

TEST REPORT NO: EU2464/6865

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REPORT ON THE EMC TESTING OF A Cambridge Consultants Ltd Iridium S1c L-Band Satellite Transceiver WITH RESPECT TO ETSI EN 301 489- 20 V1.2.1 (2002-11)

TEST DATE: 9th - 17th February 2006

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DATE	13 th March 2006	

Distribution:

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SUMMARY

TEST REPORT NO:	EU2464/6865
TRL WO:	EU2464
PURPOSE OF TEST:	Electromagnetic Compatibility - CERTIFICATION
TEST SPECIFICATION:	ETSI EN 301 489-20V1.2.1 (2002-11)
EQUIPMENT UNDER TEST:	Iridium S1c L-Band Satellite Transceiver
EQUIPMENT BUILD LEVEL:	Production, C7484-DL-001 V1.2 rev b
EQUIPMENT SERIAL No:	7023T0 (C7478-GR-037)
TEST RESULT:	Measured as Compliant Given the modifications (if any) described in Section 6 (Note uncertainty values in Appendix B)
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1 INTRODUCTION

This report EU2464/6865 presents the results of the EMC testing on a Cambridge Consultants Ltd, Iridium S1c L-Band Satellite Transceiver to specification ETSI EN 301 489-20 V1.2.1 (2002-11).

The testing was carried out for Cambridge Consultants Ltd by TRL Compliance Ltd, an independent test house, at their EMC test facility located at Up Holland, West Lancashire, England.

The test methods used were in accordance with the specifications cited in the references of ETSI EN 301 489-20 V1.2.1 (2002-11)

This report also details the configuration of the equipment under test, the test methods used and any relevant modifications where appropriate.

2 SYSTEM UNDER TEST

2.1 Equipment Under Test (EUT)

Manufacturer:	Cambridge Consultant Ltd
Name:	Iridium S1c L-Band Satellite Transceiver
Model:	9522A (replacing previous 9522A)
Supply Voltage:	4.4Vdc +/- 0.4Vdc
Build Level:	Production, C7484-DL-001 V1.2 rev b
Serial Number:	7023T0 (C7478-GR-037)
Software Revision:	MDC0003
Description of EUT:	Satellite Transceiver (MES Mobile Earth Station)

2.2 Essential Function

To provide a voice or data communications link via satellite.

2.3 **Support Equipment**

- 1. Racal Instruments 6108B Digital Radio Test Set (Ser. No. 2455)
- 2. Monaco BER Test Software V3.00, operating on desktop PC.
- 3. Monaco DPL adaptor Box (Mambo) Model C7032-GA-002 v1.0 #120

2.4 Modes of Operation of EUT During Testing

The Iridium S1c L-Band Satellite Transceiver was tested in two modes of operation (dependant on the test being performed):-

- 1. Powered via the DPL Adapter box with the phone in idle (not transmitting) mode.
- 2. Powered via the DPL Adapter box with the phone in transmit / receive mode monitoring for bit and frame errors.
- Notes: 1. For the active, transmit / receive mode, channel 1 was selected operating at a frequency of 1.616GHz.
 - 2. During Conducted Emissions testing the phone was powered directly from the power source via the LISN (i.e. not via the DPL Adapter box).

2.5 **Performance Criteria**

2.5.1 Mobile Earth Station Equipment Classification

CLASS OF MES EQUIPMENT	RESULT OF TOO LOW PERFORMANCE
1	Vehicle mounted MES (V-MES) Intended to be powered by the vehicle main battery
2	Portable MES (P-MES) powered by a stand alone battery
3	Fixed MES (F-MES) powered either by a DC or AC mains

The Iridium S1c L-Band Satellite Transceiver been designated as equipment class 3.

2.5.2 Performance Criteria for Continuous Phenomena applied to Transmitters & Receivers (CT/CR)

During and after test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state or stored data.

2.5.3 Performance Criteria for Transient Phenomena applied to Transmitters & Receivers (TT/TR)

After test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by permissible loss of performance.

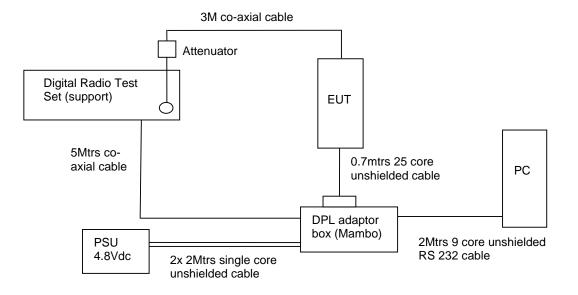
During transient type testing (electrostatic discharge, fast burst transients, etc.) a change of the frame error rate (FER), as monitored by the Racal Instruments 6108B Digital Radio Test Set, was deemed acceptable by the manufacturer, however loss of function or loss of established link was deemed unacceptable.

During the test, a degradation of performance is, however, allowed. No change of actual mode of operation (e.g. unintended transmission) or stored data is allowed.

2.6 Monitoring of Performance

During the idle mode of operation the EUT was connected to the spectrum analyser with the peak hold function on to monitor for unintentional transmissions. During the transmit/receive mode the EUT was connected via the antenna port to the Racal Instruments 6108B Digital Radio Test Set. The PC with the Monaco BER Test Software was used to put the EUT into a transmit/receive test mode and it was monitored for a continuous communications link, the Bit Error Rate (BER) and Frame Error Rate (FER) were also monitored for degradation via the test software.

2.7 Block Diagram (Transmit / Receive BER testing)



NOTE: 1. All cables are un-screened unless otherwise stated.

2. Cable lengths are as shown in diagram.

3 TEST SPECIFICATION, METHODS AND PROCEDURES

3.1 Test Specification

ETSI EN 301 489-20 V1.2.1 (2002-11)

Title:

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 20: Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS).

3.2 Clauses and Applicability

3.2.1 EMC Emissions

PHENOMENON	APPLICATION	TEST REQUIREMENT	NOTE
Radiated emissions	Enclosures of ancillary equipment	Not applicable	1
Conducted emissions	DC power input/output port	Applicable	
Conducted emissions	AC power input/output port	Not applicable	2
Harmonic current emissions	AC mains input port	Not applicable	2
Voltage fluctuations and flicker	AL mains nower port I Not applica		2
Conducted emissions	Telecommunication port	Not applicable	3

Note 1: Not applicable, no ancillary equipment. Radiated emissions will be carried out under radio approval and detailed under TRL report no. RU1221/6892. Note 2: Not applicable as the EUT had no AC mains power port.

Note 3: Not applicable as the EUT had no telecommunication port.

3.2.2 EMC Immunity

PHENOMENON	APPLICATION TEST REQUIREMENT		NOTE
RF electromagnetic field	Enclosure Applicable		
Electrostatic discharge	Enclosure	Applicable	
Fast transients common mode	Signal, telecommunication and control ports, AC & DC power port	Applicable	
RF common mode	Signal, telecommunication and control ports, AC & DC power port Applicable		
Transients and surges	DC power input ports	Not applicable	1
Voltage Dips and interruptions	AC mains input port	Not applicable	2
Surges	AC mains power ports and telecommunication ports		

Note 1: Not applicable as the Iridium S1c L-Band Satellite Transceiver is not intended to be connected directly to a vehicles supply.

Note 2: Not applicable as the EUT had no AC mains power port.

Note 3: Not applicable as the EUT had no telecommunications port.

3.3 References

ETSI EN 301 489-1: Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.

ETSI EN 301 489-20: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 20: Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS)

1999/5/EC: Council Directive on the approximation of the laws of the Member States relating to radio equipment and telecommunication terminal equipment and the mutual recognition of their conformity.

89/336/EEC: Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provisions of information in the field of technical standards and regulations

4 TEST CONDITIONS

4.1 Radiated Electromagnetic Emissions

Measurement Frequency Range	30MHz - 1000MHz
Measurement Distance	N/A
Antenna Height	1-4 metres
Antenna Polarisation	Vertical and Horizontal
Receiver bandwidth detectors	120kHz Quasi-peak (CISPR Time constants)
Ambient Conditions	N/A
EUT Height	N/A
Remarks	 All recorded emissions are the maximum value observed by: a) Rotating the EUT b) Elevating antenna c) Polarising antenna Horizontal and Vertical d) Manipulation and placement of system and power cables
Measurement Uncertainty	See Appendix B

Note: Not applicable, radiated emissions will be carried out under radio approval and detailed under TRL report no. RU1221/6892.

4.2 **Conducted Emissions – DC Power input/output Port**

Measurement Freq Range	150kHz - 30MHz		
Line Voltage	4.4V		
Line Frequency	DC		
Artificial Mains Network (AMN) Impedance	50 ohm/50µH		
Receiver bandwidth detectors	9kHz Quasi-Peak (CISPR Time Constants) and Average		
Configuration	Conforming to CISPR 16		
EUT Height	Mounted on a 0.8m high, non-conductive table		
Remarks	Where the average limit values are met using the Quasi-peak detector, both limits were deemed to be met. Where the product had load and other power terminals, conduction at those terminals was also measured and compared with the appropriate limit.		
Measurement Uncertainty	See Appendix B		

Test equipment used for this measurement was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
LISN/AMN	R & S	ESH3-Z5	863906/018	UH05	Х
RECEIVER	R & S	ESHS 10	841429/012	UH187	Х
SOFTWARE	CHASE	CIS9942	V4.31	N/A	Х

Note: During Conducted Emissions testing a NAL Research Corporation breakout-box was fitted in-line to the power / signal connector on the EUT.

4.3 **Conducted Emissions – AC Power input/output Port**

Measurement Freq Range	150kHz - 30MHz
Line Voltage	N/A
Line Frequency	N/A
Artificial Mains Network (AMN) Impedance	50 ohm/50µH
Receiver Bandwidth Detectors	9kHz Quasi-Peak (CISPR Time Constants) and Average
Configuration	Conforming to CISPR 16
EUT Height	N/A
Remarks	Where the average limit values are met using the Quasi-peak detector, both limits were deemed to be met. Where the product had load and other power terminals, conduction at those terminals was also measured and compared with the appropriate limit.
Measurement Uncertainty	See Appendix B

Note: Not applicable as the EUT had no AC Power input/output Port.

