network

Flashlink User Manual

D422

RS-422 Data Transceiver Supports CWDM

Rev. 6

network-electronics.com

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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**	Change Description
6	5	2008-07-24	Added Declaration of Conformity.
5	4	2007-10-24	New front page and removed old logo.
4	3	2007-10-05	Added Materials Declaration and EFUP
3	2	06.02.06	Updated CWDM laser options.
2	1	13.12.05	Added text in table (Chapter 4.2).
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

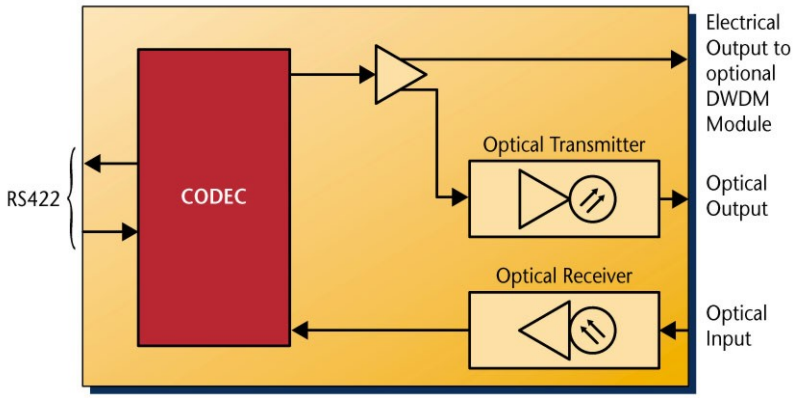


Figure 2. D422 – RS-422 Data Transceiver Block Diagram

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±40nm or a DFB laser for 1550±40nm and the CWDM wavelengths according to ITU-T G.694 from 1270±6nm up to 1610±6nm.

The product is available in the following 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		
	CWDM (DFB lasers)		
D422-C1470	1470± 6nm 0dBm	**D422-C1270**	1270± 6nm 0dBm
D422-C1490	1490± 6nm 0dBm	**D422-C1290**	1290± 6nm 0dBm
D422-C1510	1510± 6nm 0dBm	**D422-C1310**	1310± 6nm 0dBm
D422-C1530	1530± 6nm 0dBm	**D422-C1330**	1330± 6nm 0dBm
D422-C1550	1550± 6nm 0dBm	**D422-C1350**	1350± 6nm 0dBm
D422-C1570	1570± 6nm 0dBm	**D422-C1370**	1370± 6nm 0dBm
D422-C1590	1590± 6nm 0dBm	**D422-C1390**	1390± 6nm 0dBm
D422-C1610	1610± 6nm 0dBm	**D422-C1410**	1410± 6nm 0dBm

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:	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 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.

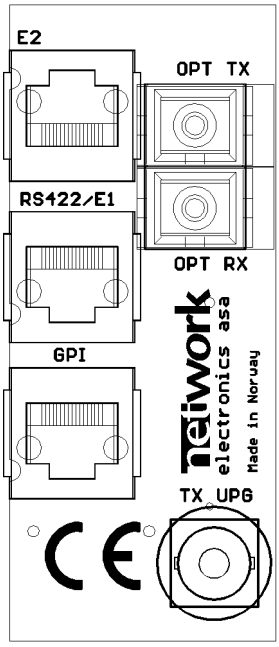


Figure 2. Overview of the D422-C1 connector module

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

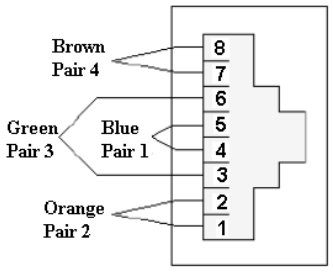


Figure 3: RS-422 Outlet

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.

