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Report On

FCC Testing of the
Sharp SHL22 Dual-band CDMA (BC0, BC6) & Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI,
FDDV) & Tri-band LTE (B1, B11, B18) multi mode cellular phone with
Bluetooth, WLAN, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)

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FCC ID: APYHRO00192

Document 75920802 Report 15 Issue 1

June 2013



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COMMERCIAL-IN-CONFIDENCE

REPORT ON

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June 2013

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DATED

27 June 2013

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler

M Russell

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHL22 Dual-band CDMA (BC0, BC6) & Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Tri-band LTE
(B1, B11, B18) multi mode cellular phone with Bluetooth, WLAN, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp SHL22 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Tri-band LTE (B1, B11, B18) multi mode cellular phone with Bluetooth, WLAN, NFC (FeliCa) and GPS to the requirements of FCC CFR 47 Part 15C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Model Number(s)	SHL22
Serial Number(s)	IMEI 004401114764455
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C (2012)
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	9676
Date	30 April 2013
Start of Test	10 June 2013
Finish of Test	11 June 2013
Name of Engineer(s)	G Lawler M Russell
Related Document(s)	ANSI C63.10: 2009



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15C (FeliCa) is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
FeliCa				
2.1	15.225 (a)(b)(c)(d)	Field Strength of any Emission	Pass	
2.2	15.225, 15.215 (c)	Occupied Bandwidth	Pass	
2.3	15.225 (e)	Frequency Stability Under Temperature Variations	Pass	



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1.3 PRODUCT TECHNICAL DESCRIPTION

Please refer to the "04D_Model Description APYHRO00192.pdf" Model Description Form.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHL22 Dual-band CDMA (BC0, BC6) & Quad-band GSM (GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Tri-band LTE (B1, B11, B18) multi mode cellular phone with Bluetooth, WLAN, NFC (FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp SHL22 Dual-band CDMA (BC0, BC6) & Quad-band GSM
(GSM850/GSM900/DCS1800/PCS1900) & Dual-band UMTS (FDDI, FDDV) & Tri-band LTE
(B1, B11, B18) multi mode cellular phone with Bluetooth, WLAN, NFC (FeliCa) and GPS
In accordance with FCC CFR 47 Part 15C (FeliCa)



Product Service

2.1 FIELD STRENGTH OF ANY EMISSION

2.1.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225 (a)(b)(c)(d)

2.1.2 Equipment Under Test and Modification State

SHL22 S/N: IMEI 004401114764455 - Modification State 0

2.1.3 Date of Test

11 June 2013

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The EUT was placed on a remotely controlled turntable within a semi-anechoic chamber. Measurements of the carrier frequency from the EUT were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

2.1.6 Environmental Conditions

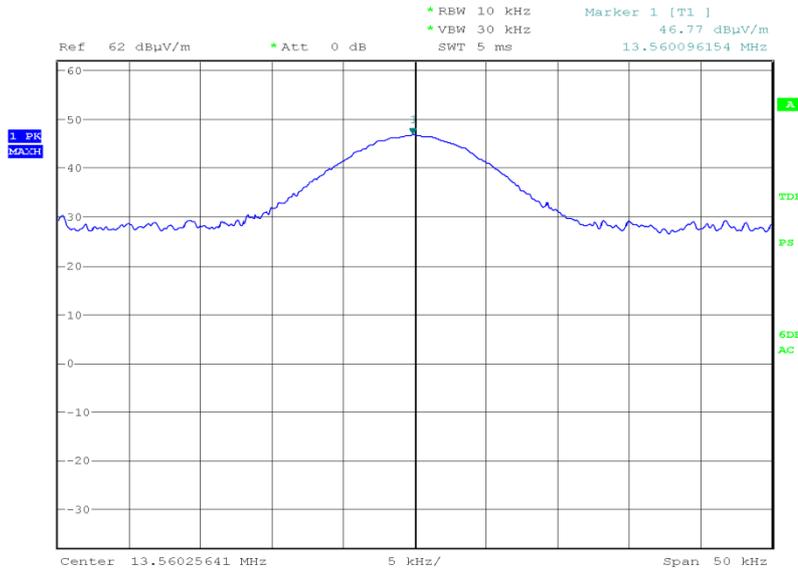
Ambient Temperature	21.9°C
Relative Humidity	43.0%



