

ES/EMY1401VI

11.3 Gb/s LN Modulator Driver IC



1. Features

- 1) Operation up to 11.3 Gb/s
- 2) Internal Input 50 ohm Termination
- 3) Output Voltage Swing: 5.0V(50ohm Load)
- 4) Power Supply Voltage : -5.20V
- 5) Duty Ratio Adjustable
- 6) 5.6mm x 6.4mm 16-pin Hermetically Sealed Ceramic Package

2. Absolute 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}	-6.5 to 0.5	V
Output Termination Voltage	V_{TT}	-1.0 to 6.0	V
Input Voltage	V_{IN}	-2.0 to 0.8	V
Output Swing Control Voltage	V_{IP}	$V_{SS} - 0.5$ to $V_{SS} + 2.2$	V
Duty Control Voltage	V_{DUTY}	$V_{SS} - 0.5$ to $V_{SS} + 2.2$	V
Storage Temperature	T_{STG}	-55 to 125	degC

Eudyna assumes customer's agreement on the notes in the last page for use of the information in this document.



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	-4.83	V
Output Termination Voltage (Output Amplitude Control)	V_{TT}		3.0	---	4.0	V
Input Data Level High	V_{IH}	DC-Coupled $V_{ISD} = 0.25 \sim 1.2V_{PP}$ $V_{ISS} = 0.5 \sim 1.2V_{PP}$	-0.50	---	0.00	V
Input Data Level Low	V_{IL}		-1.20	---	-0.25	V
Input Data Swing (DC-Coupled)	V_{ISD}	Differential	0.25	---	1.20	V_{PP}
	V_{ISS}	Single-ended	0.50	---	1.20	V_{PP}
Input Data Swing (AC-Coupled)	V_{ISDA}	Differential	0.25	---	1.00	V_{PP}
	V_{ISSA}	Single-ended	0.50	---	1.00	V_{PP}
Output Current Control Voltage	V_{IP}		V_{SS}	---	$V_{SS}+2.0$	V
Duty Control Voltage	V_{DUTY}		V_{SS}	---	$V_{SS}+2.0$	V
Output Amplitude	V_{out} (Amplitude)		---	5.0	5.5	V
Case Temperature	T_C		0	---	75	degC

Note: It is recommended to follow the power supply sequence to avoid damaging the IC.

1. Set V_{SS} , V_{DUTY} and V_{IP} to power supply voltage simultaneously .
2. Set V_{TT} to the output termination Voltage.
3. Adjust V_{DUTY} and V_{IP} for optimum output waveforms.
4. Return V_{IP} , V_{DUTY} to V_{SS} level ,then turn off V_{TT} , and turn off the power supply voltage.

4. Electrical Characteristics

Table4-1. Electrical Characteristics

($R_L=50\Omega$)

Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Maximum Data Rate	fb	NRZ	11.3	---	---	Gb/s
Power Supply Current (Vss)	I _{SS}	V _{IP} = 0.8*V _{SS} V _{out} =5 V(Amplitude)	120	150	190	mA
Output Termination Current at 5V Output	I _{TT}	V _{IP} = 0.8*V _{SS} V _{out} =5 V(Amplitude)	90	110	130	mA
Maximum Output Termination Current	I _{TTMAX}	V _{IP} = TBD, V _{TT} =4.0 V	100	120	140	mA
Rise Time	Tr	fb=11.3Gb/s,NRZ PRBS 2 ³¹ -1 20 to 80 %	---	25	35	ps
Fall Time	Tf	V _{IP} = 0.8*V _{SS} V _{out} =5 V(Amplitude)	---	25	35	ps
Output Voltage Swing	V _{out} (Amplitude)	AC coupling V _{IP} = 0.8*V _{SS} ,V _{TT} <4.0V	5.0	5.2	---	V
Maximum Crossing Adjustment Range	Cross_max	fb=11.3 Gb/s , NRZ PRBS 2 ³¹ -1 Din/DinB=0.5V _{PP} V _{IP} = 0.8*V _{SS} Input Crossing Point:50% V _{out} =5 V(Amplitude)	55	60	---	%
Minimum Crossing Adjustment Range	Cross_min	fb=11.3 Gb/s , NRZ PRBS 2 ³¹ -1 Din/DinB=0.5V _{PP} V _{IP} = 0.8*V _{SS} Input Crossing Point:50% V _{out} =5 V(Amplitude)	---	40	45	%
Jitter_rms	Jitter_rms	fb=11.3 Gb/s, NRZ, PRBS 2 ³¹ -1 Din/DinB=0.5V _{PP} V _{IP} = 0.8*V _{SS} Input Crossing Point:50% Output Crossing Point:50% V _{out} =5 V(Amplitude)	---	3.5	4.0	ps
Jitter_pp	Jitter_pp	fb=11.3 Gb/s , NRZ, PRBS 2 ³¹ -1 Din/DinB=0.5V _{PP} V _{IP} = 0.8*V _{SS} Input Crossing Point:50% Output Crossing Point:50% V _{out} =5 V(Amplitude)	---	21	24	ps

