COMPLIANCE TESTING REPORT
FCC TITLE 47 PART 15
SUBPART C

Client:	Magellan Technology Pty Ltd
Address:	65 Johnston Street, Annandale NSW 2038, Australia
Report Number:	1008MAG_MARS-24ATR_fcc_c_r2
Date of Testing:	16th to 25th July 2013
File Number:	MAG130613
Equipment Name:	MARS-ATR series
Equipment Model Number:	MARS-24ATR
Equipment Serial Number:	9001661
Equipment FCC ID:	TVN-MARS-24ATR
Equipment Description:	13.56MHz RFID Read/Write System
Result:	COMPLIES (refer page 5)
Tested by:	Richard Turner
Approved by:	Colin Gan Assessment Engineer
Date of Issue:	20th November, 2013

AUSTEST (NSW) FCC REGISTRATION NUMBER 90455

DESIGN NUMBER AU0003 REGISTRATION NUMBER 520620

Results appearing herein relate only to the sample(s) tested.
This report may not be reproduced in any form unless done so in full.

This report is issued within the scope of A2LA accreditation #2765.02.

Accredited for compliance with ISO / IEC 17025.
Approval Specialists Pty Ltd (ACN: 094 656 354) Trading as Austest Laboratories
2/9 Packard Avenue, Castle Hill NSW 2154 Australia Ph: +612 9680 9990

ACCREDITED
TEST LABORATORY
CERT #2765.02

Table of Contents:

Report Revision History:

Date	Report Number	Changes
03/10/2013	1003MAG_MARS-24ATR_fcc ab&c	Original Report.
08/10/2013	1008MAG_MARS-24ATR_fcc_c	Removed FCC Part 15B aspects from report as requested by TCB.
09/10/2013	1008MAG_MARS-24ATR_fcc_c_r1	Removed reference to FCC Parts 15 A & B on the cover page.
20/11/2013	1008MAG_MARS-24ATR_fcc_c_r2	Extra antenna photos added to Appendix A.

1 TEST SUMMARY

Austest makes no claim regarding the consistency of production versions of the EUT.

The results in this report apply only to the tested EUT described in Section 3 of this report.

FCC Section	Test	Result	Notes
FCC Part 15, Subpart C – Intentional Radiators			
15.203	Antenna Requirement	COMPLIES	
15.205	Restricted Bands of Operation	COMPLIES	
15.207	Conducted Limits	COMPLIES	
15.209	Radiated Emission Limits, General Requirements	COMPLIES	
15.225	Operation within the Band 13.110-14.010MHz	COMPLIES	

Notes (applicable only if referenced in "Notes" column of above summary table):
(i) EUT complies (the measurement results were below the applicable limits), but some emissions were within the range of measurement uncertainty of the limits.
(ii) EUT complies (when modified as described in Section 2 of this report).
(iii) There were deviations from the applied standard as described in Section 6.2 of this report.

2 MODIFICATIONS

No modifications were required to achieve compliance.

3 REFERENCES

FCC Title 47 Part 15 current as of July 2013
ANSI C63.10: 2009
KDB Publication 174176, 02/07/2008

4 EQUIPMENT UNDER TEST (EUT) DESCRIPTION

EUT Name:	MARS-ATR Series
EUT Description:	13.56MHz RFID Read/Write System
EUT Model:	MARS-24ATR
EUT Serial Number:	9001661
EUT FCC ID:	TVN-MARS-24ATR
Manufacturer:	Magellan Technology Pty Ltd
Power Supply & Rating:	100-240VAC 1.5A 47-63Hz (supplied plug pack)
Highest Clock/Operating Frequency:	50MHz
Lowest Internal Frequency source	32kHz RTC
Transmit Frequency Range:	13.56MHz only
Transmit Power:	Set during installation for maximum output
Modulation Technique:	Phase Jitter Modulation
Number of Channels:	Not applicable
Antenna Specifications:	Magellan Technologies 175 x 94 x1.6mm loop antenna p/n 031-10-092

The equipment under test (EUT) was a13.56MHz RFID read/write system with 24 antenna ports.

The EUT is housed in a metal case containing the following PBAs:

#61-10-000
#63-10-034 (containing transmitter circuits)
#63-10-046
#63-10-047 (multiplexer)

The EUT can connect up to 24 loop antennas, but only one loop antenna is transmitting at any one time. The client advised that the remaining antenna ports are electrically disconnected when not transmitting.

The EUT was labelled as follows:

Type: RFID Reader	Model: MARS-24ATR
P/N: 063-70-067	Rating: 12VDC 15.0A
D/C: 06/13	S/N: 9001661
FCC ID: TVN-MARS-24ATR	

The EUT was supplied with a Magellan Technologies 175 x 94 x 1.6mm loop antenna, #031-10-092-PCB ver B, #031-10-092-ASY ver B

5 EUT TEST SETUP & CONFIGURATION

Refer to the photographs in

APPENDIX C – EUT TEST SETUP PHOTOGRAPHS for the EUT test setup and physical configuration.

It was not practical to test with 24 loop antennas connected to the EUT. Since the client advised that the non-transmitting loop antennas are electrically disconnected, tests were performed with only one loop antenna connected to the one transmitting antenna port. Cables, without antennas, were connected to the other ports.

In the test setup, shown in Appendix C, the following cables and auxiliary equipment were used.

EUT Port	Connecting Cable	Source / Load
LAN	Unshielded CAT5 cable	Test PC
USB Host	Shielded 2m USB cable, bundled	RunDisk USB pen drive
USB Device	Shielded 2m USB cable, bundled	-
User IO	Not connected	-
A00	Shielded 1.5m RG58U coaxial cable	Supplied loop antenna
A01 thru A23	Shielded 1.5m RCA cables	-
12VDC 5A	Unshielded 70cm DC power lead	Supplied AC adaptor
AC mains (AC adaptor)	Unshielded 1.6m IEC mains lead	115VAC 60Hz mains supply

The test PC was placed away from the teat area. Selection of transmitting antenna port was provided by the software installed at the test PC.

The User IO port was not connected by a cable since the client advised that this port is only used during installation and maintenance.

Preliminary assessments of mains conducted emissions and radiated emissions were undertaken to determine whether the number of connected antenna cables affected disturbances levels. No significant change noted and final measurement was made with all antenna ports connected with cables.

For measurement of intentional radiation, selection of the active transmitting antenna port was varied, so that all ports were assessed. No significant change in emission levels noted. Final measurement was made with the loop antenna connected to port A00.

For measurement of mains conducted disturbances under section 15.207 (intentional radiation) two tests were performed, one with the loop antenna connected and one with a dummy load connected. Refer to KDB174176.

The EUT was powered from the supplied Cincon Electronics Co. Ltd AC adaptor, model TRG100A120, input: 100-240VAC 1.5A, 47-63Hz, output: 12VDC 8.34A.
The AC adaptor was connected to a 115VAC 60Hz, provided by the AC source.

5.1 Transmitter Test Channels

The EUT can only transmit on one frequency 13.56MHz.

6 TEST SPECIFICATIONS

6.1 Accreditations & Listings

Austest Laboratories has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Test Site Criteria (ANSI C63.4-2009) by the FCC Laboratory Division for Certification testing under Parts 15 or 18 of the FCC Rules.

Austest Laboratories (NSW)'s Yarramalong test facilities are listed with the FCC under Registration Number 90455.

Austest Laboratories (NSW)'s Yarramalong test facilities are accredited by A2LA. The tests reported herein have been performed in accordance with its terms of accreditation.

6.2 Deviations from Standards and/or Accreditations

None.

6.3 Test Facility

Testing was performed in New South Wales at Austest Laboratories (NSW)'s Yarramalong test facilities located at 46 Glenola Farm Lane in Yarramalong Valley, New South Wales, Australia.

