



钰地半导体
Tudi Semiconductor

Product Specification

TUDI-ULN2003LV

High Voltage, High Current Darlington Transistor Arrays

网址 www.sztdbdt.com 🔍

用芯智造 · 卓越品质

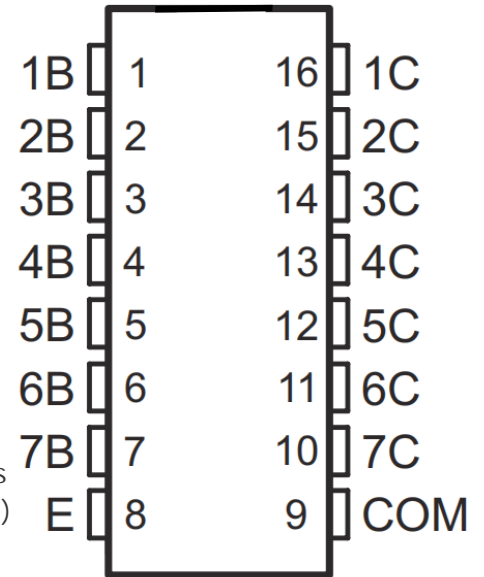
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- 7-Channel High-Side Current Driver
- Supports up to 8V Output Pull-up Voltage
- Supports Wide Rang of 3V to 5V Relays and Inductive Coils
- Low Output VOL of 0.4V (Typical)
 - 100mA (Typical) Current Sink Ca per Channel with 3.3V Logic Input
 - 140mA (Typical) Current Sink Capability per Channel with 5.0V Loc Input
- Compatible with 3.3V and 5.0V Microcontrollers and Logic Interfaces
- Internal Flyback Diodes for Inductive Kickback Protection
- ut Pull-down Resistors Enable Three-State Input Drivers
- Input RC Buffer to Eliminate Parasitic Operation in Noisy Environments
- Low Input and Output Leakage Curren Easy-to-Use Parallel Interface
- ESD Protection Performance Exceeds JESD 22 Specification Requirements
 - 2kV Human Body Mode (HBM), 500V Component Charging Model (CDM)



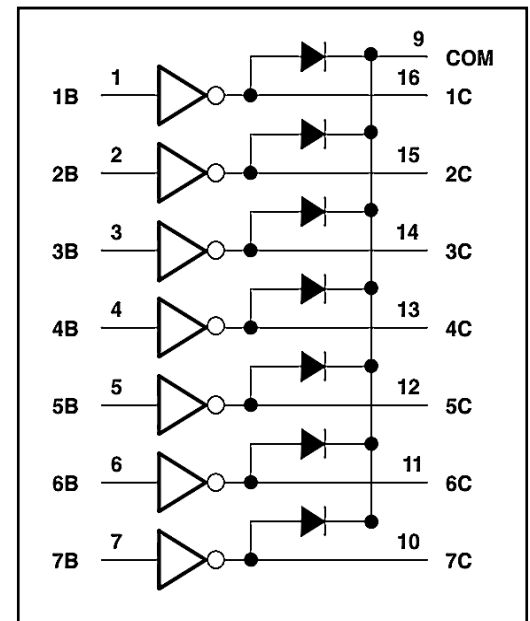
Pin Diagram

Description

The ULN2003LV is a low-voltage, low-power upgrade of the 7-channel Darlington transistor array. The ULN2003LV sink driver features 7 low-output-impedance drivers to support low-voltage relays and inductive coil applications. The low-impedance drivers significantly reduce on-chip power dissipation; for a typical 3V relay, power dissipation is reduced by up to 5 times. The ULN2003LV supports 3.3V to 5V CMOS logic input interfaces, making this device compatible with a wide range of microcontrollers and other logic interfaces. The ULN2003LV has an improved input interface that can significantly reduce input DC current drawn from external drivers. The ULN2003LV features an input RC buffer that can greatly improve the device's performance under noisy operating conditions. The ULN2003LV channel inputs feature internal input pull-down resistors to enable three-state input logic. ULN2003LV can also support other logic input levels. The ULN2003LV provides the flexibility to increase current sinking capability by combining several adjacent parallel channels. Typically 7 channels are paralleled, the ULN2003LV can support up to 1.0A of load current. In addition, the ULN2003LV can be used in various applications requiring sink current drivers, such as driving LEDs and logic level shifting.

