

## Sabre Series

D38999 Size 11-02 Optical Dual Receiver, PCB Mount, \*ELIO<sup>®</sup>, 850nm, ARINC 818, 803 & 804

Dual RX, Flange Mount

### FEATURES

- Compliant with ARINC 818, 803 & 804
- Suitable for 1x/2x/4xFibre Channel and sFPDP applications from 100Mbps to 5.0Gbps
- Maximum optical channel bit error rate less than  $1 \times 10^{-12}$
- Operating temperature range from -55°C to +85°C
- Shock and vibration resistant per RTCA / D0-160E
- Olive drab cadmium over electroless nickel plating meets stringent corrosion performance specifications
- Twelve pin PCB footprint with Loss of Signal (LOS) function
- ELIO<sup>®</sup> 2.5mm ceramic optical fiber ferrule connector interface per EN 4531, ABS 1379 and ARINC 801
- Compatible with Mil-Dtl-38999 ELIO<sup>®</sup> size 11-02 connectors

### APPLICATIONS

Sabre series 38999 size 11-02 optical receivers enable high speed network communications over long distances in harsh environments.

- Fibre Channel switches and peripherals
- ARINC 818 video interfaces
- sFPDP data links

Sabre series 38999 size 11-02 optical dual receivers provide a rugged optical interface that is compliant with ELIO<sup>®</sup> 2.5mm ceramic optical ferrules\*.

The multimode optical fiber interface supports applications where copper cable link distance, bandwidth, weight or bulk make the use of twisted pair, twinax or quadrx copper conductors unacceptable.

\*ELIO<sup>®</sup> is a registered trademark of Souriau Connection Technology



Two RX Links Operating from 100Mbps to 5.0Gbps

### DESCRIPTION

Sabre series 38999 size 11-02 optical dual receivers consist of optoelectronic receiver functions integrated into a wall mount D38999 optical connector.

The optical receivers consist of PIN and preamplifier assemblies and limiting post-amplifiers. Outputs from the receivers consist of differential CML data signals on the receiver (RX+ and RX-) lines and single ended CMOS indicator functions on the Loss of Signal (LOS) lines. The receiver data lines are squelched upon LOS assertion, preventing errant data generation when an invalid incoming optical signal is presented to the transceiver.

The optical mating interface of the Sabre series 38999 size 11-02 optical receivers is a Souriau D38999 ELIO<sup>®</sup> fiber optic cable plug per EN 4531. The electrical interface to the Sabre series D38999 size 11-02 optical transceiver is a 12 position pin header suitable for thru-hole soldering to a flexible or rigid printed circuit.

Sabre series D38999 size 11-02 optical receivers are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

### ORDERING INFORMATION

Application	Part Number
100Mbps to 3.19Gbps	P86F-2R1E-BW
3.2Gbps to 5.0Gbps	P86F-2R1G-BW

See Appendix A3 for more part number options

P86F-2R1x-BW-DS - July 2, 2012 - Released

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

### ABSOLUTE MAXIMUM RATINGS

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Storage Temperature	$T_s$	-55		+100	°C
Supply Voltage	$V_{cc}$	-0.5		+4.5	V
RX Output Current	$I_o$			50	mA

### RECOMMENDED OPERATING CONDITIONS

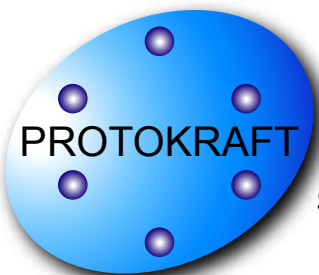
Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	$T_A$	-55		+85	°C
Power Supply Voltage	$V_{cc}$	+3.135		+3.465	V
Power Supply Noise (p-p)	$N_p$			200	mV

### SPECIFICATIONS COMPLIANCE

Requirement	Feature	Condition	Notes
RTCA / D0-160E	ESD	Class II	2200V
RTCA / D0-160E	Vibration	3.8g <sup>2</sup> /Hz	43G rms
RTCA / D0-160E	Shock	40.0g	6-9mS
RTCA / D0-160E	Flame Resistance	Method 1012	30 Seconds
RTCA / D0-160E	Damp Heat	10 Cycles	24 Hours
ARINC 801	Mating Durability	500 Cycles	<0.5dB Change
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

