

SDI 3G/HD/SD Distribution Amplifier

Rev E

Part Number

13-111-102-A (1x2)

13-111-104-A (1x4)

83-211-102-A (Dual 1x2)

83-411-102-A (Quad 1x2)

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Document History

<u>REV</u>	<u>Date</u>	<u>Action</u>
E	Jan 16, 2014	Addition of Dual/Quad 1x2 to product family.
D	Mar 21, 2013	Updated Current measurement Added detail to power supply section.
C	Jun 22, 2011	Added additional power connector pin functions Add connector “J” reference designators
B	Jan 29, 2012	Added Maintenance Mode commands.
A	Nov 15, 2011	Initial release

1 Overview

The 13 and 83 Series Serial Digital Interface (SDI) 3G/HD/SD Distribution Amplifiers (DA's) included in this manual provide a way of distributing one SDI signal to two or four other devices. Dual and Quad DA's provide a way of distributing two or four SDI signals to two other devices for each SDI input. Each SDI input features adaptive cable equalization and re-clocking of data rates from 125Mbps to 2.97Gbps. The following SDI formats are supported:

Type	Standard	Rate	Range ¹
Standard Definition (SD-SDI)	SMPTE259M	270/360Mbps	400 meters
High Definition (HD-SDI)	SMPTE292M	1.5485Gbps	200 meters
High Definition (3G-SDI)	SMPTE242M	2.97Gbps	120 meters

Table 1 SDI Signal Types and Optimized range using Belden 1694A

The 13 & 83 Series units automatically detect the incoming serial data stream and suppress accumulated jitter by retiming to the recovered phase-locked data rate. All outputs cable drivers incorporate selectable slew rate control. SDI input and output connections are via high speed BNC connectors. The use of high quality connectors and cable (Belden 1694A or equivalent) is highly recommended to achieve optimum performance.

Universal Serial Bus (USB) port/interface (multiple) provides the unit maintenance interface. This permits the user to view and change the default configuration parameters, select specific inputs for system debug, and upgrade firmware. Internal non-volatile memory is used to hold the power up default settings.

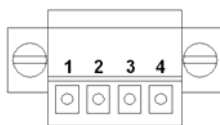
The power connector is a 4 pin 3.5mm on-center header (Phoenix Contact #1897267) and mating power plug (Phoenix Contact #1847071) with screw flanges for vibration and shock resistance. External power source is isolated from the internal power and will operate correctly from 10-24 VAC or 10-32 VDC.

2 Status LED

A bi-color LED (green/yellow for each input channel) provides power and operational status. At power-on and during unit power on self-test: status LEDs will illuminate with both LEDs active. After self-test the LEDs momentarily turn OFF, followed by LEDs providing an indication of signal presence. Green indicates signal presence, Amber indicates no-signal. Dual and Quad units incorporate a LED per channel.

3 Power Requirements

This unit has an internal switching supply that isolates supply power from the internal power. The units will operate correctly from 10-24 VAC or 10-32 VDC. Units are equipped with full wave rectification on the power front end, so power may be applied to Pin 1 & 2 using either polarity.



- Pin 1 Power IN1 (Supply Connection +V)
- Pin 2 Power IN2 (Supply Connection -V)
- Pin 3 AGND/Circuit Ground (Same as SDI BNC Shields)
- Pin 4 CGND/Chassis Ground (Ground for ESD Protection)

Figure 1

¹ Maximum length/range using Belden 1694A Cable per SD/HD SDI equalizer specification.

