钍地半导体
Tudi Semiconductor

Product Specification

TUDI-MC3487

Quad differential line driver

网址 www.sztdbdt.com

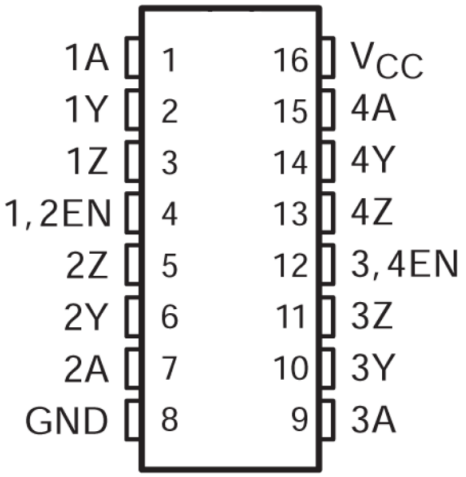
用芯智造·卓越品质

semiconductor device manufacturer

- Design
- research and development
- production
- and sales

Features

- Meets or exceeds the requirements of ANSI TIA/EIA -422-B and ITU Recommendation V.11
- Tri-state TTL output
- Fast transition time
- High impedance input
- 5V single power supply
- Power-up and power-down protection



MC3487

Applications

- Factory automation
- ATMs and banknote counters
- Smart grids
- AC and servo motor drives

Description

The MC3487 provides four independent differential line drivers designed to comply with the ANSI TIA/EIA-422-B and Recommendation V.11 specifications. Each driver has a buffered TTL -compatible input to reduce current and further reduce loading.
When the appropriate output enable is at a logic low level the driver output uses a tri-state circuit to provide a high-impedance state on any pair of differential outputs. If the output enable is low, the internal circuitry is in high-impedance state at the differential outputs during power-up and power-down transitions.
The MC3487 is designed to be used with the MC346 quad line receiver to achieve superior performance. The device is housed in a 16-pin Dual-In-Line package and operates from a single 5V power supply

Pin Configuration and Functions

Pin Functions

PIN		TYPE(1)	DESCRIPTION
NAME	NO.		
1A	1	I	Single Ended Data Input for Channel 1
1Y	2	O	Non-Inverting Output for Differential Driver on Channel 1
1Z	3	O	Inverting Output of Differnetial Driver on Channel 1
1,2EN	4	I	Enable Input for Channels 1 and 2
2Z	5	O	Inverting Output of Differnetial Driver on Channel 2
2Y	6	O	Non-Inverting Output for Differential Driver on Channel 2
2A	7	I	Single Ended Data Input for Channel 2
GND	8	GND	Device Ground
3A	9	I	Single Ended Data Input for Channel 3
3Y	10	O	Non-Inverting Output for Differential Driver on Channel 3
3Z	11	O	Inverting Output of Differential Driver on Channel 3
3,4EN	12	I	Enable Input for Channels 3 and 4
4Z	13	O	Inverting Output of Differential Driver on Channel 4
4Y	14	O	Non-Inverting Output for Differential Driver on Channel 4
4A	15	I	Single Ended Data Input for Channel 4
Vcc	16	P	5V Power Supply Positive Terminal Connection

(1) Signal Types: I = Input, O = Output, I/O = Input or Output, P = Power, GND = Ground.

Specifications

Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
V_{cc}(see(2))	Supply voltage		7	V
V_I	Input voltage		5.5	V
V_o	Output voltage		7	V
T_J	Operating virtual junction temperature		150	℃
T_{stg}	Storage temperature range	-65	150	℃

(1) Stresses beyond those listed under “ absolute maximum ratings ” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “ recommended operating conditions ” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltage values, except differential output voltage, VOD, are with respect to the network ground terminal.

Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
V_{cc}	Supply voltage	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
T_A	Operating free-air temperature	0		70	℃

Thermal Information

THERMAL METRIC(1)		D (SOIC)	N(PDIP)	NS (SOP)	UNIT
		16-PINS			
$R\theta_{JA}$	Junction-to-ambient thermal resistance	84.6	60.6	88.5	°C/W
$R\theta_{JC(top)}$	Junction-to-case (top)thermal resistance	43.5	48.1	46.2	°C/W
$R\theta J_B$	Junction-to-board thermal resistance	43.2	40.6	50.7	°C/W
ψ JT	Junction-to-top characterization parameter	10.4	27.5	13.5	°C/W
ψ JB	Junction-to-board characterization parameter	42.8	40.3	50.3	°C/W
$R\theta_{JC(bot)}$	Junction-to-case (bottom)thermal resistance	N/A	N/A	N/A	°C/W

(1) For more information about traditional and new thermal metrics, see the Semiconductor and IC package thermal metrics application report.

Device Functional Modes

Function Table (Each Driver)

INPUT	OUTPUT ENABLE(1)	OUTPUTS	
		Y	Z
H	H	H	L
L	H	L	H
X	L	Z	Z

(1) H = TTL high level, L = TTL low level, X = irrelevant, Z = High impedance

Electrical Characteristics

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	MAX	UNIT
V_{IK}	Input clamp voltage	I_I=-18 mA				-1.5	V
V_{oH}	High-level output voltage	V_{IL}=0.8V,	V_{IH}=2V,	I_{oH}=-20 mA	2.5		V
V_{oL}	Low-level output voltage	V_L=0.8V,	V_{IH}=2V,	I_{oL}=48mA		0.5	V
$IV_{oo}I$	Differential output voltage	R_L=100 Q	See 图 1		2		
$\triangle IV_{oo}I$	Change in magnitude of differentialoutput voltage(1)	R_L=1000	See 图 1			± 0.4	V
Voc	Common-mode output voltage(2)	R_L=1000	See 图 1			3	V
$\triangle IV_{oc}I$	Change in magnitude of common-mode output voltage(1)	R_L=1000	See 图 1			± 0.4	V
I_o	Output current with power off	V_{cc}=0	V_o=6V			100	μA
			V_o=-0.25V			-100	
I_{oz}	High-impedance-state outputcurrent	Output enables at 0.8V	V_o=2.7V			100	μA
			V_o=0.5V			-100	
I_I	Input current at maximum inputvoltage	V_1=5.5V				100	μA
I_H	High-level input current	V_1=2.7V				50	μA
I_I	Low-level input current	V_1=0.5V				-400	μA
I_{os}	Short-circuit output current(3)	V_1=2V			-40	-140	mA
I_{CC}	Supply current (alldrivers)	Outputs disabled				105	mA
		Outputs enabled, No load				85	

(1) $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.
(2) In ANSI Standard TIA/EIA-422-B, V_{OC}, which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS}.
(3) Only one output at a time should be shorted, and duration of the short circuit should not exceed one second.

Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
t_{PLH}	Propagation delay time,low-to high-level output	C_L=15 pF,	See 图 2		20	ns
t_{PHL}	Propagation delay time,high-to low-level output				20	
t_{sk}	Skew time	C_L=15 pF,	See 图 2		6	ns
$t_{OD)}$	Differential-output transition time	C_L=15 pF,	See 图 3		20	ns
t_{pZH}	Output enable time to high level	C_L=50 pF,	See 图 4		30	ns
t_{pzL}	Output enable time to low level				30	
t_{PHz}	Output disable time from high level	C_L=50 pF,	See 图 4		25	ns
t_{PLZ}	Output disable time from low level				30	

