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# Report On

Limited FCC Testing of the  
JRC JHS-780D Marine VHF Radio Telephone (Duplex)  
In accordance with FCC CFR 47 Part 15: 2006 and Part 80: 2006

FCC ID: CKEJHS-780D



Product Service

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COMMERCIAL-IN-CONFIDENCE

**REPORT ON**

Limited FCC Testing of the  
JRC JHS-780D Marine VHF Radio Telephone (Duplex)  
In accordance with FCC CFR 47 Part 15: 2006 and Part 80: 2006

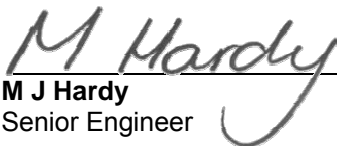
Document 75902880 Report 03 Issue 1

August 2008

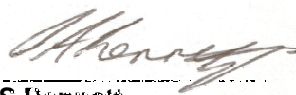
**PREPARED FOR**


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Dean House Farm  
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Senior Engineer

**APPROVED BY**

  
**S Bennett**  
Authorised Signatory

  
**J Adams**  
Authorised Signatory

**DATED**


14 August 2008

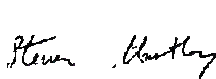
14 August 2008

**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 15 and Part 80. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

  
**B Airs**

  
**S Hartley**

  
**R Blagg**





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## **SECTION 1**

### **REPORT SUMMARY**

Limited FCC Testing of the  
JRC JHS-780D Marine VHF Radio Telephone (Duplex)  
In accordance with FCC CFR 47 Part 15: 2006 and Part 80: 2006



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## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Limited FCC Testing of the JRC NTE-780D and JHS-780D Marine VHF Radio Telephone (Duplex) to the requirements of FCC CFR 47 Part 15: 2006 and Part 80: 2006.

Objective	To perform FCC CFR 47 Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Applicant	Japan Radio Company
Manufacturer	Japan Radio Company
Type Number(s)	JHS 770S (Duplex)
Serial Number(s)	BK10268 BK10299
Number of Samples Tested	Two
Test Specification/Issue/Date	FCC CFR 47 Part 15: 2006 FCC CFR 47 Part 80: 2006
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	DX-8422-UD-001
Date	18 January 2008
Start of Test	20 February 2008
Finish of Test	01 August 2008
Name of Engineer(s)	B Airs S Hartley R A Blagg



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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 15: 2006 is shown below.

Configuration 1 - Duplex						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
2.1	15.109	Radiated Emissions (Enclosure Port) - Rx	Rx Top		N/A	FCC CFR 47: Part 15: 2006
			Rx Middle	1	Pass	
			Rx Bottom		N/A	



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A brief summary of the tests carried out in accordance with FCC CFR 47 Part 80: 2006 is shown below.

Configuration 1 - Duplex						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
2.2	80.141(d)	Time Out Timer	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.3	80.209(a)	Frequency Stability Under Voltage Variations	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.4	80.209(a)	Frequency Stability Under Temperature Variations	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.5	80.211(f) (1)(2)	Emission Limitations (Emission Mask)	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.6	80.205(a)	Occupied Bandwidth	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.7	80.213(d)	Frequency Deviation (DSC)	DSC	1	Pass	FCC CFR 47: Part 80: 2006
2.8	80.211(c) (f)(3)	Emission Limitations (Conducted Transmitter Spurious)	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	



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2.9	80.211 (f)(3)	Emission Limitations (Radiated Transmitter Spurious)	Tx Top	1	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	1	Pass	
			Tx Bottom	1	Pass	
			DSC	1	Pass	
2.10	80.213(d)	Audio Filter	Tx Top	1	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	1	Pass	
			Tx Bottom	1	Pass	
			DSC	1	Pass	
2.11	80.215	Transmitter Power	Tx Top	0	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	0	Pass	
			Tx Bottom	0	Pass	
			DSC	0	Pass	
2.12	80.215 (e)(g)(1)(2)(3)	Carrier Power Reduction	Tx	1	Pass	FCC CFR 47: Part 80: 2006
			Tx	1	Pass	
			Tx	1	Pass	
			Tx	1	Pass	
2.13	80.217(b)	Suppression of Interference Aboard Ships	Tx Top	1	Pass	FCC CFR 47: Part 80: 2006
			Tx Middle	1	Pass	
			Tx Bottom	1	Pass	
			DSC	1	Pass	

N/A – Not Applicable





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A brief summary of the tests carried out previously in accordance with ETSI EN 300 338 V1.2.1 and ETSI EN 301 925 V1.1.1 is shown below. This testing was carried out by TUV Product Service Ltd in November 2006 and reported in Report Reference RM615529/03. Excerpts from the test report showing the results are shown in Annex A.

This testing was performed on the JHS-770S which JRC declare is identical to the JHS-780D apart from the duplex filter internally fitted in the JHS-780D.

Configuration - Simplex						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
Annex A	80.225	Frequency Tolerance of B and Y States (DSC)	-	-	Pass	ETSI EN 300 338 V1.2.1
Annex A	80.225	Modulation Rate (DSC)	-	-	Pass	ETSI EN 300 338 V1.2.1
Annex A	80.225	Modulation Index (DSC)	-	-	Pass	ETSI EN 300 338 V1.2.1
Annex A	80.215(a)(2)	Frequency Deviation	-	-	Pass	ETSI EN 301 925 V1.1.1



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A brief summary of the tests covered by Manufacturers Declarations are shown below:

Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
	80.81	Antenna Polarisation	N/A	N/A	N/A	FCC CFR 47: Part 80: 2006
	80.225	FM Pre-Emphasis 6dB/octave (DSC)	N/A	N/A	N/A	FCC CFR 47: Part 80: 2006
	80.255(a)	DSC Call Declaration	N/A	N/A	N/A	FCC CFR 47: Part 80: 2006
	80.227	RF Exposure	N/A	N/A	N/A	FCC CFR 47: Part 80: 2006



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### 1.3 APPLICATION FORM

APPLICANT'S DETAILS	
CATEGORY OF APPLICANT (please tick relevant box opposite)	(a) [ <input checked="" type="checkbox"/> ] MANUFACTURER
	(b) [ <input type="checkbox"/> ] IMPORTER
If box (b), (c) or (d) is ticked complete details in box below with respect to the manufacturer	(c) [ <input type="checkbox"/> ] DISTRIBUTOR
	(d) [ <input type="checkbox"/> ] AGENT
COMPANY NAME :	Japan Radio Company
ADDRESS :	Dean House Farm Church Gate NEWDIGATE RH5 5DL
NAME FOR CONTACT PURPOSES :	Mr. Jim Moon
TELEPHONE NO : +44 (0) 1306 631180	FAX NO : +44 (0) 1306 631180
	E-MAIL : Jrcjimmoon@aol.com

MANUFACTURER'S DETAILS	
COMPANY NAME :	Japan Radio Co., Ltd, Japan
ADDRESS :	Mitaka Plant 1-1 Shimoren jaku 5-Chome Mitaka-SHI Tokyo, 181-8510 Japan
NAME FOR CONTACT PURPOSES :	Mr. Jim Moon
TELEPHONE NO : +44 (0) 1306 631180	FAX NO : +44 (0) 1306 631180
	E-MAIL : Jrcjimmoon@aol.com





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TYPE OF EQUIPMENT	
<input type="checkbox"/>	Transmitter
<input checked="" type="checkbox"/>	Transmitter/Receiver
<input type="checkbox"/>	Receiver
<input type="checkbox"/>	Simplex on single-frequency channels
<input type="checkbox"/>	Simplex on two-frequency channels
<input checked="" type="checkbox"/>	Duplex
<input type="checkbox"/>	Separate DSC unit
<input checked="" type="checkbox"/>	Integrated DSC units
<input type="checkbox"/>	Integrated analogue selective calling decoder
<b>Interfaces</b>	
<input type="checkbox"/>	DSC at audio level
<input type="checkbox"/>	DSC at DC level
<input type="checkbox"/>	Printer
<input checked="" type="checkbox"/>	External Speaker / Microphone
<input type="checkbox"/>	DSC watchkeeping receiver antenna output
<input type="checkbox"/>	DSC watchkeeping receiver control



DUPLEX OPERATION		
Is the equipment intended for		
Duplex operation	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
Is the equipment fitted with separate transmitter and receiver antenna sockets		
	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Is the equipment fitted with a duplex filter as an integral part of the equipment with a single antenna connection socket		
	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
Is the duplex filter externally fitted and connected to the main equipment by co-axial cable(s)		
	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Type and make of duplex filter		
.....		



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TRANSMITTER AND RECEIVER CHARACTERISTICS	
NUMBER OF CHANNELS:	
<input checked="" type="checkbox"/>	ITU channels
<input checked="" type="checkbox"/>	USA channels
<input checked="" type="checkbox"/>	PRIVATE channels
<input checked="" type="checkbox"/>	WEATHER channels (Rx Only)
<input type="checkbox"/>	MEMORY channels
DSC CHANNEL(S) (if provided)	
<input checked="" type="checkbox"/>	F2B (G2B)
<input type="checkbox"/>	Other :
CHANNEL SEPARATION :	25 kHz
ITU designation of class of emission(s) : 16K0G3E	
ANTENNA IMPEDANCE : 50 ohm	



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TRANSMITTER TECHNICAL CHARACTERISTICS	
TRANSMITTER FREQUENCY	
Method of frequency generation	
[ <input type="checkbox"/> ]	CRYSTAL
[ <input checked="" type="checkbox"/> ]	SYNTHESIZER
[ <input type="checkbox"/> ]	OTHER
Transmitter frequency bands :	
Channel 60, 156.025MHz to Channel 88, 157.425MHz	
TRANSMITTER MODULATION	
Modulation method : Direct FM	
Occupied bandwidth : 14 kHz	
Maximum frequency deviations : +/- 5 kHz (or less)	
TRANSMITTER MODULATION INPUT CHARACTERISTICS	
Impedance :	
[150Ω ]	balanced – Microphone Input Impedence
[ <input type="checkbox"/> ]	unbalanced

TRANSMITTER RF POWER CHARACTERISTICS	
RATED TRANSMITTER OUTPUT POWER (as stated by the manufacturer)	
Maximum output power :	25 W
Reduced output power :	0.5 W
Output power switch :	[ <input checked="" type="checkbox"/> ] Yes
	[ <input type="checkbox"/> ] No





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TRANSMITTER AND RECEIVER POWER SOURCE (1)				
<input type="checkbox"/>	AC MAINS	State voltage: V	<input type="checkbox"/>	Single phase
	AC MAINS FREQUENCY		<input type="checkbox"/>	Three phase
<input checked="" type="checkbox"/>	DC Voltage	24VDC (21.6VDC - 31.2VDC)		
	DC Maximum Current	8A (25W transmission), 5A (Reception)		
<input type="checkbox"/>	Other:			
BATTERY				
<input type="checkbox"/>	Nickel Cadmium			
<input type="checkbox"/>	Mercury			
<input type="checkbox"/>	Alkaline			
<input type="checkbox"/>	Lead acid (Vehicle regulated)			
<input type="checkbox"/>	Leclanche			
<input type="checkbox"/>	Lithium			
<input checked="" type="checkbox"/>	None			

(1) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.

TX and RX same power source used



Product Service

RECEIVER TECHNICAL CHARACTERISTICS	
RECEIVER FREQUENCY	
Method of frequency generation :	
<input type="checkbox"/>	CRYSTAL
<input checked="" type="checkbox"/>	SYNTHESISER
<input type="checkbox"/>	OTHER :
Intermediate frequencies :	
<input checked="" type="checkbox"/>	1st 21.4 MHz
<input checked="" type="checkbox"/>	2nd 455 kHz
<input type="checkbox"/>	3rd
Receiver frequency channels :	
Lowest Channel 01 156.050MHz, Highest channel 88 162.025MHz	
Is local oscillator injection frequency higher or lower than the receiver nominal frequency?	
<input type="checkbox"/>	Higher
<input checked="" type="checkbox"/>	Lower



RECEIVER MODULATION OUTPUT CHARACTERISTICS	
RATED AUDIO OUTPUT POWER (as stated by the manufacturer)	
Internal Speaker :	2 W @ 4 ohms
Handset Phone :	1 mW @ 150 ohms
RECEIVER MULTIPLE WATCH FACILITIES	
Dual watch facilities :	
	<input checked="" type="checkbox"/> Yes
	<input type="checkbox"/> No
If Yes, then :	
Selection of priority channel possible ? :	
	<input checked="" type="checkbox"/> Yes (=Ch70 156.525MHz)
	<input type="checkbox"/> No
Multiple watch facilities :	
	<input type="checkbox"/> Yes
	<input checked="" type="checkbox"/> No
If Yes, then :	
Selection of priority channel possible ? :	
	<input type="checkbox"/> Yes
	<input type="checkbox"/> No
Number of additional channels selectable :	
Scan time programmable ? :	
	<input type="checkbox"/> Yes
	<input checked="" type="checkbox"/> No



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RECEIVER POWER SOURCE (1)			
<input type="checkbox"/>	AC MAINS	State voltage: V	<input type="checkbox"/> Single phase
	AC MAINS FREQUENCY		<input type="checkbox"/> Three phase
<input checked="" type="checkbox"/>	DC Voltage	24VDC (21.6VDC - 31.2VDC)	
	DC Maximum Current	8A (25W transmission), 5A (Reception)	
<input type="checkbox"/>	Other:		
BATTERY			
<input type="checkbox"/>	Nickel Cadmium		
<input type="checkbox"/>	Mercury		
<input type="checkbox"/>	Alkaline		
<input type="checkbox"/>	Lead acid (Vehicle regulated)		
<input type="checkbox"/>	Leclanche		
<input type="checkbox"/>	Lithium		
<input type="checkbox"/>	None		

TX and RX same power source used

(1) If a transmitter and receiver use the same power source, this should be declared. In such cases only the box for the transmitter power source should be filled in.



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CONSTRUCTION OF THE EQUIPMENT	
<input checked="" type="checkbox"/>	Single unit (1)
<input type="checkbox"/>	Multiple units
If multiple units, describe each one clearly :	
TEMPERATURE RANGES over which the equipment is to be tested	
<input type="checkbox"/>	+15°C to +35°C
<input checked="" type="checkbox"/>	-15°C to +55°C
<input type="checkbox"/>	Other

(1) Unit means a physically separate item of the equipment.



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OTHER ITEMS SUPPLIED		
Spare batteries	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Battery charging device	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Special tools for dismantling equipment	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Test interface box (if applicable)	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
Full documentation on equipment (Handbook and circuit diagrams)	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
Others	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If Yes, please specify : <b>USER'S MANUAL</b>		



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DECLARATION		
Are the equipments submitted representative production models ?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If not are the equipments pre-production models ?	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If pre-production equipments are submitted will the final production equipments be identical in all respects with the equipment tested	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If no supply full details: Submitted samples have marginal ACR. Samples of improved design representing production will follow for testing conformation. TUV test engineer Simon Bennett has been advised.		
Is the Test Report to be used as part of a R&TTE " Opinion"	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
If yes, has the product, any direct engineering predecessor, or variant ever been granted Type Approval in any EEC member country ?	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If yes supply full details :		
Will labelling of the equipment comply with the requirements of ETS 300 338 ?	<input type="checkbox"/>	Yes
	<input type="checkbox"/>	No

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature : Completed electronically  
Name : Mr Jim Moon  
Position held : Radio Validation Manager  
Date : 19 February 2008

TÜV Product Service formally certifies that the manufacturer's declaration as typed out in this report, is a true and accurate record of the original received from the applicant. Product Information

## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a JRC JHS 780D (Duplex) as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test





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## 1.4.2 Test Configurations

### Configuration 1: Duplex

The EUT was configured in accordance with FCC CFR 47 Part 15: 2006 and FCC CFR 47 Part 80: 2006.

## 1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 – Channel 60 Rx

Mode 2 – Channel 16 Rx

Mode 3 – Channel 88 Rx

Mode 4 – Channel 60 Tx

Mode 5 – Channel 16 Tx

Mode 6 – Channel 88 Tx

Mode 7 – Channel 70 Tx (DSC)

Mode 8 – Channel 67 Tx

Mode 9 – Channel 13 Tx

Mode 10 – Channel 75 Tx

Mode 11 – Channel 76 Tx

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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## 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, test laboratories or an open test area as appropriate.

The EUT was powered from either JRC Power Supply (BJ10393) or an external DC Supply.