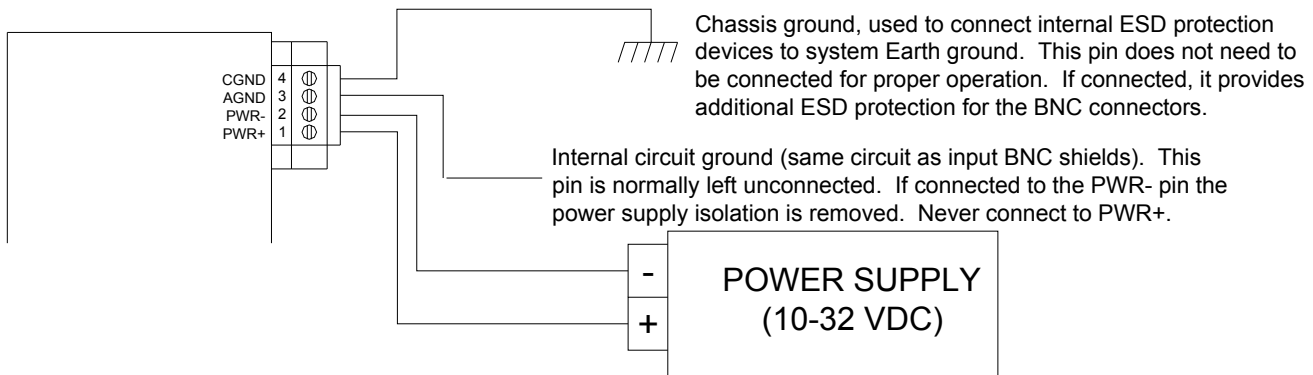


Figure 2

Circuit ground (AGND/Pin-3) is the internal circuit ground reference. It is NOT the input voltage return path of pins 1 and 2. The user has the option of floating internal circuits, with respect to any system ground, by not connecting to this pin. The user also has the option to connect the circuit ground to the chassis ground or the input power ground (or both). This power connector pin-out permits the user to define the grounding environment the unit is used in.

Chassis ground (CGND/Pin-4) is the electrical return path for all Electro-Static Discharge (ESD) protection devices. Chassis ground does not need to be connected for proper operation. Secondary ESD protection connections exist between the input and output video signals and internal circuit ground.

The power connector (J7) is a 4 pin 3.5mm center header (Phoenix Contact #1897267). Each unit is shipped with the mating power plug (Phoenix Contact #1847071). The screw flange feature of this connector has shown increased performance for high vibration and shock resistance.

4 Universal Serial Bus (USB) Maintenance Interface

The Universal Serial Bus (USB) maintenance port provides a terminal interface that the user may use to perform several functions such as: Selection of the control mode, setting configuration parameters, displaying status, and performing debug/maintenance. **Maintenance commands and functions are described at greater detail in Section 5.**

The mini-USB port connects to the unit processor via a virtual serial communication channel. Terminal programs such as HyperTerminal² may be used to view, enter, and modify configuration parameters. User modified configuration parameters are saved in non-volatile memory as the power-up defaults. Xon/Xoff flow control is used during firmware update.

The USB cable may be plugged into the unit at any time. The computer then enumerates the USB-to-UART bridge interface and establishes the Serial communication port number. The “port” should now be visible when configuring the terminal program. USB port configuration parameters should be: 9600bps 8-N-1. (8bit, No parity, 1Stop). Loading of the CP2102 USB-bridge driver (available from Silicon Labs web site) may also be required.

NOTE: USB shield is referenced to Chassis Ground. It is therefore possible for a ground “Sneak Path” to be created through the connected laptop computer. This will typically occur when the laptop or peripherals are connected to an external power source.

² HyperTerminal is no longer a software component of post Windows-XP operating systems. Alternate terminal programs such as Hercules Setup may be considered.

5 Maintenance Mode Commands (USB)

This unit has a USB port permitting the user to retrieve information, change parameters, and system debug. The intent of this port is for it to be connected to a laptop computer and use a terminal program to communicate with the internal processor.

At unit power up the user may enter the Maintenance Mode by entering NO when asked if the user wants to download new code. Once the unit is up and running, any key will signal code that the user wants to enter Maintenance Mode. Two carriage return (↵) characters are required to enter Maintenance Mode. If the two carriage return characters, or if no key activity is detected for 30 sec, the code will return to the RUN/Application mode.

Depending on the selected option it may be necessary to change or configure additional parameters. Some parameter value changes may not be available or take effect until the next system reset or power-up is performed. All parameters are retained in non-volatile memory

Symbols:

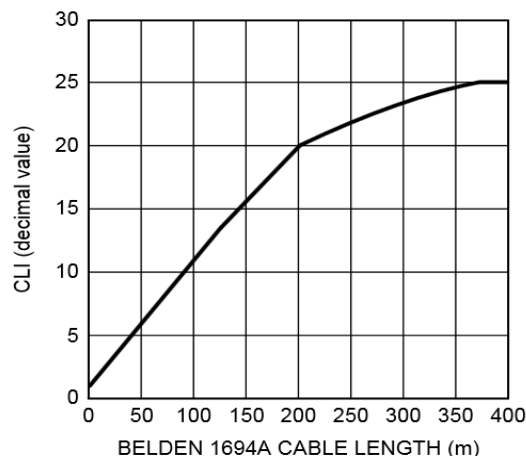
- ↵ = Carriage Return (0x0D)
- = Space (0x0A)

- X1 = One Character X decimal number
- X2 = Two Character XX decimal number

The following shows the different commands available in Maintenance Mode³.