Parameter Measurement Information

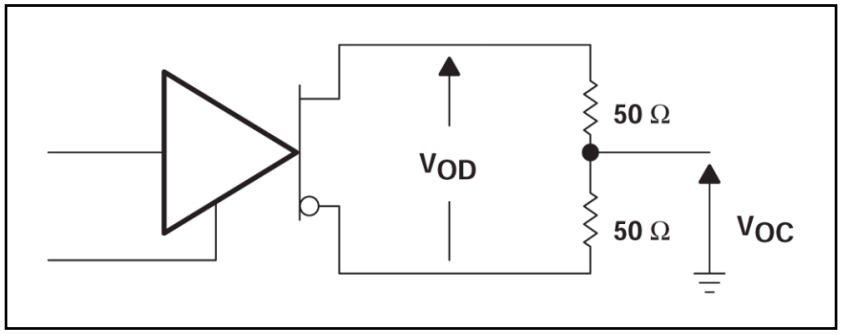


图 1. Differential and Common-Mode Output Voltages

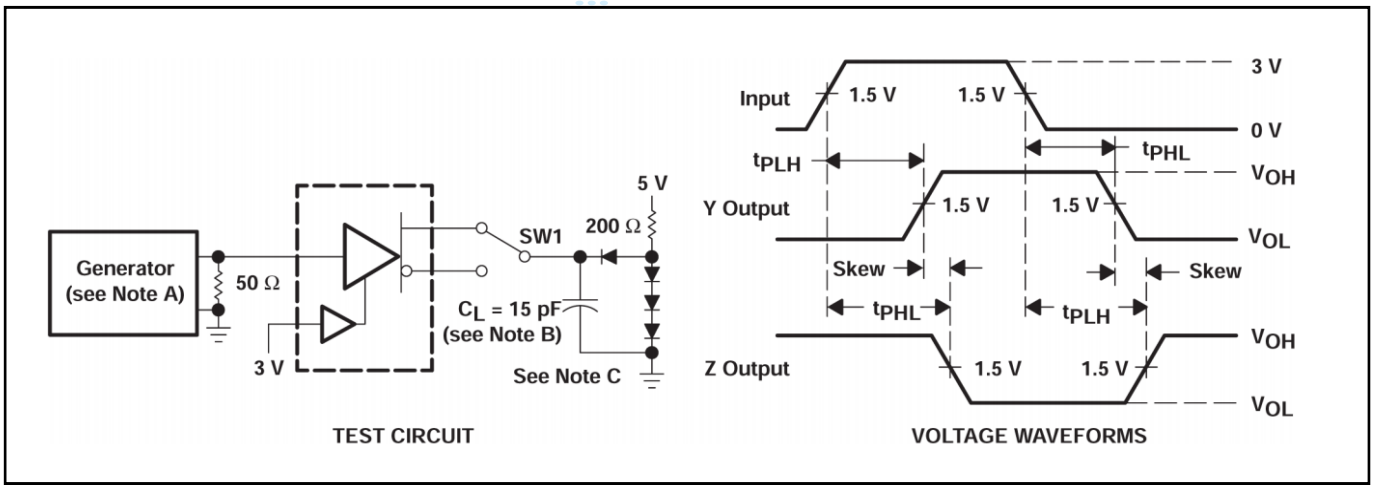


图 2. Test Circuit and Voltage Waveforms

A. The input pulse is supplied by a generator having the following characteristics: $t_r \leq 5$ ns, $t_f \leq 5$ ns, PRR ≤ 1 MHz, duty cycle = 50% Z_o = 50 Ω.
B. C_L includes probe and stray capacitance.
C. All diodes are 1N916 or 1N3064.

