

**TEST REPORT ON  
NX 300 E Patch**

UHF Digital FSK Transmitter  
916.100 - 916.900 MHz  
FCC Procedures  
Part 15

**TEST REPORT NUMBER  
CTMS 2000/1512c  
October 2000**

**Prepared for:**

**Nexan Ltd  
The Quorum,  
Barnwell Road,  
Cambridge,  
England.**

This results in this report refer to the tested unit only





**CAMBRIDGE**  
TEST & MEASUREMENT SERVICES

## **Certificate of Application**

Cambridge Test and Measurement Services Ltd., certifies that the product tested was fully compliant with the requirements of Parts 15 of the FCC Code of Regulations 47CFR, the results of which are contained in this test report No: CTMS 2000/1512c

I certify that the application was prepared under my supervision and that to the best of my knowledge and belief, the facts set forth in this application and technical data, are true and correct.

Signature :

Date :

Name : David Fisher

Title : Radio Technical Manager



**General Test Information**

Date Test Sample Received : 22/09/2000

Date Testing Started : 25/09/2000

Date Testing Finished : 26/09/2000

Equipment Serial Number : 000006

CTMS Project Number : 2000/1512c

Test Engineer : D.Fisher

Report Copy No 1



### Contents list and Information

#### 2.1033 Application for Certification

For use in accordance with FCC Rules and Regulations 47 CFR parts 2 and parts 15.

2.1033 (b) (1)	Name of applicant	:	Nexan Ltd.
	Address of applicant	:	The Quorum, Barnwell Road, Cambridge, CB5 8RE, England.
Contact :Mr. P.Lewis,			
2.1033 (b) (2)	FCC Identifier	:	PCP NX-300
	Model Type Number	:	NX 300 E Patch
2.1033 (b) (3)	Installation and operating instructions	:	User Guide, see exhibit
2.1033 (b) (4)	Brief description of circuit function	:	see exhibit
2.1033 (b) (5)	Block diagram showing frequency		
2.1034	of oscillators	:	see exhibit
2.1033 (b) (6)	Report of measurements		
15	Subpart A General		
15.31	Measurement standards (OATS)	:	Page 5
15.33	Frequency range of radiated measurements	:	Page 6
15.35	Measurement detector and bandwidths	:	Page 6
15	Subpart C Intentional Radiators		
15.249	Radiated emission limits	:	Page 7
2.1033 (7)	Photographs of equipment and identification plate / label	:	Pages 10

