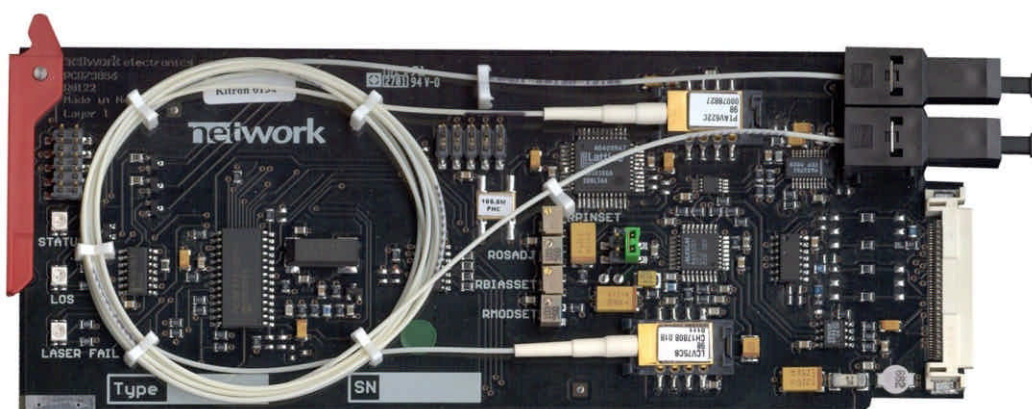




D422

Supports CWDM

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Technical specifications are subject to be changed without notice

Revision history

The latest version is always available in pdf-format on our web site:

<http://www.network-electronics.com/>

Current revision of this document is the uppermost in the table below.

Revision	Replaces	Date	<u>Change Description</u>
1	0	26.11.02	Added CWDM information
0	A	01.11.01	Final first release.
A		04.09.01	Preliminary version

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1. General

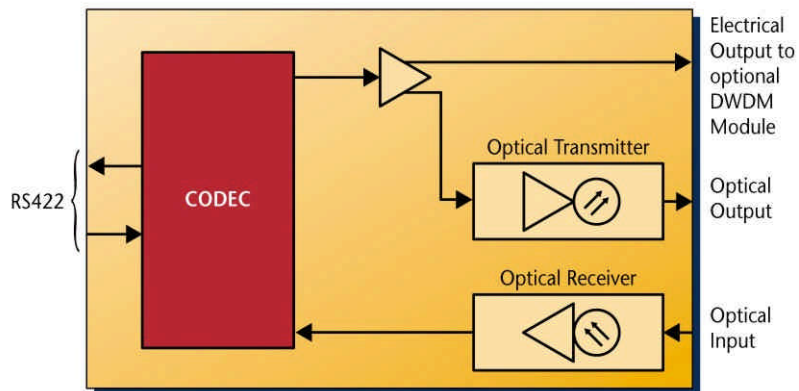


Figure 2. D422 – RS-422 Data Transceiver Block Diagram

The flashlink D422 module provides an economical solution for transmitting RS-422 data signals via fiber optic cable. A pair of D422 allows bi-directional transmission of RS-422 data for distances over 60km. When access to fiber is limited, D422 can be combined with the flashlink optical multiplexing WDM, CWDM or DWDM products.

As stand alone unit, the D422 module utilises 2 fiber strands for bi-directional data transport. Using either 2 fiber strands or optical multiplexing technology guarantees minimum possible latency for applications where timing is crucial. The D422 module is supplied together with the D422-C1 connector module.

The optical output is made with a Fabry-Perot laser diode for $1310\pm 40\text{nm}$ or a DFB laser for $1550\pm 40\text{nm}$ and the CWDM wavelengths according to ITU-T G.694 from $1470\pm 6\text{nm}$ up to $1610\pm 6\text{nm}$.

