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EMI TEST REPORT
for
CERTIFICATION
of
FCC PART 15.231 TRANSMITTER

FCC ID: PCL-000901

Manufacturer: Millennium Electronics Pty. Ltd.
Test Sample: Sound Asleep Baby Monitor Transmitter

Report Number: M000539-Tx

Date: 3rd January 2001

5292

This Laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation for FCC Part 15.

EMI TEST REPORT FOR CERTIFICATION of FCC PART 15.231 TRANSMITTER FCC ID: PCL-000901

CERTIFICATION of COMPLIANCE with FCC PART 15 REGULATIONS.
EMC Technologies Report Number: M000539-Tx
Date: 3rd January 2001

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EMI TEST REPORT FOR CERTIFICATION
of
FCC PART 15.231 TRANSMITTER

Report Number:	M000539-Tx
Test Sample:	**Sound Asleep Baby Monitor Transmitter**
FCC ID:	PCL-000901
Manufacturer:	Millennium Electronics Pty. Ltd. 12 Webber Parade, East Keilor, Victoria 3033, Australia
Phone: **Fax:**	+ 613 9331 7032 + 613 9331 7038
Responsible Party:	Eric Au Operations Manager Millennium Electronics Pty. Ltd.
Equipment Type:	Intentional Radiator, Low Power Transmitter
Test Standards:	FCC Part 15 Section 231 Intentional Radiators. ANSI C63.4-1996 OET Bulletin No. 63, February 1996
Tested for:	Millenium Electronics Pty. Ltd.
Test Date:	24th June 2000
Test Officer:	Praveen Rao
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 Signature:

Chris Zombolas
EMC Technologies Pty Ltd

EMI TEST REPORT FOR CERTIFICATION of FCC PART 15.231 TRANSMITTER

1.0 SUMMARY OF RESULTS

This report details the results of EMI tests and measurements performed on the **Sound Asleep Baby Monitor Transmitter** in accordance with the Federal Communications Commission (FCC) regulations as detailed in **Title 47 CFR, Part 15 Rules for intentional radiators.** The results and photographs of all the EUT are detailed in this report. The EUT complied with requirements for 15.231 at fundamental frequencies and spurious emissions per section 15.231.

Transmitter Fundamental Frequency:	Complied, margin of 0.4 dB.
Transmitter Spurious:	Complied, margin of 1.1 dB.
20 dB bandwidth	Complied, worst case margin of 387 kHz

The measurement procedure was in accordance with ANSI C63.4-1996, and OET Bulletin No. 63. The instrumentation conformed to these requirements.

2.0 GENERAL INFORMATION

2.1 General Description of Test Setup

Test Sample:	Sound Asleep Baby Monitor Transmitter
FCC ID:	PCL-000901
Equipment Type:	Intentional Radiator, Low Power transmitter

2.2 Technical Specifications

- Battery Type 2 x CR1220 3.0 V Lithium Battery
- Transmission Frequency 315 MHz
- Size Diameter 57 mm
  Thickness 15 mm
- Activation Mechanism Silicon Keypad
- Plastic Moulding Water Proof
- Plastics Material Lead Free, non-toxic
- Attachment Mechanism Via Safety Pin onto the child's clothes
- Operating Temperature 0 °C – 50 °C

2.3 Test Sample Functional Description

Normal Operation
Under normal operation and the transmitter is not activated, the transmitter will monitor the battery voltage level on the transmitter. On a regular interval, say every 40 minutes, the transmitter will send its “current status” to the Rx/Monitor to confirm its correct operation. Thus “current status” will contain the status of the Transmitter as well as its battery status. If the Transmitter has not been activated for a period of 48 hours, the Transmitter will shut down and cease transmission until the Transmitter is activated again.

Status - Alert
When the child who is wearing this CDM Tx turns over and starts to sleep on its chest, the body weight of the child will activate the mechanism in the CDM Tx. The CDM Tx will send an “status – alert” signal to the Rx/Monitor. This “status – alert” will also contain the battery status.
When the CDM Tx is in the "status-alert" state, it will transmit once every 5 minutes until mechanism in the CDM Tx is released.

