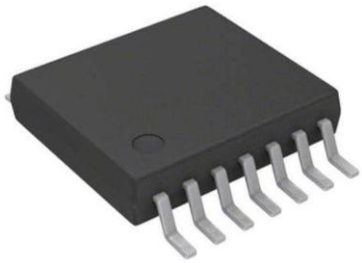
WLN2003AE

HIGH VOLTAGE, HIGH CURRENT DARLINGTON TRANSISTOR ARRAYS

Description

The WLN2003AE 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.



TSSOP16

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

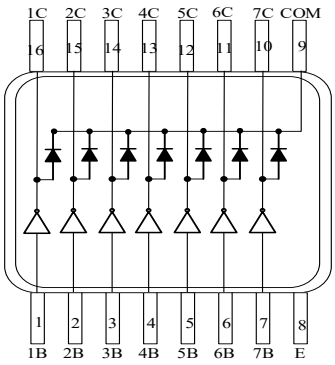
Mechanical Characteristics

- JEDEC TSSOP16 package
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS Compliant & HF
- Device meets MSL3 requirement

Applications

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

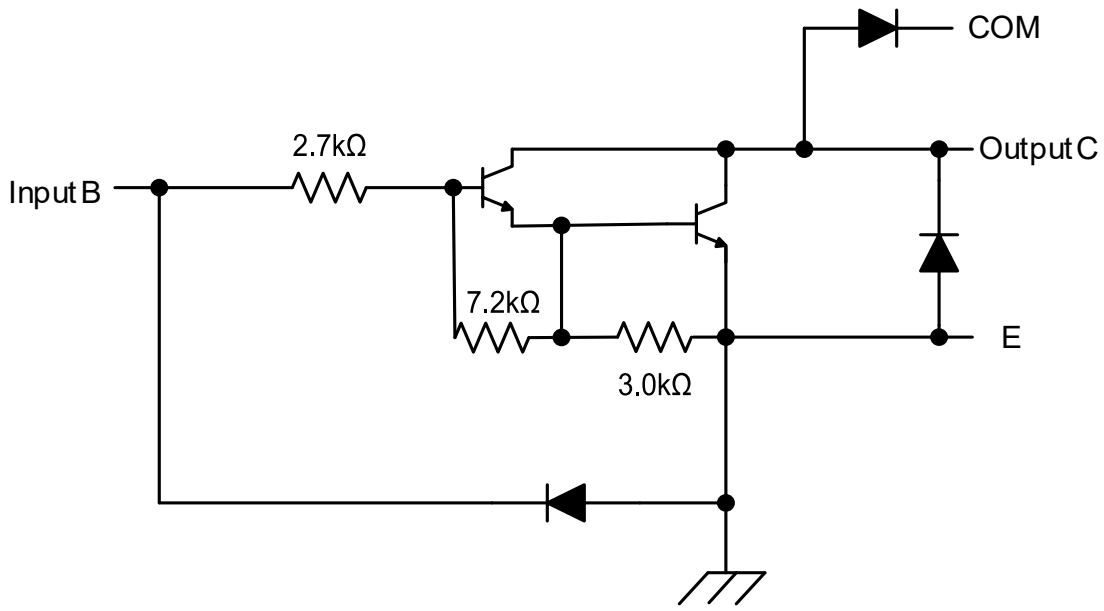
Functional Diagram



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)	98.0	°C/W
θ_{JC}	Thermal Resistance Junction-to-Case (Note 4)	31.0	°C/W
P_D	Power Dissipation(Note 5)	1.38	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

