

MEASUREMENT/TECHNICAL REPORT

Company: Interflex N.A., Inc.

FRN: 0006-6303-47

Models

IF P611

IF P610

IF P1744

IF P1723

IF P623

IF P644

IF P643

IF 1743

FCC ID: P8KPXFA

Description: This is a report to support a request for an original grant of equipment authorization.

Equipment Type: Low Power Communications Device Transmitter (DXX)

Report prepared for:

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Report prepared by:

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Introduction

This report is an application for Certification of a Transmitter operating pursuant to 47 CFR 15.209. The model numbers covered by this report are IF P611, IF P610, IF P1744, IF P1723, IF P623, IF P644, IF P643, and IF P1743. All of these devices contain the same transmitter (Philips HTRC110). This report is designed to demonstrate the compliance of these devices with the requirements outlined in 47 CFR Part 15 using the methods outlined in 47 CFR Part 2.

Testing was performed on the IF P611, IF P1723, and IF P1744. These models are considered to be worst-case representatives of the other five models. Descriptions of the untested models follow:

IF P610: equivalent to the IF P611, without a keypad

IF P623: Slave Terminal version of the IF P1723

IF P644: Slave Terminal version of the IF P1744

IF P643: Slave Terminal version of the IF P1744, without a barcode reader PCB

IF P1743: equivalent to the IF P1744, without a barcode reader PCB

Note: Slave Terminals are reduced configurations with regard to their Master Terminal counterparts. Their functionality is limited to being controlled by other units, rather than having the ability to control. This means that the Slave Terminals lack some modular components, as well as have different firmware.

Statement of Conformity

The Interflex IF P611, IF P1723, and IF P1744 have been found to conform with the following parts of the 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	The products contain no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.31(e)	Readings were taken at the fundamental frequency with the supply voltage varied 15% below the lowest nominal rated voltage and 15% above the highest nominal rated voltage.
	15.203	An antenna is printed directly on the transmitter board. The IF P611 (and the IF P610) also contains an additional antenna loop which is soldered onto the board.
	15.205 15.209	The fundamental is not in a Restricted band and the spurious emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	The unit is DC powered without the capability of being operated from the AC mains.

Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4 (1992). The testing was performed at an antenna to EUT distance of 3 or 1 meter(s) below 30MHz and a distance of 10 or 3 meters above 30MHz. The actual test distance used is noted in the test data sheets. The device's performance was investigated to 1GHz. The EUT was powered by a 24V DC power supply. Since the device is installed in one orientation, the emissions were maximized around the vertical axis and the maximum reading was recorded. The integrated antenna cannot be maximized separately.

All other performance tests were made in accordance with the procedures outlined in Part 15 of CFR 47. The applicable sections provided under Part 15 are provided in the measurement section of this report.

Test Facility

Curtis-Straus LLC

All testing for the range 9kHz–1000MHz was performed at Curtis-Straus (A2LA Certificate Number 1627-01). The open area test site used to collect the radiated data is located at 527 Great Road, Littleton, MA 01460. Sites “A”, “F”, and “T” were used.

Test Equipment Used

SPECTRUM ANALYZERS					
x	Analyzer	Model No.	Company	Serial No.	Calibration Due
X	YELLOW 9kHz-2.9GHz	8594E	HP	3523A01958	27-JUL-2002
X	GREEN 9kHz-26.5GHz	8593E	HP	3829A03618	04-OCT-2002
X	BLACK 9kHz-12.8GHz	8596E	HP	3710A00944	29-JUN-2002
X	ORANGE 9kHz-26.5GHz	E4407B	HP	US39440975	18-MAY-2002

OPEN AREA TEST SITES (OATS)					
x	Site	FCC Code	IC Code	VCCI Code	Calibration Due
X	"F" Florida	93448	IC 2762-F	R-468/ C-480	23-JUN-2002
X	"T" Texas	93448	IC 2762-T	R-905/ C-480	09-SEP-2002
X	"A" Alaska	93448	IC 2762-A	R-903/ C-480	23-JUN-2002

