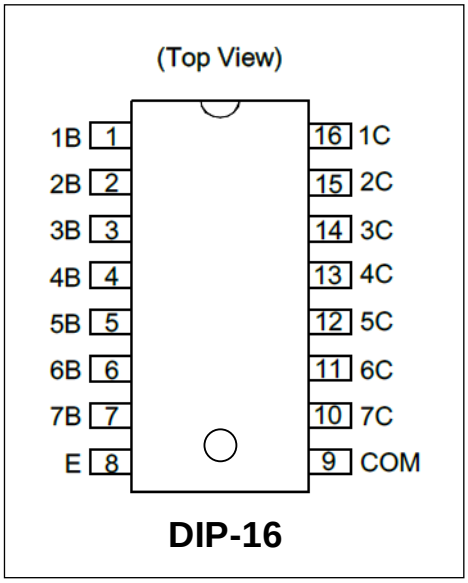
WLN2003AD

HIGH VOLTAGE, HIGH CURRENT DARLINGTON TRANSISTOR ARRAYS

Description

The WLN2003AD are high voltage, high current Darlington arrays each containing seven open collector common emitter pairs. Each pair is rated at 500mA. Suppression diodes are included for inductive load driving, the inputs and outputs are pinned in opposition to simplify board layout.



DIP-16

Features

- ESD Capability：8KV(HBM)
- 500mA Rated Collector Current (Single Output)
- High Voltage Outputs: 50V
- Output Clamp Diodes
- Inputs Compatible with Popular Logic Types (5V TTL,CMOS)
- Relay Driver Applications

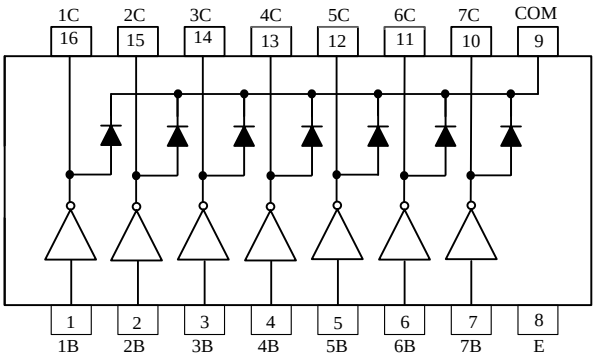
Mechanical Characteristics

- JEDEC DIP-16 package
- Marking: Marking Code
- Packaging: Tube
- RoHS Compliant & HF
- Device meets MSL3 requirement

Applications

- Solenoids
- Relays
- DC motors
- LED displays
- Filament lamps
- Thermal print-heads
- High-power buffers

