MANUAL



DIGILINK DLC300 FUNCTION MODULE

3G-SDI Multi-Rate Digital Video Optical Transmitter/Receiver/ Repeater

Installation and Operations Manual

WWW.ARTEL.COM

DLC300 Function Module

3G-SDI Multi-Rate Digital Video
Optical Transmitter/Receiver/Repeater

Installation and Operations Manual

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Revision history for the *DLC300 Function Module Installation and Operations Manual*.

Revision History

Revision	Document Number	Date	Reason for Change
A	AR200-008120-C00_K	January, 2012	Initial release.
B	AR200-008120-C00_L	February, 2016	Update Artel logo.
C	AR200-008120-C00_M	December, 2016	Updated images and copy.

Table of Contents

About This Manual

This manual provides instructions for installing, configuring, and operating the DLC300 function module.

Audience

This manual is intended for the following trained and qualified service personnel who are responsible for installing and operating the DLC300:

- System installer
- Hardware technician
- System operator

Related Documentation

The following documentation contains material related to the DLC300 function module:

Document	Provides . . .
DLC300 Data Sheet	Product operating and environmental specifications, and regulatory conformance information.
DLC300 Quick Start	Product configuration information and descriptions of the front panel status LED operations.
DigiLink Media Transport Platform Chassis Installation and Operations Manual	Overview and installation instructions for the DigiLink media transport platform chassis options, including the following: • DL4360x chassis—Installation of this 12-slot chassis, power supplies, switch module, and function modules. • DL4300 chassis—Installation of this 12-slot chassis, power supplies, and function modules. • DL4000 chassis—Installation of this 4-slot chassis, power supplies, and function modules.
DigiLink Media Transport Platform Datasheet	Overview of the DigiLink media transport platform chassis options.
DL Manager Setup and Operations Manual	Overview and operating instructions for the DL Manager element management system.

Note: To obtain the latest versions of this guide and the documents listed in this section, go to www.artel.com.

Symbols and Conventions

This manual uses the following symbols and conventions.

Caution

A caution means that a specific action you take or fail to take could cause harm to the equipment or to the data transmission.

Warning

A warning describes an action you take or fail to take that could result in death, serious physical injury, or destruction of property.

Note: Important related information, reminders, and recommendations.

Italics—used for emphasis, for indicating the first occurrence of a new term, and for book titles

1. Numbered list—where the order of the items is important
    - Bulleted list—where the items are of equal importance and their order is unimportant

Artel Customer Service

You can reach Customer Service by e-mail at customercare@artel.com or by telephone:

In the US call (800) 225-0228, then select 1 for technical support.

Outside the US call (978) 263-5775, then select 1 for technical support.

When requesting assistance, please be ready to provide the following information:

- Your name and telephone number
- Product model and serial number
- Brief description of the problem
- List of symptoms
- Steps you have already taken to try to resolve the problem

If the product is damaged

If any portion of the unit is damaged, forward an immediate request to the delivering carrier to perform an inspection of the product and to prepare a damage report. Save the container and all packing materials until the contents are verified.

Concurrently, report the nature and extent of the damage to Artel Customer Service so that action can be initiated to either repair or replace the damaged items.

Do not return any items to Artel until you obtain instructions from Customer Service.

Report the problem or deficiency to Customer Service along with the model number and serial number. Upon receipt of this information, Artel will provide service instructions, or a *Return Authorization Number* and shipping information.

DLC300 Function Module

3G-SDI Multi-Rate Digital Video
Optical Transmitter/Receiver/Repeater

Information About the DLC300

This manual introduces the DLC300 function module, which is a multi-functional digital video fiber transport module that can optically transport all digital formats from 19.39 Mb/s ATSC to 3G-SDI (SMPTE 424M) using specialized video or standard multi-rate SFP transceivers. You can configure the DLC300 as a receiver, transmitter, or repeater.

The DLC300 can transmit and receive external signals using the following built-in options:

- BNC connectors and Small Form Factor Pluggable (SFP) ports for connecting to external devices
- Backplane connector for connecting to other function modules in the DL4000 chassis

For transmitting and receiving optical signals, the DLC300 can use dual SFP optics available in WDM, CWDM, or DWDM optical wavelengths. You can configure the DLC300 to use one or both SFPs. When dual SFPs are used for redundancy, the DLC300 can automatically switch over to the secondary SFP when the input signal to the primary SFP is lost. The DLC300 can also switch back to the input on the primary SFP if the signal on this SFP returns.

The DLC300 can add SMPTE EG-34 style dithering to allow transmission over DWDM networks of video that may contain pathological bit sequences. For more information about the DLC300 signal processing options, see the "Setting the SW3 Configuration DIP Switch" section on page 11.

The DLC300 also supports conversion of 19.39 Mb/s ATSC (SMPTE 310M) to 270 Mb/s DVB-ASI.

Provisioning and monitoring is accomplished using DIP switches, LEDs, front panel monitor jack, or Artel's DL Manager, which is an element management system (for more information, see the *DL Manager Setup and Operations Manual*). The DLC300 also has a set of major and minor alarms that indicate problems related to its on-board power supplies, optics, temperature, and the input signals.

