

## Transmission Laser Modules

### KeyFeatures

Very low dispersion penalty over 750 km of fiber up to 2.7 Gbit/s operation

Wavelength selection according to ITU-T G.692

Industry-standard 14-pin butterfly package

High frequency butterfly package with 50Ω RF impedance

Low drive voltage ( $\leq 2V$  pp)

InGaAsP monolithically integrated DFB laser and modulator chip

RoHS Compliant

### Applications

STM-16 and OC-48 D-WDM  
Regional Metropolitan and  
Long-Haul equipment

Size Optimized Transceiver and  
Transponder

Digital CATV transmission

### For moreInfo

Please contact us at:

North America: 514.748.4848  
888.922.1044

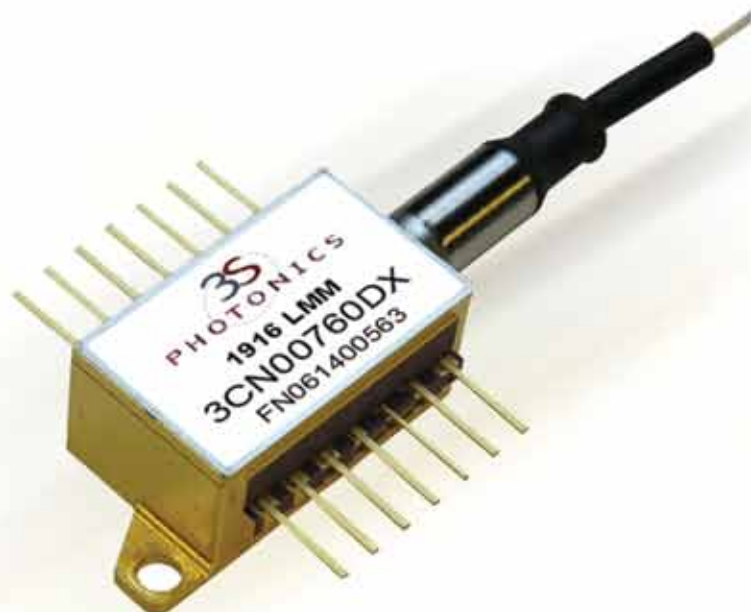
Europe & Asia: +33 (0) 1 69 80 58 33  
or via e-mail at [sales@3spgroup.com](mailto:sales@3spgroup.com)

## 1916 LMM

**WDM - 7200 ps/nm & 12800 ps/nm  
applications - 2.5 Gbit/s digital laser  
module with integrated  
electro-absorption modulator**

The 1916 LMM contains a 3SPGroup DFB laser with monolithically integrated electro-absorption modulator (ELM). This chip provides much lower dispersion penalties than a directly modulated DFB, without the complexity of LiNbO3 external modulators.

The 3SPGroup 1916 LMM is optimized for regional Metropolitan and long-haul amplified 2.5 Gb/s transmission equipment supporting dispersion up-to 12800 ps/nm.



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### OPTICAL CHARACTERISTICS

Parameters	Symb	Conditions	Min	Max	Units
Operating case temperature	Tc		0	70	°C
Threshold current	Ith	CW, Vbias= 0V, See [4]	5	35	mA
Operating current	If	WDM application, CW, Vbias= 0V	55	85	mA
Optical output power	Pave	If, Vmod, [1] @ If, See [4]	- 4	+1	dBm
Laser forward voltage	Vf	CW, If, Vbias= 0V		2	V
Modulator bias voltage	Vbias	See [1], [4] @ If	- 2	0	V
Modulator drive voltage	Vmod	See [1], [4] @ If		2	V
Dynamic extinction ratio	DER	See [1], [4] @ If	10.5		dB
Emission wavelength	$\lambda$	See [4] @ If, See table 3	1529.55	1569.59	nm
Laser chip temperature range for tunability	Twave		20	35	°C
Side mode suppression	SMSR	See [4] @ If	40		dB
Cut off frequency	S21	See [4] @ If & - 3dB	4		GHz
RF return loss	S11	DC to 3 GHz	10		dB
Dispersion penalty	$\lambda S$	See [1], [2] or [3] @ If		2	dB
Rise time / Fall time	Tr/Tf	See [1], 10%, 90%		140	ps
Monitor diode current	Im	See [4] @ If, V= - 5V	20	1500	$\mu$ A
Dark current	Id			0.1	$\mu$ A
TEC current	It	$\Delta T= 50^{\circ}\text{C}$ , If+20% (EOL), Tc= 70°C, Vbias= - 1V		1.3	A
TEC voltage	Vt	$\Delta T= 50^{\circ}\text{C}$ , If+20% (EOL), Tc= 70°C, Vbias= - 1V		2.5	V
Thermistor resistance	RTH	Tsubmount= 25°C	9.5	10.5	k $\Omega$
Thermistor $\beta$ coefficient	$\beta$	Tsubmount= 25°C	3800	4000	K

Notes : All limits start of life Tcase= 25°C, Tsubmount= Twave for WDM applications and Tsubmount= 25 °C. for Single Channel applications, V= - 5V, unless otherwise stated.

