User Manual
RFS-700D
Rubidium Frequency Standard
DIN Rail Package

P/N 001-0509

900000181 REV. B
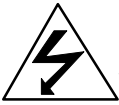**July 2024**

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Revision History

REVISION	DATE	COMMENTS	ECO NUMBER
A	04/13/2020	INITIAL RELEASE	ECO11275
B	07/3/2021	Changed temperature specs to match test results	ECO13217

Safety Warnings

WARNING:
The lightning flash with an arrowhead inside of an equilateral triangle is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product's enclosure. The "dangerous voltage" may be of sufficient magnitude to constitute a risk of electrical shock to people.

CAUTION:
Observe all necessary precautions for handling electrostatic discharge sensitive devices when handing component modules. Improper handling will damage internal circuitry.

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1 Introduction

1.1 Basic Concept

Figure 1 - RFS-700D

Brandywine's RFS-700D is a miniaturized Rubidium Frequency Reference in a compact ruggedized package designed for mounting on a DIN rail system. The RFS-700D is capable of outputting 7x 10MHz frequency reference with low phase noise.

The frequency standard includes a low phase noise oven controlled quartz oscillator, which is frequency locked to the rubidium oscillator. The time constant of this loop is selected such that the short term stability (and phase noise) of the outputs are determined by the OCXO characteristics, which the long term stability is determined from the rubidium oscillator.

The frequency standard has internal temperature sensors that are used to compensate the oscillator, based on a factory calibration, to improve the overall accuracy of the system.

The unit has been qualified under MIL-STD-810F for operation in demanding environments.

1.2   System Overview

The RFS-700D receives power via a 24 VDC power supply via a DC terminal block connector, and outputs seven 10MHz reference signals via 50 Ω SMA connectors. In addition, there is an Ethernet port that is used for remote management and control of the RFS-700D.

1.3   Specifications

Power

Input Voltage Range:	18-28 VDC
Nominal Input Voltage:	24 VDC
Input Connector:	Terminal Block
Power consumption:	15 W

Output

Connector type:	SMA
No. of connectors:	7
Output Frequency:	10 MHz
Output impedance:	50Ω
Short term stability:	1 E-11
Aging:	5 E-11 per Month
Phase Noise @ 100Hz	-138 dBc/Hz
Phase Noise @ 1kHz	-151 dBc/Hz
Phase Noise @10kHz	-165 dBc/Hz
Phase Noise @100kHz	-165 dBc/Hz

Environmental

Operating temp.:	-30 deg. C to +65 deg. C
Storage temp.:	-40 deg. C to +85 deg. C
Humidity:	95% Non-condensing
Operating Altitude:	10,000 ft. ASL
Non-Operating Altitude:	50,000 ft. ASL

Ethernet

Port speed:	10/100BaseT
Protocols supported:	SNMPv3
Fault reporting:	Output fail (1-7), Rb Lock Status, PLL lock status, Over current (OCXO)temp.

2 Setup

2.1 Installation

Remove the RFS-700D from the shipping carton and protective packaging. Mount the RFS-700D securely onto the DIN rail. Connect the unit for power via the terminal block connector on the top of the unit. Connect the 10 MHz outputs to the rest of the equipment in the cabinet as required.

3 Configuration

The RFS-700D is configured via SNMPv3 over the included Ethernet port. Please see the attached MIB file for more information.

4 Operation

The RFS-700D requires no user intervention for normal operations. For Maintenance tasks, please refer to Chapter 5, for troubleshooting procedures, please refer to Chapter 6.

5   Maintenance

The RFS-700D requires no regular maintenance tasks for normal operation. Care sure be taken on a regular basis to clean the unit as well as visually inspect it for loose or frayed connections, as well as making sure that the power and frequency output connectors are firmly connected.

6   Troubleshooting

These instructions will help in troubleshooting the RFS-700D (001-0509).