The product is available in 11 versions:

D422-13T -7.5dBm	1310± 40nm -7.5 dBm F-P laser	
D422-13T 0 dBm	1310± 40nm 0 dBm F-P laser	
D422-15T 0 dBm	1550± 40nm 0 dBm DFB laser	
<i>CWDM</i>		
D422-C1470	1470± 6nm 0dBm DFB laser	CWDM frame 2
D422-C1490	1490± 6nm 0dBm DFB laser	CWDM frame 2
D422-C1510	1510± 6nm 0dBm DFB laser	CWDM frame 1
D422-C1530	1530± 6nm 0dBm DFB laser	CWDM frame 1
D422-C1550	1550± 6nm 0dBm DFB laser	CWDM frame 1
D422-C1570	1570± 6nm 0dBm DFB laser	CWDM frame 1
D422-C1590	1590± 6nm 0dBm DFB laser	CWDM frame 2
D422-C1610	1610± 6nm 0dBm DFB laser	CWDM frame 2

2. Specifications

Data inputs and outputs

Signal format:	RS-422
Connector:	RJ-45
Bit Rate:	DC up to 115.2 kbps
Latency:	400ns maximum single direction latency including 1m of fiber. Additional latency 5µs/km of fiber.

Electrical

Voltage:	+5V DC
Power:	2.4 Watts
Control:	RS-422 with protocol for use with GYDA System Controller. Control system has access to set-up and module status with BITE (Built-In Test Equipment).

Optical

Optical Input

Sensitivity:	better than -30dBm
Max. input power:	-3dBm
Optical wavelengths:	1310nm, 1550nm
Transmission circuit fiber:	Multi Mode 50/125µm, Single Mode 9/125µm compatible
Return loss:	> 26dB
Connector:	SC/UPC, Return Loss better than 40dB

Optical Output

Transmission circuit fiber:	Single Mode
Light source:	F-P/DFB Laser
Optical wavelength (ver. 13T):	1310nm ± 40nm
Optical power:	-7.5 dBm
Optical power (option):	0 dBm
Optical wavelength (ver. 15T):	1550nm ± 40nm
Optical power (option):	0 dBm
Optical wavelength for CWDM:	1470, 1490, 1510, 1530, 1550, 1570, 1590 or 1610 ± 6nm according to ITU-T G.694.2
Optical power for CWDM modules:	0 dBm
Jitter (UI=unit interval):	0.135 UI max.
Connector return loss:	better than 40 dB typ.
Maximum reflected power:	4%
Connector:	SC/UPC

3. Connector module

The D422 has a dedicated connector module: D422-C1. This module is mounted at the rear of the sub-rack. The module is shown in figure 2.

To set up a link, two D422 modules must be used. The RS-422 data cable is connected to RS422/E1 on each of the D422 modules. The two modules are connected to the fibres with one fiber from TX on module 1 to RX on module 2, and from RX on module 1 to TX on module 2.

The TX UPG connector contains an electrical version of the modulated signal running on the fiber. This connector is used for future upgrade with a flashlink multichannel DWDM system.

The connector marked E2 is not in use with the D422 module.

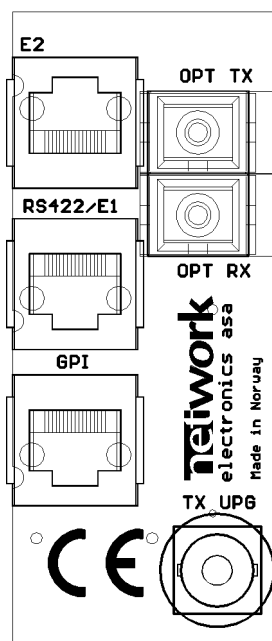


Figure 2. Overview of the D422-C1 connector module

3.1 Mounting the connector module.

This section only applies if the module is not purchased pre-mounted in a sub-rack.

The details of how the connector module is mounted, is found in the user manual for the sub-rack frame FR-2RU-10-2.

This manual is also available from our web site: <http://www.network-electronics.com/>

3.2 Connector Pin Assignments

RS-422 shall be connected to the RS422/E1 connector, positioned as shown in figure 2. The connector is a RJ-45, 8-pin type.

