

FMM3117VN

12.5Gbps Dual-drive LN Modulator Driver IC



1. Features

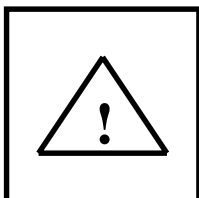
- 1) High Speed Operation up to 12.5Gbps
- 2) On-chip 50 ohm Termination for High Speed Data Input
- 3) Rapid Rise/Fall Time : 25ps (Typ., 20-80%)
- 4) Adjustable Output Voltage Swing :2.0Vpp to 2.85Vpp (50ohm Load)
- 5) Adjustable Output Offset Level
- 6) Single Power Supply Voltage : -5.2V
- 7) Duty 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	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
Output Swing Control Voltage	V _{ip}	V _{SS} -0.5 to V _{SS} +2.2	V
Output Offset Control Voltage	V _{IB1} , V _{IB2}	-8.0 to 0.5	V
Output Offset Control Current	I _{B1} , I _{B2}	50	mA
Duty Control Voltage	V _{dut}	V _{SS} -0.5 to V _{SS} +2.2	V
Output Voltage	V _{out}	-3.1 to 0.5	V
Storage Temperature	T _{stg}	-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			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 = 0.25~1.20V _{pp}	-0.50		0.00	V
Input Data Level Low	V _{IL}	Single-ended Input Data Swing = 0.50~1.20V _{pp}	-1.20		-0.25	V
Input Data Swing	V _{ISD}	Differential Input	0.25		1.20	V _{pp}
	V _{ISS}	Single-ended Input	0.5		1.20	V _{pp}
Output Swing Control Voltage	V _{ip}		V _{SS}	---	V _{SS} +2.0	V
Output Offset Control Voltage	V _{IB1} , V _{IB2}		V _{SS}	---	0.0	V
Output Offset Control Current	IB1, IB2		0		30	mA
Duty Ratio Control Voltage	V _{dut}		V _{SS}	---	V _{SS} +2.0	V
Case Temperature	T _C		0	---	75	degC

4. Electrical Characteristics

Table4-1. Electrical Characteristics

(T_c = 25 degC , V_{SS} = -5.20V, R_L=50ohm)