DLC300 Laser Warnings

The SFP module used in the DLC300 has a transmitter that contains a Class 1 laser. You must adhere to the standard safety practices for handling a Class 1 laser product, including the following warning.

Warning

Never stare directly into a fiber optic connector.

Although the light used in most fiber optic transmissions is not visible to the naked eye, potentially harmful levels of radiation may be present at the optical output ports and unconnected transmit fiber ends.

Failure to observe this warning could result in personal injury.

DLC300 Module Functional Description

Figure 1 shows the functional block diagram for the DLC300.

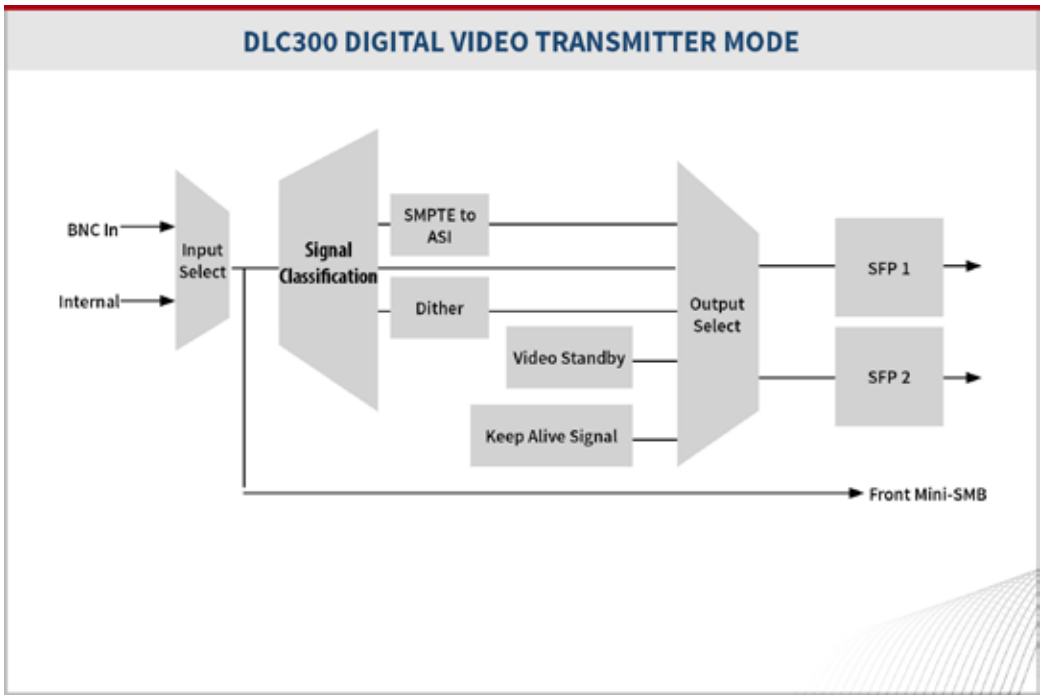

Figure 1. DLC300 Module Functional Block Diagram

The video formats that the DLC300 supports include the following:

- 1.485 Gb/s and 1.485/1.001 Gb/s—HD-SDI (SMPTE 292M)
- 2.97 Gb/s and 2.97/1.001 Gb/s—3G-SDI (SMPTE 424M)
- 270 Mb/s:
  - SD-SDI (SMPTE 259M-C, ITU 656)
  - SDTI (SMPTE 305M)
  - DVB-ASI
- 19.39 Mb/s—ATSC (SMPTE 310M)

This section contains the following topics:

Signal Paths

The primary signal path of the DLC300 is determined by the mode in which it operates, which are as follows:

- Transmitter mode—Electrical input to optical transmit
- Receiver mode—Optical receive to electrical transmit
- Repeater mode—Optical receive to optical transmit

Both hardware and software provide flexibility in routing, such as allowing the selection of input and output paths.

The DLC300 allows you to select one the following transmitter sources:

- Electrical input BNC (transmitter mode)
- One of the other DL4000 chassis slots (transmitter mode)
- Optical receiver output (repeater mode)

The receive path is connected to the electrical outputs and is also made available to the function modules located in the remaining chassis slots.

The monitor output is determined by the operating mode of the DLC300. When the DLC300 is operating in either receive or repeater mode, the monitor displays the received signal. When the DLC300 is operating in transmitter mode, the monitor displays the transmitted signal.

Electrical Input

The electrical input is a precision 75 Ohm BNC and includes an automatic cable equalizer. This input passes through a multi-rate reclocker that detects the signal rate but is format transparent.

When no input signal is connected and the DLC300 is in transmitter or repeater mode, the DLC300 transmits a standby signal to the optical receiver to maintain the optical link between modules. The DLC300 can transmit either an SDI video or a PRBS143 non-video standby signal.

Note: For optimal performance, follow the recommendations stated in the DLC300 data sheet for full cable lengths and cable types.

Electrical Outputs

The electrical output is a precision 75 Ohm BNC with a multirate cable driver.

The mini 75 Ohm SMB monitor jack (MON) located on the front panel also provides an electrical output (see the "Signal Paths" section on page 4)

Receive electrical output is provided on the output BNC through a multirate driver directly connected to the receive path reclocker. The electrical output signal is also made available to the function modules located in the remaining DL4000 chassis slots.