### MATERIALS

Item	Detail	Notes
38999 Shell	Aluminum	
38999 Shell Plating	Olive Drab Cadmium over Nickel	QQ-P-416, QQ-N-290
Insert	Arcap	
Solder Pins	Brass	
Solder Pin Plating	Gold	
Ferrule	Ceramic	
Printed Circuits	Polyimide / FR-4	



## Facilitating Secure Communications in Harsh Environments

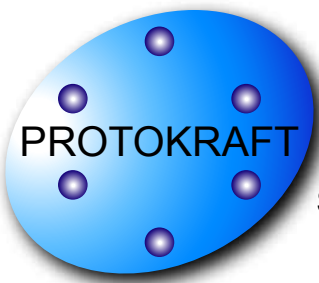
Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

### OPTICAL RECEIVERS $T_A$ = Operating Temperature Range, $V_{CC}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity (BER<10 <sup>-12</sup> , ER=9.0) xxxx-2R1E-xx @ 125Mbps to 1.25Gbps xxxx-2R1E-xx @ 2.125Gbps xxxx-2R1E-xx @ 2.5Gbps to 3.19Gbps xxxx-2R1G-xx @ 3.2Gbps to 4.25Gbps	$P_i$	-17.0 -15.0 -15.0 -14.0		0.0	dBm
Optical Wavelength	$\lambda_{IN}$	830		860	nm
Optical Modulation Amplitude (ER=9.0, p-p) xxxx-2R1E-xx @ 125Mbps to 1.25Gbps xxxx-2R1E-xx @ 2.125Gbps xxxx-2R1E-xx @ 2.5Gbps to 3.19Gbps xxxx-2R1G-xx @ 3.2Gbps to 4.25Gbps	OMA	31 49 56 61			$\mu$ W
CML Differential Output Voltage (p-p)	$V_{Diff}$	600	780	1200	mV
Signal Detect Deassert Level	$P_{OFFr}$	-28.0			dBm
Signal Detect Hysteresis	HYS	1.5	2.25	3.5	dB

### POWER SUPPLY CURRENT $T_A$ = Operating Temperature Range, $V_{CC}$ = 3.135V to 3.465V

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per receiver	$I_{CCT}$		50	75	mA

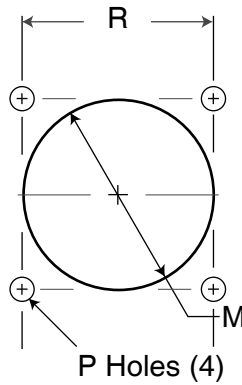
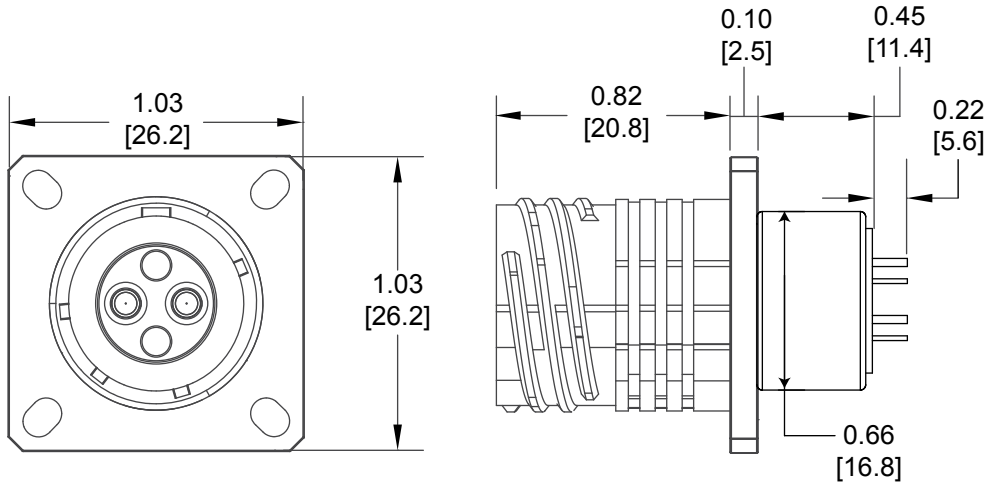


