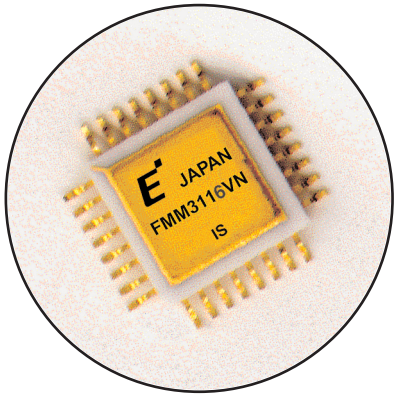
12.5Gb/s MI-LD Driver IC

FMM3116VN

FEATURES



- High speed operation up to 12.5Gb/s
- On-chip 50Ω Termination for High Speed Data Input
- Low Rise/Fall Time: 25ps (Typ., 20-80%)
- Adjustable Output Voltage Swing: 1.5Vpp to 2.5Vpp (50Ω load)
- Adjustable Output Offset Level
- Low Power Dissipation: 0.91W
- Single Power Supply Voltage: -5.20V
- Adjustable Duty Ratio
- Hermetically Sealed Ceramic Package (6mm x 6mm, 32-Pin)

DESCRIPTION

The FMM3116VN is a 12.5Gb/s(OC-192) driver with an output voltage of 2.5Vpp for the Modulator Integrated (MI)-Laser. This product is uniquely suited for use as a driver for MI-Lasers such as FLD5F20NP. The output is adjustable for peak current, duty ratio, and offset voltage/current. This product features an internal 50Ω termination at both high-speed differential inputs for ease of design and use.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{SS}	-6.50 to 0.0	V
Input Voltage	V_{IN}	-2.0 to 0.5	V
Power Supply Current	I_{SS}	500	mA
Peak Current Control Voltage	V_{IP}	Vss-0.5 to Vss+2.2	V
Output Offset Control Voltage	$V_{IB1,2}$	-8.0 to 0.5	V
Output Offset Control Current	$IB_{1,2}$	50	mA
Duty Control Voltage	V_{DUT}	Vss-0.5 to Vss+2.2	V
Output Voltage	V_{OUT}	-3.1 to 0.5	V
Storage Temperature	T_{stg}	-55 to 125	°C

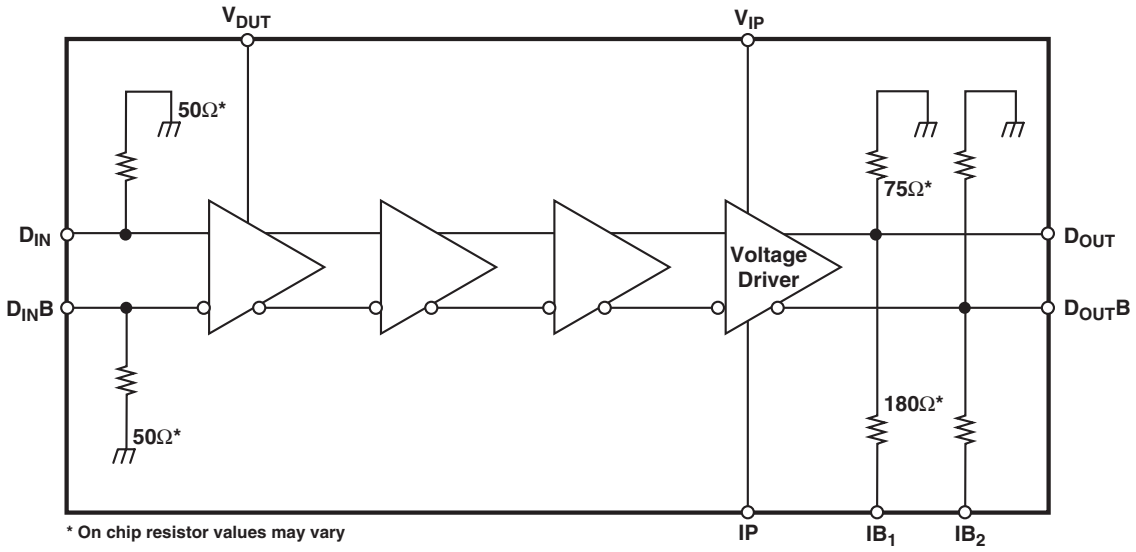
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Tc=25°C, VSS=-5.20V, RL=50Ω)

