FMM3117VN

12.5Gbps Dual-drive LN Modulator Driver IC

**Eudyna**
Eudyna Devices Inc.

1. Features

1) **High Speed Operation up to 12.5Gbps**
2) **On-chip 50 ohm Termination for High Speed Data Input**
3) **Rapid Rise/Fall Time : 25ps (Typ., 20-80%)**
4) **Adjustable Output Voltage Swing :2.0Vpp to 2.85Vpp (50ohm Load)**
5) **Adjustable Output Offset Level**
6) **Single Power Supply Voltage : -5.2V**
7) **Duty Ratio Adjustment**
8) **6mm x 6mm 32-pin Hermetically Sealed Ceramic Package**

2. Maximum Ratings

The semiconductor devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings. The normal logic operation is not assured even within the ratings.

Table 2-1. Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	Vss	-6.50 to 0.0	V
Input Voltage	Vin	-2.0 to 0.5	V
Power Supply Current	Iss	500	mA
Output Swing Control Voltage	Vip	Vss-0.5 to Vss+2.2	V
Output Offset Control Voltage	V_{IB1}, V_{IB2}	-8.0 to 0.5	V
Output Offset Control Current	IB1, IB2	50	mA
Duty Control Voltage	Vdut	Vss-0.5 to Vss+2.2	V
Output Voltage	Vout	-3.1 to 0.5	V
Storage Temperature	Tstg	-55 to 125	degC
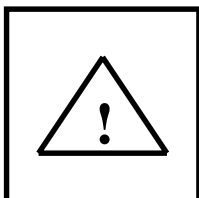
GaAs

CAUTION

This device contains Gallium Arsenide(GaAs).

For safety, please observe the following:

(1) Do not put devices in your mouth. Gallium Arsenide is dangerous if ingested.

(2) Do not burn, crush, or process chemically. It is dangerous to inhale or ingest the gas, powder, or liquid which results from burning, crushing or chemical processing of the devices.

(3) Discard devices separately from industrial and domestic wastes in accordance with the method specified by law.

3. Recommended Operating Conditions

   The recommended operating conditions are the recommended values assuring normal operation and long term reliability.

Table 3-1. Recommended Operating Conditions

Parameter	Symbol	Condition	Limit Min.	Limit Typ.	Limit Max.	Unit
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	-0.50		0.00	V
Input Data Level Low	V_{IL}	Single-ended Input Data Swing = 0.50~1.20Vpp	-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	Vpp
Output Swing Control Voltage	Vip		Vss	---	Vss+2.0	V
Output Offset Control Voltage	V_{IB1}, V_{IB2}		Vss	---	0.0	V
Output Offset Control Current	IB1,IB2		0		30	mA
Duty Ratio Control Voltage	Vdut		Vss	---	Vss+2.0	V
Case Temperature	T_C		0	---	75	degC

4. Electrical Characteristics

Table4-1. Electrical Characteristics   (Tc = 25 degC , Vss = -5.20V, R_L=50ohm)

Parameter	Symbol	Condition	Limit Min.	Limit Typ.	Limit Max.	Unit
Maximum Data Rate	fb	NRZ	12.5G	---	---	bps
Power Supply Current	Iss	V_{OUT}=2.85V_{PP}, R_L=50ohm IB1=IB2=0mA	---	220	280	mA
Output Voltage Swing (max.)	V_{OUTMAX}		2.85	---	---	Vpp
Output Voltage Swing (min.)	V_{OUTMIN}		---	---	2.0	Vpp
Rise Time	Tr	20 to 80 %	---	25	35	ps
Fall Time	Tf	V_{OUT}=2.5Vpp	---	25	35	ps
Output Low Voltage	V_{OL}		-3.0	---	---	V
Crossing Adjustment Range	Crossing	Din/DinB=0.50Vpp V_{OUT}=2.85V_{PP}	45		55	%
Jitter RMS(OUT)	Jitter	Din/DinB=0.50Vpp V_{OUT}=2.85Vpp Cross=50%	---	---	3.0	ps

