation; Average detector



Point	Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	5761.650	47.7	54.0	-6.3
2	3510.570	45.3	54.0	-8.7
3	3441.690	43.8	54.0	-10.2
4	2816.050	42.5	54.0	-11.5

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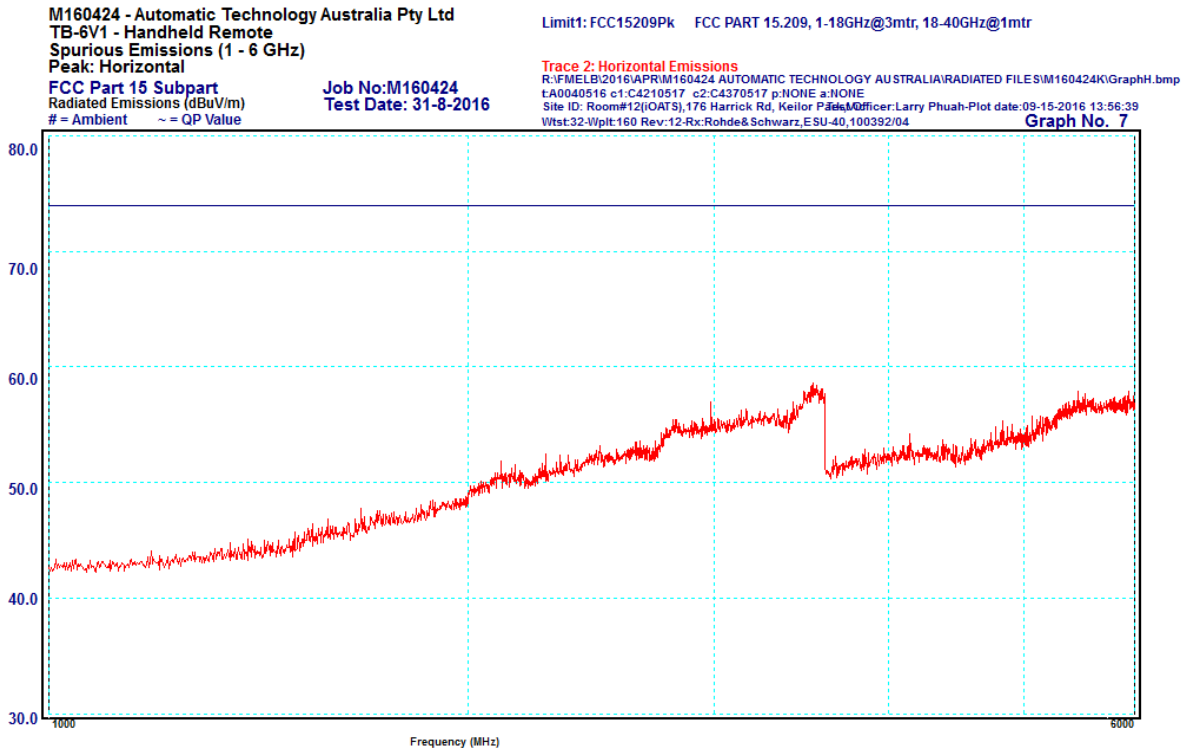
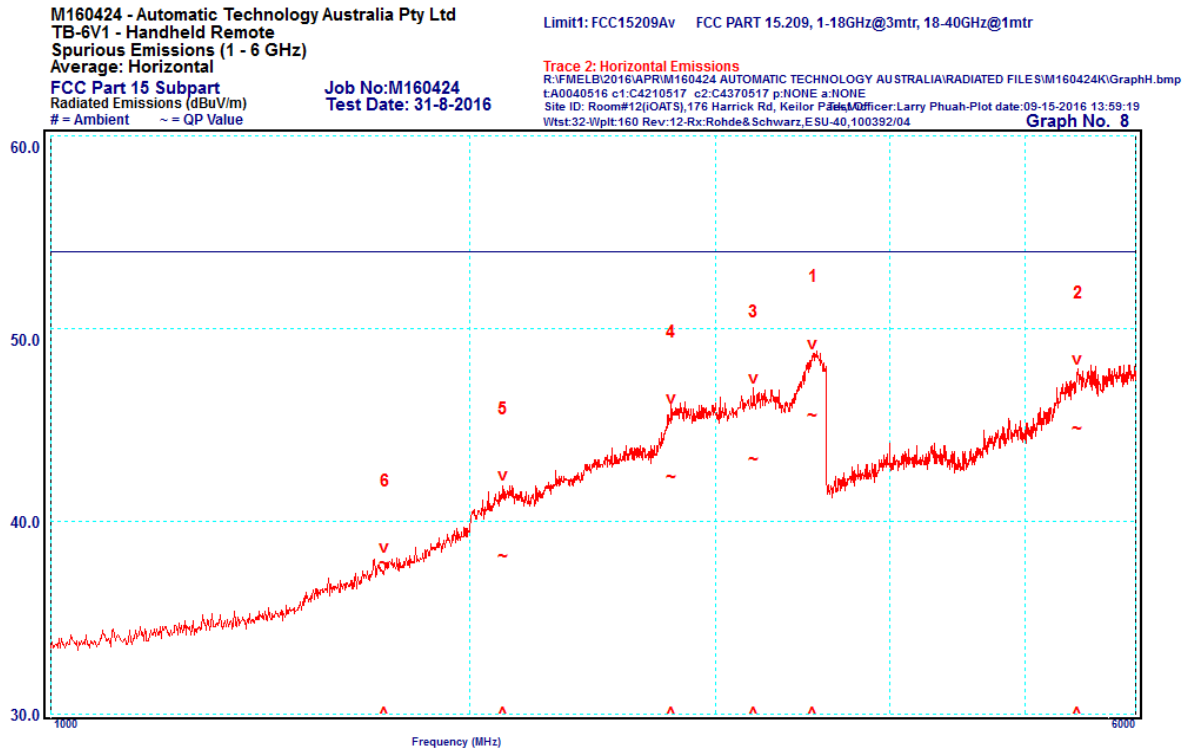
3.7.4.3 Horizontal Polarisation; Peak Detector