Radiated emission testing is performed at an Open Area Test Site (OATS), where some ambient signals may exceed the continuous disturbance limit. The possibility of missing an emission during testing is removed by use of pre-scans, performed in a shielded enclosure, prior to the final OATS measurements.

6.4 Test Equipment

Test Equipment	Brand & Model	Serial No./ID	Cal. Due Date
EMI Receiver	HP 8574B	MEQ 72	23 Jan. 2014
Test Software	HP85969PC	-	Verified
Spectrum Analyser	HP 8593E	MEQ 738	05 Jul. 2014
Biconical Array Antenna	Emco 93110B	MEQ 337	12 Jan. 2014
Log-Periodic Array Antenna	Emco 93146	MEQ 336	12 Jan. 2014
Loop Antenna	EM-6876	MEQ 225	22 Jan. 2014
Pre-Amplifier (30MHz-1GHz)	HP 8447E	MEQ 74	17 Jan. 2014
Attenuator	Omni Spectra 10dB	1022627	27 Aug 2013
AMN/LISN	Compower LI-200	MEQ 80	28 Feb. 2014
Coaxial Cables	Suhner	Various	Aug. 2013
Thermometer	Fluke 52	MEQ 183-12	12 Oct. 2013
Thermocouple	Type K		
Temperature Chamber	GDW-128	-	Verified
Close Field Probe (H)	Compower	-	Verified
AC Source	Chroma 6512	MEQ 320	Verified

All test equipment was checked and performance verified prior to testing.

6.5 Measurement Uncertainties

The following uncertainties are for a 95% level of confidence, based on a coverage factor, k=2.

Test	Measurement Uncertainty
Mains Conducted Emissions	±2.6dB
Radiated Emissions	±4.7dB
Frequency	±5 part in 10^{10}

7 FCC Part 15C, Section 15.203 – ANTENNA REQUIREMENT

The EUT uses standard BNC connectors for connection to loop antennas.

The client advises that the EUT and its associated loop antennas would only be installed by professional installers (Refer to APPENDIX D – ANTENNA CONNECTION LETTER).

The EUT complies with the requirement of this Section since the use of a unique antenna connector is not required if the intentional radiator is professionally installed.

8 FCC Part 15C, Section 15.205 – RESTRICTED BANDS OF OPERATION

The EUT complies with the requirements of this Section since it does not operate within the listed Restricted Bands of Operation. The EUT operates at 13.56MHz.

9 FCC Part 15C, Section 15.207 - CONDUCTED LIMITS

Test Date:	16/07/2013	Temperature:	23°C
Test Officer:	Richard Turner	Humidity:	54%
Test Location:	Austest Laboratories (NSW)		

9.1 EUT Operating Mode

The EUT was configured so that there was constant transmission from one antenna port.
Transmission was set for maximum power by the client.
Mains supply voltage set to 115VAC 60Hz.

9.2 Test Method

a. Measurements are performed in accordance with ANSI C63.10-2009.
b. Set the EMI Receiver BW to 9kHz for the test.
c. Set up the EUT on a non-conductive table, 0.8m above a conductive ground plane, with the rear of the whole EUT setup 0.4m away from a conductive vertical reference plane (in electrical contact with the ground plane), and 0.8m away from any other conductive surface.
d. The EUT power is supplied through the EUT LISN. Power for supporting equipment (if any) is supplied through the supporting equipment LISN. Both LISNs are grounded to the ground plane and kept 0.8m away from the EUT test setup.
e. Maintain the power cable length between the EUT and the EUT LISN between 0.8m to 1m. Bundle any excess power cable lengths together in the centre of the cable to form a bundle 30cm to 40cm long.
f. Drape all interconnection cables the table edge and keep them at least 40cm above the ground plane. Bundle any excess cables in the centre of the cable to form a bundle 30cm to 40cm long.
g. Conducted emission measurements are made on both Active and Neutral lines of the EUT.
h. In accordance with KDB174176, measurements were made with the transmitting antenna port connected to a loop antenna, then repeated when connected to a dummy load supplied by the client. The dummy load test is to ensure that emissions within the 13.56MHz fundamental emission band are below limits.

9.3 Sample Calculation Example

The final voltage levels were obtained from the measurement equipment software which automatically applied all the stored calibration factors. The calibration / correction factors were applied as follows:

$$V_c = V + L_{cbl} + L_{LISN} + L_{limiter}$$

Where:

V_c = Corrected voltage level in dBµV for comparison to the limit.
V = EMI Receiver measured signal input voltage in dBµV.
L_{cbl} = Total cable insertion loss in dB.
L_{LISN} = Voltage division factor (insertion loss) of LISN in dB.
$L_{limiter}$ = Insertion loss of voltage limiter, where applicable, in dB.

Frequency (MHz)	Receiver Level, V (dBµV)	L_{cbl} (dB)	L_{LISN} (dB)	$L_{limiter}$ (dB)	Corrected Level, Vc (dBµV)
1.0	40.0	0.1	0.1	N.A.	40.2

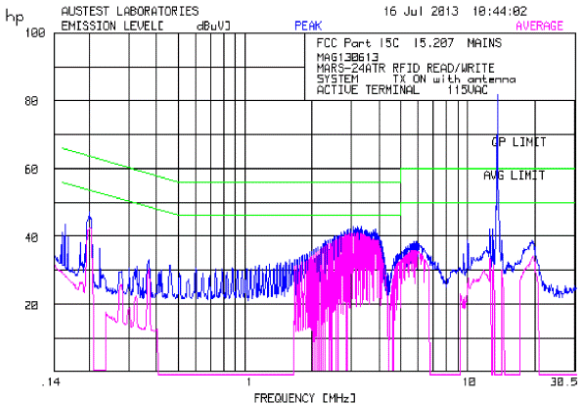
9.4 Test Results

9.4.1 Conducted Disturbances 150kHz to 30MHz, with loop antenna attached

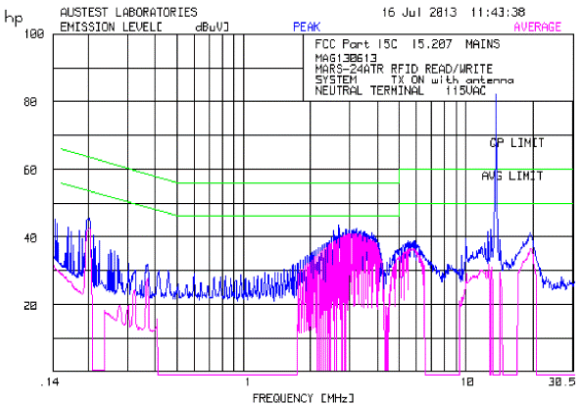
The highest measured average level was 4.8dB below the 15.207 average limit at 3.17MHz.

All measured disturbances were greater than 10dB below the 15.207 quasi-peak limits.