5. Block Diagram

Figure 5-1. Block Diagram

*On chip resistor values may vary.
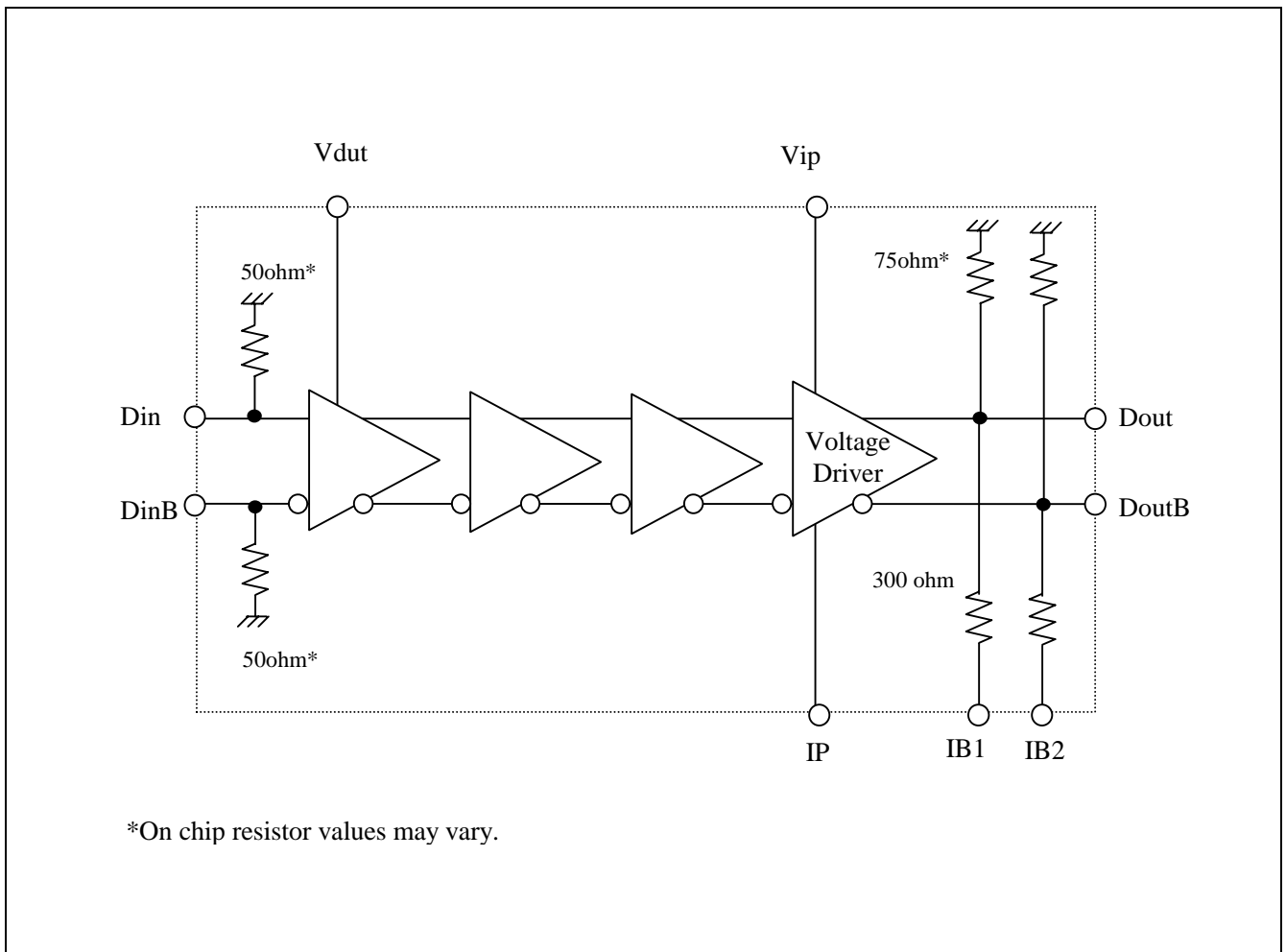
Table 5-2.   Truth table for Dout and DoutB