Status – Battery Low
When the battery level of the CDM Tx is below the recommended safety operating level, the transmitter will send an “status – battery low” signal to the Rx/Monitor regardless whether the CDM Tx is activated by the child or not.

Test Mode
When battery is first installed in the CDM Tx, it is recommended to test the transmitter by pressing against the front of the transmitter and check if an “status – alert” signal is received by the Rx/Monitor.

Serial Data Format
The serial data is sent by the CDM Tx, and received and decoded by the Rx / Monitor. This serial data packet consists of three basic blocks, a preamble to condition the receiver, a header to synchronise the start of the data, and data, with the data packet being repeated 6 times for each transmission.

The format of a serial data packet is as follows:

Preamble: 9 cycles of base clock TE, high for the 1st clock then high for every alternate clock i.e. 5
high pulses and 4 low states.

Header: 7 cycles of base clock TE, all low.

Security Data: First 3 bytes of data. This code is different for each CDM Tx unit. Each data bit is 3 base clock TE long, with the 1st clock set high, the 2nd is low or high as per data bit value, and the 3rd is always set low.

Status Data: Fourth byte of data. Each of the 8 data bits is 3 base clock TE long as per the security data above. Each bit has the following definition:
Bit 7 = Battery Low (when high).
Bit 6 = Alarm state, CDM Tx button is pressed (when high).
Bit 5 = CDM Tx about to switch off (when high).
Bits 0-4 = Not used, all set low.
TE base clock: 1 msec.

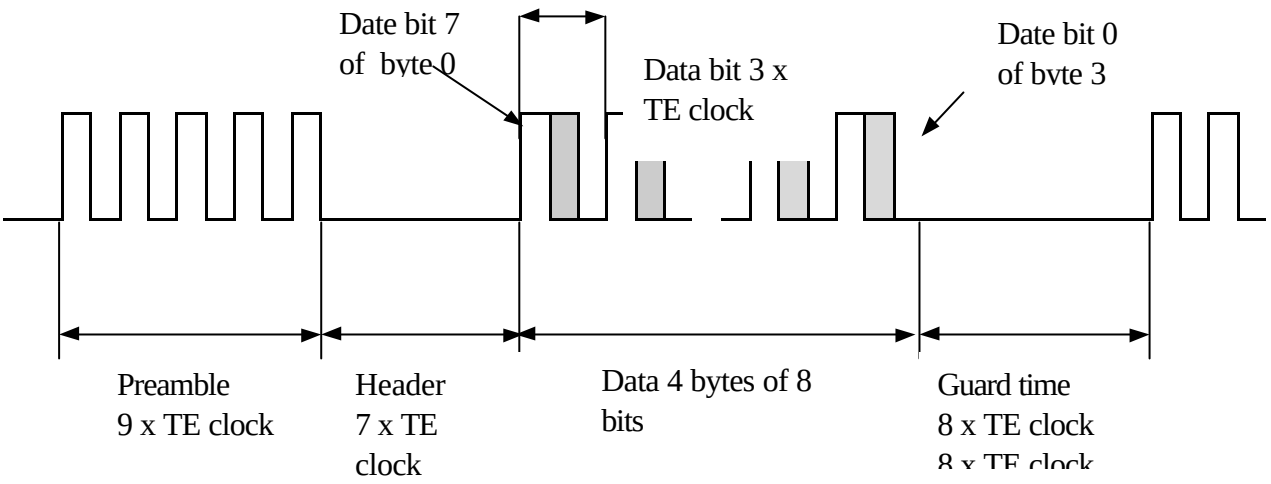


Figure 1. Format of serial data

2.4 Test Procedure

Radiated emissions measurements were performed in accordance with the procedures of ANSI C63.4-1992. Radiated emission tests were performed at an EUT distance of 10 metres. OET Bulletin 63 dated October 1993 was used for reference.

2.5 Test Facility

- **FCC Registration**

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderderg Gorge, near the town of Baccus Marsh, Victoria, Australia.
The above site has been fully described in a report submitted to the FCC office, and accepted in a letter dated June 24, 1999, **FCC Registration Number 90560**.