[1] BER= 10-10; 2.488Gbit/s modulation; 223-1 PRBS; NZR line code; DER <sup>3</sup> 10 .5dB

[2] 7200 ps/nm dispersion, assuming fiber with an average dispersion of 18 ps/nm/km @ 1550nm

[3] 12800 ps/nm dispersion, assuming fiber with an average dispersion of 18 ps/nm/km @ 1550nm

[4] For WDM application Tsubmount= Twave. Twave is the chip temperature required to meet target wavelength (see table 3)

## Absolute Maximum Ratings

Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameters	Min	Max	Unit
Storage temperature	- 40	85	°C
Operating case temperature	0	70	°C
Laser forward current		150	mA
Laser reverse voltage		2	V
Modulator forward voltage		1	V
Modulator reverse voltage		5	V
Photodiode forward current		1	mA
Photodiode reverse voltage		20	V
TEC voltage		2.8	V
TEC current		1.4	A
Soldering temperature (at 260°C)		10	s
Fiber bend radius	25		mm
Packing mounting screw torque		0.2	Nm

## 1916 LMM

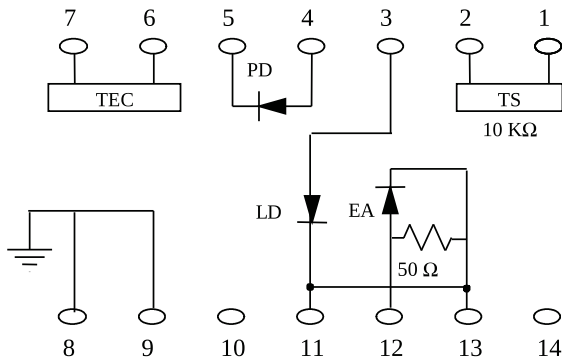
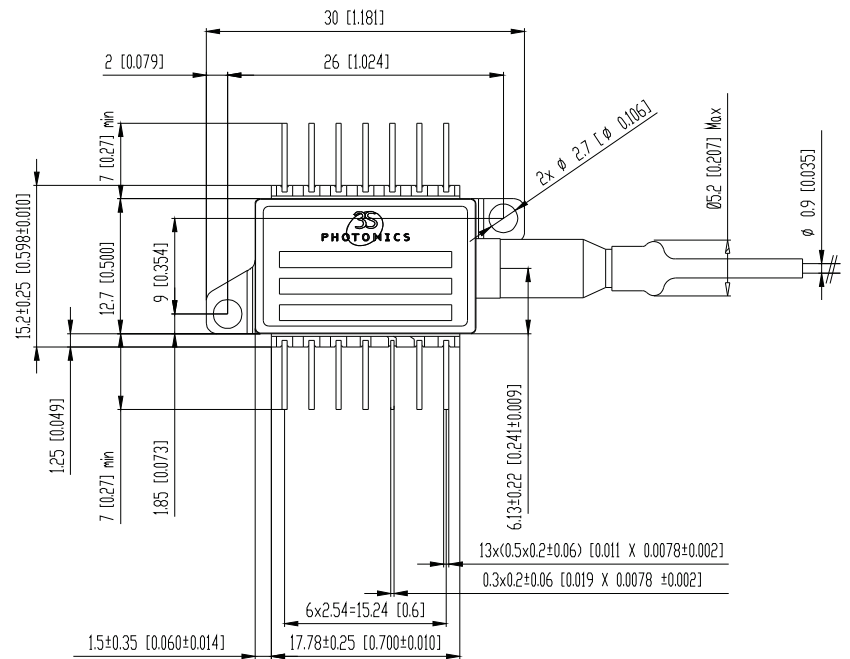
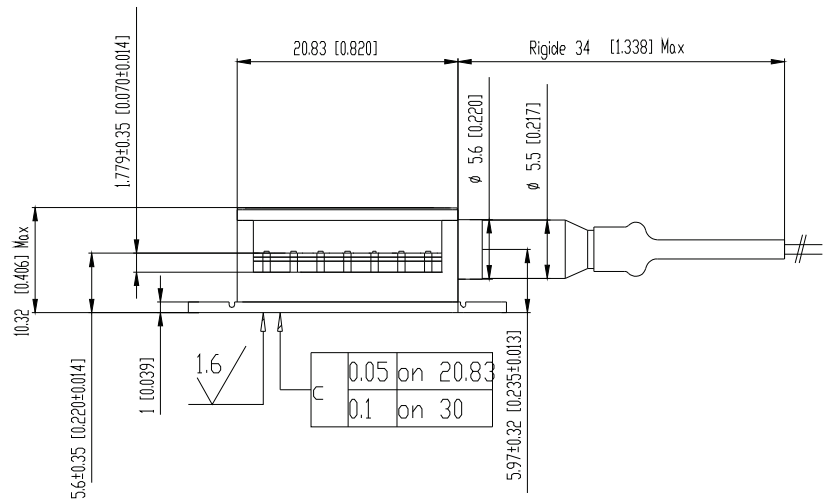
**WDM - 7200 ps/nm & 12800 ps/nm applications - 2.5 Gbit/s digital laser module with integrated electro-absorption modulator**



### Pin Out

N°	Description
1	Thermistor
2	Thermistor
3	Laser DC bias (+)
4	Photodetector Anode (-)
5	Photodetector Cathode (+)
6	TEC (+)
7	TEC (-)
8	Case Ground
9	Case Ground
10	Not Connected
11	Laser/modulator ground
12	Modulator Anode/50Ω RF input
13	Laser/modulator ground
14	Not Connected

### Mechanical Details



Dimensions are in mm Fiber length 1600 ± 100 mm (including optical connector)

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### Shipment **packing**

Each device is individually packed in an anti-static container and in such a manner as to prevent damage in transit.