Din	DinB	Dout	DoutB
0	1	L	H
1	0	H	L

6. Pin Description

Table 6-1 Pin Description

Pin Number	Symbol	I/O	Function	Remarks
1	GND	---	Ground	
2	GND	---	Ground	
3	DinB	I	Complementary Data Input	
4	GND	---	Ground	
5	GND	---	Ground	
6	Din	I	Data Input	
7	GND	---	Ground	
8	GND	---	Ground	
9	GND	---	Ground	
10	Vdut	I	Duty Ratio Control	
11	Vss	---	Supply Voltage	
12	Vss	---	Supply Voltage	
13	Vip	I	Output Swing Control	
14	IP	---	Peak Current monitor (Vss)	
15	IB2	I	DoutB Offset Control	
16	GND	---	Ground	
17	GND	---	Ground	
18	GND	---	Ground	
19	DoutB	O	Complementary Data Output	
20	GND	---	Ground	
21	GND	---	Ground	
22	Dout	O	Data Output	
23	GND	---	Ground	
24	GND	---	Ground	
25	GND	---	Ground	
26	IB1	I	Dout Offset Control	
27	GND	---	Ground	
28	GND	---	Ground	
29	Vss	---	Supply Voltage	
30	Vss	---	Supply Voltage	
31	GND	---	Ground	
32	GND	---	Ground	

7. Package

Fig.7-1 Package Outline
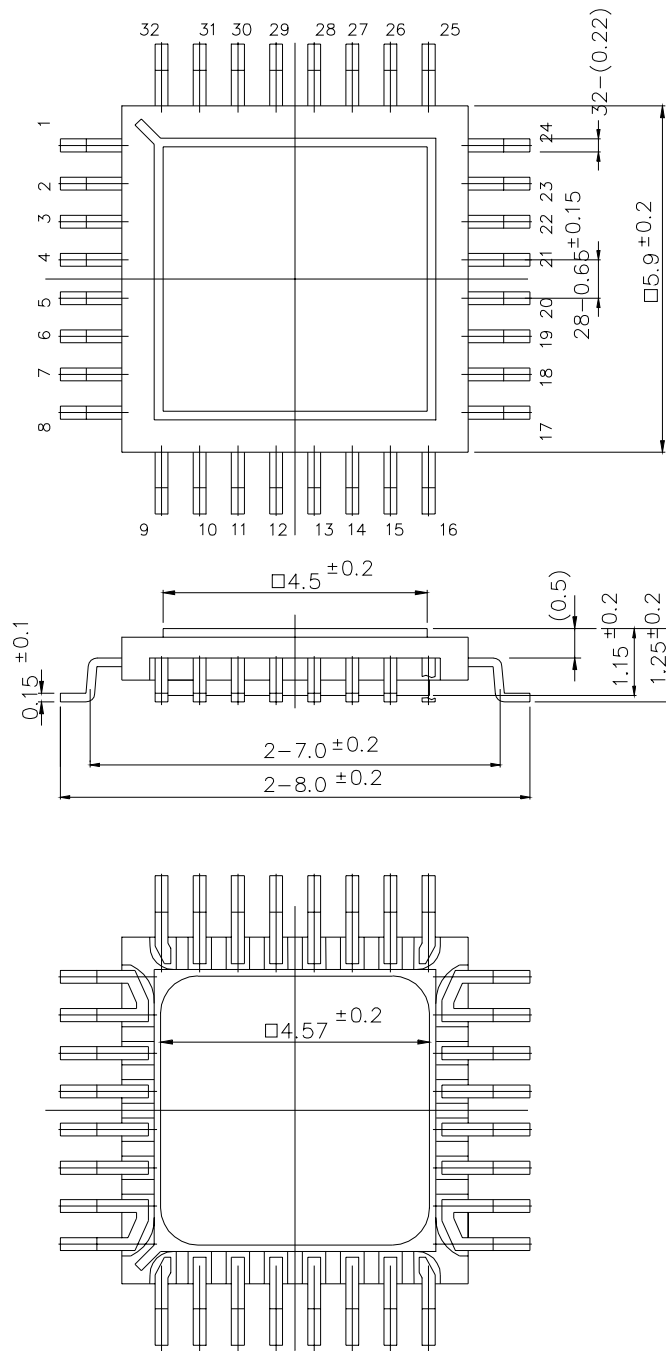
[unit : mm]