Frequency MHz	Terminal	Avg Level dBuV	Avg Limit dBuV	Below Limit dB
3.17	Active	41.2	46.0	4.8
2.99	Neutral	40.9	46.0	5.1
3.04	Neutral	40.9	46.0	5.1
3.04	Active	40.9	46.0	5.1
3.22	Active	40.9	46.0	5.1
3.22	Neutral	40.9	46.0	5.1



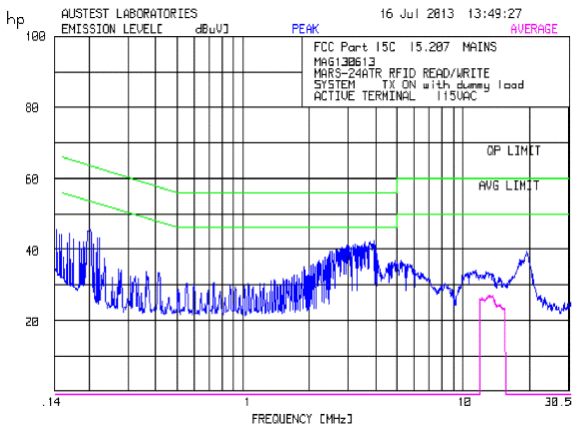
Active Terminal



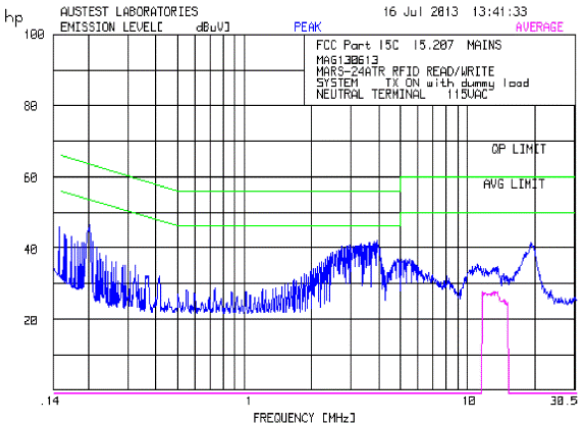
Neutral Terminal

9.4.2 Conducted Disturbances 13.110 to 14.010MHz, with dummy load attached

All measured disturbances were greater than 10dB below the 15.207 average and quasi-peak limits.



Active Terminal



Neutral Terminal

10 FCC Part 15C, Section 15.209 - RADIATED EMISSION LIMITS, GENERAL REQUIREMENTS

Test Date:	24 & 25/07/2013	Temperature:	20-24°C
Test Officer:	Richard Turner	Humidity:	54-62%
Test Location:	Austest Laboratories (NSW)		

10.1 EUT Operating Mode

The EUT was configured so that there was constant transmission from one antenna port.
Transmission was set for maximum power by the client.
Mains supply voltage set to 115VAC 60Hz.

10.2 Test Method

a. Measurements are performed in accordance with ANSI C63.10-2009.
b. Set the measuring receiver BW settings to:
   i. 200Hz (9kHz to 150kHz) EMI Receiver BW
   ii. 9kHz (150kHz to 30MHz) EMI Receiver BW.
   iii. 120kHz (30MHz to 1GHz) EMI Receiver BW.
   iv. 1MHz (above 1GHz) RBW, 1MHz or more VBW, using a Spectrum Analyser for Peak measurements.
   v. 1MHz (above 1GHz) RBW, 10Hz VBW, using a Spectrum Analyser for Average measurements.
c. Set up the EUT on a non-conductive turntable, 0.8m above the OATS conductive ground plane, and at the indicated test distance away from the measuring antenna.
d. To maximise emissions, rotate the EUT through 360° and adjust the measuring antenna height between 1m to 4m in the following antenna orientations:
   i. Loop antenna (150kHz to 30MHz) – Coaxial and coplanar orientations.
   ii. Biconical and Log-Periodic antennas (30MHz to 1GHz) - Both vertical and horizontal polarizations.
   iii. Horn antenna (above 1GHz) - Both vertical and horizontal polarizations.
e. Measure the maximised emission and repeat the above for all measurement frequencies.
f. Average level measurements were not made where the peak level did not exceed the average limit.
g. Check linearity of the measuring system, reducing gain when required.

10.3 Sample Calculation Example

The final radiated emission levels were obtained from the measurement equipment software which automatically applied all the stored calibration factors. The calibration / correction factors were applied as follows:

$$E = V + AF + L_{cbl} - G_{pre}$$

Where:

E = Radiated Electric Field Strength in dBµV/m at the specified distance.
V = EMI Receiver measured signal input voltage in dBµV.
AF = Antenna Factor of the measuring antenna in dB/m.
L_{cbl} = Total cable insertion loss in dB.
G_{pre} = Preamplifier gain in dB.

Frequency (MHz)	Receiver Level, V (dBµV)	AF (dB/m)	Lcbl (dB)	Gpre (dB)	Corrected Level, E (dBµV/m)
100.0	40.0	12.0	2.9	22.5	32.4

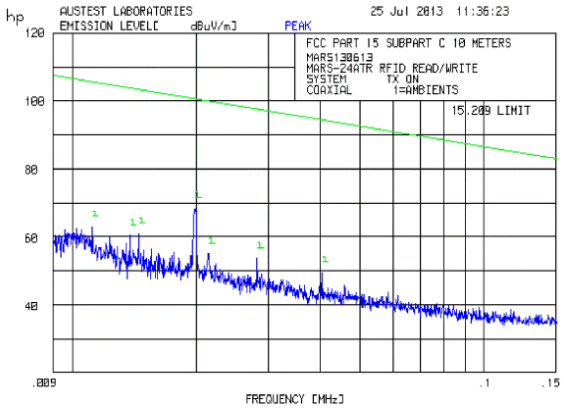
10.4 Test Results

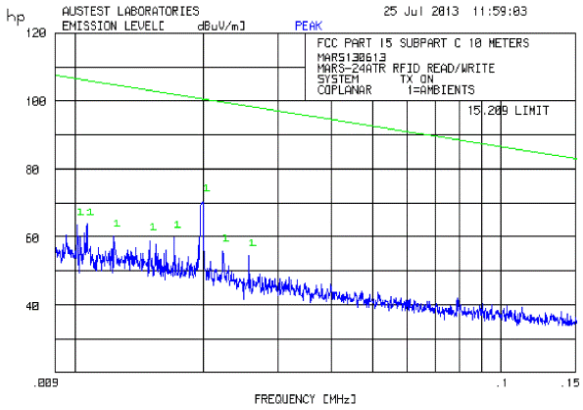
10.4.1 Radiated Disturbances: 9kHz to 30MHz at 10/3m distance

The highest measured quasi-peak level was 22.8dB below the 15.209 quasi-peak limit at 250.0MHz.

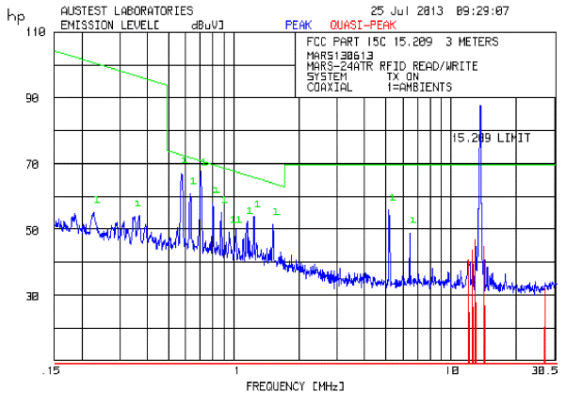
Frequency MHz	Antenna Orientation	Quasi-Peak µV/m	Quasi-Peak dBµV/m	Limit @ 30m µV/m	Limit @ 30m dBµV/m	Below Limit dB
12.5*	Coplanar	2	6.7	30	29.5	22.8
12.9*	Coplanar	2	6.6	30	29.5	22.9
12.9*	Coaxial	2	6.6	30	29.5	22.9
14.2*	Coaxial	2	4.7	30	29.5	24.8
12.1*	Coplanar	2	4.5	30	29.5	25.0
14.2*	Coplanar	2	4.1	30	29.5	25.4

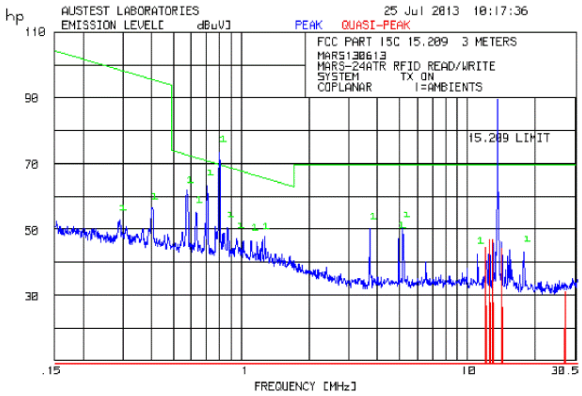
*Measured at a 3m distance. In accordance with section 15.31 (e) (2), measured field strength values were extrapolated to a 30m distance using an extrapolation factor of 40dB/decade.