## Facilitating Secure Communications in Harsh Environments

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nM, Arinc 664, 818, 803 & 804 Compliant

### OUTLINE DRAWING

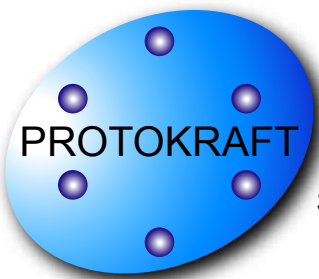
Dimensions are shown as: inches [mm]



### Panel Cutout Dimensions Rear Panel Mounting Only

Shell Size Code	Shell Size	M Hole	P Holes	R Bsc
B	11	0.812 (20.62)	0.133 (3.4) 0.123 (3.1)	0.812 (20.62)

P86F-2R1x-BW-DS - July 2, 2012 - Released



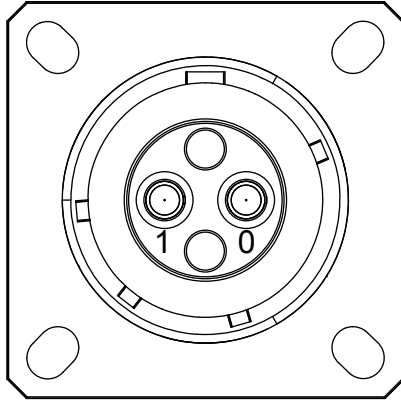
## *Facilitating Secure Communications in Harsh Environments*

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

### **OPTICAL DUAL TRANSMITTER INSERT ARRANGEMENT**

**TOP**

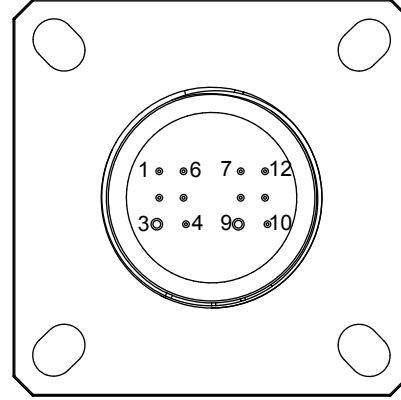
**Optical Interface**



Front face of the optical dual transmitter insert shown, fiber optic cable plug opposite - see Appendix A2 for details

**TOP**

**Electrical Interface**



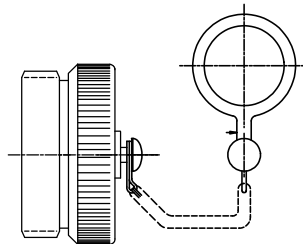
Back face of the optical dual transmitter insert shown - see Printed Circuit Board Footprint and Electrical Pin Assignment pages for details

