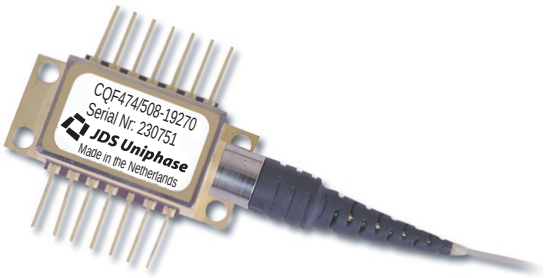
JDS Uniphase

Product Bulletin



4-channel Temperature Tunable 20 mW CW DFB Laser with Locker

CQF474/508 Series

The JDS Uniphase CQF474/508 series laser is specifically developed for dense wavelength division multiplexing (DWDM) systems, where it is used as a four-channel, tunable source in combination with an external modulator, such as the $LiNbO_3$-based Mach-Zehnder.

An integrated wavelength reference module stabilizes the laser's wavelength. The wavelength monitor consists of two back facet monitor diodes. One diode is unfiltered for use as a conventional power monitor; the other is filtered to provide wavelength dependent output.

Selected wavelengths comply with ITU recommendations, both in range (for the C and L band, 1527 to 1610 nm) and in channel definition, thus adhering to the 50 GHz grid. Each laser's wavelength is accurately measured, and the laser itself is accompanied by a datasheet with the laser performance at the temperature T_λ, where the required wavelength channel is reached.

The CQF474/508 shows high side mode suppression ratios and small linewidths. It is available in a standard 14-pin butterfly package equipped with a polarization maintaining fiber to facilitate coupling to the modulator, and shows superb thermal stability.

Key Features

- 1550 nm DWDM distributed feedback laser diode
- Temperature tunable over 4 x 50 GHz channels
- Integrated wavelength reference module
- High output power (20 mW)
- 1527 - 1610 nm wavelength range (C and L band)
- Polarization maintaining fiber
- Cooled built-in optical isolator
- Built-in thermoelectric cooler

Applications

- In hybrid fiber-coax (HFC) networks, in cable television (CATV) networks, and in DWDM metro architectures where low RIN and narrow linewidths are required
- Wavelength division multiplexing (WDM) transmission
- Sparing and restoration
- Optical add/drop multiplexing
- Inventory reduction

Specifications

Limiting Values

Parameter	Symbol	Conditions	Min	Max	Unit
Laser Diode					
Radiant output power from pigtail	P_{peak}	-	-	40	mW
Reverse voltage	V_R	-	-	2.0	V
Forward current	I_F	-	-	300	mA
Wavelength Reference Module					
Reverse voltage	V_R	-	-	10	V
Forward current	I_F	-	-	5	mA
Module					
Storage temperature range	T_{stg}	-	-40	85	°C
Case operating temperature range	T_{op}	Cooler active	-5	70	°C
Fiber Pigtail					
Bending radius	R	-	35	-	mm
Tensile strength fiber to case	F	-	-	5	N

Characteristics (R_{th} = 10 kΩ , T_{case} = 25 °C, P_O = nominal unless otherwise specified)