Test equipment used for this measurement was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
LISN/AMN	R & S	ESH3-Z5	8407 31/015	UH195	
RECEIVER	R & S	ESHS 10	830051/01	UH003	
SOFTWARE	R&S	1082	2.03	N/A	

4.4 Harmonic Current Emissions

Not applicable as the EUT had no AC mains Power input Port.

4.5 Voltage Fluctuations and Flicker

Not applicable as the EUT had no AC mains Power input Port.

4.5.1 Description

- A. The equipment is jointly manufactured by 'Spitzenberger and Spies GmbH' and 'Bioconsult Ingegneria Dei Sistemi S.P.A'. The type description of our analyser is 'B10'.
- B. For class D equipment the limits for harmonic currents are calculated for each 320ms time window (for a 50Hz voltage). Both the input voltage are measured continuously and simultaneously, allowing calculation of the input power and thus the setting of dynamic class D harmonic current limits against this input power.
- C. For class B equipment, the B10 uses the value 2.25 (being 1.5 x 1.5) in evaluating compliance to EN61000-3-2.

Test equipment for this test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
FLICKER UNIT	SCHAFFNER	INA2151	71976	UH152	
PROFLINE	SCHAFFNER	2105	54544	UH151	

4.6 **RF Electro-magnetic Field**

Frequency Range	80MHz to 1000MHz & 1400MHz to 2000MHz
Test Level	3 V/m (unmodulated level)
Modulation Type	Amplitude
Modulation Depth	80% (with 1 kHz sinewave)
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-3
Antenna to EUT Distance	3 metres
Antenna Type	Log Periodic
Antenna Polarisation	Vertical and Horizontal
Dwell Time	2.5 seconds
Frequency Step	1% of momentary frequency
Acceptable Performance Criterion	CT/CR (see section 2.5)
EUT Test Height	0.8 metres
Temperature during Test	22°C
Relative Humidity during Test	34% Humidity

4.6.1 Test Method

Compliance tests were carried out using a Log Periodic transmitting antenna. The forward power from a calibration file was called up and used in a computer controlled closed loop system to generate the required RF field of 3 V/m (unmodulated level) across the frequency range by setting the output level from the signal generator. The interfering signal was amplitude modulated to a depth of 80% with a 1 kHz sinewave.

4.6.2 **Conditions of Test**

The EUT was tested on 4 axes with the antenna both vertically and horizontally polarised with the support equipment outside the Electromagnetic Field.

The test equipment used for this test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
POWER AMP	AR	100W 1000M1A	18816	UH103	Х
V. PROBE	AR	FP1000	12386	UH20	
FIELD MONITOR	AR	FM1000	12379	UH13	
SIGNAL GEN	MARCONI	2042	119562/021	TRL254	Х
SIGNAL GEN.	MARCONI	2023	119224/040	UH105	Х
SIGNAL GEN.	MARCONI	2022D	119215/058	UH75	
SIGNAL GEN	MARCONI	6920	112224/040	UH105	Х
FUNCTION GEN.	THURLBY	TG210	018504	UH33	
RF AMPLIFIER	AR	50S1G4A	303825	UH167	Х
HORN ANTENNA	AR	AT4002A	303850	UH169	
MAC ROOM	MA	MAC4	1008/1024	UH106	Х
ISOTROPIC FIELD PROBE	AR	FP6001	305347	UH164	Х
DIR. COUPLER	AR	DC 7144	303761	UH165	
DIR. COUPLER	AR	DC6180	1006444-501	UH125	Х
RF POWER METER	ROHDE AND SCHWARZ	NRP-Z11	100002	UH260	х
RF POWER SENSOR	ROHDE AND SCHWARZ	NRP	100511	UH259	х
SPECTRUM ANALYSER	HEWLETT PACKARD	8563A	3147A01298	U256	Х
HORN ANTENNA	EATON / AILTECH	96001	2623	U223	Х

4.7 **Electrostatic Discharge**

Test Voltage Level	\pm 4kV Contact Discharge \pm 8kV Air Discharge
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-2
Acceptable Performance Criterion	TT/TR (see section 2.5)
Temperature during Test	20°C
Relative Humidity during Test	38%
Atmospheric Pressure during Test	969mb

4.7.1 **Contact Discharge**

- 1. Horizontal coupling plane
- Vertical coupling plane 2.
- 3. EUT casing
- 4.
- Casing cover Antenna TNC connector 5.

10 discharges were applied to the pre-selected points in both positive and negative polarity.

4.7.2 Air Discharge

1. 25 way D-Type connector

10 discharges were applied to the pre-selected points in both positive and negative polarity.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
ESD GUN	SCHAFFNER	NSG 435	1622	UH85	Х
ESD PLUG-IN	SCHAFFNER	NSG 435	258	UH01	
SPECTRUM ANALYSER	HEWLETT PACKARD	8563A	3147A01298	U256	х
HORN ANTENNA	EATON / AILTECH	96001	2623	U223	Х

Test equipment used for this test was:

4.8 Fast Burst Transients Common Mode

4.8.1 AC Power Ports

Test Voltage Level	N/A
Injection Method	Direct Injection
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-4
Duration of Test	60 seconds
Acceptable Performance Criterion	TT/TR (see section 2.5)
Temperature during Test	N/A
Relative Humidity during Test	N/A
Atmospheric Pressure during Test	N/A
Cables under Test	No applicable cables

4.8.2 **DC Power Ports**

Test Voltage Level	\pm 0.5kV
Injection Method	Direct Injection
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-4
Duration of Test	60 seconds
Acceptable Performance Criterion	TT/TR (see section 2.5)
Temperature during Test	20°C
Relative Humidity during Test	35%
Atmospheric Pressure during Test	967mb
Cables under Test	4.4Vdc supply cables

4.8.3 Signal, Telecommunication and Control Ports

Test Voltage Level	$\pm 0.5 kV$
Injection Method	Capactive Coupling Clamp
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-4
Duration of Test	60 seconds
Acceptable Performance Criterion	TT/TR (see section 2.5)
Temperature during Test	20°C
Relative Humidity during Test	35%
Atmospheric Pressure during Test	967mb
Cables under Test	 Antenna cable 25 way D-Type connector cable

4.8.3 Test Method

The EUT was supplied with DC power via the interference simulator. The interference simulator introduced common mode interference to the specified level with positive and negative polarity onto the DC and signal lines for a period of 60 seconds.

The test equipment used for this testing was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
COUPLING CLAMP	SCHAFFNER	CDN 125	691	UH98	Х
FBT SIMULATOR	SCHAFFNER	PNW2225	200140-042SC	UH161	Х
MAIN FRAME	SCHAFFNER	400213NSG20	200130/556AR	UH170	х
FBT SIMULATOR	SCHAFFNER	NSG 625	3040	UH83	
MAIN FRAME	SCHAFFNER	NSG600	3508	UH82	
SPECTRUM ANALYSER	HEWLETT PACKARD	8563A	3147A01298	U256	х
HORN ANTENNA	EATON / AILTECH	96001	2623	U223	Х

4.9 **RF Common Mode**

Frequency Range	0.15 - 80 MHz
Test Level	$3~\text{V}$ (rms) - unmodulated level (defined as the equivalent current into a 150Ω load)
Modulation Type	Amplitude
Modulation Depth	80% (with 1 kHz sinewave)
Reference Standard	ETSI EN 301 489-1
Test Method	EN 61000-4-6
Injection Method	CDN / Injection Clamp
Dwell Time	2.5 seconds
Frequency Step	1% of momentary frequency
Acceptable Performance Criterion	CT/CR (see section 2.5)
Temperature during Test	20°C
Relative Humidity during Test	35% Humidity
Cables under Test	 Antenna cable All cables to 25 way D-Type connector

4.9.1 Test Method

The EUT was powered via a CDN/Injection clamp. The interfering signal was applied to the line under test whilst incrementally sweeping the frequency range.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
POWER AMP	AR	75A250	18951	UH104	Х
CDN (2 wire)	MEB	M2	12109	UH135	
CDN (25 way D)	MEB	S-25	12397	UH113	
SIGNAL GEN.	MARCONI	2022D	119224/035	UH89	Х
CURRENT INJECTION PROBE	SOLAR	9120-IN	956419	UH86	
CURRENT INJECTION PROBE	SOLAR	9108-IN	972531	UH148	Х
SPECTRUM ANALYSER	HEWLETT PACKARD	8563A	3147A01298	U256	Х
HORN ANTENNA	EATON / AILTECH	96001	2623	U223	Х

The test equipment used for this test was:

4.10 Transients and Surges

Pulses Tested	Pulse 1 Pulse 2 Pulse 3a Pulse 3b Pulse 4 Pulse 5 Pulse 7
Pulse severity Level	II
Reference Standard	ETSI EN 301 489-1
Test Method Setup	ISO 7637-1
Acceptable Performance Criterion	Pulse 3a and 3b = CP (see section 2.5) Pulse 1a, 1b, 2, 4 and 5 = TP (see section 2.5)
Temperature during Test	N/A
Relative Humidity during Test	N/A
Atmospheric Pressure during Test	N/A
Cables under Test	N/A

Note: Not applicable as the EUT is not intended to be directly connected to a vehicles supply.

4.12.1 Test Method

The EUT was supplied with DC power via the pulse simulator, which introduced transients and surges to the specified level with positive and/or negative polarity on to the DC lines.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
TEST SYSTEM MAIN FRAME	SCHAFFNER	NSG 5000	IN5094-086	386	
TRANSIENT GENERATOR	SCHAFFNER	NSG 5001	AR5094-097	387	
BURST GENERATOR	SCHAFFNER	NSG 5003	AR5194-143	388	
HIGH ENERGY GENERATOR	SCHAFFNER	NSG 5005	AR5194-026	389	
BATTERY SIMULATOR	SCHAFFNER	NSG 5004	IN0995-021	390	

Test equipment used for this test was:

4.11 Voltage Dips and Interruptions

Voltage Reductions	30%, 60% and >95%
Reduction Duration	10ms for 30% reduction 100ms for 60% reduction 5000ms for >95% reduction
Number of Reductions	3
Repetition rate	10 second intervals
Acceptable Performance Criterion	30% and 60% = CT/CR (see section 2.5) >95% = 30% = TT/TR (see section 2.5)
Reference Standard	ETSI EN 301 489-1
Test Method	EN61000-4-11
Temperature during Test	NI/A
Temperature during Test	N/A
Relative Humidity during Test	N/A

Note: Not applicable as the EUT had no AC power port.