### **RECEPTACLE PROTECTION CAPS**

#### **\*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS**

MS RECEPTACLE CAP P/N

See Appendix A1



\*See DSCC or SAE QPL for Approved Suppliers

P86F-2R1x-BW-DS - July 2, 2012 - Released



## Facilitating Secure Communications in Harsh Environments

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

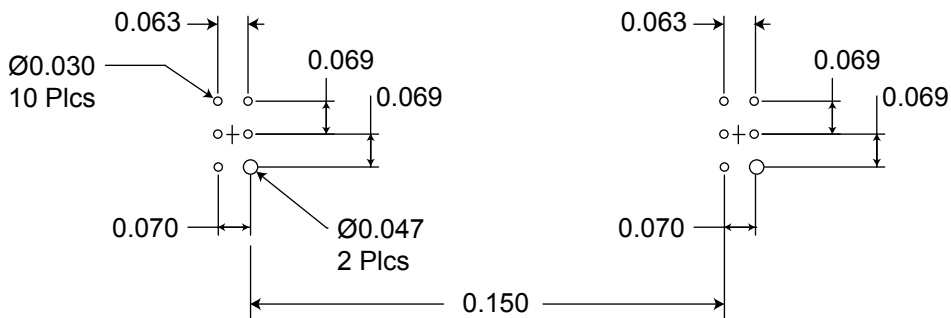
## ELECTRICAL PIN ASSIGNMENTS

Pin Number	Port Number	Symbol	Description	Logic Family
1	0	GND	Ground	N/A
2	0	V <sub>CC</sub>	Power Supply - Input	N/A
3	0	GND	Ground	N/A
4	0	LOS	Loss of Signal - Output Satisfactory Optical Input: Logic "0" Output Unsatisfactory Optical Input: Logic "1" Output	Open Drain CMOS
5	0	RX-	Receiver Data - Output	CML
6	0	RX+	Receiver Data - Output	CML
7	1	GND	Ground	N/A
8	1	V <sub>CC</sub>	Power Supply - Input	N/A
9	1	GND	Ground	N/A
10	1	LOS	Loss of Signal - Output Satisfactory Optical Input: Logic "0" Output Unsatisfactory Optical Input: Logic "1" Output	Open Drain CMOS
11	1	RX-	Receiver Data - Output	CML
12	1	RX+	Receiver Data - Output	CML

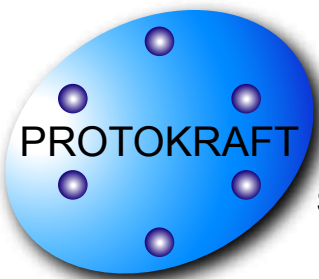
## PRINTED CIRCUIT BOARD FOOTPRINT

Dimensions are shown as: inches

### PCB Hole Pattern Mounting Side View



P86F-2R1x-BW-DS - July 2, 2012 - Released



## Facilitating Secure Communications in Harsh Environments

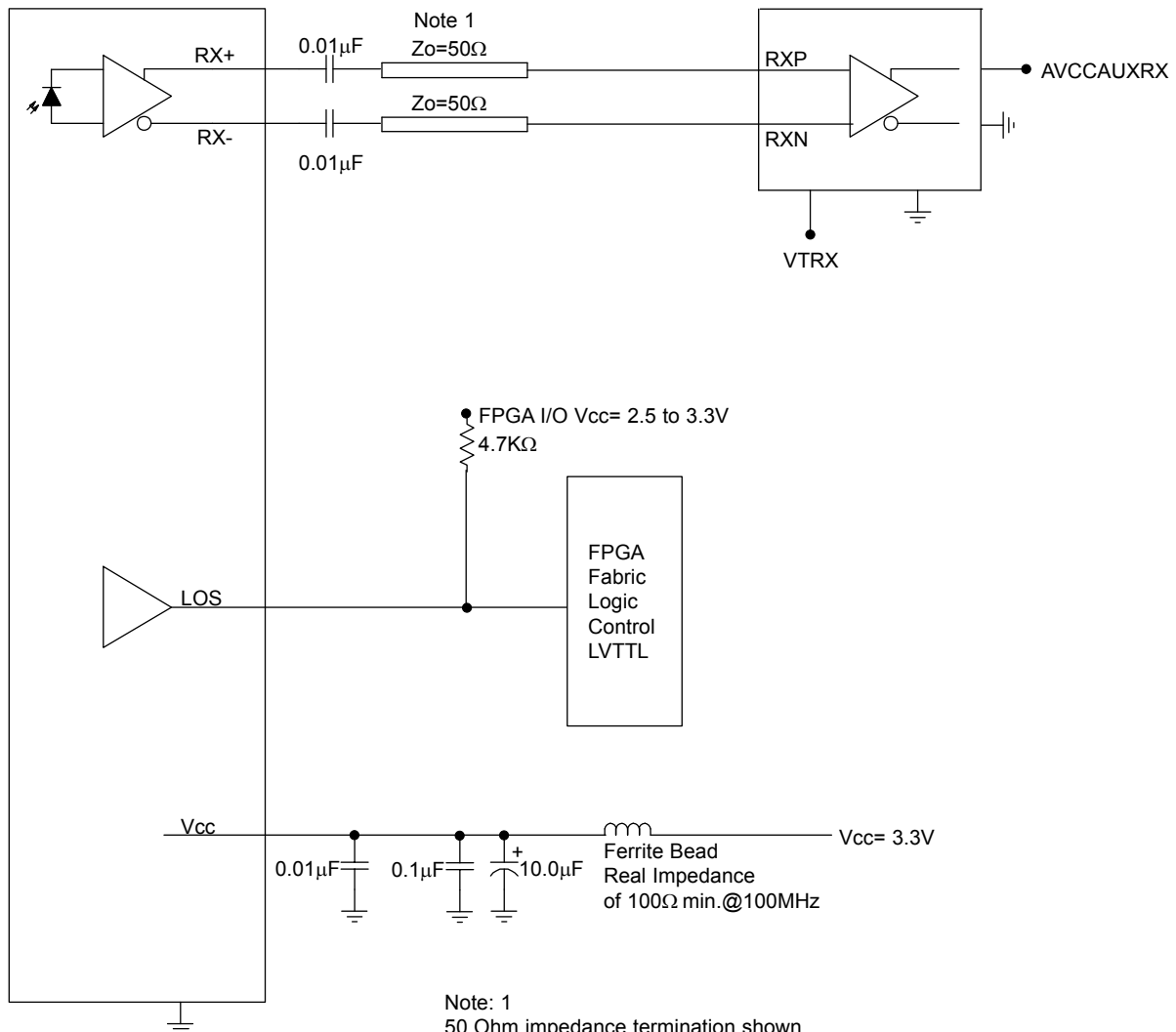
Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