Applications

- Relay and inductive load drivers in various telecom, consumer, and industrial applications
- Lighting and LED displays
- Logic level converters



Simplified block diagram



Pin description

Pin		I/O(1)	Description
Name	No.		
1B	1	I	Darlington base input
2B	2	I	Darlington base input
3B	3	I	Darlington base input
4B	4	I	Darlington base input
5B	5	I	Darlington base input
6B	6	I	Darlington base input
7B	7	I	Darlington base input
E	8	—	Common emitter shared by all channels (usually connected to ground)
COM	9	—	Flyback diode common cathode node (for inductive load)
7C	10	O	Darlington collector output
6C	11	O	Darlington collector output
5C	12	O	Darlington collector output
4C	13	O	Darlington collector output
3C	14	O	Darlington collector output
2C	15	O	Darlington collector output
1C	16	O	Darlington collector output



Maximum Ratings (TA= 25 ° C, and rating apply to any one device in the package, unless otherwise noted.)

Rating	Symbol	Value	Unit
Output Voltage	Vo	50	V
Input Voltage	V _i	30	V
Collector Current -Continuous	Ic	500	mA
Base Current -Continuous	IB	25	mA
Operating Ambient Temperature Range ULN2003LV	TA	-40~85	°C
Storage Temperature Range	Tstg	-55 to +150	°C
Junction Temperature	TJ	150	°C
Thermal Resistance,Junction-to-Ambient Case 751B,D Suffix	RoJA	100	°C/W
Thermal Resistance,Junction-to-Case Case 751B,D Suffix	RoJC	20	°CW
Electrostatic Discharge Sensitivity(ESD) Human Body Model (HBM) Machine Model (MM) Charged Device Model (CDM)	ESD	2000 400 1500	V