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

5. Block Diagram

Figure 5-1. Block Diagram

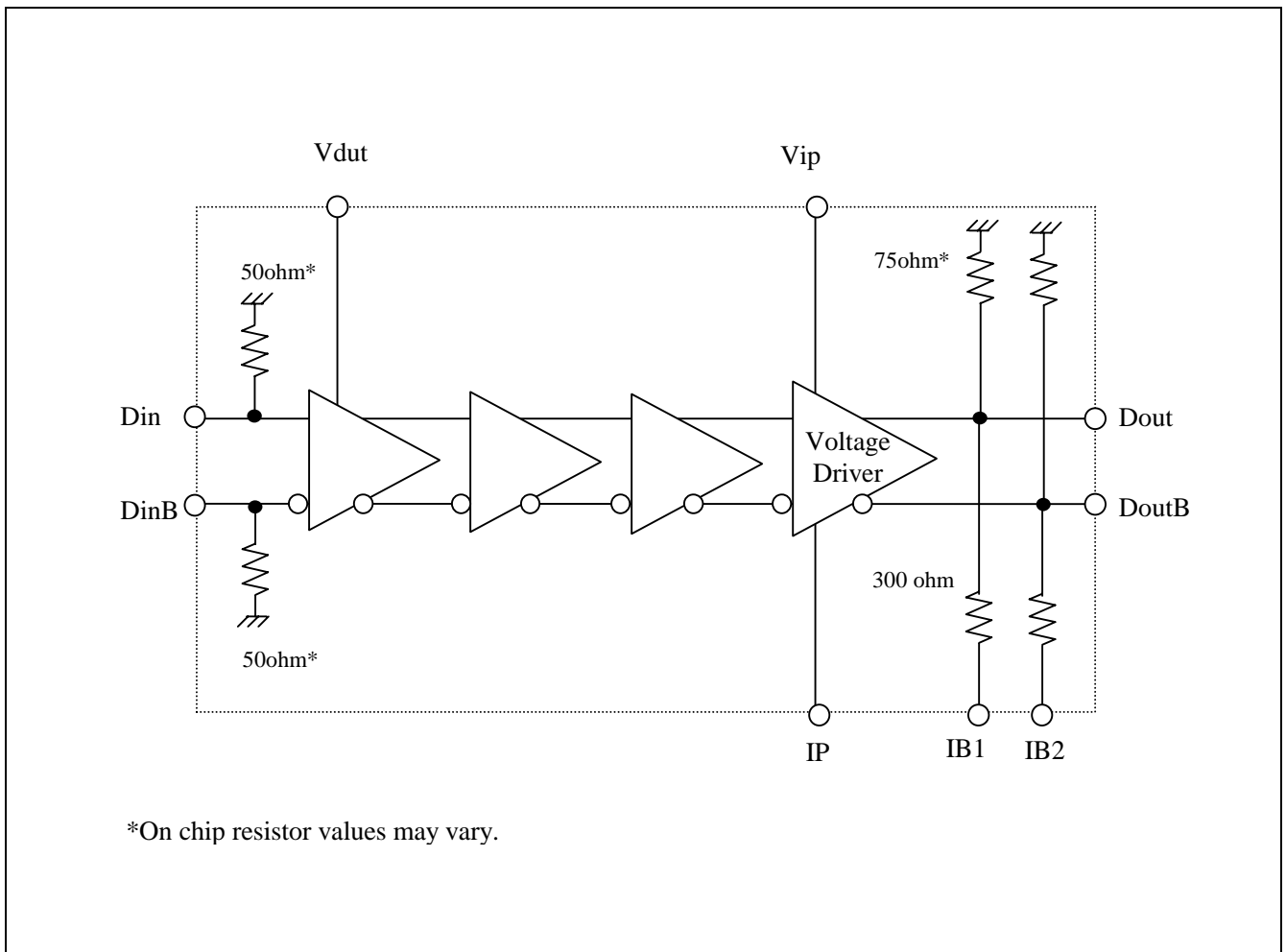


Table 5-2. Truth table for Dout and DoutB

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

