

Euvis

LD162DZ_G0 Datasheet

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Document name: **LD162DZ_DS_G0**

Release date: **02/27/2004**

Related document: **LD162DZ_DS_5G4 @ 01/09/2004**

Version: **G0**

Revision: (none)

OC-192/STM-64/10GbE

LD162DZ_G0

Differential *Laser Diode Driver*

32-Pin QFN package

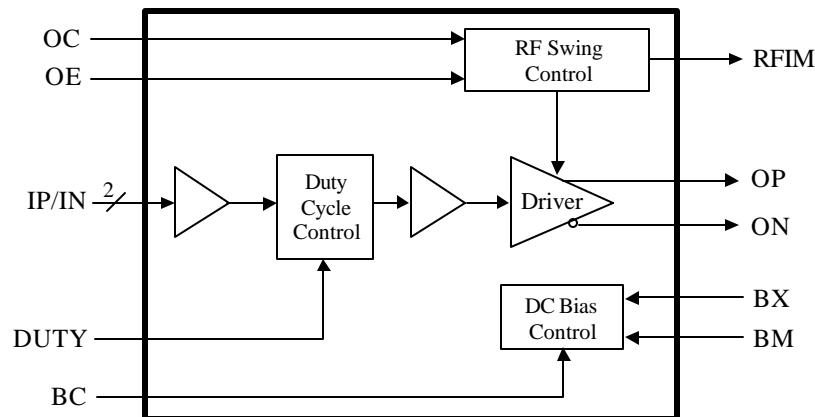
PRODUCT DESCRIPTION

The **LD162DZ** is a low-power high-speed laser diode driver designed for fiber optic communication systems such as SONET OC-192, SDH STM-64 and 10 Giga-Bit Ethernet. This chip can deliver a maximum modulation current of 80 mA to a 25- Ω load and maximum DC bias current of 80 mA to a laser diode.

KEY FEATURES

- Differential outputs with 50 Ω back terminations
- 0~80 mA variable RF differential modulation current at external 25- Ω load
- 0~80 mA variable DC bias current at laser diode (through a RF choke)
- Duty-Cycle control unit
- Output Enable Control
- Modulation Current and Bias Current Monitors
- On-chip current sink for laser bias
- Single +5 V power supply with current consumption of 110 mA (not including RF modulation current and DC bias current)

BLOCK DIAGRAM



ELECTRICAL SPECIFICATIONS

$V_{CC} = +5\text{ V}$ and $R_L = 25\ \Omega$ (simulating laser diode load with a damping resistor)

Parameter	Symbol	Min	Typical	Max	Unit
Operating Temperature	T_o	-40	25	85	$^{\circ}\text{C}$
Input Data Level ¹	V_{data}	75	150	2000	mV
Input Return Loss ²	RL_I		8		dB
Differential Modulation Current at External 25 Ω	I_{RF}	0		80	mA
DC Bias Current	I_{DC}	0		80	mA
Output Rise Time ³	t_r			40	ps
Output Fall Time ³	t_f			40	ps
Output Overshoot ⁴	I_{oos}			6	mA
Output Undershoot ⁴	I_{ous}			6	mA
Jitter Width	τ_j			2	ps, rms
Current Consumption ⁵	I_{EE}		110		mA
Power Supply	V_{CC}	4.7	5	5.5	V

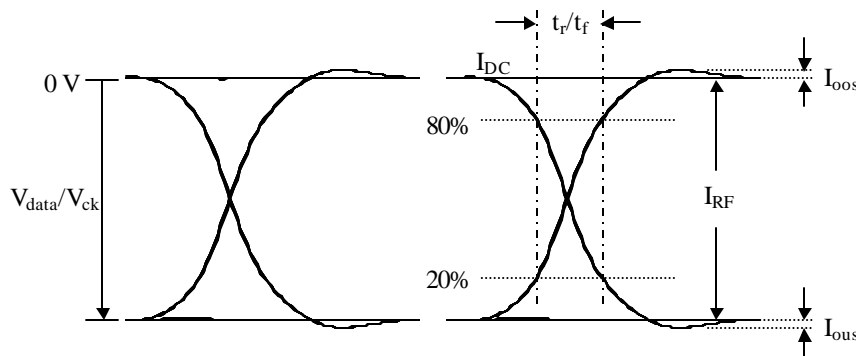
¹AC-coupled single-ended or differential input

