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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Version	Mar 05
1.1	Minor typographical errors fixed	Aug 05
1.2	Added info for Ferrite core on GPIO cable	Oct 05
1.3	Updated specs and formatting	Sept 09

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1. OVERVIEW

The 7702BPX-LB / 7703BPX-LB is a wide band 2 x 1 RF protection switch that provides auto-changeover capability by detecting a change in the input power level. Manual control or automation control via the GPI port is also provided. This is a latching switch which maintains switch state on loss of power. It is designed for L-band earth station links and operates over a wide frequency range of 950MHz to 2150MHz.

The 7703BPX-LB has integrated *Vista*LINK® technology for remote control and monitoring capability via SNMP. This provides the user with the ability to locally or remotely configure and monitor parameters such as module status, selected input, power level and switching threshold.

In the auto-changeover application, both products can be configured to have a *Main* input and a *Standby* input. In this configuration, it will automatically switch to the *Standby* input when the *Main* input power is weak or lost. It can also be set to auto-switch back to the *Main* source when this signal is re-established.

The 7702BPX-LB / 7703BPX-LB occupies one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3RU frame, which will hold up to 15 modules.

Features:

- Intelligent auto switching with input power detection
- User-definable threshold levels on 7703BPX-LB version
- Maintains switch state and RF channel on loss of power to card or frame
- Supports automatic or manual control via GPI or SNMP on 7703BPX-LB
- Switch state indication via GPO
- Card edge LEDs indicate active input channels, output channel and power levels below threshold
- Fully hot-swappable from front of frame
- Comprehensive signal and card status monitoring via four digit card edge display or remotely through SNMP and VistaLINK® on 7703 version
- VistaLINK® capability is available when 7703BPX-LB modules are used with the 3RU 7800FR or 350FR portable frame and a 7700FC VistaLINK® Frame Controller module in slot 1 of the frame

