



钲地半导体
Tudi Semiconductor

Product Specification

TUDI-TC4431/4432

2A High-Speed MOSFET Drivers

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**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Industry-standard pinout with additional enable features
- $\pm 2A$ high peak current drive capability using TrueDrive in the flat region
- Efficient constant current source implemented with a unique bipolar and CMOS output stage
- TTL/CMOS compatible inputs that are independent of the voltage
- Typical rise and fall times of 20ns with 10nF load
- Typical propagation delays of 25ns and 5ns for input fall and rise, respectively
- 4.5V to 25V supply voltage
- Thermally enhanced MSOP PowerPAD™ with $4.7^{\circ}C/W$ j_c
- Rated for $-40^{\circ}C$ to $105^{\circ}C$
- Lead- surface finish (CU NIPDAU) on 8-pin SOIC and PDIP packages

Explanation

The TC4431/TC4432 are high-current buffer/drivers capable of driving large MOSFETs and Insulated Gate Bipolar Transistors (IGBTs). The TC4431/TC4432 have matched output rise and fall times, as well as matched leading and falling-edge propagation delay times. The TC4431/TC4432 devices also have very low cross-conduction current, reducing the overall power dissipation of the device.

These devices are essentially immune to any form of upset, except direct overvoltage or over-dissipation. They cannot be latched under any conditions within their power and voltage ratings. These parts are not subject to damage or improper operation when up to 5V of ground bounce is present on their ground terminals. They can accept, without damage or logic upset, more than 1A inductive current of either polarity being forced back into their outputs. In addition, all terminals are fully protected against up to 4 kV of electrostatic discharge. The TC4431/TC4432 inputs may be driven directly from either TTL or CMOS (3V to 25V). In addition, 300 mV of hysteresis is built into the input, providing noise immunity and allowing the device to be driven from slowly rising or falling waveforms. With both surface-mount and pin-through-hole packages, in addition to a wide operating temperature range, the TC4431/TC4432 family of 2A MOSFET drivers fit into most any application where high gate/line capacitance drive is required.

Application

- Line Drivers for Extra Heavily-Loaded Lines
- Pulse Generators
- Driving the Largest MOSFETs and IGBTs
- Local Power ON/OFF Switch
- Motor and Solenoid Driver
- LF Initiator