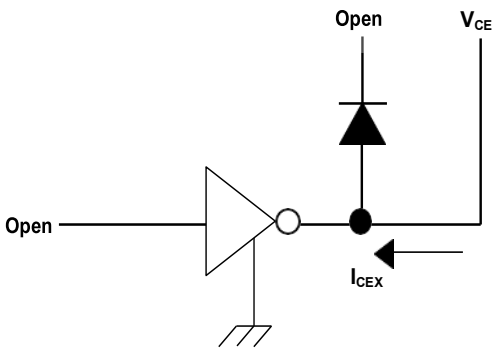


Fig.1 I_{CEX} Test Circuit

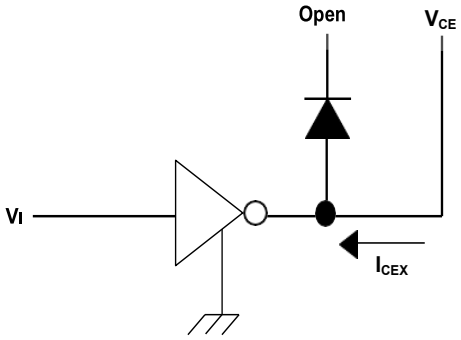


Fig.2 I_{CEX} Test Circuit

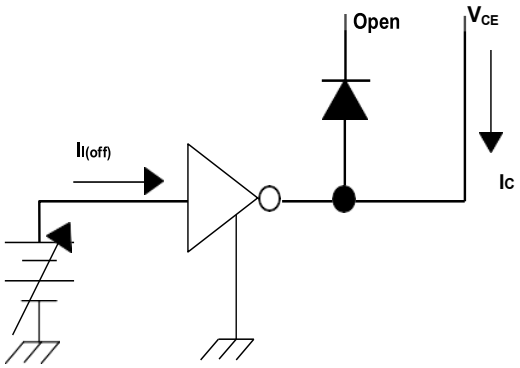


Fig.3 $I_{I(off)}$ Test Circuit

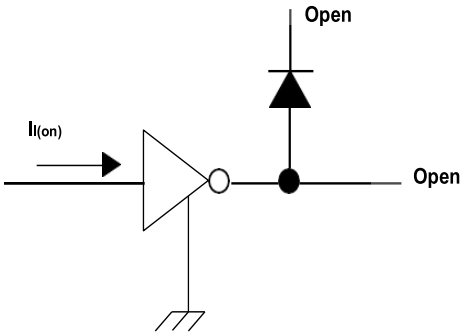


Fig.4 I_I Test Circuit

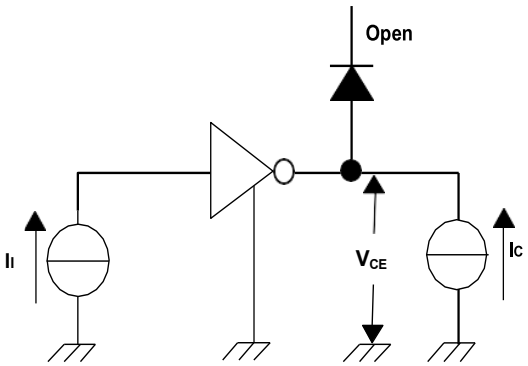


Fig.5 h_{FE}, $V_{CE(sat)}$ Test Circuit

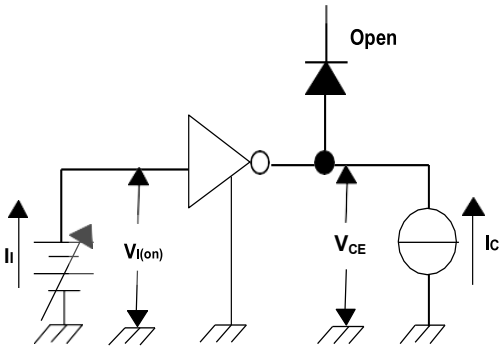


Fig.6 $V_{I(on)}$ Test Circuit

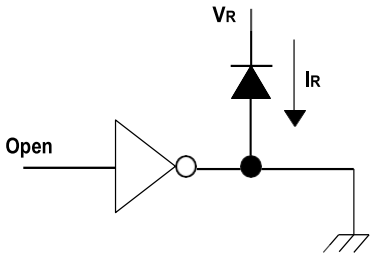


Fig.7 I_R Test Circuit

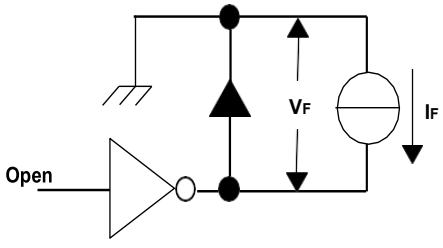


Fig.8 V_F Test Circuit

Parameter Measurement Circuits (Cont.)