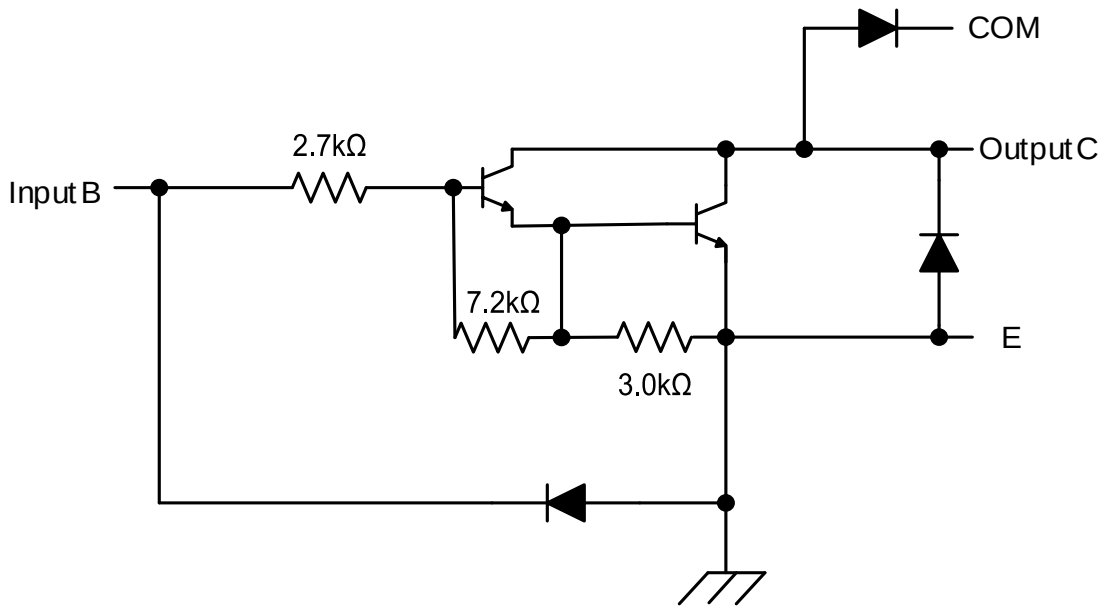
Functional Diagram



Pin Descriptions

Pin Number	Pin Name	Function
1	1B	Input Pair 1
2	2B	Input Pair 2
3	3B	Input Pair 3
4	4B	Input Pair 4
5	5B	Input Pair 5
6	6B	Input Pair 6
7	7B	Input Pair 7
8	E	Common Emitter (Ground)
9	COM	Common Clamp Diodes
10	7C	Output Pair 7
11	6C	Output Pair 6
12	5C	Output Pair 5
13	4C	Output Pair 4
14	3C	Output Pair 3
15	2C	Output Pair 2
16	1C	Output Pair 1

Functional Block Diagram



Absolute Maximum Ratings (Note 1) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Rating	Unit
V_{CC}	Collector to Emitter Voltage	50	V
V_R	Clamp Diode Reverse Voltage (Note 2)	50	V
V_I	Input Voltage (Note 2)	30	V
I_{CP}	Peak Collector Current	500	mA
I_{OK}	Output Clamp Current	500	mA
I_{TE}	Total Emitter Current	-2.5	A
θ_{JA}	Thermal Resistance Junction-to-Ambient (Note 3)	51.0	°C/W
θ_{JC}	Thermal Resistance Junction-to-Case (Note 4)	15.0	°C/W
P_D	Power Dissipation(Note 5)	1.47	W
T_J	Junction Temperature	+150	°C
T_{STG}	Storage Temperature	-65 to +150	°C

Notes:
1. Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only. 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 are with respect to the emitter/substrate terminal E, unless otherwise noted.
3. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of +150°C can affect reliability.
4. Maximum power dissipation is a function of $T_J(max)$, θ_{JC} and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_C)/\theta_{JC}$. Operating at the absolute maximum T_J of +150°C can affect reliability.
5. On PCB (Test Board: JEDEC 2s2p)

Recommended Operating Conditions

Symbol	Parameter	MIN	MAX	Unit
V_{CC}	Collector to Emitter Voltage	-	50	V
T_A	Operating Ambient Temperature	-40	+105	°C

Switching Characteristics (@T_A = +25°C, unless otherwise specified.)

Parameter		Test Figure	Min	Typ	Max	Unit
t_{PLH}	Propagation Delay Time, Low to High Level Output	9	-	0.25	1	μs
t_{PHL}	Propagation Delay Time, High to Low Level Output	9	-	0.25	1	μs
V_{OH}	High Level Output Voltage after Switching	9 (V_S = 50V, I_O = 300mA)	V_S-20	-	-	mV

Switching Characteristics (@TA = -40 to +105°C, unless otherwise specified.)

Parameter		Test Figure	Min	Typ	Max	Unit
t_{PLH}	Propagation Delay Time, Low to High Level Output	9	-	1	10	μs
t_{PHL}	Propagation Delay Time, High to Low Level Output	9	-	1	10	μs
V_{OH}	High Level Output Voltage after Switching	9 (V_S = 50V, I_O = 300mA)	V_S-50	-	-	mV

Electrical Characteristics (Cont.) (@TA = +25°C, unless otherwise specified.)

Parameter		Test Figure	Test Conditions		Min	Typ	Max	Unit
$V_{I(ON)}$	On State Input Voltage	6	V_{CE} = 2V	I_C = 200mA	-	-	2.4	V
				I_C = 250mA	-	-	2.7	
				I_C = 300mA	-	-	3	
$V_{CE(SAT)}$	Collector Emitter Saturation Voltage	5	I_I = 250μA, I_C = 100mA		-	0.9	1.1	V
			I_I = 350μA, I_C = 200mA		-	1	1.3	
			I_I = 500μA, I_C = 350mA		-	1.2	1.6	
V_F	Clamp Forward Voltage	8	I_F = 350mA		-	1.7	2	V
I_{CEX}	Collector Cut-off Current	1	V_{CE} = 50V, I_I = 0		-	-	50	μA
		2	V_{CE} = 50V, T_A = +105°C	I_I = 0	-	-	100	
$I_{I(OFF)}$	Off State Input Current	3	V_{CE} = 50V, I_C = 500μA		50	65	-	μA
I_I	Input Current	4	V_I = 3.85V		-	0.93	1.35	mA
I_R	Clamp Reverse Current	7	V_R = 50V	T_A = +105°C	-	-	100	μA
		-		-	-	-	50	
C_I	Input Capacitance	-	V_I = 0, f = 1MHz		-	15	25	pF

Electrical Characteristics (Cont.) (@TA = -40°C to +105°C, unless otherwise specified.)

