Sumitomo Electric Industries, Ltd.
Part No. : SLM55x1 Series
Document No. : HUW0024095-01G
Date of issue : February 26, 2002

Technical Specification

of

1.5μm EA-DFB Laser Diode Module integrated with EA Driver IC for 9.95Gbps Transmission

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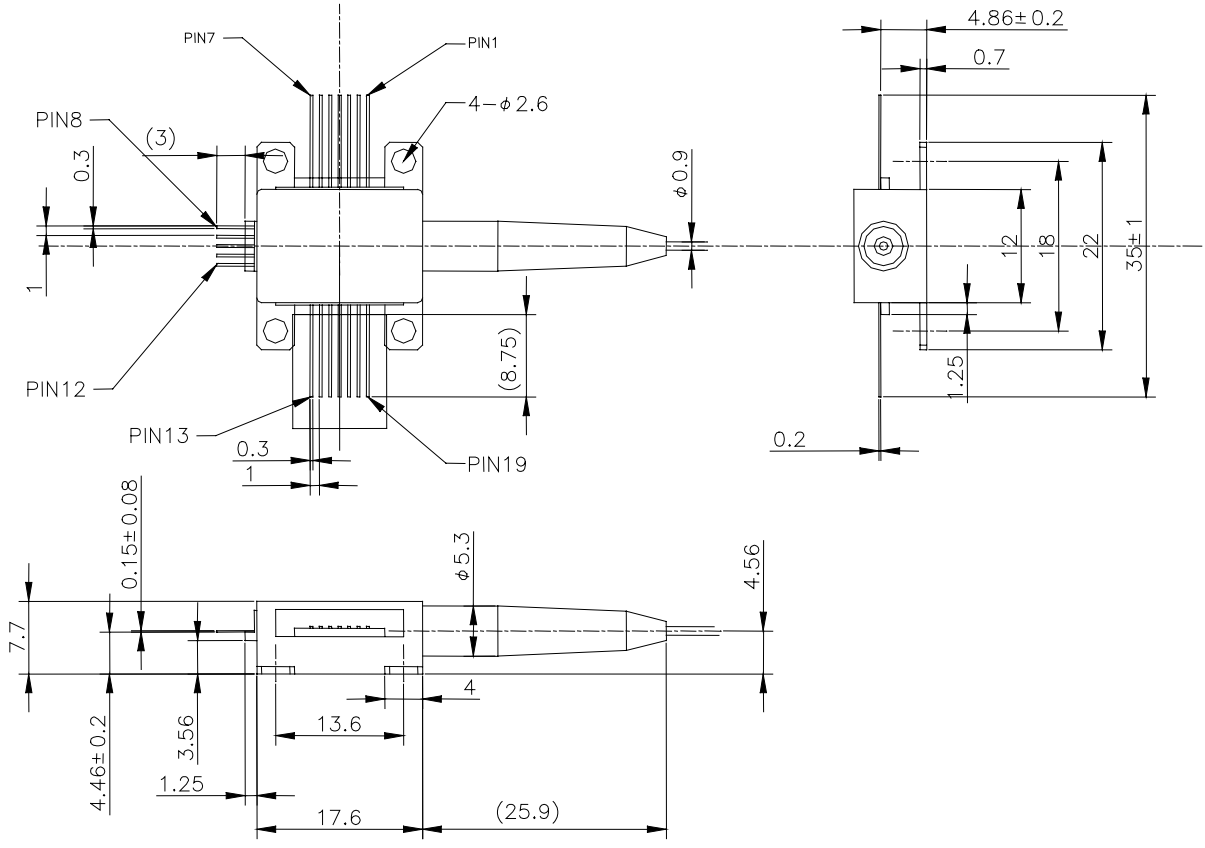
1. General

SLM55x1 series are 1.5µm single mode light source modules for 9.95Gbps data transmission. SLM55x1 series can be applied to up to 40km data transmission, which corresponds to SONET OC-192 IR2 and SR2 specifications.

DFB-LD chip integrated with electro-absorption type modulator (EA-DFB-LD) and EA driver IC are integrated in a 14pin+5pin small butterfly package. An optical isolator, an InGaAs monitor PD and a thermo-electric cooler are also mounted on this small package. 9.95Gbps differential signal is fed through the co-planar transmission line which located at the rear side of the package.