8. Test Circuit
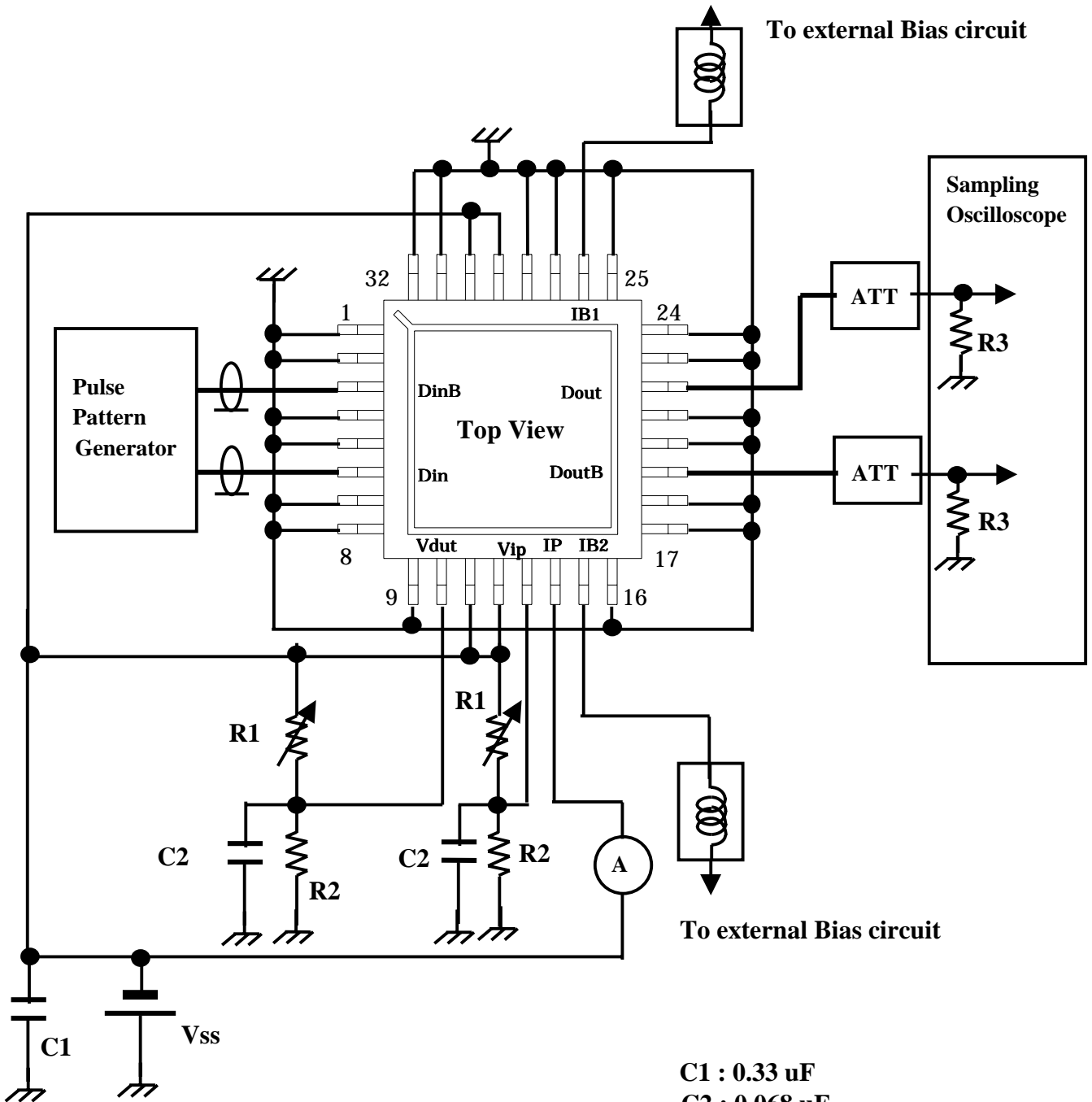
C1 : 0.33 uF
C2 : 0.068 uF
R1 : 0 to 500 ohm (10 turns)
R2 : 500 ohm
R3 : 50 ohm