Parameter		Test Figure	Test Conditions		Min	Typ	Max	Unit
$V_{I(ON)}$	On State Input Voltage	6	V_{CE} = 2V	I_C = 200mA	-	-	2.7	V
				I_C = 250mA	-	-	2.9	
				I_C = 300mA	-	-	3	
$V_{CE(SAT)}$	Collector Emitter Saturation Voltage	5	I_I = 250μA, I_C = 100mA		-	0.9	1.2	V
			I_I = 350μA, I_C = 200mA		-	1	1.4	
			I_I = 500μA, I_C = 350mA		-	1.2	1.7	
V_F	Clamp Forward Voltage	8	I_F = 350mA		-	1.7	2.2	V
I_{CEX}	Collector Cut-off Current	1	V_{CE} = 50V, I_I = 0		-	-	100	μA
$I_{I(OFF)}$	Off State Input Current	3	V_{CE} = 50V, I_C = 500μA		30	65	-	μA
I_I	Input Current	4	V_I = 3.85V		-	0.93	1.35	mA
I_R	Clamp Reverse Current	7	V_R = 50V		-	-	100	μA
C_I	Input Capacitance	-	V_I = 0, f = 1MHz		-	15	25	pF

Parameter Measurement Circuits

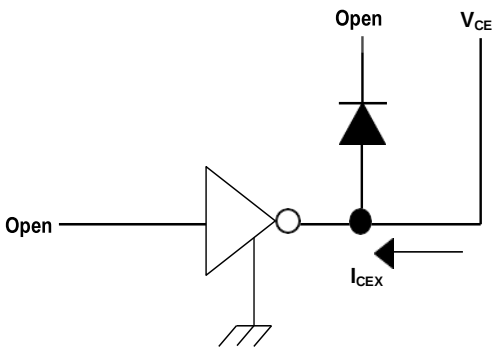


Fig.1 I_{CEX} Test Circuit

