

**Alcatel 1915 LMI**  
**1.55  $\mu\text{m}$  WDM Laser Module**  
**2.5 Gb/s Direct Modulation**  
**2mW**



**Description**

This laser module contains an Alcatel SLMQW DFB laser with 25  $\Omega$  impedance matching designed for use in Wavelength Division Multiplexed (WDM) systems, high power direct modulation operations up to 2.5 Gbit/s. The module incorporates a thermoelectric cooler, precision thermistor, and optical isolator for stable operation under all conditions.

**Features**

- 2 mW output power
- Low dispersion penalty
- Optimized for direct modulation at 2.5 Gbit/s
- Wavelength selection according to ITU-T G.692 from 1528.77 nm to 1570.42 nm

- 100 GHz spacing available
- Internal optical isolator
- 25  $\Omega$  RF impedance matching and DC bias RF filtering
- Industry - standard hermetic 14-pin butterfly package
- InGaAsP Distributed FeedBack SLMQW (DFB) laser

**Applications**

- EDFA - free long span STM-16 and OC-48 DWDM transmission systems
- High-speed DWDM Metropolitan Area Networks
- Saturation Laser for WDM EDFA
- Instrumentation

Description ..... 1  
 Features ..... 1  
 Applications..... 1  
 Electro-Opto Characteristics ..... 2  
 Definitions ..... 3  
 Mechanical details ..... 4  
 Pin out..... 4  
 Marking, packing and deliverable data ..... 5  
 Safety and handling ..... 5  
 Ordering information..... 6

## Electro-Opto Characteristics

Unless otherwise stated : BOL, Tcase = 25°C and Tsubmount = 25°C

Table 1

Parameter	Sym	Conditions	Min	Typical	Max	Units
Fiber-Coupled Peak Power	$P_{peak}$	@T <sub>wave</sub>	2		-	mW
Threshold current	$I_{TH}$	@T <sub>wave</sub>	3		25	mA
External Diff. Efficiency	$\eta$	@T <sub>wave</sub>	0.045		0.062	W/A
Laser forward voltage	$V_F$	@ $P_{Peak} = 2$ mW ; pin 11 & 3	-		2.5	V
Modulation current BOL	$I_F$	@ $P_{Peak} = 2$ mW ; pin 11 & 3 Note 1	-		45	mA
Serial resistance	$R_S$	$P_{peak} = 2$ mW; pin 11 to 12	22		27	$\Omega$
$\Delta$ (Emitted -Target Wavelength)	$\Delta\lambda_e$	@T <sub>wave</sub> See Table 4 for $\lambda_{target}$	-0.1		+0.1	nm
Emission wavelength	$\lambda$	See table 4	1529		1570	nm
Side mode suppression	SMSR	@T <sub>wave</sub> ; Note 2	40		-	dB
Photodiode current	$I_{PD}$	V = -5V, @P <sub>mean</sub> , Note 5	30		300	$\mu$ A
Photodiode Dark Current	$I_D$	V = -5 V			0.1	$\mu$ A
Photodiode Capacitance	$C_M$	V = -5V, @ 1MHz			15	pF
Thermistor resistance	$R_{TH}$		9.7		10.3	k $\Omega$
Coefficient of $R_{TH}$			-3		-5	%/°K
Emitted $\lambda$ drift vs $I_F$	$\Delta\lambda/I$		-	3	6	pm/mA
Emitted $\lambda$ drift vs T <sub>wave</sub>	$\Delta\lambda/\Delta T_w$	20°C ≤ T <sub>submount</sub> ≤ 35°C	80		100	pm/°C
Emitted $\lambda$ drift vs T <sub>case</sub>	$\Delta\lambda/\Delta T_c$	0°C ≤ T <sub>c</sub> ≤ 70°C	-		0.5	pm/°C
Relative Intensity Noise	RIN	100 MHz to 3 GHz @P <sub>mean</sub>			-140	dB/Hz
Dispersion Penalty Note 2	$\Delta S$	D = 1800 ps/nm, Note 2	-		2	dB
Linearity (kink) Note 3	$\Delta P/\Delta I$	0.2 mW ≤ P <sub>Peak</sub> ≤ 2 mW			15	%
Optical Isolation	OI	0°C ≤ T <sub>c</sub> ≤ 70°C	30		-	dB
Tracking Error Note 4	Q	@2 mW P <sub>Peak</sub>			10	%
Extinction ratio	ER	2.5Gb/s, D=1800ps/nm, PRBS 2 <sup>23-1</sup>	10			dB
Case Operating Temperature	T <sub>c</sub>		0		70	°C
Tsubmount	T <sub>s</sub>		20		35	°C
TEC current EOL	$I_t$	@I(2mW), T <sub>s</sub> = 20°C, T <sub>c</sub> = 70°C	-		1.2	A
TEC voltage EOL	$V_t$	@I(2mW), T <sub>s</sub> = 20°C, T <sub>c</sub> = 70°C	-		2.4	V