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Maximum Data Rate	fb	NRZ	12.5	-	-	Gb/s
Power Supply Current	I_{SS}	V_{OUT}=2.0Vpp, RL=50Ω, IB1=IB2=0mA	-	190	250	mA
Output Voltage Swing (max.)	V_{OUTMAX}		2.5	-	-	Vpp
Output Voltage Swing (min.)	V_{OUTMIN}		-	-	1.5	Vpp
Rise Time	t_r	20 to 80%, V_{OUT}=2.0Vpp	-	25	35	ps
Fall Time	t_f		-	25	35	ps
Output Low Voltage	V_{OL}		-3.0	-	-	V
Crossing Adjustment Range	Crossing	Din/DinB=0.25Vpp, V_{OUT}=2.0Vpp	50	-	70	%
Jitter RMS (OUT)	Jitter	V_{OUT}=2.0Vpp, Cross=65%	-	-	3.0	ps

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Supply Voltage	V_{SS}		-5.46	-5.20	-4.94	V
Input Data Level High	V_{IH}	Differential Input Data Swing=0.25~1.20Vpp Single-ended Input Data Swing=0.50~1.20Vpp	-0.50	-	0	V
Input Data Level Low	V_{IL}		-1.20	-	-0.25	V
Input Data Swing	V_{ISD}	Differential Input	0.25	-	1.20	Vpp
	V_{ISS}	Single-ended Input	0.5	-	1.20	
Output Swing Control Voltage	V_{IP}		V_{SS}	-	V_{SS} +2.0	V
Output Offset Control Voltage	$V_{IB1,2}$		V_{SS}	-	0	V
Output Offset Control Current	$IB_{1,2}$		0	-	40	mA
Duty Control Voltage	V_{DUT}		V_{SS}	-	V_{SS} +2.0	V
Case Temperature	T_C		0	-	75	°C

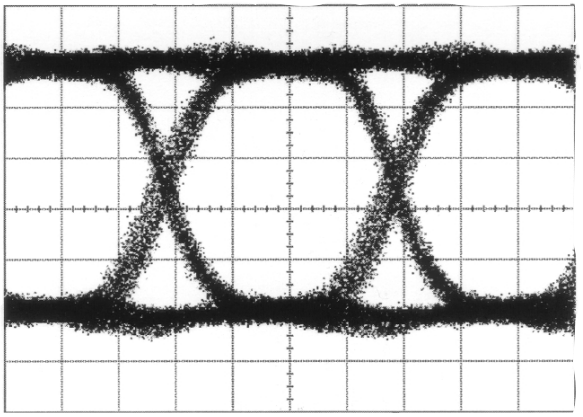
Block Diagram



Truth Table for D_{OUT} and $D_{OUT}B$

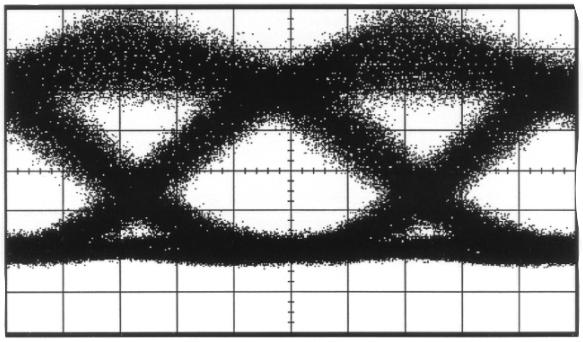
D_{IN}	$D_{IN}B$	D_{OUT}	$D_{OUT}B$	Optical Output from MI-LD at D_{OUT}	Optical Output from MI-LD at $D_{OUT}B$
0	1	L	H	L	H
1	0	H	L	H	L

Electrical Eye Pattern of D_{OUT}



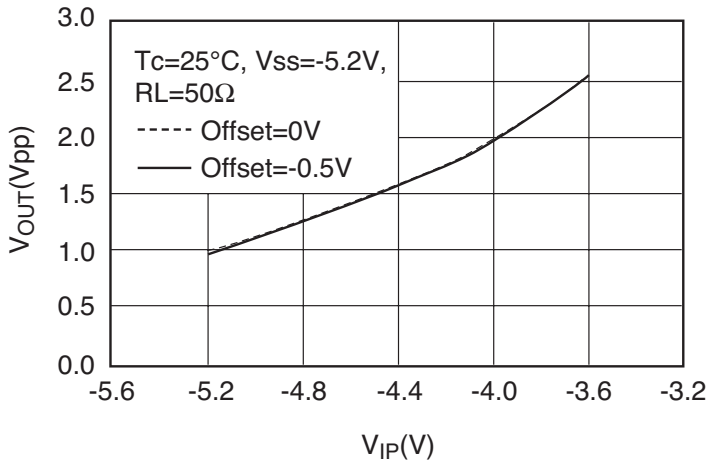
Tc=25°C, V_{SS}=-5.2V, V_{IB1}=V_{IB2}=0V, 12.5 Gb/s, PRBS=2_{23}-1, RL=50Ω, V_{OUT}=2.5Vpp, [H: 20ps/div., V:0.5V/div.]