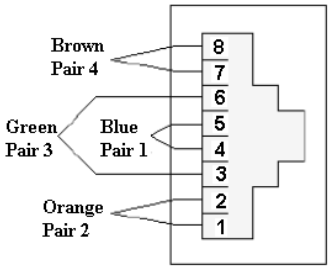
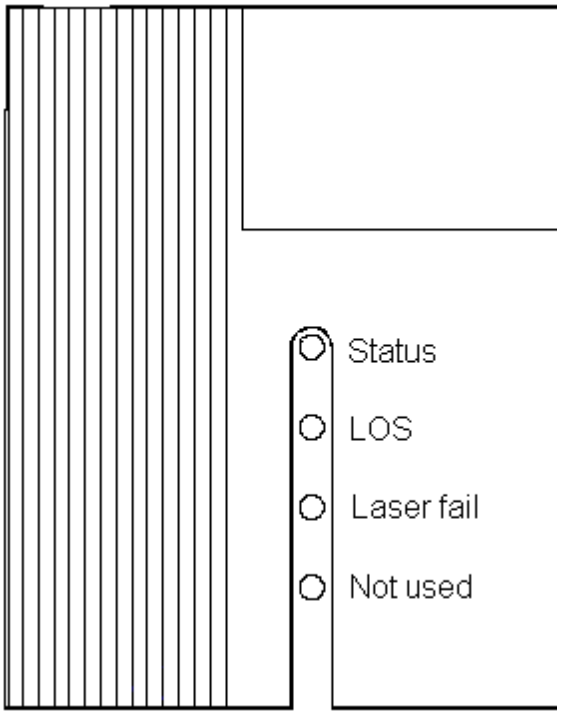


Figure 3: GPI Outlet

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.



(Text not printed on the front panel).

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 *or* Laser is turned off by GYDA	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.

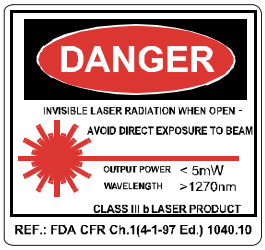
USE LASER SAFETY GOGGLES BLOCKING LIGHT AT 1310 nm AND AT 1550 nm

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.*



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)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Network Electronics AS. These conditions are available on the company web site of Network Electronics AS:

www.network-electronics.com

Materials declaration and recycling information

Materials declaration

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
D422	X	O	O	O	O	O

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Environmentally-friendly use period

The manual must include a statement of the "environmentally friendly use period". This is defined as the period of normal use before any hazardous material is released to the environment. The guidance on how the EFUP is to be calculated is not finalised at the time of writing. See http://www.aeanet.org/GovernmentAffairs/qfLeOpAaZXaMxqGjSFbEidSdPNtpT.pdf for an unofficial translation of the draft guidance. For our own products, Network Electronics has chosen to use the *50 year figure* recommended in this draft regulation.

Network Electronics suggests the following statement on An "Environmentally Friendly Use Period" (EFUP) setting out normal use:

> **EFUP is the time the product can be used in normal service life without leaking the hazardous materials. We expect the normal use environment to be in an equipment room at controlled temperature range (0ºC - 40ºC) with moderate humidity (< 90%, non-condensing) and clean air, not subject to vibration or shock.**

Further, a statement on any hazardous material content, for instance, for a product that uses some tin/lead solders:

> **Where a product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. The hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of "General Rule of Environment-Friendly Use Period of Electronic Information Products". This is indicated by the product marking:**

> **It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.**

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

Recycling information

Network Electronics provides assistance to customers and recyclers through our web site http://www.network-electronics.com. Please contact Network Electronics' Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Network Electronics or its agents for recycling, the following general information may be of assistance:

Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.

All major parts are marked or labelled to show their material content.

Depending on the date of manufacture, this product may contain lead in solder.

Some circuit boards may contain battery-backed memory devices.

EC Declaration of Conformity

MANUFACTURER	Network Electronics AS P.B. 1020, N-3204 SANDEFJORD, Norway	
AUTHORISED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	D422	
DESCRIPTION	RS-422 Data Transceiver	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 2004/108/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996	
TEST REPORTS ISSUED BY	**Notified/Competent Body**	**Report no:**
	Nemko	E08462.00
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2008	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	**AUTHORISED REPRESENTATIVE (Established within EEA)**	**Date of Issue** 2008-07-24
NETWORK ELECTRONICS AS O.nr. 976 584 201 MVA	Not applicable	**Place of Issue** Sandefjord, Norway
Name	Thomas Øhrbom	
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