Note 1: Modulation current =  $P_{Peak} / \eta * [ (1 - ER) / (1 + ER) ]$   
End Of Life criteria;  $\Delta I_F / I_F = 20\%$  or  $\Delta I_M / I_M = 20\%$  or  $\Delta I_{TH} / I_{TH} = 20\%$

Note 2 : 2.488 Gb/s, P<sub>Mean</sub>, BER = 10<sup>-10</sup>, ER = 10±1%, NRZ line code

Note 3 : relative deviation of dP / dI between 2 consecutive measurement points

Note 4 :  $Q = \text{Max} \{ | [P(70\text{ C}) - P(25\text{ C})] / P(25\text{ C}) | ; | [P(0\text{ C}) - P(25\text{ C})] / P(25\text{ C}) | \}$   
measurements @ 0 & 70°C are with  $I_F$  set at constant  $I_F(25\text{ C})$

Note 5 : P<sub>mean</sub>=P<sub>peak</sub>/2

## Definitions

### T<sub>wave</sub>

T<sub>wave</sub> is the submount temperature at which the laser emission wavelength reaches the target wavelength with an accuracy of better than:  $\lambda_{\text{target}} \pm 0.1\text{nm}$ .

This temperature is calculated during manufacturing according to:

$T_{\text{wave}} = 25^{\circ}\text{C} + (1/C) * (\lambda_{\text{target}} - \lambda_{25^{\circ}\text{C}})$ , where C is the laser wavelength drift with temperature (in nm/°C).

### Emitted wavelength drift vs T<sub>case</sub>

Absolute value of maximum emitted wavelength deviation per unit of case temperature (°C) when T<sub>case</sub> varies from min to max operating conditions.

Wavelength is stabilized through the thermal regulation of the laser chip based on the thermistor reading.

### Emitted wavelength drift vs Laser Current

Maximum emitted wavelength deviation per unit of laser current (mA) when the DC output power varies around P<sub>mean</sub>.

## Absolute maximum ratings

Exposing the device to stresses above those listed in absolute maximum rating could cause permanent damage.

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

### Environmental

Table 2

Parameters	Min	Max	Unit
Storage temperature	- 40	85	°C
Operating temperature	-10	70	°C
Soldering temperature (3 seconds maximum)		350	°C
Axial force on fiber (10 seconds max.)		10	N
Fiber bend radius	30		mm
ESD (1) applied on PIN detector (Pin 4&5)		100	V
ESD (1) on other Pin		2000	V