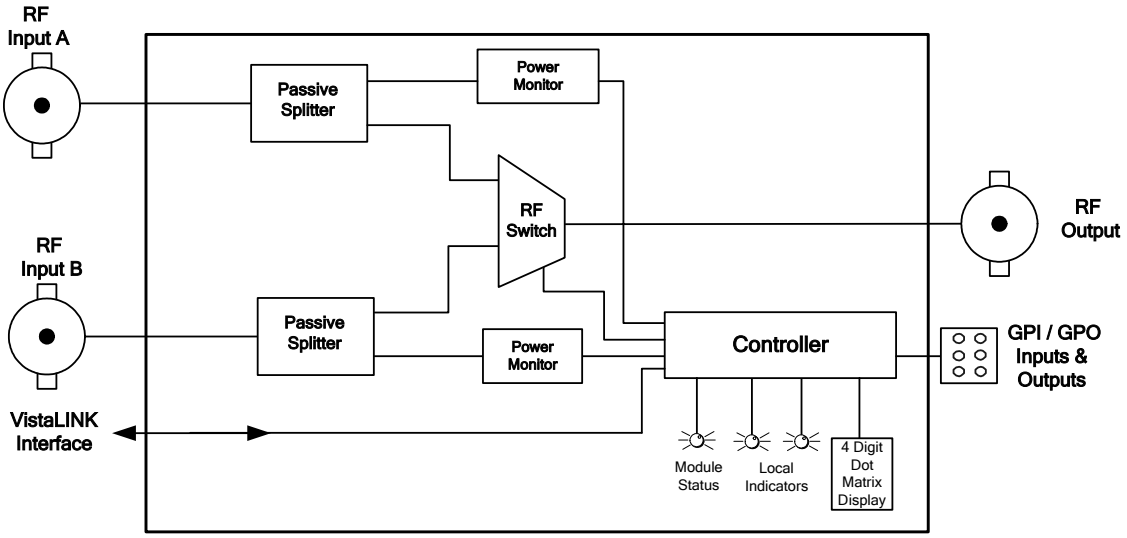

Figure 1-1: 7703BPX-LB Block Diagram

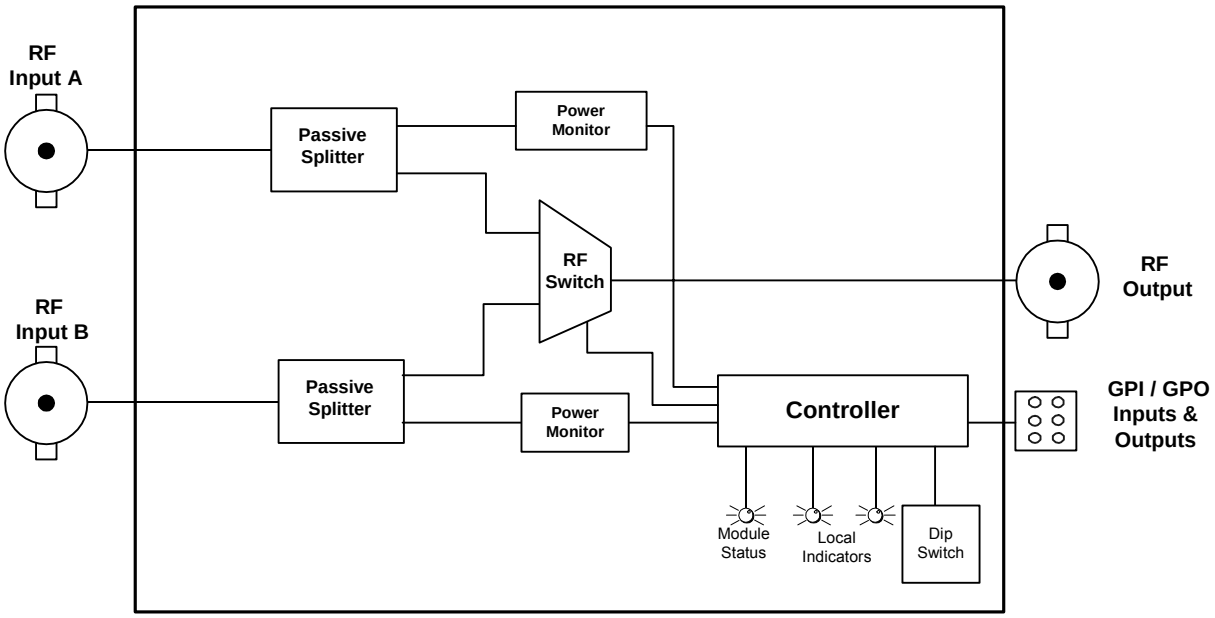

Figure 1-2: 7702BPX-LB Block Diagram

1.1. TYPICAL CONFIGURATION

1.1.1. Uni-directional Bypass Switch

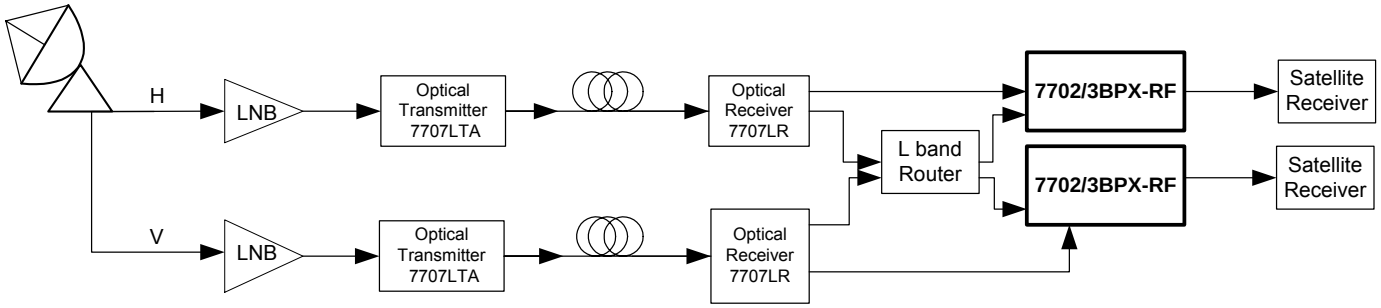

Figure 1-3: Typical Application of Protection Switch in L-band Downlink Transport System

This diagram illustrates the use of the BPX-LB as a protection switch in an earth station L-band satellite downlink transport system. The received Horizontal and Vertical polarizations are fed into LNB (Low Noise Block converter) and downconverted to L-band frequency (950 – 2150MHz). The Evertz Microsystems 7707LTA L-band optical transmitter converts the RF input to an optical signal that can be transported up to 60km from the antenna site to the Network Operations Centre (NOC). The 7707LR L-band optical receiver converts the optical signal to an RF output which can be directed to an L-band router for switching and distribution. In this application diagram, the BPX-LB is used to provide protection against router failure and directs the L-band signal to the appropriate receiver. In case of power failure to the switch, the latching mechanism keeps the switch in the same state upon failure.