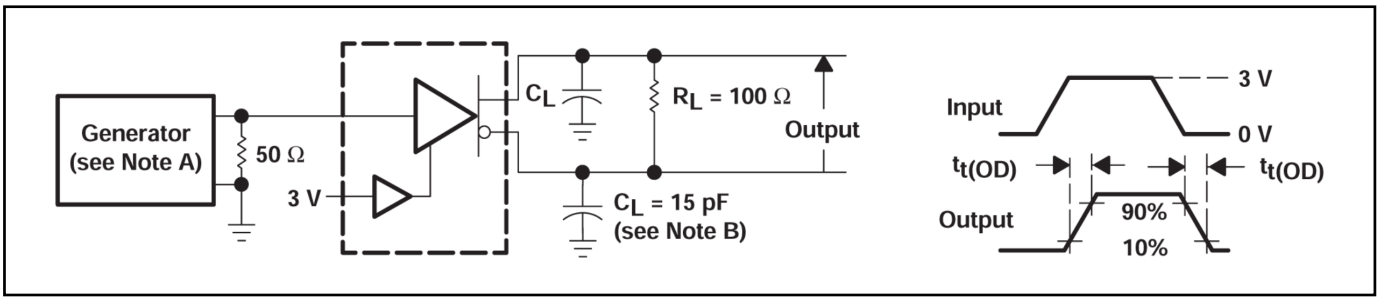
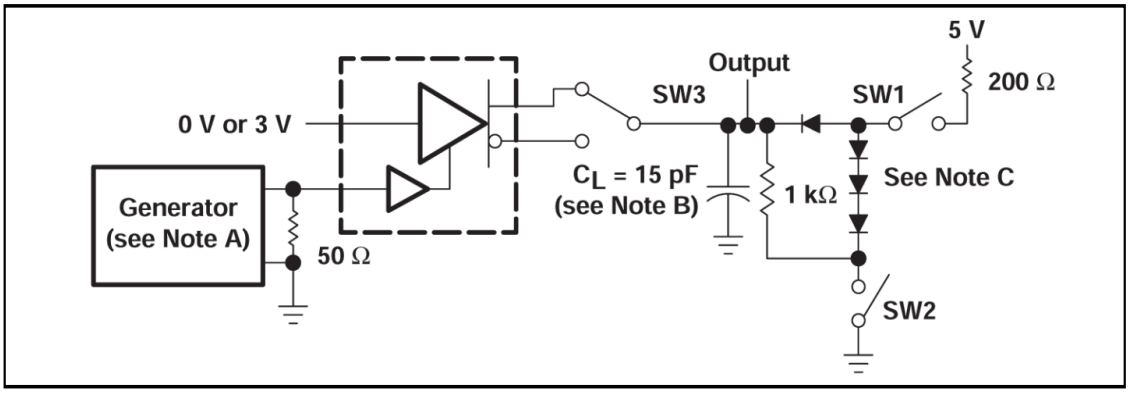
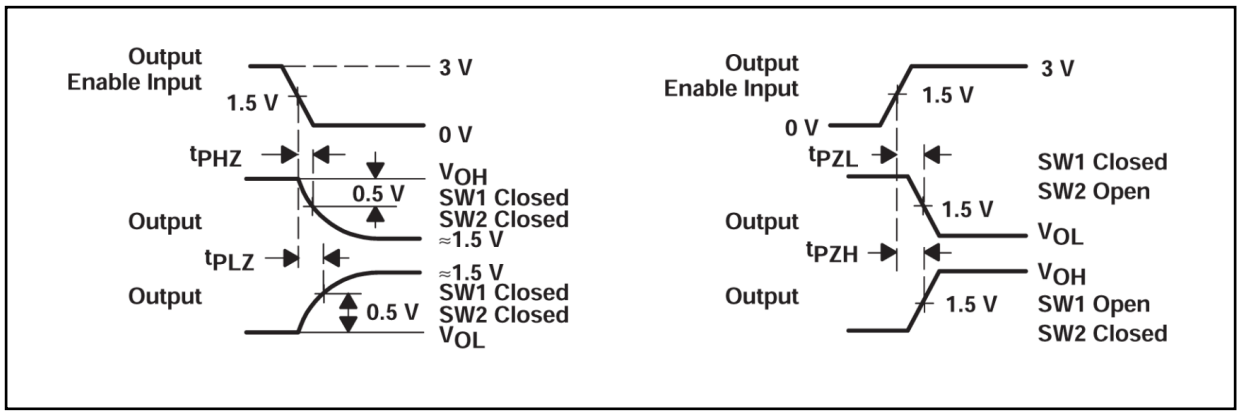


图 3. Test Circuit and Voltage Waveforms

A. The input pulse is supplied by a generator having the following characteristics: $t_r \leq 5$ ns, $t_f \leq 5$ ns, PRR ≤ 1 MHz, duty cycle = 50%, Z_o = 50 Ω.
B. C_L includes probe and stray capacitance.