4.11.1 Test Method

The EUT was supplied with AC power via the test generator. The Voltage Dips and Interruptions where applied to the AC lines for the duration times shown above.

The test equipment used for this test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
NSG2050 MAIN FRAME	SCHAFFNER	400213NSG 20	200130/556 AR	UH170	
2050 V. DIPS UNIT	SCHAFFNER	PNW2003	200138- 005SC	UH160	
TEMP/HUMID BAROMETER	RS	N/A	N/A	UH110	
SPECTRUM ANALYSER	HEWLETT PACKARD	8563A	3147A0129 8	U256	
HORN ANTENNA	EATON / AILTECH	96001	2623	U223	

4.12 Surges

Test Voltage Level	\pm 0.5 kV – line to line \pm 1.0 kV – line to ground
Injection Method	Line to Line Line to Ground
Reference Standard	ETSI EN 301 489-1
Test Method Set-up	EN61000-4-5
Number of Discharges	5 per Voltage Polarity
Repetition rate	Minimum of 1 Discharge per minute
Phase angles	0°, 90°, 180°, 270°
Acceptable Performance Criterion	TT/TR (see section 2.5)
Temperature during Test	N/A
Relative Humidity during Test	N/A
Atmospheric Pressure during Test	N/A
Cables under Test	No applicable cables

Note: Not applicable as the EUT had no AC mains or telecommunications ports.

4.12.1 Test Method

The EUT was supplied with AC power via the surge generator, which introduced a pulse of differential or common mode interference to the specified level with positive and negative polarity on to the AC lines.

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
NSG2050 MAIN FRAME	SCHAFFNER	400213NSG 20	200130/556 AR	UH170	
2050 SURGE UNIT	SCHAFFNER	PNW 2050	200130- 556AR	UH159	
TEMP/HUMIDITY METER	RS	NONE	NONE	UH110	

Test equipment used for this test was:

5 RESULTS OF TEST

5.1 Radiated Electromagnetic Emissions

Test not applicable, no ancillary equipment (see section 4.1)

5.2 **Conducted Emissions – DC Power input/output Port**

MEASUREMENT	FREQUENCY	EMISSION	LIMIT
Power Line Conduction Quasi-Peak Detector Graph A1	0.265MHz	56.33dBµV	61.27dBµV
Power Line Conduction Average Detector Graph A1	0.3MHz	46.54dBµV	50.24dBµV

5.3 **Conducted Emissions – AC Power input/output Port**

MEASUREMENT	FREQUENCY	EMISSION	LIMIT
Power Line Conduction Quasi-Peak Detector Graph A2		N/A	
Power Line Conduction Average Detector Graph A2		N/A	

Note: Not applicable as the EUT had no AC power input/output port.

5.4 **Conducted Emissions – Telecommunication Port**

MEASUREMENT	FREQUENCY	EMISSION	LIMIT		
Power Line Conduction Quasi-Peak Detector Graph A3		N/A			
Power Line Conduction Average Detector Graph A3	N/A				

Note: Not applicable as the EUT had no telecommunication port.

5.5 Harmonic Current Emissions

Not applicable as the EUT had no AC power input port.

5.6 Voltage Fluctuations and Flicker

Not applicable as the EUT had no AC power input port.

5.7 **RF Electromagnetic Field**

LEVEL	PERFORMANCE CRITERIA				
(V/m)	ACTUAL	REQUIRED			
3	CT/CR	CT/CR			

The actual frequencies (in MHz) used for this test were:

80.000	Ρ	115.606	Ρ	167.060	Ρ	241.414	Ρ	348.862	Ρ	504.132	Ρ	728.509	Ρ
80.800	Ρ	116.762	Ρ	168.730	Ρ	243.828	Ρ	352.350	Ρ	509.173	Ρ	735.794	Ρ
81.608	Ρ	117.930	Ρ	170.418	Ρ	246.266	Ρ	355.874	Ρ	514.265	Ρ	743.152	Ρ
82.424	Ρ	119.109	Р	172.122	Ρ	248.729	Ρ	359.433	Ρ	519.408	Ρ	750.584	Ρ
83.248	Ρ	120.300	Ρ	173.843	Ρ	251.216	Ρ	363.027	Ρ	524.602	Ρ	758.089	Ρ
84.081	Ρ	121.503	Ρ	175.581	Ρ	253.729	Ρ	366.657	Ρ	529.848	Ρ	765.670	Ρ
84.922	Ρ	122.718	Ρ	177.337	Ρ	256.266	Ρ	370.324	Ρ	535.146	Ρ	773.327	Ρ
85.771	Ρ	123.945	Ρ	179.111	Ρ	258.828	Ρ	374.027	Ρ	540.498	Ρ	781.060	Ρ
86.629	Ρ	125.185	Ρ	180.902	Ρ	261.417	Ρ	377.767	Ρ	545.903	Ρ	788.871	Ρ
87.495	Ρ	126.437	Ρ	182.711	Ρ	264.031	Ρ	381.545	Ρ	551.362	Ρ	796.760	Ρ
88.370	Ρ	127.701	Ρ	184.538	Ρ	266.671	Ρ	385.360	Ρ	556.875	Ρ	804.727	Ρ
89.253	Ρ	128.978	Ρ	186.383	Ρ	269.338	Ρ	389.214	Ρ	562.444	Ρ	812.775	Ρ
90.146	Ρ	130.268	Ρ	188.247	Ρ	272.031	Ρ	393.106	Ρ	568.068	Ρ	820.902	Ρ
91.047	Ρ	131.571	Ρ	190.129	Ρ	274.752	Ρ	397.037	Ρ	573.749	Ρ	829.111	Ρ
91.958	Ρ	132.886	Ρ	192.031	Ρ	277.499	Ρ	401.008	Ρ	579.487	Ρ	837.402	Ρ
92.878	Ρ	134.215	Ρ	193.951	Ρ	280.274	Ρ	405.018	Ρ	585.281	Ρ	845.776	Ρ
93.806	Ρ	135.557	Ρ	195.891	Ρ	283.077	Ρ	409.068	Ρ	591.134	Ρ	854.234	Ρ
94.744	Ρ	136.913	Ρ	197.850	Ρ	285.908	Ρ	413.158	Ρ	597.046	Ρ	862.777	Ρ
95.692	Ρ	138.282	Ρ	199.828	Ρ	288.767	Ρ	417.290	Ρ	603.016	Ρ	871.404	Ρ
96.649	Ρ	139.665	Ρ	201.826	Ρ	291.654	Ρ	421.463	Ρ	609.046	Ρ	880.118	Ρ
97.615	Ρ	141.061	Ρ	203.845	Ρ	294.571	Ρ	425.678	Ρ	615.137	Ρ	888.920	Ρ
98.591	Ρ	142.472	Ρ	205.883	Ρ	297.517	Ρ	429.934	Ρ	621.288	Ρ	897.809	Ρ
99.577	Ρ	143.897	Ρ	207.942	Ρ	300.492	Ρ	434.234	Ρ	627.501	Ρ	906.787	Ρ
100.573	Ρ	145.336	Ρ	210.021	Ρ	303.497	Ρ	438.576	Ρ	633.776	Ρ	915.855	Ρ
101.579	Ρ	146.789	Ρ	212.121	Ρ	306.532	Ρ	442.962	Ρ	640.114	Ρ	925.013	Ρ
102.595	Ρ	148.257	Ρ	214.243	Ρ	309.597	Ρ	447.391	Ρ	646.515	Ρ	934.263	Ρ
103.621	Ρ	149.740	Ρ	216.385	Ρ	312.693	Ρ	451.865	Ρ	652.980	Ρ	943.606	Ρ
104.657	Ρ	151.237	Ρ	218.549	Ρ	315.820	Ρ	456.384	Ρ	659.510	Ρ	953.042	Ρ
105.703	Ρ	152.749	Ρ	220.734	Ρ	318.978	Ρ	460.948	Ρ	666.105	Ρ	962.572	Ρ
106.760	Ρ	154.277	Ρ	222.942	Ρ	322.168	Ρ	465.557	Ρ	672.766	Ρ	972.198	Ρ
107.828	Ρ	155.820	Ρ	225.171	Ρ	325.390	Ρ	470.213	Ρ	679.494	Ρ	981.920	Ρ
108.906	Ρ	157.378	Ρ	227.423	Ρ	328.644	Ρ	474.915	Ρ	686.289	Ρ	991.739	Ρ
109.995	Ρ	158.952	Ρ	229.697	Ρ	331.930	Ρ	479.664	Ρ	693.151	Ρ	1000.000	Ρ
111.095	Ρ	160.541	Ρ	231.994	Ρ	335.249	Ρ	484.461	Ρ	700.083	Ρ		
112.206	Ρ	162.146	Ρ	234.314	Ρ	338.602	Ρ	489.305	Ρ	707.084	Ρ		
113.328	Ρ	163.768	Ρ	236.657	Ρ	341.988	Ρ	494.198	Ρ	714.155	Ρ		
114.462	Ρ	165.406	Ρ	239.024	Ρ	345.408	Ρ	499.140	Ρ	721.296	Ρ		

The letter in the adjacent column to the frequency identifies,

P = EUT passes at this frequency F = EUT fails at this frequency

E = EUT exclusion band

Note: 1.4GHz – 2GHz continued overleaf...

The actual frequencies used for 1.4GHz - 2GHz were:

1400.000	Ρ	1561.936	Ρ	1742.602	Ρ	1944.166	Ρ
1414.000	Ρ	1577.555	Ρ	1760.028	Ρ	1963.608	Ρ
1428.140	Ρ	1593.331	Ρ	1777.629	Ρ	1983.244	Ρ
1442.421	Ρ	1609.264	Ρ	1795.405	Ρ	2000.000	Ρ
1456.846	Ρ	1625.357	Ρ	1813.359	Ρ		
1471.414	Ρ	1641.610	Ρ	1831.492	Ρ		
1486.128	Ρ	1658.026	Ρ	1849.807	Ρ		
1500.989	Ρ	1674.606	Ρ	1868.305	Ρ		
1515.999	Ρ	1691.353	Ρ	1886.988	Ρ		
1531.159	Ρ	1708.266	Ρ	1905.858	Ρ		
1546.471	Ρ	1725.349	Ρ	1924.917	Ρ		

The letter in the adjacent column to the frequency identifies, P = EUT passes at this frequency F = EUT fails at this frequency E = EUT exclusion band

5.8 Electrostatic Discharge

TEST POINTS	LEVEL	PERFORMAN	CE CRITERIA
	(kV)	ACTUAL	REQUIRED
See 4.7.1	± 4	TT/TR	TT/TR
See 4.7.2	± 8	TT/TR	TT/TR

Note: During electrostatic discharge testing, when applied to the casing and antenna connector, a small increase in FER (rate and event) occurred, however this was deemed acceptable and the rate decrease after the phenomena was removed.