9kHz to 150kHz





150kHz to 30MHz

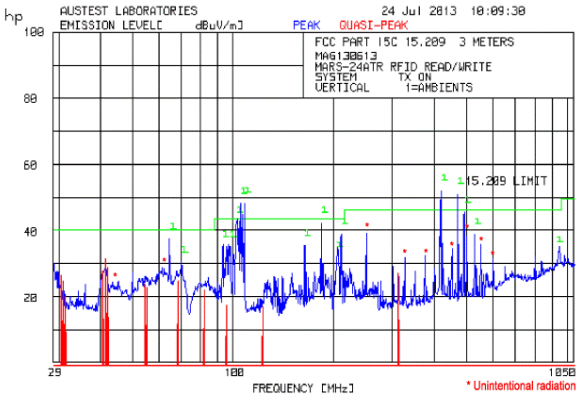
10.4.2 Radiated Disturbances: 30MHz to 1000MHz at 3m distance

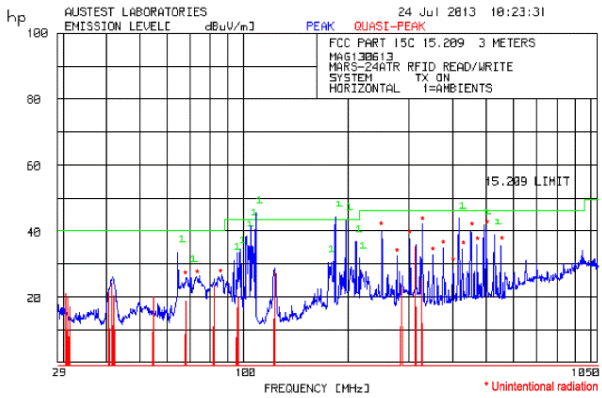
The highest measured quasi-peak level was 8.8dB below the 15.209 quasi-peak limit at 41.5MHz.

Emissions that were not attributed to the intentional radiation were not measured. Such emissions are addressed by a separate FCC Part 15, Subpart B test report.

Frequency MHz	Polarisation	Quasi-Peak µV/m	Quasi-Peak dBµV/m	Limit @ 3m µV/m	Limit @ 3m dBµV/m	Below Limit dB
41.5	Vertical	36	31.2	100	40.0	8.8
311.9*	Horizontal	57	35.1	200	46.0	10.9
30.5	Vertical	21	26.4	100	40.0	13.6
68.7	Vertical	17	24.6	100	40.0	15.4
41.3	Horizontal	16	24.1	100	40.0	15.9
122.2	Horizontal	24	27.6	150	43.5	15.9

*23rd harmonic. In accordance with section 15.33 (a) (4), the Class B limit specified in section 15.109 applies.





30MHz to 1000MHz

11 FCC Part 15C, Section 15.225 – OPERATION WITHIN THE BAND 13.110-14.010MHz

11.1 Section 15.225(a)(b)(c)(d) – Field Strength Measurement

Test Date:	16, 23 & 24/07/2013	Temperature:	22°C
Test Officer:	Richard Turner	Humidity:	56%
Test Location:	Austest Laboratories (NSW)		

11.1.1 EUT Operating Mode

The EUT was configured so that there was constant transmission from one antenna port.
Transmission was set for maximum power by the client.
Mains supply voltage set to 115VAC 60Hz.

11.1.2 Test Method

a. Measurements are performed in accordance with ANSI C63.10-2009.
b. Measuring receiver BW set to 9kHz.
c. Set up the EUT on a non-conductive turntable, 0.8m above the OATS conductive ground plane, and at the indicated test distance away from the measuring antenna.
d. To maximise emissions, rotate the EUT through 360° and adjust the measuring antenna height between 1m to 4m in the following antenna orientations:
   i. Loop antenna (150kHz to 30MHz) – Coaxial and coplanar orientations.
e. Measure the maximised emission and repeat the above for all measurement frequencies.
f. Average level measurements were not made where the peak level did not exceed the average limit.
g. Check linearity of the measuring system, reducing gain when required.

11.1.3 Sample Calculation Example

The final radiated emission levels were obtained from the measurement equipment software which automatically applied all the stored calibration factors. The calibration / correction factors were applied as follows:

$$E = V + AF + L_{cbl} - G_{pre}$$

Where:

E = Radiated Electric Field Strength in dBµV/m at the specified distance.
V = EMI Receiver measured signal input voltage in dBµV.
AF = Antenna Factor of the measuring antenna in dB/m.
L_{cbl} = Total cable insertion loss in dB.
G_{pre} = Preamplifier gain in dB.

Frequency (MHz)	Receiver Level, V (dBµV)	AF (dB/m)	Lcbl (dB)	Gpre (dB)	Corrected Level, E (dBµV/m)
13.56	40.0	12.0	2.9	22.5	32.4

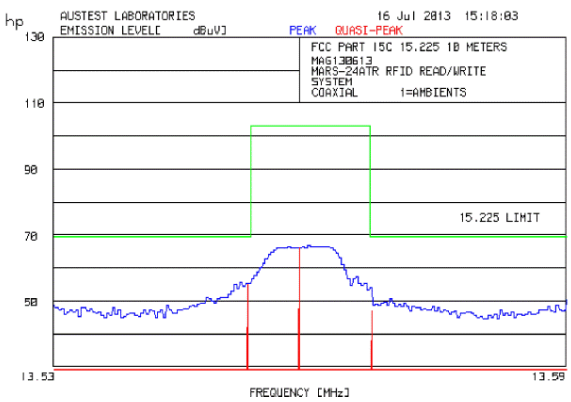
11.1.4 Test Results – Section 15.225(a) 13.553–13.567MHz at 10m distance

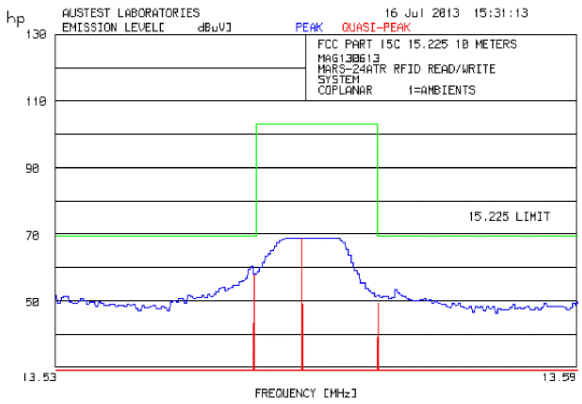
Measured field strengths shown below

Frequency MHz	Antenna Orientation	Quasi-Peak µV/m	Quasi-Peak dBµV/m	Limit @ 30m µV/m	Limit @ 30m dBµV/m	Below Limit dB
13.56*	Coplanar	324	50.2	15,848	84.0	33.8
13.56*	Coaxial	243	47.7	15,848	84.0	36.3

* Measured at a 10m distance. In accordance with section 15.31 (e) (2), measured field strength values were extrapolated to a 30m distance using an extrapolation factor of 40dB/decade.

Section15.31 (e) requires transmitted power at the fundamental to be measured with the supply voltage varied between 85% and 115% of the nominal voltage range.
No change in transmit power at the fundamental was observed when the AC supply voltage was varied.