Optical Eye Pattern with filter after 1600ps/nm fiber transmission

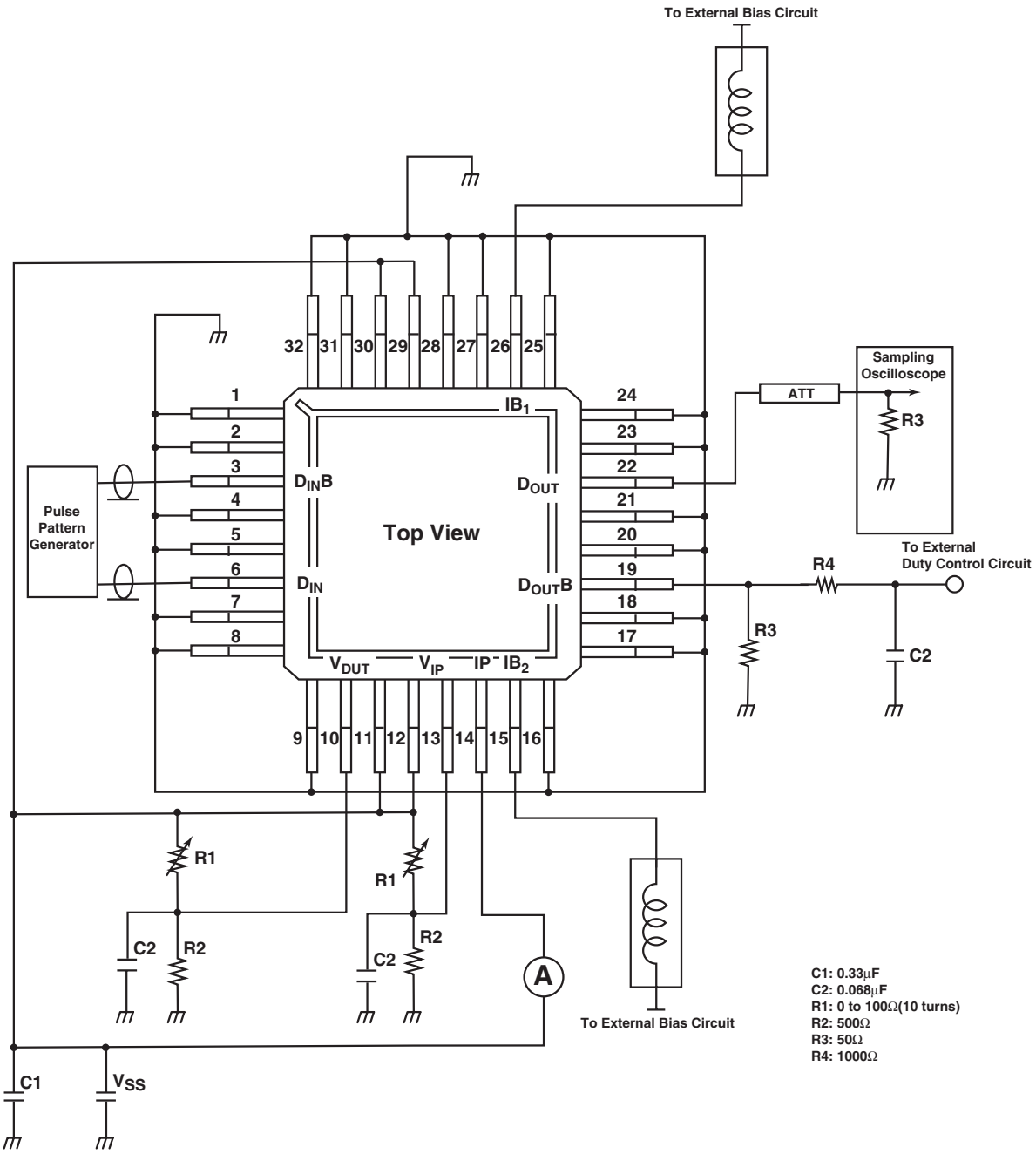


Tc=25°C, V_{SS}=-5.2V, 9.95328Gbps, PRBS=2^{23}-1, MI-LD: FLD5F20NP, T_{LD}=25°C, I_{OP}=70mA, Vo=-0.7V, V_{OUT}=2.0Vpp

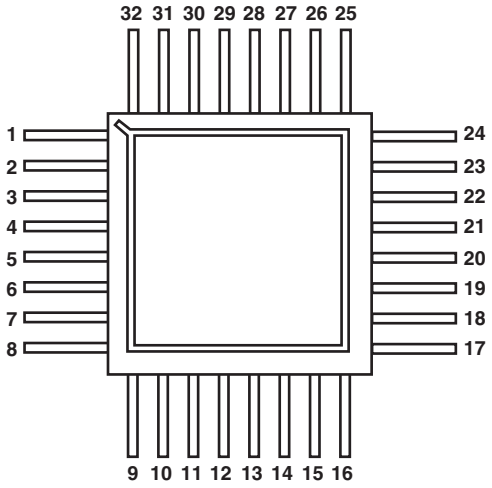
V_{OUT} vs. V_{IP} Characteristics



Test Circuit



Pin Assignment

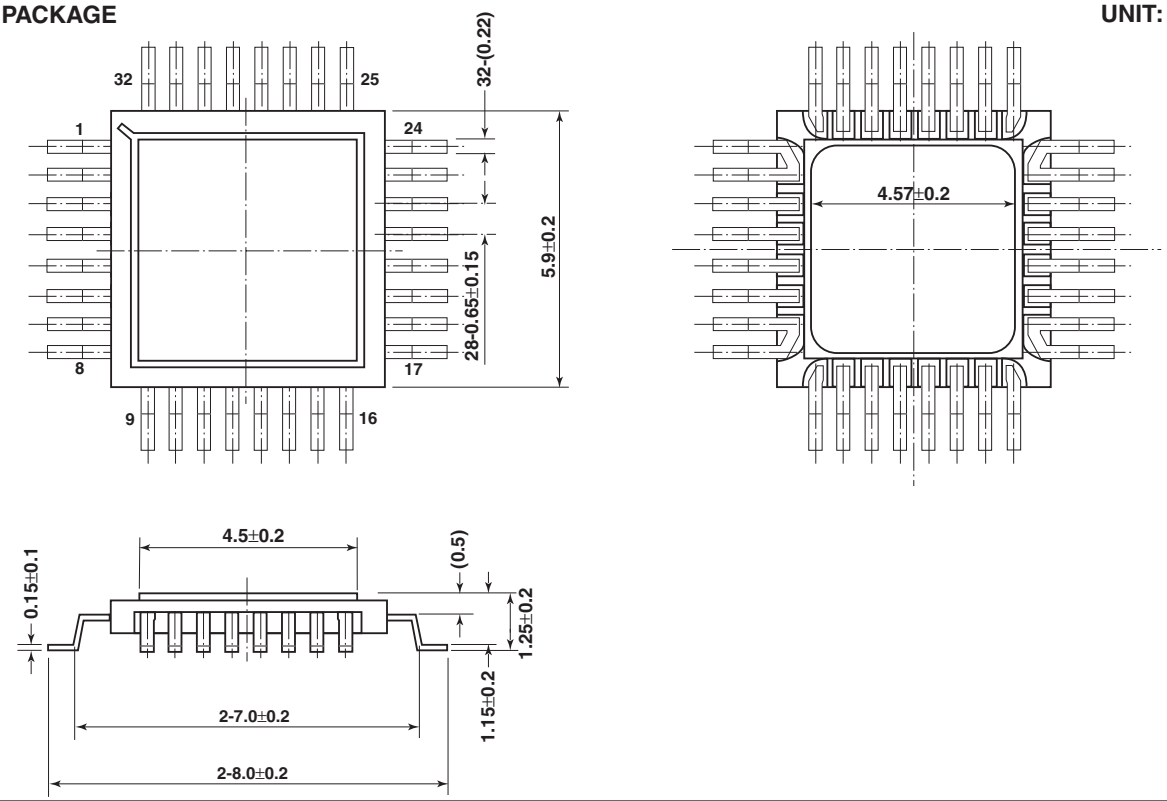


Pin Description

Pin Name	Pin No.	I/O	Description	Pin Name	Pin No.	I/O	Description
GND	1	-	Ground	GND	17	-	Ground
GND	2	-	Ground	GND	18	-	Ground
$D_{IN}B$	3	I	Complementary Data Input	D_{OUTB}	19	O	Complementary Data Output
GND	4	-	Ground	GND	20	-	Ground
GND	5	-	Ground	GND	21	-	Ground
D_{IN}	6	I	Data Input	D_{OUT}	22	O	Data Output
GND	7	-	Ground	GND	23	-	Ground
GND	8	-	Ground	GND	24	-	Ground
GND	9	-	Ground	GND	25	-	Ground
V_{DUT}	10	I	Duty Control Voltage	IB_1	26	I	D_{OUT} Offset Control
V_{SS}	11	-	Supply Voltage	GND	27	-	Ground
V_{SS}	12	I	Supply Voltage	GND	28	-	Ground
V_{IP}	13	I	Output Swing Control Voltage	V_{SS}	29	-	Supply Voltage
IP	14	-	Peak Current Monitor (V_{SS})	V_{SS}	30	-	Supply Voltage
IB_2	15	I	D_{OUTB} Offset Control	GND	31	-	Ground
GND	16	-	Ground	GND	32	-	Ground

"VN" PACKAGE

UNIT: mm



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