EMC Technologies Pty. Ltd. is also accredited by NATA (National Association of Testing Authorities) for FCC part 15 testing. NATA has Mutual Recognition Agreement (MRA) with A2LA and NVLAP.

2.6 Units of Measurements

Radiated Emissions
Measurements are reported in units of dB relative to one microvolt per metre (dBμV/m) at a distance of 10 metres from the EUT.

2.7 Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Hewlett-Packard Australia Limited. All equipment calibration is traceable to Australia national standards at the National Measurements Laboratory (NML). The reference antenna calibration was performed by NML and the working antennas (biconical and log-periodic) calibrated by the direct comparison method. The complete list of test equipment used for the measurements, including calibration dates and traceability, is contained in Appendix A of this report.

2.8 Ambients at OATS

The OATS site is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

2.9 System Test Configuration

The transmitter was configured to continuously transmit during the tests.

3.0 RADIATED EMISSION MEASUREMENTS

3.1 Test Procedure 30-1000 MHz

The EUT was set up on the table top (placed flat on the turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The EMI Receiver was operated under software control via the Portable PC Controller through the IEEE.488 Interface Bus Card Adapter. The 30 MHz to 1000 MHz test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times. The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. Each significant peak was then investigated and maximised by scanning the height of the antenna between 1 to 4 metres with the Quasi-Peak detector ON. The measurement data for each frequency range was automatically corrected by the software for cable losses, antenna factors and preamplifier gain and all data was then stored on disk in sequential data files. This process was performed for both horizontal and vertical antenna polarisation. The entire procedure was repeated again with the transmitter in the other two orthogonal positions and the worst case plot was recorded.

3.2 Plotting of Measurement Data for Radiated Emissions

30 – 1000 MHz

The stored measurement data was combined to form a single graph which comprised of all the frequency sub-ranges over the range 30-1000 MHz. The accumulated EMI (EUT ON) was plotted as the Red trace while the Ambient signals (AMBIENT) were plotted as Green trace. The worst case radiated EMI *peak* measurements (as recorded using the Max-Hold data are presented as the upper or **RED** trace while the respective ambient signals are presented as the lower or **GREEN** trace. Occasionally, an intermittent ambient arose during the EUT ON measurement (RED trace) and could not be captured when the Ambient trace was being stored. The ambient peaks of significant amplitude with respect to the limit are tagged with the "**#**" symbol while EMI peaks are identified with a numeral. Ambient peaks that were present during the EUT ON measurement (RED trace) and not captured during the AMBIENT measurement were also tagged with the "#" symbol.

The highest recorded EMI signals are shown on the Peaks List on the bottom right side of the graph. For radiated EMI, each numbered peak is listed as a frequency, peak field strength, Quasi-peak field strength, turntable azimuth, antenna height and the margin relative to the limit in dB. A negative margin is the deviation of the recorded value below the limit.

At times, the quasi peak level may appear to be higher than the peak level. This happens because the individual peak is further maximised with the QP detector. This will be apparent when the peaks list at the foot of the graphs shows the quasi peak level higher than the peak level.

1000 – 3200 MHz
The test procedure is same as in section 3.1 above except Quasi-peak measurements were replaced by Average measurements above 1 GHz. Where the peak levels were below the specified limits, no average measurements were perfomed. And the measurements were taken at 3 metres test distance

3.3 Calculation of Field Strength

The field strength was calculated automatically by the software using all 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. (measured value)
AF = Antenna Factor in dB(m^{-1}). (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable insertion loss in dB. (stored as a data array of Insertion Loss versus frequency)

Example Field Strength Calculation
Assuming a receiver reading of 34.0 dBµV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB.
The resulting Field Strength is therefore as follows:

34.0 + 9.2 + 1.9 - 20 = 25.1 dBmV/m

4.0 RADIATED FIELD STRENGTH MEASUREMENT RESULTS

The transmitter was continuously transmitting during the tests.

4.1 30 – 1000 MHz Test Results

The highest radiated spurious emission was 1.1 dB below the limit at 630 MHz for Vertical Polarisation. The fundamental frequency was 0.4 dB below the specified limit at 315 MHz for Vertical Polarisation.