13.56MHz

11.1.5 Test Results – Section 15.225(b) 13.410-13.553MHz and 13.567-13.710MHz at 10m distance

Measured field strengths shown below

Frequency MHz	Antenna Orientation	Quasi-Peak µV/m	Quasi-Peak dBµV/m	Limit @ 30m µV/m	Limit @ 30m dBµV/m	Below Limit dB
13.55*	Coplanar	86	38.7	334	50.5	11.8
13.55*	Coaxial	62	35.9	334	50.5	14.6
13.57*	Coplanar	32	30.1	334	50.5	20.4
13.53*	Coplanar	25	27.8	334	50.5	22.7
13.57*	Coaxial	24	27.7	334	50.5	22.8
13.53*	Coplanar	18	24.9	334	50.5	25.6

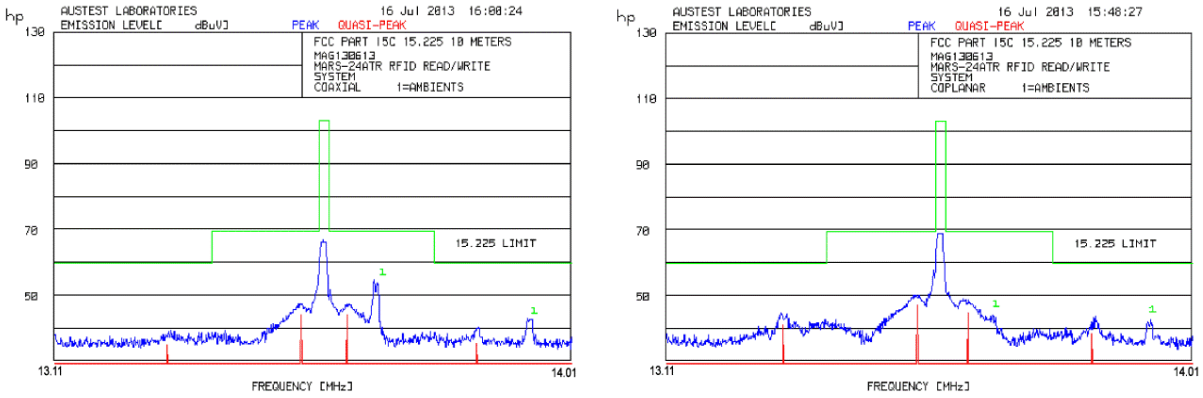
* Measured at a 10m distance. In accordance with section 15.31 (e) (2), measured field strength values were extrapolated to a 30m distance using an extrapolation factor of 40dB/decade.

11.1.6 Test Results – Section 15.225(c) 13.110-13.410MHz and 13.710-14.010MHz at 10m distance

Measured field strengths shown below

Frequency MHz	Antenna Orientation	Quasi-Peak µV/m	Quasi-Peak dBµV/m	Limit @ 30m µV/m	Limit @ 30m dBµV/m	Below Limit dB
13.35*	Coplanar	12	21.7	106	40.5	18.8
13.77*	Coplanar	9	19.2	106	40.5	21.3
13.77*	Coaxial	6	16.0	106	40.5	24.5
13.35*	Coaxial	6	15.8	106	40.5	24.7

*Measured at a 10m distance. In accordance with section 15.31 (e) (2), measured field strength values were extrapolated to a 30m distance using an extrapolation factor of 40dB/decade.



13MHz to 14MHz

11.1.7 Test Results – Section 15.225(d) outside the band 13.110-14.010MHz at 10/3m distance

Measured field strength levels did not exceed the general radiated emission limits in section 15.209. Refer to section 12 of this report.

11.2 Section 15.225(e) – Frequency Tolerance

Test Date:	25/07/2013	Temperature:	22°C
Test Officer:	Richard Turner	Humidity:	56%
Test Location:	Austest Laboratories (NSW)		

11.2.1 EUT Operating Mode

The EUT was configured so that there was constant transmission from one antenna port.
Transmission was set for maximum power by the client.
Mains supply voltage set to 115VAC 60Hz.

11.2.2 Test Method – Frequency stability with respect to ambient temperature

a. Measurements are performed in accordance with ANSI C63.10-2009 clause 6.8.1
b. The EUT was placed in a temperature chamber. The loop antenna was placed outside the chamber and connected to the one transmitting port.
c. A close field probe was fixed into position close to the loop antenna and connected to a spectrum analyser.
d. Connect the EUT to the AC source, output set to 115VAC 60Hz. Switch on the EUT.
e. Spectrum analyser settings were adjusted to facilitate accurate measuring of the transmission frequency. Final setting: RBW 100Hz, VBW100Hz, span 1kHz centred on 13.559986MHz.
f. Switch off the EUT. Temperature chamber set to +50°C and wait for the temperature to stabilise at that setting.
g. Switch on the EUT. Record the operating frequency at start up, two, five and ten minutes after transmission is initiated.
h. Switch off the EUT and reduce the temperature in the chamber by 10°C.
i. After the temperature has stabilised repeat step g.
j. Repeat steps g to i until the lower temperature of -20°C is reached.

11.2.3 Test Method – Frequency stability with respect to supply voltage

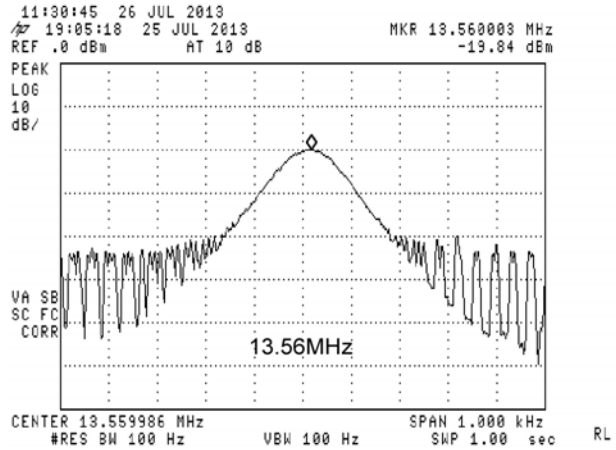
a. Measurements are performed in accordance with ANSI C63.10-2009 clause 6.8.2
b. The EUT was placed in a temperature chamber. The loop antenna was placed outside the chamber and connected to the one transmitting port.
c. Temperature chamber set to +20°C (ambient room temperature).
d. A close field probe was fixed into position close to the loop antenna and connected to a spectrum analyser
e. Connect the EUT to the AC source, output set to 115VAC 60Hz. Switch on the EUT.
f. Spectrum analyser settings were adjusted to facilitate accurate measuring of the transmission frequency. Final setting: RBW 100Hz, VBW100Hz, span 1kHz centred on 13.559986MHz.
g. Switch on the EUT. Record the operating frequency.
h. Repeat step g with the AC supply voltage set to 85% and 115% the nominal AC voltage.

11.2.4 Test Results – Frequency stability with respect to ambient temperature

Operating frequency: 13.56MHz.
The maximum deviation from the operating frequency was +0.068kHz, occurring 5 minutes after transmission was initiated at an ambient temperature of -20°C.

The frequency tolerance of the carrier signal kept within ±0.01% of the operating frequency, ±1.356kHz.

Temperature °C	Start up MHz	After 2mins MHz	After 5 mins MHz	After 10 mins MHz	Max. Δf kHz
50	13.559988	13.559998	13.560018	13.560038	+0.038
40	13.559988	13.559993	13.560008	13.560013	+0.013
30	13.559984	13.559971	13.559996	13.559993	-0.029
20	13.559984	13.559976	13.559976	13.559979	-0.024
10	13.560003	13.559986	13.559986	13.559979	-0.021
0	13.560023	13.560003	13.559998	13.560003	+0.023
-10	13.560046	13.560036	13.560026	13.560028	+0.046
-20	13.560046	13.560061	13.560068	13.560063	+0.068



11.2.5 Test Results – Frequency stability with respect to supply voltage

Operating frequency: 13.56MHz.
Ambient temperature: 20°C.