#### **General Information and Attachments :**

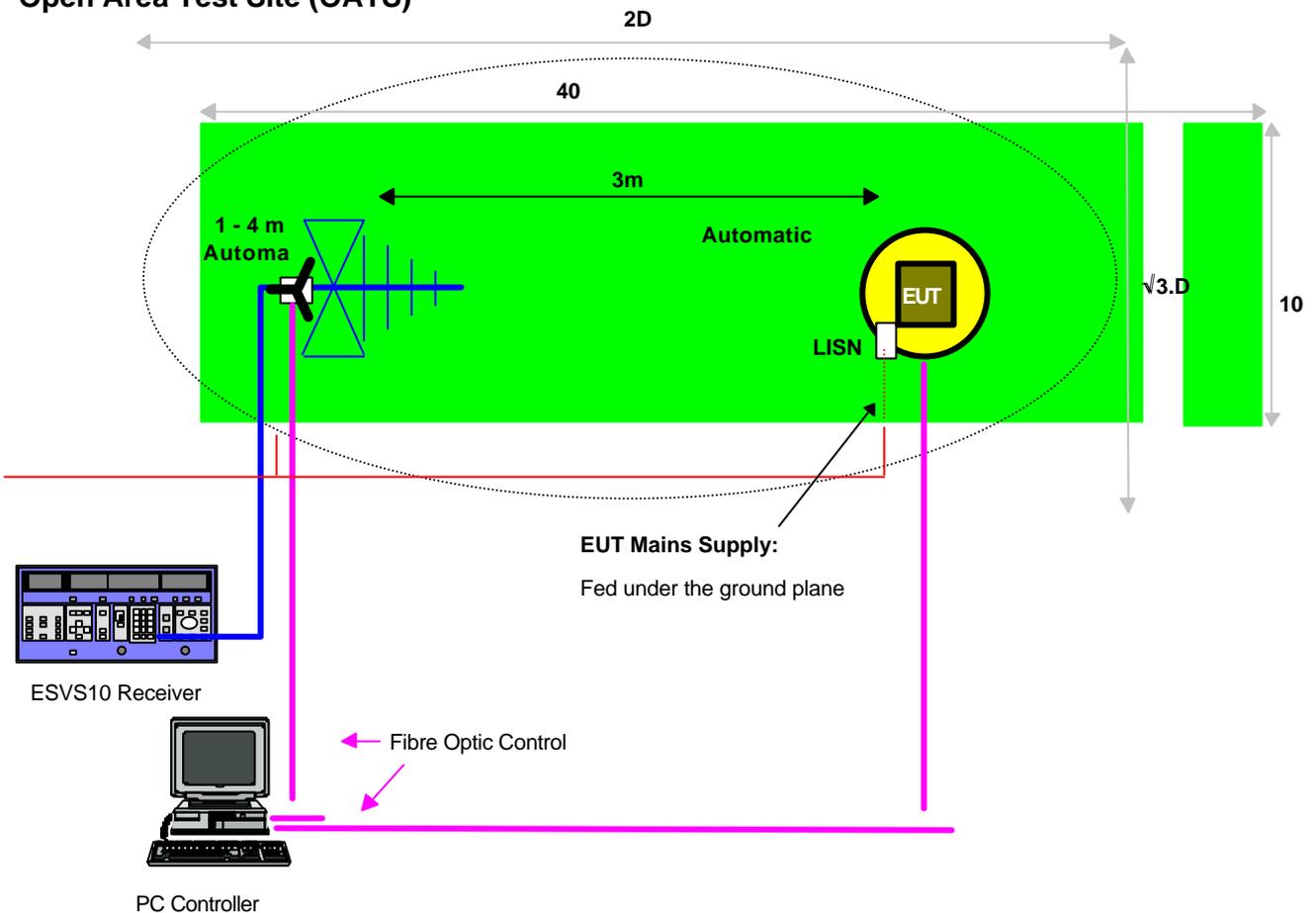
Company Accreditations & Credentials	:	Page 17
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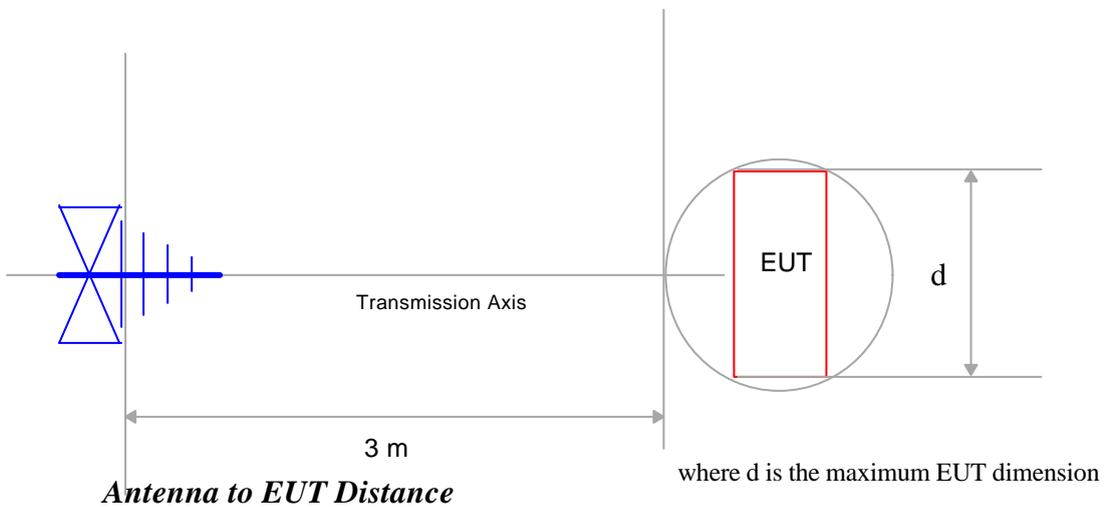
### 15.31 Measurement standards

The measurement facilities at Cambridge Test and Measurement Services LTD, are in accordance with ANCI C63.4 and lodged with the FCC under rule 2.948, a letter from the FCC recognising compliance with the requirements was dated March 02,1999 with the registration number 93385.