2. INSTALLATION

The 7702/3BPX-LB comes with a companion rear plate that has three BNC (F type optional) connectors and a six pin terminal strip. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.

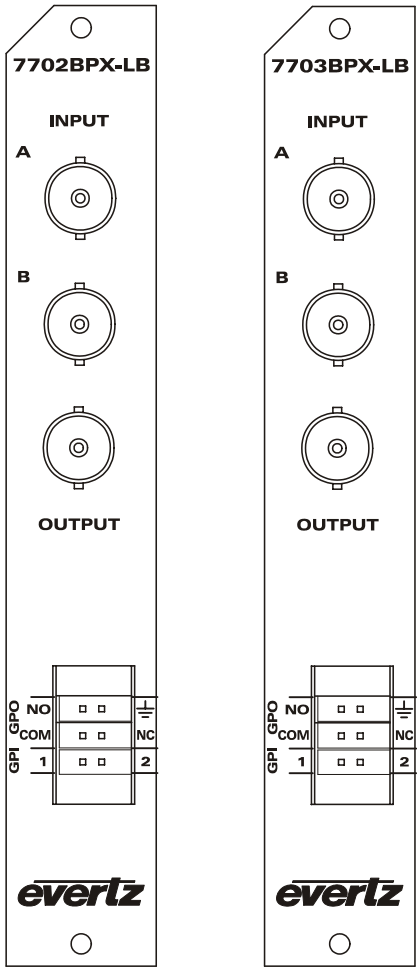

Figure 2-1: 7702BPX-LB / 7703BPX-LB Rear Panel

INPUT A, B: The two BNC (F type optional) connectors are RF inputs that accept frequencies over the range of 10MHz to 3GHz. The A connector is for the *Main* input and the B connector is for the *Standby* input.

OUTPUT: This BNC (F type optional) connector is the output from the switch.

2.1. GPIO

A 6-pin removable terminal block labeled **GPIO** contains 2 GPI inputs and 2 GPO outputs

GPI's: The two top pins on the 6 pin terminal strip are used for two General Purpose inputs (GPI). The GPIs can be configured as active high or low by setting DIP switch 3. GPIs are active low when DIP switch 3 is Off and GPIs are active high when DIP switch 3 is On (positioned closest to the PCB). The GPI inputs are opto isolated with an internal pull-up resistor to +5V or +12V as shown in Figure 2-2. See section 6.4 for information on selecting the pull-up voltage.

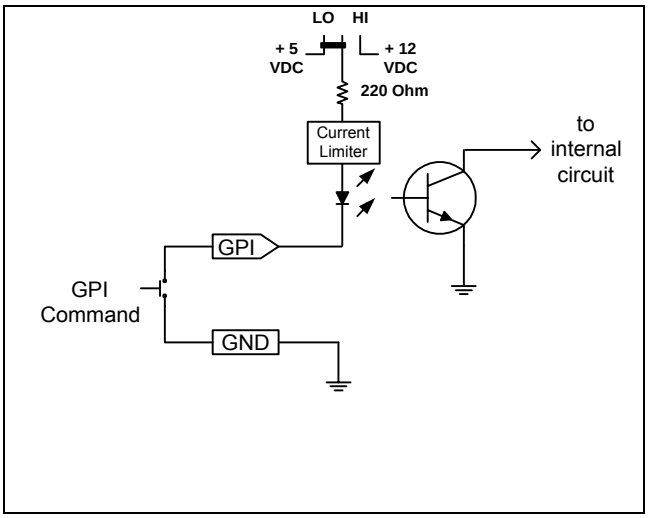

Figure 2-2: GPI Input Circuitry

GPO: The **NC, NO** and **COM** pins on the 6 pin terminal strip are used for the General Purpose Output (GPO). The GPO output is a set of normally open and normally closed relay contacts as shown in Figure 2-3.