2.1.7 Test Results

4.0 V DC Supply

Carrier

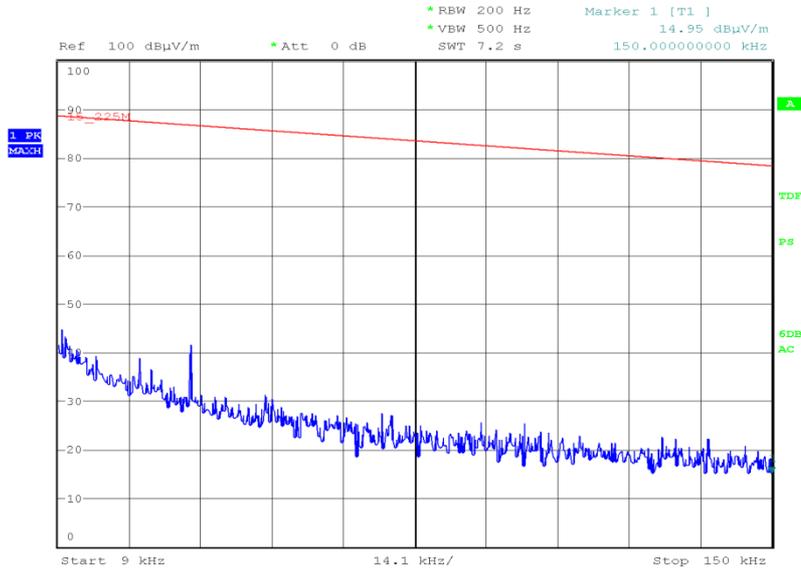


Date: 11.JUN.2013 18:30:12

Frequency (MHz)	QP Level (dBµV/m) at 3m	QP Level (µV/m) at 3m	QP Limit (dBµV/m) at 3m	QP Limit (µV/m) at 30m	Angle (deg)	Height (m)	Polarity
13.56	45.81	195.21	104	15848	346	1.50	Face On