Note: For optimal performance, follow the recommendations stated in the DLC300 data sheet for full cable lengths and cable types.

Optical Input and Output

The optical interfaces are provided by two SFP sockets; a primary SFP (PRI) and a secondary SFP (SEC). Each SFP uses LC/PC connectors. Optical performance is dependant the quality of your optical fiber and fiber interconnects, and on the selected SFP, which must be specifically qualified by Artel. Consult Artel for available SFP options.

DLC300 Module Overview

Figure 2 provides a view of the major components of the DLC300.

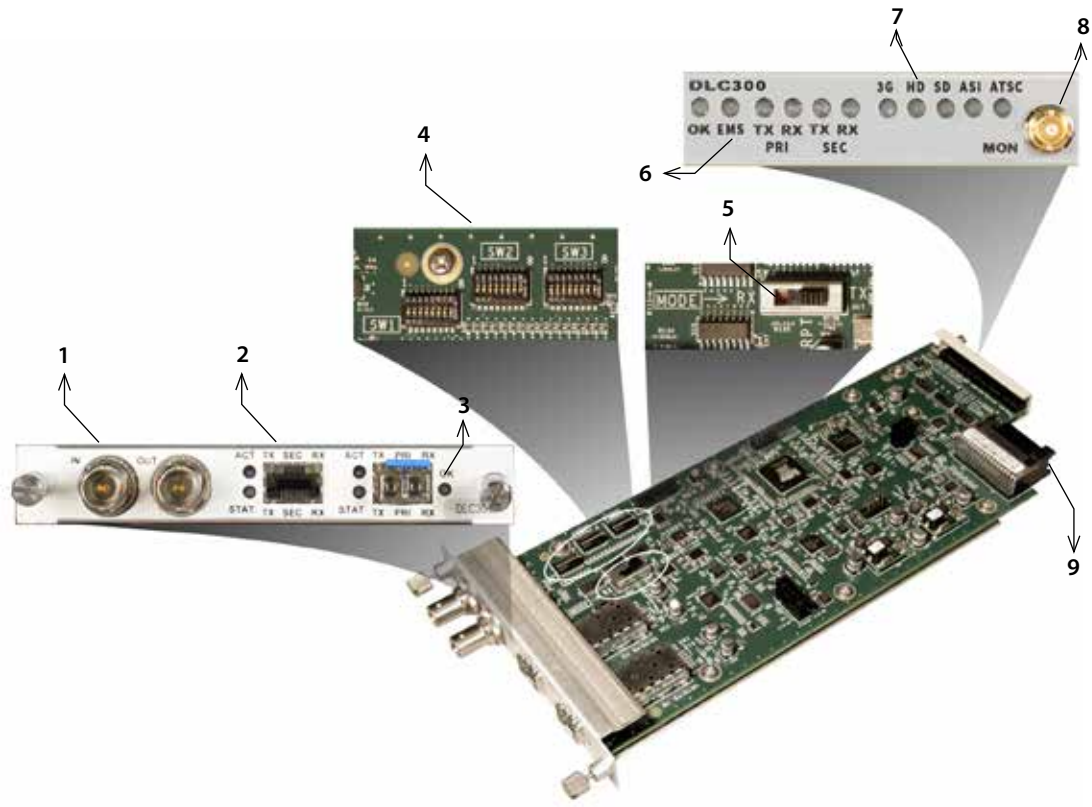

Figure 2. DLC300 Module Major Components

Table 1 describes the components called out in Figure 2.

Table 1. DLC300 Elements

Item	DLC300 Element	for details, see...
1	Rear panel BNC connectors for the following electrical connections: • IN—Video in • OUT—Video out or loop-through out	Cabling the DLC300 Module (page 14)

Table 1. DLC300 Elements (Continued)

Item	DLC300 Element	for details, see...
2	Two SFP sockets and status LEDs (ACT and STAT) for the following primary and secondary optical connections: • TX—Transmit • RX—Receive	Cabling the DLC300 Module (page 14) and Understanding the Rear Panel Status LEDs (page 20)
3	Rear panel alarm indicator LED (OK).	Understanding the Rear Panel Status LEDs (page 20)
4	Configuration DIP switches: • SW1—Video rate lockout • SW2—Input signal source and standby signal format • SW3—Video processing, alarm and optical reversion control	Setting the Configuration DIP Switches (page 9)
5	Mode select switch SW4. Determines operating mode; transmit, receive, or repeat.	Setting the SW4 Mode Select Switch (page 9)
6	Front panel module and TX/RX status LEDs: • OK—Alarm indicator • EMS—Element Management System indicator • TX—Transmit signal indicators; one for the primary (PRI) and one for the secondary (SEC) SFP • RX—Receive signal indicators; one for the primary (PRI) and one for the secondary (SEC) SFP	Understanding the Front Panel Status LEDs (page 16)
7	Front panel signal rate LEDs: • 3G—3G-SDI signal indicator (2.97 Gb/s and 2.97/1.001 Gb/s) • HD—High definition signal indicator (1.485 Gb/s and 1.485/1.001 Gb/s) • SD—SD-SDI signal indicator • ASI—DVB-ASI signal indicator • ATSC—ATSC signal indicator	Understanding the Front Panel Status LEDs (page 16)
8	Front panel monitor mini 75 Ohm SMB output jack.	Using the Monitor Jack (page 19)
9	Backplane connector—Provides power to the module, allows the module to share signals with other function modules, and is used for alarm and management signals.	N/A

Configuring the DLC300 Module Operation

This section describes how to configure the DLC300 mode of operation and the function of the transmit and receive signal connections. You configure the DLC300 to operate one of the following modes:

- **Transmitter mode**—The optical transmitters are enabled and the optical receivers are disabled. The DLC300 operates as an electrical-to-optical transmitter.