ANTENNAS					
x	Antenna	Model No.	Company	Serial No.	Calibration Due
X	GREEN-WHITE Bilog: 30MHz-2GHz	CBL6112B	Chase	2574	28-JUN-2002
X	SMALL LOOP Passive Loop: 9kHz-30MHz	PLA-130/A	ARA	1024	27-JAN-2003
X	LARGE LOOP Passive Loop: 20Hz-5MHz	6511	EMCO	9704-1154	05-NOV-2003

PREAMPLIFIERS					
x	Preamplifier	Model No.	Company	Serial No.	Calibration Due
X	BLUE 0.01-2000MHz	ZFL-1000-LN	MiniCircuits/ C-S	n/a	18-MAY-2002
X	BLUE-BLACK 0.01-2000MHz	ZFL-1000-LN	MiniCircuits/ C-S	n/a	24-SEP-2002
X	BLACK 0.01-2000MHz	ZFL-1000-LN	MiniCircuits/ C-S	n/a	22-MAR-2003

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Measurement Results

Operating Frequency

These devices operate at 125kHz.

Electric Field Strength Radiation Measurements

Radiated Emissions Table							Curtis-Straus LLC		
Date: 13-Dec-01			Company: Interflex				Table 1		
Engineer: Evan Gould			EUT Desc: IF P611				Work Order: B1260		
Frequency Range: 10kHz - 30MHz									
Notes: Fundamental through tenth harmonic. All measurements are peak readings.						EUT Max Freq: 16MHz Test Site: "T"			
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209		
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
0° (3m)	0.1253	61.8	22.4	51.9	0.0	91.3	105.6	-14.3	Pass
0° (1m)	0.25	36.8	22.6	51.2	0.0	65.4	118.7	-53.3	Pass
0° (3m)	0.3753	34.6	22.6	50.8	0.0	62.8	96.1	-33.3	Pass
0° (1m)	0.5	33.6	22.6	50.6	0.0	61.6	92.7	-31.1	Pass
0° (1m)	0.625	50.4	22.6	50.5	0.0	78.3	90.7	-12.4	Pass
0° (1m)	0.75	36.9	22.6	50.3	0.0	64.6	89.1	-24.5	Pass
0° (1m)	0.8758	45.5	22.5	50.1	0.0	73.1	87.8	-14.7	Pass
0° (1m)	1.0	33.5	22.5	50.0	0.0	61.0	86.6	-25.6	Pass
0° (1m)	1.125	46.7	22.5	49.8	0.0	74.0	85.6	-11.6	Pass
0° (1m)	1.25	37.6	22.5	49.7	0.0	64.8	84.7	-19.9	Pass
Table Result: Pass by -11.6 dB Worst Freq: 1.125 MHz									
10kHz-5MHz >>		Pre-Amp: Blue		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Lg Loop	
5MHz-30MHz >>		Pre-Amp: N/A		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Sm Loop	