Commands:

- HELP↵ Responds with the list of valid Maintenance mode commands.
- INFO↵ Displays the unit information:
Part Number
Serial Number
Revision level
CRC values.
- STATUS↵ Displays current status information:
Mode: HD/SD
Lock Status
Carrier Detect status.
CLI: X2 Cable Length Indication. As cable length increases the value increases.



- RELOCK•ON/OFF↵ Enables/Disables the re-clocking and de-emphasis functions.

³ Maintenance Mode commands are not case sensitive.

Extend3G●ON/OFF← Enables/Disables Extended cable Reach mode for 3G

RateDetect●← Data Rate Select: (SEE Page 9 of LMH0346)
0: Auto-Rate Detect/Select
1: 270Mbps (SD/DVB-ASI)
2: 1283/1485Mbps(HD), 2967/2970Mbps(3G)

RUN← Exits Maintenance mode and returns/jumps to main application.

REBOOT← Forces code to re-start as if power was cycled. (aka “cold start”)

LOAD●NEW●CODE← Permits the user to load a new revision of processor code.

NOTE:

Care must be taken any time a new revision is to be loaded.
It is the responsibility of the user to contact the factory before attempting to use this function.

6 Specifications:

Video Formats: SMPTE 292M (1.48Gbit/s)
 SMPTE 259M (270/360Mbit/s)
 SMPTE 424M (2.97Gbit/s)

Output: V_{swing} 400-800mV_{p-p} (700mV_{p-p})
 V_{Offset} 1.05-1.85V (1.25V)
 Z_{Term} 75Ω - AC coupled

Connectors: BNC
 Input Termination: 75 Ohms,

USB Interface (ASCII data) 8 bit
 9600
 1 stop
 No parity
 XON/XOFF flow control (code loading)

Power LED: Green (Indicates uP is running)
 Yellow (Used to display control mode at power-up)

Operating Temperature: -40°C to +85°C

Power: AC: 10-28Vac
 DC: 10-32Vdc (either polarity on PWR connector)

Supply Current:

Part Number:	Pwr	12Vdc	28 Vdc
13-111-102-A	4W	<340mA	<125mA
13-111-104-A	3W	<290mA	<100mA
83-211-102-A	3W	<300mA	<110mA
83-411-102-A	6W	<600mA	<220mA

Power Connector: 3.5mm 4 pin terminal block (Phoenix Contact #1843813)
 Mating plug (Phoenix Contact #1847071)

Specified Torque⁴ 3.5mm Plug Terminal/M2: 0.22-0.25Nm
 3.5mm Plug Flange/M2.5: 0.40-0.50Nm

Package Dimensions:

Part Number:	Dimensions	Weight
13-111-102-A	4.4" x 2.2" x 0.650"	8oz
13-111-104-A		
83-211-102-A		
83-411-102-A	4.4" x 2.2" x 1.40"	17oz

Mounting: 6-32 threaded inserts (2)

⁴ Phoenix Contact indicates that Torque specified under DIN EN 60947-1 is sufficient to secure connections, however recommended those listed.