The EUT has two power settings, maximum power (25 W) and minimum power (1 W). It should be assumed that testing was performed at maximum power unless otherwise shown.

A test board was supplied to enable the PTT switch and to allow test modulation to be applied.

FCC Accreditation  
90987 Octagon House, Fareham Test Laboratory

## 1.6 DEVIATIONS FROM THE STANDARD

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

## 1.7 MODIFICATION RECORD

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	N/A	N/A
1	Deviation adjustment via software. Instruction provided by Japan Radio Company 03 March 2008.	TUV under Customer instruction	05 March 2008



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## **SECTION 2**

### **TEST DETAILS**

Limited FCC Testing of the  
JRC JHS-780D (Duplex)  
In accordance with FCC CFR 47 Part 15: 2006 and Part 80: 2006



Product Service

## **2.1 SPURIOUS RADIATED EMISSIONS (ENCLOSURE PORT)**

### **2.1.1 Specification Reference**

FCC CFR 47 Part 15: 2006 Clause 15.109

### **2.1.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.1.3 Date of Test and Modification State**

08 July 2008 – Modification State 1

### **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**

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

### **2.1.6 Environmental Conditions**

	08 July 2008
Ambient Temperature	20°C
Relative Humidity	48%
Atmospheric Pressure	1005mbar

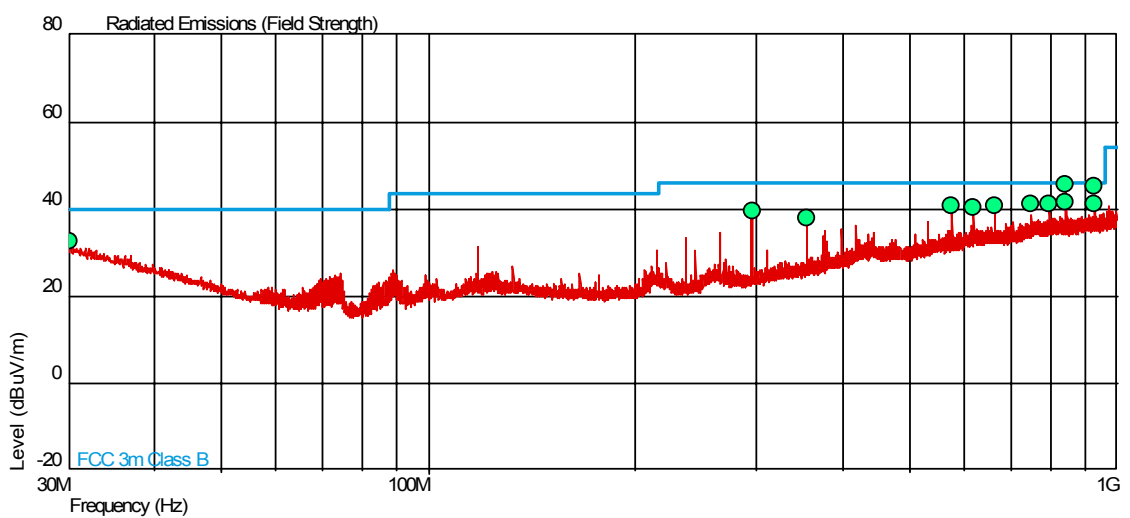


### 2.1.7 Test Results

The EUT was tested with the customer supplied PSU outside of the test chamber.

#### Configuration 1 - Mode 2

#### 30MHz to 1GHz



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
30.168	32.6	42.7	40.0	100.0	-7.4	-57.3	253	1.00	Vertical
294.916	39.6	95.5	46.0	200.0	-6.4	-104	194	1.00	Horizontal
353.897	37.8	77.6	46.0	200.0	-8.2	-121.9	212	1.00	Horizontal
575.064	40.7	108.4	46.0	200.0	-5.3	-91.1	28	1.00	Vertical
619.301	40.5	105.9	46.0	200.0	-5.5	-93.6	176	1.00	Vertical
663.536	41.0	112.2	46.0	200.0	-5.0	-87.3	191	1.00	Vertical
752.000	41.0	112.2	46.0	200.0	-5.0	-87.3	44	2.49	Horizontal
796.245	41.3	116.1	46.0	200.0	-4.7	-83.4	81	1.00	Horizontal
840.480	41.7	121.6	46.0	200.0	-4.3	-77.9	355	1.00	Vertical
840.480	45.6	190.5	46.0	200.0	-0.4	-9.0	76	1.00	Horizontal
928.944	41.2	114.8	46.0	200.0	-4.8	-84.7	24	1.00	Vertical
928.948	45.2	182.0	46.0	200.0	-0.8	-17.5	89	1.00	Horizontal



**2.2 TIME OUT TIMER**

**2.2.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.141(d)

**2.2.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

**2.2.3 Date of Test and Modification State**

28 February 2008 - Modification State 0

**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 EUT was activated on Channel 60 and maintained an output power of 43.60dBm for a period of 5 minutes. After 5 minutes the EUT stops transmitting and the display shows a timeout warning.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4

**2.2.6 Environmental Conditions**

	28 February 2008
Ambient Temperature	22°C
Relative Humidity	37%

**2.2.7 Test Results**

Configuration 1 – Mode 4

The TOT circuitry shall be enabled when utilizing a manually operated press-to-talk (PTT) switch.

TEST CONDITION	Transmission Time (min)
	156.025 MHz
Transmission Period (Min)	5
Measurement uncertainty (s)	± 0.5

**LIMIT CLAUSE 5.5.2**

The TOT shall activate within 5 minutes ±10% of constant transmission
---



Product Service

## **2.3 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS**

### **2.3.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.209(a)

### **2.3.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.3.3 Date of Test and Modification State**

21 February 2008 - Modification State 0

### **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 an unmodulated carrier on channels 60, 16, 88 and 70 at maximum power. Using a frequency counter, the frequency error was measured and the result recorded.

The voltage to the EUT was varied as shown in the table of results at a temperature of 20°C.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### **2.3.6 Environmental Conditions**

	21 February 2008
Ambient Temperature	22°C
Relative Humidity	23%



### 2.3.7 Test Results

#### Configuration 1 – Mode 4

Channel: 60      Frequency: 156.025 MHz

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
21.6	156.025	-158	±1.56
24.0	156.025	-157	±1.56
31.2	156.025	-157	±1.56

#### Configuration 1 – Mode 5

Channel: 16      Frequency: 156.800 MHz

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
21.6	156.800	-158	±1.57
24.0	156.800	-158	±1.57
31.2	156.800	-158	±1.57

#### Configuration 1 – Mode 6

Channel: 88      Frequency: 157.425 MHz

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
21.6	157.425	-158	±1.57
24.0	157.425	-158	±1.57
31.2	157.425	-159	±1.57

#### Configuration 1 – Mode 7

Channel: 70      Frequency: 156.525 MHz

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
21.6	156.525	-157	±1.57
24.0	156.525	-157	±1.57
31.2	156.525	-157	±1.57

Limit

±1.56 kHz / ± 1.57 kHz or 10ppm
---------------------------------





Product Service

## **2.4 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS**

### **2.4.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.209(a)

### **2.4.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.4.3 Date of Test and Modification State**

21 February 2008 - Modification State 0

### **2.4.4 Test Equipment Used**

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

### **2.4.5 Test Procedure**

The EUT was set to transmit an unmodulated carrier on channels 60, 16, 88 and 70 at maximum power. Using a frequency counter, the frequency error was measured and the result recorded. The temperature was adjusted between -20° and +55° in 10° steps.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### **2.4.6 Environmental Conditions**

	21 February 2008
Ambient Temperature	33°C
Relative Humidity	22%



### 2.4.7 Test Results

#### Configuration 1 – Mode 4

Bottom Channel: 60                      Frequency: 156.025 MHz

Temperature Interval °C	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
-20	156.025	-129	± 1.56
-10	156.025	-110	± 1.56
0	156.025	-75	± 1.56
+10	156.025	-115	± 1.56
+20	156.025	-138	± 1.56
+30	156.025	-157	± 1.56
+40	156.025	-132	± 1.56
+50	156.025	-97	± 1.56
+55	156.025	-95	± 1.56

#### Configuration 1 – Mode 5

Middle Channel: 16                      Frequency: 156.800 MHz

Temperature Interval °C	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
-20	156.800	-128	± 1.57
-10	156.800	-101	± 1.57
0	156.800	-74	± 1.57
+10	156.800	-114	± 1.57
+20	156.800	-141	± 1.57
+30	156.800	-157	± 1.57
+40	156.800	-132	± 1.57
+50	156.800	-96	± 1.57
+55	156.800	-93	± 1.57



Configuration 1 – Mode 6

Top Channel: 88 Frequency: 157.425 MHz

Temperature Interval °C	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
-20	157.425	-130	± 1.57
-10	157.425	-100	± 1.57
0	157.425	-74	± 1.57
+10	157.425	-114	± 1.57
+20	157.425	-143	± 1.57
+30	157.425	-158	± 1.57
+40	157.425	-132	± 1.57
+50	157.425	-96	± 1.57
+55	157.425	-93	± 1.57

Configuration 1 – Mode 7

DSC Channel: 70 Frequency: 156.525 MHz

Temperature Interval °C	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
-20	156.525	-128	± 1.57
-10	156.525	-111	± 1.57
0	156.525	-74	± 1.57
+10	156.525	-114	± 1.57
+20	156.525	-143	± 1.57
+30	156.525	-156	± 1.57
+40	156.525	-133	± 1.57
+50	156.525	-105	± 1.57
+55	156.525	95	± 1.57

Limit

±1.56 kHz / ± 1.57 kHz or 10ppm
---------------------------------



Product Service

## **2.5 EMISSION LIMITATIONS (EMISSION MASK)**

### **2.5.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.211(f)(1)(2)

### **2.5.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.5.3 Date of Test and Modification State**

21 February 2008 - Modification State 0

### **2.5.4 Test Equipment Used**

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

### **2.5.5 Test Procedure**

The EUT was initially connected to a Modulation Analyser and the EUT set to transmit. Using an Audio Analyser, an audio frequency was swept between 300Hz to 5kHz to find the frequency which produced the highest deviation.

The amplitude at this frequency was then increased to give a deviation of 2.5kHz.

The amplitude and frequency levels were 42.4 mV at 2.240 kHz to give a deviation of 2.5 kHz.

Then at a frequency of 2.5kHz the amplitude recorded above was increased by 16dB to provide the Final Modulated level.

A dotting pattern was used to modulate channel 70.

The EUT transmitting on full power was then connected to a Spectrum Analyser via a 30dB Attenuator. The modulated carrier was checked (for the bottom, middle and top channels and Channel 70 of the EUT) against the emission mask.

The Path Loss was recorded and the worst case loss was entered as a Reference Level Offset

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### **2.5.6 Environmental Conditions**