TEST CIRCUIT



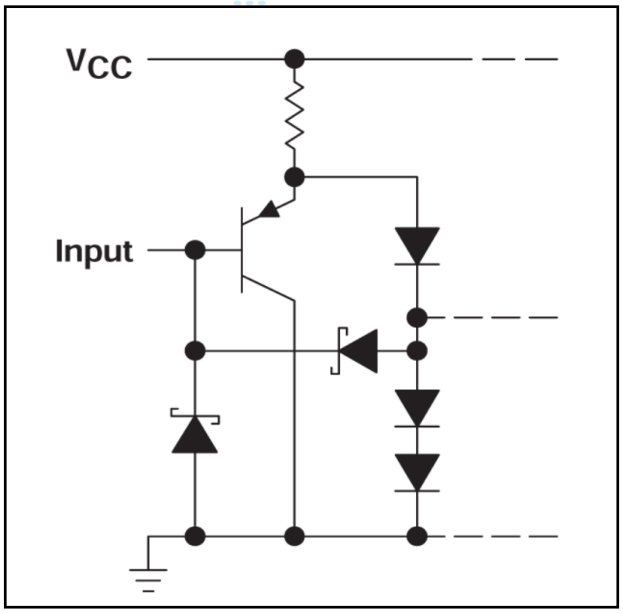
VOLTAGE WAVEFORMS

图 4. Driver Test Circuit and Voltage Waveforms

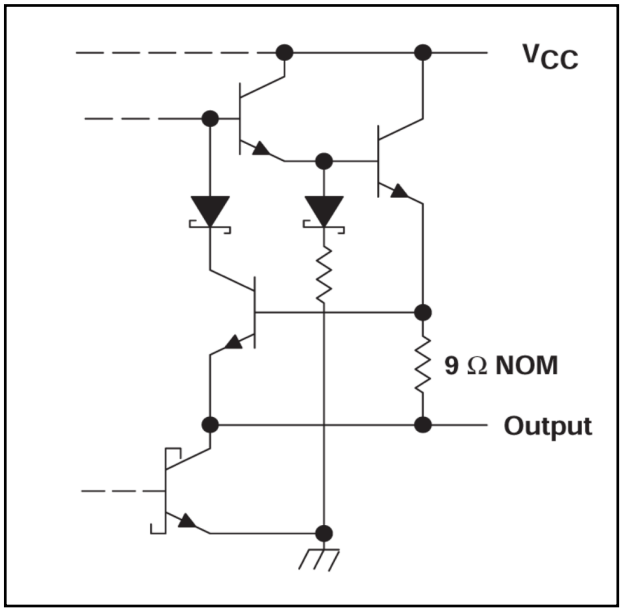
A. The input pulse is supplied by a generator having the following characteristics: tr ≤ 5 ns, tf ≤ 5 ns, PRR ≤ 1 MHz, duty cycle = 50%,ZO = 50 Ω.
B. CL includes probe and stray capacitance.
C. All diodes are 1N916 or 1N3064.

Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
MC3487DR-TUDI	SOP16	Tape,Reel,2500	MC3487	0℃ to 70℃
MC3487N-TUDI	DIP16	Tube,25,A box of 2000	MC3487N	