Radiated Emissions Table							Curtis-Straus LLC			
Date: 16-Jan-02			Company: Interflex				Table 2			
Engineer: Evan Gould			EUT Desc: IF P611				Work Order: B1260			
Frequency Range: 30-1000MHz						Measurement Distance: 3 m				
Notes: Spurious Emissions						EUT Max Freq: 16MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209			
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	
nf	37.3	42.4	22.6	14.0	0.5	34.3	40.0	-5.7	Pass	
V	100.0	50.5	22.6	10.4	0.9	39.2	43.5	-4.3	Pass	
V	120.0	42.2	22.6	11.7	1.0	32.3	43.5	-11.2	Pass	
V	145.9	50.6	22.5	10.2	1.2	39.5	43.5	-4.0	Pass	
V	156.5	47.2	22.5	9.4	1.2	35.3	43.5	-8.2	Pass	
V	183.4	42.5	22.4	8.5	1.4	30.0	43.5	-13.5	Pass	
V	196.0	46.2	22.4	9.0	1.5	34.3	43.5	-9.2	Pass	
Hbb	229.1	49.0	22.5	10.8	1.7	39.0	46.0	-7.0	Pass	
H	240.0	47.7	22.5	11.5	1.7	38.4	46.0	-7.6	Pass	
H	275.0	52.2	22.6	12.6	1.9	44.1	46.0	-1.9	Pass	
H	290.0	48.5	22.7	12.9	2.0	40.7	46.0	-5.3	Pass	
Hbb	300.0	47.5	22.7	13.1	2.0	39.9	46.0	-6.1	Pass	
Hbb	325.0	45.5	22.6	13.8	2.1	38.8	46.0	-7.2	Pass	
H	350.0	42.7	22.6	14.4	2.2	36.7	46.0	-9.3	Pass	
H	721.9	29.9	22.8	19.4	3.6	30.1	46.0	-15.9	Pass	
Table Result: Pass by -1.9 dB Worst Freq: 275.0 MHz										
Test Site: "F"		Pre-Amp: Blue-Blk		Cable: 65 ft RG8A/U		Analyzer: Yellow		Antenna: Grn-Wht		

Voltage Variations						
Date: 21-Dec-01			Company: Interflex			
Engineer: Evan Gould			EUT Desc: IF P611			
Work Order: B1260			Measurement Distance: 3 m			
Table: 3						
Note: Reading at nominal voltage: 91.3dBµV/m (from Table 1)						
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)
17.42VDC	0.125	61.8	---	---	---	---
0deg			22.4	52.0	0.0	91.4
43.7VDC	0.125	61.4	---	---	---	---
0deg			22.4	52.0	0.0	91.0
Test Site: "A"			Pre-Amp: Black		Cable: 65 ft RG8A/U	
Analyzer: Black			Antenna: Lg Loop			

Radiated Emissions Table							Curtis-Straus LLC		
Date: 14-Dec-01			Company: Interflex				Table 4		
Engineer: Evan Gould			EUT Desc: IF P1723				Work Order: B1260		
Frequency Range: 10kHz - 30MHz									
Notes: Fundamental through tenth harmonic. All measurements are peak readings.						EUT Max Freq: 33MHz			
Test Site: "T"									
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209		
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
0° (3m)	0.1253	57.7	22.4	51.9	0.0	87.2	105.6	-18.4	Pass
0° (1m)	0.25	33.9	22.6	51.2	0.0	62.5	118.7	-56.2	Pass
0° (3m)	0.3753	31.5	22.6	50.8	0.0	59.7	96.1	-36.4	Pass
0° (1m)	0.5	19.3	22.6	50.6	0.0	47.3	92.7	-45.4	Pass
0° (1m)	0.625	38.2	22.6	50.5	0.0	66.1	90.7	-24.6	Pass
0° (1m)	0.75	23.2	22.6	50.3	0.0	50.9	89.1	-38.2	Pass
0° (1m)	0.8758	35.5	22.5	50.1	0.0	63.1	87.8	-24.7	Pass
0° (1m)	1.0	31.6	22.5	50.0	0.0	59.1	86.6	-27.5	Pass
0° (1m)	1.125	37.1	22.5	49.8	0.0	64.4	85.6	-21.2	Pass
0° (1m)	1.25	26.7	22.5	49.7	0.0	53.9	84.7	-30.8	Pass
Table Result:		Pass	by	-18.4 dB			Worst Freq:		0.1253 MHz
10kHz-5MHz >>		Pre-Amp: Blue		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Lg Loop	
5MHz-30MHz >>		Pre-Amp: N/A		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Sm Loop	