	21 February 2008
Ambient Temperature	22°C
Relative Humidity	33%



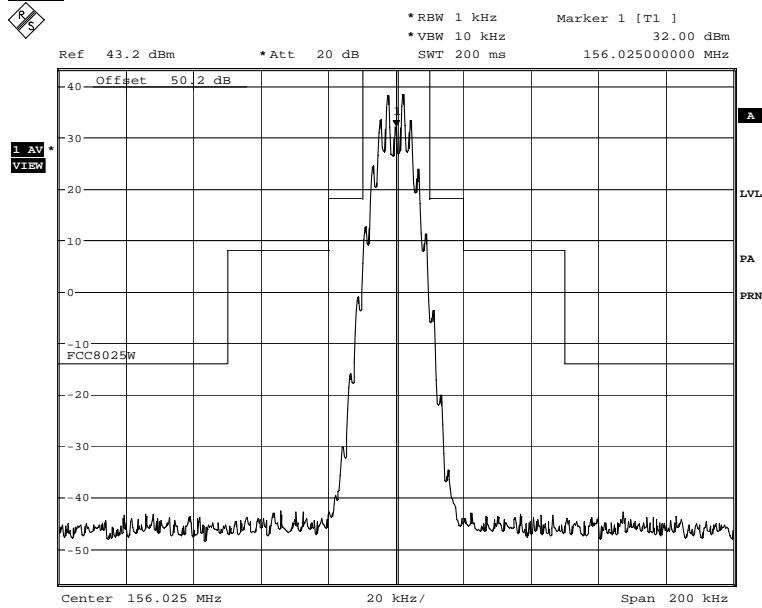
Product Service

## 2.5.7 Test Results

### Configuration 1 – Mode 4

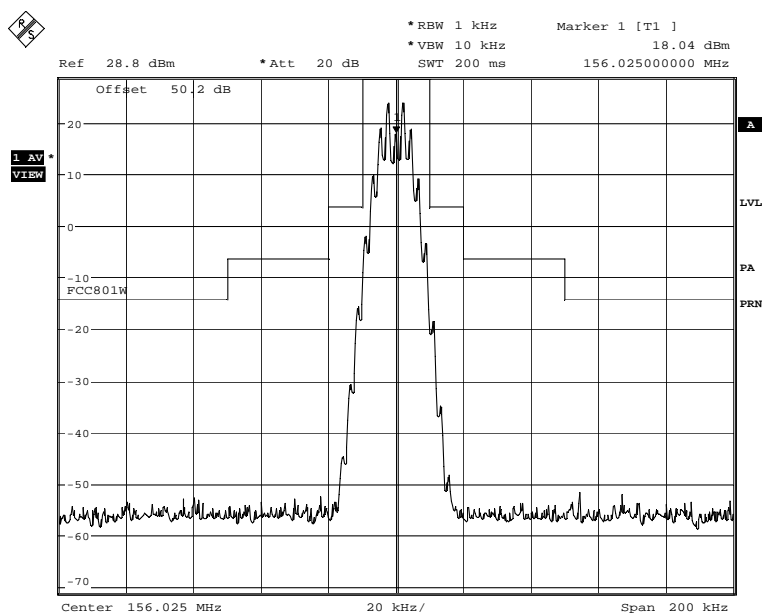
### Bottom Channel – 60

#### 25W



Date: 21.FEB.2008 12:23:09

#### 1W



Date: 21.FEB.2008 12:43:03

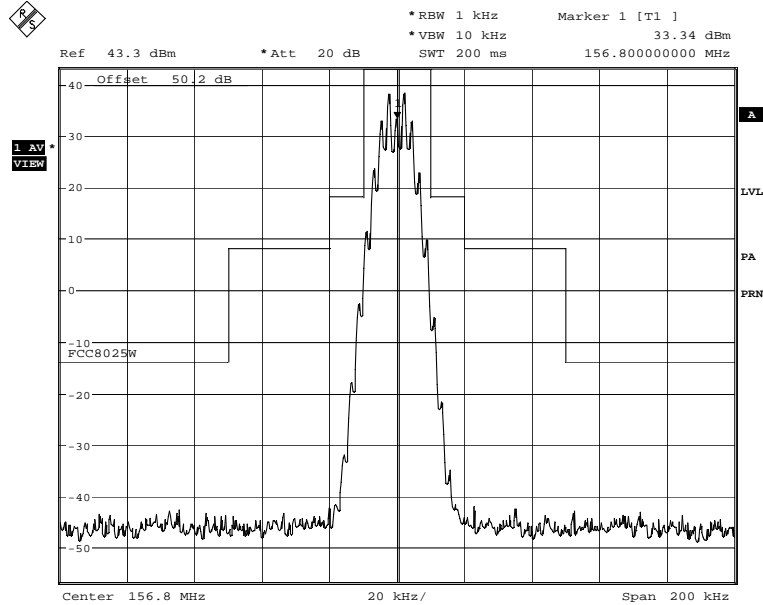


Product Service

### Configuration 1 – Mode 5

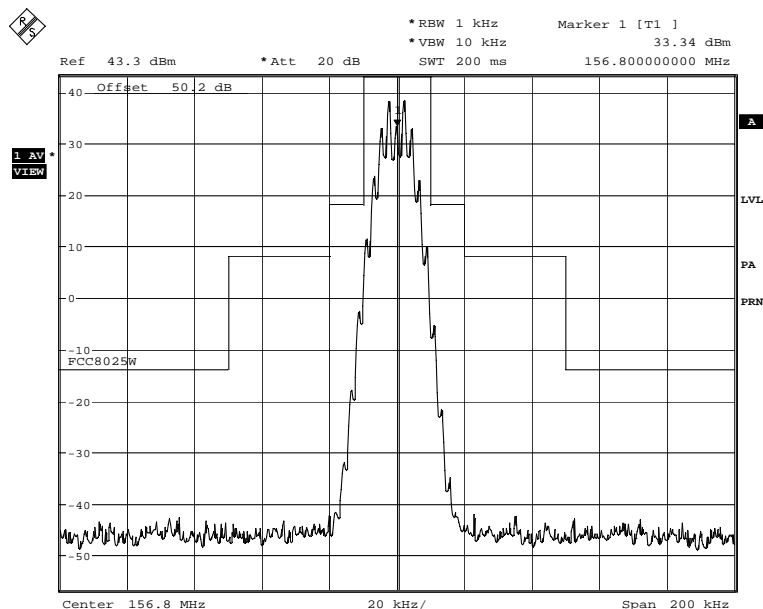
### Middle Channel – 16

### 25W



Date: 21.FEB.2008 13:06:10

### 1W



Date: 21.FEB.2008 13:06:10

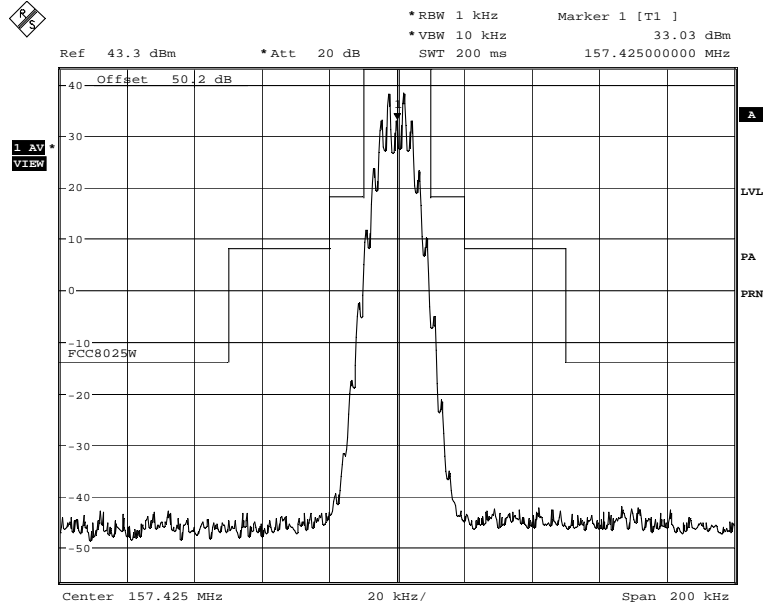


Product Service

### Configuration 1 – Mode 6

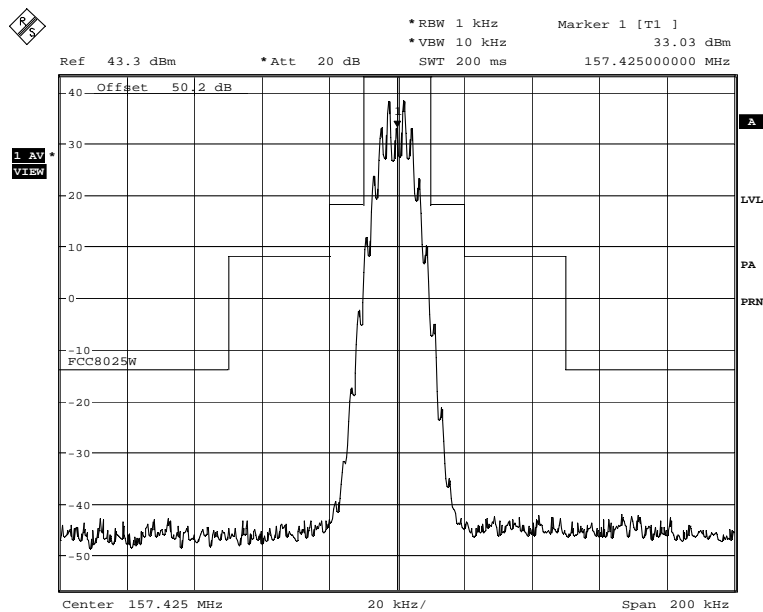
### Top Channel – 88

### 25W



Date: 21.FEB.2008 15:23:27

### 1W



Date: 21.FEB.2008 15:23:27

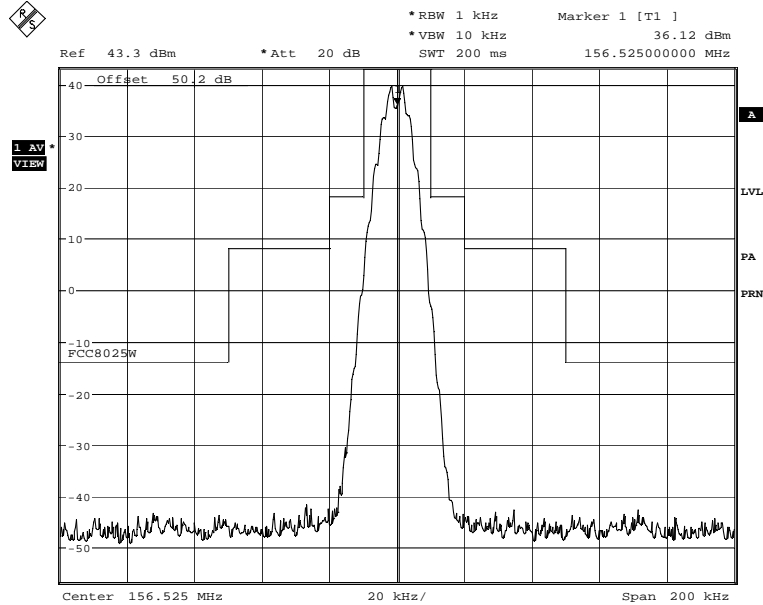


Product Service

### Configuration 1 – Mode 7

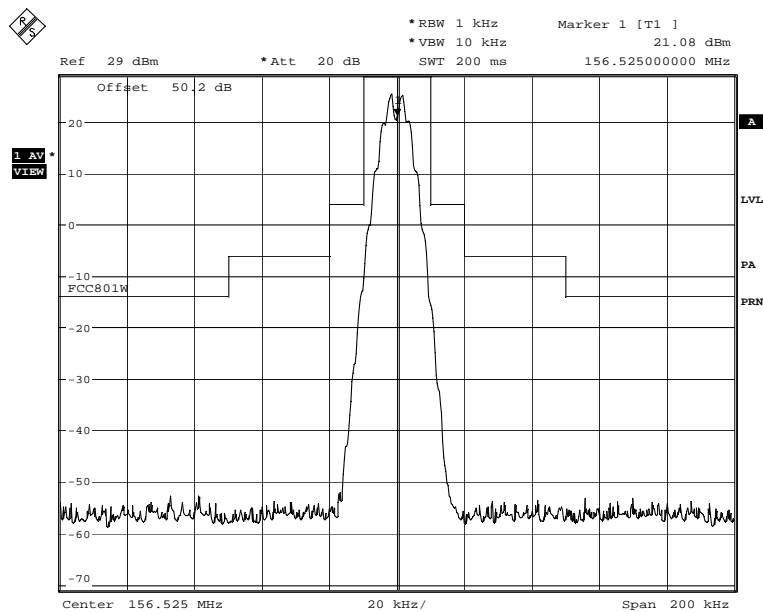
### DSC Channel – 70

#### 25W



Date: 21.FEB.2008 15:29:14

#### 1W



Date: 21.FEB.2008 15:32:26





Product Service

## **2.6 OCCUPIED BANDWIDTH**

### **2.6.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.205(a)

### **2.6.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.6.3 Date of Test and Modification State**

20 February 2008 - Modification State 0

### **2.6.4 Test Equipment Used**

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

### **2.6.5 Test Procedure**

The EUT is declared as having an emission designator of: 16K0G3E for voice application which equates to an Authorised Bandwidth of: 20 kHz.

Initially, the EUT was connected via a 30dB Attenuator to a Modulation Analyser, which was set to measure the Deviation. The audio frequency for a set input level which produces the highest level of deviation was 2.24 kHz. Thus, the Audio Analyser was set to supply the EUT with an audio tone of 2.5 kHz at an amplitude which produced a deviation corresponding to 50% of the maximum permissible frequency deviation, ( $\pm 2.5$ kHz). The level was then increased on the audio analyser by 16dB.

The Modulation Analyser was then replaced with a Spectrum Analyser and the 99% Bandwidth was measured. The measurements were performed on Channel 16, bottom and top channels and Channel 70 at the maximum power level.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### **2.6.6 Environmental Conditions**

	20 February 2008
Ambient Temperature	22°C
Relative Humidity	26%



Product Service

## 2.6.7 Test Results

### Configuration1 – Modes 4, 5, 6 and 7

Channel Number/Frequency	Power Level (W)	Result (kHz)	Authorised Bandwidth (kHz)
60 / 156.025MHz	25	13.558	20
16 / 156.800MHz	25	13.494	20
88 / 157.425MHz	25	11.571	20
70 / 156.525MHz	25	13.526	20

Channel Number/Frequency	Power Level (W)	Result (kHz)	Authorised Bandwidth (kHz)
60 / 156.025MHz	1	13.526	20
16 / 156.800MHz	1	13.558	20
88 / 157.425MHz	1	13.526	20
70 / 156.525MHz	1	12.372	20

The test result plots are presented below.