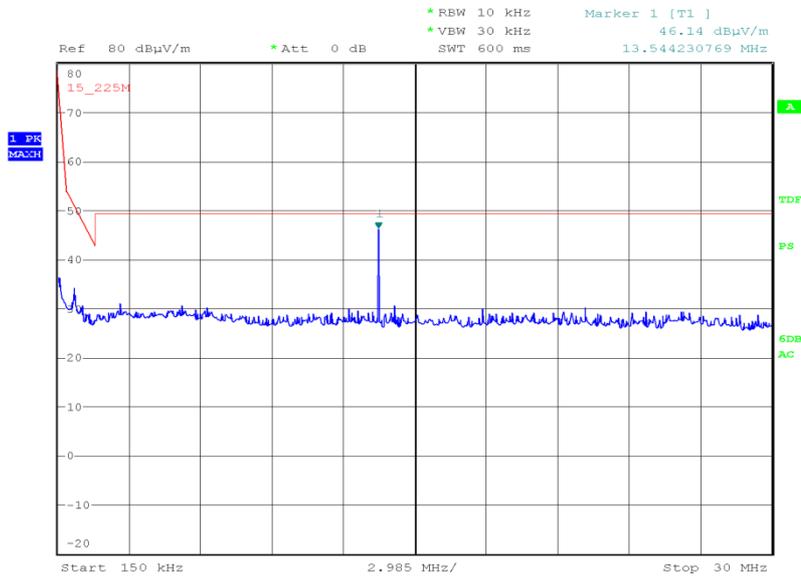


9 kHz to 150 kHz



Date: 11.JUN.2013 18:11:05

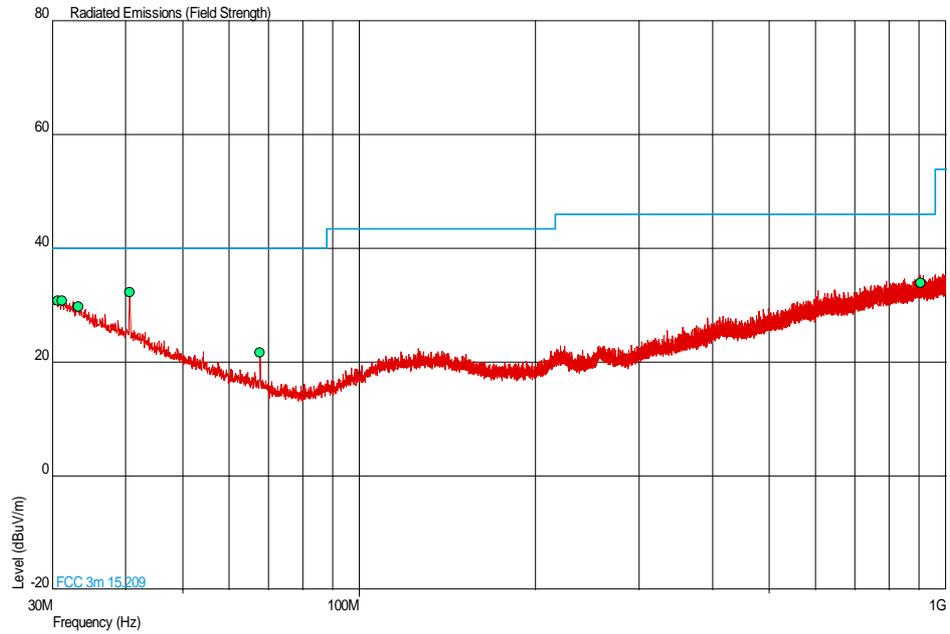
150 kHz to 30 MHz



Date: 11.JUN.2013 18:28:33



30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBuV/m)	QP Level (uV/m)	QP Limit (dBuV/m)	QP Limit (uV/m)	QP Margin (dBuV/m)	QP Margin (uV/m)	Angle (Deg)	Height (m)	Polarity
30.679	30.8	34.7	40.0	100	-9.2	65.3	194	1.99	Horizontal
31.149	30.8	34.7	40.0	100	-9.2	65.3	1	1.00	Horizontal
33.191	29.8	30.9	40.0	100	-10.2	69.1	184	1.00	Horizontal
40.693	32.4	41.7	40.0	100	-7.6	58.3	82	1.00	Vertical
67.780	21.7	12.2	40.0	100	-18.3	87.8	265	1.11	Vertical
905.640	34.0	50.1	46.0	200	-12.0	149.9	0	1.63	Horizontal



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2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225, 15.215 (c)

2.2.2 Equipment Under Test and Modification State

SHL22 S/N: IMEI 004401114764455 - Modification State 0

2.2.3 Date of Test

10 June 2013

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15C and ANSI C63.10.

The EUT was transmitting at maximum power, at all data rates via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen. The peak point of the trace was measured and the markers positioned to give the -20dBc points of the displayed spectrum. The test was performed with an unmodulated carrier.

The plot of the following pages shows the resultant display from the Spectrum Analyser.