### APPLICATION SCHEMATIC

For Xilinx Rocket I/O Interfaces

#### Optical Receivers

#### Xilinx Rocket I/O

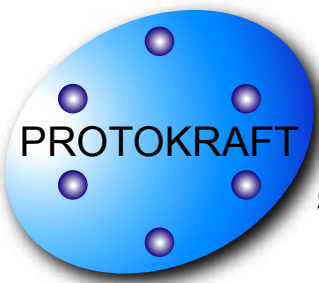


Typical application schematic shown  
For alternate applications or termination  
techniques, please consult the Factory

Note: 1  
50 Ohm impedance termination shown.  
For alternate impedance requirements,  
please consult the Factory.

All Protokraft statements, technical information and recommendations related to the products herein are based upon information believed to be reliable or accurate. However, the accuracy or completeness thereof is not guaranteed, and Protokraft assumes no responsibility for any inaccuracies. The user assumes all risks and liability whatsoever in connection with the use of a product or its application. Protokraft reserves the right to change at any time, without prior or subsequent notice, the design, specifications, function, fit or form of its products described herein, including withdrawal at any time of a product offered for sale herein. Protokraft makes no representations that the products herein are free from any intellectual property claims of others. Protokraft and the Protokraft logo are trademarks of Protokraft, LLC. Other trademarks are the property of their respective holders. Contact Protokraft for prices and availability. For the most recent version of this data sheet, please go to the Protokraft website at <http://www.protokraft.com>. In case of discrepancy, the web version takes precedence over any printed literature. ©2004 Protokraft, LLC. All rights reserved.