Graph 1: Vertical Antenna Polarisation
Graph 2: Horizontal Antenna Polarisation

Summary of Results

Antenna Polarisation	Frequency MHz	QP Level dBmV/m	Limit @ 10m dBmV/m	Result ±dB
FUNDAMENTAL FREQUENCY				
Vertical	315.0	65.2	65.6	-0.4
Horizontal	315.0	46.9	65.6	-18.7
SPURIOUS EMISSIONS				
Vertical	630.0	44.5	45.6	-1.1
Vertical	390.4	41.9	45.6	-3.7
Horizontal	630.0	31.3	45.6	-14.3
Horizontal	390.4	27.8	45.6	-17.8

The measurement uncertainty was 3.7 dB

4.2 1000 - 3200 MHz Test Results

The highest radiated spurious emission was 2.1 dB below the limit at 1263 MHz for Horizontal Polarisation.

Summary of Results

Antenna Polarisation	Frequency MHz	Peak Level dBmV/m	Limit @ 3m dBmV/m	Result ±dB
Horizontal	1263	53.50	55.62	-2.1
Horizontal	1173	50.30	55.62	-5.3
Vertical	1263	46.40	55.62	-9.2
Vertical	1173	43.00	55.62	-12.6
Horizontal	1580	40.20	55.62	-15.4
Vertical	1580	37.82	55.62	-17.8
Horizontal	1568	34.45	55.62	-21.2

All other peaks were > 20 dB below the limt

5.0 Conducted Emissions Results

Conducted EMI Tests are not applicable as the transmitter is battery powered.

6.0 Bandwidth Tests

The bandwidth of the fundamental carrier was measured using a peak detector with a resolution bandwidth of 120 kHz.
The measured bandwidth (20 dB down from the modulated carrier) was 400 kHz. The limit is 0.25 % of 315 MHz which is 787 kHz. The EUT complied with a margin of 387 kHz.

7.0 CONCLUSION

The Sound Asleep Baby Monitor Transmitter (FCC ID: PCL-000901), complied with the requirements of the FCC Parts 2 and 15 Rules for low power transmitter tested in accordance with 15.231. The results were as follows:

Transmitter Fundamental : complied, worst case margin of 0.4 dB.
Transmitter Spurious : complied, worst case margin of 1.1 dB.
20 dB bandwidth : complied, worst case margin of 387 kHz