The maximum deviation from the operating frequency was +0.013kHz.

The frequency tolerance of the carrier signal kept within ±0.01% of the operating frequency, ±1.356kHz.

115VAC 60Hz (nominal ac voltage).
Measured frequency: 13.560008MHz Deviation: +0.008kHz

132.25VAC 60Hz (115% of nominal AC voltage).
Measured frequency: 13.560013MHz Deviation: +0.013kHz.

97.75VAC 60Hz (85% of nominal AC voltage.
Measured frequency: 13,560013MHz Deviation: +0.013kHz

APPENDIX A – PHOTOGRAPHIC RECORD OF EUT

EUT Front/Top

EUT Rear

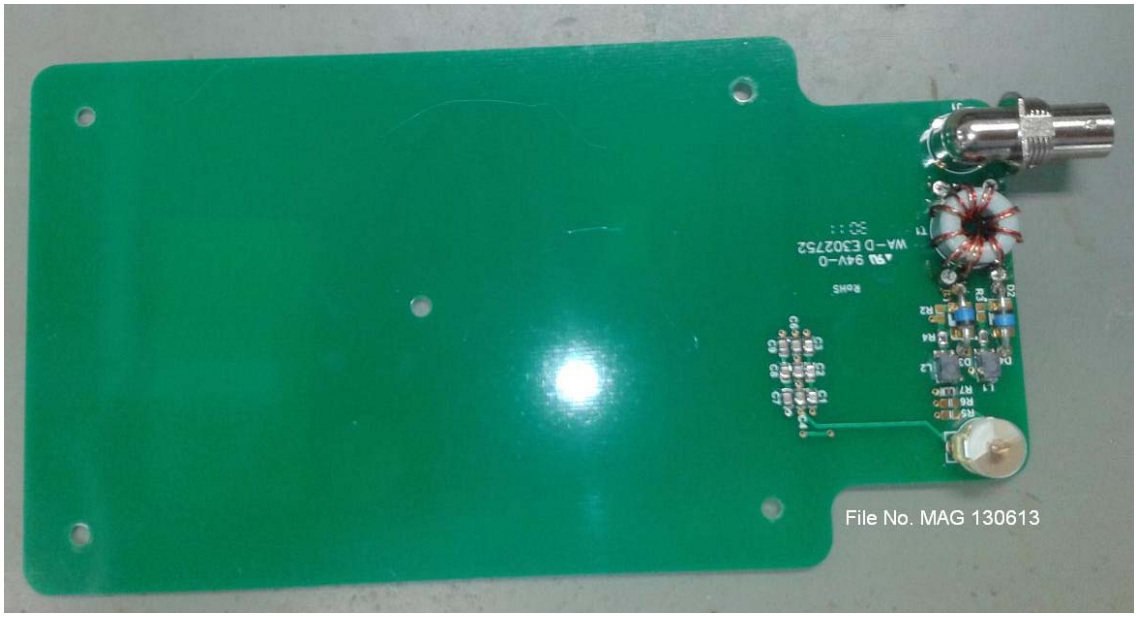
EUT Internal View

EUT Internal View

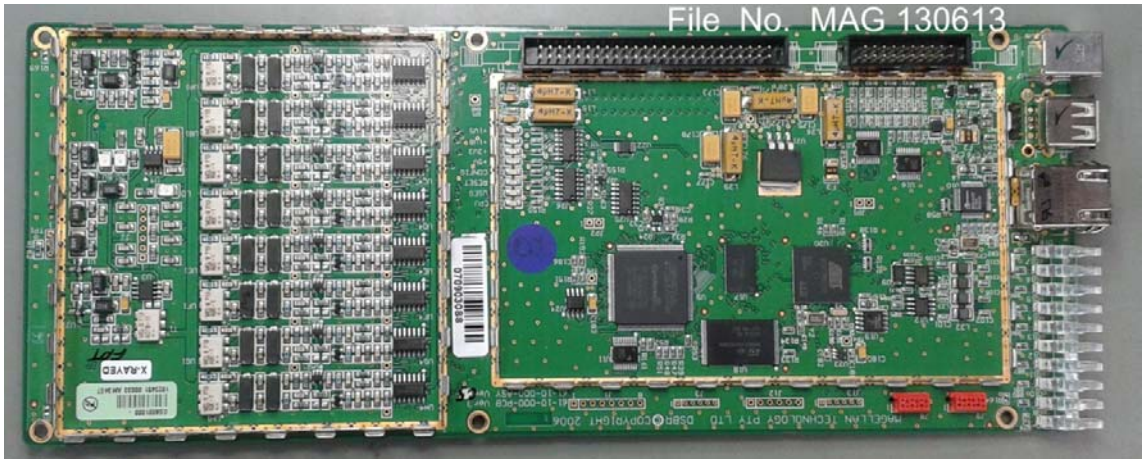
Loop Antenna

Loop Antenna Labelling Detail

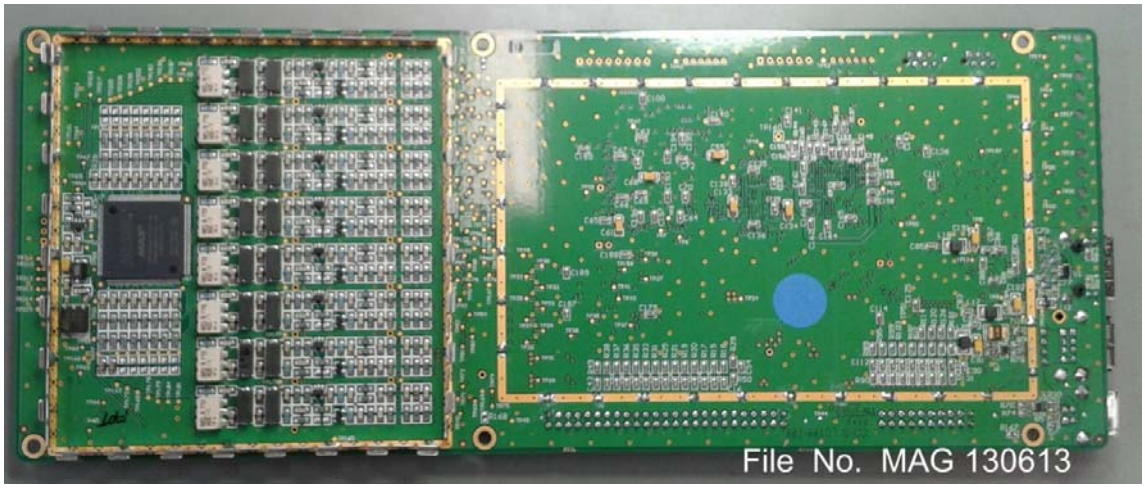
Loop Antenna (Trace Side Detail)