limit Parameter

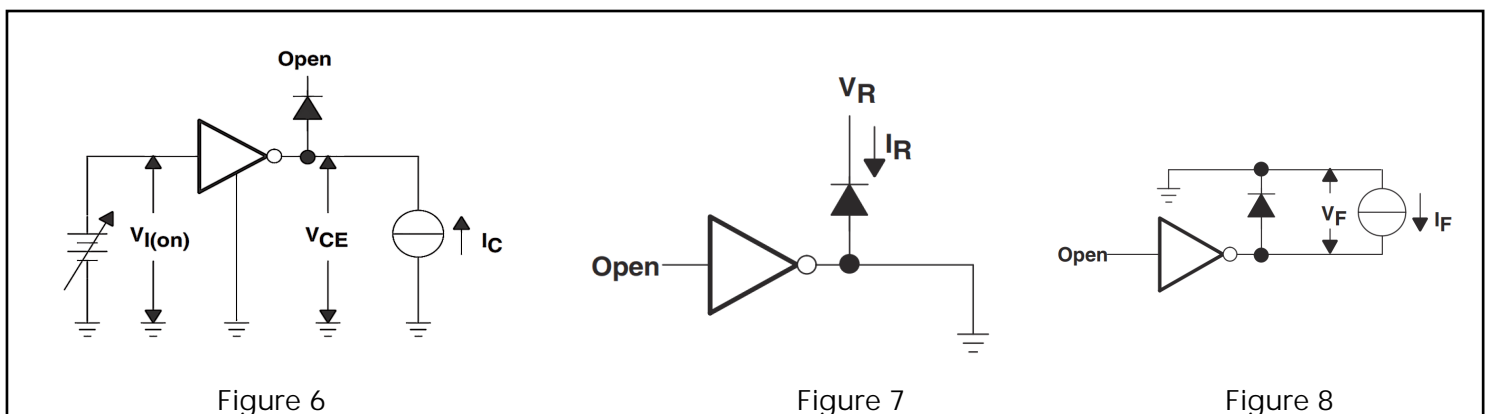
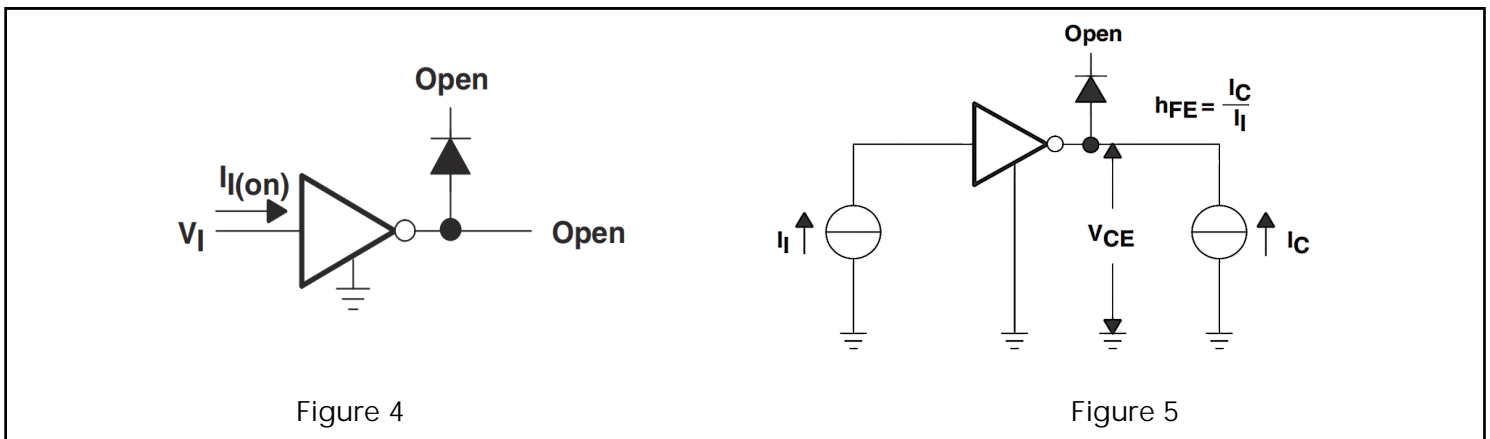
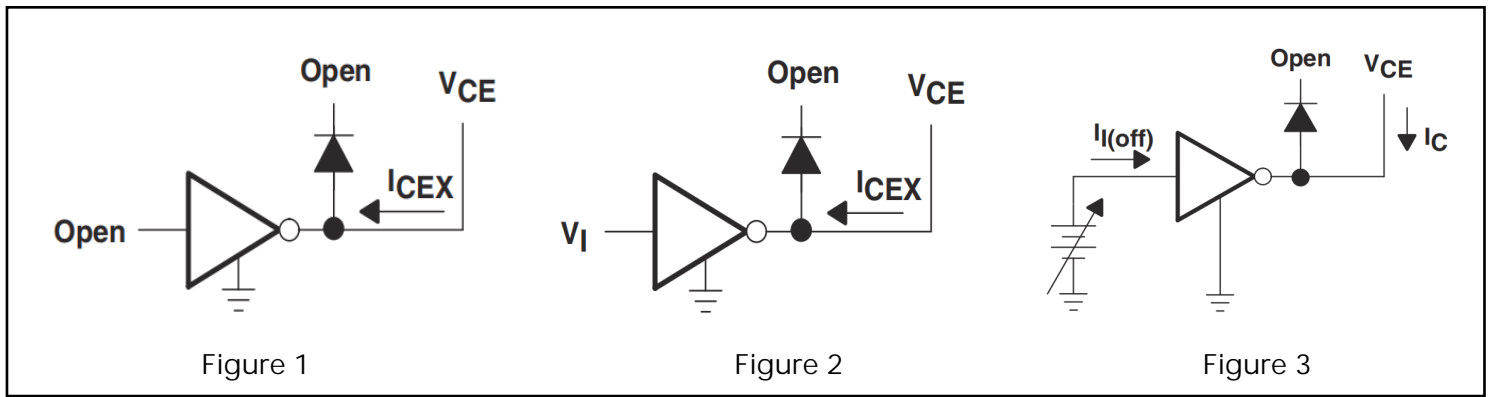
limit parameter	
Storage temperature:	65°C~150°C
Operating temperature range:	40°C~85°C
Junction temperature range:	40°C~150°C
Input Voltage:	0.3V~30V
Output Voltage:	55V
Maximum Emitter-to-Base Voltage:	6.0V
Collector continuous current:	500mA
Continuous Base Current	25mA