7 Mechanical

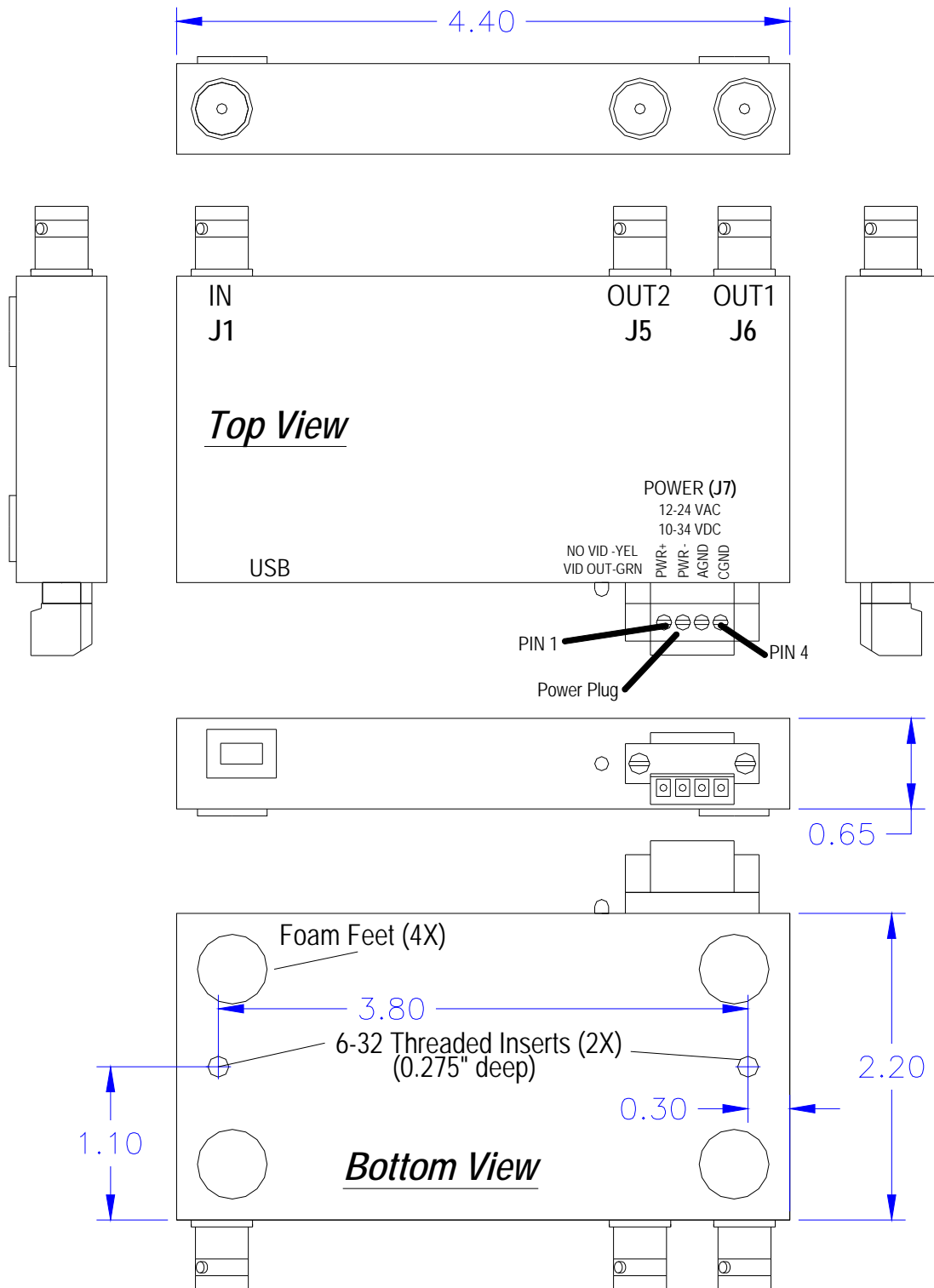


Figure 3: 13-111-102-A (1x2 SDI DA)