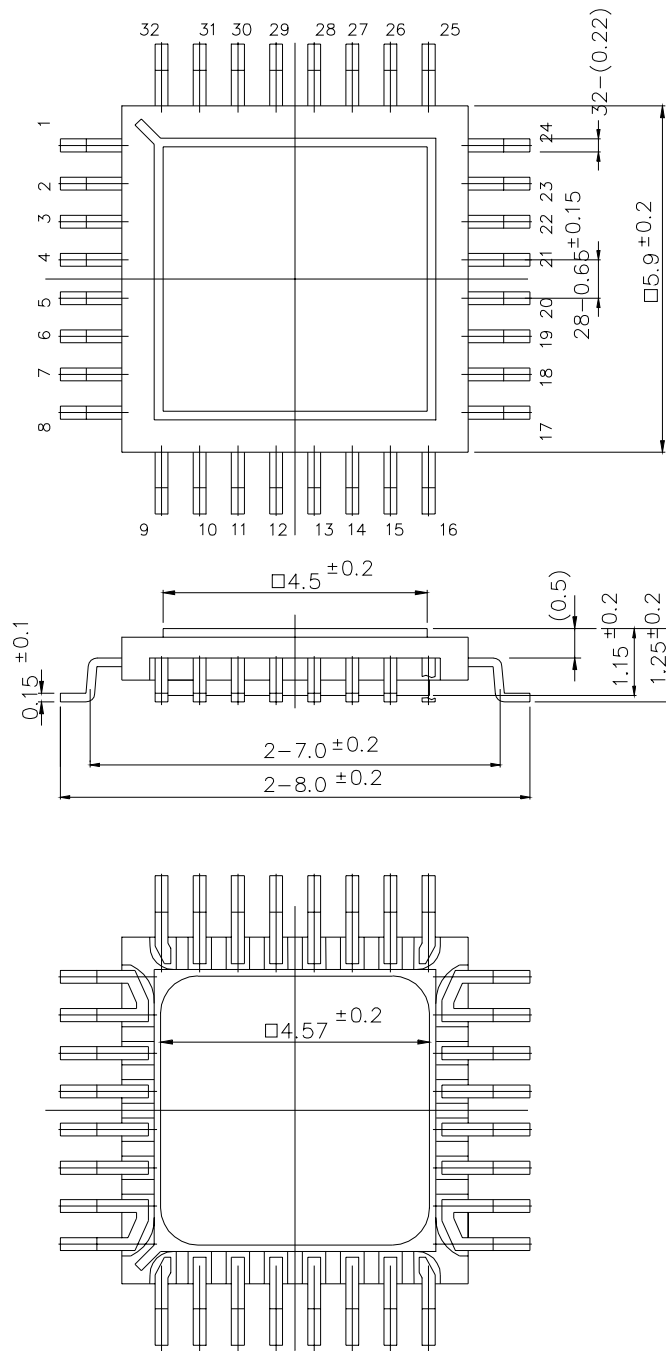
6. Pin Description

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	

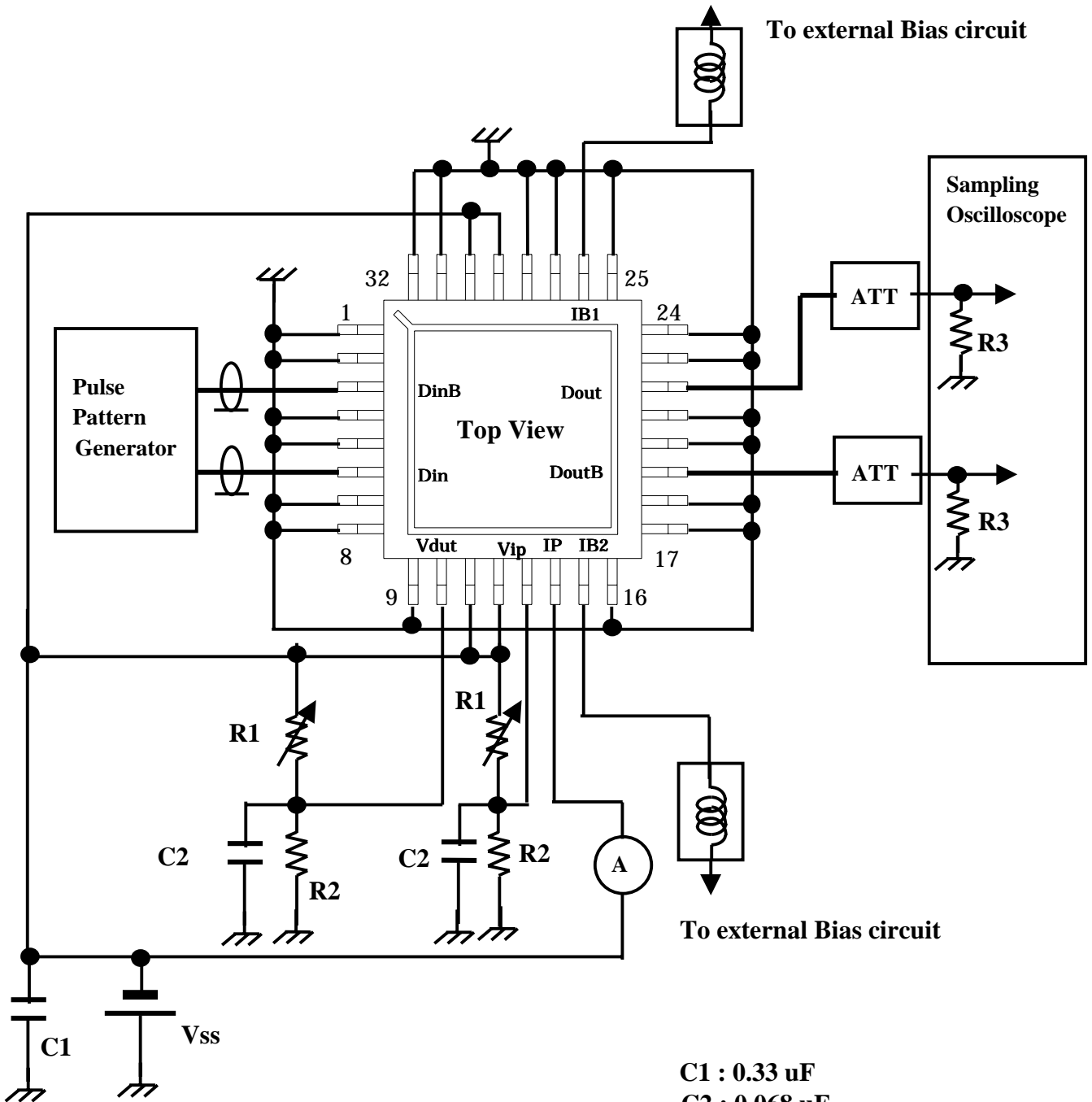
7. Package

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 2²³-1, R_L=50 ohm, V_{OUT}=2.85 V_{PP}