Figure 2 - RFS-700D

6.1   LEDs

The three LEDs on the case are the most important tool for troubleshooting.
They include "Output Status", "PLL Locked" and "Rb Locked".
On startup, the Output Status LED will momentarily be Red until the oscillators are stable at which point it turns Green.
In normal operation, the LEDs will all be Green.
Any persistent Red LEDs indicates a hardware problem that requires service.

6.2   SNMP

The check the status of individual outputs (J1-J7) requires SNMP over the network connection.
There are many free GUI and command-line tools for windows.
The following example uses the snmpwalk command-line tool from the Net-SNMP open-source project.
http://www.net-snmp.org/

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6.2.1 SNMPWALK and OIDs

The top-level Object Identifier (OID) for Brandywine devices is iso.identified-organization.dod.internet.private.enterprise.brandywine (1.3.6.1.4.1.18954)
The following example shows the command for walking the Brandywine MIBs from the top of the tree and it's output.

```
root@beaglebone:~# snmpwalk -v3 -l authPriv -u dinrailUser -a SHA -A
dinrailAuthPassPhrase -x AES -X dinrailPrivPassPhrase 192.168.1.212
1.3.6.1.4.1.18954
SNMPv2-SMI::enterprises.18954.500.1.1.0 = INTEGER: 6034
SNMPv2-SMI::enterprises.18954.500.1.2.0 = STRING: "001-0509"
SNMPv2-SMI::enterprises.18954.500.1.3.0 = STRING: "0AB34A"
SNMPv2-SMI::enterprises.18954.500.1.4.0 = STRING: "925601301"
SNMPv2-SMI::enterprises.18954.500.1.5.0 = STRING: "v1.0"
SNMPv2-SMI::enterprises.18954.502.6034.1.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.2.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.3.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.4.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.5.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.6.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.7.0 = INTEGER: 0
SNMPv2-SMI::enterprises.18954.502.6034.8.0 = INTEGER: 1
SNMPv2-SMI::enterprises.18954.502.6034.9.0 = INTEGER: 1
SNMPv2-SMI::enterprises.18954.502.6034.10.0 = Gauge32: 143
```

In this example the DIN Rail is at IP 192.168.1.212.

7   Support Information

All Brandywine Communications products come with a one-year warranty.
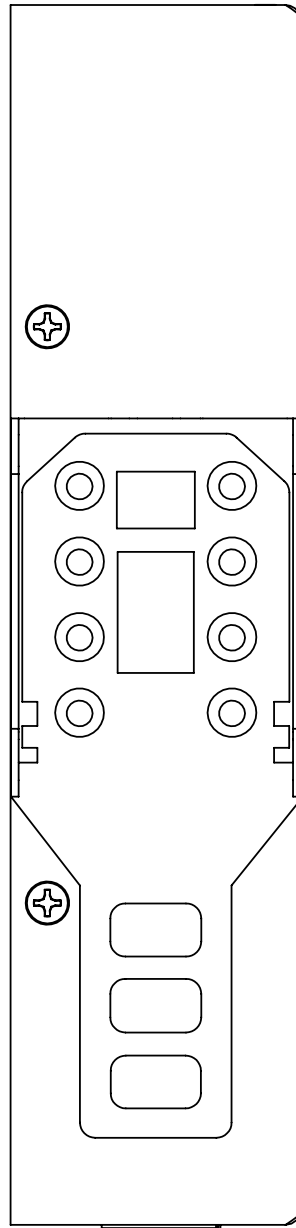
If the unit is still exhibiting problems not covered by the above troubleshooting guide, contact us for technical support at support@brandywinecomm.com or call us at 714-755-1050.

If it becomes necessary to return the unit to the factory for repairs, call us at 714-755-1050 extension 113 to arrange an RMA.