P86F-2R1x-BW-DS - July 2, 2012 - Released



## Facilitating Secure Communications in Harsh Environments

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

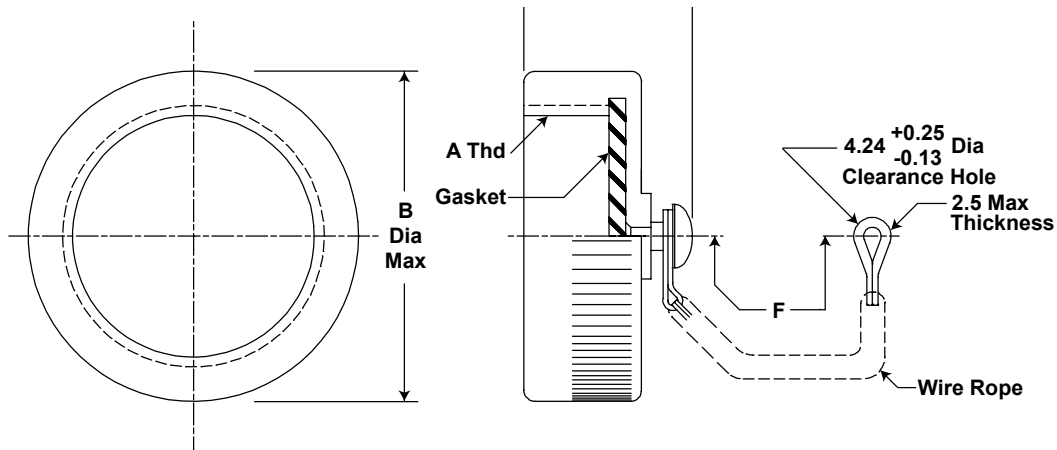
### APPENDIX A1

#### RECEPTACLE PROTECTION CAPS

##### \*MIL-DTL-38999/33 PROTECTION CAP PART NUMBERS

MS RECEPTACLE CAP P/N

\*D38999/33W11N

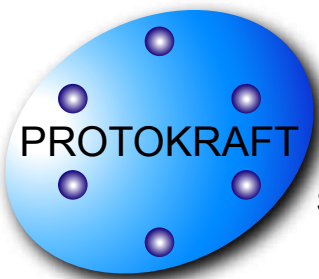


##### MIL-DTL-38999/33 Outline Dimensions - mm

Shell Size Code	Shell Size	A Thread (inches)	B Max Dia
B	11	.7500-0.1P- 0.3L-TS	1.10 (28.0)

P86F-2R1x-BW-DS - July 2, 2012 - Released



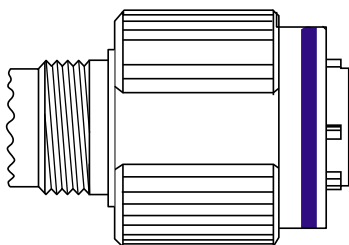


## Facilitating Secure Communications in Harsh Environments

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nm, Arinc 664, 818, 803 & 804 Compliant

### APPENDIX A2 Mating Fiber Optic Connectors and Termini

#### ELIO® Plug Connector



8D	5	E	11	W	02	A	N
Shell type: 5 = Plug							
Designation: E							
Shell size: 09							
Plating							
W: Olive drab cadmium							
F: Nickel							
Insert arrangement: 01							
Insert: Male							
Polarization N, A, B, C, D, E							

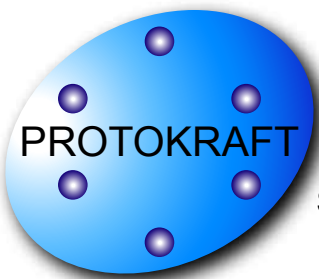
#### ELIO® Termini



### Ordering Information

Ello	09	N	G	L	A
Cable external diameter: 09: 0.9 mm or cable wider than 1.9mm with 0.9mm jacket inside 18: from 1.5mm to 1.9mm					
Contact sealing: W: waterproof (1.8mm +/- 0.1mm cable only) N: non waterproof					
Fibre type: G: 50 or 62,5/125 µm D: 100/140 µm					
Boot type: L: Long boot S: Short boot N: No boot (non waterproof version only)					
Contact version index					