(1) Human body model

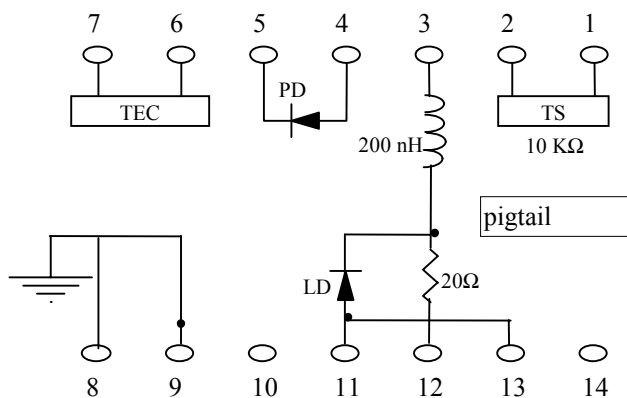
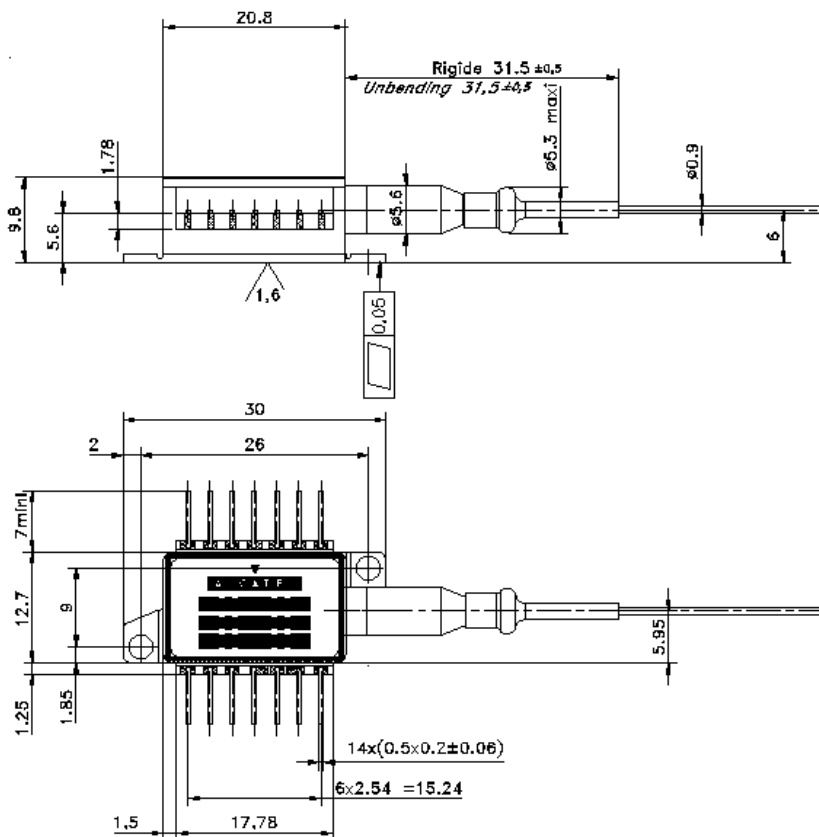
### Electro-optic

Table 3

Parameters	Min	Max	Unit
Laser forward current		150	mA
Laser reverse voltage		2	V
Photodiode forward current		1	mA
Photodiode reverse voltage		20	V
Thermistor Voltage		9	V
Thermistor Current		250	μA
TEC Voltage		2.8	V
TEC Current		1.4	A
Packing Mounting Torque		0.2	N.m

## Mechanical details

Note : all dimensions in mm



## Pin out

N°	Description	N°	Description
1	Thermistor	8	Case Ground
2	Thermistor	9	Case Ground
3	Laser DC bias (-)	10	Not Connected
4	Photodetector Anode (-)	11	RF common (+)
5	Photodetector Cathode (+)	12	Laser Modulation (-)
6	TEC (+)	13	RF common (+)
7	TEC (-)	14	Not Connected

## Marking, packing and deliverable data

### Device marking

Each device includes the following information as a minimum:

1. Alcatel logo
2. Product family name: A 1915 LMI
3. Product code : 3CN 00492 XX
4. Serial number

### Packing

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

The packaging shall include the following information:

1. Alcatel logo
2. Product family name: A 1915 LMI
3. Product code : 3CN 00492 XX
4. Serial number
5. Hazard warning label (ESD)
6. Laser Safety Class Label

### Deliverable data

The following data shall be supplied with each device:

1. L(I)/V(I) curves @ Tcase/ Tsubmount = 25°C/25°C
2. TEC @ Tcase/Tsubmount=25°C/75°C, P=2mW
3. Values of Twave and Thermistor @ Tsubmount =Twave
4. Values of laser forward current, monitoring photocurrent, laser threshold current and external differential efficiency @ Tsubmount =Twave
5. Peak wavelength at Tcase/Tchip=25°C and under modulation
6. Dispersion penalty

Product testing shall be carried out at a level that ensures conformity to the customer specification

## Safety and handling

### Safety and IEC.825 Classification

Take appropriate precautions to prevent undue exposure to naked eye.