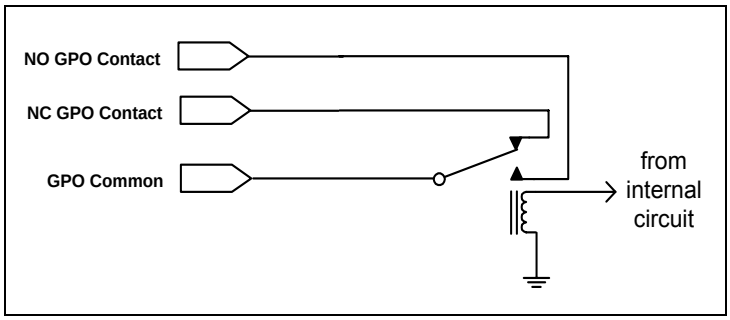

Figure 2-3: GPO Configuration

When connecting cables to the GPIO terminal block, a ferrite core should be placed around the cable in order to reduce the electromagnetic interference to limits acceptable for Class A digital devices. The ferrite impedance should be greater than 70 ohms at 25MHz greater than 135 ohms at 100MHz

3. SPECIFICATIONS

3.1. RF INPUT/OUTPUT

Inputs: 2
Outputs: 1
Connectors: BNC per IEC 61169-8 Annex A (F type optional)
I/O Impedance: 75Ω, 50Ω optional
Frequency Range: 950MHz to 2250MHz
Flatness: < ±1.5dB
Input Power Range: 0dBm to –50dBm
Return Loss: > 10 dB
Isolation: > 50 dB

3.2. GENERAL PURPOSE INPUTS

Number of Inputs: 2
Type: Opto-isolated, active low with internal pull-ups to +5V
Connector: 2 pins plus ground on 6 pin removable terminal strip
Signal Level:
+5V Pullup: Low: -5 to +2.5 VDC, High: 3.5 to 10 VDC
+12V Pullup: Low: -5 to +9.5 VDC, High: 10.5 to 15 VDC
Max Sink Current: (input shorted to ground) 15 mA
Max Leakage Current for input High: 200 µA

3.3. GENERAL PURPOSE OUTPUTS

Number of Outputs: 1
Type: "Dry Contact" relay contacts - normally open and normally closed contact provided
Connector: 3 pins on 6 pin removable terminal strip

3.4. ELECTRICAL

Voltage: +12VDC
Power: 4 Watts
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS AND DISPLAYS

The 7702BPX-LB and 7703BPX-LB have 9 LED Status indicators on the front card edge to show operational status of the card at a glance. The 7703BPX-LB also has an alphanumeric dot matrix display, toggle switch and push button. The card edge pushbutton and toggle switch is for user input. Figure 6-1 shows the location of the LEDs and card edge controls.

4.1. STATUS INDICATOR LEDS

Two large LEDs on the front of the board indicate the general health of the module:

LOCAL FAULT: This Red LED indicates poor module health and will be On during the absence of a valid RF input signal or if a board power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be On when a valid RF input signal is present, and the board power is good.

There are seven small LEDs beside the LED display that indicate the status of the module:

CH A ACTIVE: This Green LED indicates that Channel A has power above threshold.

CH A PWR LOW: This Red LED indicates when the received power on Channel A is below the switching threshold set for Channel A. (See section 4.2.8)

CH B ACTIVE: This Green LED indicates that Channel B has power above threshold.

CH B PWR LOW: This Red LED indicates when the received power on Channel B is below the switching threshold set for Channel B. (See section 4.2.8)

OUTPUT INDICATOR: This Green LED is ON when Channel A is connected to the output and OFF when Channel B is connected to the output.

AUTO MODE: This Yellow LED is ON when Auto Mode is selected and OFF when Auto mode is not selected.

SWITCH BACK: This Yellow LED is OFF when Switch Back Mode is selected (For auto mode only).

4.2. DOT-MATRIX DISPLAY (7703BPX-LB ONLY)

Additional signal and status monitoring and control over the card's parameters are provided via the 4-digit alphanumeric display located on the card edge. To select one of two menu display modes, press the toggle switch. To go to the sub-menu press the pushbutton once to select the sub-menu display and then press the toggle switch. When in a particular display mode, press the pushbutton to display the value and use the toggle switch to change values (if applicable) and to see what status is being displayed for the particular menu item. The following display messages indicate what is being displayed. The details of each of the displays are described in the sections 4.2.1 to 4.2.10.