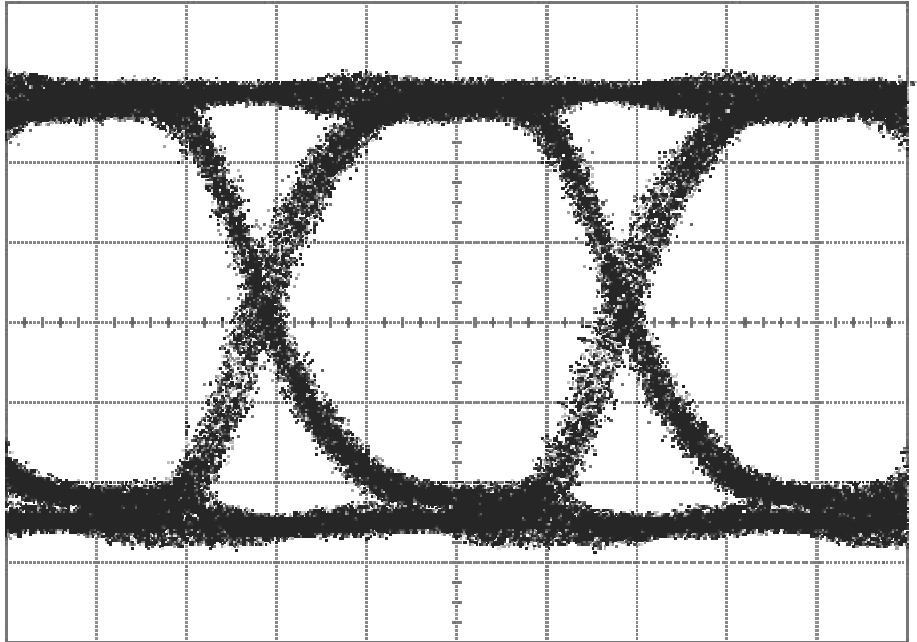


Fig. 8-1 Electrical Eye Diagrams of Dout [H: 20ps/Div. , V:0.5V/Div.]