RS-422 pin layout:

Signal	Name	Pin #	Mode
RX +	Receive Data Positive	Pin 1	Input
RX -	Receive Data Negative	Pin 2	Input
TX +	Transmit Data Positive	Pin 3	Output
TX -	Transmit Data Negative	Pin 6	Output

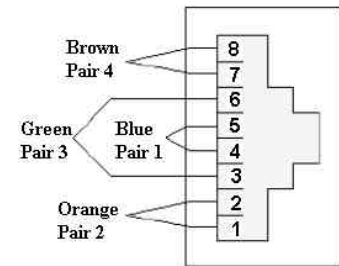


Figure 3: RS-422 Outlet

3.3 Line Termination

At the end of a RS-422 bus, the line must be terminated with a resistor. With RS-422 lines this is typically done at the receiver side with a 120 ohm resistor.

The D422 module has a built in 120 ohm resistor at the receiver input terminal. The transmitter output terminal has no line terminating resistors.

4. Module status

The status of the module can be monitored in three ways.

1. GYDA System Controller.
2. GPI at the rear of the sub-rack.
3. LED's at the front of the sub-rack.

Of these three, the GPI and the LED's are mounted on the module itself, whereas the GYDA System Controller is a separate module giving detailed information of the status of the card. The functions of the GPI and the LED's are described in sections 4.1 and 4.2. The GYDA controller is described in a separate user manual.

4.1 GPI – Module Status Outputs

These outputs can be used for wiring up alarms for third party control systems. The GPI outputs are open collector outputs, sinking to ground when an alarm is triggered. The GPI connector is shown in figure 2.

Electrical Maximums for GPI outputs

Max current: 100mA

Max voltage: 30V

D422 module GPI pin layout:

Signal	Name	Pin #	Mode
Status	General error status for the module.	Pin 1	Open Collector
LOS	Los Of optical input Signal	Pin 2	Open Collector
Laser Fail	Laser Fail Alarm	Pin 3	Open Collector
Ground	0 volt pin	Pin 8	0V.

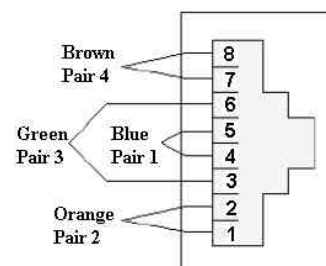


Figure 3: GPI Outlet

4.2 Front Panel - Status Monitoring

The status of the module can be easily monitored visually by the LED's at the front of the module. The LED's are visible through the front panel as shown in figure 4 on the next page.