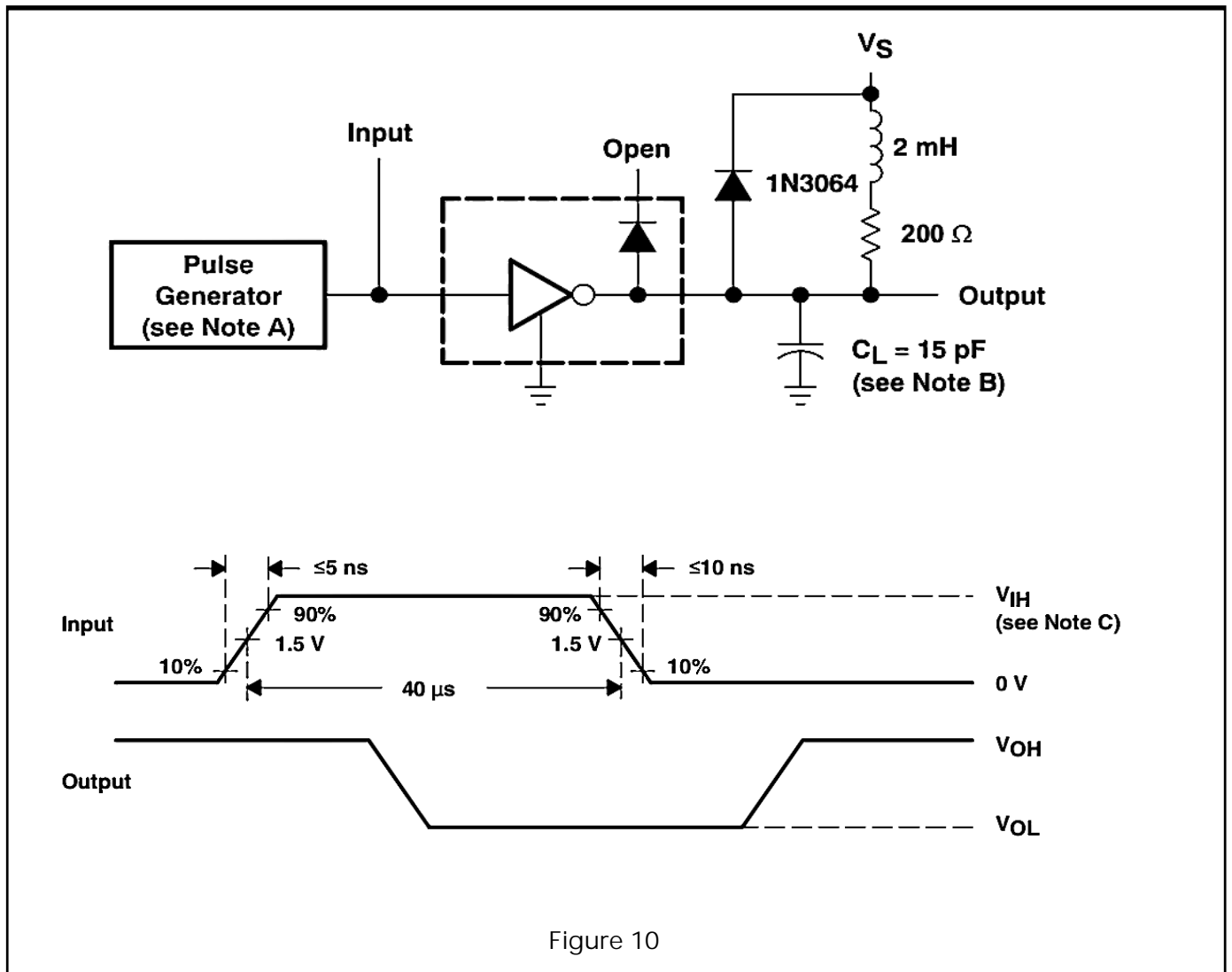
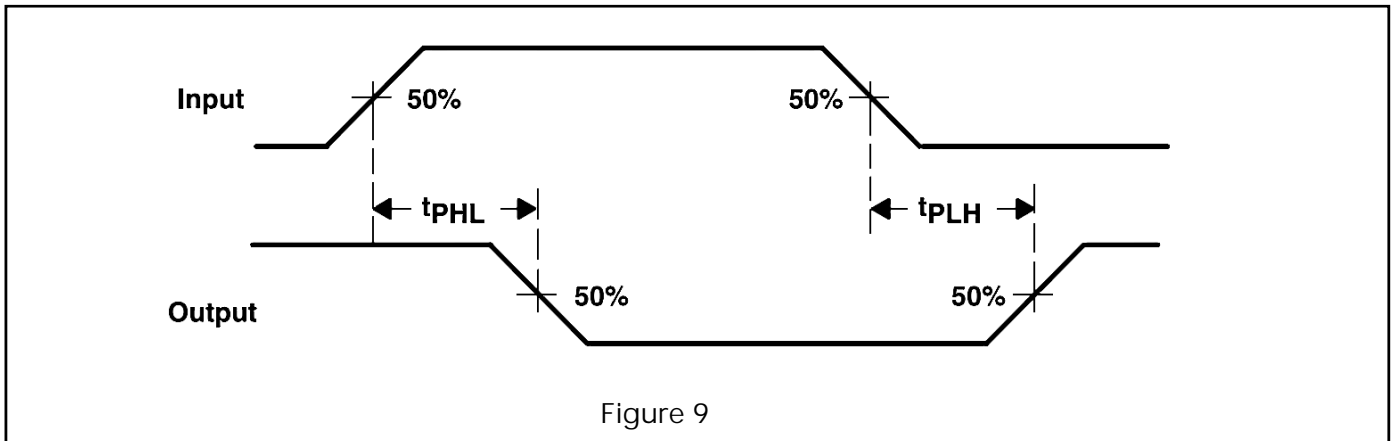