Radiated Emissions Table							Curtis-Straus LLC		
Date: 12-Dec-01			Company: Interflex			Table 5			
Engineer: Evan Gould			EUT Desc: IF P1723			Work Order: B1260			
Frequency Range: 30-1000MHz					Measurement Distance: 10 m				
Notes: Spurious Emissions					EUT Max Freq: 33MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.209		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
V	117.5	38.5	22.5	11.5	1.0	28.5	33.0	-4.5	Pass
Vbb	125.7	31.5	22.5	11.6	1.1	21.7	33.0	-11.3	Pass
V	137.1	39.8	22.5	10.8	1.1	29.2	33.0	-3.8	Pass
V	156.6	39.2	22.5	9.4	1.2	27.3	33.0	-5.7	Pass
Vbb	185.7	31.6	22.5	8.6	1.4	19.1	33.0	-13.9	Pass
Hbb	196.0	41.0	22.5	9.0	1.5	29.0	33.0	-4.0	Pass
V	224.0	39.2	22.5	10.5	1.6	28.8	35.5	-6.7	Pass
Hbb	225.1	39.0	22.5	10.6	1.7	28.8	35.5	-6.7	Pass
Hbb	237.4	38.8	22.5	11.3	1.7	29.3	35.5	-6.2	Pass
H	240.0	37.8	22.5	11.5	1.7	28.5	35.5	-7.0	Pass
H	250.0	37.2	22.6	12.1	1.8	28.5	35.5	-7.0	Pass
H	275.0	39.8	22.6	12.6	1.9	31.7	35.5	-3.8	Pass
H	279.1	35.1	22.6	12.7	1.9	27.1	35.5	-8.4	Pass
H	280.0	36.7	22.6	12.7	1.9	28.7	35.5	-6.8	Pass
H	300.0	39.0	22.6	13.1	2.0	31.5	35.5	-4.0	Pass
H	320.0	35.1	22.6	13.6	2.1	28.2	35.5	-7.3	Pass
H	325.0	36.1	22.6	13.8	2.1	29.4	35.5	-6.1	Pass
H	440.0	29.8	22.5	16.3	2.5	26.1	35.5	-9.4	Pass
Table Result: Pass by -3.8 dB Worst Freq: 137.1 MHz									
Test Site: "T"		Pre-Amp: Blue		Cable: 65 ft RG8A/U		Analyzer: Green		Antenna: Grn-Wht	

Voltage Variations						
Date: 21-Dec-01			Company: Interflex			
Engineer: Evan Gould			EUT Desc: IF P1723			
Work Order: B1260			Measurement Distance: 3 m			
Table: 6						
Note: Reading at nominal voltage: 87.2dBμV/m (from Table 4)						
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)
11.9VDC	0.125	57.6	---	---	---	---
0deg			22.4	52.0	0.0	87.2
43.7VDC	0.125	57.6	---	---	---	---
0deg			22.4	52.0	0.0	87.2
Test Site: "A"			Pre-Amp: Black		Cable: 65 ft RG8A/U	
Analyzer: Black			Antenna: Lg Loop			

Radiated Emissions Table							Curtis-Straus LLC		
Date: 17-Dec-01			Company: Interflex				Table 7		
Engineer: Evan Gould			EUT Desc: IF P1744				Work Order: B1260		
Frequency Range: 10kHz - 30MHz									
Notes: Fundamental through tenth harmonic. All measurements are peak readings.							EUT Max Freq: 33MHz		
							Test Site: "T"		
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.209		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
0° (3m)	0.1253	37.9	22.4	51.9	0.0	67.4	105.6	-38.2	Pass
0° (1m)	0.25	29.2	22.6	51.2	0.0	57.8	118.7	-60.9	Pass
0° (3m)	0.3753	37.5	22.6	50.8	0.0	65.7	96.1	-30.4	Pass
0° (1m)	0.5	31.2	22.6	50.6	0.0	59.2	92.7	-33.5	Pass
0° (1m)	0.625	35.8	22.6	50.5	0.0	63.7	90.7	-27.0	Pass
0° (1m)	0.75	21.5	22.6	50.3	0.0	49.2	89.1	-39.9	Pass
0° (1m)	0.8758	27.4	22.5	50.1	0.0	55.0	87.8	-32.8	Pass
0° (1m)	1.0	33.5	22.5	50.0	0.0	61.0	86.6	-25.6	Pass
0° (1m)	1.125	36.6	22.5	49.8	0.0	63.9	85.6	-21.7	Pass
0° (1m)	1.25	26.5	22.5	49.7	0.0	53.7	84.7	-31.0	Pass
Table Result: Pass by -21.7 dB Worst Freq: 1.125 MHz									
10kHz-5MHz >>		Pre-Amp: Blue		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Lg Loop	
5MHz-30MHz >>		Pre-Amp: N/A		Cable: 65 ft RG8A/U		Analyzer: Orange		Antenna: Sm Loop	