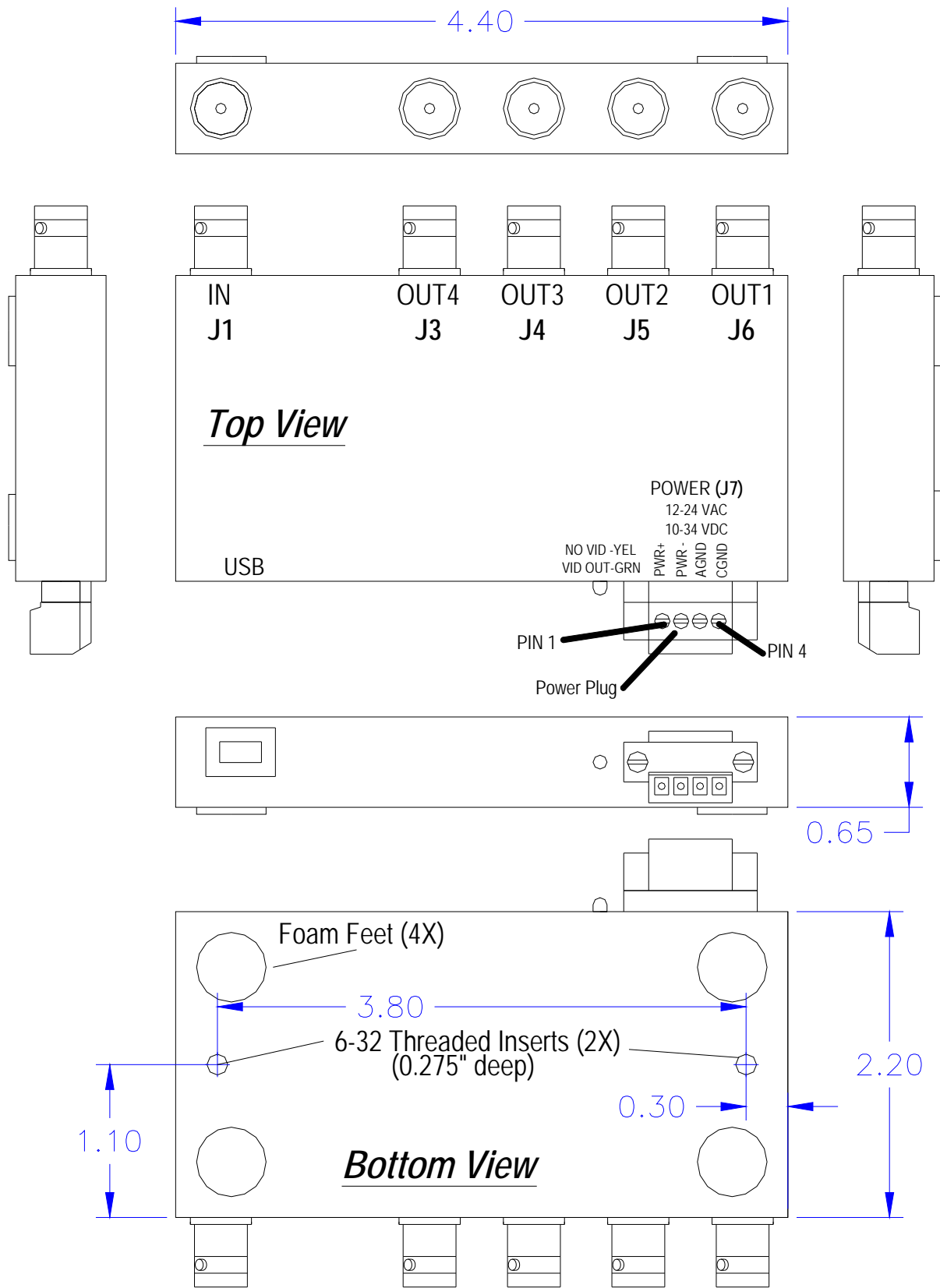


Figure 4: 13-111-104-A (1x4 SDI DA)