5.9 Fast Transients Common Mode

TEST	LEVEL	PERFORMAN	ICE CRITERIA
POINTS	(kV)	ACTUAL	REQUIRED
DC input	± 0.5	CT/CR	TT/TR
25 way input/output cable	± 0.5	CT/CR	TT/TR
Antenna cable	± 0.5	CT/CR	TT/TR

5.10 **RF Common Mode**

LEVEL	PERFORMANCE CRITERIA					
(Vrms)	ACTUAL	REQUIRED				
3	CT/CR	CT/CR				

The actual frequencies (in MHz) used for this test were:

0.160 P 2.250 P 4.350 P 6.673 P 10.334 P 15.392 P 35.851 P 35.854 P 35.857 P 35.857 P 36.864 P 36.864 P 36.864 P 35.857 P 35.856 P 35.875 P 35.875 P 35.874 P 35.874 P 35.874 P 35.875																		
0.250 P 2.350 P 4.450 P 6.807 P 10.338 P 15.701 P 23.847 P 3.6.218 P 55.507 P 0.300 P 2.450 P 4.550 P 6.943 P 10.651 P 16.017 P 24.326 P 3.6.94 P 5.6.11 P 0.400 P 2.500 P 4.600 P 1.03 P 16.017 P 24.356 P 3.6.91 P 5.6.11 P 0.400 P 2.650 P 4.600 P 7.032 P 16.631 P 2.4.815 P 3.8.41 P 58.331 P 58.331 P 58.331 P 58.371 P 4.800 P 7.317 P 11.041 P 17.324 P 26.341 P 3.8.31 P 58.97 P 0.607 P 3.601 P 5.001 <td>0.150</td> <td>Ρ</td> <td>2.250</td> <td>Ρ</td> <td>4.350</td> <td>Ρ</td> <td>6.673</td> <td>Ρ</td> <td>10.134</td> <td>Ρ</td> <td>15.392</td> <td>Ρ</td> <td>23.377</td> <td>Ρ</td> <td>35.504</td> <td>Ρ</td> <td>53.924</td> <td>Ρ</td>	0.150	Ρ	2.250	Ρ	4.350	Ρ	6.673	Ρ	10.134	Ρ	15.392	Ρ	23.377	Ρ	35.504	Ρ	53.924	Ρ
0.300 P 2.400 P 4.500 P 6.875 P 10.441 P 15.888 P 24.685 P 56.567 P 0.400 P 2.500 P 4.600 P 7.013 P 10.651 P 16.177 P 24.569 P 37.315 P 56.674 P 0.450 P 2.550 P 4.660 P 7.013 P 10.758 P 16.339 P 24.861 P 37.868 P 57.813 P 0.500 P 2.650 P 4.700 P 7.228 P 10.974 P 16.67 P 25.817 P 58.97 P 0.600 P 2.700 P 4.800 P 7.514 P 11.741 P 26.061 P 30.411 P 60.762 P 0.700 P 2.800 P 5.000 P 7.514	0.200	Ρ	2.300	Ρ	4.400	Ρ	6.739	Ρ	10.235	Ρ	15.546	Ρ	23.610	Ρ	35.859	Ρ	54.463	Ρ
0.350 P 2.450 P 4.550 P 6.943 P 10.546 P 12.177 P 24.569 P 3.7315 P 56.714 P 0.450 P 2.500 P 4.600 P 7.013 P 10.651 P 16.302 P 24.815 P 3.7315 P 57.241 P 0.500 P 2.600 P 4.700 P 7.154 P 10.855 P 16.502 P 25.832 P 38.046 P 57.813 P 0.650 P 2.600 P 4.800 P 7.238 P 11.064 P 17.072 P 26.081 P 39.611 P 69.762 P 0.700 P 2.800 P 5.050 P 7.570 P 11.491 P 17.672 P 26.081 P 40.07 P 61.302 P 0.800	0.250	Ρ	2.350	Ρ	4.450	Ρ	6.807	Ρ	10.338	Ρ	15.701	Ρ	23.847	Ρ	36.218	Ρ	55.007	Ρ
0.400 P 2.500 P 4.600 P 7.013 P 10.651 P 16.177 P 24.569 P 37.315 P 56.67 P 0.500 P 2.550 P 4.600 P 7.013 P 10.758 P 16.302 P 24.815 P 37.689 P 57.241 P 0.550 P 2.650 P 4.700 P 7.225 P 10.864 P 25.567 P 38.831 P 58.975 P 0.600 P 2.750 P 4.800 P 7.218 P 11.306 P 17.712 P 26.031 P 39.611 P 61.076 P 1.330 P 17.544 P 26.031 P 40.407 P 61.370 P 1.439 P 17.547 P 26.631 P 40.407 P 61.370 P 1.500 P 2.500 <td>0.300</td> <td>Ρ</td> <td>2.400</td> <td>Ρ</td> <td>4.500</td> <td>Ρ</td> <td>6.875</td> <td>Ρ</td> <td>10.441</td> <td>Ρ</td> <td>15.858</td> <td>Ρ</td> <td>24.085</td> <td>Ρ</td> <td>36.580</td> <td>Ρ</td> <td>55.557</td> <td>Ρ</td>	0.300	Ρ	2.400	Ρ	4.500	Ρ	6.875	Ρ	10.441	Ρ	15.858	Ρ	24.085	Ρ	36.580	Ρ	55.557	Ρ
0.450 P 2.550 P 4.650 P 7.083 P 10.758 P 16.339 P 24.815 P 3.7688 P 5.7241 P 0.500 P 2.600 P 4.700 P 7.1254 P 10.974 P 16.667 P 38.465 P 55.311 P 0.600 P 2.700 P 4.800 P 7.228 P 11.144 P 16.667 P 38.416 P 56.311 P 0.700 P 2.800 P 4.900 P 7.514 P 11.414 P 17.712 P 26.031 P 40.007 P 67.72 P 0.700 P 2.800 P 5.000 P 7.514 P 11.649 P 7.7452 P 26.0371 P 40.007 P 67.204 P 0.800 P 3.000 P 5.112	0.350	Ρ	2.450	Ρ	4.550	Ρ	6.943	Ρ	10.546	Ρ	16.017	Ρ	24.326	Ρ	36.946	Ρ	56.113	Ρ
0.500 P 2.600 P 4.700 P 7.154 P 10.865 P 16.502 P 25.063 P 3.8.46 P 5.8.391 P 0.550 P 2.650 P 4.800 P 7.225 P 10.944 P 16.667 P 25.314 P 38.344 P 56.975 P 0.650 P 2.750 P 4.800 P 7.7371 P 11.084 P 17.722 P 26.081 P 38.31 P 60.762 P 0.750 P 2.850 P 4.900 P 7.670 P 11.634 P 7.671 P 26.601 P 40.407 P 61.370 P 0.850 P 3.050 P 5.152 P 7.924 P 17.642 P 26.611 P 42.468 P 63.230 P 0.850 P 3.150	0.400	Ρ	2.500	Ρ	4.600	Ρ	7.013	Ρ	10.651	Ρ	16.177	Ρ	24.569	Ρ	37.315	Ρ	56.674	Ρ
0.550 P 2.650 P 4.750 P 7.225 P 10.874 P 16.667 P 2.5314 P 38.446 P 58.391 P 0.600 P 2.700 P 4.800 P 7.238 P 11.084 P 16.6334 P 2.5807 P 38.831 P 58.975 P 0.700 P 2.800 P 4.900 P 7.444 P 11.306 P 7.172 P 26.811 P 39.611 P 60.762 P 0.750 P 2.850 P 5.000 P 7.594 P 11.649 P 7.682 P 26.871 P 40.407 P 61.760 0.850 P 2.900 P 5.000 P 7.747 P 17.682 P 27.410 P 41.632 P 63.820 P 0.950 P 3.500 P	0.450	Ρ	2.550	Ρ	4.650	Ρ	7.083	Ρ	10.758	Ρ	16.339	Ρ	24.815	Ρ	37.689	Ρ	57.241	Ρ
0.600 P 2.700 P 4.800 P 7.288 P 11.084 P 16.834 P 25.567 P 38.831 P 58.975 P 0.650 P 2.750 P 4.860 P 7.371 P 11.194 P 17.102 P 25.822 P 39.219 P 59.565 P 0.750 P 2.850 P 4.950 P 7.519 P 11.769 P 26.061 P 40.407 P 61.320 P 0.800 P 2.900 P 5.050 P 7.670 P 11.649 P 17.692 P 26.871 P 40.811 P 61.320 P 0.800 P 3.050 P 5.152 P 7.902 P 18.208 P 42.048 P 63.300 1.000 P 3.200 P 5.308 P 8.061 P	0.500	Ρ	2.600	Ρ	4.700	Ρ	7.154	Ρ	10.865	Ρ	16.502	Ρ	25.063	Ρ	38.065	Ρ	57.813	Ρ
0.650 P 2.750 P 4.850 P 7.371 P 11.194 P 17.002 P 2.802 P 39.219 P 59.565 P 0.700 P 2.800 P 4.900 P 7.444 P 11.306 P 17.172 P 26.081 P 39.611 P 60.762 P 0.800 P 2.900 P 5.000 P 7.594 P 11.534 P 17.517 P 26.081 P 40.007 P 61.370 0.800 P 3.000 P 5.101 P 7.747 P 11.681 P 27.410 P 41.032 P 63.230 P 0.900 P 3.000 P 5.101 P 7.821 P 12.022 P 18.285 P 27.411 P 41.632 P 63.620 P 1.000 P 3.200 P	0.550	Ρ	2.650	Ρ	4.750	Ρ	7.225	Ρ	10.974	Ρ	16.667	Ρ	25.314	Ρ	38.446	Ρ	58.391	Ρ
0.700 P 2.800 P 4.490 P 7.444 P 11.306 P 7.717 P 2.081 P 39.611 P 60.161 P 0.750 P 2.850 P 4.950 P 7.519 P 11.419 P 17.517 P 26.605 P 40.007 P 61.370 P 0.800 P 2.900 P 5.000 P 7.574 P 11.659 P 26.605 P 40.017 P 61.370 P 0.900 P 3.000 P 5.152 P 7.824 P 11.863 P 27.141 P 41.632 P 63.203 P 1.000 P 3.150 P 5.205 P 7.981 P 12.243 P 18.545 P 28.242 P 43.322 P 65.146 P 1.150 P 3.200 P 5.468	0.600	Ρ	2.700	Ρ	4.800	Ρ	7.298	Ρ	11.084	Ρ	16.834	Ρ	25.567	Ρ	38.831	Ρ	58.975	Ρ
0.750 P 2.850 P 4.950 P 7.519 P 11.419 P 7.734 P 26.341 P 40.007 P 60.762 P 0.800 P 2.900 P 5.000 P 7.574 P 11.534 P 7.592 P 26.871 P 40.407 P 61.370 P 0.900 P 3.000 P 5.101 P 7.747 P 11.765 P 7.868 P 27.410 P 41.632 P 63.230 P 0.900 P 3.000 P 5.203 P 7.801 P 18.248 P 27.685 P 42.048 P 63.862 P 1.000 P 3.200 P 5.336 P 8.061 P 18.243 P 18.698 P 28.242 P 42.488 P 65.797 P 1.200 P 3.200	0.650	Ρ	2.750	Ρ	4.850	Ρ	7.371	Ρ	11.194	Ρ	17.002	Ρ	25.822	Ρ	39.219	Ρ	59.565	Ρ
0.800 P 2.900 P 5.000 P 7.594 P 11.534 P 17.517 P 26.605 P 40.407 P 61.370 P 0.850 P 2.950 P 5.050 P 7.670 P 11.649 P 7.682 P 26.871 P 40.811 P 61.984 P 0.900 P 3.000 P 5.152 P 7.824 P 11.883 P 27.411 P 41.632 P 63.230 P 1.000 P 3.050 P 5.55 P 7.981 P 12.022 P 18.285 P 28.242 P 42.883 P 65.146 P 1.100 P 3.200 P 5.361 P 8.223 P 18.969 P 28.809 P 44.133 P 67.119 P 1.200 P 3.350 P 5.468	0.700	Ρ	2.800	Ρ	4.900	Ρ	7.444	Ρ	11.306	Ρ	17.172	Ρ	26.081	Ρ	39.611	Ρ	60.161	Ρ