Switching Characteristics

Parameter	Test conditions	2003		unit
		Min	max	
tpLH propagation delay time, low to high output level	Please refer to Figure 9	0.25	1	μS
tPHL propagation delay time, high to low output level		0.25	1	μS

Circuit Test



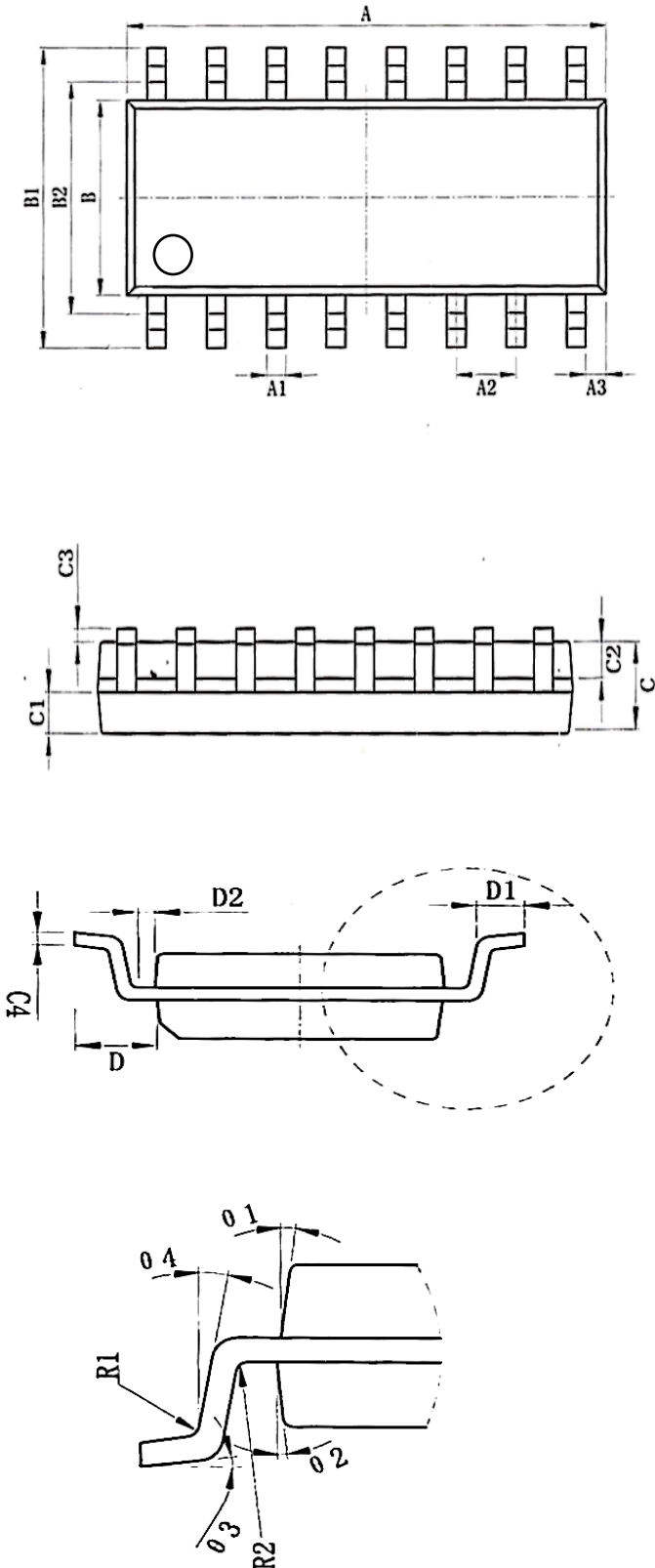


Note:

1. The absolute maximum ratings indicate limits beyond which the device may be damaged; they are not normal operating conditions. The electrical characteristics table provides the device's operating conditions;
2. Unless otherwise specified, all conditions apply to the Darlington array;
3. Under typical conditions, continuous operation of each output at $^{\circ}\text{C}$, $V^{CE(sat)} = 1.6\text{V}$, and a pulse width of 20ms



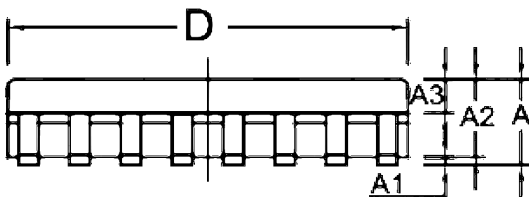
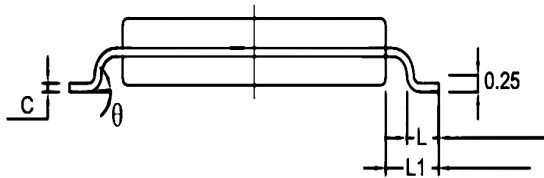
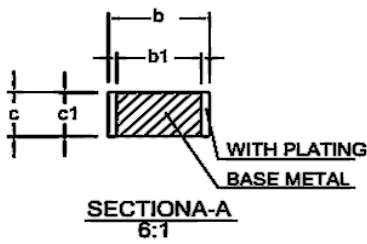
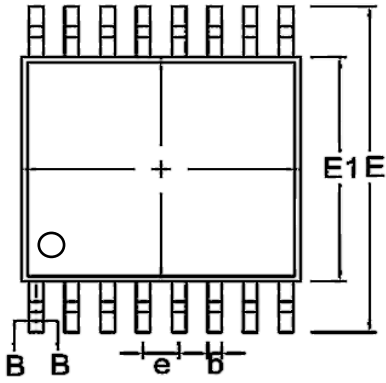
Package SOP16