OK

MON

- **PWRA** Display the input power of channel A
- **PWRB** Display the input power of channel B
- **GPI1** GPI1 state
- **GPI2** GPI2 state
- **CHAN** Indicates whether input A or input B is the active channel
- **MODE** Indicates operating mode status
  - **AUTO** Indicates Auto – No switch back
  - **ASB** Indicates Auto - Switch Back
  - **EXT** Indicates external (GPI) mode status
  - **CHAN A** Indicates external mode status
  - **CHAN B** Indicates external mode status
- **VER** Display firmware version

SET

- **MODE** Sets operating mode
  - **AUTO** Auto – No switch back
  - **ASB** Auto - Switch Back
  - **EXT** External (GPI) mode
  - **CHAN A** Switch to channel A
  - **CHAN B** Switch to channel B
- **MINA** Set Channel A's minimum power threshold
- **MINB** Set Channel B's minimum power threshold
- **DISP** Set Display Orientation (HORZ / VERT)
- **ACTV** Sets High or Low as GPI Active State
- **FRST** Factory Reset

4.2.1. Displaying the RF Power of Input A and Input B

The 7703BPX-LB detects the input RF power of both inputs and displays this on the four-digit card edge display. Enter the *MON* menu item, then toggle to *PWRA* or *PWRB* and press the pushbutton. This displays the corresponding input power. The following list describes possible displays and their significance.

MON
PWRA
PWRB
OVR
-10 to -50
LOW

The video standard will be displayed from the list below:

OVR	Indicates RF input power is above threshold
-10 to –50	Numerical value of RF input power in dBm
LOW	Indicates RF input power is below threshold

4.2.2. Displaying the GPI1 and GPI2 State

The 7703BPX-LB detects the status of the GPI inputs and displays this on the four-digit card edge display. Enter the MON menu item, then use the toggle switch to select GPI1 or GPI2, and press the pushbutton.

MON
GPI1
GPI2
High
Low

The following list describes possible displays and their significance:

HIGH	Indicates that the selected GPI input is high
LOW	Indicates that the selected GPI input is low

4.2.3. Displaying the Active Channel

The 7703BPX-LB detects the active channel and displays this on the four-digit card edge display. Enter the MON menu item, then use the toggle switch to select CHAN, and press the pushbutton to select it.

MON
CHAN
CH A
CH B

The following list describes possible displays and their significance:

CH A	Indicates that A is active channel
CH B	Indicates that B is active channel

4.2.4. Displaying the Operating Mode Status

The 7703BPX-LB detects the operating mode status and displays this on the four-digit card edge display. Enter the MON menu item, then use the toggle switch to select GPI1 or GPI2, and press the pushbutton.

MON
MODE
AUTO
ASB
EXT
CH A
CH B

The following list describes the possible displays and their significance:

AUTO	Indicates Auto – No switch back
ASB	Indicates that A is active channel
EXT	Indicates external (GPI) mode status
CHAN A	Indicates external mode status
CHAN B	Indicates external mode status

4.2.5. Displaying the Firmware Version

To view the current firmware version enter the *MON* menu, then toggle to the *VER* menu option.

MON *VER*	Displays the current firmware version on the card

4.2.6. Selecting the Switch Mode

To select the desired operating mode, enter the SET menu and select the MODE menu item. The following list of modes will be displayed (AUTO, ASB, CH A (Manual), CH B (Manual) or EXT (External Mode)). Table 4-1 shows the operating modes for each selection.

SET
  MODE
  AUTO
  ASB
  CH A
  CH B
  EXT
	See Table 4-1 for a list and description of the switch mode parameters.

SETTING	MODE	DESCRIPTION
AUTO	**Auto**	If channel A is active, it will switch to channel B if A falls below threshold (if B is above threshold). If A rises above threshold, channel B will remain the active channel, unless channel B falls below threshold, then the module will switch back to A (if A is above threshold).
ASB	**Auto Switch Back**	Channel A is the main input and Channel B is standby. If A falls below threshold, it will switch to B (if B is above threshold). When A returns to a level above threshold, it will switch back to A.
CH A or CH B	**Manual**	The active channel is selected as either Channel A or Channel B.
EXT	**External (GPI)**	Operating mode is selectable via the GPIs.