0.860 P 2.950 P 5.050 P 7.670 P 11.649 P 17.692 P 26.871 P 40.811 P 61.984 P 0.900 P 3.000 P 5.101 P 7.747 P 11.765 P 17.869 P 27.140 P 41.219 P 62.604 P 0.950 P 3.050 P 5.523 P 7.902 P 18.228 P 27.685 P 42.048 P 63.230 P 1.000 P 3.150 P 5.555 P 7.981 P 12.224 P 18.411 P 42.048 P 65.146 P 1.100 P 3.200 P 5.461 P 8.223 P 12.489 P 18.869 P 28.097 P 44.133 P 67.119 P 1.200 P 3.350 P 5.548	0.750	Ρ	2.850	Ρ	4.950	Ρ	7.519	Ρ	11.419	Ρ	17.344	Ρ	26.341	Ρ	40.007	Ρ	60.762	Ρ
0.900 P 3.000 P 5.101 P 7.747 P 11.765 P 7.746 P 41.219 P 62.604 P 0.905 P 3.050 P 5.152 P 7.824 P 11.883 P 18.048 P 27.411 P 41.632 P 63.230 P 1.000 P 3.100 P 5.255 P 7.981 P 12.022 P 18.411 P 27.962 P 42.488 P 65.166 P 1.100 P 3.200 P 5.308 P 8.142 P 12.266 P 18.761 P 28.242 P 42.483 P 67.179 P 1.200 P 3.300 P 5.468 P 8.305 P 18.749 P 28.809 P 44.035 P 67.791 1.200 P 3.400 P 5.523 P	0.800	Ρ	2.900	Ρ	5.000	Ρ	7.594	Ρ	11.534	Ρ	17.517	Ρ	26.605	Ρ	40.407	Ρ	61.370	Ρ
0.950 P 3.050 P 5.152 P 7.824 P 11.883 P 18.048 P 27.411 P 41.632 P 63.320 P 1.000 P 3.100 P 5.203 P 7.902 P 18.228 P 27.685 P 42.048 P 63.862 P 1.000 P 3.150 P 5.255 P 7.981 P 18.292 P 18.811 P 27.962 P 42.048 P 65.146 P 1.100 P 3.200 P 5.361 P 12.429 P 18.969 P 28.909 P 43.322 P 65.717 P 1.200 P 3.300 P 5.468 P 8.305 P 19.950 P 28.909 P 44.635 P 67.71 P 1.200 P 3.450 P 5.578 P 8.472	0.850	Ρ	2.950	Ρ	5.050	Ρ	7.670	Ρ	11.649	Ρ	17.692	Ρ	26.871	Ρ	40.811	Ρ	61.984	Ρ
1.000 P 3.100 P 5.203 P 7.902 P 12.002 P 18.228 P 27.685 P 42.048 P 63.862 P 1.000 P 3.150 P 5.255 P 7.981 P 12.122 P 18.411 P 27.685 P 42.468 P 64.500 P 1.100 P 3.200 P 5.361 P 18.142 P 12.666 P 18.781 P 28.524 P 43.322 P 65.717 P 1.200 P 3.300 P 5.414 P 8.233 P 12.614 P 19.158 P 29.097 P 44.103 P 67.119 P 1.200 P 3.350 P 5.578 P 8.472 P 19.503 P 29.097 P 45.631 P 67.791 P 1.300 P 3.450 P 5.578 P 8.472 P 12.868 P 19.739 P	0.900	Ρ	3.000	Ρ	5.101	Ρ	7.747	Ρ	11.765	Ρ	17.869	Ρ	27.140	Ρ	41.219	Ρ	62.604	Ρ
1.050 P 3.150 P 5.255 P 7.981 P 12.122 P 18.411 P 27.962 P 42.468 P 64.500 P 1.100 P 3.200 P 5.308 P 8.061 P 18.595 P 28.242 P 42.468 P 65.797 P 1.100 P 3.300 P 5.414 P 8.223 P 12.489 P 18.969 P 28.909 P 43.755 P 66.455 P 1.200 P 3.300 P 5.448 P 12.740 P 19.350 P 29.977 P 44.635 P 67.791 P 1.300 P 3.450 P 5.578 P 8.272 P 12.986 P 19.739 P 29.979 P 45.987 P 69.532 P 1.400 P 3.500 P 5.639	0.950	Ρ	3.050	Ρ	5.152	Ρ	7.824	Ρ	11.883	Ρ	18.048	Ρ	27.411	Ρ	41.632	Ρ	63.230	Ρ
1.100 P 3.200 P 5.308 P 8.061 P 12.243 P 18.595 P 28.242 P 42.893 P 65.146 P 1.150 P 3.250 P 5.361 P 8.142 P 12.366 P 18.781 P 28.524 P 43.322 P 65.797 P 1.200 P 3.300 P 5.448 P 8.233 P 12.614 P 19.158 P 29.097 P 44.193 P 67.119 P 1.300 P 3.400 P 5.523 P 8.388 P 12.740 P 19.530 P 29.997 P 44.635 P 67.791 P 1.350 P 3.500 P 5.634 P 8.577 P 19.936 P 30.279 P 45.532 P 69.453 P 1.450 P 3.500 P 5.630 P 8.729 P 13.258 P 30.279 P	1.000	Ρ	3.100	Ρ	5.203	Ρ	7.902	Ρ	12.002	Ρ	18.228	Ρ	27.685	Ρ	42.048	Ρ	63.862	Ρ
1.150 P 3.250 P 5.361 P 8.142 P 12.366 P 18.781 P 28.524 P 43.322 P 65.797 P 1.200 P 3.300 P 5.414 P 8.223 P 12.489 P 18.969 P 28.809 P 43.322 P 66.455 P 1.200 P 3.400 P 5.523 P 8.388 P 12.740 P 19.550 P 24.635 P 67.711 P 1.300 P 3.450 P 5.578 P 8.387 P 19.543 P 29.979 P 44.635 P 68.469 P 1.400 P 3.500 P 5.634 P 8.557 P 12.996 P 19.936 P 30.279 P 45.987 P 69.453 P 1.450 P 3.600 P 5.747 P 8.729 P 13.258 P 20.135 P 30.582 P	1.050	Ρ	3.150	Ρ	5.255	Ρ	7.981	Ρ	12.122	Ρ	18.411	Ρ	27.962	Ρ	42.468	Ρ	64.500	Ρ
1.200 P 3.300 P 5.414 P 8.223 P 12.489 P 18.969 P 28.809 P 43.755 P 66.455 P 1.250 P 3.350 P 5.468 P 8.305 P 12.614 P 19.158 P 29.097 P 44.193 P 67.119 P 1.300 P 3.400 P 5.523 P 8.388 P 12.740 P 19.350 P 29.979 P 44.635 P 67.711 P 1.400 P 3.500 P 5.634 P 8.557 P 12.996 P 19.739 P 29.979 P 45.532 P 69.153 P 1.450 P 3.560 P 5.690 P 8.643 P 13.126 P 30.527 P 45.937 P 69.153 P 1.500 P 3.660 P 5.747 P 8.729 P 13.258 P 20.337 P	1.100	Ρ	3.200	Ρ	5.308	Ρ	8.061	Ρ	12.243	Ρ	18.595	Ρ	28.242	Ρ	42.893	Ρ	65.146	Ρ
1.250 P 3.350 P 5.468 P 8.305 P 12.614 P 19.158 P 29.097 P 44.193 P 67.119 P 1.300 P 3.400 P 5.523 P 8.388 P 12.740 P 19.350 P 29.388 P 44.635 P 67.791 P 1.300 P 3.450 P 5.578 P 8.472 P 12.868 P 19.739 P 29.682 P 45.081 P 68.469 P 1.450 P 3.550 P 5.690 P 8.643 P 13.126 P 19.936 P 30.279 P 45.987 P 69.845 P 1.500 P 3.600 P 5.747 P 8.729 P 13.258 P 20.135 P 30.582 P 46.447 P 70.543 P 1.500 P 3.600 P 5.863 P 8.905 P 13.524 P	1.150	Ρ	3.250	Ρ	5.361	Ρ	8.142	Ρ	12.366	Ρ	18.781	Ρ	28.524	Ρ	43.322	Ρ	65.797	Ρ
1.300 P 3.400 P 5.523 P 8.388 P 12.740 P 19.350 P 29.388 P 44.635 P 67.791 P 1.350 P 3.450 P 5.578 P 8.472 P 12.868 P 19.543 P 29.682 P 45.081 P 68.469 P 1.450 P 3.550 P 5.634 P 8.557 P 12.996 P 30.279 P 45.932 P 69.453 P 1.500 P 3.600 P 5.747 P 8.729 P 13.390 P 30.582 P 46.447 P 70.543 P 1.500 P 3.600 P 5.863 P 8.905 P 13.390 P 20.337 P 30.887 P 46.447 P 71.249 P 1.600 P 3.700 P 5.863 P 8.905 P 13.659 P 20.540 P 31.96 P	1.200	Ρ	3.300	Ρ	5.414	Ρ	8.223	Ρ	12.489	Ρ	18.969	Ρ	28.809	Ρ	43.755	Ρ	66.455	Ρ
1.350 P 3.450 P 5.578 P 8.472 P 12.868 P 19.543 P 29.682 P 45.081 P 68.469 P 1.400 P 3.500 P 5.634 P 8.557 P 12.996 P 19.739 P 29.979 P 45.987 P 69.153 P 1.450 P 3.550 P 5.690 P 8.643 P 13.126 P 19.936 P 30.279 P 45.987 P 69.845 P 1.500 P 3.660 P 5.747 P 8.729 P 13.258 P 20.337 P 30.887 P 46.447 P 70.543 P 1.600 P 3.700 P 5.863 P 8.995 P 13.524 P 20.540 P 31.96 P 47.381 P 71.961 P 1.600 P 3.750 P 5.981 P 9.083 P 13.659 P	1.250	Ρ	3.350	Ρ	5.468	Ρ	8.305	Ρ	12.614	Ρ	19.158	Ρ	29.097	Ρ	44.193	Ρ	67.119	Ρ
1.400 P 3.500 P 5.634 P 8.557 P 12.996 P 19.739 P 29.979 P 45.532 P 69.153 P 1.450 P 3.550 P 5.690 P 8.643 P 13.126 P 19.936 P 30.279 P 45.987 P 69.845 P 1.500 P 3.600 P 5.747 P 8.729 P 13.258 P 20.135 P 30.582 P 46.447 P 70.543 P 1.500 P 3.650 P 5.805 P 8.816 P 13.390 P 20.337 P 30.887 P 46.911 P 71.961 P 1.600 P 3.700 P 5.863 P 8.905 P 13.524 P 20.540 P 31.196 P 47.854 P 72.681 P 1.600 P 3.750 P 5.981 P 9.083 P 13.69 P	1.300	Ρ	3.400	Ρ	5.523	Ρ	8.388	Ρ	12.740	Ρ	19.350	Ρ	29.388	Ρ	44.635	Ρ	67.791	Ρ
1.450 P 3.550 P 5.690 P 8.643 P 13.126 P 19.936 P 30.279 P 45.987 P 69.845 P 1.500 P 3.600 P 5.747 P 8.729 P 13.258 P 20.135 P 30.582 P 46.447 P 70.543 P 1.500 P 3.650 P 5.805 P 8.816 P 13.390 P 20.337 P 30.887 P 46.447 P 71.249 P 1.600 P 3.700 P 5.863 P 8.905 P 13.524 P 20.540 P 31.196 P 47.854 P 72.681 P 1.600 P 3.700 P 5.981 P 9.083 P 13.659 P 31.508 P 47.854 P 72.681 P 1.700 P 3.800 P 6.041 P 9.174 P 13.934 P 21.163 P	1.350	Ρ	3.450	Ρ	5.578	Ρ	8.472	Ρ	12.868	Ρ	19.543	Ρ	29.682	Ρ	45.081	Ρ	68.469	Ρ