P86F-2R1x-BW-DS - July 2, 2012 - Released

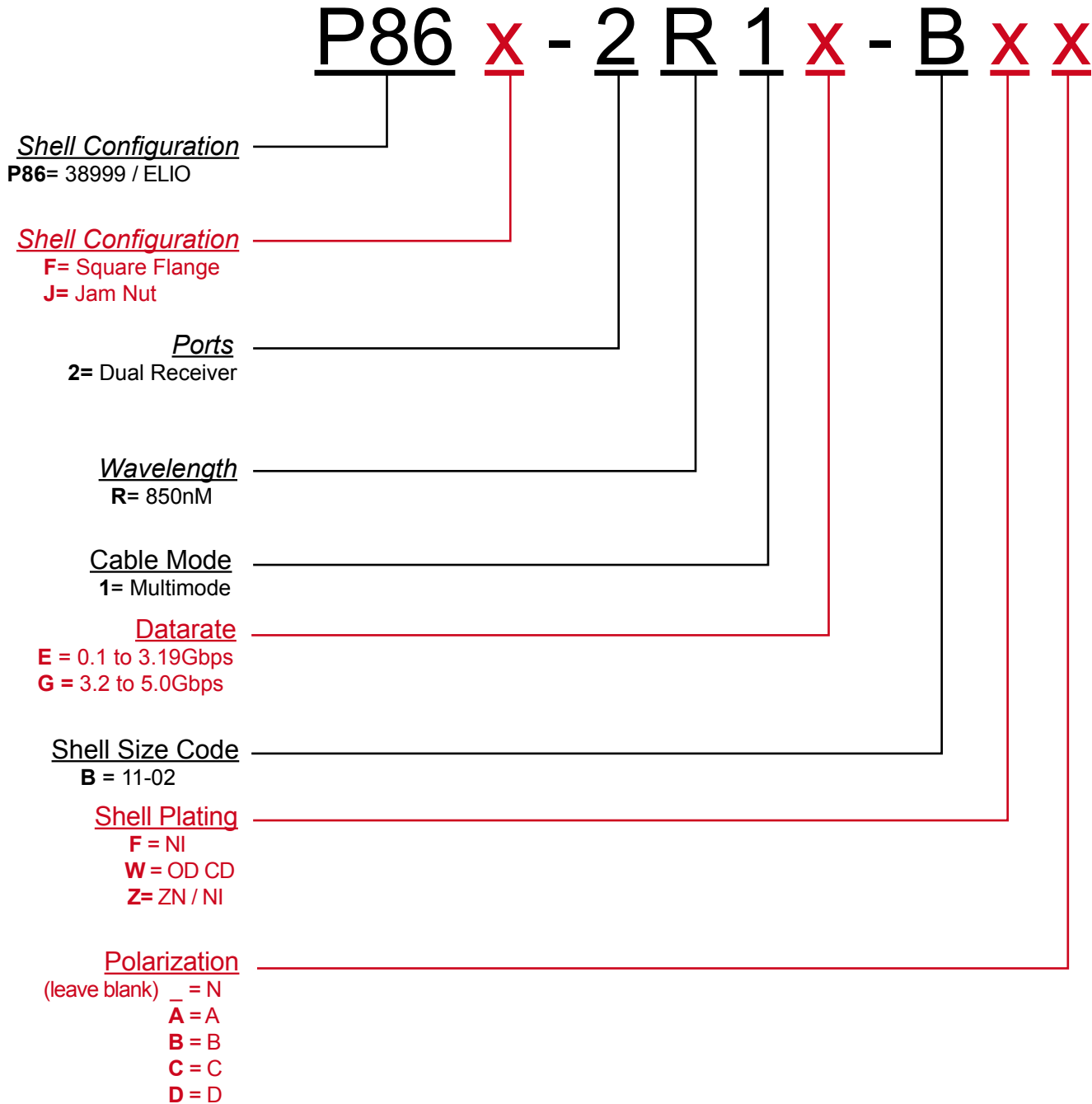


## Facilitating Secure Communications in Harsh Environments

Sabre Series Mil-Dtl-38999 / ELIO Size 11-02 Optical Dual Receiver,  
Multimode, 850nM, Arinc 664, 818, 803 & 804 Compliant

### APPENDIX A3 PART NUMBER OPTIONS

Sabre 11-02 Series



Other wavelength, mounting and port count options are available.  
Please consult the Protokraft website for alternate configurations.

P86F-2R1x-BW-DS - July 2, 2012 - Released