APPENDIX A1

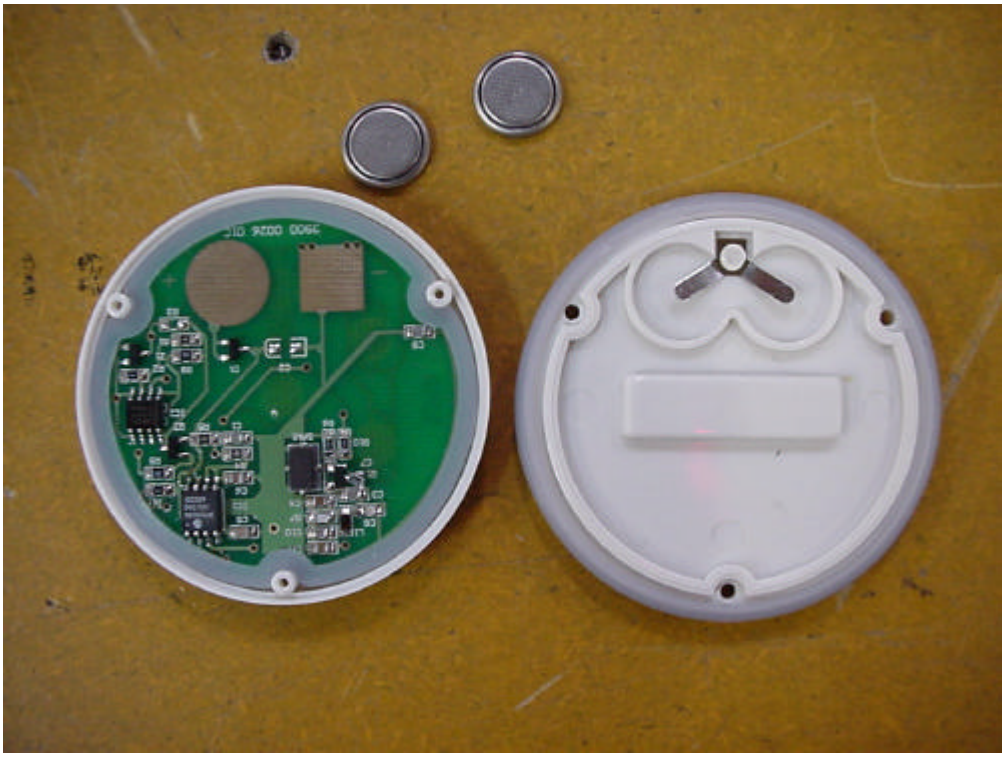
PHOTOGRAPHS OF TEST SAMPLE

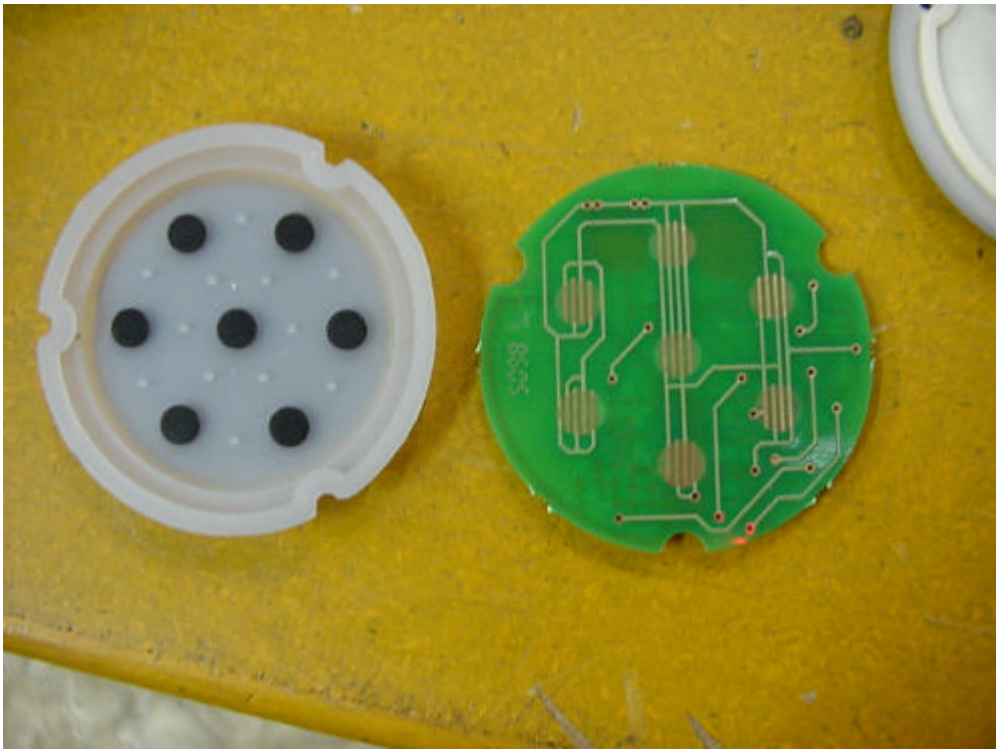
APPENDIX A2

PHOTOGRAPHS OF TEST SETUP

APPENDIX A3

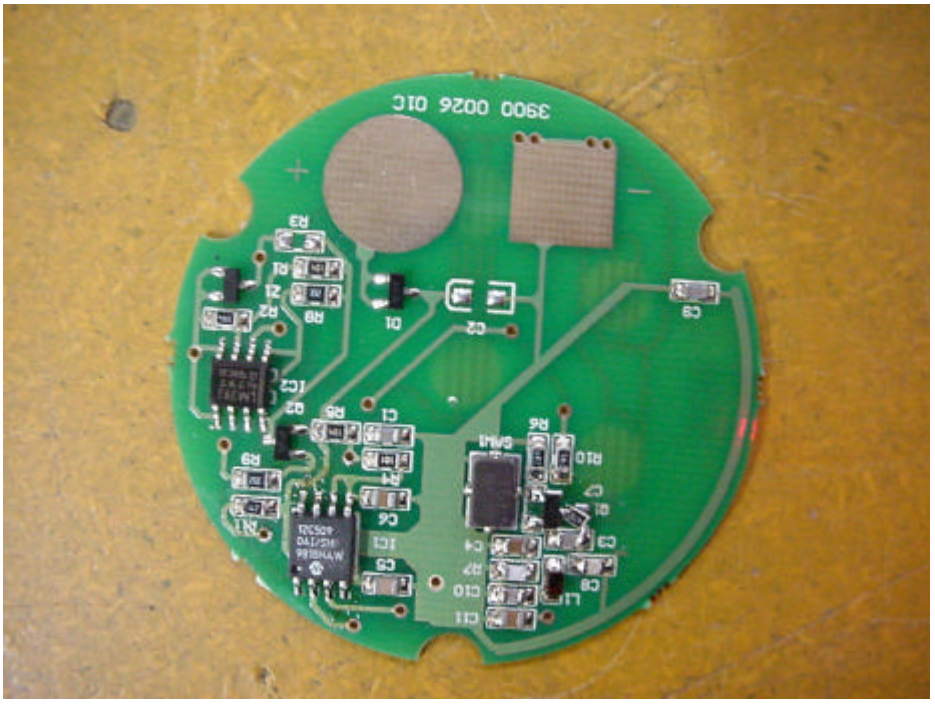
PHOTOGRAPHS OF TEST SAMPLE





APPENDIX A4

PHOTOGRAPHS OF TEST SAMPLE



APPENDIX B

TEST SAMPLE SCHEMATICS

SUBMITTED AS ATTACHMENT

APPENDIX C

FCC ID LABELLING

SUBMITTED AS ATTACHMENT

APPENDIX D

GRAPHS OF EMI MEASUREMENTS

RADIATED EMI : 30 MHz to 1000 MHz