8   Front Panel Drawing
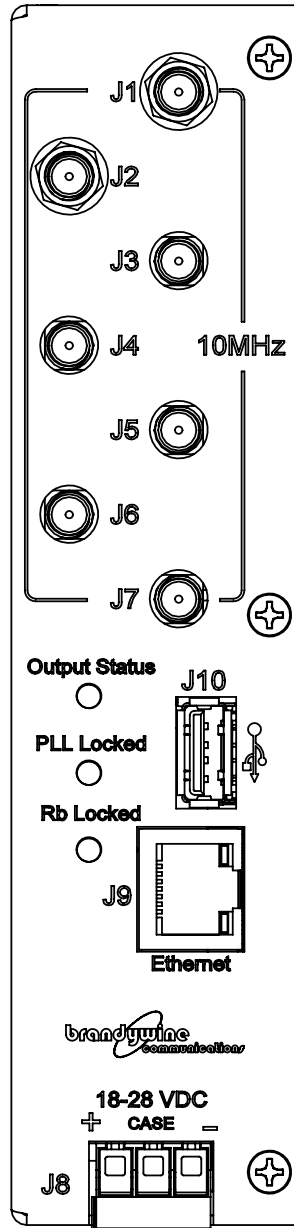
9   Rear Panel Drawing

10 Parts Lists

11 MIB File

```
-- DIN Rail MIB.
--
-- Author                      Date        Comment
-- ====================================================================
-- Sonny Bui                    12/23/2019    Initial
--

BRANDYWINECOMM-DINRail-MIB DEFINITIONS ::= BEGIN

       IMPORTS
              brandywineComm,
              products FROM BRANDYWINECOMM-COMMON-MIB
              enterprises       FROM RFC1155-SMI
              OBJECT-TYPE       FROM RFC-1212
              TRAP-TYPE         FROM RFC-1215;

DINRail MODULE-IDENTITY
     LAST-UPDATED "201912230000Z"
     ORGANIZATION "Brandywine Communications Inc"
     CONTACT-INFO "support@www.brandywinecomm.com"
     DESCRIPTION  "All objects specific to the DINRail project"
--   Revision History
       REVISION     "201912230000Z"
     DESCRIPTION  "preliminary"
                     ::= { products 6034 }


Fault1 OBJECT-TYPE
       SYNTAX        INTEGER { no-fault(0), fault(1) }
       MAX-ACCESS    read-only
       STATUS        current
       DESCRIPTION   "Output Fail #1"
       ::= { DINRail 1 }

Fault2 OBJECT-TYPE
       SYNTAX        INTEGER { no-fault(0), fault(1) }
       MAX-ACCESS    read-only
       STATUS        current
       DESCRIPTION   "Output Fail #2"
       ::= { DINRail 2 }

Fault3 OBJECT-TYPE
       SYNTAX        INTEGER { no-fault(0), fault(1) }
       MAX-ACCESS    read-only
       STATUS        current
       DESCRIPTION   "Output Fail #3"
       ::= { DINRail 3 }

Fault4 OBJECT-TYPE
       SYNTAX        INTEGER { no-fault(0), fault(1) }
       MAX-ACCESS    read-only
       STATUS        current
```

```
              DESCRIPTION   "Output Fail #4"
              ::= { DINRail 4 }


Fault5 OBJECT-TYPE
              SYNTAX        INTEGER { no-fault(0), fault(1) }
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "Output Fail #5"
              ::= { DINRail 5 }


Fault6 OBJECT-TYPE
              SYNTAX        INTEGER { no-fault(0), fault(1) }
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "Output Fail #6"
              ::= { DINRail 6 }


Fault7 OBJECT-TYPE
              SYNTAX        INTEGER { no-fault(0), fault(1) }
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "Output Fail #7"
              ::= { DINRail 7 }




RbLocked OBJECT-TYPE
              SYNTAX        INTEGER { no-locked(0), locked(1) }
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "Rb Locked 3.3V"
              ::= { DINRail 8 }

ocxoLocked OBJECT-TYPE
              SYNTAX        INTEGER { no-locked(0), locked(1) }
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "OCXO Locked"
              ::= { DINRail 9 }




ocxoCurrent OBJECT-TYPE
              SYNTAX        Unsigned32
              MAX-ACCESS    read-only
              STATUS        current
              DESCRIPTION   "OCXO Current in mA"
              ::= { DINRail 10 }


END
```