  This mode supports the following I/O connections:

  - Input—A single electrical input is accepted from either the digital video IN BNC connector or one of the four backplane connectors.
  - Output—The optical output is available at both SFP transmitters. The electrical output is available on the BNC OUT connector and the monitor jack. The monitor jack output signal is undithered when the dithering DIP switch is enabled.

  The DLC300 auto-configures for one or two SFPs. When operating with just one SFP, you can use either the primary or secondary SFP socket. When no electrical input is detected, the DLC300 transmits a switch-selectable standby signal; either SDI video or a PRBS143 non-video standby signal.

  The DLC300 detects the incoming bit rate and its processing feature includes SDI EG-34 dithering. When you configure the DLC300 to process the input signal, it adds dithering to SDI. The dithering processing makes the DLC300 optical output compatible with DWDM networks for any of the applied signals.

- **Receiver mode**—The optical receivers are enabled and the optical transmitters are disabled. The DLC300 operates as an optical-to-electrical receiver.

  This mode supports the following I/O connections:

  - Input—An optical input is accepted from one or both SFP receivers.
  - Output—The electrical output is available at the output BNC (OUT), the four backplane connectors, and the monitor jack.

- **Repeater mode**—The optical receivers and transmitters are both enabled. The DLC300 operates as an optical-to-optical repeater.

  This mode supports the following I/O connections:

  - Input—An optical input is accepted from one or both SFP receivers.
  - Output—The optical output, which has been reclocked to assure the optimal performance in long-haul applications, is available at both SFP transmitters. The electrical output is available at the output BNC (OUT), the four backplane connectors, and the monitor jack.

The switches that control the functionality of the DLC300 are the SW1, SW2, and SW3 configuration DIP switches and the SW4 mode select switch (see Figure 2).

Dual SFP optics provide optical redundancy and work in transmitter, receiver, and repeater modes. They can also serve as an additional output source for fanout purposes in transmitter and repeater modes. The DLC300 switches over to the secondary SFP when the input signal to the primary SFP is lost. If you enable the *optical reversion* feature, the optical input selector reverts to the input signal on the primary SFP receiver if the signal on this SFP returns. The default reversion time is set to one minute, which means that

the DLC300 does not revert back to the primary SFP signal until it has returned for one minute. You can modify the length of the reversion time using DL Manager (see the *DL Manager Setup and Operations Manual*). The optical reversion feature is disabled by default. For information about enabling this feature, see the "Setting the SW3 Configuration DIP Switch" section on page 11.

Default Configuration Settings

Artel ships the DLC300 configured as follows:

- Transmitter mode selected
- All signal types allowed
- Electrical input set to BNC
- Standby signal set to Artel non-video standby signal
- SDI Standby set to 525 line (SD-SDI), 59.94 fps (HD/3G)
- Forced bypass is disabled (when forced bypass is enabled, all signal classification, dithering, and reclocking is bypassed)
- SDI processing set to no EG-34 dithering
- ATSC to ASI conversion is disabled
- SFP alarms are enabled
- Optical reversion is disabled
- Video loss alarm is disabled
- EMS override is enabled (EMS can change the DLC300 configuration)

Note: You configure the DLC300 while the module is out of the chassis because the mode select switch and the configuration DIP switches are mounted to the top of the module PCB.

This section contains the following topics:

Setting the SW4 Mode Select Switch

The SW4 mode select switch (see Figure 3) determines the operating mode for your DLC300.

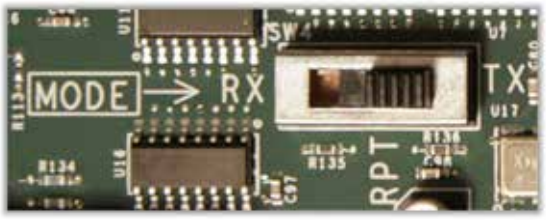

Figure 3. DLC300 SW4 Mode Select Switch

Table 2 describes the operating mode options and the signal types that are present depending on the operating mode.

Table 2. SW4 Mode Select Switch

		Mode		
I/O		**Transmit (TX)**	**Receive (RX)**	**Repeat (RPT)**
Electrical In		BNC IN or backplane from another module (user selected).	Not used.	Not used.
Optical In		Not used.	Primary or secondary SFP (automatically selected).	Primary or secondary SFP (automatically selected).
Electrical Out	BNC OUT	Same as Electrical In.	Same as Optical In.[1]	Same as Optical In.[1]
	Backplane to other modules	Same as Electrical In.[1]	Same as Optical In.[1]	Same as Optical In.[1]
	Monitor	Same as Electrical In. [2]	Same as Optical In.[1]	Same as Optical In.[1]
Optical Out		Same as Electrical In.[1]	Not used.	Same as Optical In.