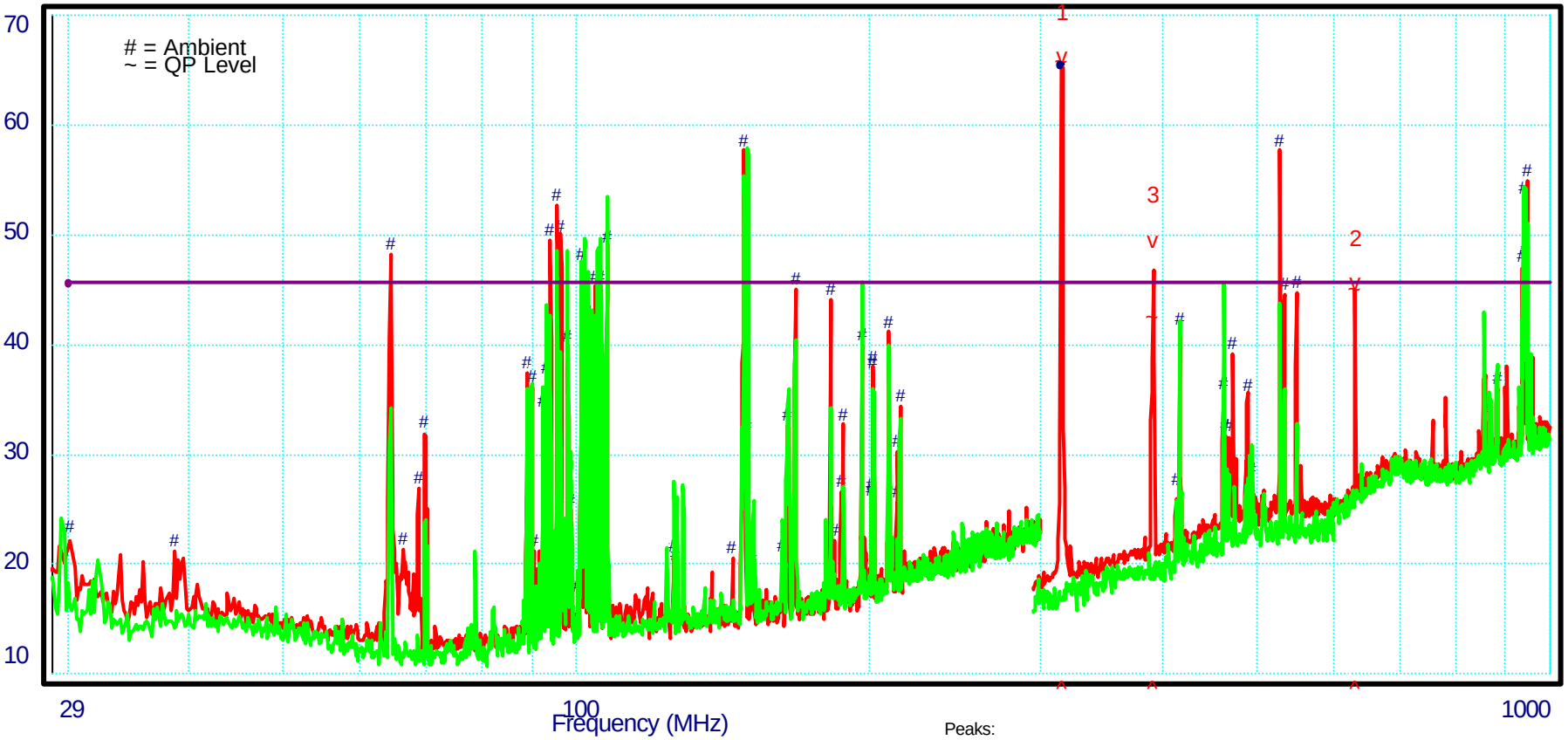
Graph 1: Vertical polarisation

Graph 2: Horizontal Polarisation

EMC Technologies Pty. Ltd. - Global Product Certification

FCC 15.231 Project No:M000539 \\server\plotting\pcf\0539_1.PCF

Electric Field Strength dBuV/m Peak Test Date: 24-05-00 GRAPH No. 1



MILLENNIUM ELCTRONICS PTY. LTD.

SOUND ASLEEP BABY MONITOR

Limits:
FCC231T FCC PART 15.231 TX LMTS FOR 315 MHz AT 10mtrs
FCC231SP FCC PART 15.231 SPURIOUS LMTS FOR 315 MHz AT 10mtrs

Legend:
Vertical Ambients
Vertical Emissions

Equipment: HP8546A TST 99B
Transducers: LCABLE a1100201 a1360100 NOPREAMP
Site ID: Lerderderg OATS1
Test Officer:Praveen Rao

Source:
analdata 6 7 8 9 2 3
analdata 15 16 17 18 7 8

Peaks:

No	Freq (MHz)	Peak (dBuV/m)	Qp Val	FCC231T (dBuV/m)	dL1 (dB)	FCC231SP (dBuV/m)	dL2 (dB)
1	315.03	65.6	65.2	65.6	-.4	45.6	19.6
2	630.06	45.1	44.5	65.6	-21.1	45.6	-1.1
3	390.40	49.0	41.9	65.6	-23.7	45.6	-3.7