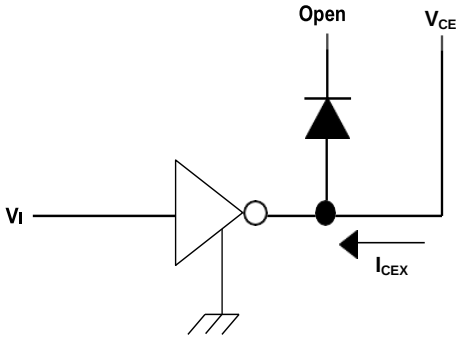


Fig.2 I_{CEX} Test Circuit

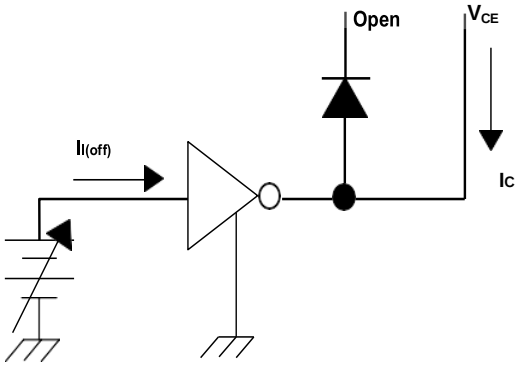


Fig.3 $I_{I(off)}$ Test Circuit

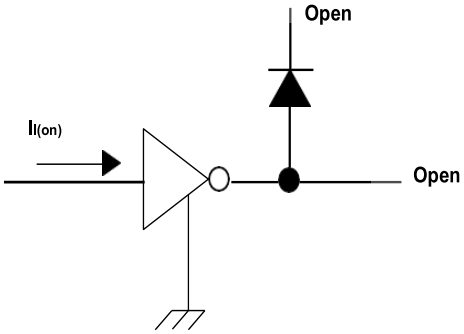


Fig.4 I_I Test Circuit

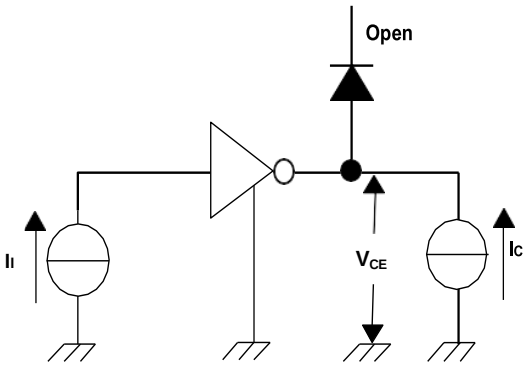


Fig.5 h_{FE}, $V_{CE(sat)}$ Test Circuit

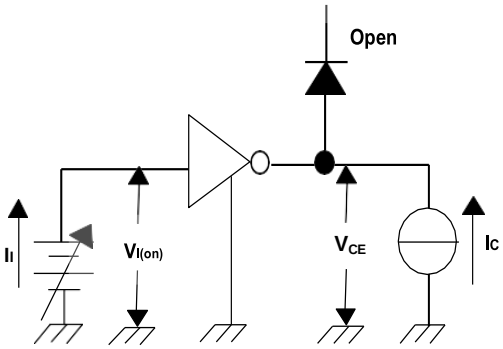


Fig.6 $V_{I(on)}$ Test Circuit

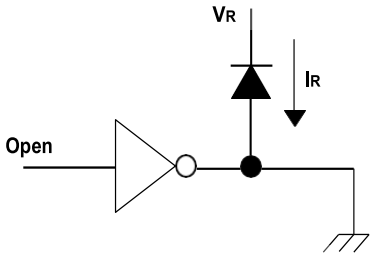


Fig.7 I_R Test Circuit

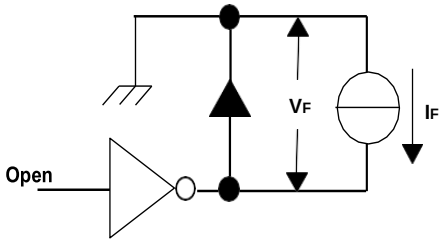


Fig.8 V_F Test Circuit

Parameter Measurement Circuits (Cont.)

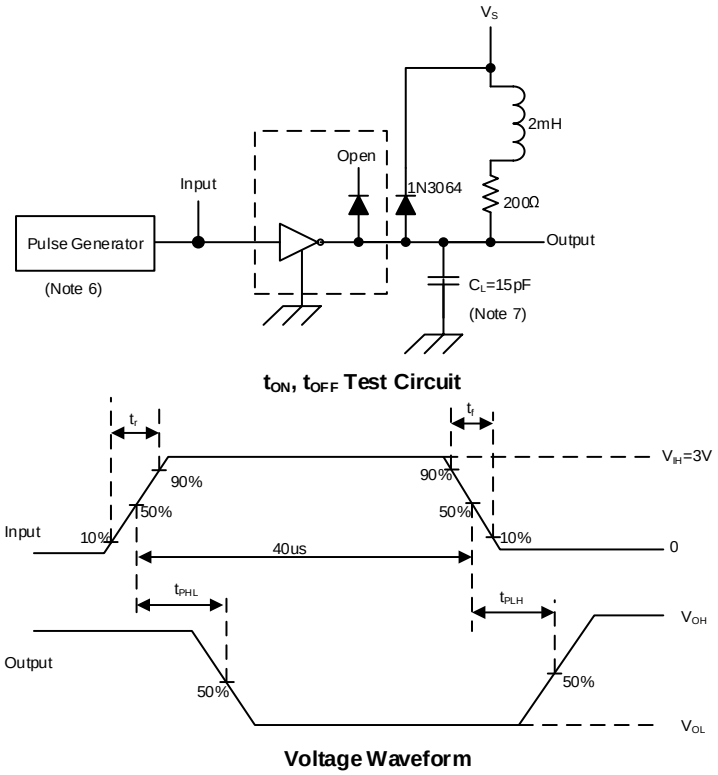


Fig. 9 Latch-Up Test Circuit and Voltage Waveform

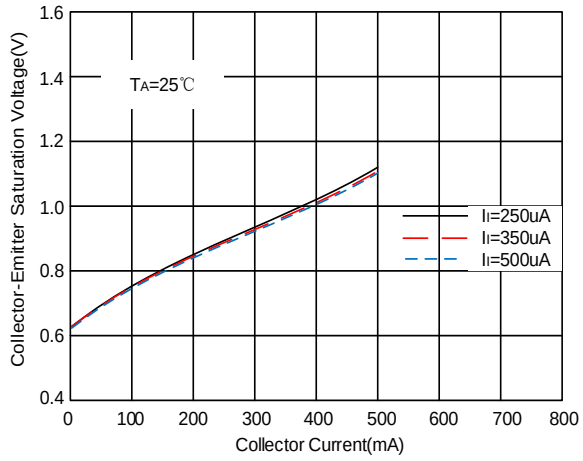
Notes:

6 The pulse generator has the following characteristics: Pulse Width = 12.5Hz, output impedance 50Ω, tr ≤ 5ns, tr ≤ 10ns.