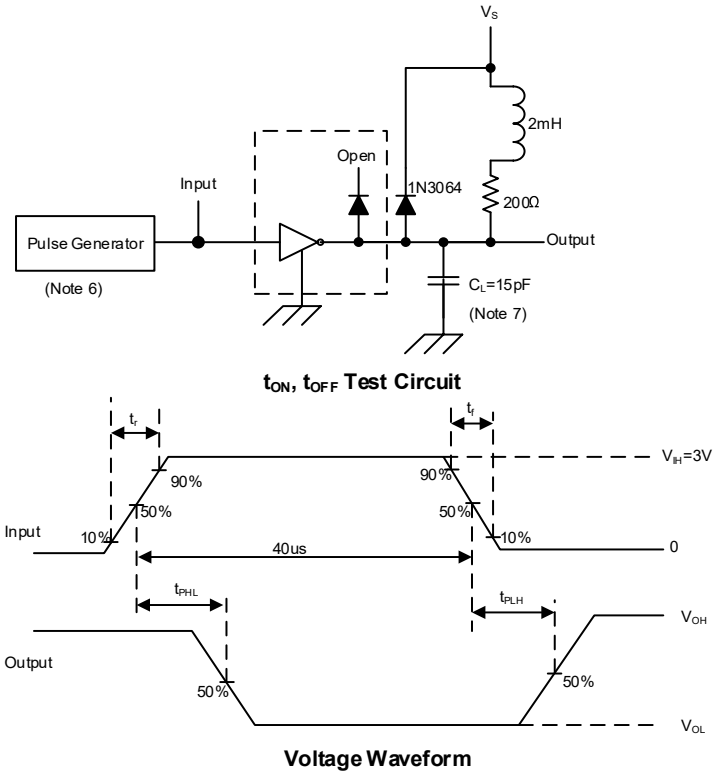


Fig. 9 Latch-Up Test Circuit and Voltage Waveform

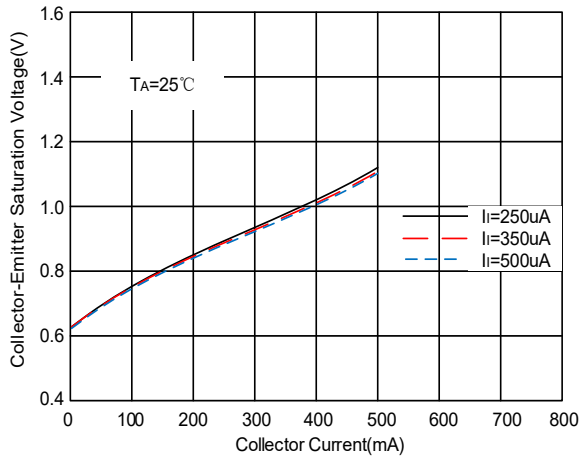
Notes:

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

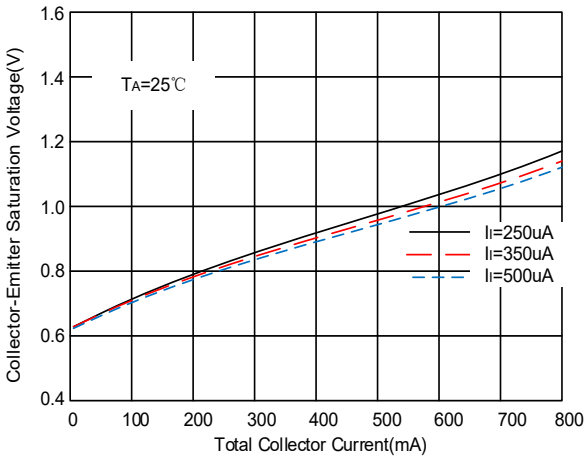
7 C_L includes prove and jig capacitance.