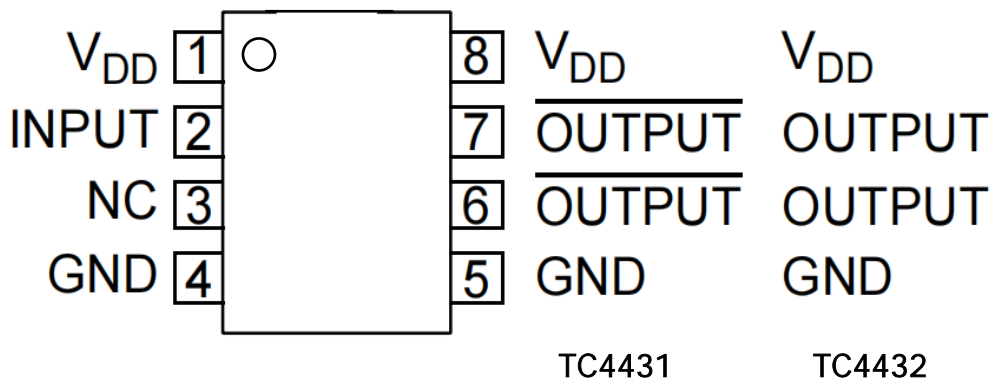


Figure 1. Pin Diagram

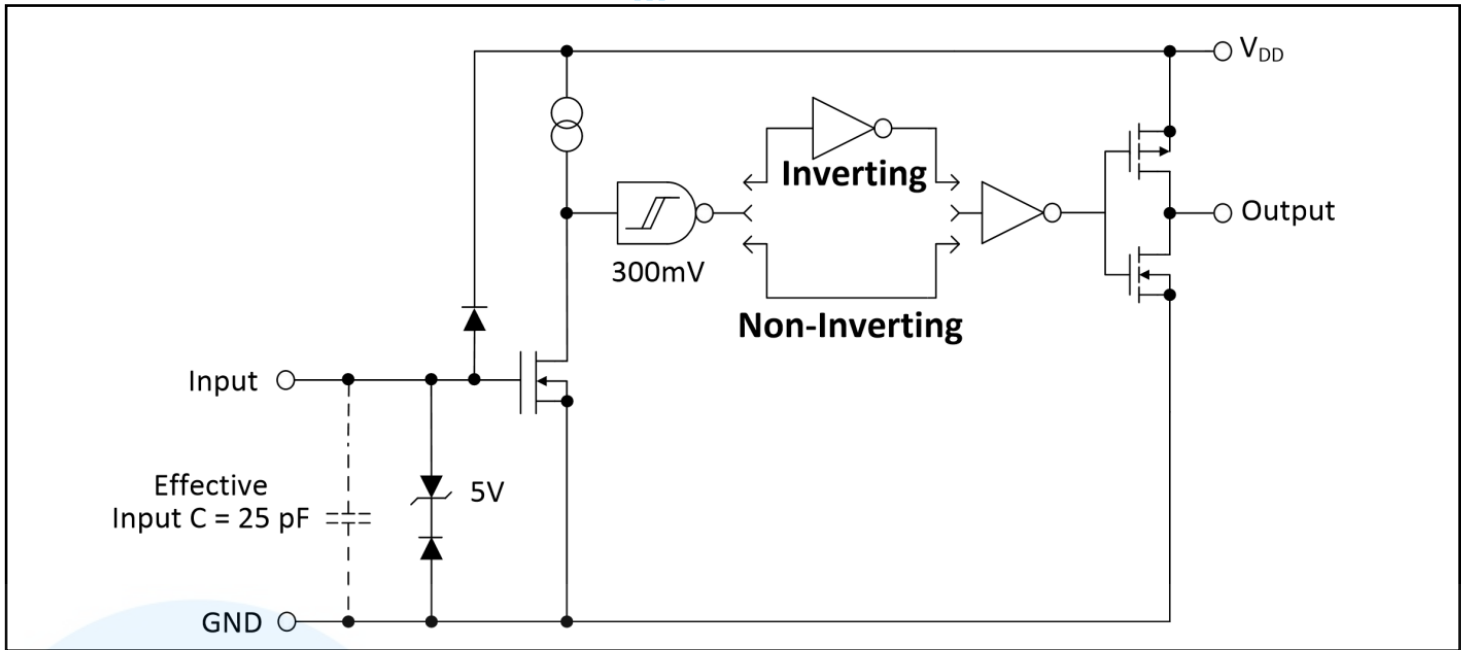


Figure 2. Functional Block Diagram

4431: Output out of phase with input

4432: Output in phase with input

Pin Description

Pin	Name	Description
1	VDD	Power Supply
2	INPUT	Control input,TTL/CMOS compatible input
3	NC	No Connection
4	AGND	Ground
5	PGND	Ground
6	OUTPUT	CMOS push-pull output
7	OUTPUT	CMOS push-pull output
8	VDD	Power Supply
	PAD	Exposed Metal Pad,electrically isolated

Note: Duplicate pins must both be connected for proper operation.



Product Specification

Absolute Maximum Ratings(1)			
Parameter	Min	Max	Unit
DC supply voltage Vs		28	V
Operating junction temperature	-40	+125	°C
Storage temperature	-55	+150	°C
Maximum input voltage	GND-5	VDD+0.3	V
Thermal Data			
Parameter	Rating		Unit
Package Thermal Resistance	155(SOP8) 125(DIP8)		°C/W
Recommended Operating Conditions			
Parameter	Rating		Unit
DC Supply Voltage	4.5V~25V		V
Operating ambient temperature	-40 to +125		°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
INPUT						
Input Signal High Threshold	VIH		1.6			V
Input Signal Low Threshold	VIL				0.7	V
Input Signal Hysteresis	VHYS			0.3		V
Input Signal High Current	IH	Inverting Input Current, VINx=18V			0.01	μA
		Non-inverting Input Current, VINx=18V		88	125	
Input Signal High Current	IL	Inverting Input Current, VINx=0V		88	125	μA
		Non-inverting Input Current, VINx=0V			0.01	