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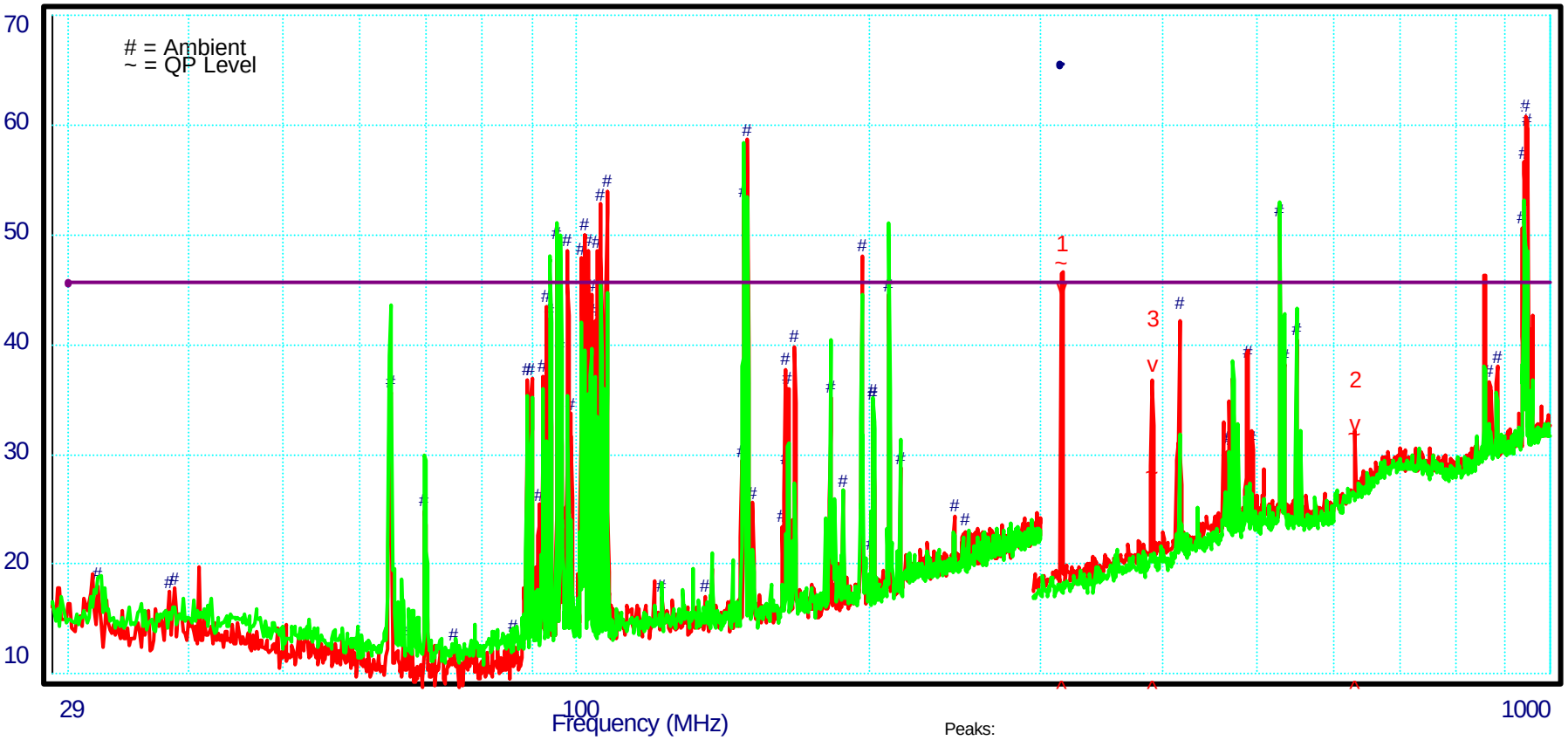
EMC Technologies Pty. Ltd. - Global Product Certification

FCC 15.231 Project No:M000539 \\server\plotting\pcf\0539_2.PCF

Electric Field Strength dBuV/m Peak Test Date: 24-05-00 GRAPH No. 2



MILLENNIUM ELCTRONICS PTY. LTD.

SOUND ASLEEP BABY MONITOR

Limits:
FCC231T FCC PART 15.231 TX LMTS FOR 315 MHz AT 10mtrs
FCC231SP FCC PART 15.231 SPURIOUS LMTS FOR 315 MHz AT 10mtrs

Legend:
Horizontal Ambients
Horizontal Emissions

Equipment: HP8546A TST 99B
Transducers: LCABLE a1100201 a1360100 NOPREAMP
Site ID: Lerderderg OATS1
Test Officer:Praveen Rao

Source:
analdata 10 11 12 13 4 5
analdata 19 20 21 22 9 10

Peaks:

No	Freq (MHz)	Peak (dBuV/m)	Qp Val	FCC231T (dBuV/m)	dL1 (dB)	FCC231SP (dBuV/m)	dL2 (dB)
1	315.03	44.7	46.9	65.6	-18.7	45.6	1.3
2	630.04	32.1	31.3	65.6	-34.3	45.6	-14.3
3	390.37	37.7	27.8	65.6	-37.8	45.6	-17.8

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APPENDIX E

USER INSTRUCTIONS (MANUAL)

SUBMITTED AS ATTACHMENTS 1 AND 2