Table 4-1: Setting the Switch Mode via the SET/MODE menu

To operate in external (GPI) mode, set the EXT item to ON. The Switch mode is now selectable based on the GPI1 and GPI2 settings. Table 4-2 shows the settings to achieve the desired switch state. The *Auto Switch Back* and *No Auto Switch Back* Modes operate as described in Table 4-1. The *ACTV* menu item controls whether the active GPI state is high or low.

Operating	Manual		Auto	
Mode	**CH A**	**CH B**	**Switch Back**	**No Switch Back**
GPI1	Active	Inactive	Inactive	Active
GPI2	Inactive	Active	Inactive	Active

Table 4-2: Controlling the Switch Using GPI Inputs – 7703BPX-LB

4.2.7. Selecting High or Low as GPI Active State

The 7703BPX-LB allows setting the Active state of the GPIs as high or low. Enter the SET menu and toggle to the ACTV menu item.

SET *ACTV* *HIGH* *LOW*	**HIGH** **LOW**	Sets the selected GPI input to high Sets the selected GPI input to low

4.2.8. Setting the RF Power Threshold for Auto Mode Switching

The *MINA* and *MINB* display in the *SET* menu allows the user to set the minimum input RF power threshold for each channel before the auto switch function will occur. To increase the RF power threshold press the toggle switch up. To decrease the RF power threshold press the toggle switch down.

SET *MINA* *MINB* *dbm threshold*	The threshold will be shown in dBm.

4.2.9. Changing the Orientation of the Text on the Display

The *DISP* display allows the user to select a horizontal or vertical orientation for the displays to accommodate mounting the module in the 3RU or 1RU frames. To change the orientation of the display press the toggle switch. The following list describes possible display options and their significance.

SET *DISP* *HORZ* *VERT*	**VERT** **HOR**	Vertical orientation suitable for modules installed in the 3RU frame. Horizontal orientation suitable for modules installed in the 1RU frame.

4.2.10. Performing a Factory Reset

The 7703BPX-LB enables the user to perform a factory reset of card parameters. Enter the SET menu and navigate to the FRST menu item, then toggle to 'YES' and hit the pushbutton. This restores the default parameters of the card. The default operating mode is External and the default threshold levels are –50dBm for both channels.

SET *FRST*	Selecting the *FRST* menu item will restore the card's parameters to factory default.

5. DIP SWITCHES (7702BPX-LB ONLY)

The 7702BPX-LB is equipped with a 4 position DIP switch to allow the user to select the operating modes. DIP switch 1 is located at the top of the DIP switch (farthest from to the card ejector). Table 5-1 gives an overview of the DIP switch functions. Sections 5.1 and 5.2 give a detailed description of each of the DIP switch functions. The On position is down, or closest to the printed circuit board. See section 4.2.6 for a description of the operating modes.

DIP Switch	Function
1	Manual Mode Enable
2	CH A/B (Manual Mode) – Switch Back Select (Auto Mode)
3	External GPI Mode Enable
4	GPI Active HIGH / Active LOW select

Table 5-1: DIP Switch Functions

5.1. CONTROLLING THE SWITCH OPERATING MODE

DIP switches 1, 2, and 3 allow the user to select one of four operating modes for the 7702BPX-LB.

DIP 1	DIP 2	DIP 3	Mode	Description
Off	Off	Off	Auto	If channel A is active, it will switch to channel B if A falls below threshold (if B is above threshold). If A rises above threshold, channel B will remain the active channel, unless channel B falls below threshold, then the module will switch back to A (if A is above threshold)
Off	On	Off	Auto Switch Back	Channel A is the main input and Channel B is standby. If A falls below threshold, it will switch to B (if B is above threshold). When A returns to a level above threshold, it will switch back to A.
On	Off	Off	Manual Mode	Selects Channel A
On	On	Off		Selects Channel B
Off	Off	On	External GPI	Operating mode controlled via GPIs. See section 5.2 for controlling operating modes via GPI in external mode.

Table 5-2: Operating Mode Switch Settings

5.2. CONTROLLING THE SWITCH USING GPI INPUTS

In External GPI mode, the Switch mode is selectable based on the GPI1 and GPI2 settings. Table 5-4 shows the settings to achieve the desired switch state. The *Auto Switch Back* and *No Auto Switch Back* Modes operate as described in Table 5-2. DIP switch 4 controls whether GPIs are active when high or low in external mode. When the module is in Manual mode or one of the Auto modes, DIP 4 has no effect.