1.500 P 3.600 P 5.747 P 8.729 P 13.258 P 20.135 P 30.582 P 46.447 P 70.543 P 1.550 P 3.650 P 5.805 P 8.816 P 13.390 P 20.337 P 30.887 P 46.417 P 71.249 P 1.600 P 3.700 P 5.863 P 8.905 P 13.524 P 20.540 P 31.196 P 46.911 P 71.249 P 1.600 P 3.750 P 5.922 P 8.994 P 13.659 P 20.746 P 31.508 P 47.854 P 72.681 P 1.700 P 3.800 P 5.981 P 9.083 P 13.953 P 31.823 P 48.333 P 73.408 P 1.750 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P	1.400	Ρ	3.500	Ρ	5.634	Ρ	8.557	Ρ	12.996	Ρ	19.739	Ρ	29.979	Ρ	45.532	Ρ	69.153	Ρ
1.550 P 3.650 P 5.805 P 8.816 P 13.390 P 20.337 P 30.887 P 46.911 P 71.249 P 1.600 P 3.700 P 5.863 P 8.905 P 13.524 P 20.540 P 31.196 P 47.381 P 71.961 P 1.650 P 3.750 P 5.922 P 8.994 P 13.659 P 20.746 P 31.508 P 47.854 P 72.681 P 1.700 P 3.800 P 5.981 P 9.083 P 21.163 P 31.823 P 48.333 P 73.408 P 1.750 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P 32.463 P 48.816 P 74.428 P 1.800 P 3.900 P 6.162 P 9.452 P 14.073 P 21.374 P	1.450	Ρ	3.550	Ρ	5.690	Ρ	8.643	Ρ	13.126	Ρ	19.936	Ρ	30.279	Ρ	45.987	Ρ	69.845	Ρ
1.600 P 3.700 P 5.863 P 8.905 P 13.524 P 20.540 P 31.196 P 47.381 P 71.961 P 1.650 P 3.750 P 5.922 P 8.994 P 13.659 P 20.746 P 31.508 P 47.854 P 72.681 P 1.700 P 3.800 P 5.981 P 9.083 P 20.953 P 31.823 P 48.333 P 73.408 P 1.750 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P 32.142 P 48.816 P 74.142 P 1.800 P 3.900 P 6.101 P 9.266 P 14.073 P 21.374 P 32.463 P 49.304 P 74.883 P 1.800 P 3.950 P 6.162 P 9.452 P 14.356 P 21.844 P	1.500	Ρ	3.600	Ρ	5.747	Ρ	8.729	Ρ	13.258	Ρ	20.135	Ρ	30.582	Ρ	46.447	Ρ	70.543	Ρ
1.650 P 3.750 P 5.922 P 8.994 P 13.659 P 20.746 P 31.508 P 47.854 P 72.681 P 1.700 P 3.800 P 5.981 P 9.083 P 13.796 P 20.953 P 31.823 P 48.333 P 73.408 P 1.700 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P 32.142 P 48.816 P 74.142 P 1.800 P 3.900 P 6.101 P 9.266 P 14.073 P 21.374 P 32.463 P 49.304 P 74.883 P 1.800 P 3.950 P 6.162 P 9.359 P 14.214 P 21.884 P 32.463 P 49.797 P 75.632 P 1.800 P 4.000 P 6.224 P 9.452 P 14.365 P	1.550	Ρ	3.650	Ρ	5.805	Ρ	8.816	Ρ	13.390	Ρ	20.337	Ρ	30.887	Ρ	46.911	Ρ	71.249	Ρ
1.700 P 3.800 P 5.981 P 9.083 P 13.796 P 20.953 P 31.823 P 48.333 P 73.408 P 1.750 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P 32.142 P 48.333 P 73.408 P 1.800 P 3.900 P 6.011 P 9.266 P 14.073 P 32.142 P 48.816 P 74.883 P 1.800 P 3.950 P 6.162 P 9.359 P 14.214 P 21.588 P 32.463 P 49.304 P 75.632 P 1.850 P 3.950 P 6.162 P 9.452 P 14.566 P 21.588 P 32.463 P 49.797 P 75.632 P 1.900 P 4.000 P 6.224 P 9.452 P 14.500 P 22.022 P	1.600	Ρ	3.700	Ρ	5.863	Ρ	8.905	Ρ	13.524	Ρ	20.540	Ρ	31.196	Ρ	47.381	Ρ	71.961	Ρ
1.750 P 3.850 P 6.041 P 9.174 P 13.934 P 21.163 P 32.142 P 48.816 P 74.142 P 1.800 P 3.900 P 6.101 P 9.266 P 14.073 P 21.374 P 32.463 P 49.304 P 74.883 P 1.800 P 3.950 P 6.162 P 9.359 P 14.214 P 21.588 P 32.788 P 49.797 P 75.632 P 1.900 P 4.000 P 6.224 P 9.452 P 14.356 P 21.804 P 33.115 P 50.295 P 76.388 P 1.900 P 4.000 P 6.224 P 9.452 P 14.500 P 23.144 P 50.295 P 76.388 P 1.900 P 4.050 P 6.286 P 9.547 P 14.500 P 23.781 P	1.650	Ρ	3.750	Ρ	5.922	Ρ	8.994	Ρ	13.659	Ρ	20.746	Ρ	31.508	Ρ	47.854	Ρ	72.681	Ρ
1.800 P 3.900 P 6.101 P 9.266 P 14.073 P 21.374 P 32.463 P 49.304 P 74.883 P 1.800 P 3.950 P 6.162 P 9.359 P 14.214 P 21.588 P 32.788 P 49.304 P 75.632 P 1.900 P 4.000 P 6.224 P 9.452 P 14.356 P 21.804 P 33.115 P 50.295 P 76.388 P 1.900 P 4.050 P 6.286 P 9.547 P 14.500 P 33.1447 P 50.798 P 77.152 P 2.000 P 4.100 P 6.349 P 9.642 P 14.645 P 22.425 P 33.781 P 51.306 P 77.924 P 2.0050 P 4.150 P 6.412 P 9.739 P 14.791 P 22.465 P	1.700	Ρ	3.800	Ρ	5.981	Ρ	9.083	Ρ	13.796	Ρ	20.953	Ρ	31.823	Ρ	48.333	Ρ	73.408	Ρ
1.850 P 3.950 P 6.162 P 9.359 P 14.214 P 21.588 P 32.788 P 49.797 P 75.632 P 1.900 P 4.000 P 6.224 P 9.452 P 14.356 P 21.588 P 33.115 P 50.295 P 76.388 P 1.900 P 4.000 P 6.224 P 9.452 P 14.356 P 21.804 P 33.115 P 50.295 P 76.388 P 1.950 P 4.050 P 6.286 P 9.547 P 14.500 P 22.022 P 33.447 P 50.798 P 77.152 P 2.000 P 4.100 P 6.349 P 9.642 P 14.645 P 22.422 P 33.781 P 51.306 P 77.924 P 2.050 P 4.150 P 6.412 P 9.739 P 14.791 P	1.750	Ρ	3.850	Ρ	6.041	Ρ	9.174	Ρ	13.934	Ρ	21.163	Ρ	32.142	Ρ	48.816	Ρ	74.142	Ρ
1.900 P 4.000 P 6.224 P 9.452 P 14.356 P 21.804 P 33.115 P 50.295 P 76.388 P 1.950 P 4.050 P 6.286 P 9.547 P 14.500 P 22.022 P 33.147 P 50.798 P 77.152 P 2.000 P 4.100 P 6.349 P 9.642 P 12.464 P 33.781 P 51.306 P 77.924 P 2.050 P 4.150 P 6.412 P 9.739 P 14.791 P 22.465 P 34.119 P 51.319 P 78.703 P 2.100 P 4.200 P 6.476 P 9.836 P 14.939 P 22.089 P 34.400 P 52.338 P 79.490 P 2.100 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P	1.800	Ρ	3.900	Ρ	6.101	Ρ	9.266	Ρ	14.073	Ρ	21.374	Ρ	32.463	Ρ	49.304	Ρ	74.883	Ρ
1.950 P 4.050 P 6.286 P 9.547 P 14.500 P 22.022 P 33.447 P 50.798 P 77.152 P 2.000 P 4.100 P 6.349 P 9.642 P 14.645 P 22.242 P 33.781 P 51.306 P 77.924 P 2.000 P 4.150 P 6.412 P 9.739 P 14.791 P 22.465 P 34.119 P 51.819 P 78.703 P 2.100 P 4.200 P 6.476 P 9.836 P 14.939 P 22.689 P 34.400 P 52.338 P 79.490 P 2.100 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P 2.150 P 4.250 P 6.541 P 9.934 P 15.088 P	1.850	Ρ	3.950	Ρ	6.162	Ρ	9.359	Ρ	14.214	Ρ	21.588	Ρ	32.788	Ρ	49.797	Ρ	75.632	Ρ
2.000 P 4.100 P 6.349 P 9.642 P 14.645 P 22.242 P 33.781 P 51.306 P 77.924 P 2.050 P 4.150 P 6.412 P 9.739 P 14.791 P 22.465 P 34.119 P 51.819 P 78.703 P 2.100 P 4.200 P 6.476 P 9.836 P 14.939 P 22.689 P 34.460 P 52.338 P 79.490 P 2.100 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P 2.150 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P	1.900	Ρ	4.000	Ρ	6.224	Ρ	9.452	Ρ	14.356	Ρ	21.804	Ρ	33.115	Ρ	50.295	Ρ	76.388	Ρ
2.050 P 4.150 P 6.412 P 9.739 P 14.791 P 22.465 P 34.119 P 51.819 P 78.703 P 2.100 P 4.200 P 6.476 P 9.836 P 14.939 P 22.689 P 34.460 P 52.338 P 79.490 P 2.150 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P	1.950	Ρ	4.050	Ρ	6.286	Ρ	9.547	Ρ	14.500	Ρ	22.022	Ρ	33.447	Ρ	50.798	Ρ	77.152	Ρ
2.100 P 4.200 P 6.476 P 9.836 P 14.939 P 22.689 P 34.460 P 52.338 P 79.490 P 2.150 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P	2.000	Ρ	4.100	Ρ	6.349	Ρ	9.642	Ρ	14.645	Ρ	22.242	Ρ	33.781	Ρ	51.306	Ρ	77.924	Ρ
2.150 P 4.250 P 6.541 P 9.934 P 15.088 P 22.916 P 34.805 P 52.861 P 80.000 P	2.050	Ρ	4.150	Ρ	6.412	Ρ	9.739	Ρ	14.791	Ρ	22.465	Ρ	34.119	Ρ	51.819	Ρ	78.703	Ρ
	2.100	Ρ	4.200	Ρ	6.476	Ρ	9.836	Ρ	14.939	Ρ	22.689	Ρ	34.460	Ρ	52.338	Ρ	79.490	Ρ
2.200 P 4.300 P 6.606 P 10.034 P 15.239 P 23.145 P 35.153 P 53.390 P	2.150	Ρ	4.250	Ρ	6.541	Ρ	9.934	Ρ	15.088	Ρ	22.916	Ρ	34.805	Ρ	52.861	Ρ	80.000	Ρ
	2.200	Ρ	4.300	Ρ	6.606	Ρ	10.034	Ρ	15.239	Ρ	23.145	Ρ	35.153	Ρ	53.390	Ρ		