2. Package dimension and pin assignment

(unit : mm, tolerance : ±0.15 unless otherwise noted)



Pin No.	Function	Pin No.	Function	Pin No.	Function
1	TEC Anode	8	Case Ground	13	PD Cathode
2	Thermistor	9	$\overline{D_{IN}}$	14	PD Anode
3	Vb	10	Case Ground	15	Case Ground
4	Vm	11	D_{IN}	16	LD Bias (Anode)
5	Vss	12	Case Ground	17	N/C
6	Vx2			18	N/C
7	Vx1			19	TEC Cathode

3. Absolute maximum ratings

Parameter	Symbol	Min.	Max.	Unit
Storage temperature	Tstg	-40	85	°C
Operating case temperature	Tc	0	75	°C
LD forward current	IfL	–	150	mA
LD reverse voltage	VrL	–	2	V
PD reverse current	IrP	–	2	mA
PD reverse voltage	VrP	–	15	V
Driver IC supply voltage	Vss	-6.5	0.3	V
Cross point control voltage	Vx1,Vx2	Vss-4.8 (min -6.5)	Vss+2.4 (max.0.3)	V
EA modulation voltage control voltage	Vm	-6.5	Vss+1.2 (max 0.3)	V
EA bias control voltage	Vb	-6.5	Vss+2.4 (max 0.3)	V
TEC current	Ic	–	2.3	A
Package mounting screw torque(*1)	Npt	–	0.2	Nm
ESD tolerance1 (*2)	V_{ESD1}	–	200	V
ESD tolerance2 (*3)	V_{ESD2}	–	50	V
Lead soldering temperature	Stemp	–	260	°C
Lead soldering time	Stime	–	10	sec

Note *1 Without buffer materials under the package
Note *2 Pin No. 1-5, 8, 10, 12, 13-19.
Note *3 Pin No. 6, 7, 9, 11.

4. Electrical and optical characteristics

(Unless otherwise noted, T_{LD}=25°C, Tc=0~75°C; BOL)

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Threshold current	Ith	CW		–	–	25	mA
Operating power	Pop	SLM5551		-1	–	+2	dBm
		SLM5521		-4	–	0	dBm
		SLM5511		-5	–	-1	dBm
Tracking error	TE	Pf=Pop; (*4); Tc=0~75°C Im=const.; Vb,Vm=const.		-0.5	–	+0.5	dB
Operating current	Iop	Pf=Pop; (*4)		50	75	100	mA
Forward voltage	Vf	If=Iop		–	–	2.2	V
Peak wavelength	λp	Pf=Pop; (*4)		1530	–	1565	nm
Side mode suppression ratio	SMSR	Pf=Pop; CW		35	–	–	dB
Optical isolation	OIS	–		25	–	–	dB
Monitor current	Im	If=Iop		100	–	1500	μA
Monitor dark current	Id	VrP=5V		–	1	10	nA
Monitor capacitance	C	VrP=5V, f=1MHz		–	–	12	pF
Driver IC supply voltage	Vss	–		-5.5	-5.2	-5.0	V
Driver IC supply current	Iss	–		–	–	285	mA
EA modulation voltage control voltage	Vm	–		Vss	–	Vss+1.0	V
EA bias control voltage	Vb	–		Vss	–	Vss+2.2	V
Cross point control voltage	Vx1,Vx2	X-point=50±1%		Vss+0.8	–	Vss+2.2	V
Data input voltage	D_{IN}, $\overline{D_{IN}}$	differential; AC coupled		0.5	–	1.0	V
Input return loss	S_{11}	100kHz~10GHz		–	–	-10	dB
Rise time	Tr	20 to 80%; (*5)		–	–	30	ps
Fall time	Tf	20 to 80%; (*5)		–	–	30	ps
Extinction Ratio	Ext	SLM5551	(*4)	8.0	–	–	dB
		SLM5521	(*4)	8.0	–	–	dB
		SLM5511	(*4)	8.0	–	–	dB
Pulse Mask	Mask	(*4), 500counts		Error Free			–
Floor	FL	SLM5551	(*4);(*6);@10^{-12}	Floor Free			–
		SLM5521	(*4);(*7);@10^{-12}	Floor Free			–
		SLM5511	(*4);(*8);@10^{-12}	Floor Free			–
Dispersion penalty	Pd	SLM5551	(*4);(*6)	–	–	2	dB
		SLM5521	(*4);(*7)	–	–	2	dB
		SLM5511	(*4);(*8)	–	–	2	dB