9.Typcal Measurement data

Tc=25 deg.C, V_{SS} = -5.2V, VIB1=VIB2=0V,

12.5 Gbps, PRBS 2^23-1, R_L=50 ohm, V_{OUT}=2.85 V_{PP}
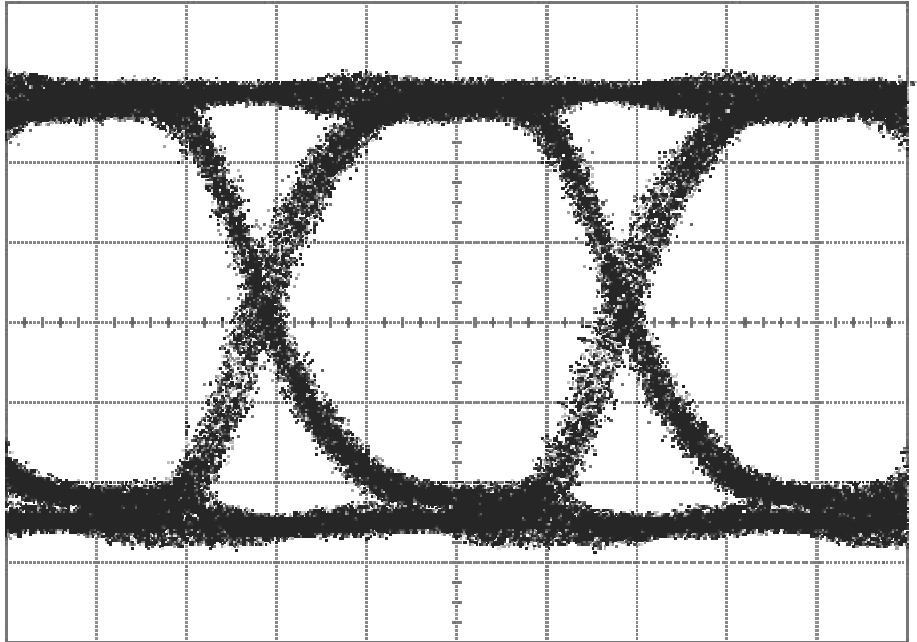
Fig. 8-1 Electrical Eye Diagrams of Dout [H: 20ps/Div. , V:0.5V/Div.]

Vss=-5.2V,Ta=25degC, VIB1=VIB2=0V, RL=50ohm
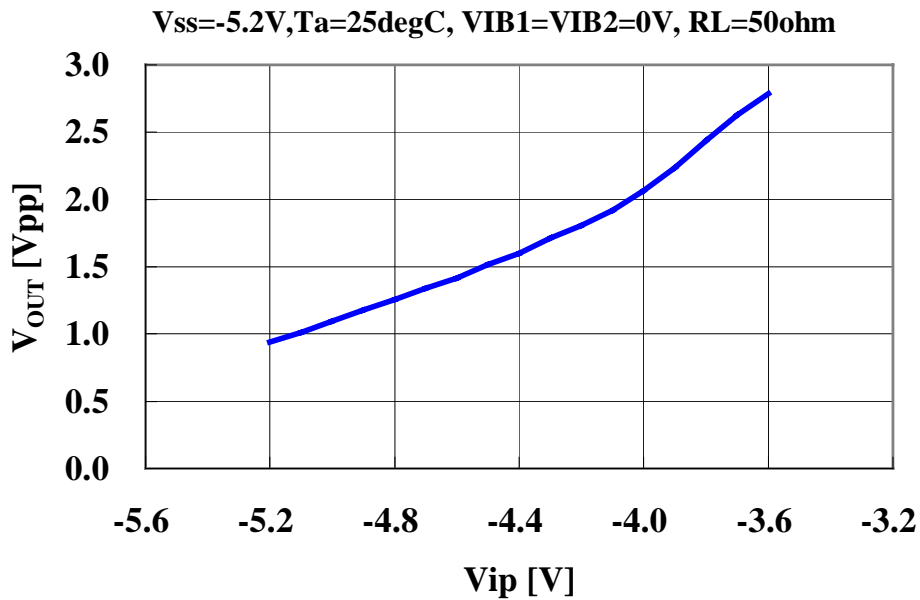
Fig. 8-2 V_{OUT}-Vip Characteristics

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10. Schematic Diagram for Interconnection with LN modulator

External Bias-T