The letter in the adjacent column to the frequency identifies,

P = EUT passes at this frequency F = EUT fails at this frequency E = EUT exclusion band

5.11 Transients and Surges

5.11.1 Test Pulse 1

SEVERITY LEVEL	Vs	Ri	td	tr	t1	t2	t3	PERFORMANCE CRITERIA		
	V	Ω	ms	μS	s	ms	μS	ACTUAL REQUIRED		
II	-50	10	2	≤ 1	2.5	200	≤ 100	N/A	N/A	

5.11.2 Test Pulse 2

SEVERITY LEVEL	Vs	Ri	td	tr	t1	t2	PERFORMAN	CE CRITERIA
	V	Ω	ms	μS	s	ms	ACTUAL REQUIRED	
II	+50	10	0.05	≤ 1	2.5	200	N/A	N/A

5.11.3 Test Pulse 3a

SEVERITY LEVEL	Vs	Ri	td	tr	t1	t4	t5	PERFORMANCE CRITERIA	
	V	Ω	μS	ns	μS	ms	Ms	ACTUAL REQUIRED	
Ш	-50	50	0.1	≤ 5	100	10	90	N/A N/A	

5.11.4 Test Pulse 3b

SEVERITY LEVEL	Vs	Ri	td	tr	t1	t4	t5	PERFORMANCE CRITERIA		
	V	Ω	μS	ns	μS	ms	Ms	ACTUAL REQUIRED		
II	+50	50	0.1	≤ 5	100	10	90	N/A	N/A	

5.11.5 Test Pulse 4

SEVERITY LEVEL	Vs	Va	Ri	t6	t7	t8	tf	tr	PERFORMAN	CE CRITERIA
	V	V	Ω	ms	ms	s	ms	ms	ACTUAL REQUIRED	
II	-5	-2.5	0.01	25	≤ 5 0	5	5	≤ 5	N/A	N/A

5.11.6 Test Pulse 5

SEVERITY LEVEL	Vs	Ri	td	tr	PERFORMAN	CE CRITERIA
	V	Ω	ms	ms	ACTUAL	REQUIRED
II	+46.5	4	100	5	N/A	N/A

5.11.7 Test Pulse 7

SEVERITY LEVEL	Vs	Ri	td	tr	t3	PERFORMAN	CE CRITERIA
	V	Ω	ms	ms	μS	ACTUAL	REQUIRED
II	-40	10	100	5	≤ 1 00	N/A	N/A

5.12 Voltage Dips and Interruptions

LEVEL	PERFORMAN	CE CRITERIA				
	ACTUAL	REQUIRED				
30% dip, 10ms	N/A					
60% dip, 100ms	N	/Α				
>95% dip, 5000ms	N/A					

5.13 **Surges**

TEST POINT	LEVEL (kV)	PERFORMANCE CRITERIA				
TEST FOINT	WORST CASE	ACTUAL	REQUIRED			
Line to line	± 0.5	١	I/A			
Line to ground	± 1.0	٢	I/A			

6 EMC MODIFICATIONS

The following modifications were incorporated during testing:

1. The support, conductive paint covered, 25-way D type connecter supplied for the testing was changed to a moulded plastic plug as discharges directly to the connector caused the software to stop refreshing. It was not established whether a EUT failure occurred or the support equipment was susceptible to the discharges. After the software application was closed and restarted the EUT operate as intended.

7 CONCLUSIONS

7.1 Emission Tests

The Iridium S1c L-Band Satellite Transceiver meets the requirements of ETSI EN 301 489-20 V1.2.1 (2002-11) in the configuration tested.

7.2 Immunity Tests

TEST	SEVERITY LEVEL	PERFORMANCE CRITERIA		
	SEVERIT LEVEL	ACTUAL	REQUIRED	
Radio Field Susceptibility	3V/m 80% AM	CT/CR	CT/CR	
Electrostatic Discharge	\pm 8kV AIR	TT/TR	TT/TR	
	\pm 4kV CONTACT	11/11	11/11	
Fast Transients Common Mode	± 0.5kV	CT/CR	TT/TR	
RF Common Mode	3Vrms 80% AM	CT/CR	CT/CR	
Transients and Surges	N/A	N/A	N/A	
Voltage Surges	\pm 1kV / \pm 0.5kV	N/A	N/A	
Voltage Dips and Interruptions	30% Dip, 10ms	N/A	N/A	
	60% Dip, 100ms	N/A	N/A	
	>95% Dip, 5000ms	N/A	N/A	

Note should be taken of modifications (if any) as described in section 6 of this report.

7.3 **Conformity in Production**

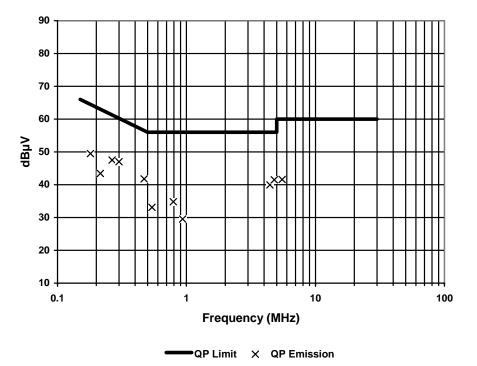
TRL EMC has based this test report on results from the equipment sample(s) provided.