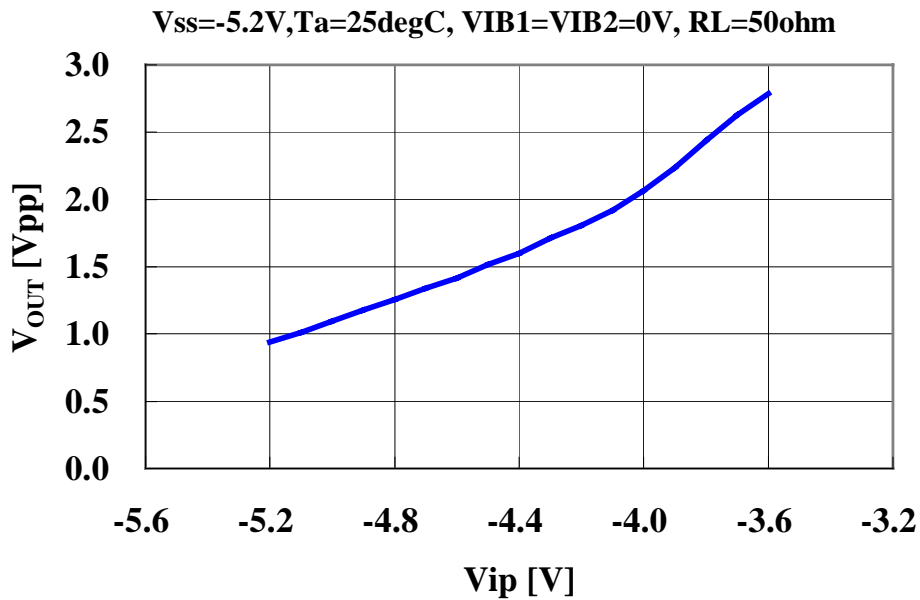
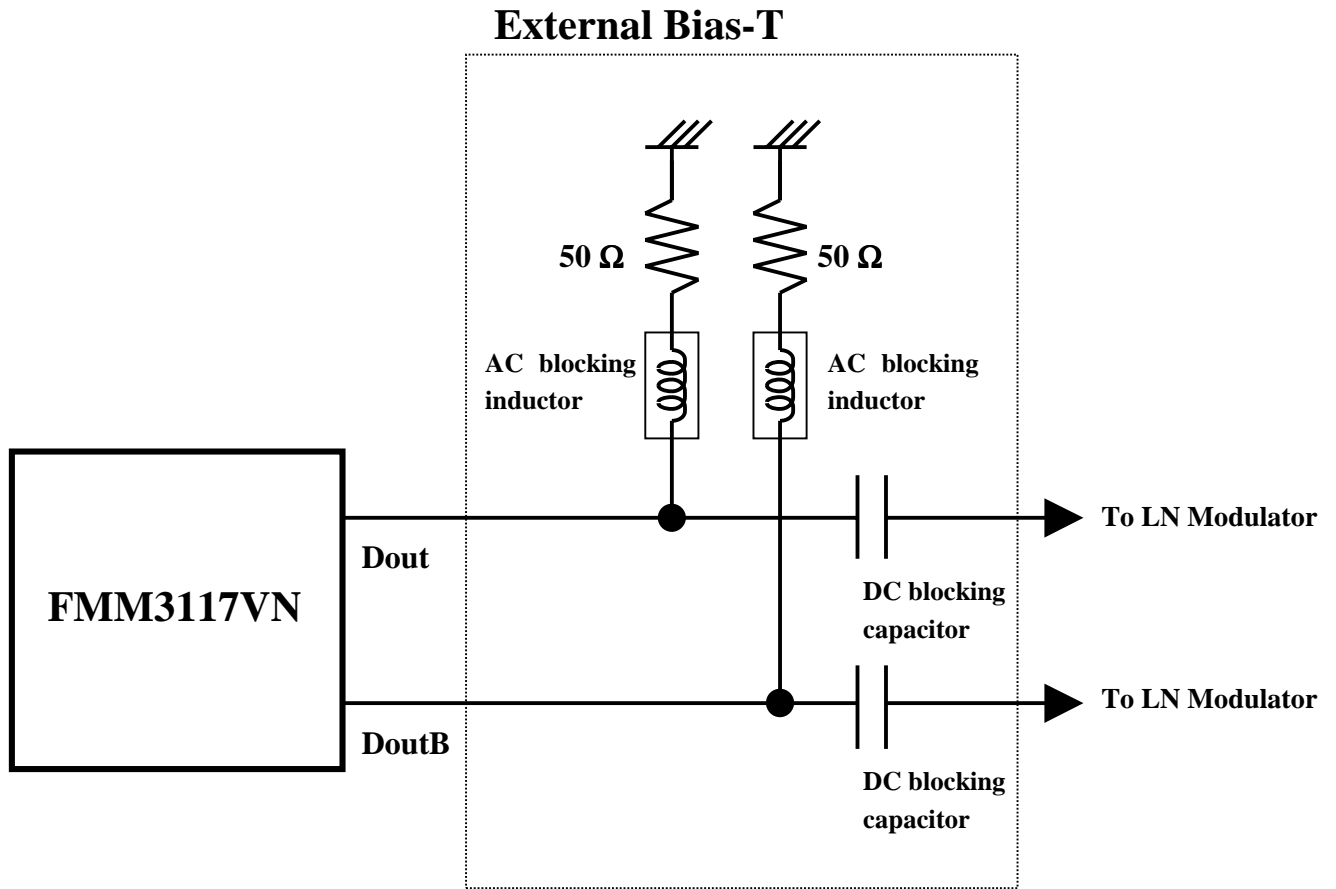


Fig. 8-2 V_{OUT}-Vip Characteristics

10. Schematic Diagram for Interconnection with LN modulator



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