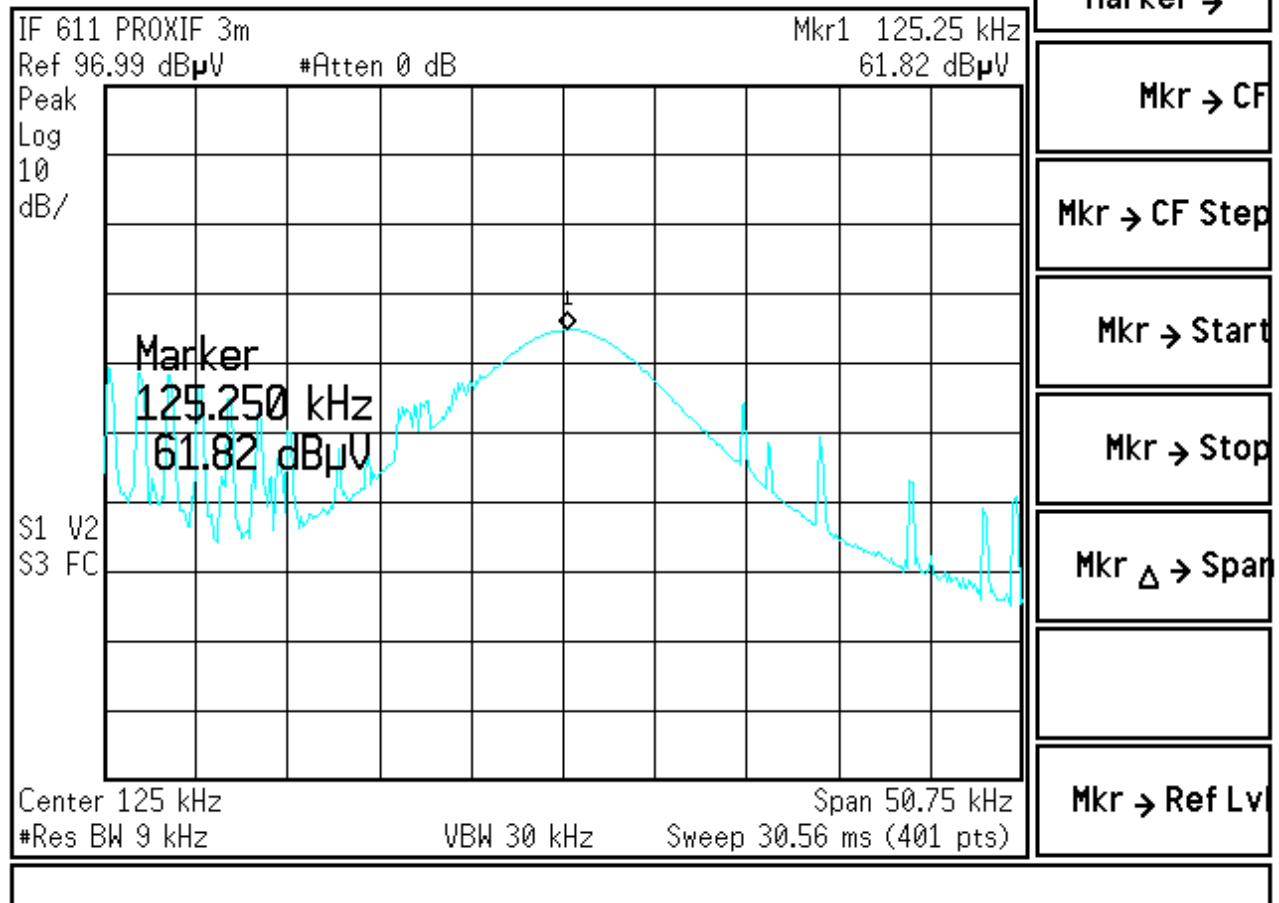
Radiated Emissions Table							Curtis-Straus LLC		
Date: 12-Dec-01			Company: Interflex				Table 8		
Engineer: Evan Gould			EUT Desc: IF P1744				Work Order: B1260		
Frequency Range: 30-1000MHz					Measurement Distance: 10 m				
Notes: Spurious Emissions					EUT Max Freq: 16MHz				
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.209		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
Vbb	126.0	37.0	22.5	11.5	1.1	27.1	33.0	-5.9	Pass
V	135.1	42.5	22.5	10.9	1.1	32.0	33.0	-1.0	Pass
V	136.0	42.4	22.5	10.9	1.1	31.9	33.0	-1.1	Pass
V	143.9	43.3	22.5	10.3	1.2	32.3	33.0	-0.7	Pass
V	151.7	42.5	22.5	9.8	1.2	31.0	33.0	-2.0	Pass
V	151.9	37.7	22.5	9.8	1.2	26.2	33.0	-6.8	Pass
V	160.0	40.1	22.5	9.2	1.3	28.1	33.0	-4.9	Pass