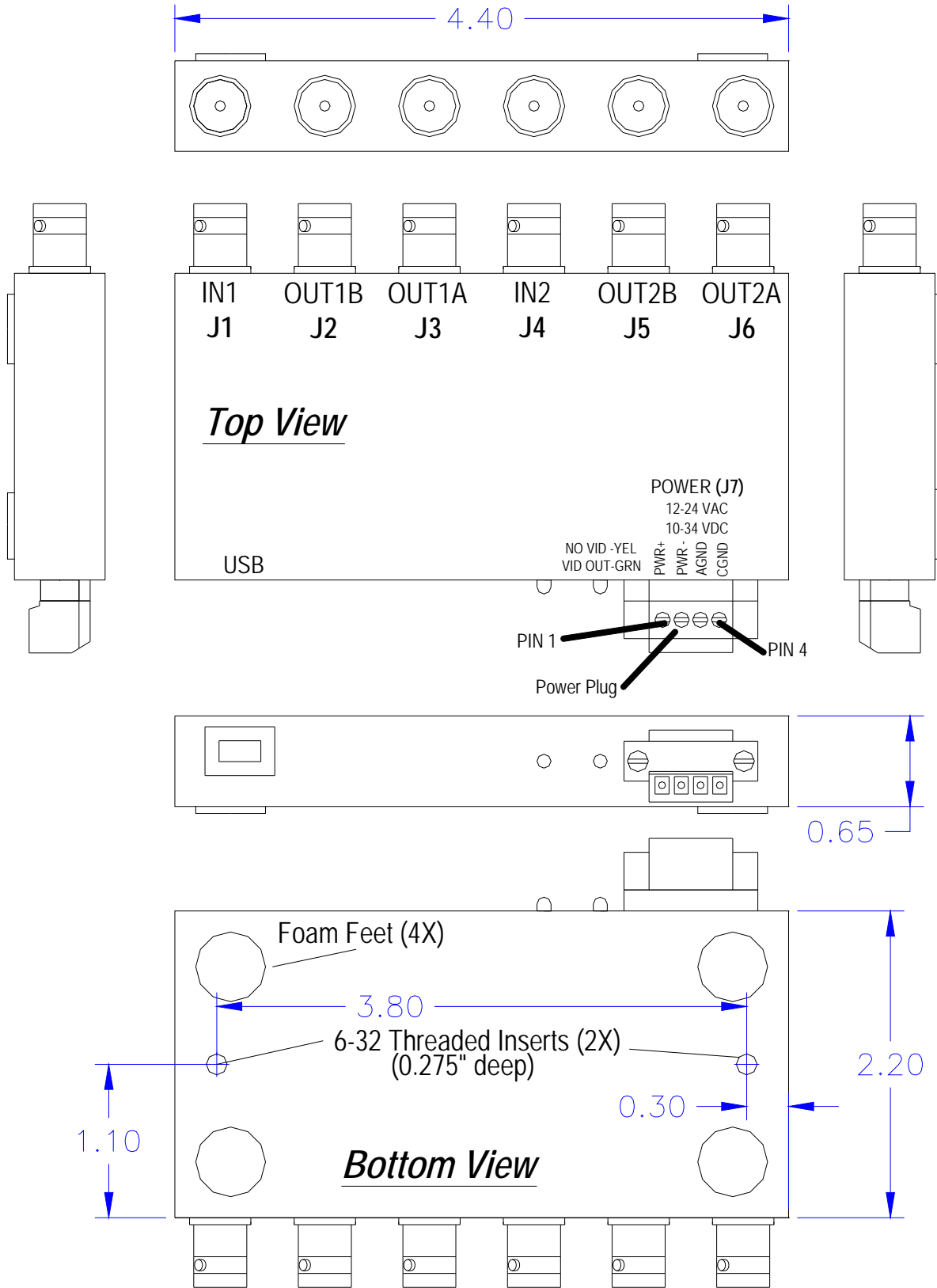


Figure 5: 83-211-102-A (Dual 1x2 SDI DA)