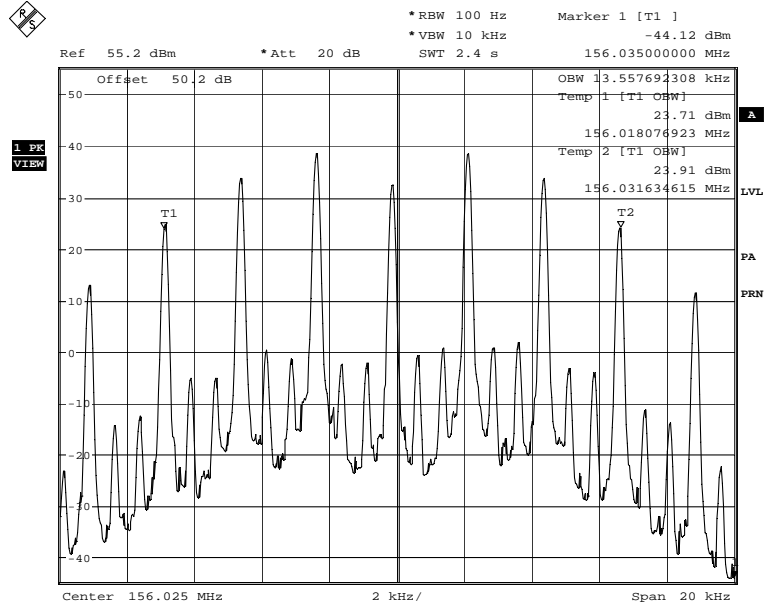


Product Service

### Configuration 1 – Mode 4

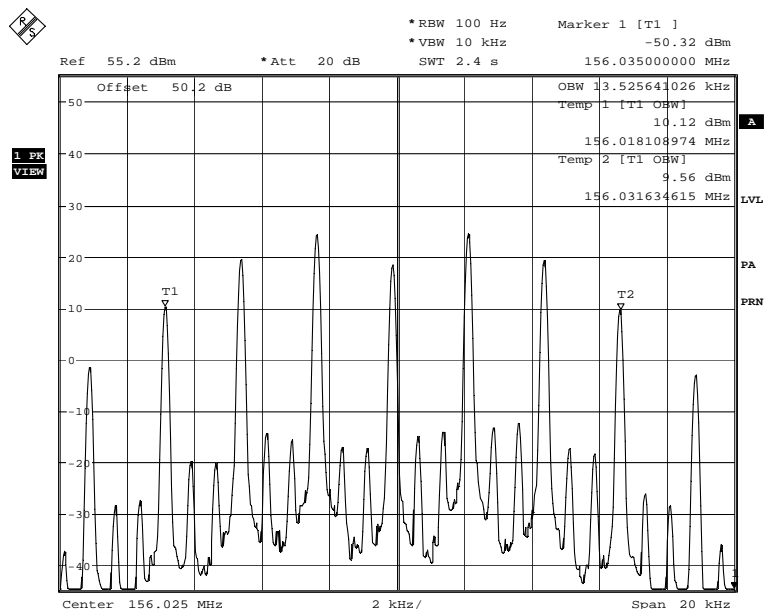
### Bottom Channel – 60

#### 25W



Date: 20.FEB.2008 17:11:16

#### 1W



Date: 20.FEB.2008 17:13:51

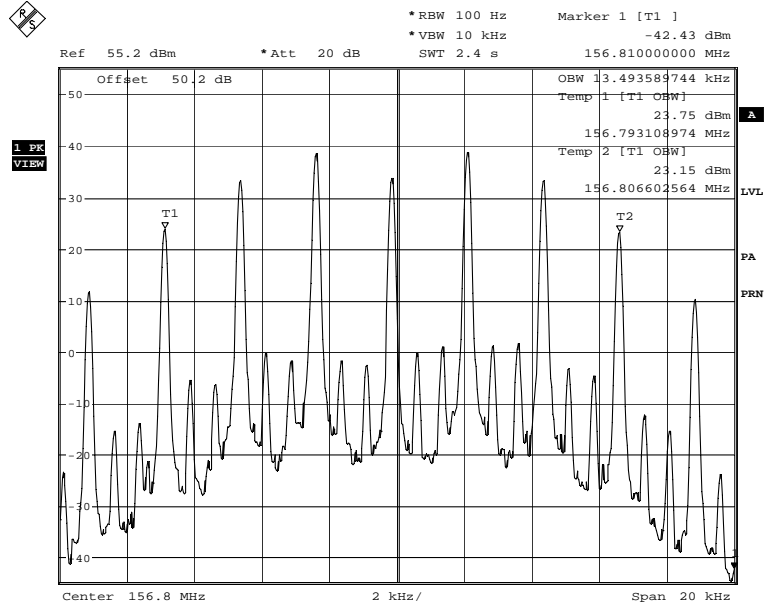


Product Service

### Configuration 1 – Mode 5

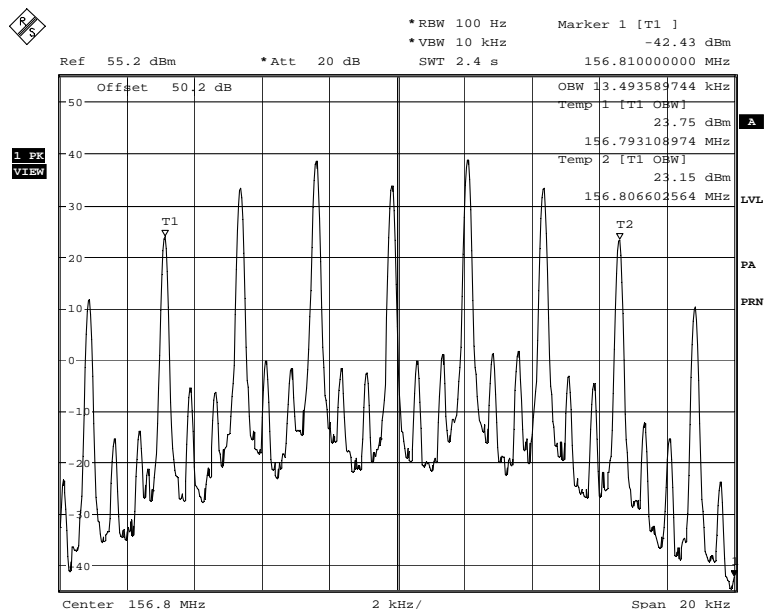
### Middle Channel – 16

#### 25W



Date: 20.FEB.2008 18:05:22

#### 1W



Date: 20.FEB.2008 18:05:22

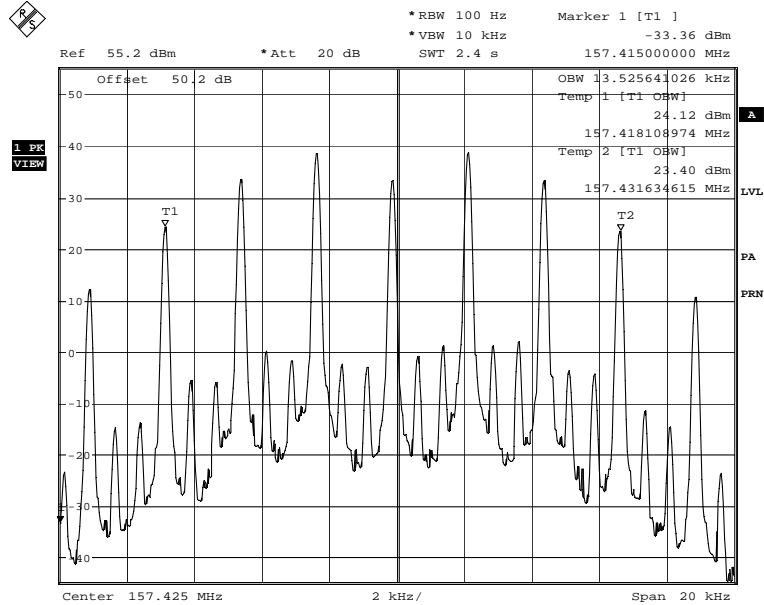


Product Service

### Configuration 1 – Mode 6

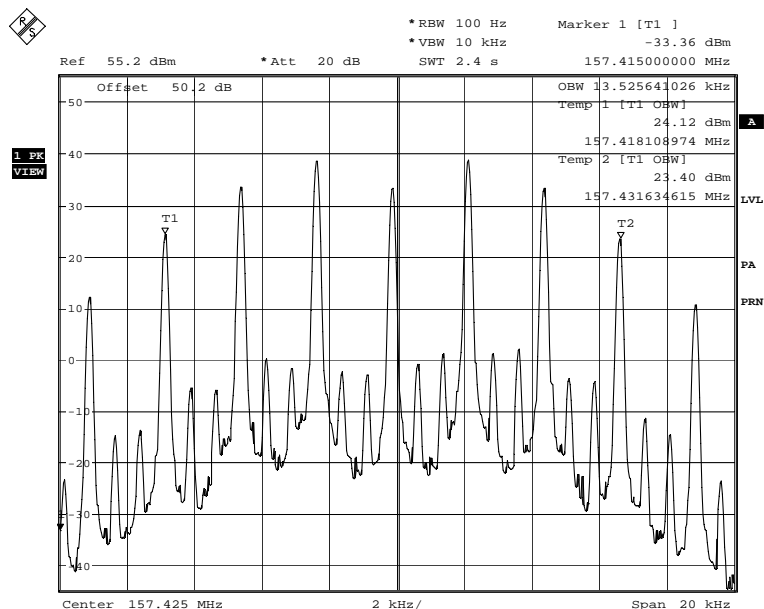
### Top Channel – 88

### 25W



Date: 20.FEB.2008 17:17:53

### 1W



Date: 20.FEB.2008 17:17:53

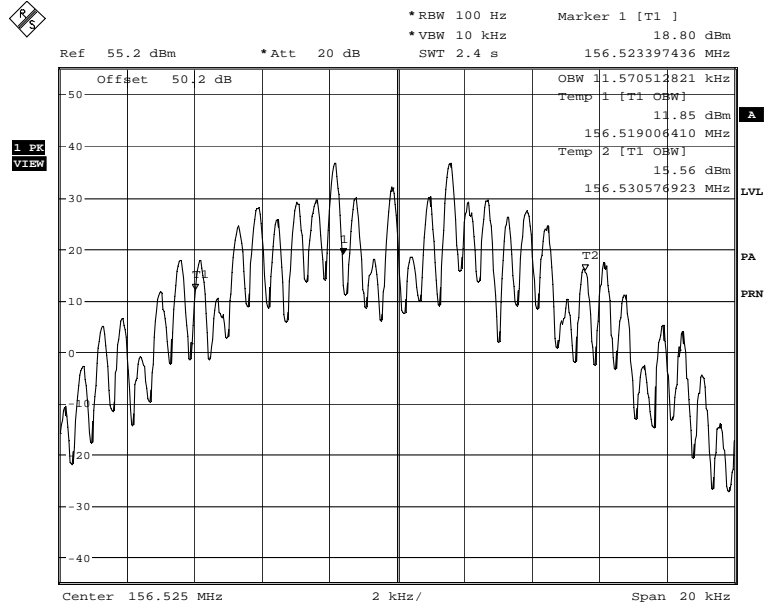


Product Service

### Configuration 1 – Mode 6

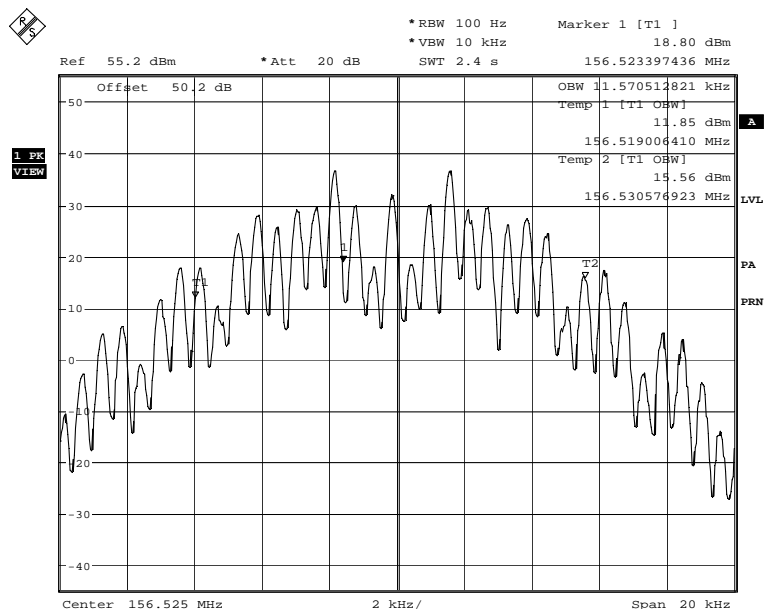
### DSC Channel – 70

#### 25W



Date: 20.FEB.2008 17:03:56

#### 1W



Date: 20.FEB.2008 17:03:56



Product Service

## **2.7 FREQUENCY DEVIATION (DSC)**

### **2.7.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.213(d)

### **2.7.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.7.3 Date of Test and Modification State**

01 August 2008 - Modification State 1

### **2.7.4 Test Equipment Used**

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

### **2.7.5 Test Procedure**

The EUT was connected to a modulation analyser via a 30dB attenuator and a power sensor. The EUT was set to transmit and modulated with the following DSC tones:

Space (B)  
Mark (Y)  
Dotting pattern

The modulation for each tone was measured.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 7

### **2.7.6 Environmental Conditions**

	01 August 2008
Ambient Temperature	24.9°C
Relative Humidity	57.5%



Product Service

## 2.7.7 Test Results

### Configuration 1 – Mode 7

TEST CONDITION	Frequency Deviation (kHz)
	156.525MHz
Space (B)	4.17
Mark (Y)	2.57
Dotting Pattern	4.19

### Limit

Maximum Permissible Deviation	± 5 kHz
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## 2.8 EMISSION LIMITATIONS (CONDUCTED TRANSMITTER SPURIOUS)

### 2.8.1 Specification Reference

FCC CFR 47 Part 80: 2006 Clause 80.211(f)(1)(2) & (3)

### 2.8.2 Equipment Under Test

JHS-780D (Duplex), S/N: BK10299

### 2.8.3 Date of Test and Modification State

21 February 2008 - Modification State 0

### 2.8.4 Test Equipment Used

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

### 2.8.5 Test Procedure

The EUT transmitting on full power, was then connected to a Spectrum Analyser via 50dB of attenuation in the 9kHz - 300MHz frequency range and via a 20dB Attenuator with 300MHz High Pass Filter in the 300MHz - 2GHz frequency range.

The EUT was checked (for the bottom, middle and top channels of the EUT) against the specification limit for all emissions >250% removed from the assigned Frequency, between 9kHz - 2GHz.

The Path Loss for each frequency range was recorded and the worst case loss was entered as a Reference Level Offset.

Total Path loss (9kHz - 150MHz) = 50.8dB  
Total Path loss (150MHz - 300MHz) = 51.7dB  
Total Path loss (300MHz - 1.0GHz) = 21.5dB  
Total Path loss (1.0GHz - 2GHz) = 21.5dB

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### 2.8.6 Environmental Conditions

	21 February 2008
Ambient Temperature	28°C
Relative Humidity	26%

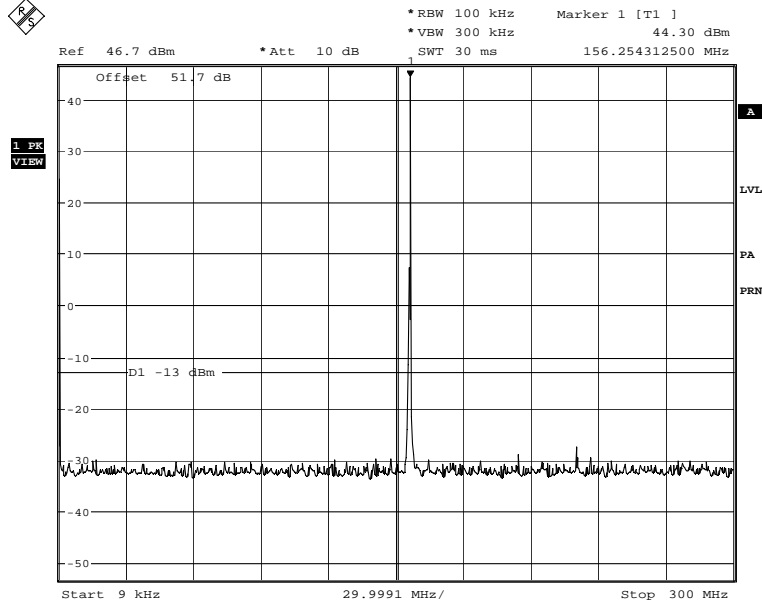


Product Service

## 2.8.7 Test Results

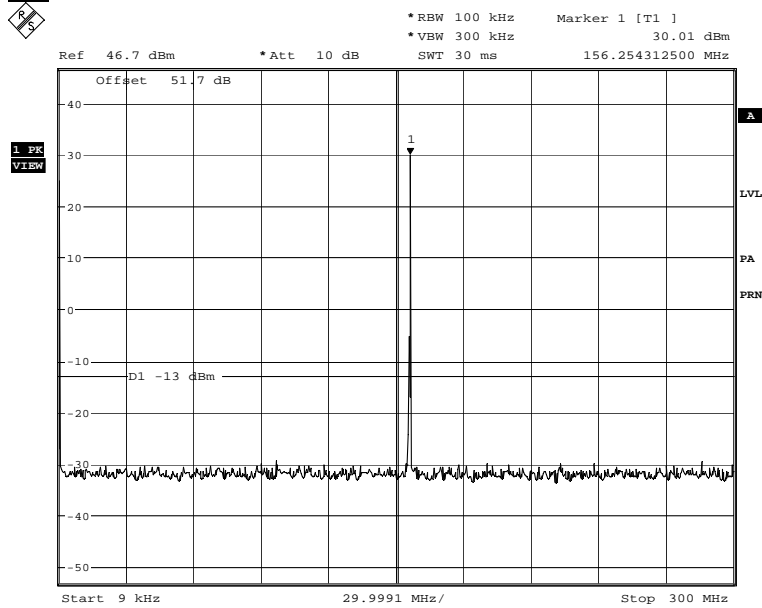
### Bottom Channel – 60 – 9kHz to 300MHz

25W



Date: 21.FEB.2008 17:02:52

1W



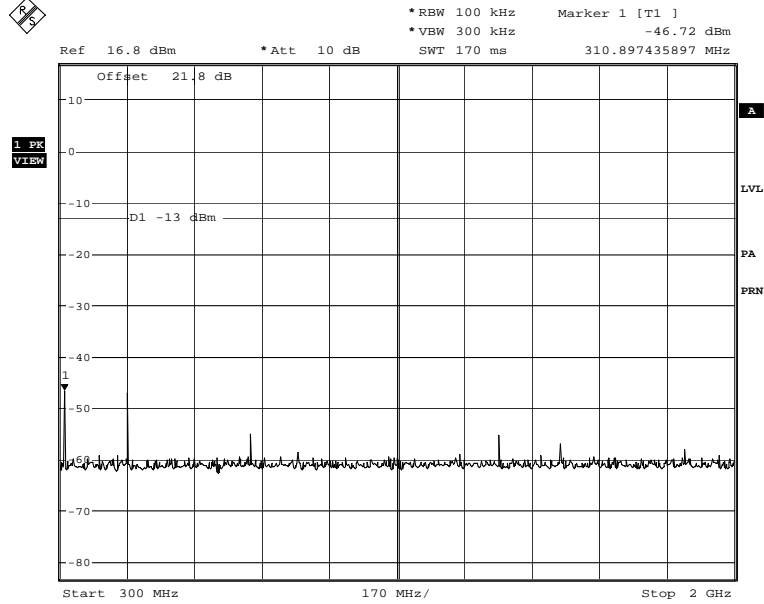
Date: 21.FEB.2008 17:07:49



Product Service

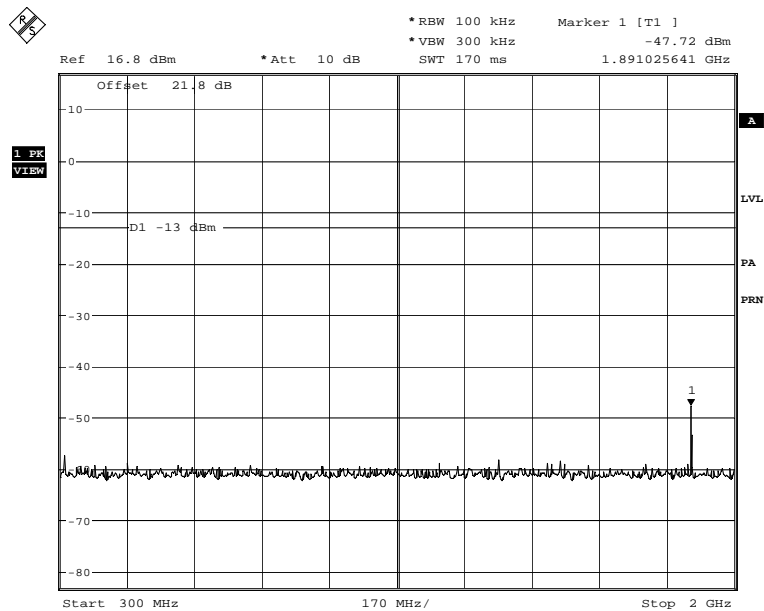
### Bottom Channel – 60 – 300 MHz to 2000 MHz

#### 25W



Date: 22.FEB.2008 16:46:38

#### 1W



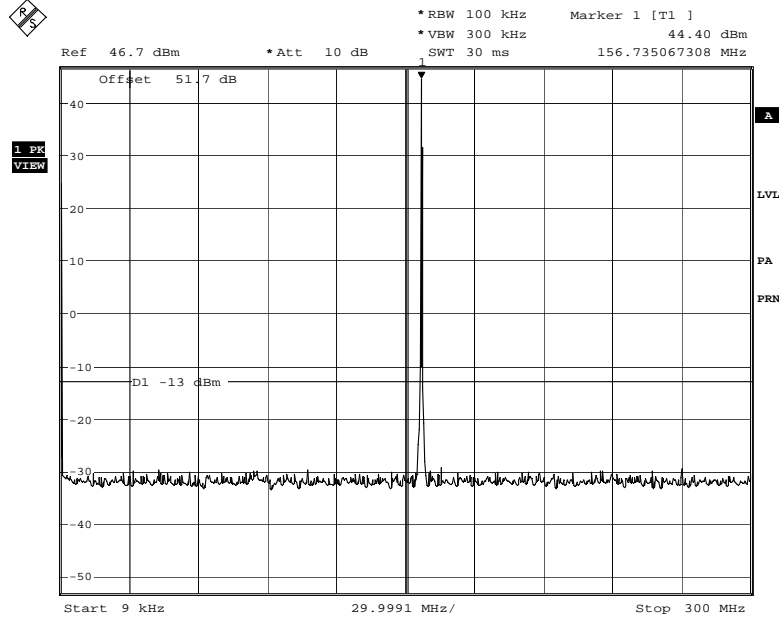
Date: 22.FEB.2008 16:48:34



Product Service

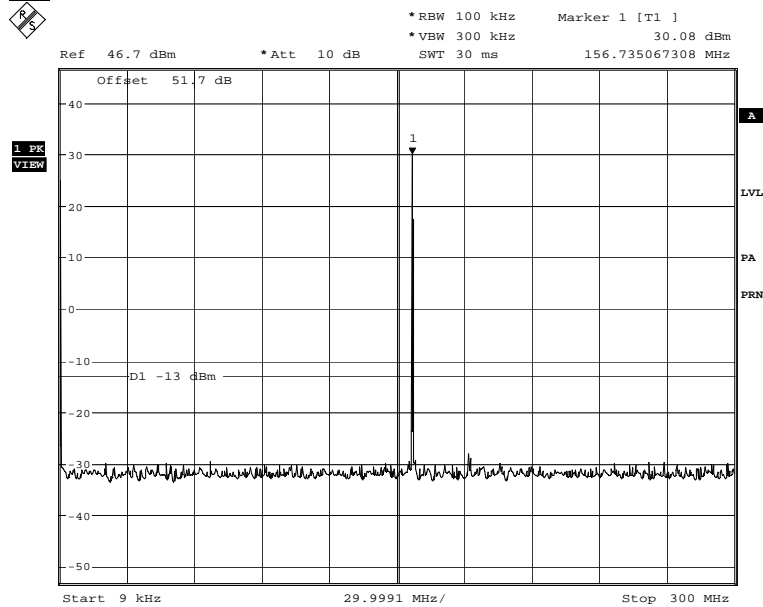
### Middle Channel – 16 – 9kHz to 300MHz