DIP 4	GPI Active State
Off	Active low
On	Active high

Table 5-3: GPI Active State Switch Settings

Operating	Manual		Auto	
Mode	CH A	CH B	Switch Back	No Switch Back
GPI1	Active	Inactive	Inactive	Active
GPI2	Inactive	Active	Inactive	Active

Table 5-4: Controlling the Switch Using GPI Inputs – 7702BPX-LB

6. JUMPERS

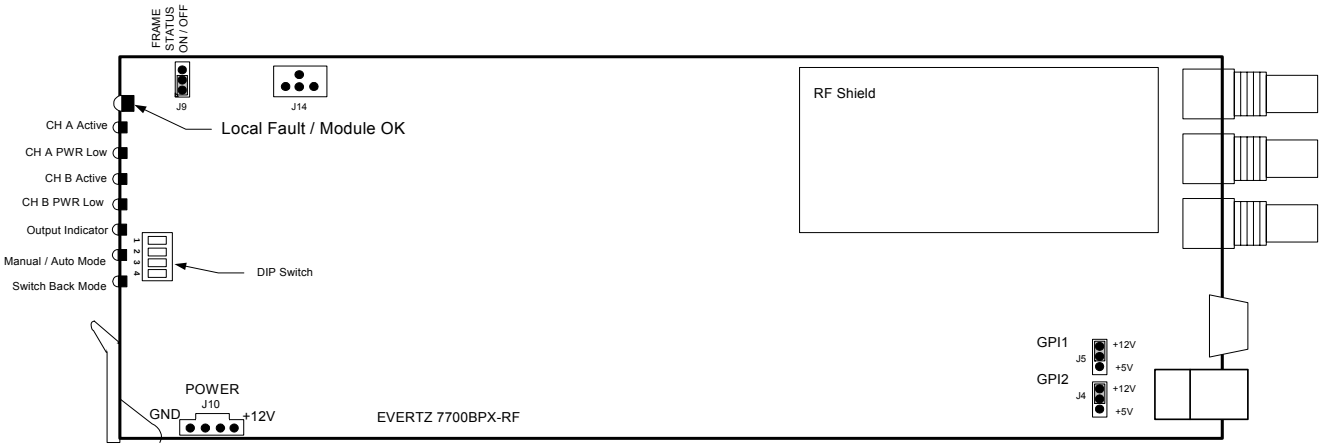

Figure 6-1: Location of Jumpers – 7702BPX-LB

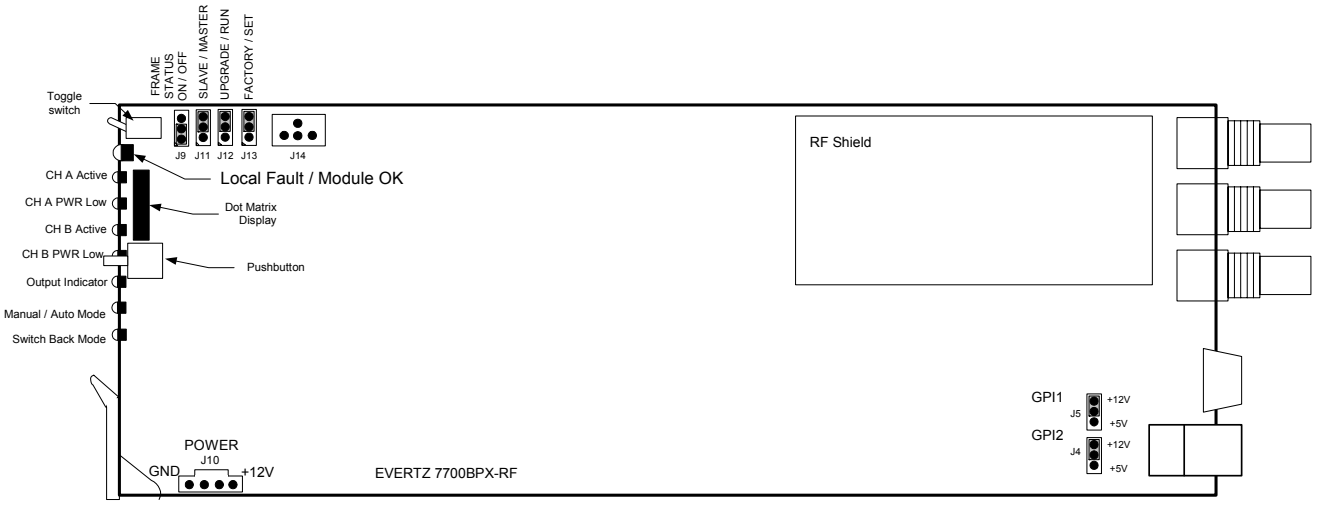

Figure 6-2: Location of Jumpers – 7703BPX-LB

6.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J9 located near the top front of the module determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