#### Open Area Test Site (OATS)



*Equipment Test Set Up*



### Frequency spectrum to be investigated - 47 CFR 15.33

The level of frequency search was from the lowest radio frequency generated to the 10<sup>th</sup> Harmonic of the fundamental frequency of the highest carrier frequency. (9.165 GHz)

### Measurement detector and bandwidths 47 CFR 15.35

Measurements below 1000 MHz are taken using a quasi-peak detector which has been calibrated to the requirements of CISPR 16-1.

For frequencies above 1000MHz a minimum resolution bandwidth of 1MHz was employed.

### General Test Conditions

Laboratory environment .

Ambient Temperature : 21 °C

Relative Humidity : 48 %

Open Area test Site : 18 °C

### Test Instruments used

Receiver:	Rohde & Schwarz type ESHS 10
Receiver:	Rohde & Schwarz type ESVS 10
Spectrum Analyser:	Advantest type R3271
Antenna:	Schaffner Chase bi-log type CBL6141A
Antenna:	Emco active loop type 6502
Antenna:	Emco double ridged guide horn type 3115



### **Transmitter emission limits- 47 CFR 15.249**

The Transmitter (the EUT) fitted with a new battery pack and body patch. Set to 100 % continuous transmit and was placed on a wooden table at a distance of 3m from the receiving antenna the radiated field for each spurious emission was detected and measured on a calibrated receiver.

The antenna was oriented in horizontal and vertical polarisation plane and was raised between 1-4 metres so as to ensure the maximum level of any spurious emission was detected.

The EUT was rotated through 360° at each orthogonal axis, the emission levels for each spurious were observed on the receiver and recorded.

For each of the emissions detected the EUT was switched off to determine the emission was that of the EUT.

To search for emissions below 30 MHz a Calibrated loop antenna was used. For emissions above 1GHz measurements were carried out by the same method as above, except that a spectrum analyser employing an average detector, and a double-ridged guide horn were used, the measurement distance was reduced to 1m and the results converted to 3m equivalents, the test site used was an absorber lined room which is accepted in ANSI C63.4 in this frequency range.



Results in accordance with Part 15.249 Emission Limits

Field Strength Fundamental

Operating Frequency MHz	Emission Frequency MHz	Identity	Level transmitted by EUT $\mu$ W	Result converted to $V/m$ @ 3m	Spec limit at this frequency $V/m$ @ 3m
916.500	916.500	fundamental (fc)	115.3	19.6 mV/m	50 mV/m

The transmitted output power level was found by substitution method. ie the EUT is replaced by a half wave dipole with its centre to coincide with the reference point of the test sample and the transmitted level was found by using a signal generator.

Field Strength Harmonics

Operating Frequency MHz	Emission Frequency MHz	Identity	Level transmitted by EUT nW	Result converted to $V/m$ @ 3m	Spec limit at this frequency $V/m$ @ 3m
916.500	1833.33	2*fc	6.6	148.4 $\mu$ V/m	500 $\mu$ V/m

The transmitted harmonic level was found by substitution method. ie when an emission was found the EUT is replaced by a half wave dipole with its centre to coincide with the reference point of the test sample and the level was found by using a signal generator.

The calculation used for all the above is as follows

$$\frac{PG}{4\pi D^2} = \frac{E^2}{120\pi}$$

P = Transmitter Power in Watts.

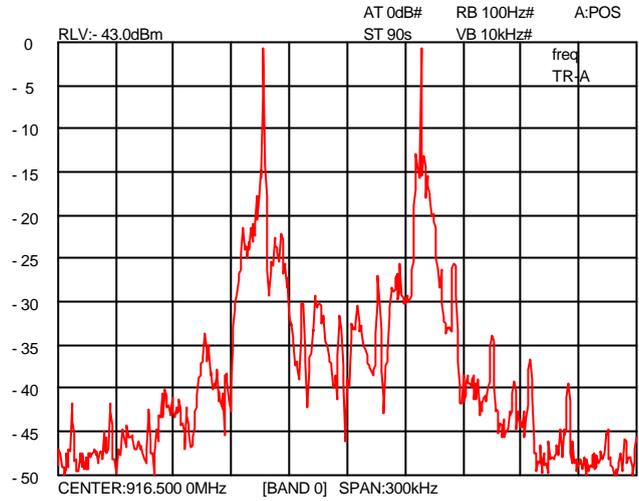
G = Gain of Transmitting Antenna relative to isotropic source.

D = Distance in metres.

E = field Strength in Volts/Meter.