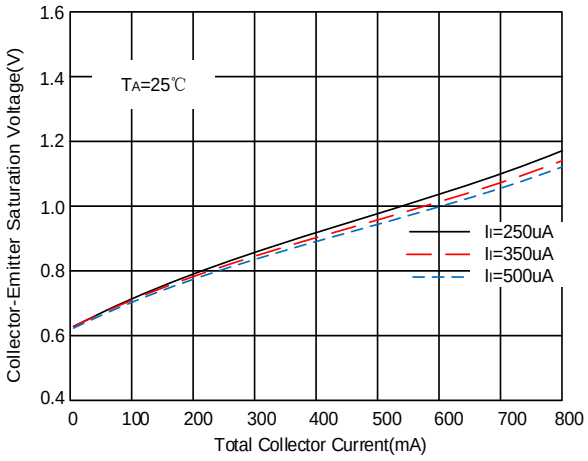
7 C_L includes prove and jig capacitance.

Typical Performance Characteristics

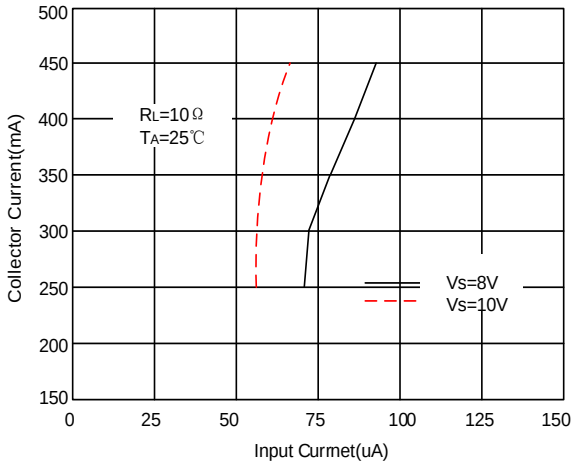
Collector-Emitter Saturation Voltage vs. Collector Current (One Darlington)



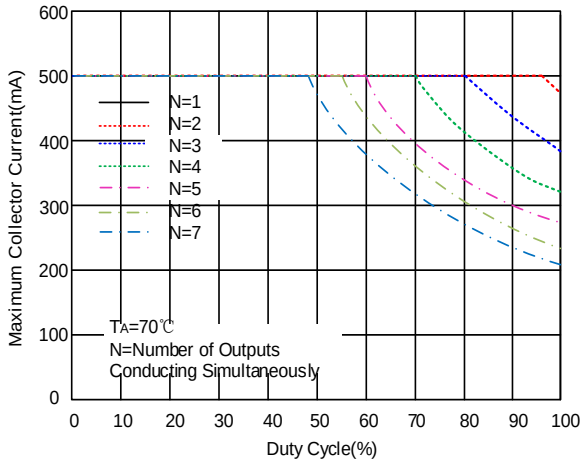
Collector-Emitter Saturation Voltage vs. Collector Current (Two Darlington in Parallel)