²DC to 10 GHz

³20~80% of full swing

⁴at $I_{\text{RF}}=60\text{ mA}$

⁵excluding RF modulation current



Symbolic interpretation

ABSOLUTE MAXIMUM RATINGS – WITH +5 V SUPPLY VOLTAGE

Parameter	Symbol	Typical	Unit
Ambient Temperature	T_A	-40~85	°C
Storage Temperature	T_{STR}	-65~150	°C
Power Supply Voltage	V_{CC}	8	V

TYPICAL OPERATION CONDITIONS – WITH +5 V SUPPLY VOLTAGE

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5	5.5	V
Supply Current	I_{CC}		110		mA
Input Data Level (Single-Ended)	V_{DATA}		150		mV _{PP}
¹ Bias Control, $I_{BX}=0\sim 100$ mA	BC	1.2		3.5	V
¹ Bias Control, $I_{BX}=20\sim 80$ mA		1.8		3	V
² RF Modulation Control, $I_{RF}=0\sim 80$ mA	OC	0.1		0.78	V
² RF Modulation Control, $I_{RF}=20\sim 60$ mA		0.32		0.63	V
Output Enable, V_{CC} : Enable; V_{EE} : Disable	OE	V_{EE}		V_{CC}	V
Output Enable Threshold	OE_{TH}		1.3		V
Duty Cycle Control	DUTY	0.5		2.5	V
LD Bias Monitoring	IBM	0		3.6	mA
RF Modulation Current Monitoring	RFIM	0		1	V
VCSO Modulation Current Monitoring	VCSO	0		1.8	V
Input Coupling	AC Coupled				
Output Coupling	AC Coupled				

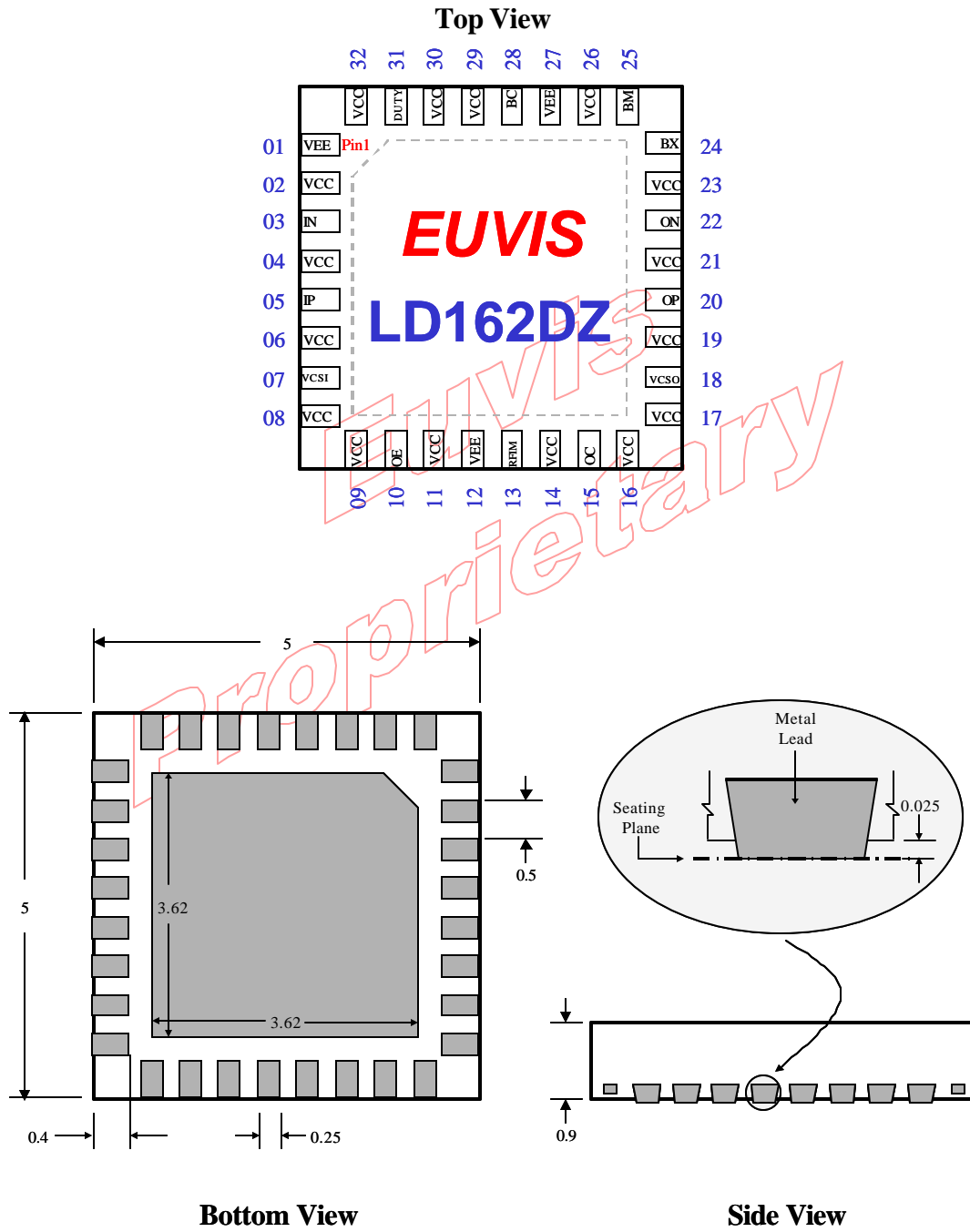
¹ With 1-K Ω in-series resistor at BC² With 25- Ω load