5. Block Diagram

Figure 5-1. Block Diagrams

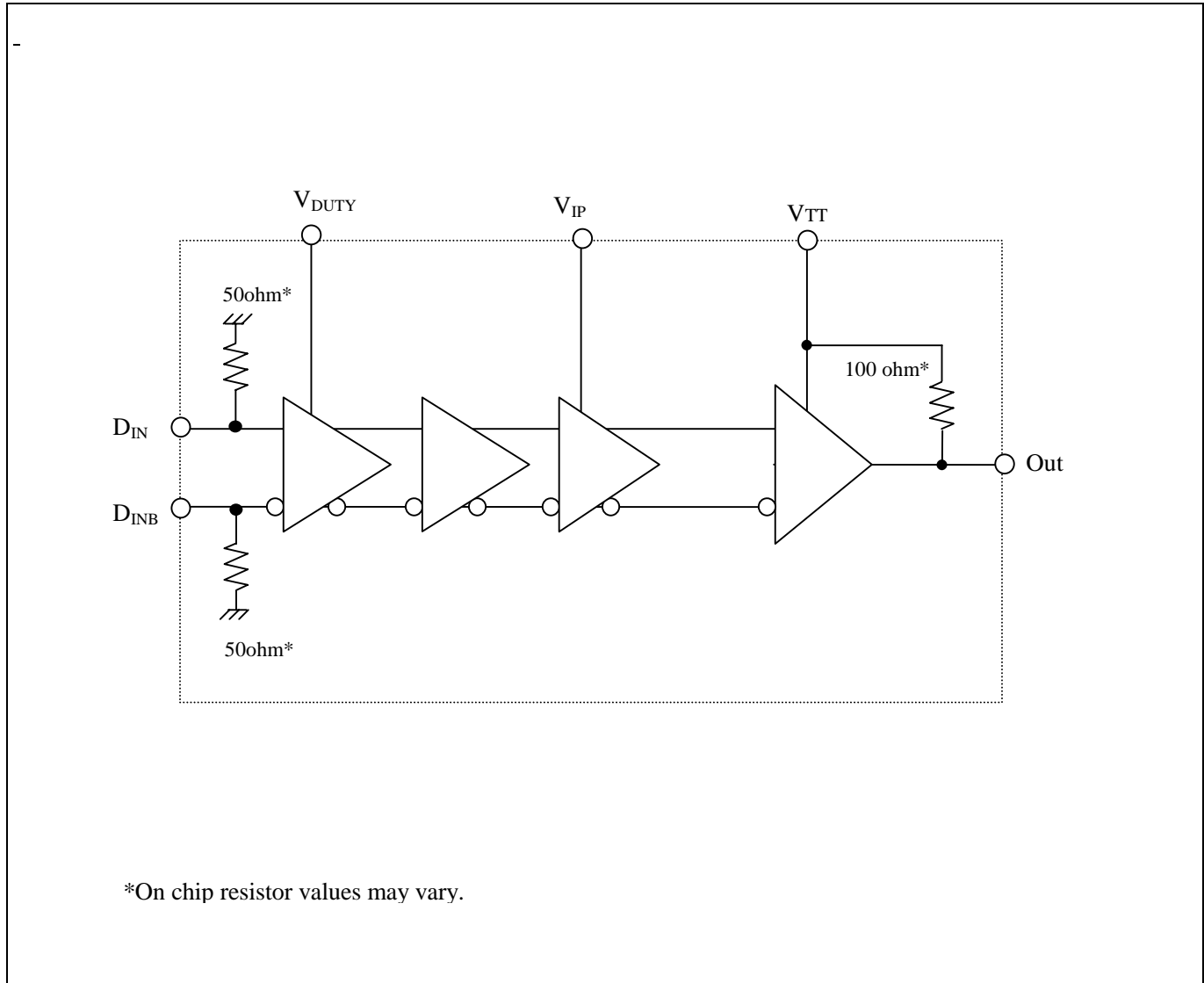


Table 5-1. Truth table

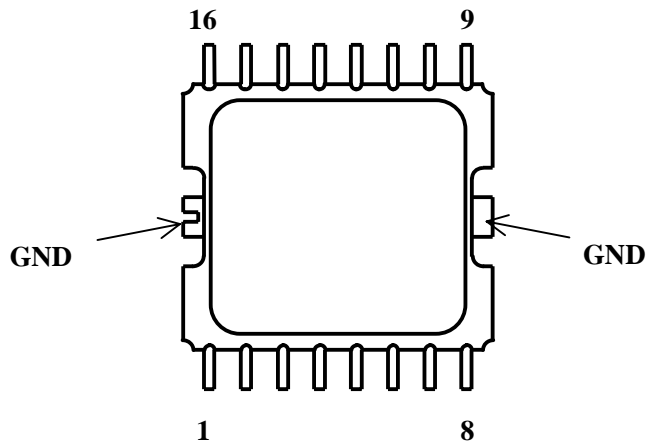
Din	DinB	Dout
L	H	L
H	L	H

6. Pin Description

Table 6-1 Pin Description

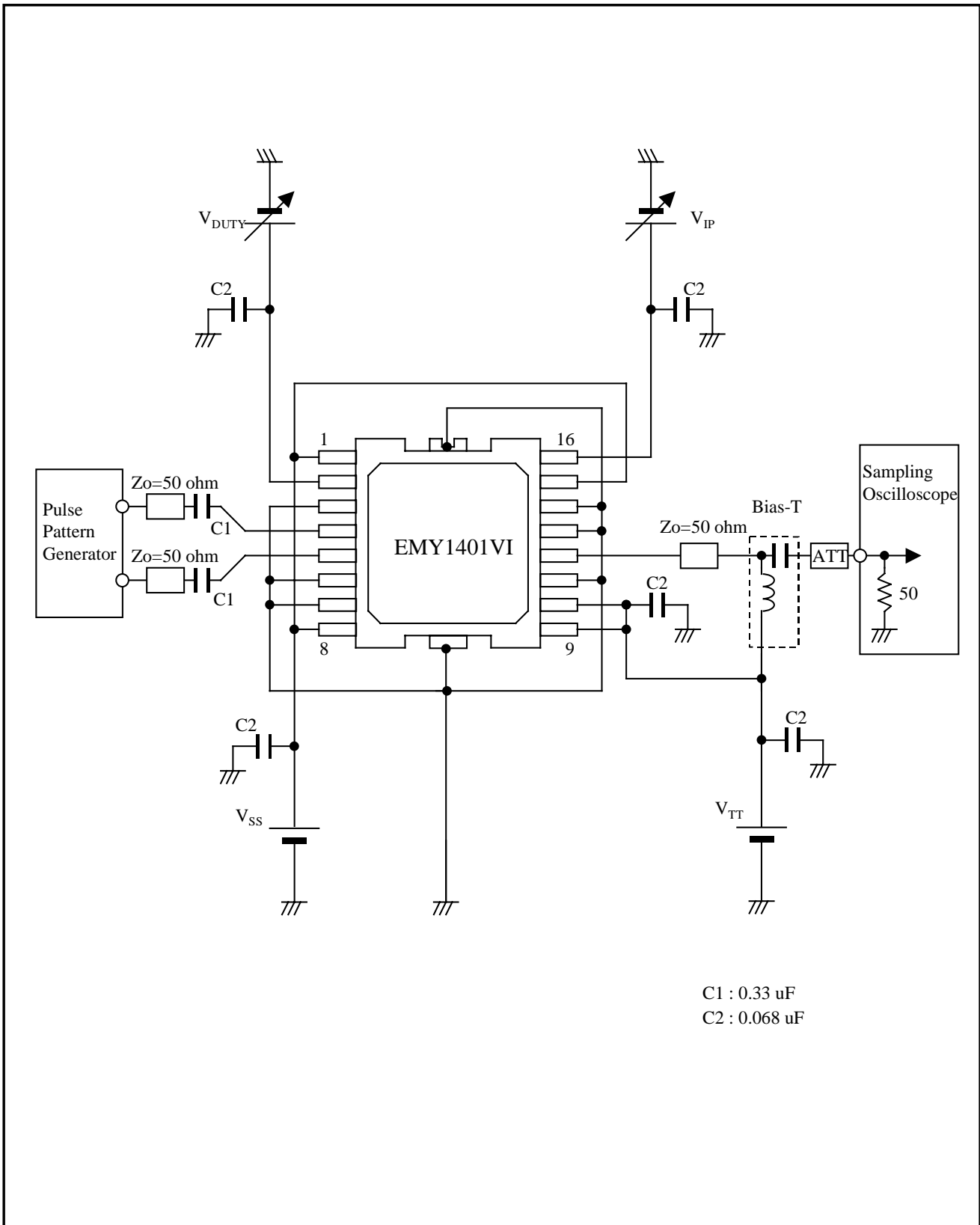
Pin Number	Symbol	I/O	Function	Remarks
1	V _{SS}	-	Power Supply	
2	V _{DUTY}	I	Duty Ratio Control	
3	GND	-	Ground	
4	Din	I	Data Input	
5	DinB	I	Complementary Data Input	
6	GND	-	Ground	
7	GND	-	Ground	
8	V _{SS}	-	Power Supply	
9	V _{TT}	-	Output Termination Voltage (Output Swing Control)	
10	V _{TT}	-	Output Termination Voltage (Output Swing Control)	
11	GND	-	Ground	
12	Dout	O	Data output	
13	GND	-	Ground	
14	GND	-	Ground	
15	V _{SS}	-	Power Supply	
16	V _{IP}	I	Output Waveform Control	
Heat Sink	GND		GND	

Top View



8. Test Circuit

Figure 8-1 Schematic Diagram of Test Circuit for ES/EMY1401VI



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