This product is classified Class 3A Laser Product according to IEC.825

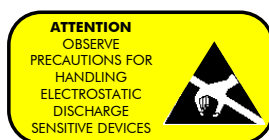
### Handling

This product, in line with all similar devices, is sensitive to electrostatic discharge. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling the laser. Handle the laser module by its package only, never hold it by leads or pigtail.

For package mounting the following procedure should be carefully followed:

1. In order to achieve the ultimate thermal performance of the device, thermal paste can be usefully added on the support
2. Tighten screws up to 200 mN/m - **Do not exceed this mounting torque.**
3. Assure that the leads are aligned and in contact with appropriate contact pads.

Care should be taken to avoid supply transient and over voltage. Over voltage above the maximum specified in absolute maximum rating section (table 3) may cause permanent damage to the device.



## Ordering information

Alcatel 1915 LMI

Nominal power	Connector type	Part number
2 mW	FC/PC	3CN 00492 ##

## defines the wavelength and the connector according to the following table .

Table 4

$\lambda$ (1)	THz	Connector FC/PC	$\lambda$	THz	Connector FC/PC
1528,77	196,10	BM	1550,12	193,40	DT
1529,55	196,00	BP	1550,92	193,30	DV
1530,33	195,90	BR	1551,72	193,20	DX
1531,12	195,80	BT	1552,52	193,10	DZ
1531,90	195,70	BV	1553,33	193,00	EB
1532,68	195,60	BX	1554,12	192,90	ED
1533,47	195,50	BZ	1554,94	192,80	EF
1534,25	195,40	CB	1555,75	192,70	EH
1535,04	195,30	CD	1556,55	192,60	EK
1535,82	195,20	CF	1557,36	192,50	EM
1536,61	195,10	CH	1558,17	192,40	EP
1537,40	195,00	CK	1558,98	192,30	ER
1538,19	194,90	CM	1559,79	192,20	ET
1538,98	194,80	CP	1560,61	192,10	EV
1539,77	194,70	CR	1561,42	192,00	EX
1540,56	194,60	CT	1562,23	191,90	EZ
1541,35	194,50	CV	1563,05	191,80	FB
1542,14	194,40	CX	1563,86	191,70	FD
1542,94	194,30	CZ	1564,68	191,60	FF
1543,73	194,20	DB	1565,49	191,50	FH
1544,53	194,10	DD	1566,31	191,40	FK
1545,32	194,00	DF	1567,13	191,30	FM
1546,12	193,90	DH	1567,95	191,25	FP
1546,92	193,80	DK	1568,77	191,20	FS
1547,72	193,70	DM	1569,59	191,15	FU
1548,51	193,60	DP	1570,42	191,10	FW
1549,32	193,50	DR			

(1) in vacuum

January 2002  
Copyright © 2002  
Alcatel Optronics

Customized versions are available for large quantities.

Performance figures contained in this document must be specifically confirmed in writing by Alcatel Optronics before they become applicable to any particular order or contract. Alcatel Optronics reserves the right to make changes to the products or information contained herein without notice.

For additional information, contact your Alcatel Optronics Account Manager, or the following :

### INTERNET

<http://www.alcatel.com/optronics>

### E-MAIL

[optronics@alcatel.com](mailto:optronics@alcatel.com)

### EUROPE

France : (+33) 1 64 49 47 00  
UK : (+44) 1506 42 60 00

### USA

Chantilly – VA : (+1) 703-679-6715  
Plano – TX : (+1) 972-477-54 53

### CANADA

Gatineau : (+1) 819 243 3755

### ASIA - PACIFIC

Japan : (+81)-3-5302-4341  
China : (+86) 755 6981 471