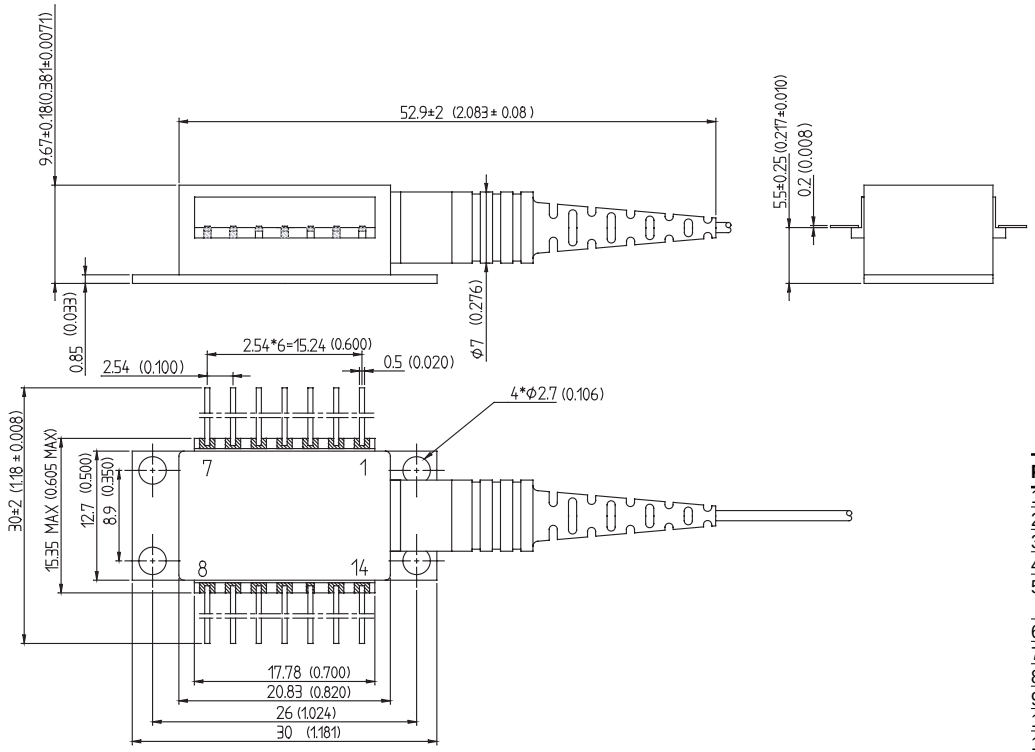
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Laser Diode						
Radiant output power from pigtail	P_O	-	20	-	-	mW
Operating current	I_{op}	BOL	-	130	200	mA
Threshold current	I_{th}	-	-	20	40	mA
Forward voltage	V_F	-	-	-	2.5	V
Laser diode set temperature for λ_c	T_λ	-	10	-	40	°C
Central wavelength	λ_c	-	1527		1610	nm
Spectral linewidth	$\Delta\lambda$	FWHM	-	< 2	5	MHz
Side mode suppression ratio	SMSR	-	30	45	-	dB
Optical isolation	ISO	-	30	35	-	dB
Relative intensity noise	RIN	50 kHz - 10 GHz	-	-	-135	dB/Hz
Temperature tracking error	TE	-5 °C < T_{case} < 70 °C	-	-	10	%
Wavelength Reference Module (V_R = 10 V)						
Power monitoring photocurrent	I_{pwr}	at λ_c	20	-	400	µA
Wavelength monitoring photocurrent	I_{wav}	at λ_c	10	-	200	µA
Dark current	I_{md}	-	-	-	0.1	µA
Responsivity ratio (XR = I_{wav} / I_{pwr})	XR	at λ_c	0.25	-	3	
Filter slope (normalized to photocurrent at operating conditions)	FS	at λ_c (note[1])	0.25	-	2	nm
Thermistor						
Resistance	R_{th}	T_{th} = 25 °C	9.5	10	10.5	kΩ
Thermistor constant	B	-	3800	-	4100	K
Thermoelectric Cooler (ΔT = 60 °C)						
Cooler current	I_{cool}	-	-	-	1.5	A
Cooler voltage	V_{cool}	-	-	-	3.0	V

1. $FS = \frac{1}{I\lambda} \cdot \frac{I_{\lambda+\Delta\lambda} - I_{\lambda-\Delta\lambda}}{2 \cdot \Delta\lambda}$ with $\Delta\lambda$ = 0.05 nm

Specifications Continued

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Polarization Maintaining Fiber Pigtail (Fujikura SM15-P-8/125-UV/UV400 with 900 µm loose tube)						
Mode field diameter	$Ø_{mf}$	-	9.5	-	11.5	µm
Cladding diameter	$Ø_{cl}$	-	122	-	128	µm
Diameter of secondary coating	$Ø_{sc}$	-	380	-	420	µm
Diameter of loose tube	$Ø_{LT}$	-	0.8	-	1.0	mm
Length of loose tube	l_{LT}	-	0.9	-	-	m
Polarization extinction ratio	ER	E-field along slow axis	18	20	-	dB
Length of pigtail	l	-	0.9	-	-	m

