iSource+™ Low Cost HPFRS Spec

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iPrecision Timing Solutions™

Low Cost High Performance Frequency Rubidium Standard (HPFRS)

High Precision & Performance Source

Telecom | Navigation | Broadcast | Defense | Instrument

Applications

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Product Characteristics:

- Small volume : 0.4 liter
- Frequency offset : over -5°C to +55°C < ± 1× 10^{-10}
- Stability : 3× 10^{-12} / 100 sec.
- Long term stability : < 5× 10^{-10} / year
- Power supply range : 18V to 32V or 11.2V to 15.5V
- Pin out & Package compatible with industry std.
- Output frequencies : 5,10,20 Mhz or any frequency from 1-30 MHz with built-in synthesizer

Main Features:

- Very low temperature sensitivity
- Excellent short term stability
- Low power consumption
- Fast warm-up
- Small volume / low profile
- Rb lamp extended life expectancy (20 years)
- Pin out compatible with other Rb sdt
- RS 232 interface for centre frequency adjustment and monitoring
- Built-in Synthesizer

Main Applications:

- Synchronisation telecommunications (SDH, SONET, SS7, GSM, TETRA)
- Digital Audio Broadcast
- TV transmissions (analog & digital)
- Military communications
- Navigation
- Instrumentation
- Tracking and guidance control

Parameters accessible through RS232:

The working and monitoring parameters of the HPFRS-02 are accessible for read and write operations through the serial RS-232 port (1200 bits/sec., no parity, 1 start bit, 8 data bits, 1 stop bit).
There are three different commands, which are:
M, *Cxx* and *Fxx* followed by a carriage return.

M: monitors the basic factory adjustments of the atomic clock.
The returned answer looks like

HH GG FF EE DD CC BB AA <CR>

Where each returned byte is an ASCII coded hexadecimal value, separated by a <Space> character. All parameters are coded at full scale.

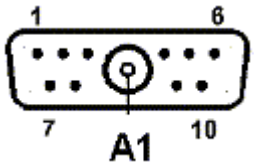
HH: DC-Voltage of the photocell (5V to 0V)
GG: peak voltage of Rb-signal (0 to 5V)
FF: not used
EE: varactor control voltage (0 to 5V)
DD: Read-back of the user provided frequency adjustment voltage on pin 2 (0 to 5V)
CC: Rb-lamp heating information
BB: Rb-cell heating information
AA: Automatic gain control voltage of the rubidium RF section (0 to 15V)

Cxx: output frequency correction through the synthesizer, by steps of 1 x 10^{-9} , where xx is a signed 8 bits word. This value is automatically stored in a EEPROM.