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OUTPUT						
High Output Voltage VOH	VoH	DC Test	VDD- 0.025			V
Low Output Voltage	VoL	DC Test			0.025	V
Pull-Up Resistance	RoH	Source Current =10mA		0.83		Ω
Pull-Down Resistance	RoL	Sink Current =-10mA		0.5		Ω
Peak Output Current	I _{pK}	10V≤VDD ≤18V		9.0		A
POWER SUPPLY						
Power Supply Current	I _{cc}	V _{IN} =3V		0.85		mA
		V _{IN} =0V		0.65		
Operating Voltage Range	VDD		4.5		25	V
Under-Voltage Lockout ON Threshold				3.7	4.1	V
Under-Voltage Lockout Hysteresis				0.5		V
SWITCHING CHARACTERISTICS						
Rise Time	t _R	CL=10,000 pF, See Figure 3		35		ns
Fall Time	t _F	CL=10,000 pF, See Figure 3		36		ns
Turn-On Delay Time	t _{D1}	4431,C=10,000pF 4432,		58		ns
		C=10,000pF 4431,C=10		60		ns
Turn-Off Delay Time	t _{D2}	,000pF 4432,C=10,		59		ns
		000pF		63		ns
OVER-TEMPERATURE PROTECTION						
Thermal Shutdown				150		°C
Thermal Shutdown Threshold				25		°C

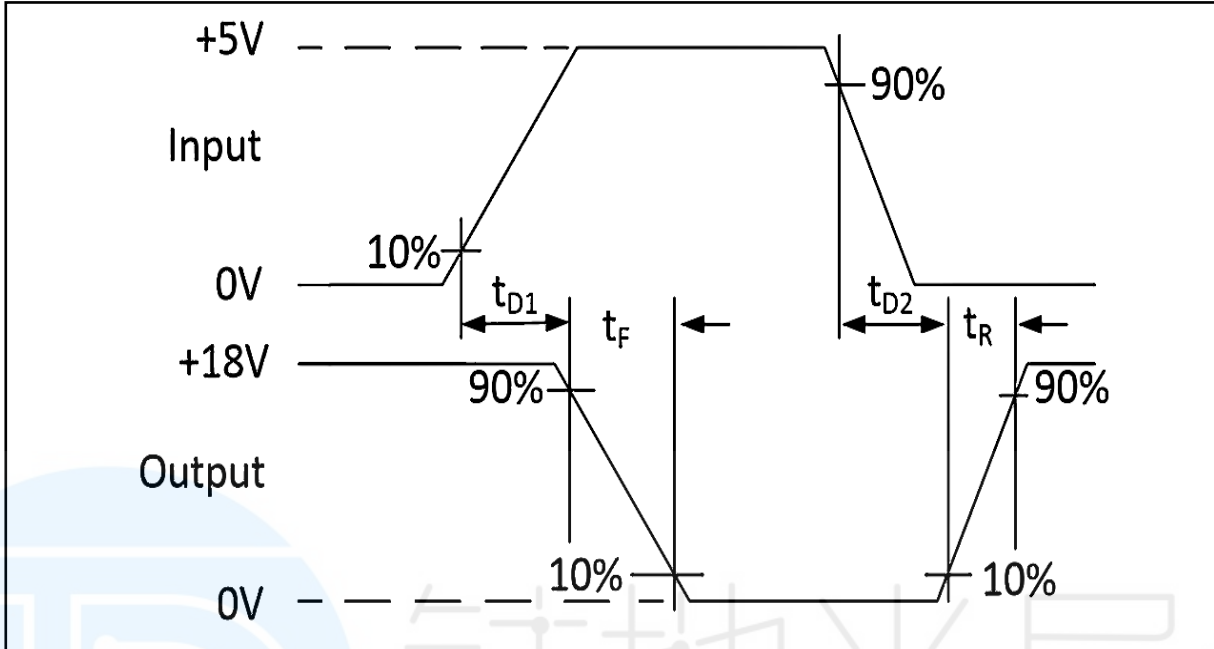
Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.



Input
MOSFET driver input is a high-impedance,TTL/CMOS compatible input.It also has 300 mV of hysteresis between the high and low thresholds that prevents output glitching even when the rise and fall time of the input signal is very slow.
Ground (GND)
Ground is the device return pin.The Ground pin(s)should have a low-impedance connection to the bias supply source return.High peak current flows out the Ground pin(s)when the capacitive load is being discharged.
Output
MOSFET driver outputs are low-impedance,CMOS push-pull style outputs.The pull-down and pullup devices are of equal strength,making the rise and fall times equivalent.The Output is held LOW if Input is unbiased or floating.
Supply Input (VDD)
The VDD input is the bias supply for the MOSFET driver and is rated for 4.5V to 25V with respect to the Ground pin.The VDD input should be bypassed with local ceramic capacitors.The value of these capacitors should be chosen based on the capacitive load that is being driven.A value of 1.0 μ F is suggested.
Exposed Metal Pad
The exposed metal pad of the DFN-S package is not internally connected to any potential.Therefore,this pad can be connected to a ground plane or other copper plane on a Printed Circuit Board(PCB),to aid in heat removal from the package.