1. Subject to EG-34 dithering as configured by the EG-34 dithering DIP switch (see "Setting the SW3 Configuration DIP Switch" section on page 11).
2. When ATSC-to-ASI conversion is enabled, the monitor output is the ASI version of the signal (see "Setting the SW3 Configuration DIP Switch" section on page 11).

Setting the Configuration DIP Switches

The SW1, SW2, and SW3 configuration DIP switches (see Figure 4) determine the functionality of the DLC300 as follows:

- SW1—Controls the video rate and forced bypass function settings.
- SW2—Controls the input source (BNC IN or backplane connector) for transmitter mode and operation of the standby video pattern generator.
- SW3—Controls the following functions: SDI dithering, ATSC to ASI video conversion, SFP alarms, optical reversion, video loss alarm, and EMS enable setting.

Figure 4. Configuration DIP Switches

Setting the SW1 Configuration DIP Switch

Table 3 describes the SW1 configuration DIP switch configuration options for setting the video rate. The factory-set configuration settings are shown in bold type.

Table 3. SW1 Configuration DIP Switch: Video Rate

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
3G-SDI	Enabled: Signal type accepted.	**ON**							
	Disabled: Signal type blocked.	OFF							
HD-SDI	Enabled: Signal type accepted.		**ON**						
	Disabled: Signal type blocked.		OFF						
SD-SDI	Enabled: Signal type accepted.			**ON**					
	Disabled: Signal type blocked.			OFF					
DVB ASI	Enabled: Signal type accepted.				**ON**				
	Disabled: Signal type blocked.				OFF				
ATSC	Enabled: Signal type accepted.					**ON**			
	Disabled: Signal type blocked.					OFF			
DV238	Enabled: Signal type accepted.						**ON**		
	Disabled: Signal type blocked.						OFF		
Reserved	Must be ON.							**ON**	
All others	Enabled: The DLC300 allows all signals not explicitly stated above in this table.								**ON**
	Disabled: The DLC300 blocks all signals not explicitly stated above in this table.								OFF

Note: Setting the SW1 configuration DIP switches all to OFF places the DLC300 in bypass mode. In this mode, the DLC300 accepts all signal types but does not perform any dithering on the signal before transmitting it.

Setting the SW2 Configuration DIP Switch

Table 4 describes the SW2 configuration DIP switch configuration options for setting the input signal source and standby signal format. The factory-set configuration settings are shown in bold type.

Table 4. SW2 Configuration DIP Switch: Input Signal Source and Standby Signal Format

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
BNC IN	Enabled: Input signal source.	**ON**	**ON**	**ON**					
Chassis Slot 1	Enabled: Input signal source.	OFF	OFF	OFF					
Chassis Slot 2	Enabled: Input signal source.	OFF	ON	OFF					
Chassis Slot 3	Enabled: Input signal source.	OFF	OFF	ON					
Chassis Slot 4	Enabled: Input signal source.	OFF	ON	ON					
Reserved	N/A	ON	OFF	OFF					
Reserved	N/A	ON	OFF	ON					
Reserved	N/A	ON	ON	OFF					
Standby Type	Artel (non-video keepalive)				**ON**	**ON**			
	3G 1080p				OFF	ON			
	SD-SDI				ON	OFF			
	HD 1080i				OFF	OFF			
Standby Format	525 line (SD-SDI) 59.94 fps (HD/3G)						**ON**		
	625 line (SD-SDI) 50 fps (HD/3G)						OFF		
Reserved	Must be ON.							**ON**	
Reserved	Must be ON.								**ON**

Setting the SW3 Configuration DIP Switch

This section describes the SW3 configuration DIP switch options for setting video signal processing, SFP alarms, and optical reversion.

The video signal EG-34 dithering feature is disabled by default. If you enable this feature, dithering is performed on the following SDI signals: SMPTE 259M (SD), SMPTE305M (SD), SMPTE292M (HD), and SMPTE424M (3G). The EG 34 dithering is an implementation of SMPTE EG 34-2004 "Pathological Conditions in Serial Digital Video Systems" and is compatible with dithering used in some other manufacturers' equipment.

Note: If the EG-34 dither setting is mismatched between a transmitter and a receiver, there will be errors in the embedded audio or data, which may cause missing or distorted audio.

Table 5 describes the SW3 configuration DIP switch configuration options. The factory-set configuration settings are shown in bold type.

Table 5. SW3 Configuration DIP Switch: Video Signal Dithering, SFP Alarms, and Optical Reversion

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
Reserved	Must be ON.	**ON**							
EG-34 Dither Processing	Disabled: No EG-34 dithering		**ON**						
	Enabled: EG-34 dithering		OFF						
ATSC to ASI Conversion (Transmitter mode only)	Disabled: No conversion.			**ON**					
	Enabled: Conversion enabled.			OFF					
Reserved	Must be ON.				**ON**				
SFP Alarms	Enabled: Alarm generated when no SFPs are detected or when an SFP causes an alarm.					**ON**			
	Disabled[1]: No alarm generated when either the primary or secondary SFP is not detected or when other SFP alarm conditions exist, such as low light, TX fail, or RX fail.					OFF			
Optical Reversion	Disabled: The optical input selector will not revert to the primary SFP receiver if the signal is detected on the primary SFP receiver after a switchover to the secondary SFP.						**ON**		
	Enabled[2]: The optical input selector will revert to the primary SFP receiver if the signal is detected on the primary SFP receiver after a switchover to the secondary SFP.						OFF		