#### **The packing shall include the following information:**

3S Photonics logo  
Product family name : 1916 LMM  
Product code : 3CN number (see Ordering information section)  
Serial number  
Hazard warning label (ESD)  
Laser Safety Class Label

### Laser Safety **Information**

Take appropriate precautions to prevent undue exposure to naked eye. This product is classified Class 1M Laser Product according to IEC-60825-1: edition2.

All versions are Class IIIB laser products per 21 CFR 1040-10 Laser.

Safety requirements under accession number 0120546-00.



### Qualification, Reliability and **Standards**

3SPGroup policy for all products is to carry out a complete qualification program. This qualification is based on manufacturers' qualification in agreement with Telcordia GR-468-Core (Generic Reliability Assurance Requirements for Optoelectronic Devices Used In Telecommunications Equipment - Central Office Level), MIL STD 883E (Test method and procedures for microelectronics) and following the standards ITU-T G652 and G-691. All products pass strict tests before shipping. Failure criteria are defined during the product qualification process.

### Device **marking**

The device shall be legibly and permanently marked with the following information:

3S Photonics logo  
Product family name: 1916 LMM  
Product code : 3CN number (see Ordering information section)  
Serial number

### Deliverable **data**

The following data shall be supplied with each device for WDM and Single Channel applications :

L(I) / V(I) / Im(I) curves from If= 0 to 100mA @ Von= 0V

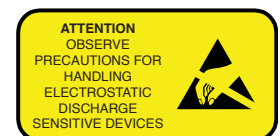
Values for RTH, Twave, If, Im, Von (On-state voltage [0 data]), Vbias (bias voltage), Vmod, DER, Pave, S0 (received optical power without fiber) and DS @ If and Twave

Plot of SER vs Vmod over the range 0V to -3V @ If, Twave and Tc= 25°C

### **Handling**

This product is sensitive to electrostatic discharge and should not be handled except at a static free workstation. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling the product.

Handle the laser module by its package only, never hold it by its pigtail. Care should be taken to avoid supply transient and over voltage. Over voltage above the maximum specified in absolute maximum rating section may cause permanent damage to the device.





## 1916 LMM

**WDM - 7200 ps/nm & 12800 ps/nm applications - 2.5 Gbit/s digital laser module with integrated electro-absorption modulator**



## ORDERING INFORMATION

	Application	Part number	Optical Connector
WDM	12800 ps/mm	3CN00760##	FC/PC
WDM	12800 ps/mm	3CN00761##	LC/PC
WDM	12800 ps/mm	3CN00762##	SC/PC
WDM	7200 ps/mm	3CN00763##	FC/PC
WDM	7200 ps/mm	3CN00764##	LC/PC
Single Channel	7200 ps/mm	3CN00765AA	SC/PC
WDM	7200 ps/mm	3CN00765##	SC/PC

## defines the wavelength according to the Table 3.

Table 3

$\lambda$ (nm)	THz	Code ##	$\lambda$ (nm)	THz	Code ##
1529,55	196,00	BP	1545,32	194,00	DF
1530,33	195,90	BR	1546,12	193,90	DH
1531,12	195,80	BT	1546,92	193,80	DK
1531,90	195,70	BV	1547,72	193,70	DM
1532,68	195,60	BX	1548,5	193,60	DP
1533,47	195,50	BZ	1549,32	193,50	DR
1534,25	195,40	CB	1550,12	193,40	DT
1535,04	195,30	CD	1550,92	193,30	DV
1535,82	195,20	CF	1551,72	193,20	DX
1536,61	195,10	CH	1552,52	193,10	DZ
1537,40	195,00	CK	1553,33	193,00	EB
1538,19	194,90	CM	1554,12	192,90	ED
1538,98	194,80	CP	1554,94	192,80	EF
1539,77	194,70	CR	1555,75	192,70	EH
1540,56	194,60	CT	1556,55	192,60	EK
1541,35	194,50	CV	1557,36	192,50	EM
1542,14	194,40	CX	1558,17	192,40	EP
1542,94	194,30	CZ	1558,98	192,30	ER
1543,73	194,20	DB	1559,79	192,20	ET
1544,53	194,10	DD			

All wavelengths referenced to vacuum, Twave for WDM applications.

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Please note: information in this document is typical and must be specifically confirmed in writing by your supplier before it becomes applicable to any order or contract. Information is subject to change without notice.  
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## ORDERING INFO

Please contact your Sales Manager. 3SPGroup can also develop custom products to meet a wide range of technical requirements.

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