2.2.6 Environmental Conditions

Ambient Temperature	20.8°C
Relative Humidity	37.1%

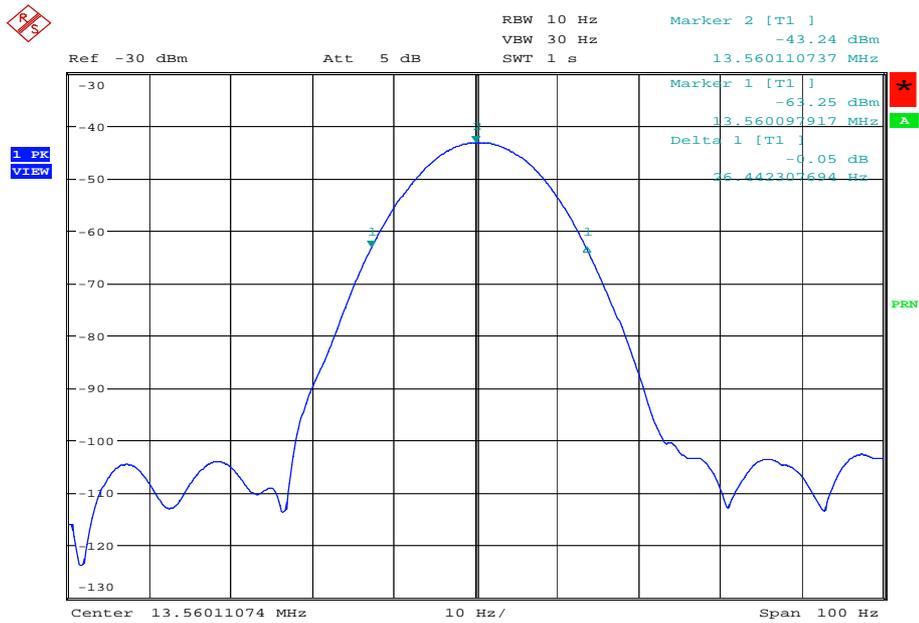


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2.2.7 Test Results

4.0 V DC Supply

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	26.44



Date: 10.JUN.2013 15:30:22



2.3 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

2.3.1 Specification Reference

FCC CFR 47 Part 15C, Clause 15.225 (e)

2.3.2 Equipment Under Test and Modification State

SHL22 S/N: IMEI 004401114764455 - Modification State 0

2.3.3 Date of Test

10 June 2013

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The EUT was set to transmit on maximum power with normal modulation. An frequency counter, was used to measure the frequency error. The temperature was adjusted between -20°C and +50°C in 10° steps as per 15.225 (e).

2.3.6 Environmental Conditions

Ambient Temperature	20.8°C
Relative Humidity	37.1%



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2.3.7 Test Results

4.0 V DC Supply

RFID

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (%)
-20	13.56	0.000960
-10	13.56	0.000479
0	13.56	0.000818
+10	13.56	0.000961
+20	13.56	0.000826
+30	13.56	0.007980
+40	13.56	0.007980
+50	13.56	0.000624

Limit Clause

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.



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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Field Strength of any Emission					
Tester	Rohde & Schwarz	CMU 200	39	12	21-Dec-2013
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	13-Sep-2013
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Load (50ohm, 30W)	JFW	50T-054	284	12	13-Jun-2013
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Antenna (Active Loop, 9kHz-30MHz)	Rohde & Schwarz	HFH2-Z2	333	24	30-Oct-2014
Communications Tester	Rohde & Schwarz	CMU 200	442	12	1-Nov-2013
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	20-Feb-2014
Pre-Amplifier	Phase One	PS04-0086	1533	12	27-Sep-2013
Pre-Amplifier	Phase One	PSO4-0087	1534	12	28-Sep-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	31-Jan-2014
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	10-Jul-2013
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	10-Jul-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	1-Feb-2014
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3694	12	25-Oct-2013
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturu GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturu GmbH	NCD	3917	-	TU
1 metre, SMA to SMA	Suhner	Sucoflex armoured cable	4048	-	O/P Mon



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Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 - Occupied Bandwidth					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
Communications Tester	Rohde & Schwarz	CMU 200	442	12	1-Nov-2013
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	24-Jul-2013
Attenuator: 6dB/10W	Trilithic	HFP-50N	476	12	24-Jul-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jul-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply	Hewlett Packard	6104A	1948	-	TU
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2419	12	3-Oct-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	23-Jun-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
Combiner/Splitter	Weinschel	1506A	3877	12	19-Mar-2014
Combiner/Splitter	Weinschel	1506A	3878	12	19-Mar-2014
P-Series Power Meter	Agilent	N1911A	3980	12	17-Sep-2013
P-Series Power Meter	Agilent	N1911A	3981	12	17-Sep-2013
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3982	12	17-Sep-2013
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3983	12	17-Sep-2013
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4100	12	25-Oct-2013
1 Metre K Type Cable	Rhophase	KPS-1501A-1000-KPS	4105	12	25-Oct-2013
Section 2.3 - Frequency Stability under Temperature Variations					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Multimeter	White Gold	WG022	190	12	30-Oct-2013
RF Coupler	TUV SUD Product Service	TUV	415	-	TU
Communications Tester	Rohde & Schwarz	CMU 200	442	12	1-Nov-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013
Attenuator (20dB, 2W)	Pasternack	PE 7004-20	2943	12	27-Mar-2014
Thermocouple Thermometer	Fluke	51	3172	12	30-Jul-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



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3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Frequency Stability Under Temperature Variations	± 3.54 Hz
Field Strength of any Emission	9 kHz to 1 GHz: ± 5.1 dB
Occupied Bandwidth	± 16.74 kHz



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

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