### Bandwidth Plot



## PHOTOGRAPHS OF EQUIPMENT

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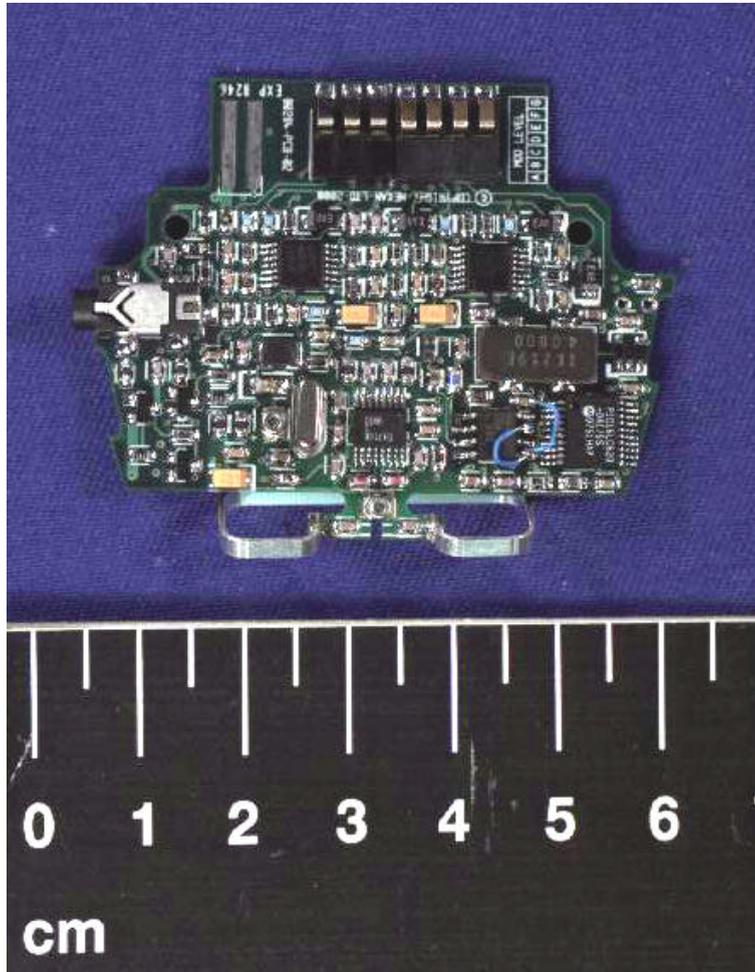
NX 300 E Patch Transmitter Front View