Typical Performance Characteristics

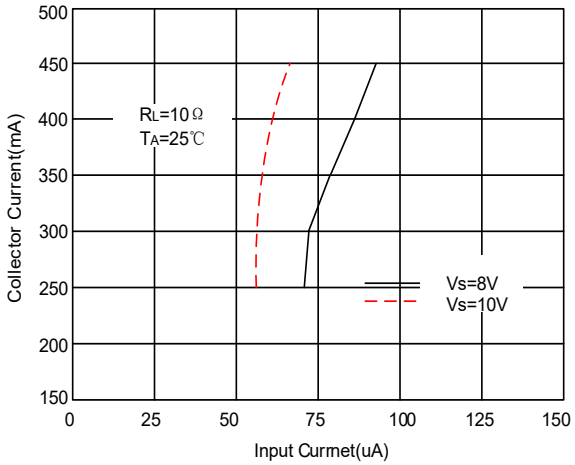
Collector-Emitter Saturation Voltage vs. Collector Current (One Darlington)



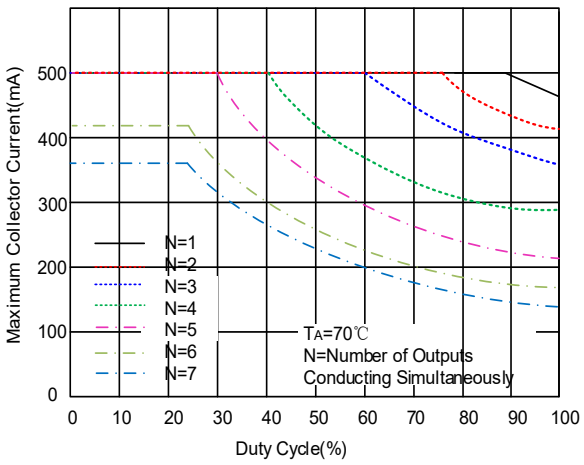
Collector-Emitter Saturation Voltage vs. Collector Current (Two Darlington in Parallel)



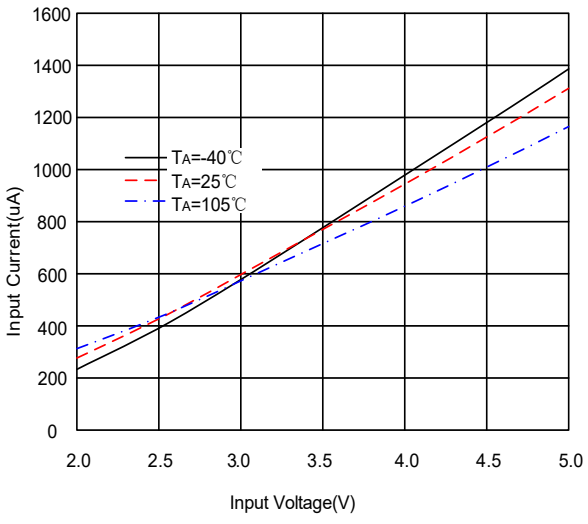
Collector Current vs. Input Current



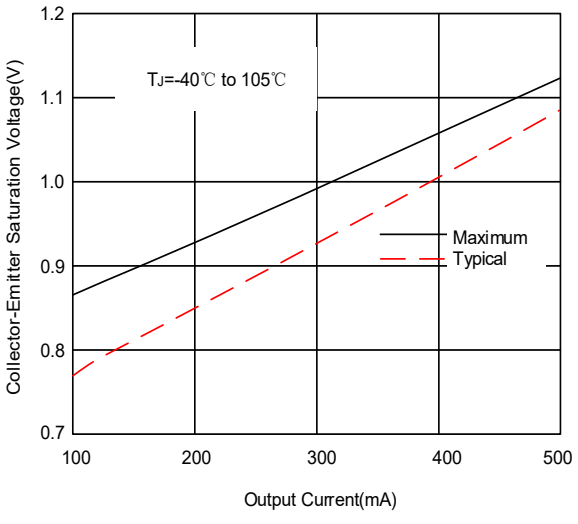
Maximum Collector Current vs. Duty Cycle