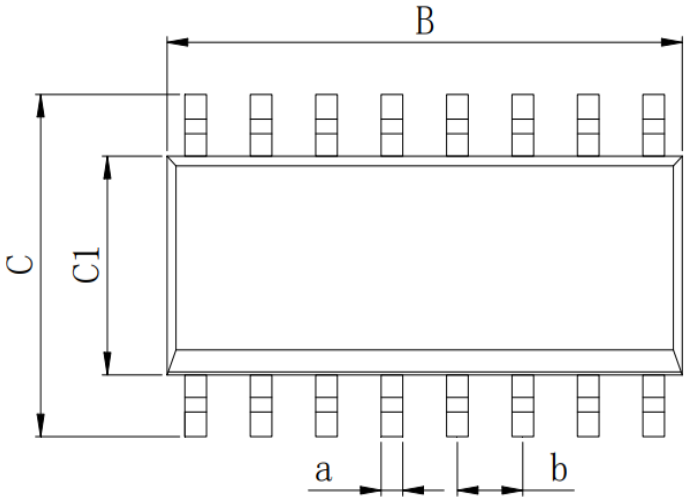
EQUIVALENT OF EACH INPUT

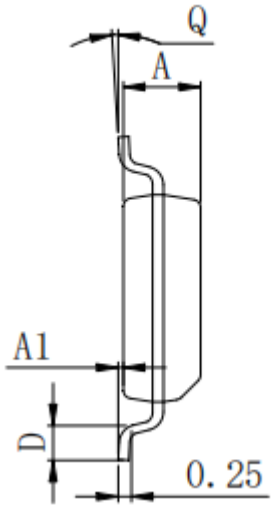


TYPICAL OF ALL OUTPUTS

图5 Schematics of Inputs and Outputs

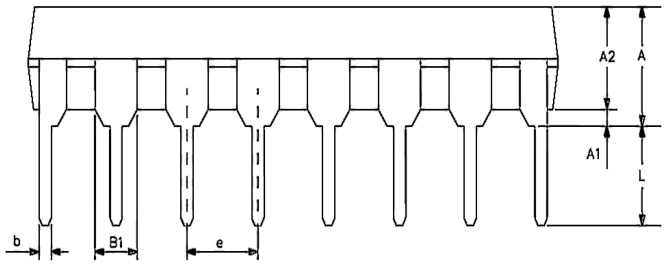
Package SOP16

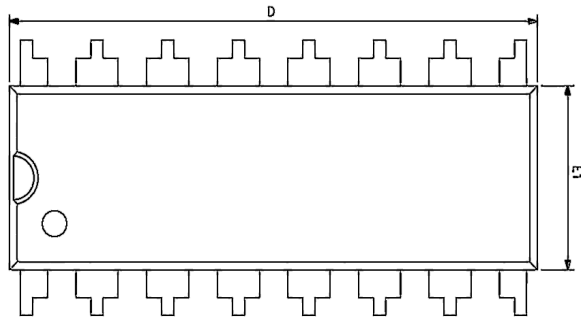


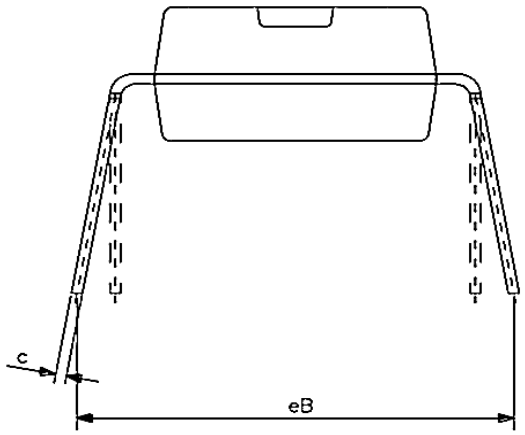


SYMBOL	MIN./mm	MAX./mm
A	1.35	1.55
A1	0.05	0.2
B	9.80	10.00
C	5.80	6.20
C1	3.80	4.00
D	0.40	0.80
Q	0°	8°
a	0.35	0.45
b	1.27BSC	

Package DIP16







SIZE / SYMBOL	MIN./mm	MAX./mm
A2	3.20	3.60
A1	0.51	___
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
C	0.20	0.36
eB	7.62	9.30
R	0.20TYP	
R1	0.30TYP	
θ	0°	8°
θ1	45°TYP	
02	12°TYP	
03	0°	8°
04	0°	10°

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