Table 5. SW3 Configuration DIP Switch: Video Signal Dithering, SFP Alarms, and Optical Reversion (Continued)

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
Video Loss Alarm	Disabled: No alarm generated when a video input signal is not detected.							**ON**	
	Enabled: Major alarm generated when a video input signal is not detected.							OFF	
EMS Override	Enabled: DL Manager can change the DLC300 module configuration.								**ON**
	Disabled: DL Manager cannot change the DLC300 module configuration.[3]								OFF

1. Disable the SFP alarms when you do not install any SFPs because you want the output signal available at the backplane connectors only.
2. When optical reversion is enabled and the primary signal returns with a continuously good signal, by default the DLC300 waits one minute before switching back to the primary signal. You can use DL Manager to adjust the wait period (see the *DL Manager Setup and Operations Guide*).
3. If the module is operating in EMS Override mode, as indicated by a green EMS LED on the front panel, then the EMS Override DIP switch has no effect until you use DL Manager to take the module out of override mode and set it to local mode (see the *DL Manager Setup and Operations Guide*).

Installing the DLC300 Module and SFPs

The DLC300 and associated SFPs are hot swappable, enabling you to safely install them while power is applied to the DL4000. Before installing your DLC300, see the DLC300 3G-SDI Multi-Rate Digital Video Transmitter/Receiver/Repeater Module data sheet for a detailed description of the DLC300 product specifications, including environmental requirements that you must adhere to when installing the module.

To install the DLC300 in the Artel chassis, perform the following steps (see Table 5):

1. From the back of the chassis, remove the two screws that secure the blank tray to one of the unused function module slots (if necessary). Use any available function module slot.
2. Slide the DLC300 into the slot using the printed circuit board guide rails located on both sides of the slot.
3. Push the DLC300 in until it is firmly seated into the backplane and flush with the chassis.
4. Tighten the two mounting screws that secure the module to the chassis.

Note: Failure to properly secure the DLC300 to the chassis with the two mounting screws can result in disconnecting the module from the backplane when you attach a cable to the monitor connector located on the front panel.

5. Install the SFPs into the DLC300 (handle on top as shown in Figure 5). Push each SFP into the sockets located on the right side of the function module until they are firmly seated into the socket. If you are installing only one SFP, you can install it in either the primary (PRI) or secondary (SEC) SFP socket.

   Note: When you do not install any SFP, both sets of TX and RX status LEDs located on the DLC300 front panel flash. See Table 6 for other status LED indications.

6. Repeat this procedure for each DLC300 that you are installing in the chassis.

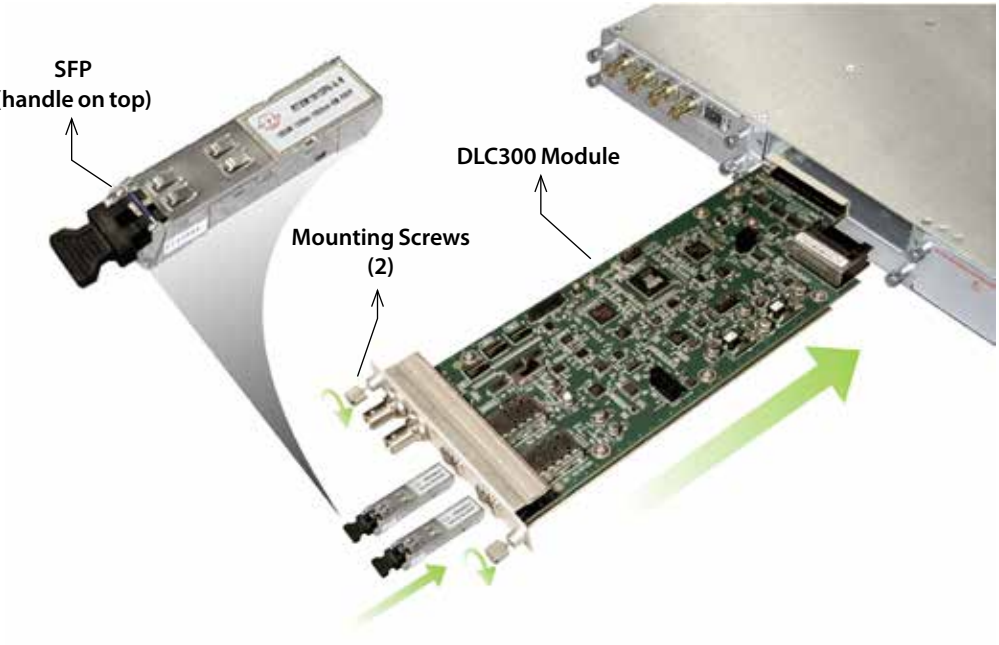

Figure 5. DCL300 Module and SFP Installation

Note: Insert a blank tray in any unused chassis module slots to maintain proper ventilation.