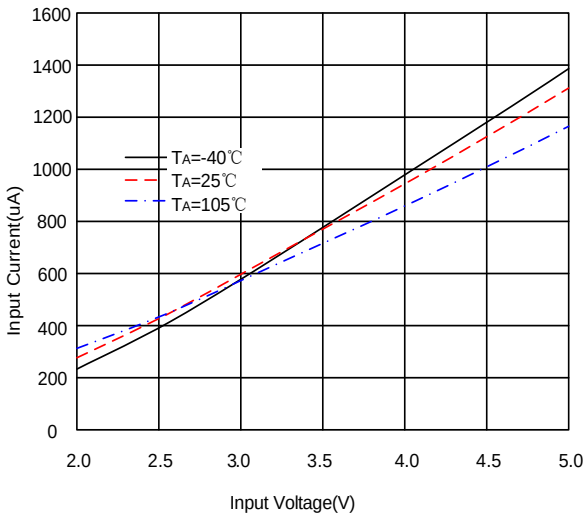
Collector Current vs. Input Current



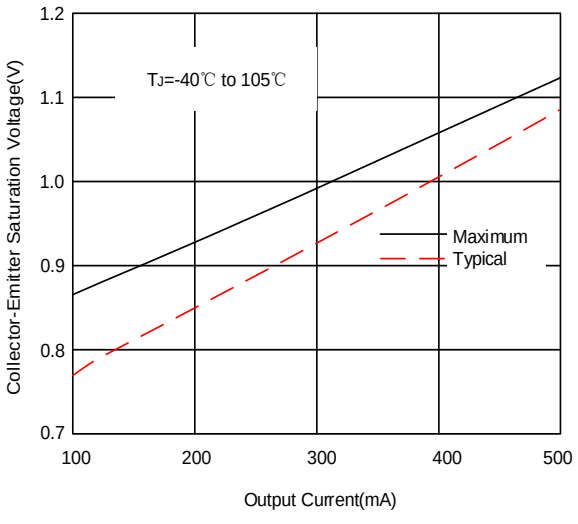
Maximum Collector Current vs. Duty Cycle



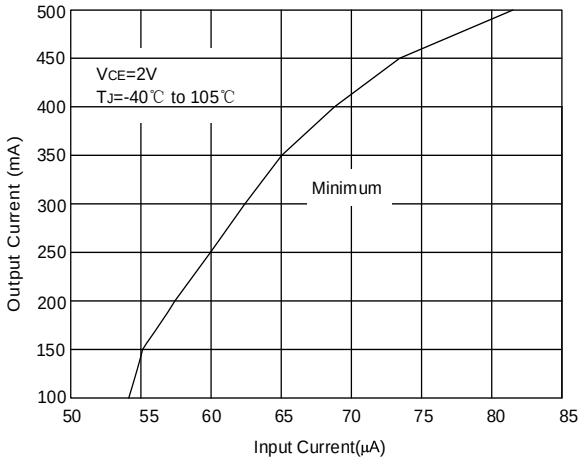
Input Current vs. Input Voltage



Collector-Emitter Saturation Voltage vs. Output Current

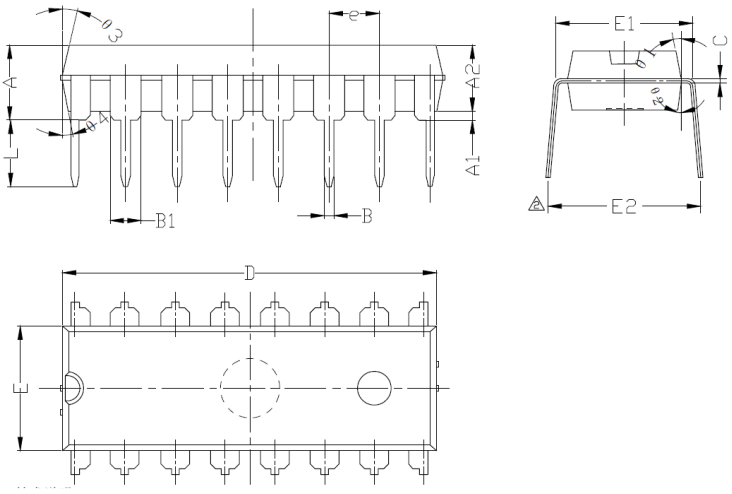


Output Current vs. Input Current



Outline Drawing – DIP-16

PACKAGE OUTLINE



Symbol	MILLIMETERS		
	MIN	NOM	MAX
A	3.75	3.90	4.05
A1	0.51	--	--
A2	3.20	3.30	3.45
B	0.38	0.48	0.56
B1		1.52(BSC)	
C	0.2	0.25	0.34
D	18.80	19.05	19.30
E	6.20	6.35	6.50
E1	7.35	7.62	7.85
e		2.54 BSC	
L	3.00	3.30	3.60
E2	8.00	8.40	8.80
θ1	9°	-	15°
θ2	7°	-	13°
θ3	8°	-	14°
θ4	5°	-	12°

Marking Codes

Part Number	WLN2003AD
Marking Code	 WLN2003AD=Specific Device Code XXXX=Lot Code

Package Information

Qty：25/Tube

CONTACT INFORMATION

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For additional information, please contact your local Sales Representative.