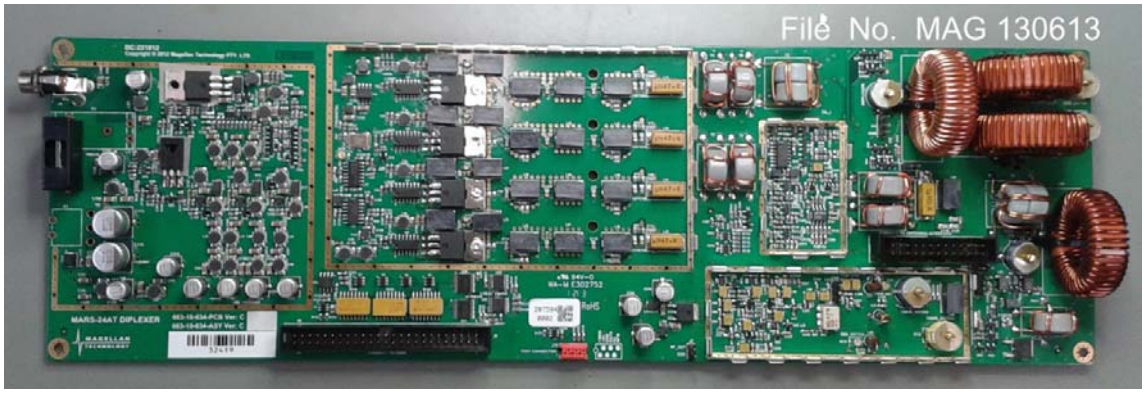
Loop Antenna (Component Side Detail)



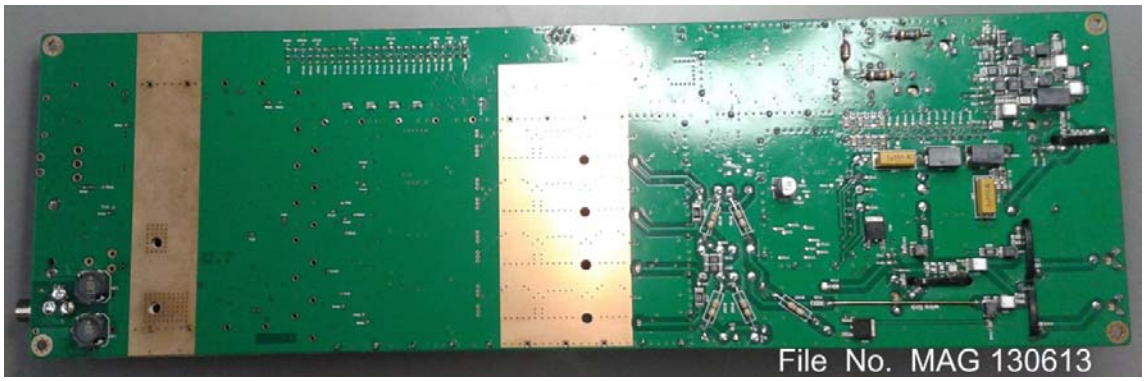
ASY PCB – 61_10_000 (Shields Removed) (Component Side)



ASY PCB ASY PCB – 61_10_000 (Shields Removed) (Trace Side)

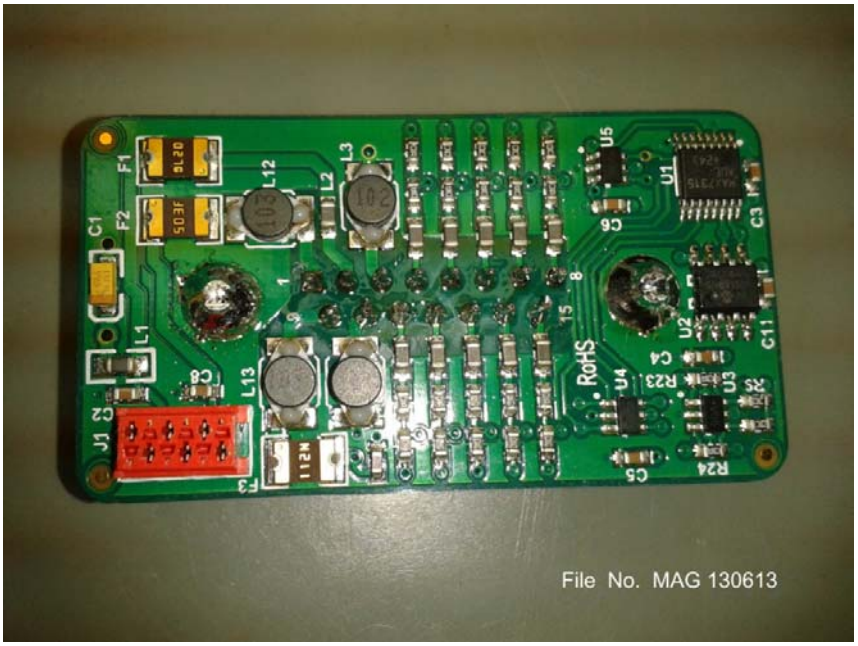


ASY PCB - Tr ASY PCB – 63_10_034 Transmitter Circuits (Shields Removed) (Component Side)

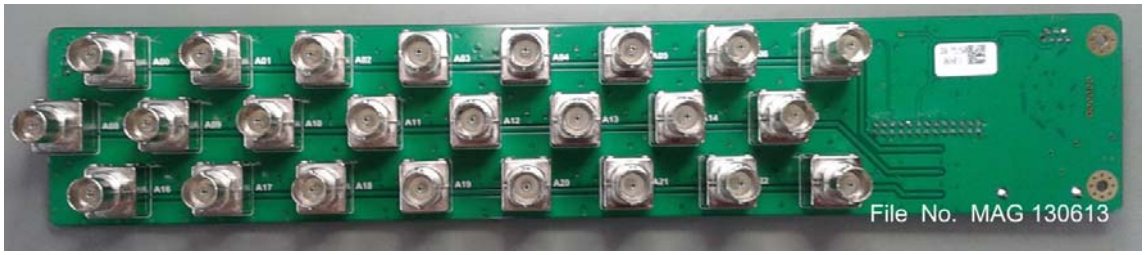


ASY PCB - 63_10_034 Transmitter Circuits (Shields Removed) (Trace Side)

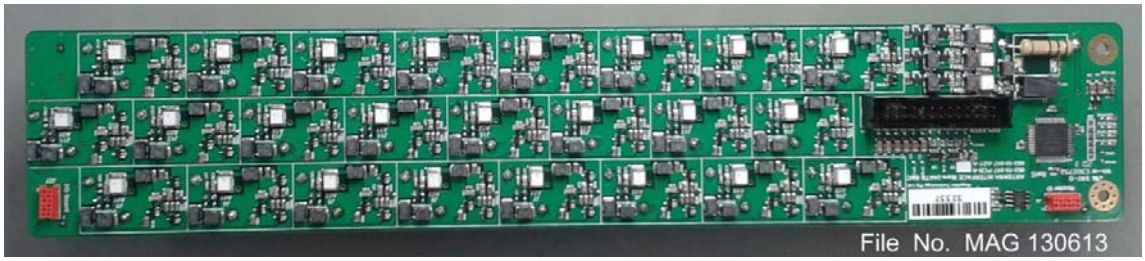
ASY PCB -63_10_046 (Connector/Trace Side)



ASY PCB - 63_10_046 (Component Side)

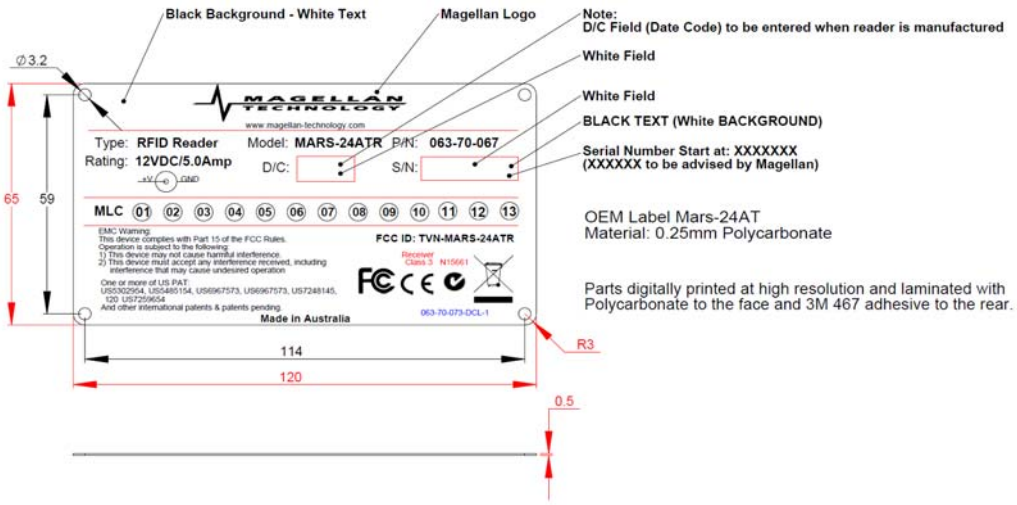


ASY PCB - 63_10_047 Multiplexer (Connector/Trace Side)