25W



Date: 21.FEB.2008 17:15:06

1W



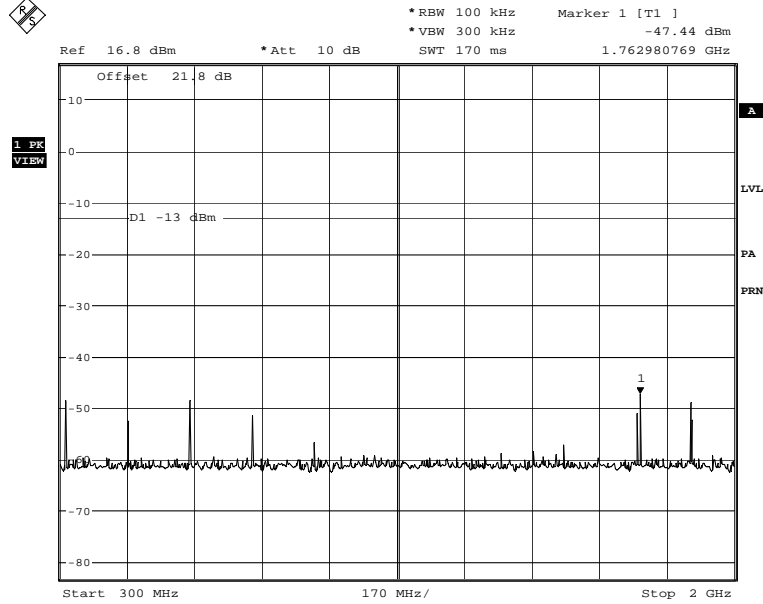
Date: 21.FEB.2008 17:11:50



Product Service

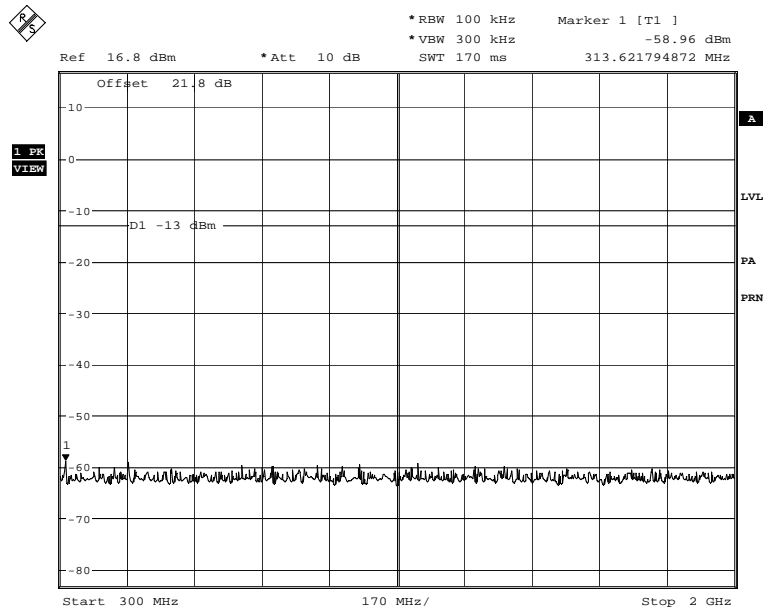
### Middle Channel – 16 – 300 MHz to 2000 MHz

#### 25W



Date: 22.FEB.2008 17:04:52

#### 1W



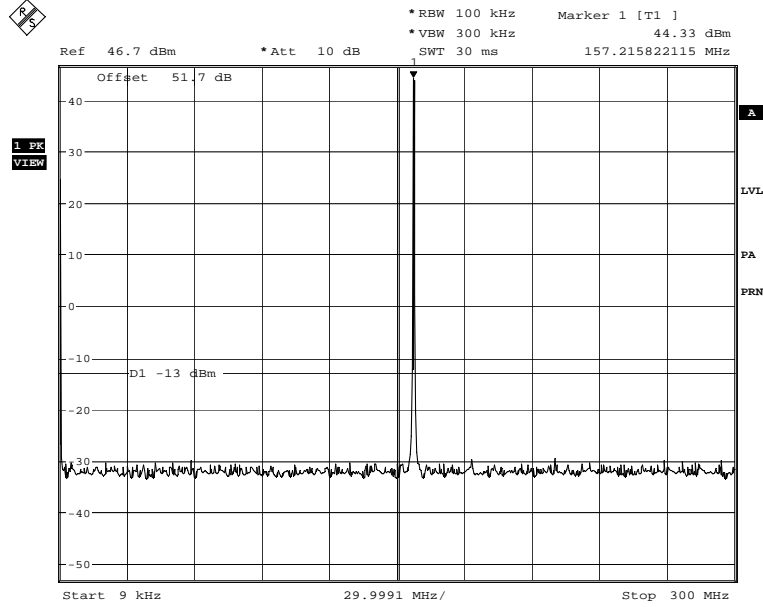
Date: 22.FEB.2008 17:06:55



Product Service

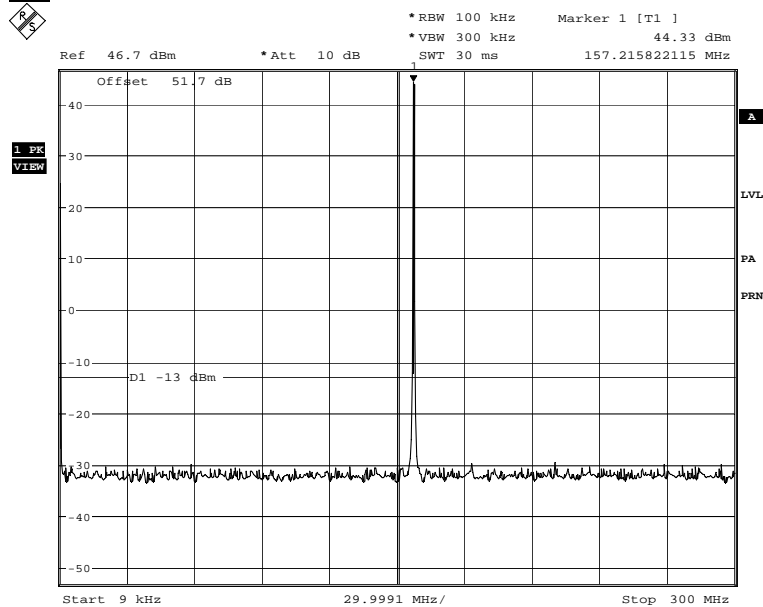
### Top Channel – 88 – 9kHz to 300MHz

25W



Date: 21.FEB.2008 17:14:14

1W



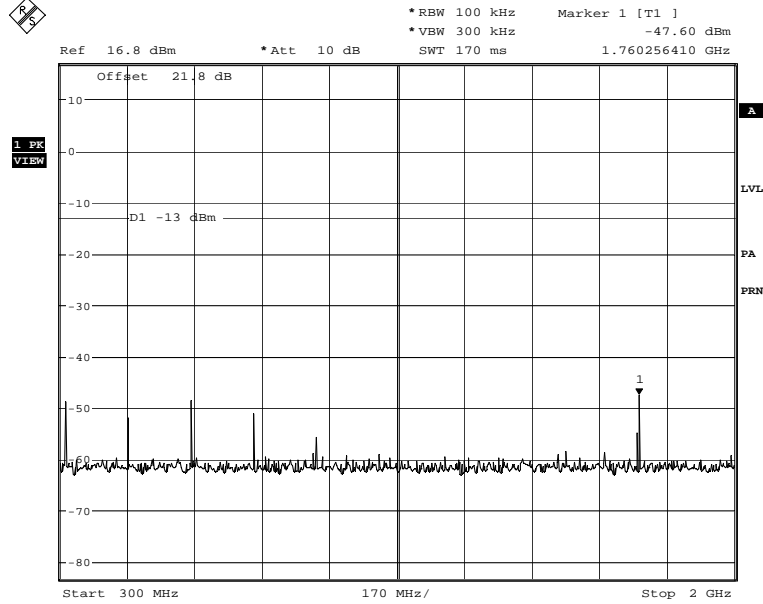
Date: 21.FEB.2008 17:14:14



Product Service

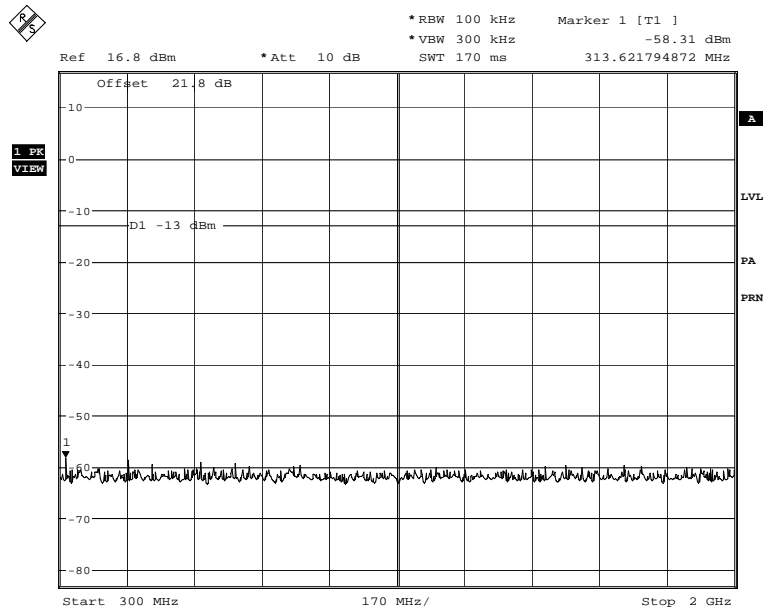
### Top Channel – 88 – 300 MHz to 2000 MHz

#### 25W



Date: 22.FEB.2008 17:08:12

#### 1W



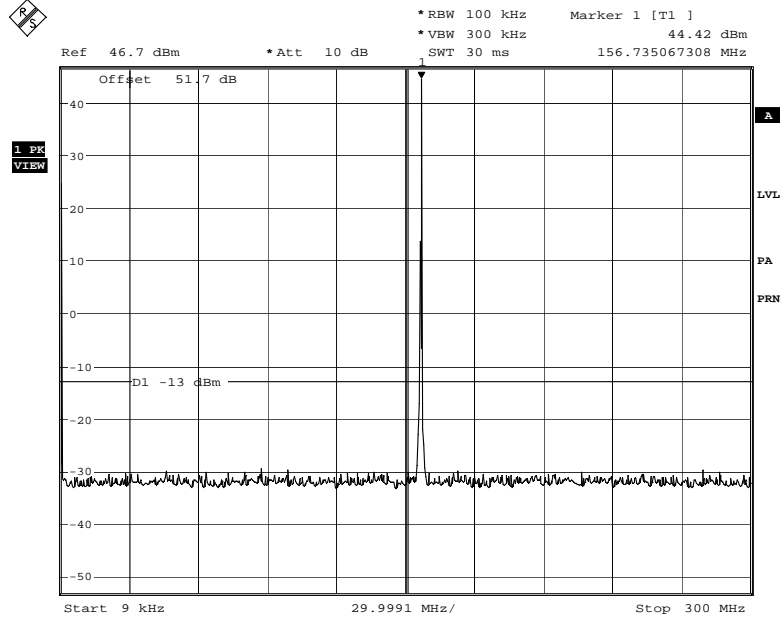
Date: 22.FEB.2008 17:07:38



Product Service

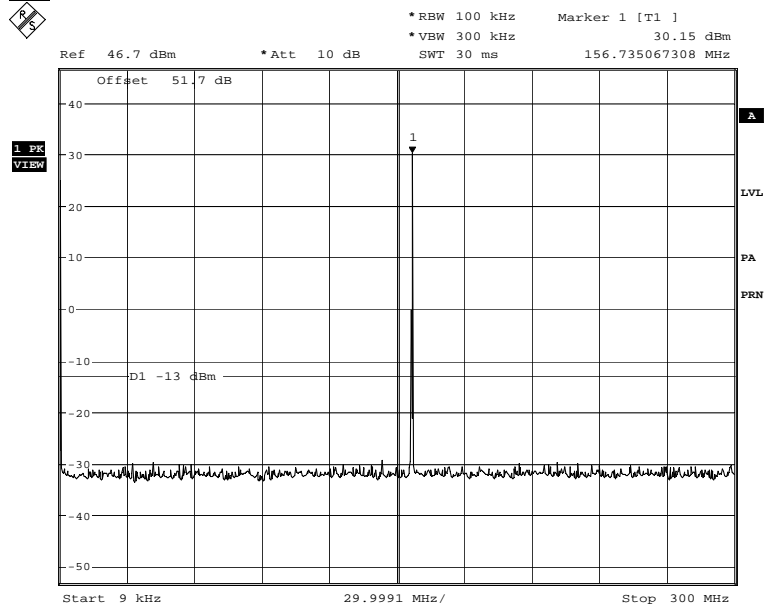
### DSC Channel – 70 – 9kHz to 300MHz

25W



Date: 21.FEB.2008 17:18:44

1W



Date: 21.FEB.2008 17:28:22

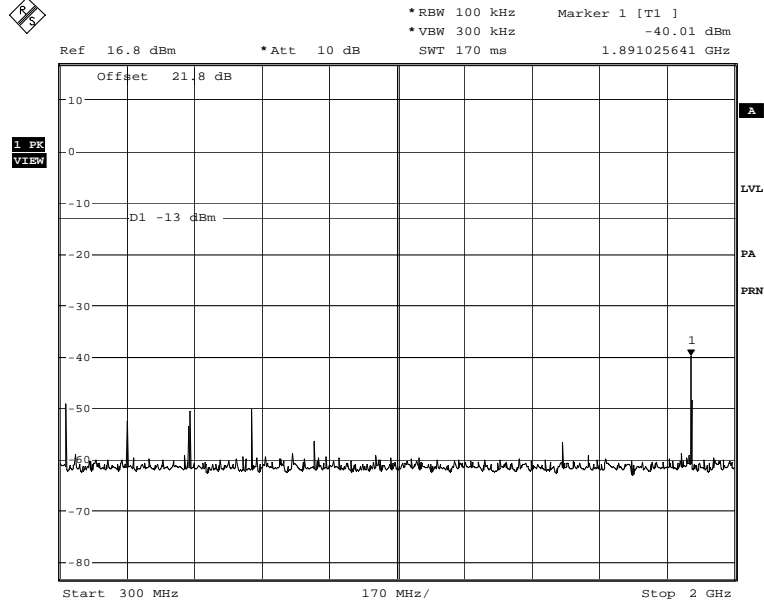




Product Service

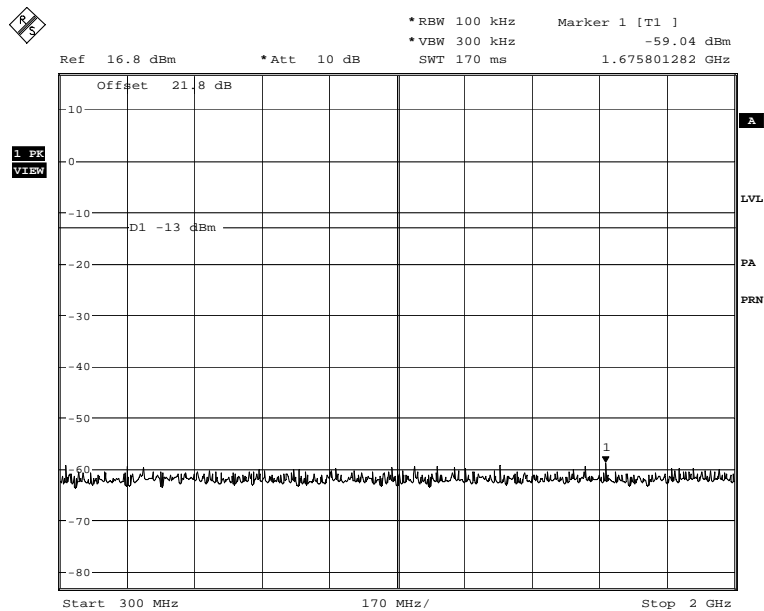
### DSC Channel – 70 – 300 MHz to 2000 MHz

#### 25W



Date: 22.FEB.2008 17:09:43

#### 1W



Date: 22.FEB.2008 17:11:13



## 2.9 EMISSION LIMITATIONS (RADIATED TRANSMITTER SPURIOUS)

### 2.9.1 Specification Reference

FCC CFR 47 Part 80: 2006 Clause 80.211(f)(3)

### 2.9.2 Equipment Under Test

JHS-780D (Duplex), S/N: BK10299

### 2.9.3 Date of Test and Modification State

26 and 27 March 2008 - Modification State 1

### 2.9.4 Test Equipment Used

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

### 2.9.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 2GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### 2.9.6 Environmental Conditions

	26 March 2008	27 March 2008
Ambient Temperature	18.2°C	19.9°C
Relative Humidity	46%	29%



### 2.9.7 Test Results

#### Configuration 1 – Mode 4

##### Bottom Channel – 60 (Transmitting on Full Power) – 30MHz to 2GHz

Frequency MHz	Antenna Polarisation	Antenna Height	Antenna Azimuth	Result (dBm)	Limit (dBm)	Margin (dBm)
623.78	Vertical	100	200	-23.99	-13.0	-10.99

All other emissions measured were greater than 20dB below the specification limit.