Cabling the DLC300 Module

The DLC300 allows you to transmit and receive signals over electrical and fiber optic cable connections. The cabling configuration that you use depends on your application. The electrical and optical connectors are located on the back panel of the DLC300 (see Figure 6). You access the connectors from the rear panel of the chassis.

Figure 6. DLC300 BNC Electrical and SFP Optical Connectors

Note: When handling fiber optic cables, adhere to the standard safety practices for handling a Class 1 laser product (see the "DLC300 Laser Warnings" section on page 2).

This section contains the following topics:

Cabling the Electrical Connections

To connect to the BNC connectors on the DLC300, use a high quality 75 Ohm precision video coax cable, such as Belden 1694A cable.

To cable the electrical connections, perform the following tasks:

- Input signal—Connect the electrical cable to the DLC300 receive connector (IN) and the source device's electrical transmit connector.
- Output signal—Connect the electrical cable to the DLC300 transmit connector (OUT) and the destination device's electrical receive connector.

Cabling the Optical Connections

Use a single mode fiber when connecting to the LC connectors on the DLC300 SFPs.

To cable the primary and secondary SFP optical connections, perform the following tasks for each connection:

1. Remove the SFP safety plug that protects the TX and RX ports. Cover any unused optical port to keep the port clean.
2. Cable the optical connections as follows:
   - Receive signal—Connect the fiber optic cable to the source device's optical transmit connector and the SFP receive optical connector (RX) on the DLC300 module.
   - Transmit signal—Connect the fiber optic cable to the destination device's optical receive connector and the SFP transmit optical connector (TX) on the DLC300 module.

Monitoring the DLC300 Module Operations

You monitor the operation of the DLC300 using the status LEDs located on the module front and rear panels and the monitor jack located on the front panel. You can also use DL Manager, Artel's element management system, to monitor the module operations (see the *DL Manager Setup and Operations Manual*).

This section contains the following topics:

Understanding the Front Panel Status LEDs

The front panel of an installed DLC300 is viewed from the front panel of the chassis as shown in Figure 7.

Figure 7. DLC300 Front Panel Status LEDs and Monitor Connector

Table 6 describes the different states of the DLC300 front panel status LEDs as shown in Figure 7.

Table 6. DLC300 Front Panel Status LEDs

LED	Indicates . . .	State	Description	Alarms	Action
OK (also located on the rear panel (see Figure 8))	The DLC300 status	Off	If power is applied to the system, an internal fault with the DLC300 may exist.	None	Replace the DLC300.
		Green	Normal operation.	None	None.
		Yellow	A temperature alarm is indicated if the RX LED is not flashing yellow (see RX flashing yellow below).	Minor	Address the problem indicated by the RX alarm or check that there is adequate inlet and exhaust airflow.
		Red	The TX or RX LEDs may indicate the cause of the alarm. Loss of video if the video alarm is enabled. Video rate is not locked.[1] The corresponding signal rate LED will flash red. Possible internal error.	Major	Address the TX or RX alarm. Check the video input. Check the video input Replace the DLC300.

Table 6. DLC300 Front Panel Status LEDs

LED	Indicates . . .	State	Description	Alarms	Action
EMS	Element Management System (DL Manager) status	Off	The DLC300 module is in local mode and its configuration is controlled by the onboard configuration switches.	None	None.
		Green	The DLC300 module is in remote mode and the configuration has been set by DL Manager. When in remote mode, the actual configuration of the module will likely not match the settings of the configuration switches and changing the configuration switches will have no effect on the module's operation.	None	None.
TX[2]	Transmitter status of the corresponding primary (PRI) and secondary (SEC) optical connections	Off	Receiver mode is selected or the corresponding PRI or SEC SFP is not installed.	None	None.
		Green	Normal TX operation (input signal is present).	None	None.
		Yellow	Standby operation (signal from the standby generator).		
		Red (flashing)	No SFP is installed in either socket or an SFP TX failure exists.	Major	Install an SFP or replace the existing SFP. Also, check the DLC300 configuration.
RX[2]	Receiver status of the corresponding primary (PRI) and secondary (SEC) optical connections	Off	Transmitter mode is selected or the corresponding PRI or SEC SFP is not installed.	None	None.
		Green	Normal RX operation (input signal is present).	None	None.
		Yellow (solid)	143 Mb PRBS non-video standby signal detected.		
		Yellow (flashing)	Receive optical power is high.	Minor	Check the optical RX signal power or the SFP.
		Red (flashing)	Low light, loss of the SFP RX signal, the PRI and SEC SFP sockets are both missing SFPs, or an SFP RX failure exists.	Major	Check the optical RX signal power or replace the SFP.