TERMINAL DESCRIPTION

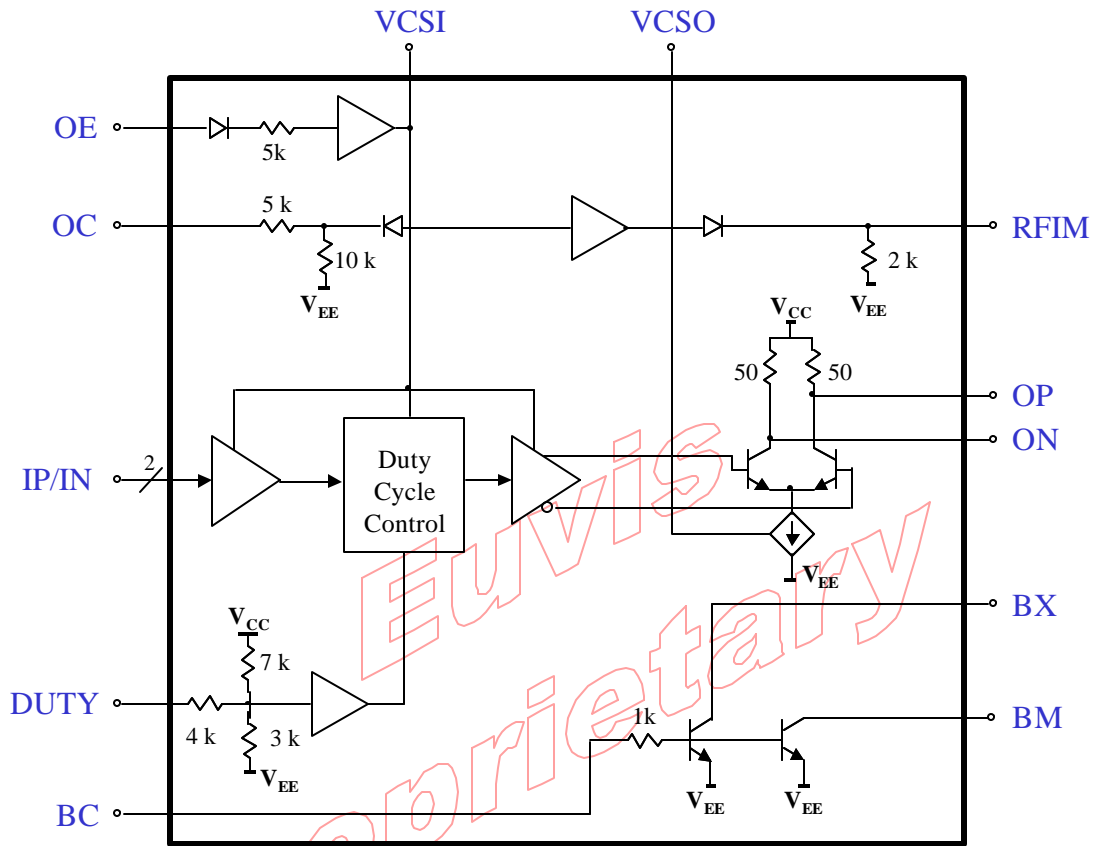
Name	Function	I/O	Signal
VCC	Power Supply		DC
VEE	Ground		DC
IP	Data Input +	I	RF
IN	Data Input -	I	RF
DUTY	Duty Cycle Control	I	DC
OE	RF Modulation Enable	I	DC
OC	RF Modulation Current Control	I	DC
BC	LD DC Bias Control	I	DC
BX	LD DC Bias Current Input	I	DC
RFIM	RF Modulation Current Monitor	O	DC
BM	LD DC Bias Current Monitor	I	DC
VCSI	Input Stage VCS Generator Bypass	O	DC
VCSO	Output Stage VCS Generator Bypass/Current Monitoring	O	DC
OP	Modulated Output +	O	RF
ON	Modulated Output -	O	RF