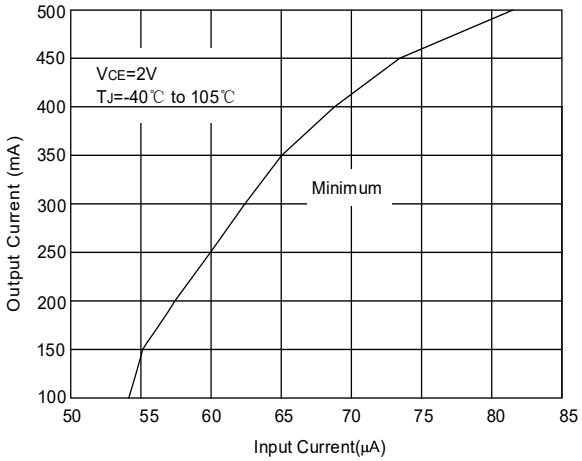
Input Current vs. Input Voltage



Collector-Emitter Saturation Voltage vs. Output Current

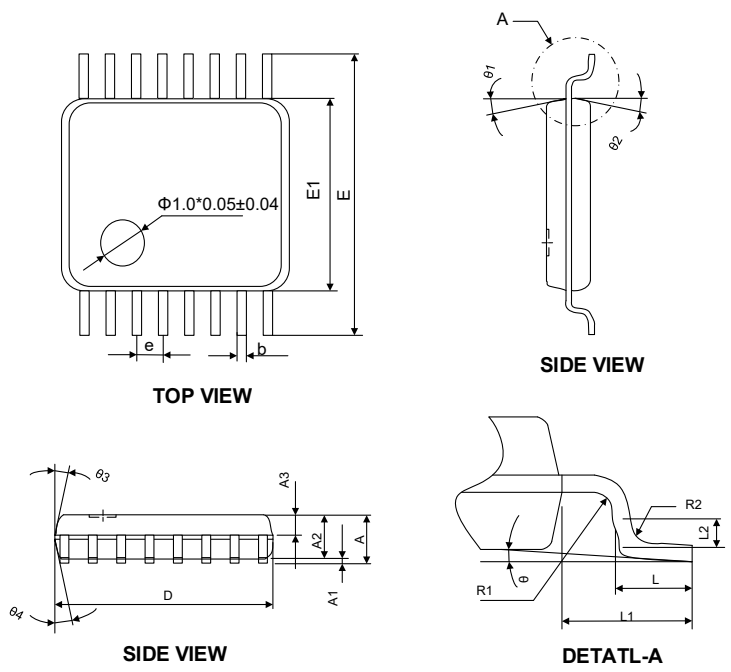


Output Current vs. Input Current



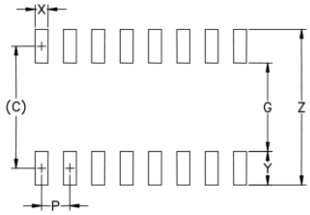
Outline Drawing – TSSOP16

PACKAGE OUTLINE



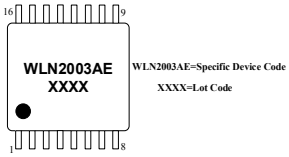
Symbol	MILLIMETERS		
	MIN	NOM	MAX
A	-	-	1.2
A1	0.05	0.10	0.15
A2	0.965	1.000	1.035
A3	0.415	0.440	0.465
b	0.200	-	0.280
D	4.92	5.02	5.12
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65 BSC		
L	0.45	0.60	0.75
L1	1.00 BSC		
L2	0.25REF		
θ	0°	-	8°
θ1-θ4	12°REF		
R1	0.15REF		
R2	0.15REF		

Soldering Footprint



DIM	MILLIMETERS
C	5.80
G	4.30
P	0.65
X	0.28
Y	1.50
Z	7.30

Marking Codes

Part Number	WLN2003AE
Marking Code	

Package Information

Qty：5k/Reel

CONTACT INFORMATION

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Tel: 86-21-50310888 Fax: 86-21-50757680 Email: market@way-on.com
WAYON website: **http://www.way-on.com**

For additional information, please contact your local Sales Representative.

Product Specification Statement

1. The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

2. The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. WAYON shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and WAYON assumes no responsibility for the application of the product.

3. WAYON strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, WAYON cannot guarantee that the information provided in the product specification is entirely accurate and error-free. WAYON shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications. WAYON reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with WAYON to ensure that the product specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult WAYON in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

4. Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

5. The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. WAYON shall assume no responsibility for any consequences resulting from such usage.

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