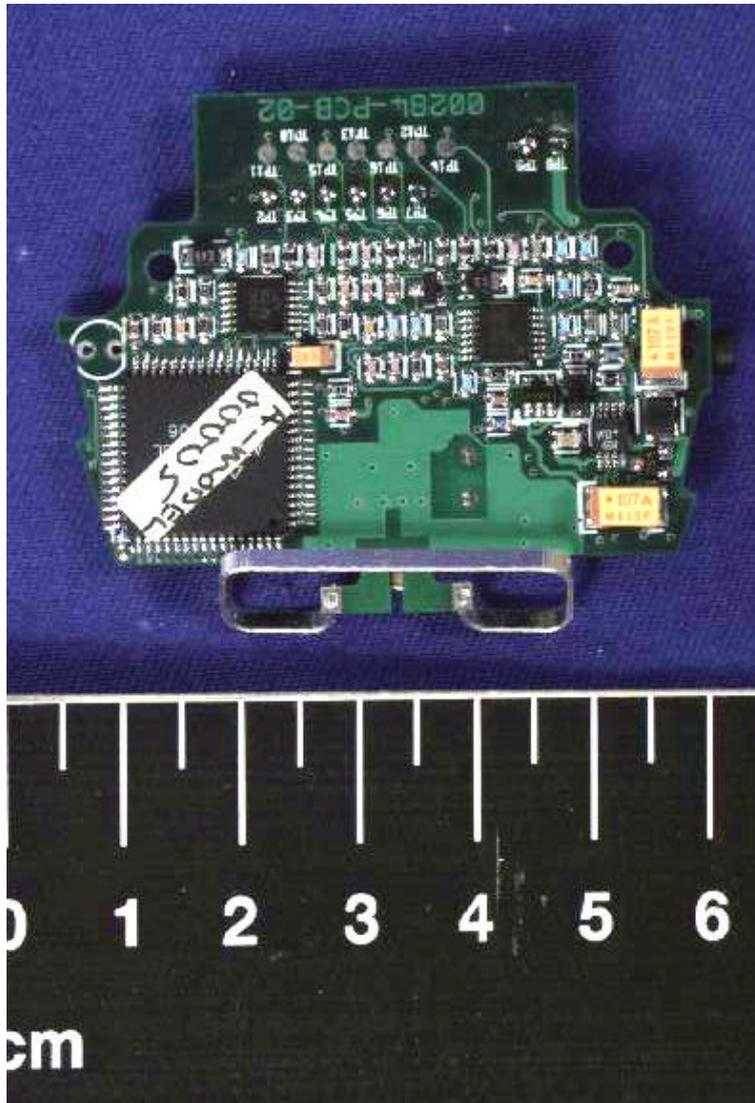
NX 300 E Patch Transmitter Back View



NX 300 E Patch Transmitter Internal View 1



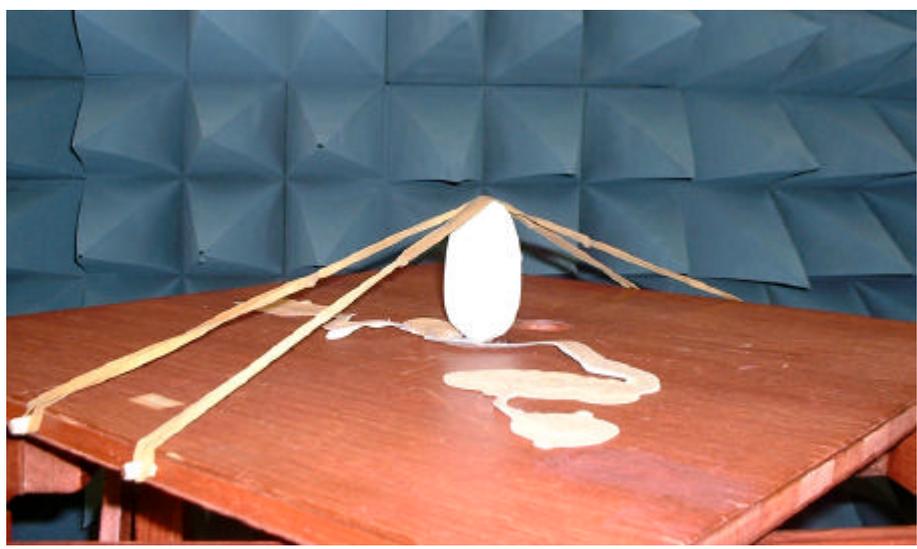
NX 300 E Patch Transmitter Internal View 2



Transmitter with Body Patch



Test Setup



### CTMS LTD, Company Accreditations & Credentials

#### Appendix

UKAS Certificate	18
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## United Kingdom Accreditation Service

### ACCREDITATION CERTIFICATE



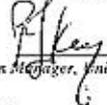
TESTING LABORATORY  
No. 1831

Cambridge Test and Measurement Services Ltd  
PO Box 465  
St Andrews Road  
Cambridge  
CB4 1ZJ

is accredited to undertake tests as detailed in the schedule bearing the accreditation number above. From time to time this schedule may be revised and reissued by the United Kingdom Accreditation Service.

This Accreditation shall remain in force until the expiry date printed below, subject to continuing compliance with United Kingdom Accreditation Service requirements. Accredited organisations meet the requirements of EN 45001, ISO/IEC Guide 25 and the relevant requirements of the BS EN ISO 9000 series of standards, including those of the model described in BS EN ISO 9002 when acting as suppliers producing test results.

Initial Accreditation 11 June 1997

  
\_\_\_\_\_  
Accreditation Manager, United Kingdom Accreditation Service

This certificate issued on 16 June 2000

Expiry date 31 May 2001

The Department of Trade and Industry (DTI) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of measurement, testing, inspection and certification of systems, products and personnel.





SGS Yarsley  
International Certification Services Limited

Certificate Number

**Q10171**

This is to certify that the  
Quality Management systems of

**Cambridge Test and Measurement  
Services Limited**

have been assessed and registered as meeting the  
requirements of ISO 9002

The scope of registration is detailed on the Assessment  
Schedule bearing this certificate number.

SGS Yarsley International Certification Services Ltd  
Signed by

30 June 1997

This certificate remains valid subject to  
satisfactory maintenance of the system



Registered Office:  
SGS Yarsley  
International Certification Services Limited  
SGS House, 217/221 London Road,  
Camberley, Surrey GU15 3EY, United Kingdom.