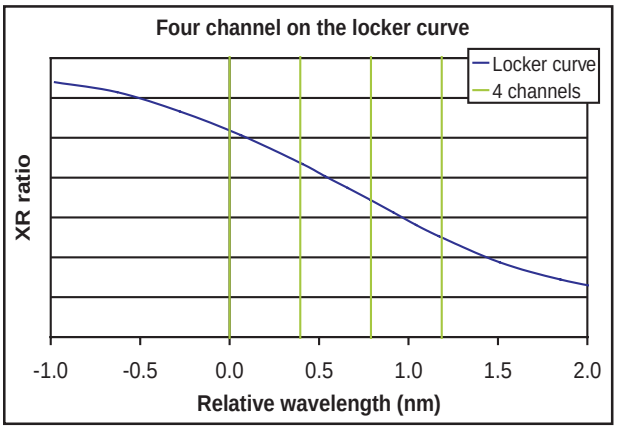
Dimensions Diagram (Specifications in mm [inches] unless otherwise noted; tolerance = ±0.15 [±0.006])



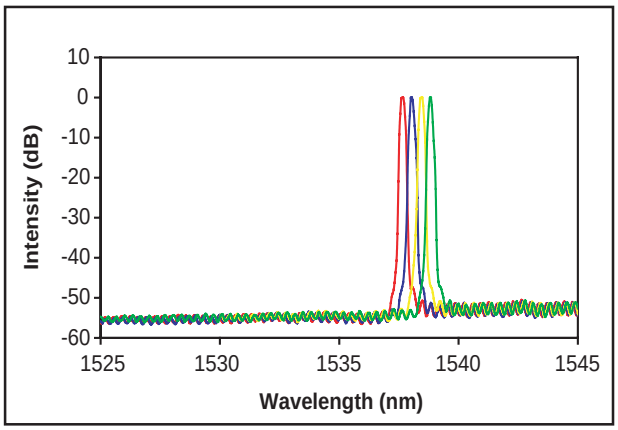
Pinout	
1	Thermistor
2	Thermistor
3	LD cathode DC input
4	Power PD anode
5	Common cathode for power PD and WL-PD
6	Cooler anode
7	Cooler cathode
8	Case GND
9	Case GND
10	WL PD anode
11	LD anode
12	LD cathode, AC input
13	LD anode
14	Not connected

Fiber Termination: 1.25 mm or 2.5 mm ferrule.

Typical Performance Characteristics



The CQF474/708 allows absolute wavelength monitoring using the bandpass filter slope.



High Side Mode Suppression Ratio (SMSR) values at all channels.

Ordering Information

For more information on this or other products and their availability, please contact your local JDS Uniphase account manager or JDS Uniphase directly at 800-871-8537 in North America and 800-8735-5378 worldwide or via e-mail at jdsu.sales@jdsu.com.

Sample: CQF474/508-19270 for optical frequencies 192.70 THz, 192.65 THz, 192.60 THz, and 192.55 THz.

Attention: Order confirmations on this part number will be preceeded by FG' (e.g., FG'CQF474/508-19270).

CQF474/508-□□□□□

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
19625	196.25	1527.61
19620	196.20	1527.99
19615	196.15	1528.38
19610	196.10	1528.77
19605	196.05	1529.16
19600	196.00	1529.55
19595	195.95	1529.94
19590	195.90	1530.33
19585	195.85	1530.73
19580	195.80	1531.12
19575	195.75	1531.51
19570	195.70	1531.90
19565	195.65	1532.29
19560	195.60	1532.68
19555	195.55	1533.07
19550	195.50	1533.47
19545	195.45	1533.86
19540	195.40	1534.25
19535	195.35	1534.64

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
19530	195.30	1535.04
19525	195.25	1535.43
19520	195.20	1535.82
19515	195.15	1536.22
19510	195.10	1536.61
19505	195.05	1537.00
19500	195.00	1537.40
19495	194.95	1537.79
19490	194.90	1538.19
19485	194.85	1538.58
19480	194.80	1538.98
19475	194.75	1539.37
19470	194.70	1539.77
19465	194.65	1540.16
19460	194.60	1540.56
19455	194.55	1540.95
19450	194.50	1541.35
19445	194.45	1541.75
19440	194.40	1542.14

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
19435	194.35	1542.54
19430	194.30	1542.94
19425	194.25	1543.33
19420	194.20	1543.73
19415	194.15	1544.13
19410	194.10	1544.53
19405	194.05	1544.92
19400	194.00	1545.32
19395	193.95	1545.72
19390	193.90	1546.12
19385	193.85	1546.52
19380	193.80	1546.92
19375	193.75	1547.32
19370	193.70	1547.72
19365	193.65	1548.12
19360	193.60	1548.51
19355	193.55	1548.92
19350	193.50	1549.32
19345	193.45	1549.72