#### Configuration 1 – Mode 5

##### Middle Channel – 16 (Transmitting on Full Power) – 30MHz to 2GHz

Frequency MHz	Antenna Polarisation	Antenna Height	Antenna Azimuth	Result (dBm)	Limit (dBm)	Margin (dBm)
627.20	Vertical	100	102	-25.33	-13.0	-12.33

All other emissions measured were greater than 20dB below the specification limit.

#### Configuration 1 – Mode 6

##### Top Channel – 88 (Transmitting on Full Power) – 30MHz to 2GHz

Frequency MHz	Antenna Polarisation	Antenna Height	Antenna Azimuth	Result ERP (dBm)	Limit ERP (dBm)	Margin (dBm)
629.70	Vertical	100	091	-24.78	-13.0	-11.78

All other emissions measured were greater than 20dB below the specification limit.

#### Configuration 1 – Mode 7

##### DSC – 70 (Transmitting on Full Power) – 30MHz to 2GHz

Frequency MHz	Antenna Polarisation	Antenna Height	Antenna Azimuth	Result ERP (dBm)	Limit ERP (dBm)	Margin (dBm)
626.30	Vertical	100	287	-24.31	-13.0	-11.31

All other emissions measured were greater than 20dB below the specification limit.

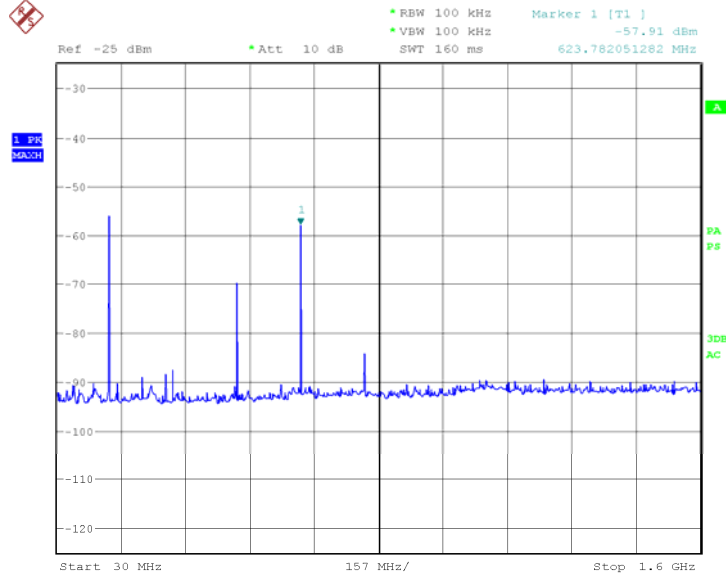


Product Service

### Configuration 1 – Mode 4

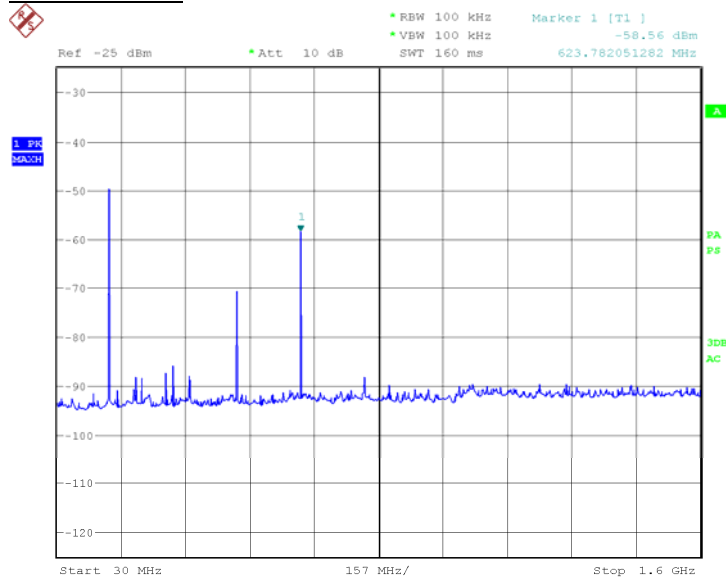
### Bottom Channel – 60 (Transmitting on Full Power)– 30MHz to 1.6GHz

#### Vertical Plot



Date: 12.AUG.2008 17:17:51

#### Horizontal Plot



Date: 12.AUG.2008 17:18:42

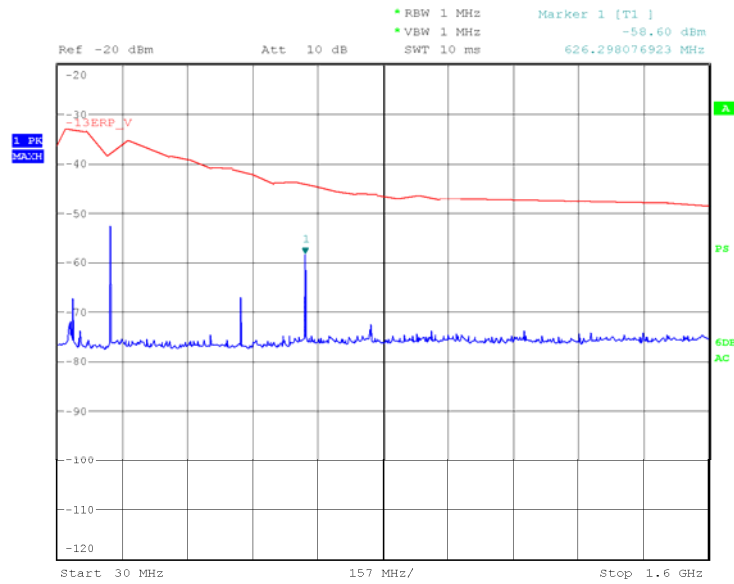


Product Service

### Configuration 1 – Mode 5

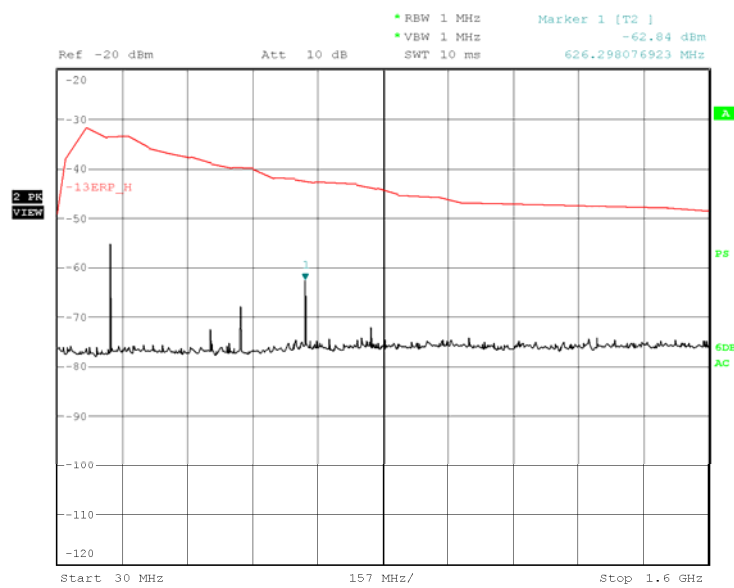
### Middle Channel – 16 (Transmitting on Full Power)– 30MHz to 1.6GHz

### Vertical Plot



Date: 26.MAR.2008 14:24:53

### Horizontal Plot



Date: 26.MAR.2008 14:29:54

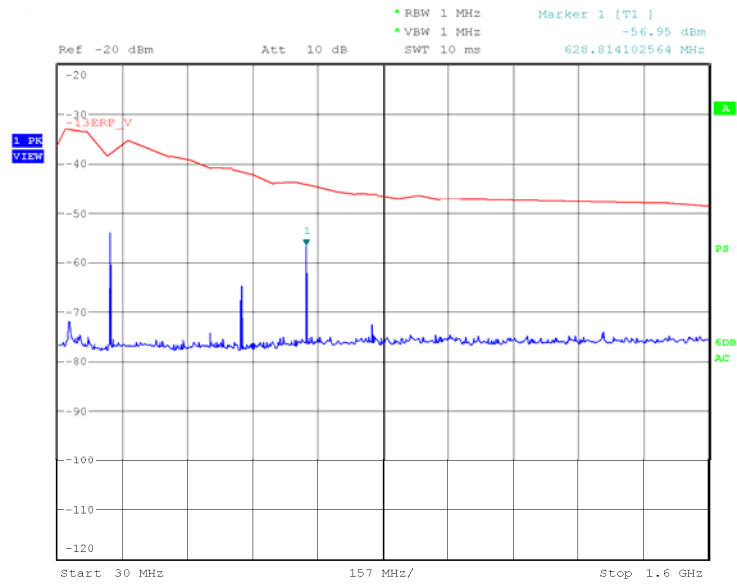


Product Service

### Configuration 1 – Mode 6

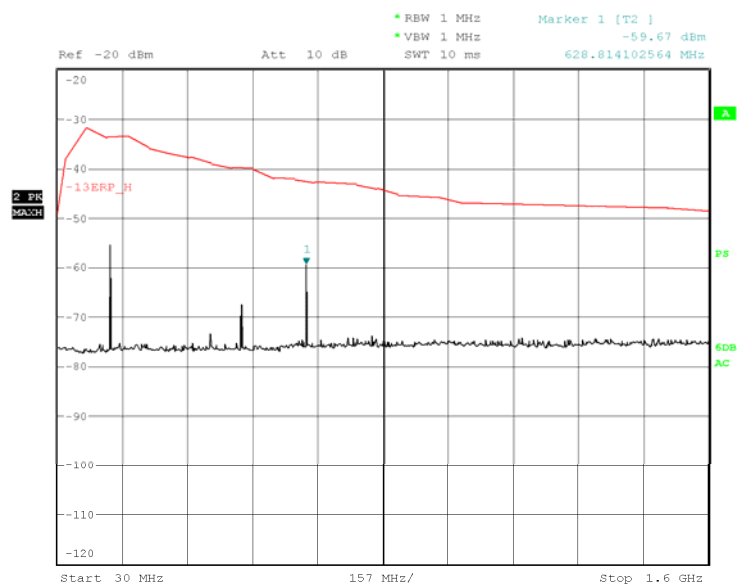
### Top Channel – 88 (Transmitting on Full Power) – 30MHz to 1.6GHz

### Vertical Plot



Date: 26.MAR.2008 13:41:51

### Horizontal Plot



Date: 26.MAR.2008 13:51:39

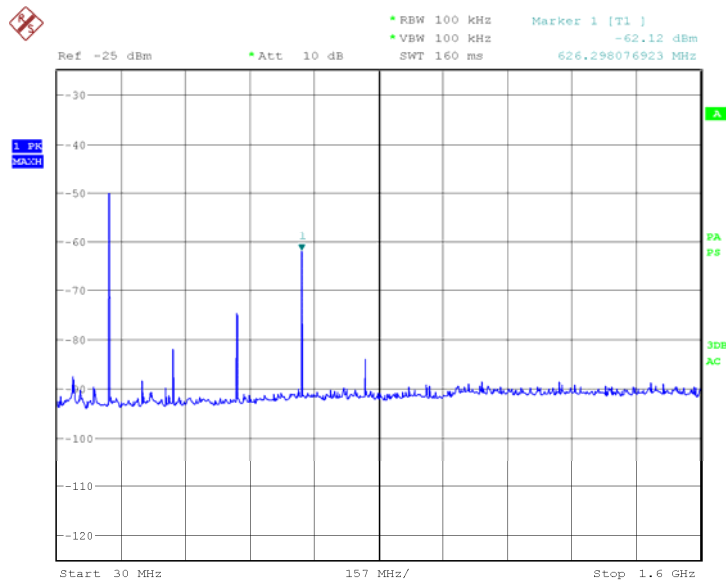


Product Service

### Configuration 1 – Mode 7

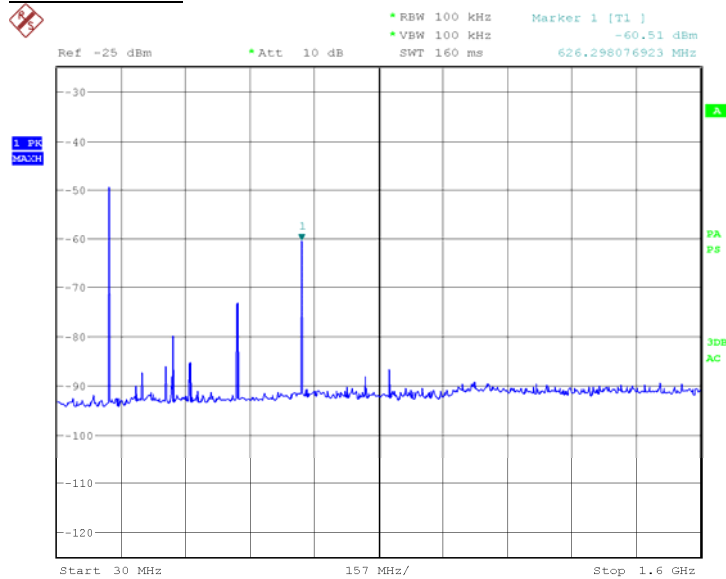
### DSC – 70 (Transmitting on Full Power) – 30MHz to 1.6GHz

#### Vertical Plot



Date: 12.AUG.2008 18:13:15

#### Horizontal Plot



Date: 12.AUG.2008 18:15:53



Product Service

## **2.10 AUDIO FILTER**

### **2.10.1 Specification Reference**

FCC CFR 47 Part 80: 2006 Clause 80.213

### **2.10.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.10.3 Date of Test and Modification State**

05 March 2008 - Modification State 1

### **2.10.4 Test Equipment Used**

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

### **2.10.5 Test Procedure**

The EUT was connected to a Modulation Analyser via a 30dB attenuator. An audio signal of varying frequency and amplitude was applied to the microphone input using an audio analyser. To demonstrate compliance with the test limits, the test was conducted in two parts. The first to demonstrate a variety of input levels over a set frequency range and the second to demonstrate the limiting effect on the deviation when large signal levels are applied to its input.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6

### **2.10.6 Environmental Conditions**

	05 March 2008
Ambient Temperature	22°C
Relative Humidity	33%





**2.10.7 Test Results**

Configuration 1 – Mode 4

Bottom Channel - 60 – Deviation vs Input Voltage/Frequency – 25W

The input voltage and frequency were varied across the range shown in the table below. This demonstrates the point at which the deviation is limited for a given input voltage and frequency.