While all due care and skill was exercised in carrying out this assessment,  
SGS Yarsley, ICN accepts responsibility only for proven gross negligence.  
This is not a legal document and cannot be used as such. The use of the  
Accreditation mark shown on this certificate indicates accreditation in the  
respect of those activities defined by that Accreditation Authority. This certificate  
remains the property of SGS Yarsley ICN to whom it must be returned on request.



**United Kingdom Accreditation Service**

TESTING LABORATORY  
 No. 1831

**SCHEDULE**



**Testing Performed at Permanent Laboratory**

Address of permanent laboratory  Cambridge Test & Measurement Services Ltd PO Box 465 St Andrews Road Cambridge CB4 1ZJ	Laboratory contact: Mr D Fisher  Telephone: +44 (0) 1223 876876 Fax: +44 (0) 1223 876851 EMail:  Issue No: 7 <span style="float: right;">Date: 16 June 2000</span>
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Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
Computers and peripherals Domestic appliances Electrical/Electronic components Electrical/Electronic products Telecommunications equipment IT equipment Pager and pager devices Mobile/Portable radio - PMR PMR and ancillary equipment Fixed/Link PMR equipment Low power devices	<b>1 EMC TESTS</b>  1.1 Conducted Emissions  150 kHz to 30 MHz	EN 55011:1997 EN 55014:1993 Discontinuous emissions EN 55022:1994 CISPR 14-1:1997 Disturbance power CISPR 22:1993 FCC Part 15:1996 ANSI C63.4:1992
	1.2 Radiated Emissions - Electric Field  30 MHz to 1 GHz	EN 55011:1997 EN 55022:1994 CISPR 22:1993 FCC Part 15:1996 ANSI C63.4:1992
	1.3 Mains Harmonics and Flicker	EN 61000-3-2:1995 EN 61000-3-3:1995
	1.4 Discontinuous Emissions (Clicks): 10 kHz to 30 MHz	EN 55014-1:1997
	1.5 Power Absorbing Emissions Measurements (Power Clamp) 30 MHz to 300 MHz	EN 55014-1:1997
	Continued on Sheet 2	



**United Kingdom Accreditation Service**

TESTING LABORATORY No. 1831  Testing Performed at Permanent Laboratory	<b>SCHEDULE</b>  Issue No: 7  Date: 16 June 2000
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Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 1	<b>1 EMC TESTS (cont'd)</b>	
	1.6 Electrostatic Discharge Up to 15 kV	IEC 801-2:1991 IEC 1000-4-2:1995 EN 61000-4-2:1995
	1.7 Radiated Immunity 80 MHz to 1000 MHz, 1.4 GHz to 2.0 GHz up to 10 V/m	IEC 1000-4-3:1995 EN 61000-4-3:1996 Including Amendment 1:1998 ENV 50140:1993 ENV 50204:1995
	1.8 Fast Transient and Burst Immunity	IEC 801-4:1988 IEC 1000-4-4:1995 EN 61000-4-4:1995 ISO 7637:Part 1:1990
	1.9 Surge Immunity	IEC 1000-4-5:1995 EN 61000-4-5:1995 ENV 50142:1994
	1.10 Conducted Radio Frequency Disturbance	IEC 61000-4-6:1996 EN 61000-4-6:1996 ENV 50141:1993
	1.1 Mains Dips and Interruptions	IEC 1000-4-11:1994 EN 61000-4-11:1994
	1.12 Magnetic Field Immunity	EN 61000-4-8:1994
	Continued on Sheet 3	