PACKAGE DIMENSION AND PIN ARRANGEMENTS

- Unit: mm
- Package Format: 32-pin QFN
- Package Size: 5 mm x 5 mm
- Pin Pitch: 0.5 mm

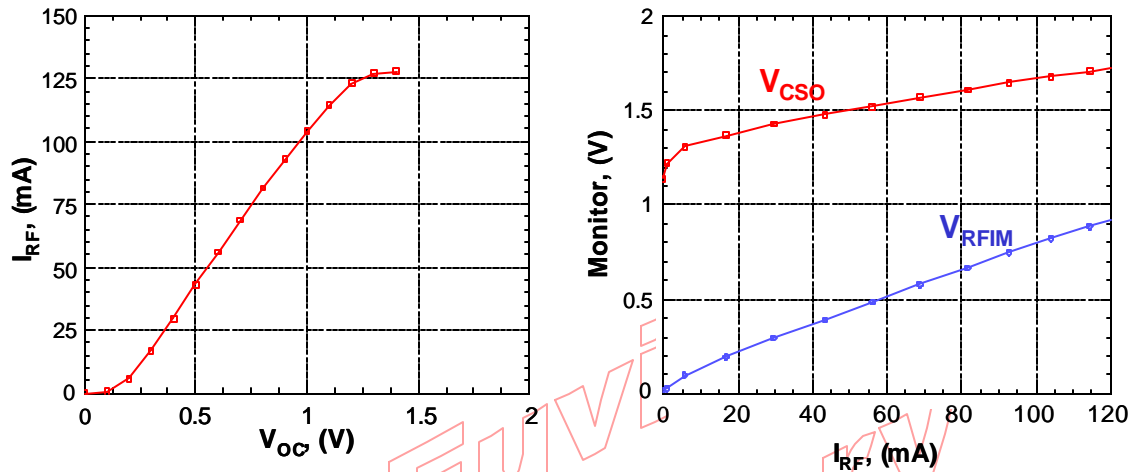


DC EQUIVALENT CIRCUIT

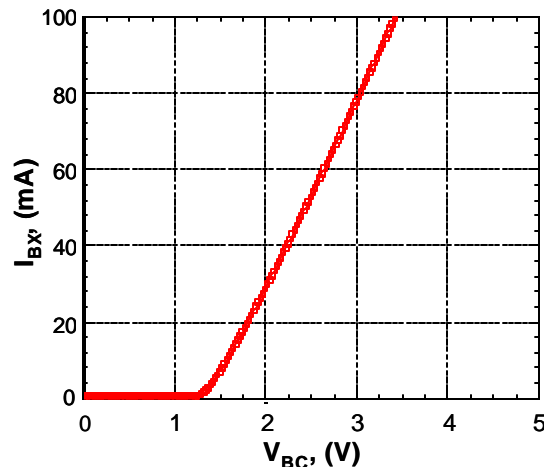


DC CONTROL CHARACTERISTICS

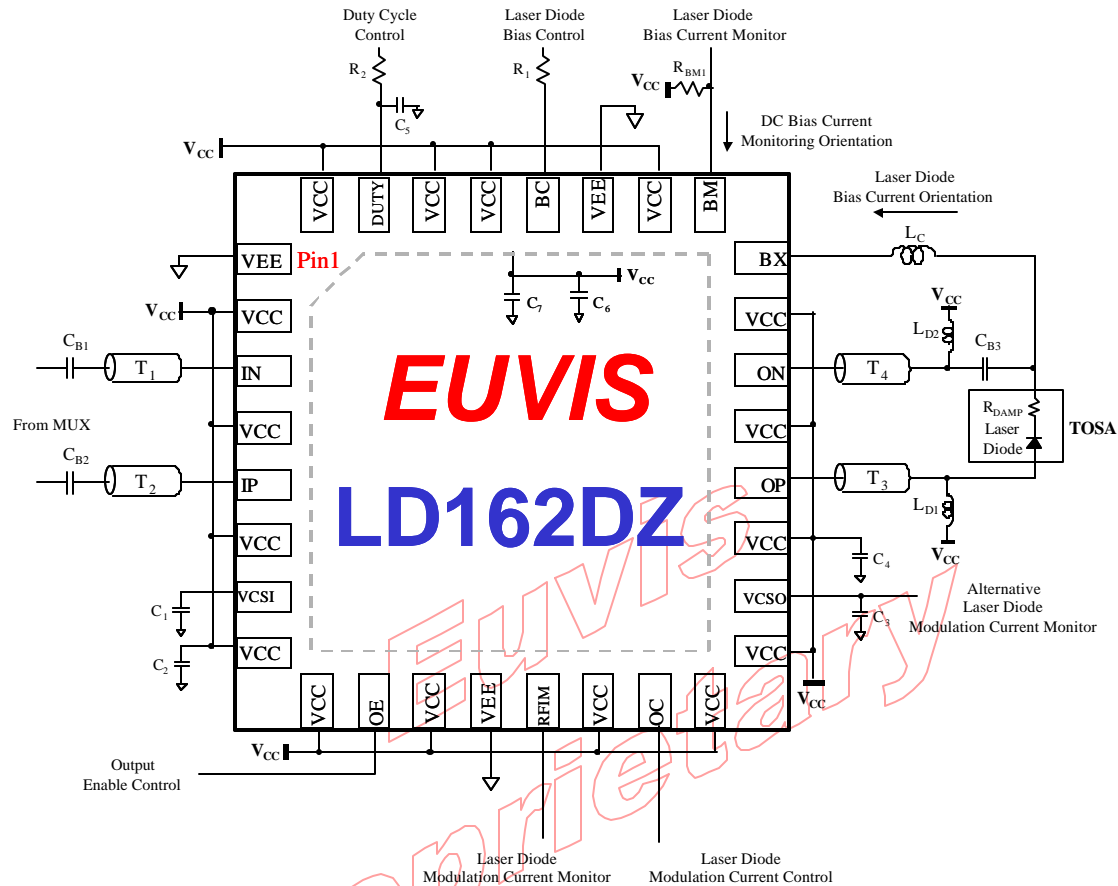
The modulation current I_{RF} can be controlled by applying the control voltage at pin **OC** and monitored by either the voltage at pin **RFIM** or the voltage at **VCSO**. The relationship of the modulation current I_{RF} delivered to a 25- Ω differential load versus control voltage V_{OC} and the corresponding monitoring voltages reading are shown as the following figures.



Similarly, if the on-chip current source is used to bias the laser diode, the DC bias current I_{BX} can be controlled by the control voltage at pin **BC** and monitored by the voltage at pin **BM**. The relationship of the DC bias current delivered to a laser diode with a 25- Ω turn-on resistance versus DC bias control voltage V_{BC} is shown as the following figures. In the figures, the turn-on voltage of the laser diode is 1.2 volt. The DC bias current monitoring feature can be accomplished by sensing the DC monitoring current I_{BM} flowing into the chip as shown in the next section. The ratio of DC bias current over DC monitoring current I_{BX}/I_{BM} is about 50. Due to the on-chip protection circuits, there are offset currents of 500 μA and 300 μA for I_{BX} and I_{BM} respectively.



TYPICAL CONNECTION



Notes:

V_{CC} 's are connected to +5 V

V_{EE} 's are connected to power supply ground

Center Pad of the package is connected to V_{cc} , +5V

$T_1 \sim T_4$: 50- Ω transmission lines

C_1, C_3, C_5 and C_6 : 100-nF surface mount capacitors

C_2 and C_4 : 100-pF high-quality capacitors at input and output*

C_7 : a 10-uF capacitor on power trace

L_C : RF choke for laser diode DC bias

L_{D1} and L_{D2} : RF chokes for driver outputs

$C_{B1} \sim C_{B3}$: 100-nF AC-coupling capacitors

R_1, R_2 and R_{BM1} : 1-k Ω resistors

R_{DAMP} : 15~25 Ω damping resistor

* Should be located close to the chip

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