V	168.0	39.8	22.5	8.9	1.3	27.5	33.0	-5.5	Pass
V	171.0	37.6	22.5	8.8	1.3	25.2	33.0	-7.8	Pass
V	179.0	40.0	22.5	8.4	1.4	27.3	33.0	-5.7	Pass
V	200.0	40.6	22.5	9.1	1.5	28.7	33.0	-4.3	Pass
H	225.0	41.3	22.5	10.6	1.7	31.1	35.5	-4.4	Pass
H	256.0	33.3	22.6	12.2	1.8	24.7	35.5	-10.8	Pass
H	279.1	35.7	22.6	12.7	1.9	27.7	35.5	-7.8	Pass
H	296.0	33.8	22.6	13.0	2.0	26.2	35.5	-9.3	Pass
H	300.0	37.0	22.6	13.1	2.0	29.5	35.5	-6.0	Pass
H	325.0	41.0	22.6	13.8	2.1	34.3	35.5	-1.2	Pass
H	375.0	35.4	22.5	15.2	2.3	30.4	35.5	-5.1	Pass
H	400.0	36.4	22.5	16.0	2.4	32.3	35.5	-3.2	Pass
H	450.0	36.1	22.5	16.4	2.6	32.6	35.5	-2.9	Pass
H	600.0	33.5	22.3	18.7	3.1	33.0	35.5	-2.5	Pass
Table Result: Pass by -0.7 dB Worst Freq: 143.9 MHz									
Test Site: "T"		Pre-Amp: Blue		Cable: 65 ft RG8A/U		Analyzer: Green		Antenna: Grn-Wht	