No emissions were measured within 10 dB of the limit.

3.7.4.4 Horizontal Polarisation; Average detector



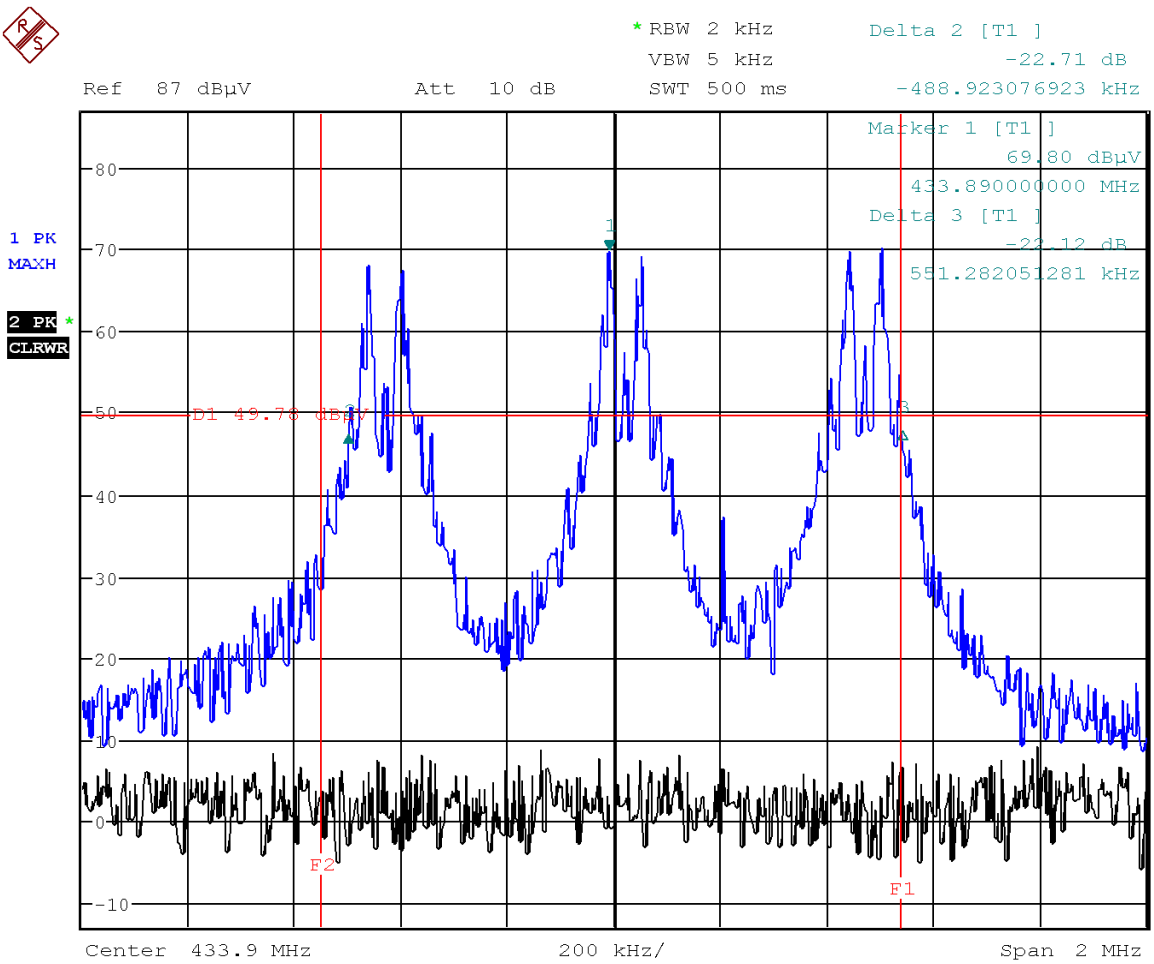
Point	Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	3521.250	45.4	54.0	-8.6
2	5450.460	44.8	54.0	-9.2
3	3191.090	43.2	54.0	-10.8
4	2787.930	42.3	54.0	-11.7
5	2111.290	38.2	54.0	-15.8
6	1736.000	37.8	54.0	-16.2

3.7.5 Conclusion

The spurious emissions complied with the general limits of §15.209 and §15.231(b) by a margin of 1.6 dB.

3.8 §15.231(c) Emission Bandwidth

The bandwidth of the shall be less than 0.25% of the center frequency. This bandwidth is determined at the points 20 dB below from the carrier.



Frequency (MHz)	20 dB BW (MHz)	Limit (MHz)	Results
433.89	1.040205	1.084725	Complied

3.9 §2.1093 Radiofrequency radiation exposure evaluation: portable devices.

KDB 447498 D01 V06 was used to calculate the minimum separation distance allowed before SAR measurements were required.

1-g Head or body:
[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0
[0.152 mW × √0.433 GHz] / 3.0 < 5 mm

10-g Extremity:
[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 7.5
[0.152 mW × √0.916 GHz] / 7.5 < 5 mm

The PTX-5V2 was considered exempt from SAR measurements and complied with the maximum permissible exposure levels.

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4.0 COMPLIANCE STATEMENT

The Remote Control (Handheld), Model PTX-5V2, tested on behalf of Automatic Technology Australia Pty. Ltd. complied with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators), Section 15.231 – Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz

Results were as follows:

FCC Part 15 Subpart C	Test Performed	Results
15.203	Antenna Requirement	**Complied**
15.205	Restricted bands of operation	**Complied**
15.207	Conducted limits	**Not applicable** Battery powered, no AC mains
15.209	Radiated Emissions Limits; General Requirements	**Complied**
15.231(a)	Periodic Operation	**Complied**
15.231(b)(2)	Fundamental Field Strength	**Complied**
15.231(b)(3)	Spurious Emissions	**Complied**
15.231(c)	Emission Bandwidth	**Complied**
§2.1093	Radiofrequency radiation exposure evaluation: portable devices.	**Complied**

5.0 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	9 kHz to 30 MHz	±4.1 dB
	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB
Peak Output Power:		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.