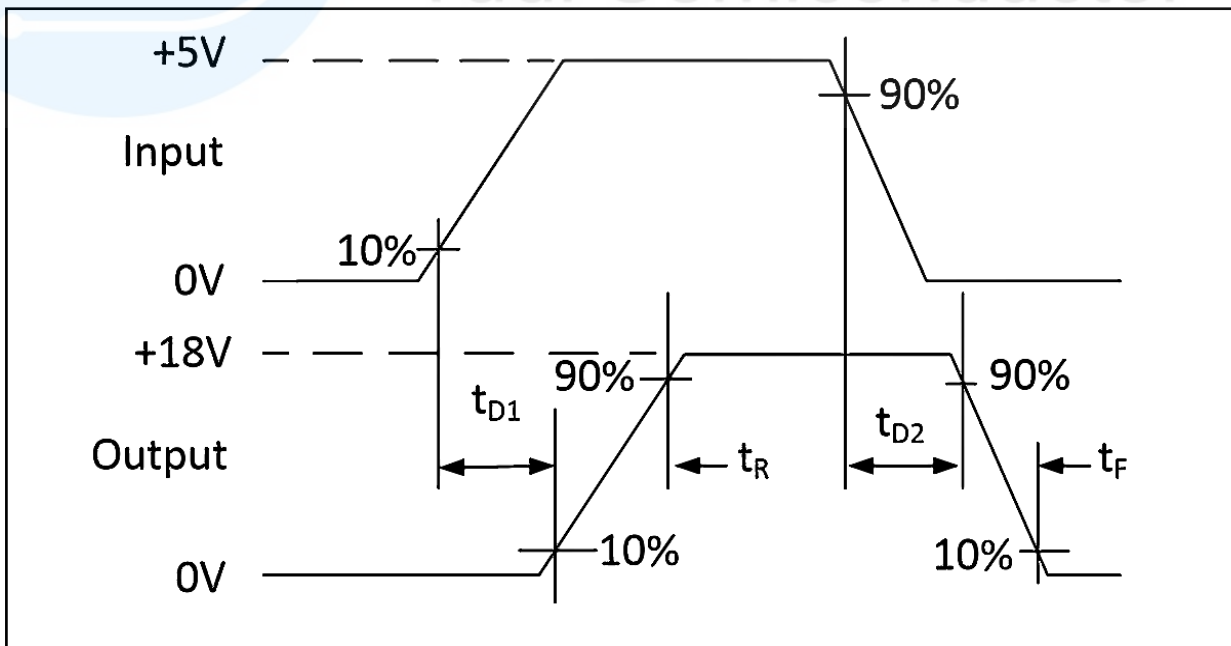


Application Information



Inverting Driver

4431



Non-Inverting Driver

4432

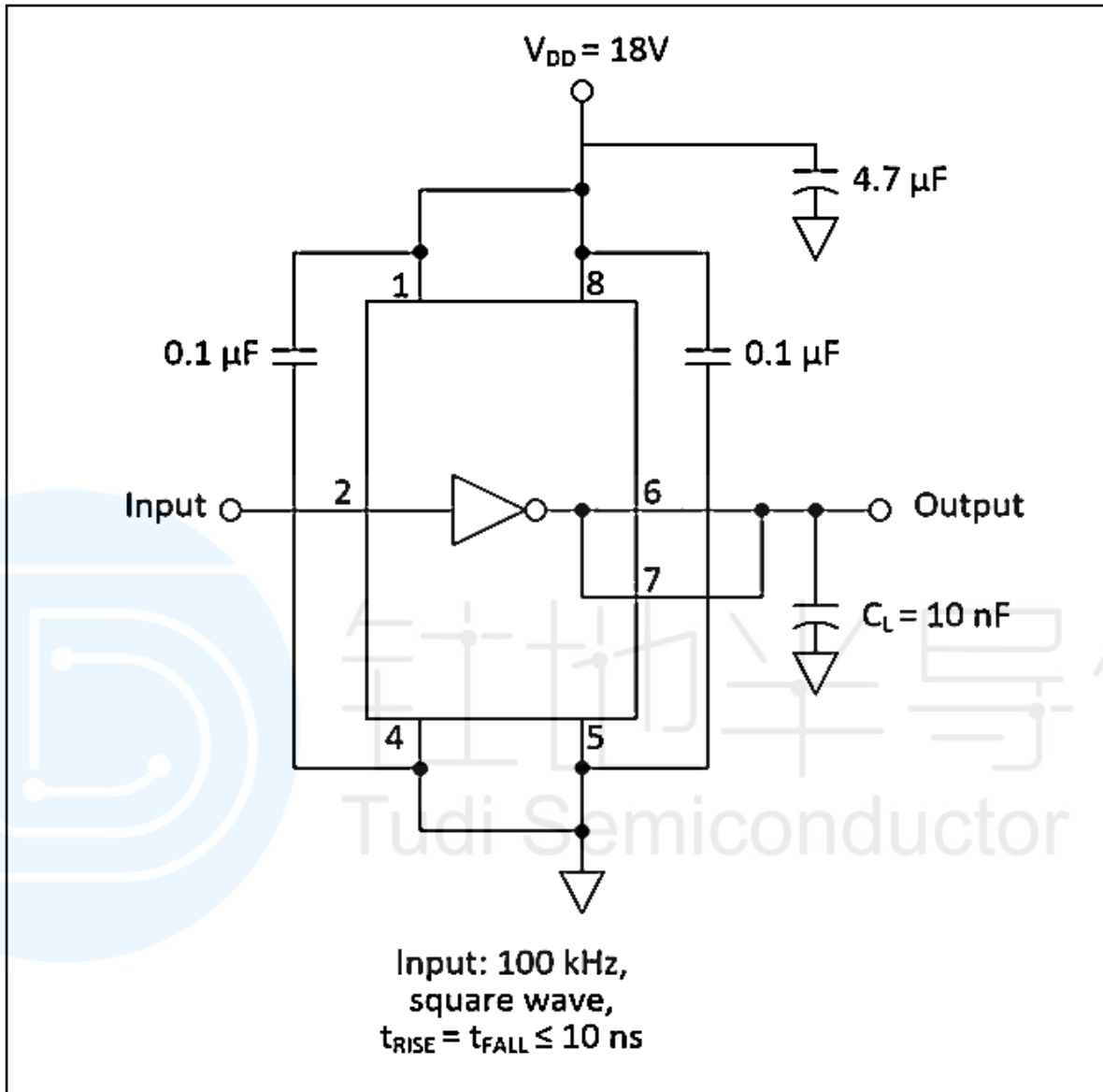