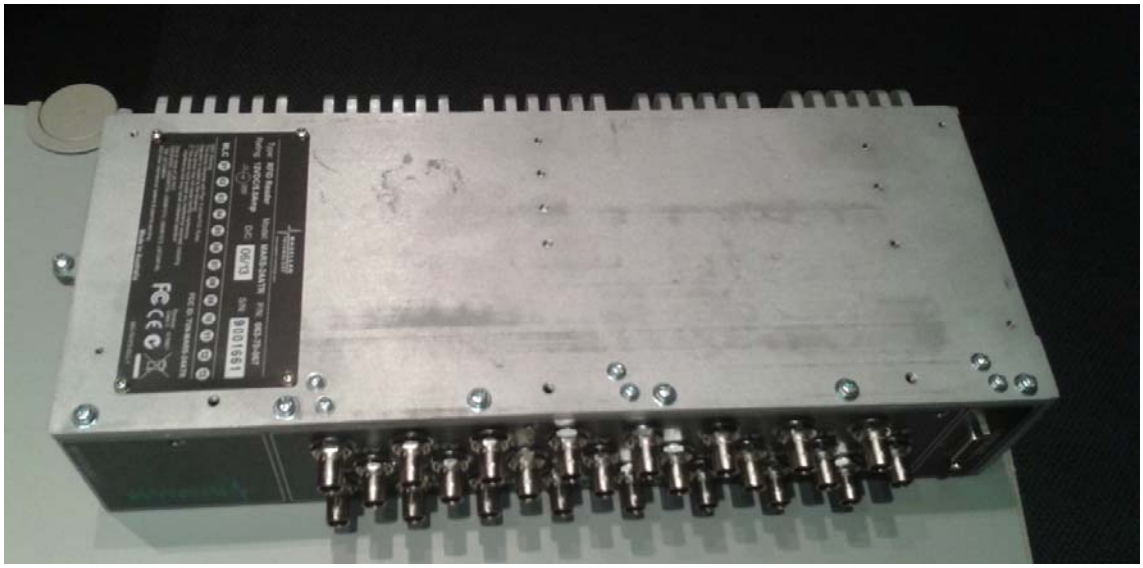


ASY PCB - 63_10_047 Multiplexer (Component Side)

APPENDIX B – FCC LABEL & LOCATION



FCC Label



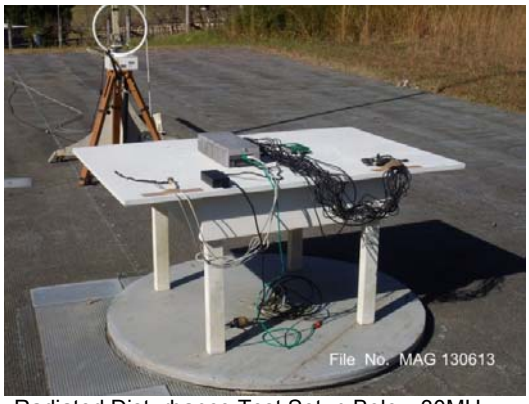
FCC Label Location on EUT

APPENDIX C – EUT TEST SETUP PHOTOGRAPHS

Conducted Disturbance (Antenna) Test Setup

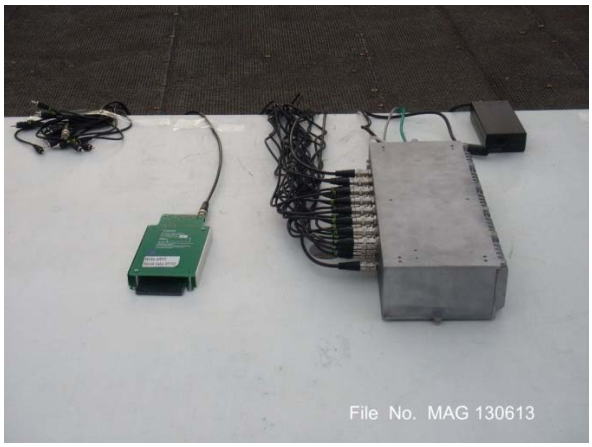
Conducted Disturbance (Dummy Load) Test Setup

Radiated Disturbance Test Setup (15.209)



Radiated Disturbance Test Setup Below 30MHz – (15.209)

Radiated Disturbance Test Setup – 30 – 1000MHz (15.209)



Radiated Disturbance Test Setup – (15.225)

Frequency Stability Test Setup – (15.225)

APPENDIX D – ANTENNA CONNECTION LETTER

MAGELLAN TECHNOLOGY

Dear Sir

REFERENCE: MARS-24ATR Antenna Connection

The MARS-24ATR product uses standard BNC for antenna connection.

It is our opinion that this new device meets the requirements for antenna connection in the following aspects:

Marketing.
Page 6 of the user manual states that the product must be installed and maintained by professional service trained personnel only.

The following marketing methods are used:

- The equipment is never sold at retail or to the general public. We manufacture and sell our products only to licensed users.
- The equipment is sold through only exclusive and formal license arrangements.
- Only Walker Digital (a system integrator company) is licensed by Magellan to install this equipment in the USA.
- Walker Digital technicians are professionally trained in installation methods and procedures by Magellan and by Walker Digital.
- Walker Digital already has trained professional installers to ensure that equipment is professionally installed and supervised.

Nature of the Application.
The devices are intended solely for the use by casinos in the gaming industry. On installation the antennas are embedded in the casino tables to which only professional people will have access. The general public do not have any knowledge about the installation of the devices and therefore do not have general access.

Installation.
Section 3 of the user manual contains a dedicated section relating to antenna installation.

The following statement has being included in the user manual, important information section, installation sub-section (at page 6):

> *Magellan's RFID reader-writers are to be professionally installed by authorized, qualified and service-trained installation personnel only.*

Magellan Technology Pty, 65 Johnston Street, Annandale NSW 2038, Australia
Phone: +61 2 9562 9800, Fax: +61 2 9518 7620
info@magtech.com.au, www.magtech.com.au

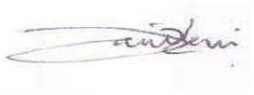
MAGELLAN TECHNOLOGY

Section 4 and 5 of the user manual describes the hardware and software installation of the antenna respectively.

The antenna software set-up at section 4.2.6 refers to **Reader Manager Guide (40-10-006-DOC)** for detailed instructions using the Wizard tool in *Reader Setup (Section 6.8)* to properly set-up the antenna.

Section 15.203 of the FCC Rules and Regulations states that the requirement of a unique connector is not required if the intentional radiator is professionally installed. We feel that we satisfy the requirements of a professional installation.

Sincerely Yours,



Tai Wai Pong
Senior Engineer - Hardware

Magellan Technology Pty, 65 Johnston Street, Annandale NSW 2038, Australia
Phone: +61 2 9562 9800, Fax: +61 2 9518 7620
info@magtech.com.au, www.magtech.com.au