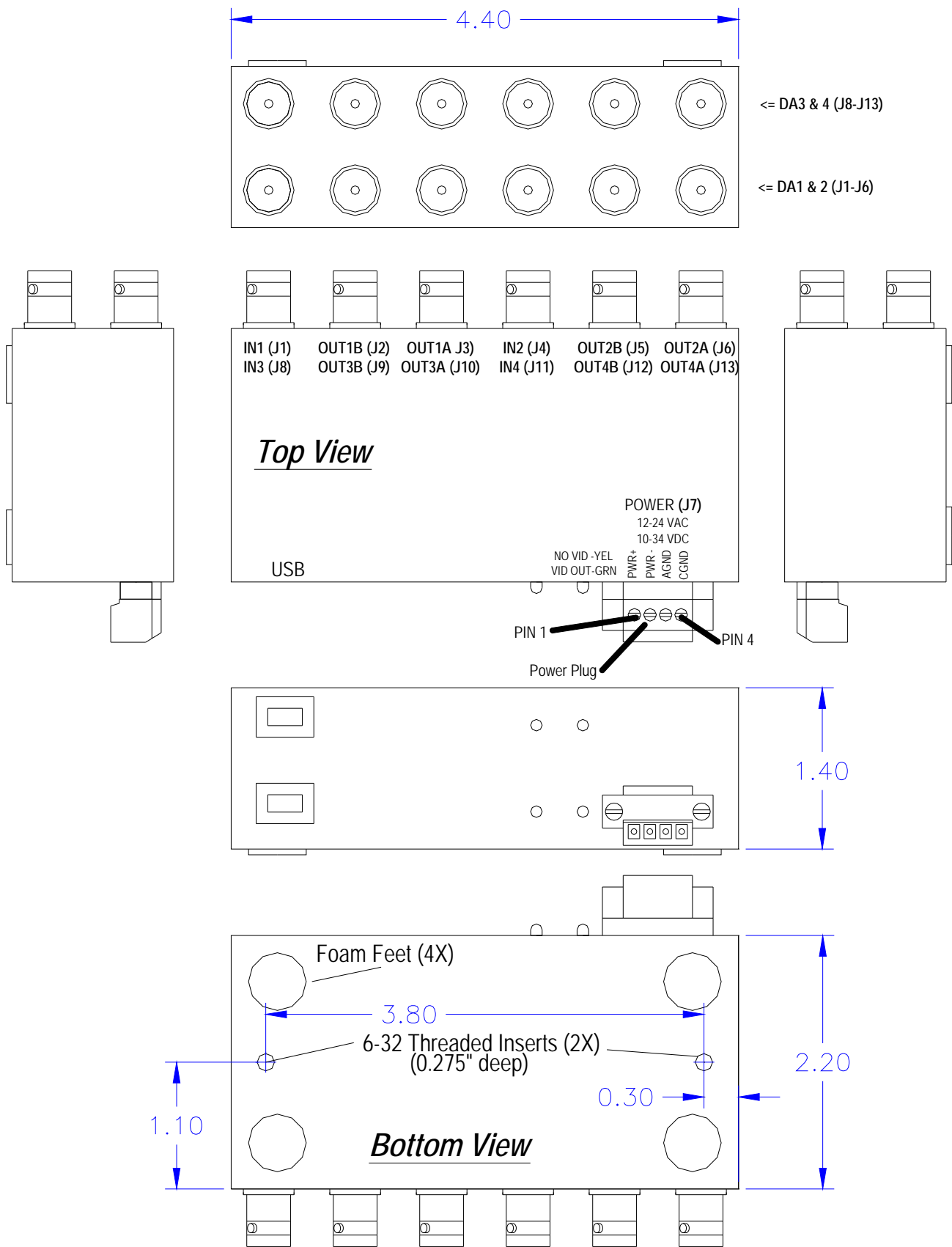


Figure 6: 83-411-102-A (Quad 1x2 SDI DA)

Alternate Terminal Programs

Post Windows-XP operating systems no longer include HyperTerminal. The majority of alternative serial terminal emulation programs are sufficient in supporting basic configuration of the option and parameters on VAC products. However in order to support field upgrade of firmware, the terminal emulator must be capable of ASCII file transfer and Xon/Xoff flow control.

Be sure that the appropriate x64/x86/Unix Silicon Lab's CP2102 driver is installed. Windows based operating systems should identify the "COM" port associated with the unit in the "Device Manager" of the Computer Management screen as "Silicon Labs CP210x USB to UART Bridge". Unit communication parameters are set for 9600, 8N1, and Xon/Xoff flow control.

While no warranty or guarantee is implied, NetBurner Inc has a handy terminal program "Multi-threaded TTY" they distribute in support of their product offerings. (www.netburner.com/support/resources/cb34-ex)