The manufacturer is advised that they may have an obligation to demonstrate that production samples are in conformity with the Standards noted.

The EMC performance reported above was achieved after incorporation of any modifications as detailed in section 6 of this report.

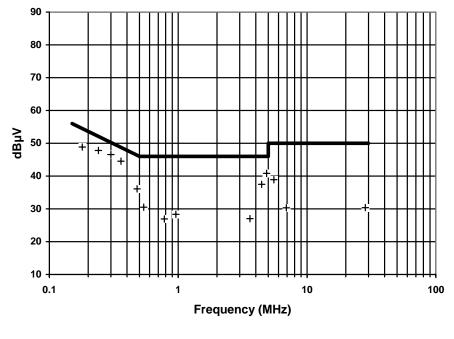
APPENDIX A

GRAPHS

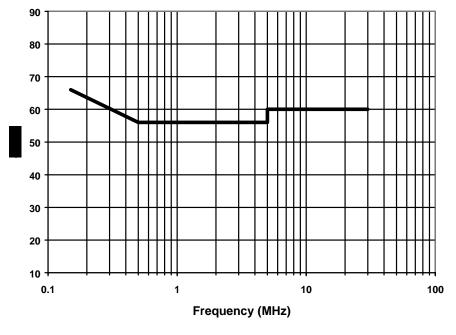


Conducted Emissions Quasi Peak Limit

Conducted Emissions Average Limit



AV Limit + AV Emission

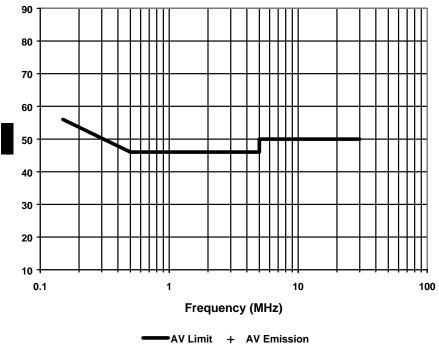


Conducted Emissions Quasi Peak Limit

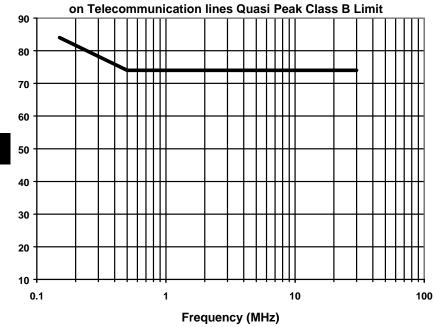


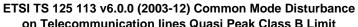
Note: Not applicable (see note 2 in section 3.2.1)

Conducted Emissions Average Limit

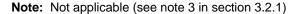


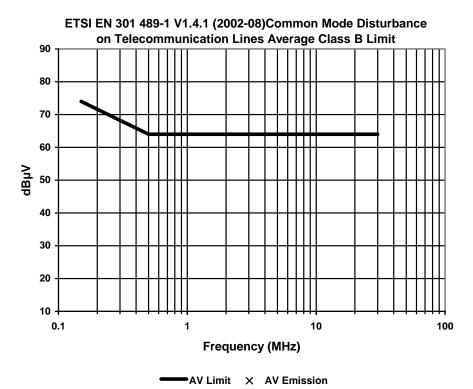
Note: Not applicable (see note 2 in section 3.2.1)













Graph A3:

APPENDIX B

MEASUREMENT UNCERTAINTY

SCHEDULE A - EMC MEASUREMENT UNCERTAINTY

Static Discharge

Tolerance Parameter	TRLUH 01	TRLUH 85	TRL 252 / 212	Specification Tolerance
Negative Discharge Current at 2kV	10.25%	21.80%	19.70%	30%
Negative Discharge Current at 8kV	27.31%	25.34%	28.63%	30%
Negative Discharge Voltage	3.33%	4.73%	5.11%	10%
Negative Rise Time at 2kV	11.81%	5.93%	7.10%	17.7%
Negative Rise Time at 8kV	11.81%	2.20%	5.93%	17.7%
Positive Discharge Current at 2kV	6.90%	14.45%	19.70%	30%
Positive Discharge Current at 8kV	18.13%	27.31%	22.06%	30%
Positive Discharge Voltage	5.87%	5.36%	5.87%	10%
Positive Rise Time at 2kV	14.16%	3.58%	7.10%	17.7%
Positive Rise Time at 8kV	11.81%	3.58%	5.93%	17.7%

Voltage Surge (1.2/50µs)

Tolerance Parameter	TRLUH 42	TRL 444	TRLUH 159	TRL 177	Specification Tolerance
Positive Voltage	4.49%	8.05%	8.85%	8.05%	10%
Negative Voltage	4.49%	8.36%	9.03%	6.30%	10%
Positive Duration	10.40%	5.72%	6.89%	10.66%	20%
Negative Duration	10.81%	6.29%	6.11%	9.99%	20%
Positive Front Time	23.30%	18.57%	28.51%	24.17%	30%
Negative Front Time	22.44%	18.57%	28.51%	25.04%	30%
Peak Current	7.84%	9.76%	9.76%	12.37%	10%
Duration (8/20µs)	6.39%	12.64%	12.64%	7.17%	10%
Front Time (8/20µs)	8.20%	10.00%	14.20%	11.80%	10%
Current Undershoot	Inside Tolerance	Inside Tolerance	Inside Tolerance	Outside Tolerance	30% of Peak Current

Transients (5/50ns)

Tolerance Parameter	LG LAB	UH LAB	BEST	NSG1025	Specification Tolerance
Positive Voltage	2.60%	2.60%	5.81%	4.59%	10%
Negative Voltage	2.99%	2.99%	5.81%	5.92%	10%
Source impedance (positive waveform)	9.69%	9.69%	11.71%	10.29%	20%
Source impedance (negative waveform)	N/A	N/A	N/A	N/A	20%
Pulse Parameters (positive waveform)	4.87%	4.87%	18.93%	5.56%	30%
Pulse Parameters (negative waveform)	6.50%	6.50%	14.21%	26.01%	30%
Burst Parameters	1.00%	1.00%	1.00%	1.00%	10%

Voltage Dips and Short Interruptions

Tolerance Parameter	2050 System (UH)	2050 System (LG)	BEST System (LG)	Specification Tolerance
Event Duration	1.00%	1.00%	1.00%	10%
Repetition Time	1.00%	1.00%	1.00%	10%
Supply Regulation	<5µs	<5µs	<5µs	<5µs
Phase Delay	2.98%	2.98%	2.98%	10%
Switching time at 90 degrees	1.2µs	2.95µs	2.42µs	1-5µs
Switching time at 270 degrees	3.8µs	3.04µs	2.12µs	1-5us

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SCHEDULE A - EMC MEASUREMENT UNCERTAINTY

Conducted Emissions

- [1] Conducted Emissions 9kHz to 150kHz = 3.7dB
- [2] Conducted Emissions 150kHz to 30MHz = 3.4dB

Radiated Emissions

[1] Radiated Emissions 30MHz to 1GHz using Bilog CBL6112 Antenna = 5.8dB

Conducted Immunity

- [1] Re-establishment of pre-calibrated field = 1.9dB
- [2] Limiting of injected level using monitor coil = 2.6dB

Radiated Immunity

- [1] Re-establishment of pre-calibrated field level = 2.17dB
- [2] Dynamic feedback calibrated field level = 2.21dB

Power Frequency magnetic Field

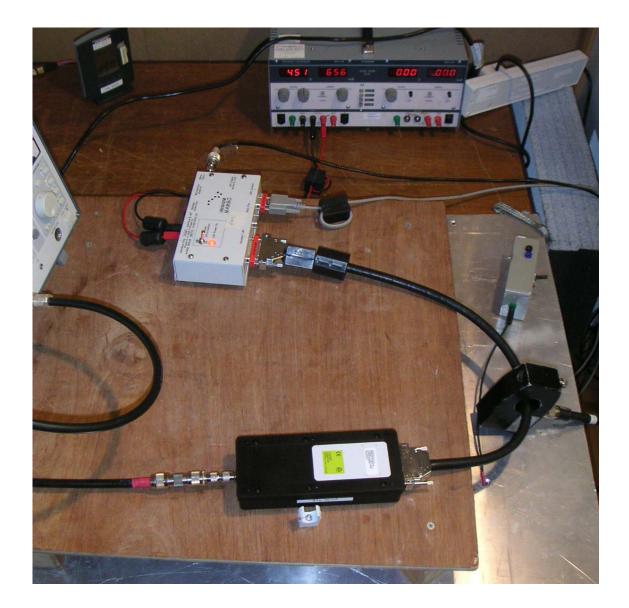
[1] Magnetic field immunity up to 1000A/m DC-400Hz = **1.7dB**

APPENDIX C

PHOTOGRAPHS

Photograph C1





Photograph C3



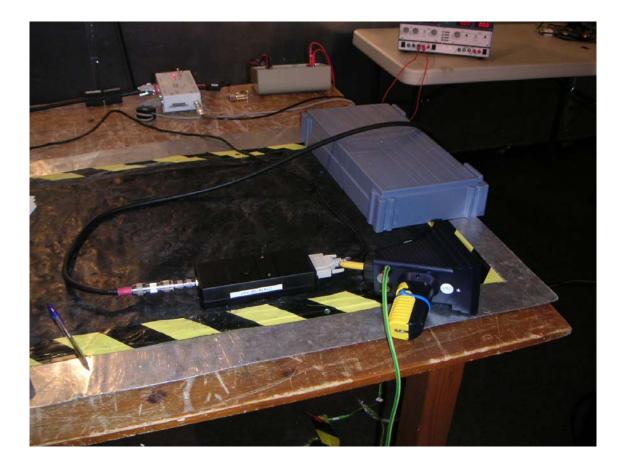
FAST BURST TRANSIENTS

Photograph C4



Photograph C5

ELECTROSTATIC DISCHARGE



APPENDIX D

ADDITIONAL INFORMATION

ADDITIONAL INFORMATION

NB: The contents of this page and subsequent page(s) are not covered by the scope of the laboratories UKAS accreditation.

Not applicable.