Audio Input Level To EUT (mV)	MAXIMUM DEVIATION (kHz)					Maximum Deviation Limit (kHz)
	100Hz	500Hz	1000Hz	3000Hz	5000Hz	
-						-
0.1	-0.108	-0.109	-0.129	-0.153	-0.109	5.0
0.2	-0.107	-0.114	-0.136	-0.210	0.116	5.0
0.4	-0.106	-0.128	-0.178	-0.333	0.132	5.0
0.6	-0.108	-0.148	-0.220	-0.456	0.155	5.0
0.8	-0.109	-0.166	-0.262	-0.578	0.174	5.0
1.0	-0.108	-0.183	-0.305	-0.703	0.191	5.0
1.5	-0.109	-0.226	-0.415	-1.009	0.241	5.0
2.0	0.108	-0.271	-0.523	-1.324	0.292	5.0
3.0	0.107	-0.365	-0.743	-1.953	0.396	5.0
4.0	-0.108	-0.456	-0.962	-2.587	0.490	5.0
5.0	-0.109	-0.551	-1.185	-3.100	0.527	5.0
10.0	-0.109	-1.018	-2.305	-3.569	0.629	5.0
20.0	-0.109	-1.969	-3.607	-3.686	0.743	5.0
40.0	-0.135	-3.490	-4.090	-3.724	0.790	5.0
60.0	-0.204	-3.587	-4.070	-3.800	0.918	5.0
80.0	-2.754	-4.020	-4.050	-3.833	1.050	5.0
100.0	-3.625	-4.020	-4.060	-3.842	1.202	5.0
120.0	3.772	-4.060	-4.060	-3.832	1.237	5.0
140.0	3.864	-4.070	-4.060	-3.843	1.251	5.0
160.0	4.060	-4.080	-4.060	-3.855	1.250	5.0
180.0	4.100	-4.080	-4.050	-3.850	1.251	5.0
200.0	4.720	-4.080	-4.030	-3.860	1.252	5.0
220.0	4.720	-4.090	-4.030	-3.869	1.256	5.0
240.0	4.530	-4.090	-4.030	-3.862	1.261	5.0



Configuration 1 – Mode 5

Middle Channel - 16 – Deviation vs Input Voltage/Frequency – 25W

The input voltage and frequency were varied across the range shown in the table below. This demonstrates the point at which the deviation is limited for a given input voltage and frequency.

Audio Input Level To EUT (mV)	MAXIMUM DEVIATION (kHz)					Maximum Deviation Limit (kHz)
	100Hz	500Hz	1000Hz	3000Hz	5000Hz	
-						-
0.1	-0.109	-0.109	-0.121	-0.154	-0.114	5.0
0.2	-0.110	-0.109	-0.136	-0.209	-0.122	5.0
0.4	-0.109	-0.134	-0.179	-0.328	-0.138	5.0
0.6	-0.108	-0.152	-0.219	-0.447	-0.158	5.0
0.8	-0.109	-0.168	-0.260	-0.564	-0.174	5.0
1.0	-0.107	-0.189	-0.305	-0.682	-0.195	5.0
1.5	-0.109	-0.230	-0.409	-0.980	-0.242	5.0
2.0	-0.108	-0.275	-0.518	-1.280	-0.290	5.0
3.0	-0.109	-0.367	-0.725	-1.881	-0.386	5.0
4.0	-0.108	-0.459	-0.936	-2.492	-0.480	5.0
5.0	-0.109	-0.548	-1.154	-2.990	-0.512	5.0
10.0	-0.111	-0.995	-2.220	-3.441	-0.590	5.0
20.0	-0.118	-1.898	-3.478	-3.559	-0.711	5.0
40.0	-0.141	-3.387	-3.919	-3.582	-0.761	5.0
60.0	-0.221	-3.479	-3.909	3.660	-0.768	5.0
80.0	-2.882	-3.879	-3.892	-3.693	-0.782	5.0
100.0	-3.600	-3.879	-3.892	-3.698	-0.801	5.0
120.0	-3.721	-3.919	-3.892	-3.698	-0.810	5.0
140.0	-3.848	-3.919	-3.882	-3.704	-0.808	5.0
160.0	-3.902	-3.920	-3.872	-3.710	-0.812	5.0
180.0	-3.940	-3.932	-2.864	-3.716	-0.818	5.0
200.0	-4.680	-3.932	-3.861	-3.718	-0.832	5.0
220.0	-4.650	-3.941	-3.861	-3.720	-0.838	5.0
240.0	-4.490	-3.936	-3.858	-3.720	-0.850	5.0



Configuration 1 – Mode 6

Top Channel - 88 – Deviation vs Input Voltage/Frequency – 25W

The input voltage and frequency were varied across the range shown in the table below. This demonstrates the point at which the deviation is limited for a given input voltage and frequency.

Audio Input Level To EUT (mV)	MAXIMUM DEVIATION (kHz)					Maximum Deviation Limit (kHz)
	100Hz	500Hz	1000Hz	3000Hz	5000Hz	
-						-
0.1	-0.114	-0.118	-0.123	-1.160	-0.114	5.0
0.2	-0.118	-0.121	-0.141	-0.212	-0.122	5.0
0.4	-0.115	-0.140	-0.182	-0.331	-0.140	5.0
0.6	-0.112	-0.158	-0.224	-0.452	-0.157	5.0
0.8	-0.114	-0.172	-0.266	-0.571	-0.174	5.0
1.0	-0.115	-0.189	-0.310	-0.690	-0.193	5.0
1.5	-0.116	-0.239	-0.410	-0.989	-0.241	5.0
2.0	-0.113	-0.282	-0.526	-1.292	-0.292	5.0
3.0	-0.113	-0.375	-0.736	-1.900	-0.389	5.0
4.0	-0.114	-0.467	-0.953	-2.512	-0.484	5.0
5.0	-0.114	-0.564	-1.171	-3.018	-0.518	5.0
10.0	-0.115	-1.016	-2.259	-3.471	-0.593	5.0
20.0	-0.122	-1.926	-3.521	-3.590	-0.711	5.0
40.0	-0.148	-3.418	-3.961	-3.616	-0.763	5.0
60.0	-0.230	-3.518	-3.970	-3.691	-0.774	5.0
80.0	-2.912	-3.902	-3.960	-3.725	-0.798	5.0
100.0	-3.602	-3.902	-3.950	-3.736	-0.810	5.0
120.0	3.725	-3.951	-3.960	-3.740	-0.819	5.0
140.0	3.844	-3.955	-3.950	-3.745	-0.821	5.0
160.0	3.882	-3.950	-3.940	-3.750	-0.820	5.0
180.0	3.919	-3.960	-3.930	-3.750	-0.826	5.0
200.0	-4.790	-3.972	-3.920	-3.756	-0.826	5.0
220.0	-4.750	-3.980	-3.920	-3.755	-0.829	5.0
240.0	-4.580	-3.971	-3.920	-3.755	-0.828	5.0



Configuration 1 – Mode 4

Bottom Channel - 60 – Maximum Permissible Deviation – 25W

The EUT was connected as described in the test above. Initially, an Audio signal of 1kHz was applied to the input and the amplitude varied to give a deviation of 3kHz, which in this case was 13.0mV. This level was then increased by 20dB to a level of 130mV. The maximum peak deviation was then measured across the frequency range 100Hz to 10kHz.

Modulating Frequency (kHz)	Peak Frequency Deviation (kHz)	Maximum Deviation Limit (kHz)
0.1	-3.950	5.0
0.2	-2.376	5.0
0.4	-4.080	5.0
0.6	-3.790	5.0
0.8	-4.070	5.0
1.0	-4.110	5.0
1.2	-4.130	5.0
1.4	-4.160	5.0
1.6	-4.180	5.0
1.8	-4.230	5.0
2.0	-4.290	5.0
2.5	-4.630	5.0
3.0	-3.910	5.0
3.5	-2.783	5.0
4.0	-1.817	5.0
4.5	-1.248	5.0
5.0	-0.867	5.0
6.0	-0.651	5.0
7.0	-0.333	5.0
8.0	-0.728	5.0
9.0	-0.473	5.0
10.0	-0.237	5.0



Configuration 1 – Mode 5

Middle Channel - 16 – Maximum Permissible Deviation – 25W

The EUT was connected as described in the test above. Initially, an Audio signal of 1kHz was applied to the input and the amplitude varied to give a deviation of 3kHz, which in this case was 13.65mV. This level was then increased by 20dB to a level of 136.5mV. The maximum peak deviation was then measured across the frequency range 100Hz to 10kHz.

Modulating Frequency (kHz)	Peak Frequency Deviation (kHz)	Maximum Deviation Limit (kHz)
0.1	-3.762	5.0
0.2	-2.683	5.0
0.4	-3.880	5.0
0.6	-3.570	5.0
0.8	-3.842	5.0
1.0	-3.887	5.0
1.2	-3.929	5.0
1.4	-3.935	5.0
1.6	-3.972	5.0
1.8	-4.040	5.0
2.0	-4.100	5.0
2.5	-4.420	5.0
3.0	-3.730	5.0
3.5	-2.667	5.0
4.0	-1.767	5.0
4.5	-1.206	5.0
5.0	-0.824	5.0
6.0	-0.641	5.0
7.0	-0.345	5.0
8.0	-0.713	5.0
9.0	-0.484	5.0
10.0	-0.259	5.0



Configuration 1 – Mode 6

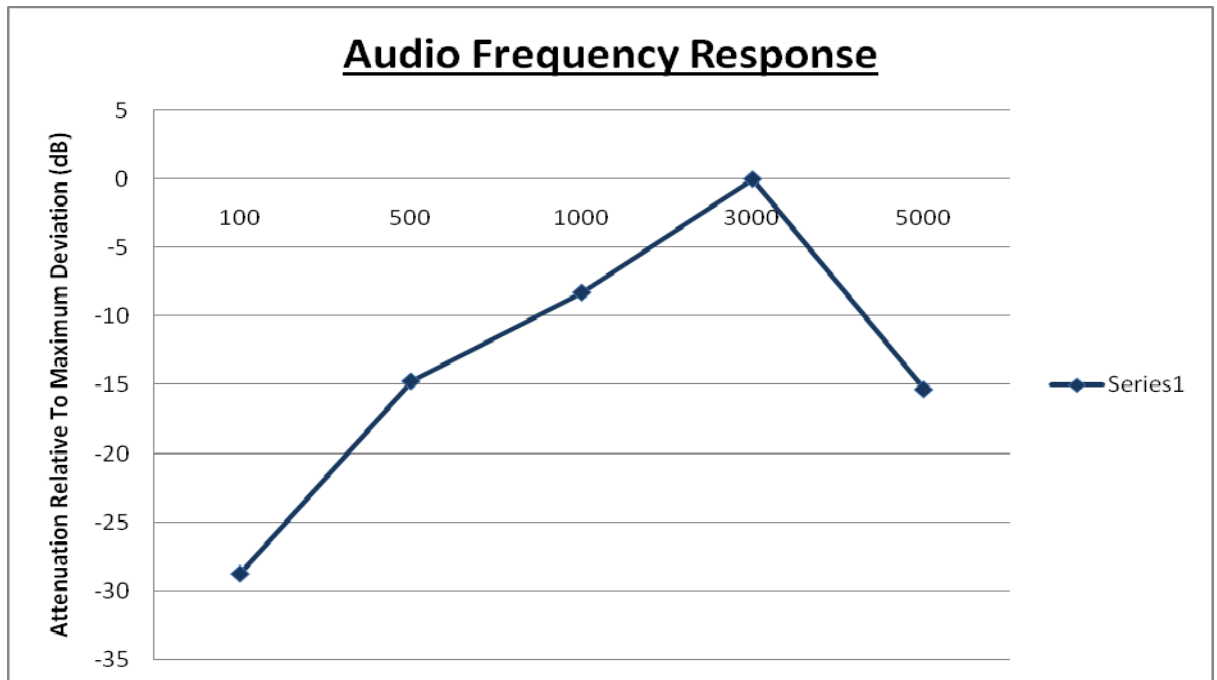
Top Channel - 88 – Maximum Permissible Deviation – 25W

The EUT was connected as described in the test above. Initially, an Audio signal of 1kHz was applied to the input and the amplitude varied to give a deviation of 3kHz, which in this case was 13.45mV. This level was then increased by 20dB to a level of 134.5mV. The maximum peak deviation was then measured across the frequency range 100Hz to 10kHz.

Modulating Frequency (kHz)	Peak Frequency Deviation (kHz)	Maximum Deviation Limit (kHz)
0.1	-3.820	5.0
0.2	-2.603	5.0
0.4	-3.950	5.0
0.6	-3.610	5.0
0.8	-3.885	5.0
1.0	-3.932	5.0
1.2	-3.971	5.0
1.4	-3.992	5.0
1.6	-4.040	5.0
1.8	-4.080	5.0
2.0	-4.130	5.0
2.5	-4.430	5.0
3.0	-3.776	5.0
3.5	-2.685	5.0
4.0	-1.775	5.0
4.5	-1.206	5.0
5.0	-0.825	5.0
6.0	-0.629	5.0
7.0	-0.330	5.0
8.0	-0.714	5.0
9.0	-0.479	5.0
10.0	-0.241	5.0



Product Service





Product Service

## **2.11 TRANSMITTER POWER**

### **2.11.1 Specification Reference**

FCC FR 47 Part 80: 2006 Clause 80.215

### **2.11.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.11.3 Date of Test and Modification State**

25 February 2008 - Modification State 0

### **2.11.4 Test Equipment Used**

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

### **2.11.5 Test Procedure**

The EUT was connected via 30dB and 10dB attenuators to a power meter and sensor. The path loss between the EUT and the power sensor was measured and recorded. The power meter reading and adjusted by the path loss value.

The emissions designator for the EUT is declared as G3E. The measurement of G3E designations is defined as being Carrier Power. The Carrier Power was measured unmodulated.

The carrier power was measured on the top, middle and bottom channels of the operating frequency band and Channel 70 at maximum and minimum power levels.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 4  
- Mode 5  
- Mode 6  
- Mode 7

### **2.11.6 Environmental Conditions**

	25 February 2008
Ambient Temperature	22°C
Relative Humidity	32%





Product Service

## 2.11.7 Test Results

### Configuration 1 – Mode 4, 5, 6 and 7

#### Maximum Power – 25W Unmodulated

Channel Number/Frequency	Result (dBm)	Result (W)
60 / 156.025MHz	43.49	22.34
16 / 156.800MHz	43.60	22.91
88 / 157.425MHz	43.57	22.75
70 / 156.525MHz	43.63	23.07

#### Minimum Power - 1W Unmodulated

Channel Number/Frequency	Result (dBm)	Result (W)
60 / 156.025MHz	29.29	0.849
16 / 156.800MHz	29.38	0.867
88 / 157.425MHz	29.35	0.861
70 / 156.525MHz	29.38	0.867

#### Limit

$\leq 1W$ or $<+30.00$ dBm
Between 8W and 25W
39dBm and 43.98dBm



Product Service

## **2.12 TRANSMITTER CARRIER POWER REDUCTION**

### **2.12.1 Specification Reference**

FCC FR 47 Part 80: 2006 Clause 80.215 (e)(g)(1)(2)(3)

### **2.12.2 Equipment Under Test**

JHS-780D (Duplex), S/N: BK10299

### **2.12.3 Date of Test and Modification State**

01 August 2008 - Modification State 1

### **2.12.4 Test Equipment Used**

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

### **2.12.5 Test Procedure**

The EUT was connected via a 30dB attenuator to a spectrum analyser. The path loss between the EUT and the spectrum analyser was measured and recorded. The analyser reading was adjusted by the path loss value.

The carrier power was measured on the following channels and the carrier power reduction was assessed:

156.375 MHz  
156.650 MHz  
156.775 MHz  
156.825 MHz

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 8  
                  - Mode 9  
                  - Mode 10  
                  - Mode 11

### **2.12.6 Environmental Conditions**

	01 August 2008
Ambient Temperature	24.9°C
Relative Humidity	57.5%



Product Service

## 2.12.7 Test Results

### Configuration 1 – Mode 8, 9, 10 and 11

Channel Number/Frequency	Default Power (W)	Manual Override to 25 W Possible (Yes/No)
156.375 MHz	1	Yes
156.650 MHz	1	Yes
156.775 MHz	1	No
156.825 MHz	1	No

### Limits

All transmit and remote control units must be capable of reducing the carrier power to 1 W or less.
All transmitters must automatically reduce the carrier power to 1W or less when the transmitter is tuned to 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650MHz.
All transmitters must be capable of tuning to 156.775 MHz and 156.825 MHz and must automatically reduce the carrier power to 1W or less, with no manual override capability, when the transmitter is tuned to either 156.775 MHz or 156.825 MHz.