Figure 3. Switching Time Test Circuit

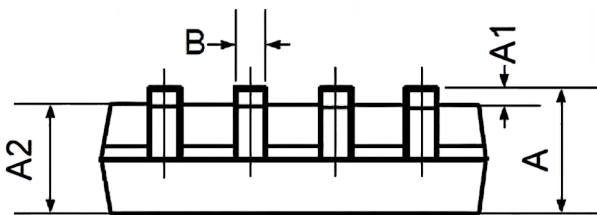
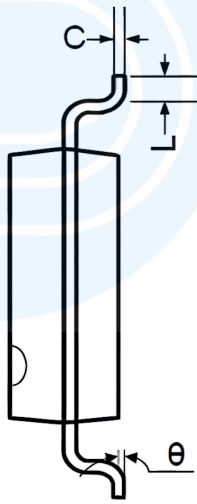
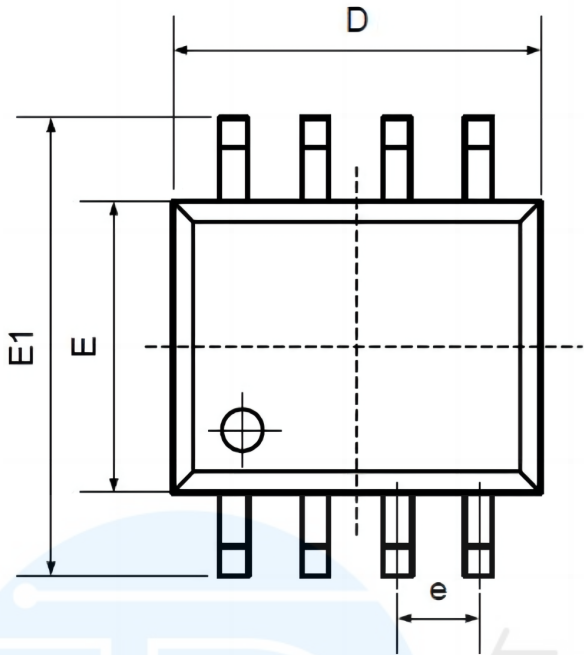


Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
TC4431COA-TUDI	SOP8	Tape,Reel,2500	TC4431COA	0°C to 70°C
TC4431CPA-TUDI	DIP8	Tube,50,A box of 2000	TC4431CPA	
TC4432COA-TUDI	SOP8	Tape,Reel,2500	TC4432COA	
TC4432CPA-TUDI	DIP8	Tube,50,A box of 2000	TC4432CPA	
TC4431EOA-TUDI	SOP8	Tape,Reel,2500	TC4431EOA	-40°C to 85°C
TC4431EPA-TUDI	DIP8	Tube,50,A box of 2000	TC4431EPA	
TC4432EOA-TUDI	SOP8	Tape,Reel,2500	TC4432EOA	
TC4432EPA-TUDI	DIP8	Tube,50,A box of 2000	TC4432EPA	
TC4431VOA-TUDI	SOP8	Tape,Reel,2500	TC4431VOA	-40°C to 105°C
TC4431VPA-TUDI	DIP8	Tube,50,A box of 2000	TC4431VPA	
TC4432VOA-TUDI	SOP8	Tape,Reel,2500	TC4432VOA	
TC4432VPA-TUDI	DIP8	Tube,50,A box of 2000	TC4432VPA	



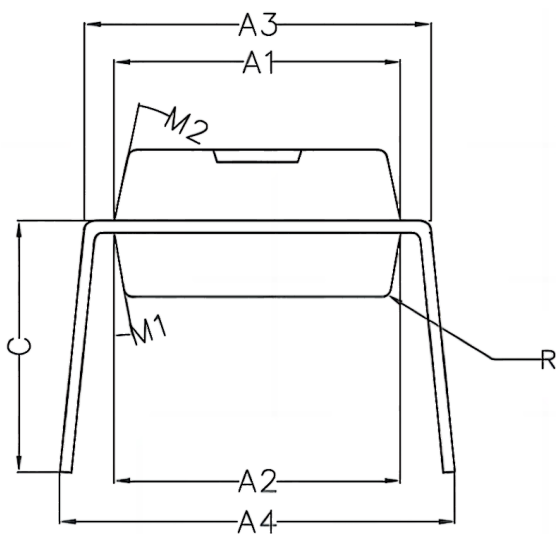
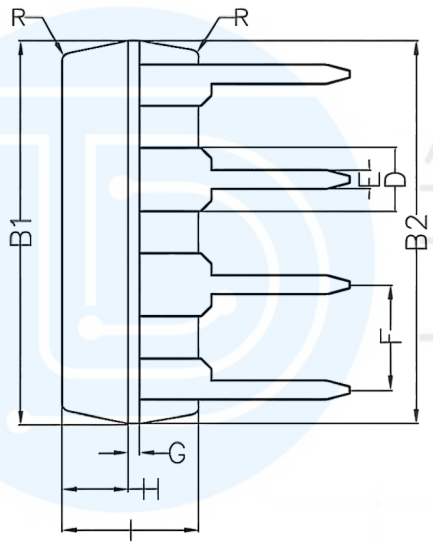
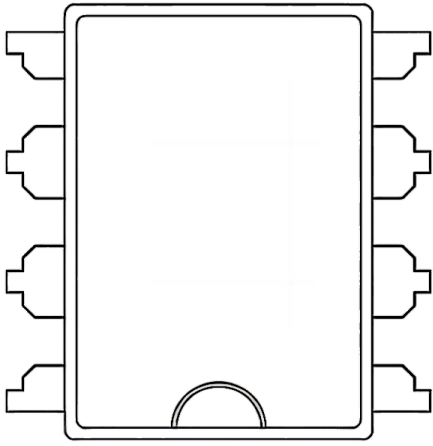
Package SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°



Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



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