CQF474/508-□□□□□

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
19340	193.40	1550.12
19335	193.35	1550.52
19330	193.30	1550.92
19325	193.25	1551.32
19320	193.20	1551.72
19315	193.15	1552.12
19310	193.10	1552.52
19305	193.05	1552.93
19300	193.00	1553.33
19295	192.95	1553.73
19290	192.90	1554.13
19285	192.85	1554.54
19280	192.80	1554.94
19275	192.75	1555.34
19270	192.70	1555.75
19265	192.65	1556.15
19260	192.60	1556.56
19255	192.55	1556.96
19250	192.50	1557.36
19245	192.45	1557.77
19240	192.40	1558.17
19235	192.35	1558.58
19230	192.30	1558.98
19225	192.25	1559.39
19220	192.20	1559.79
19215	192.15	1560.20
19210	192.10	1560.61
19205	192.05	1561.01
19200	192.00	1561.42
19195	191.95	1561.83
19190	191.90	1562.23
19185	191.85	1562.64
19180	191.80	1563.05
19175	191.75	1563.46
19170	191.70	1563.86
19165	191.65	1564.27
19160	191.60	1564.68
19155	191.55	1565.09
19150	191.50	1565.50
19145	191.45	1565.90
19140	191.40	1566.31
19135	191.35	1566.72
19130	191.30	1567.13
19125	191.25	1567.54
19120	191.20	1567.95
19115	191.05	1568.39
19110	191.10	1568.77

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
19105	191.05	1569.18
19100	191.00	1569.59
19095	190.95	1570.01
19090	190.90	1570.42
19085	190.85	1570.83
19080	190.80	1571.24
19075	190.75	1571.65
19070	190.70	1572.06
19065	190.65	1572.48
19060	190.60	1572.89
19055	190.55	1573.30
19050	190.50	1573.71
19045	190.45	1574.13
19040	190.40	1574.54
19035	190.35	1574.95
19030	190.30	1575.37
19025	190.25	1575.78
19020	190.20	1576.20
19015	190.15	1576.61
19010	190.10	1577.03
19005	190.05	1577.44
19000	190.00	1577.86
18995	189.95	1578.27
18990	189.90	1578.69
18985	189.85	1579.10
18980	189.80	1579.52
18975	189.75	1579.93
18970	189.70	1580.35
18965	189.65	1580.77
18960	189.60	1581.18
18955	189.55	1581.60
18950	189.50	1582.02
18945	189.45	1582.44
18940	189.40	1582.85
18935	189.35	1583.27
18930	189.30	1583.69
18925	189.25	1584.11
18920	189.20	1584.53
18915	189.15	1584.95
18910	189.10	1585.36
18905	189.05	1585.78
18900	189.00	1586.20
18895	188.95	1586.62
18890	188.90	1587.04
18885	188.85	1587.46
18880	188.80	1587.88
18875	188.75	1588.30

Channel Code	Highest Optical Frequency f_c (THz)	Shortest Wavelength (Vacuum) λ_c (nm)
18870	188.70	1588.73
18865	188.65	1589.15
18860	188.60	1589.57
18855	188.55	1589.99
18850	188.50	1590.41
18845	188.45	1590.83
18840	188.40	1591.26
18835	188.35	1591.68
18830	188.30	1592.10
18825	188.25	1592.52
18820	188.20	1592.95
18815	188.15	1593.37
18810	188.10	1593.79
18805	188.05	1594.22
18800	188.00	1594.64
18795	187.95	1595.07
18790	187.90	1595.49
18785	187.85	1595.91
18780	187.80	1596.34
18775	187.75	1596.76
18770	187.70	1597.19
18765	187.65	1597.62
18760	187.60	1598.04
18755	187.55	1598.47
18750	187.50	1598.89
18745	187.45	1599.32
18740	187.40	1599.75
18735	187.35	1600.17
18730	187.30	1600.60
18725	187.25	1601.03
18720	187.20	1601.46
18715	187.15	1601.88
18710	187.10	1602.31
18705	187.05	1602.74
18700	187.00	1603.17
18695	186.95	1603.60
18690	186.90	1604.03
18685	186.85	1604.46
18680	186.80	1604.88
18675	186.75	1605.31
18670	186.70	1605.74
18665	186.65	1606.17
18660	186.60	1606.61
18655	186.55	1607.04
18650	186.50	1607.47
18645	186.45	1607.90
18640	186.40	1608.33
18635	186.35	1608.76

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