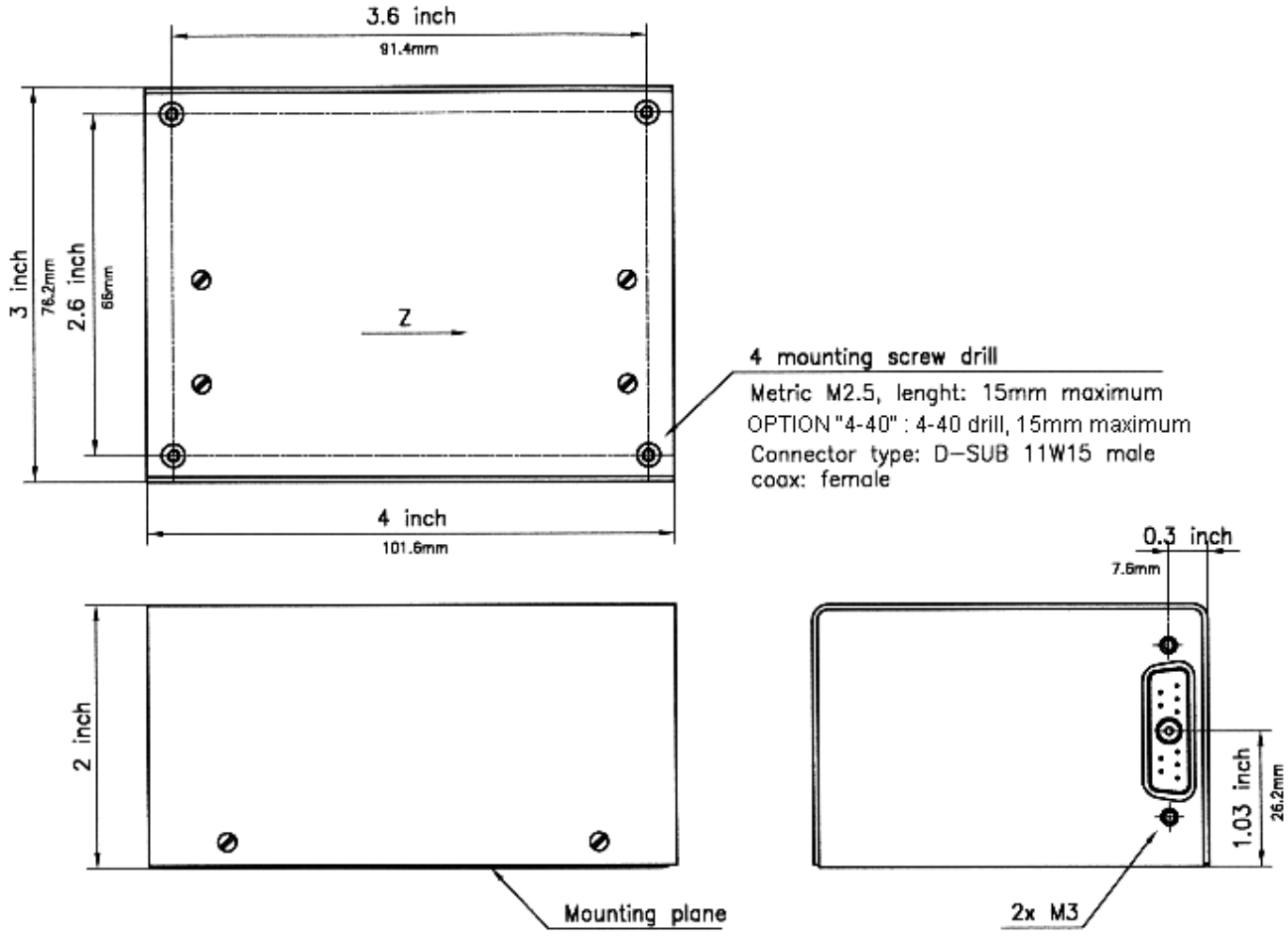
Fxx: output frequency correction through C-field, by steps of 1 x 10^{-11} , where xx is a signed 8 bits word.

PIN FUNCTION LAYOUT

The complete pin layout for the sub-D connector is given in following figure



1	Lock monitor	Out	Default: not connected (Lock indicator on pin 8) Option L (open collector): open when locked. Option B (TTL output): Low when locked.
2	Frequency adj.	In	Analog center frequency adjustment
3	GND	I/O	Voltage frequency adjustment return
4	TxD (TTL)	Out	Transmit pin for RS232 operation
5	RxD (TTL)	In	Receive pin for RS232 operation
6	Power +24V (12V)	In	Power supply input +18 to 32 V or 11.2 to 15.5 V
7	NC	Out	Not connected or Optional Xtal voltage monitor
8	+5Vref.	Out	Voltage reference for frequency adjustment Default - Lock indicator: 5V = locked / 0.4V = unlocked For option L or B: +5Vref is always at 5V.
9	Power +24V (12V)	In	Power supply input +18 to 32 V or +11.2 to 15.5 V
10	GND	I/O	Supply return line
A1	Freq. out	Out	Frequency output



SPECIFICATIONS

ELECTRICAL:

Type	HPFRS-02	
	Standard version	**Options**
Frequency	5, 10, 20 MHz	4.096, 8.192, 16.384 MHz + other on request
Frequency change within operating temperature range (peak to peak) (Thermal chamber with air flow)	<= $2x10^{-10}$ over -5°C to +55°C	over -25°C to +60°C **(option code E)** over -5°C to +65°C (**Option code 65**)
Long term stability: (after 2 months continuous operation) per month for the first year over 15 years	< 1×10^{-10}/month < 5×10^{-11}/month typical < 3×10^{-11}/month typical	**Option code A** (Consult factory)
Short term stability	Standard 3×10^{-11} / 1 s 1×10^{-11} / 10 s 3×10^{-12} / 100 s	**Option code S (only for 5,10,20 MHz)** 1×10^{-11} / 1 s 3×10^{-12} / 10 s 1×10^{-12} / 100 s
Phase noise (10 MHz)	Standard -70 dBc/Hz at 1 Hz -80 dBc/Hz at 10 Hz -115 dBc/Hz at 100 Hz -135 dBc/Hz at 1 kHz -140 dBc/Hz at 10 kHz	**Option code S (only for 10 MHz)** -80 dBc/Hz at 1 Hz -100 dBc/Hz at 10 Hz -130 dBc/Hz at 100 Hz -145 dBc/Hz at 1kHz -150 dBc/Hz at 10 kHz
Frequency retrace (in stable temperature, gravity, pressure and magnetic field conditions)	< 5×10^{-11} within 1 h after 24 h off	
Warm-up time [minutes]	5×10^{-10} after 15' at +25° C	Option Fast :<7 min. to lock **Option code F**
Analog frequency adjustment Typically: the cursor pin of a 10kohms or 22kohms potentiometer connected between pins 8 and 3 can provide this adjustment voltage. **Standard option**: Vref output impedance: 1000 ohms if HPFRS-02 is in **locked state**. Vref =**0V if not locked**	2.5×10^{-9} ± 20%	5×10^{-9} ± 20% (option code O)

ENVIRONMENTAL (for other Environmental qualifications, consult factory) **:**

Type	HPFRS-02			
	Standard version		**Options**	
Digital frequency adjustment through serial RS-232 port. Coarse adjustment: Fine adjustment:	$\pm$ 1.2 x 10^{-7} (resolution 1 x 10^{-9}) 2.5 x 10^{-9} (resolution 1 x 10^{-11}) $\pm$ 20%			
Lock indicator / Vref pin (L = open collector, B = TTL) Locked Unlocked	Standard Lock pin 1 Unused Unused	Standard Vref pin 8 5V < 0.4V	**Option L** Lock pin 1 Open Closed	**Option B1** Lock pin 1 < 0.4V 5V
			Vref pin 8 = 5V	
Harmonics / Subharmonics	< -25 dBc / <-60dBc			
Output voltage	0.5 V_{RMS} $^{\pm}$ 10 % into 50 ohms			
Spurious f_0 $\pm$ 100kHz	< -80dBc			
Supply voltage	**24V option** : 18 V to 32 V		**12V option** : 11.2V to 15.5V	
Supply voltage sensitivity	< 2 x 10^{-11} / V			
Input power	-5° C: <13 W +25° C: <10 W +55° C: <7 W			
Typical warm-up power **Option F, Option E, Option 65**	20W		25W with 24V option < 32W	
Electrical Protection power pin RF output TxD output 5V ref/lock output RxD input Frequency adjust input	Protected against reverse polarity connection ESD and short-cut protected ESD and short-cut protected ESD and short-cut protected except for option B ESD protected ESD protected			
Magnetic field sensitivity (static)	< 2 x 10^{-11} / Gauss for X and Y axis < 1 x 10^{-10} / Gauss for Z axis			
Storage Temperature	- 55°C to + 90°C			
Operating HPFRS-02 case temperature or temp. of the thermal chamber	-5°C to +55°C		**(Option code E)** -20°C to +60°C	
Overall Environment Effects * (Altitude,Vibration,Shocks)	Meets or exceeds MIL-T-28800B for Type III, class 5 equipment			
Humidity	RTCA/DO-160C hot humidity, 35°C, 95% relative humidity			
Helium concentration sensitivity	< 1 x 10^{-10} / ppm Helium concentration changes			

PHYSICAL

Size	51 x 102 x 77 mm. (2.0 x 4.0 x 3.0 inches)	
Weight	470 g max. (1.025 Lbs. max)	
Volume	0.4 liter (24 inches cubed)	
Connector	10 male contacts / 1 male coaxial contact Mate with ITT Cannon Series DAM11W1	
Mounting	4 x 2.5 mm screw drill	**Option "4-40"** 4 x 4-40 screw drill

Ordering Information :

HPFRS / XX / 10 M / 12 V

Type Option Frequency Supply voltage