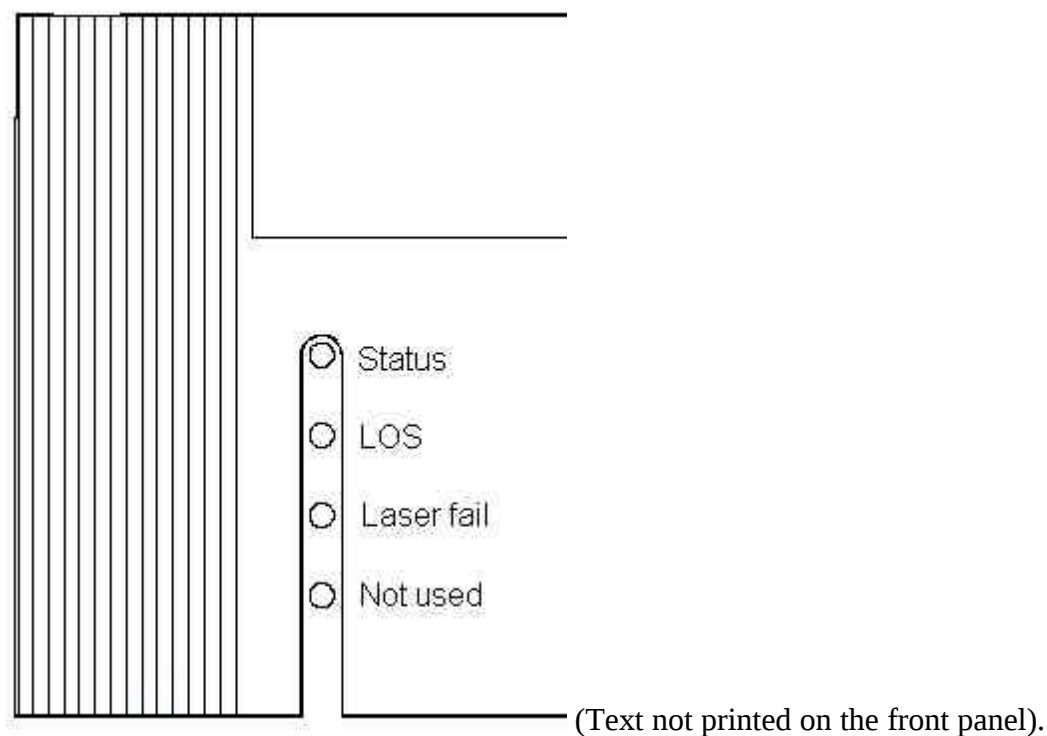


Figure 4. Front panel indicator overview for D422-13T/15T

The D422 has 3 LED's each showing a status corresponding to the GPI pin layout. The position of the different LED's is shown in figure 4.

Diode \ state	Red LED	Green LED	No light
Status	Module is faulty	Module is OK Module power is OK	Module has no power
LOS	Loss of signal No optical input signal.	Optical input signal present	
Laser fail	Laser is malfunctioning	Laser is OK	

5. Laser safety precautions

Guidelines to limit hazards from laser exposure.

All the available EO units in the flashlink® range include a laser.

Therefore this note on laser safety should be read thoroughly.

The lasers emit light at wavelengths around 1310 nm or 1550 nm. This means that the human eye cannot see the beam, and the blink reflex cannot protect the eye. (The human eye can see light between 400 nm to 700 nm).

A laser beam can be harmful to the human eye (depending on laser power and exposure time). Therefore:

!! BE CAREFUL WHEN CONNECTING / DISCONNECTING FIBER PIGTAILS (ENDS).

NEVER LOOK DIRECTLY INTO THE PIGTAIL OF THE LASER/FIBER.

NEVER USE MICROSCOPES, MAGNIFYING GLASSES OR EYE LOUPES TO LOOK INTO A FIBER END.

USE LASER SAFETY GOGGLES BLOCKING LIGHT AT 1310 nm AND AT 1550 nm

Instruments exist to verify light output power: Power meters, IR-cards etc.

flashlink[®] features:

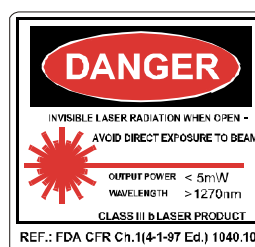
All the laser module cards in the flashlink[®] product range, are Class 1 laser products according to IEC 825-1 1993, and class I according to 21 CFR 1040.10 when used in normal operation.

More details can be found in the user manual for the FR-2RU-10-2 frame.

Maximum output power* : 5 mW.

Operating wavelengths: > 1270 nm.

**Max power is for safety analysis only and does not represent device performance.*



Declaration of conformity with CE

This apparatus meets the requirements of EN 55103-1 (November 1996) with regard to emissions, and EN 55103-2 (November 1996) with regard to immunity; it thereby complies with the Electromagnetic Compatibility Directive 89/336/EEC.

General environmental requirements for flashlink® equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:
 - Operating room temperature range 0°C to 50°C
 - Operating relative humidity range up to 90% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:
 - Temperature range -10°C to 55°C
 - Relative humidity range up to 95% (non-condensing)

3. Electromagnetic compatibility conditions:
 - Emissions EN 55103-1 (Directive 89/336/EEC)
 - Immunity EN 55103-2 (Directive 89/336/EEC)