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Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 1	<b>1 EMC TESTS (cont'd)</b>  1.13 EMC Tests  These generic and product specific tests are included in this Schedule, but limited to those basic standards that are explicitly listed in Sections 1.1 to 1.10.	Generic and Product Standards EN 50081-1:1992 EN 50081-2:1994 EN 50082-1:1996 EN 50082-2:1996 EN 50130-4:1995 EN 50199:1995 EN 55024:1998 EN 60601-1-2:1993 EN 60945:1997 EN 61000-6-2:1999 EN 61326:1997 ETS 300 279:1995 ETS 300 329:1997 ETS 300 339:1994 ETS 300 340:1994 ETS 300 342-1:1997 ETS 300 445:1996 ETS 300 446:1997 ETS 300 680-1:1997 ETS 300 682:1997 ETS 300 683:1997 ETS 300 684:1997 ETS 300 717:1997 ETS 300 741:1998 ETS 300 826:1997 ETS 300 827:1998 AS/NZS 2064:1997 AS/NZS 3548:1995 AS/NZS 4251.1:1994
Fixed, Mobile, Portable radio equipment PMR and ancillary equipment  Low power telemetry Low power telecommand Low power devices Maritime (VHF) Ship to shore Maritime (VHF) Shore stations	<b>2 RADIO TESTS</b>  Frequency range: 9 kHz to 4 GHz Power Output up to 150 W  Tests on Radio Transmitters  2.1 Frequency 2.2 RF Power, conducted and radiated 2.3 Modulation 2.4 Adjacent channel power  Continued on Sheet 4	MPT 1250:1978 MPT 1251:1973 MPT 1305:1996 MPT 1308:1978 MPT 1312:1993 MPT 1314:1994 MPT 1325:1998 MPT 1328:1997 MPT 1329:1994



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<p style="text-align: center;"><b>TESTING LABORATORY</b> No. 1831</p> <p style="text-align: center;"><b>Testing Performed at Permanent Laboratory</b></p>	<p style="text-align: center;"><b>SCHEDULE</b></p> <p>Issue No: 7</p> <p>Date: 16 June 2000</p>
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Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
As listed on Sheet 3	<p><b>2 RADIO TESTS (cont'd)</b></p> <p>2.5 Spurious Emissions - conducted and radiated</p> <p>2.6 Transmitter intermodulation</p> <p>2.7 Transmitter transient behaviour</p> <p>2.8 Audio response</p> <p>2.9 Audio distortion</p> <p>Tests on Radio Receivers</p> <p>2.10 Sensitivity - SINAD</p> <p>2.11 Adjacent channel selectivity</p> <p>2.12 Receiver intermodulation</p> <p>2.13 Co-channel rejection</p> <p>2.14 Blocking performance</p> <p>2.15 Spurious emissions - conducted and radiated</p> <p>2.16 Audio response</p> <p>2.17 Audio distortion</p>	<p>MPT 1330:1994</p> <p>MPT 1335:1993</p> <p>MPT 1336:1992</p> <p>MPT 1338:1994</p> <p>MPT 1340:1997</p> <p>MPT 1344:1994</p> <p>MPT 1345:1994</p> <p>MPT 1350:1994</p> <p>MPT 1357:1996</p> <p>MPT 1360:1994</p> <p>MPT 1361:1994</p> <p>MPT 1365:1996</p> <p>MPT 1374:1994</p> <p>MPT 1382:1997</p> <p>MPT 1411:1993</p> <p>MPT 1601:1993</p> <p>ETS 300 086:1991</p> <p>ETS 300 113:1995</p> <p>ETS 300 135:1991</p> <p>ETS 300 162:1998</p> <p>ETS 300 219:1993</p> <p>I-ETS 300 220:1992</p> <p>I-ETS 300 296:1994</p> <p>ETS 300 328:1996</p> <p>ETS 300 330:1990</p> <p>ETS 300 390:1996</p> <p>ETS 300 341:1995</p> <p>I-ETS 300 422:1995</p> <p>ETS 300 440:1999</p> <p>ETS 300 454:1995</p> <p>ETS 300 676:1997</p> <p>ETS 300 719-1:1996</p> <p>EN 300 220-1:1997</p> <p>EN 300 220-2:1997</p> <p>EN 300 422:V1.2.1:1999</p> <p>EN 301 178:1999</p> <p>EN 301 357:V1.1.1:1999</p> <p>EN 301 688:1999</p> <p>AS 4268.2:1995</p> <p>AS 4295:1995</p>
	Continued on Sheet 5	



**United Kingdom Accreditation Service**

TESTING LABORATORY No. 1831  <b>Testing Performed at Permanent          Laboratory</b>	<b>SCHEDULE</b>  Issue No: 7  Date: 16 June 2000
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Materials/Products Tested	Type of Test/Properties Measured Range of Measurement	Standard Specifications Equipment/Techniques Used
	Facilities:  Open area test site: 3, 10 and 30 m  Screened Room (Partially Lined RF Absorber) 6.4 m x 4.9 m x 2.8 m  Screened Room (unlined) 3.7 m x 2.6 m x 2.5 m  Screened Room (unlined) 3.0 m x 2.4 m x 2.4 m  Environmental Chambers (various)	
	END	