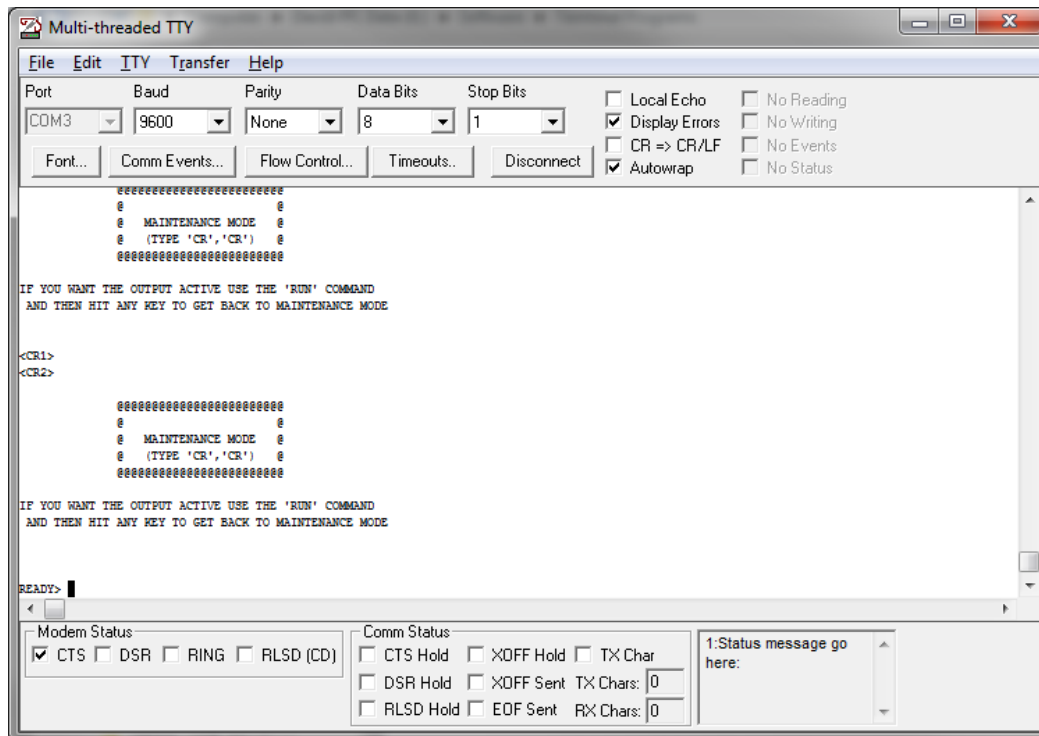


Figure 7: MTTY Serial Terminal Interface

Mtty.exe is a single executable. The example screen above shows the USB Bridge connection as COM3. Configure your "Port" setting to the port your computer has associated with the unit. Set communication parameters for 9600 8N1. Xon/Xoff flow control is configured under the "Flow Control" tab. ASCII file transfer is under the "Transfer" menu pull-down. Don't forget about the "Connect" button.

The Hercules SETUP software utility is a very powerful Serial port terminal, UDP/IP terminal, and TCP/IP Client Server terminal. This software may be downloaded free from www.hw-group.com. HWgroup should be commended for making this excellent software available as Freeware and are indeed worthy of financial support. While functional for unit configuration, serial emulation supports only binary and not ASCII file transfer (required for firmware update).

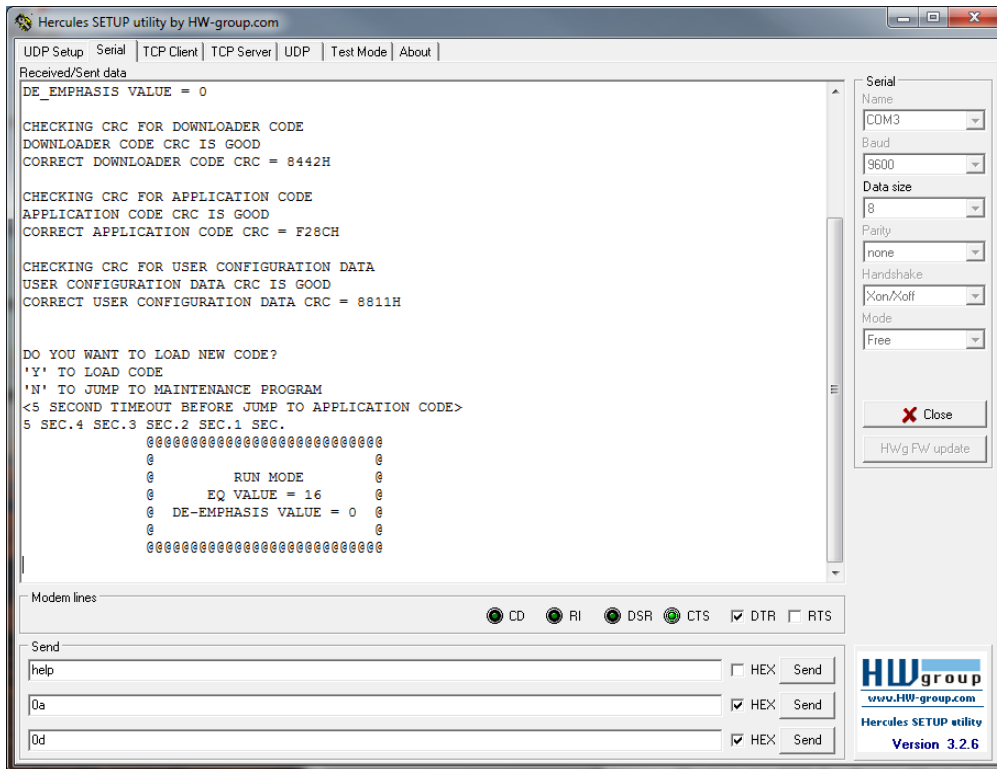


Figure 8: Serial Terminal Tab/Window

Hercules SETUP is a single executable. Some changes from the default configuration settings are required. Click on the “Serial” Tab and the window should appear similar to that of Figure 8. Set “Name” for the units associated “COM” port. For the screen above it just so happened to be COM3. Configure the remaining items for 9600 8N1, Xon/Xoff, and Mode = Free. There is no box for the stop bit ‘1’.

The next step is VERY important. There are additional settings accessed by clicking the right mouse button.

**Un-Check most everything
Change Transmit EOL to “CR (Mac)”**

Use the Open/Close button to connect/disconnect to/from the “COM” port.