FRAME STATUS: To monitor faults on this module with the frame status indicators (on the Power Supply FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

When this jumper is installed in the Off position local faults on this module will not be monitored.

6.2. MONITORING AND CONTROL OF 7703BPX-LB CARDS THROUGH SNMP OR CARD EDGE MENU SYSTEM

The card does not require any reconfiguration or adjustment to monitor and control through SNMP or the card edge menu system. Updates to configuration and status are visible in both systems.

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES (7703BPX-LB ONLY)

UPGRADE: The UPGRADE jumper J12 is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* chapter in the front of the manual binder for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move the UPGRADE jumper into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the SERIAL header J14 at the card edge. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* chapter of this manual. Once the upgrade is completed, remove the module from the frame, move the UPGRADE jumper into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

6.4. SELECTING THE GPI PULL-UP VOLTAGE

The GPI jumpers J4 and J5, located at the rear of the module, selects whether the general purpose inputs GPI1 and GPI2 will be pulled up to +5 volts or +12 Volts. Figure 2-2 shows the jumper configuration and the GPI input schematic. Jumper J5 is used for GPI1 and J4 is used for GPI2.

GPI: To set the pull-up voltage to +5 volts set the jumper to the LO position
To set the pull-up voltage to +12 volts set the jumper to the HI position

6.5. USING THE GPO OUTPUTS

There are three pins on the 6 pin terminal strip dedicated to the GPO, NC (Normally Closed), NO (Normally Open) and Common, connected as shown in the circuit diagram of section 2.1. The common connection will switch between NC and NO on a change in state of the RF switch. This GPO is intended to indicate a change in state of the switch. The signals on NC and NO are to be provided by the user.

7. VistaLINK® REMOTE MONITORING/CONTROL (7703BPX-LB ONLY)

7.1. What is *Vista*LINK®?

*Vista*LINK® is Evertz' remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. *Vista*LINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through *Vista*LINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, *Vista*LINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. An SNMP manager also known as a Network Management System (NMS) is a computer running special software that communicates with the devices in the network. Evertz *Vista*LINK® Pro Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz *Vista*LINK® enabled fiber optic products.

2. Managed devices (such as 7707BPX cards), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC *Vista*LINK® frame controller module, which serves as the Agent.

3. A virtual database known as the Management Information Base (MIB) lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

For more information on connecting and configuring the *Vista*LINK® network, see the 7700FC Frame Controller chapter.

7.2. *Vista*LINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the *Vista*LINK® interface.

Parameter	Description
Input A RF Power	A range of values describing received RF power at the input A
Input B RF Power	A range of values describing received RF power at the input B
GPI1 State	Indicates the state of the GPI1 input
GPI2 State	Indicates the state of the GPI2 input
Active Channel	Indicates input A or B as the active channel
Card Type	Indicates card type as 7703BPX-IF

Table 7-1: *Vista*LINK® Monitored Parameters

7.3. *Vista*LINK® CONTROLLED PARAMETERS

The following parameter can be remotely controlled through the *Vista*LINK® interface.

Parameter	Description
Operating Mode	Sets the operating mode for the module: o External (Controlled by GPIs) o Auto / No Switch Back o Auto / Switch Back o Channel A o Channel B
RF Threshold A	Sets the value of the Input A RF threshold
RF Threshold B	Sets the value of the Input B RF threshold
Active State for GPIs	Sets the active state for GPIs - High or Low

Table 7-2: *Vista*LINK® Controlled Parameters

7.4. *Vista*LINK® TRAPS

The following traps can be controlled through the *Vista*LINK® interface. Each trap will indicate a fault condition when its value is *True*.

Trap	Description for True Condition
ChannelAweak	Channel A input power is below the threshold
ChannelBweak	Channel B input power is below the threshold

Table 7-3: *Vista*LINK® Traps