SIZE SYMBOL	MIN./mm	MAX./mm
A	9.80	10.00
A1	0.356	0.456
A2	1.27TYP	
A3	0.302TYP	
B	3.85	3.95
B1	5.84	6.24
B2	5.00 TYP	
C	1.40	1.60
C1	0.61	0.71
C2	0.54	0.64
C3	0.05	0.25
C4	0.203	0.233
D	1.05 TYP	
D1	0.40	0.70
D2	0.15	0.25
R1	0.20TYP	
R2	0.20TYP	
O1	8°~12°TYP4	
O2	8°~12°TYP4	
O3	0°~8°	
O4	4°~12°	



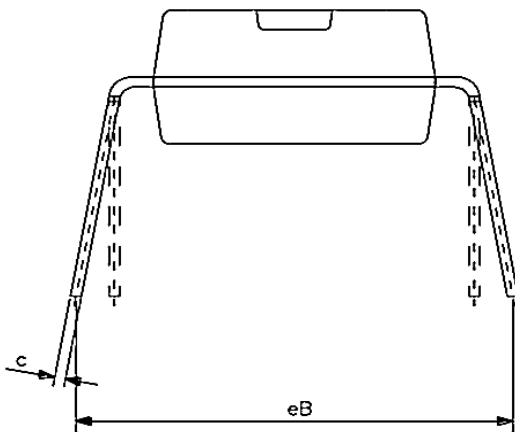
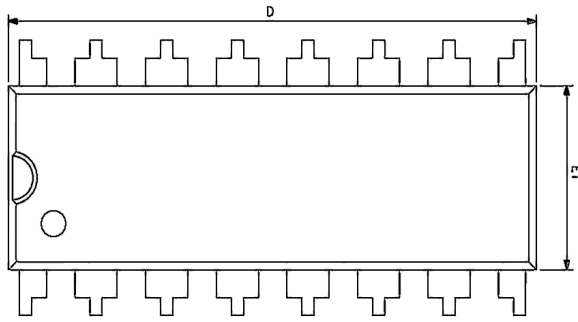
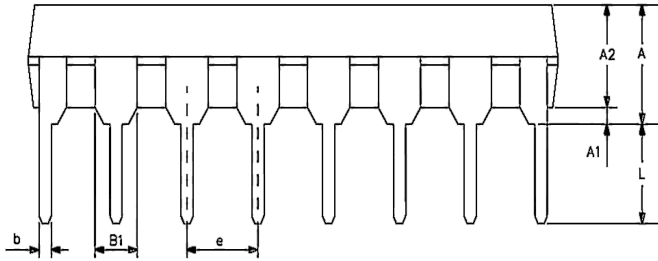
Package TSSOP16



SIZE SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	--	--	1.20
A1	0.05		0.15
A2	0.90	1.00	1.05
b	0.20	--	0.30
b1	0.19	0.22	0.25
C	0.110	0.127	0.145
cl	0.12	0.13	0.14
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
	0°	--	8°



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°
θ_1	45°TYP	
O_2	12°TYP	
O_3	0°	8°
O_4	0°	10°



Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
ULN2003LVDR-TUDI	SOP16	Tape,Reel,2500	UN2003LV	-40°C to 85°C
ULN2003LVPWR-TUDI	TSSOP16	Tape,Reel,2500	UN2003LV	
ULN2003LVN-TUDI	DIP16	Tube,25,A box of 1000	UN2003LVN	



Important statement:

- TUDI Semiconductor reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using TUDI Semiconductor products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!
- TUDI Semiconductor products have not been licensed for life support, military, and aerospace applications, and therefore TUDI Semiconductor is not responsible for any consequences arising from the use of this product in these areas.
- If any or all TUDI Semiconductor products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all TUDI Semiconductor products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- TUDI Semiconductor documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. TUDI Semiconductor assumes no responsibility or liability for altered documents.
- TUDI Semiconductor is committed to becoming the preferred semiconductor brand for customers, and TUDI Semiconductor will strive to provide customers with better performance and better quality products.