Note *4 9.95Gbit/s, 2^{31}-1NRZ, 50% duty cycle
Note *5 Vb,Vm is set to make Pop and Ext within the specification.
Note *6 BER@10^{-12} ; 800ps/nm(@1550nm)
Note *7 BER@10^{-12} ; 400ps/nm(@1550nm)
Note *8 BER@10^{-12} ; 500ps/nm(@1550nm)

5. Thermal characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Thermistor resistance	Rth	T_{LD}=25°C	9.5	10	10.5	KΩ
Thermistor B const.	B	25°C／75°C	3800	3900	4000	K
TEC current	Ic	T_{LD} =25°C, Tc =75°C	–	–	1.2	A
TEC voltage	Vc	Pf=Pop;(*9)	–	–	2.5	V

Note *9 9.95Gbit/s, 2^{31}-1 NRZ, 50% duty cycle, Extinction Ratio=9.0dB

6. Fiber specification

Parameter	Min.	Typ.	Max.	Unit
Fiber type		Single mode fiber		–
Mode field diameter	8.5	9.5	10.5	μm
Cladding diameter	122	125	128	μm
Outer jacket diameter	–	0.9	–	mm
Fiber length	0.9	1.0	1.1	m
Bending radius	40	–	–	mm
Optical connector		(See section 7.)		–

7. Ordering information

SLM5551-x
SLM5521-x
SLM5511-x

C : SC-PC
D : FC-PC
L : LC connector
M : MU connector

8. Precaution

- Radiation emitted by laser devices can be dangerous to the eyes. Avoid eye or skin exposure to direct or scattered radiation.
- The modules should be handled in the same manner as ordinary semiconductor devices to prevent the electro-static damages. For safe keeping and carrying, the modules should be packaged with ESD proof material. To assemble the modules on PCB, the workbench, the soldering iron and the human body should be grounded.
- To eliminate the ripple noise to supply voltage, a ripple filter should be placed as close to the module as possible.
- For power up of driver IC, supply control voltages to Vb,Vm,Vx1 and Vx2 first, then supply voltage to Vss. For shut down, Vss first, then control voltages. the sequence of control voltages does not need to take case.
- TEC current should be controlled carefully no to exceed an absolute maximum value. Even momentary excess current may damage the module.
- The stress to the fiber pigtail may cause the damage on the performance. The fiber pigtail may snap off by dropping the module.
- Please pay special attention to the atmosphere condition because the dew on the module may cause some electrical damages.
- Under such a strong vibration environment as in automobile, the performance and reliability are not guaranteed.

REVISION RECORD

Document No.	Date	Description	Incorporated by	Checked by	Approved by
HUW0024095-01A	Jan.-05-2001	Preliminary	T.Nakabayashi	N.Kushida	T.Fujitani
HUW0024095-01B	Mar-14-2001	Preliminary (modify PKG dimension)	T.Nakabayashi	T.Nakabayashi	K.Tanida
HUW0024095-01C	Mar-29-2001	Preliminary (modify PKG dimension)	T.Nakabayashi	T.Nakabayashi	K.Tanida
HUW0024095-01D	June-06-2001	Modify specifications (Pop, Ext, Pd) and add SLM5511	T.Nakabayashi	T.Nakabayashi	K.Tanida
HUW0024095-01E	Dec-7-2001	Modify package dimension and TEC current #17 pin is N/C.	A. Hamakawa	T.Nakabayashi	K.Tanida
HUW0024095-01F	Jan-16-2002	ESD tore lance is added. Pop, Ext and Pd are revised. S11 is deleted.	A. Hamakawa	T.Nakabayashi	K.Tanida
HUW0024095-01G	Feb-26-2002	S11(<10dB) is added. Condition of Iss is revised.	A. Hamakawa	T.Nakabayashi	K.Tanida