Voltage Variations						
Date: 21-Dec-01			Company: Interflex			
Engineer: Evan Gould			EUT Desc: IF P1744			
Work Order: B1260			Measurement Distance: 3 m			
Table: 9						
Note: Reading at nominal voltage: 67.4μV/m (from Table 7)						
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)
17VDC	0.125	37.0	---	---	---	---
0deg			22.4	52.0	0.0	66.6
43.7VDC	0.125	36.8	---	---	---	---
0deg			22.4	52.0	0.0	66.4
Test Site: "A"			Pre-Amp: Black		Cable: 65 ft RG8A/U	
Analyzer: Black			Antenna: Lg Loop			

Emissions Plots

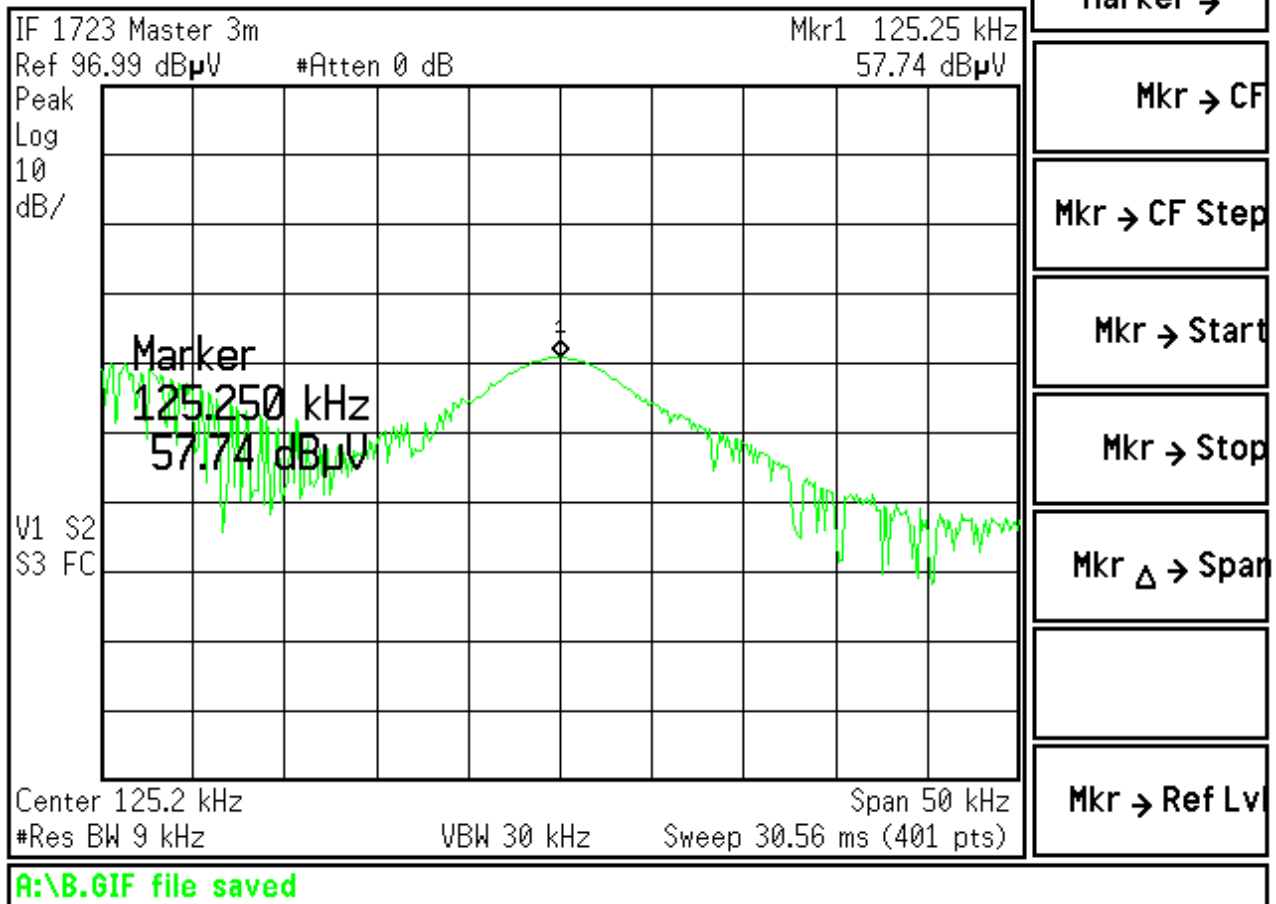
IF P611 Fundamental

Agilent 22:19:45 Dec 13, 2001



IF P1723 Fundamental

✱ Agilent 15:34:21 Dec 14, 2001



IF P1744 Fundamental

* Agilent 11:17:30 Dec 17, 2001