Table 6. DLC300 Front Panel Status LEDs (Continued)

LED	Indicates . . .	State	Description	Alarms	Action
3G	2.97 Gb/s SDI signal status	Off	3G signal is not detected.		
		Green	3G signal is received or transmitted.	None	None.
		Yellow	3G signal is detected and is being dithered.	None	None.
		Red (solid)	3G signal is detected and blocked.		
		Red (flashing)	Video rate unlocked.[1]	Major	Check video input signal.
HD	1.485 Gb/s SDI signal status	Off	HD signal is not detected.	None	None.
		Green	HD signal is received or transmitted.	None	None.
		Yellow	HD signal is detected and is being dithered.	None	None.
		Red (solid)	HD signal is detected and blocked.		
		Red (flashing)	Video rate unlocked.[1]	Major	Check video input signal.
SD	270 Mb/s SDI signal status	Off	SD signal is not detected.	None	None.
		Green	SD signal is received or transmitted.	None	None.
		Yellow	SD signal is detected and is being dithered.	None	None.
		Red (solid)	SD signal is detected and blocked.		
		Red (flashing)	Video rate unlocked.[1]	Major	Check video input signal.
ASI	ASI signal status	Off	ASI signal is not detected.	None	None.
		Green	ASI signal is received or transmitted.	None	None.
		Red (solid)	ASI signal is detected and blocked.		
		Red (flashing)	Video rate unlocked.[1]	Major	Check video input signal.

Table 6. DLC300 Front Panel Status LEDs (Continued)

LED	Indicates . . .	State	Description	Alarms	Action
ATSC	SMPTE 310 19.39 Mb/s ATSC signal status	Off	SMPTE 310 19.39 Mb/s ATSC signal is not detected.	None	None.
		Green	SMPTE 310 19.39 Mb/s ATSC signal is received or transmitted.	None	None.
		Yellow	SMPTE 310 19.39 Mb/s ATSC signal is detected and is being converted to ASI.	None	None.
		Red	SMPTE 310 19.39 Mb/s ATSC signal is detected and blocked.		

1. A video rate unlocked condition usually indicates that the input signal rate is outside the standard rate requirements. ASI is the signal type most often found to not meet the rate requirements.
The input signal rate requirements are as follows:
- SDI/ASI rates must be 270 Mb/s ± 100ppm
- HD SDI rate must be 1.485 Mb/s or 1.485/1.001 Mb/s ± 50ppm
- 3G SDI rate must be 2.97 Gb/s or 2.97/1.001 Gb/s ± 50ppm
If the signal cannot be held within these requirements, try setting the DLC300 to bypass mode (see the Note associated with Table 3).
2. When the DLC300 is in repeater mode, the TX and RX status LEDs are active to represent the simultaneous receive and transmit operations occurring.

Using the Monitor Jack

To monitor the DLC300 transmit and receive signals, connect the monitor cable to the mini 75 Ohm SMB monitor jack (MON) located on the DLC300 front panel (see Figure 7).

The monitor output in transmitter mode is always the same signal as the optical output except that it is not dithered.

Note: When the DLC300 is operating in transmitter mode and is configured to convert ATSC (SMPTE 310M) to ASI, the monitor output is the ASI signal that was converted from ATSC. The unconverted ATSC signal is available at the BNC OUT connection on the rear panel.

The monitor output in receiver mode is always the same as the BNC output on the back panel. The monitor output in repeat mode is the same as in receiver mode and is always the same as the BNC output on the back panel.

Typically, the monitor output signal is never dithered; however, when operating in transmitter mode with dithering enabled and the standby signal set to one of the SDI signals, when the DLC300 loses its input, it transmits a dithered SDI standby signal through the installed SFPs and also outputs the dithered signal to the monitor jack.

Understanding the Rear Panel Status LEDs

Both the primary (PRI) and secondary (SEC) SFP connectors on the rear panel have an identical set of status LEDs as show in Figure 8.

Figure 8. DLC300 Rear Panel Status LEDs

The OK status LED operates in the same way as the front panel OK LED. For details on how this LED operates, see Table 6.

Table 7 describes the different states of the rear panel ACT and STAT status LEDs associated with the primary (PRI) and secondary (SEC) SFP connectors.

Table 7. DLC300 Rear Panel SFP Connector Status LEDs

LED	Indicates . . .	State	Description	Alarms	Action
ACT	Receiver activity	Off	Receiver is inactive.		
		Green	Receiver is active.		
STAT	SFP status	Off	No SFP detected.		
		Green	Normal operation.		
		Yellow	Standby signal is being transmitted or received.		
		Yellow (flashing) RX mode only	Receive optical power is high.	Minor	Check the optical RX input signal.
		Red (flashing)	No SFPs are installed, low light, loss of the SFP RX signal (in Repeat or RX mode), or a SFP failure exists.	Major	Check the optical RX input signal power (in Repeat or RX mode) or replace the SFP.

Removing the SFPs and DLC300 Module (Continued)

You can safely remove either of the SFPs from the DLC300, or the DLC300 from the chassis while power is applied to the module.

This section contains the following topics:

Removing the SFP

To remove the SFP from the DLC300, perform the following steps:

1. Remove the fiber optic cables from the SFP.
2. Pull down on the SFP handle to dislodge the SFP from the DLC300 module (see Figure 9).
3. Using the SFP handle, pull the SFP out of the DLC300.

Figure 9. Removing the SFP

Removing the DLC300 Module

To remove the DLC300 from the chassis, perform the following steps:

1. Remove the fiber optic cables from the DLC300 SFPs.
2. Remove the coaxial cables from the BNC connectors.
3. Loosen the two mounting screws that secure the DLC300 to the chassis.
4. Using the two mounting screws, pull the DLC300 out of the chassis.

Caution

To avoid problems associated with overheating, do not leave a function module slot open when power is applied to the chassis. Every module slot must contain a module or blank tray to ensure proper ventilation when power is applied.

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