## 2.13 SUPPRESSION OF INTERFERENCE ABOARD SHIPS

### 2.13.1 Specification Reference

FCC CFR 47 Part 80: 2006 Clause 80.217 (b)

### 2.13.2 Equipment Under Test

JHS-780D (Duplex), S/N: BK10268

### 2.13.3 Date of Test and Modification State

06 March 2008 - Modification State 1

### 2.13.4 Test Equipment Used

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

### 2.13.5 Test Procedure

The EUT was connected to a Spectrum Analyser via a cable. No external attenuation was inserted, as there is no carrier present in this mode of operation. The emissions were measured from 9kHz to 2GHz.

The manufacturer declares a maximum antenna gain of 2.15dBi to be used with the EUT. Thus, in accordance with 80.217(B), the 2.15dBi gain has been accounted for in the limit line and the deviation of the limits are shown in the table below.

Frequency Of Interfering Emissions (MHz)	Power to Artificial Antenna ( $\mu$ W)	Power to Artificial Antenna (dBm)	Power to Artificial Antenna including Maximum Declared Antenna Gain (dBm)
<30	400	-4	-6.15
30 – 100	4000	6	+3.85
100 – 300	40000	16	+13.85
300 - 2000	400000	26	+23.85

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 5

### 2.13.6 Environmental Conditions

28 February 2008  
Ambient Temperature 22°C  
Relative Humidity 38%

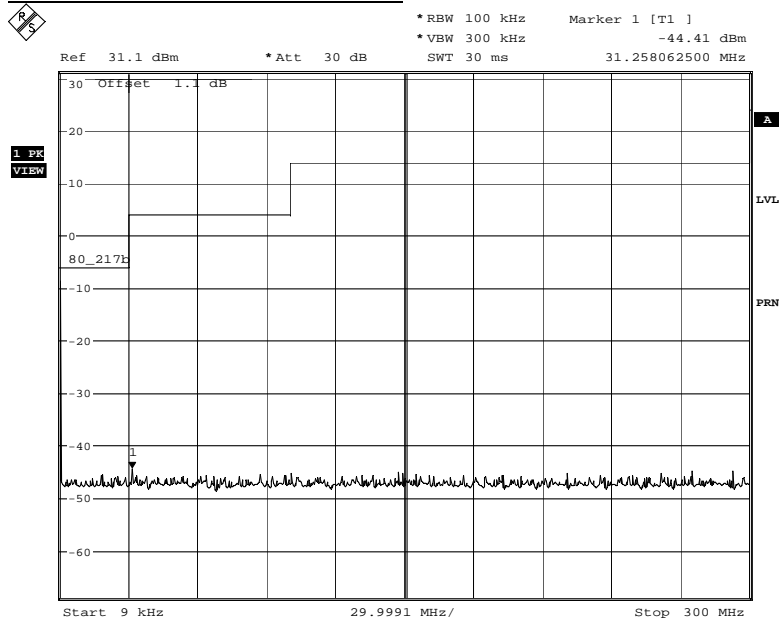


Product Service

## 2.13.7 Test Results

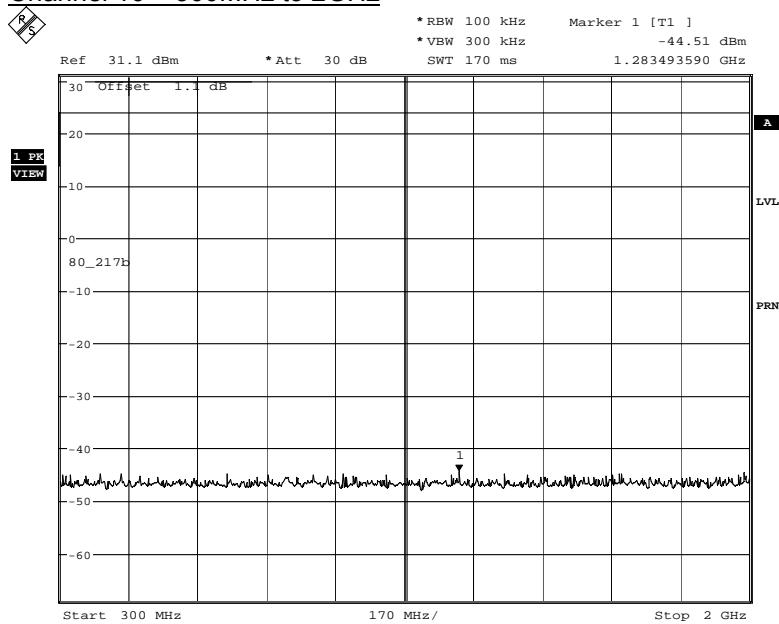
### Configuration 1 – Mode 5

#### Channel 16 – 900kHz to 300MHz



Date: 28.FEB.2008 15:15:47

#### Channel 16 – 300MHz to 2GHz



Date: 28.FEB.2008 15:19:02



Product Service



Product Service

## **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
<b>Section 2.1 &amp; 2.8 EMC - Radiated Emissions</b>					
Spectrum Analyser	Hewlett Packard	8562A	14	12	9-Jun-2008
Antenna (Horn, 11.9GHz-18.0GHz)	IFI	1824-20	29	-	TU
Modulation Analyser	Hewlett Packard	8901B	45	12	4-Jul-2008
Load (50ohm)	Diamond Antenna	DL-30N	217	12	13-Apr-2008
Load	Diamond Antenna	DL-30N	218	12	20-Jun-2008
Antenna (Bilog)	Schaffner	CBL6143	287	24	21-Jan-2010
Variac	R.S Components	8 AMP	290	-	TU
Load (50ohm, 30W)	JFW	50T-054	351	12	18-Jun-2009
Attenuator (30dB, 50W)	Bird	8321	494	12	9-Jan-2009
Attenuator (30dB, 200W)	Bird	8322	562	12	9-Jan-2009
Power Passport: 50, 60 or 400Hz Power Supply	Behlman Hauppauge	P1350-CE	1434	-	TU
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1607	-	TU
Audio Analyser	Hewlett Packard	8903B	1881	12	1-Oct-2008
Sensor	Hewlett Packard	11722A	2787	12	21-Aug-2008
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
Comb Generator	Schaffner	RSG1000	3034	-	TU
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	31-Mar-2008
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	11-Jul-2008
Termination	Tyco Electronics	1329823-1	3252	12	21-Aug-2008
Compliance 3 Emissions	Schaffner	C3e Software V.4.00.00	3274	-	N/A - Software
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	15-Mar-2009





Product Service

<b>Section 2.11 Radio (Rx) - Suppression of Interference Aboard Ships</b>					
Signal Generator	Hewlett Packard	ESG4000A	38	12	12-Mar-2008
Power Supply Unit	Hewlett Packard	6269B	113	-	O/P Mon
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	24-Jul-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
<b>Section 2.7 Radio (Tx) - Conducted Spurious Emissions</b>					
Signal Generator	Hewlett Packard	ESG4000A	38	12	12-Mar-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Power Supply Unit	Hewlett Packard	6269B	113	-	O/P Mon
High Pass Filter	Mini-Circuits	NHP-300	1640	12	16-Aug-2008
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	24-Jul-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	29-May-2008
Attenuator (20dB, 150W)	Narda	769-20	3367	12	11-May-2008
<b>Section 2.5 Radio (Tx) - Emission Mask</b>					
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Audio Analyser	Hewlett Packard	8903B	1881	12	1-Oct-2008
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	24-Jul-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	29-May-2008



Product Service

<b>Section 2.3 &amp; 2.4 Radio (Tx) - Frequency Stability</b>					
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Power Supply Unit	Hewlett Packard	6269B	113	-	O/P Mon
Sensor Module	Hewlett Packard	11722A	1333	12	14-Nov-2008
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Digital Temperature Indicator	Fluke	51	2267	12	1-Jun-2008
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
H field probe	Wandel & Goltermann	Type 10.2	3037	-	TU
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	29-May-2008
Modulation Analyser	Hewlett Packard	8901B	3292	12	15-Nov-2008
<b>Section 2.9 Radio (Tx) - Modulation Characteristics</b>					
Modulation Analyser	Hewlett Packard	8901B	45	12	4-Jul-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Power Supply Unit	Hewlett Packard	6269B	113	-	O/P Mon
Audio Analyser	Hewlett Packard	8903B	1881	12	1-Oct-2008
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Sensor	Hewlett Packard	11722A	2787	12	21-Aug-2008
<b>Section 2.6 Radio (Tx) – Occupied Bandwidth</b>					
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Sensor Module	Hewlett Packard	11722A	1333	12	14-Nov-2008
Audio Analyser	Hewlett Packard	8903B	1881	12	1-Oct-2008
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	24-Jul-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	5-Sep-2008
Modulation Analyser	Hewlett Packard	8901B	3292	12	15-Nov-2008



Product Service

<b>Section 2.10 Radio (Tx) - Power Characteristics</b>					
Signal Generator	Hewlett Packard	ESG4000A	38	12	12-Mar-2008
Modulation Analyser	Hewlett Packard	8901B	45	12	4-Jul-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Power Supply Unit	Hewlett Packard	6269B	113	-	O/P Mon
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	24-Jul-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Sensor	Hewlett Packard	11722A	2787	12	21-Aug-2008
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	5-Sep-2008
<b>Section 2.2 Radio (Tx) - Time Out Timer</b>					
Modulation Analyser	Hewlett Packard	8901B	45	12	4-Jul-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Multimeter	Iso-tech	IDM101	2424	12	13-Aug-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Sensor	Hewlett Packard	11722A	2787	12	21-Aug-2008
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	5-Sep-2008
<b>Section 2.7 Radio (Tx) – Frequency Deviation (DSC)</b>					
Power Supply	Hewlett Packard	3468A	1092	12	08-Feb-2009
Hygromer	Rotronic	A1	2138	12	13-May-2009
Multimeter	Fluke	75 Mk3	455	12	13-Dec-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Modulation Analyser	Hewlett Packard	8901B	3292	12	15-Nov-2008
Sensor Module	Hewlett Packard	11722A	1333	12	14-Nov-2008



Product Service

<b>Section 2.12 Radio (Tx) – Carrier Power Reduction</b>					
Power Supply	Hewlett Packard	3468A	1092	12	08-Feb-2009
Hygrometer	Rotronic	A1	2138	12	13-May-2009
Multimeter	Fluke	75 Mk3	455	12	13-Dec-2008
Attenuator (30dB/ 50W)	Bird	8321	46	12	29-Nov-2008
Spectrum Analyser	Rohde & Schwarz	FSQ 26	3545	12	21-May-2009

TU – Traceability Unscheduled

OP MON – Output Monitored with Calibrated Equipment



### 3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Frequency Stability Under Voltage Variations	-	± 47Hz
Frequency Stability Under Temperature Variations	-	± 47Hz
Emission Limitations (Emission Mask)	-	± 1.11dB
Occupied Bandwidth	-	± 360Hz
Emission Limitations (Conducted Transmitter Spurious)	-	± 2.41dB
Emission Limitations (Radiated Transmitter / Receiver Spurious)	30MHz to 1GHz Amplitude	± 5.1dB
	1GHz to 40GHz Amplitude	6.3dB*
Modulation Characteristics	-	± 1.73%
Transmitter Power	-	± 0.7dB
Suppression of Interference Aboard Ships	-	± 2.41dB

\*In accordance with CISPR 16-4

†In accordance with UKAS Lab 34



Product Service

## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

#### 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.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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Product Service

## **ANNEX A**

**TEST RESULTS TAKEN FROM TUV PRODUCT SERVICE REPORT REFERENCE  
RM615529/03 FEBRUARY 2007**





Product Service

**FREQUENCY ERROR (Demodulated signal)**

FCC CFR 47 Part 80: 2006 Clause 80.225

ETSI EN 300 338 CLAUSE 6.2

Test Date: 20<sup>th</sup> November 2006

Ambient Temperature.... 18.2°C      Relative Humidity.....61.9%

Equipment Under Test: JHS-770S

Power level at which the measurement was carried out: 25W

TEST CONDITIONS		DEMODULATED SIGNAL FREQUENCY	
		(Hz)	
		B STATE	Y STATE
T <sub>nom</sub> (18.2°C)	V <sub>nom</sub> (220V 50Hz)	1300.6	2099.3
T <sub>min</sub> (-15°C)	V <sub>min</sub> (90V 47.5Hz)	1300.5	2099.3
	V <sub>max</sub> (264V 63Hz)	1300.5	2099.3
T <sub>max</sub> (+55°C)	V <sub>min</sub> (90V 47.5Hz)	1300.6	2099.4
	V <sub>max</sub> (264V 63Hz)	1300.5	2099.3

**LIMIT CLAUSE 6.2.3**

The measured frequency from the demodulator at any time for the B state shall be within 1300 Hz ± 10 Hz and for the Y state within 2100 Hz ± 10 Hz.

Test Equipment Used

The major items of test equipment used for the above test are identified in section 3.1 of TUV Product Service Report Reference RM615529/03.



Product Service

**MODULATION INDEX**

FCC CFR 47 Part 80: 2006 Clause 80.225

ETSI EN 300 338 CLAUSE 6.4

Test Date: 20<sup>th</sup> November 2006

Ambient Temperature.... 18.2°C      Relative Humidity.....61.9%

Equipment Under Test: JHS-770S

EUT operating on Channel 70 (156.525 MHz)

Power level at which the measurement was carried out: 25W

TEST CONDITIONS		MODULATION INDEX	
		B STATE	Y STATE
T <sub>nom</sub> (18.2°C)	V <sub>nom</sub> (220V 50Hz)	2.038	2.010

**LIMIT CLAUSE 6.4.3**

The modulation index shall be 2.0 ± 10%
---

Test Equipment Used

The major items of test equipment used for the above test are identified in section 3.1 of TUV Product Service Report Reference RM615529/03.



Product Service

**MODULATION RATE**

FCC CFR 47 Part 80: 2006 Clause 80.225

ETSI EN 300 338 CLAUSE 6.5

Test Date: 21<sup>st</sup> November 2006

Ambient Temperature.... 23.5°C      Relative Humidity.....46.2%

Equipment Under Test: JHS-770S

EUT operating on Channel 70 (156.525 MHz)

Power level at which the measurement was carried out: 25W

TEST CONDITIONS		MODULATION RATE		
		Hz	BITS/s	ERROR (PPM)
T <sub>nom</sub> (23.5°C)	V <sub>nom</sub> (220V 50Hz)	600.0101	1200.0202	+16.833

**LIMIT CLAUSE 6.5.3**

The frequency shall be 600 Hz ± 30 ppm corresponding to a modulation rate of 1200 bits/s
--

Test Equipment Used

The major items of test equipment used for the above test are identified in section 3.1 of TUV Product Service Report Reference RM615529/03.



Product Service

**TRANSMITTER FREQUENCY DEVIATION  
(MAXIMUM PERMISSIBLE FREQUENCY DEVIATION)**

FCC CFR 47 Part 80: 2006 Clause 80.215(a)(2)

ETSI EN 301 925 CLAUSE 13.4.2

Test Date: 20<sup>th</sup> November 2006

Ambient Temperature.... 18.2°C      Relative Humidity.....61.9%

Equipment Under Test: JHS-770S

220V 50Hz AC Supply

Power level at which the measurement was carried out 25W

MODULATION 20 dB ABOVE NORMAL	MAXIMUM DEVIATION (kHz)		
		CH 16	
Maximum Deviation (kHz)		+4.2/-4.2	

**LIMIT CLAUSE 13.4.2.2**

Limit	± 5.0 kHz
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Product Service

**TRANSMITTER FREQUENCY DEVIATION  
(MAXIMUM PERMISSABLE FREQUENCY DEVIATION)**

FCC CFR 47 Part 80: 2006 Clause 80.215(a)(2)

ETSI EN 301 925 CLAUSE 13.4.2

Test Date: 20<sup>th</sup> November 2006

Ambient Temperature.... 18.2°C      Relative Humidity.....61.9%

Equipment Under Test: JHS-770S

220V 50Hz AC Supply

Power level at which the measurement was carried out 1W

MODULATION 20 dB ABOVE NORMAL	MAXIMUM DEVIATION (kHz)		
			CH 16
Maximum Deviation (kHz)		+4.3/-4.38	

**LIMIT CLAUSE 13.4.2.2**

Limit	± 5.0 kHz
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Test Equipment Used

The major items of test equipment used for the above test are identified in section 3.1 of TUV Product Service Report Reference RM615529/03.