

7-Channel Darlington Drivers

FEATURES

- Improved Replacement for ULN2803.
- Fast Turn-on and Turn-off.
- TTL/CMOS Compatible.

APPLICATIONS

- Stepping Motor Driver.
- Relay Driver.
- LED Driver.
- Solenoid Driver.

DESCRIPTION

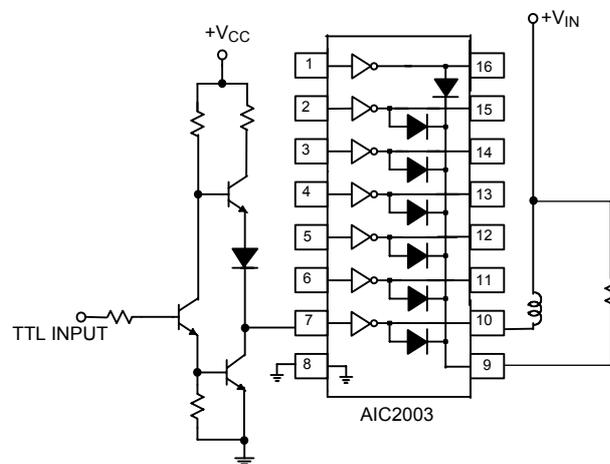
Manufactured with the standard bipolar process, the AIC2003 is a high-voltage, high-current 7-channel Darlington array, with each of the output transistors capable of sinking peak load current of 700mA and capable of withstanding at least 35V in the OFF state.

The AIC2003 has a 2.7K Ω series base resistor to each Darlington pair and thus allows operation directly with TTL or CMOS logic circuitry operating at a supply voltage of 5V. Outputs of the drivers can be paralleled for higher load current capability.

These make the AIC2003 ideally suited for numerous interfaces between low-level logic circuitry and high-power peripheral loads, particularly those beyond the capabilities of standard logic buffers. Typical loads include relays, solenoids, stepping motors, heaters, multiplexed LED, and incandescent displays.

The AIC2003 features open collector outputs and integral diodes for inductive load transient suppression.

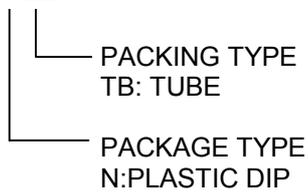
TYPICAL APPLICATION CIRCUIT



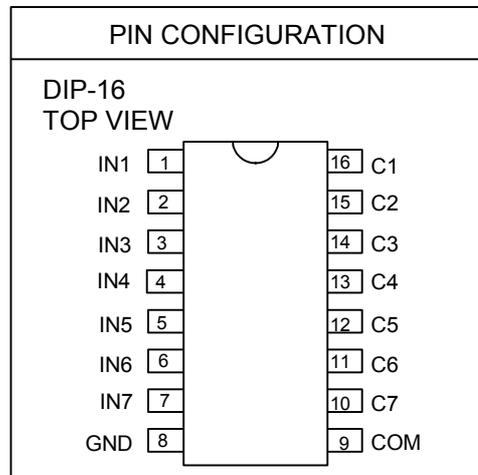
Solenoid Driver

ORDERING INFORMATION

AIC2003CXXX



Example: AIC2003CNTB
 → in DIP-16 Package & Tube Packing Type


ABSOLUTE MAXIMUM RATINGS

Output Voltage, V_{CE}	35V
Input Voltage, V_{IN}	30V
Continuous Collector Current, I_C	500mA
Continuous Base Current, I_B	25mA
Power Dissipation, PD (one Darlington pair).....	1.0W
(total package).....	2.25W
Operating Temperature Range	-40°C to +85°C
Junction Temperature.....	125°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (soldering, 10s).....	235°C

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

■ TEST CIRCUITS

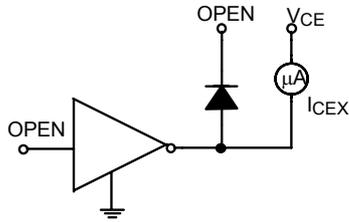


Fig. 1

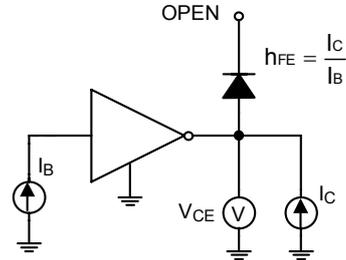


Fig. 2

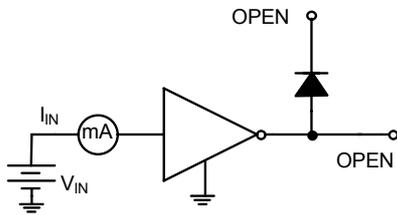


Fig. 3

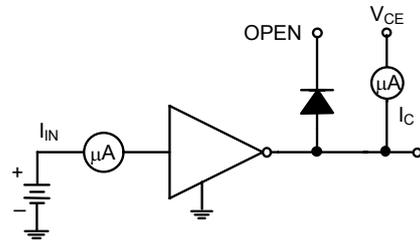


Fig. 4

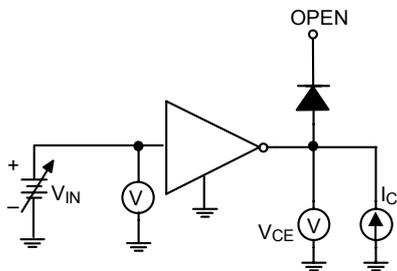


Fig. 5

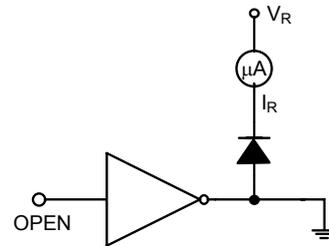


Fig. 6

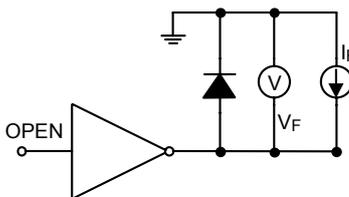


Fig. 7

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.) (Note1)

PARAMETERS	SYMBOL	TEST FIG	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Leakage Current	I_{CEX}	1	$V_{CE}=35\text{V}, T_A=25^\circ\text{C}$ $V_{CE}=35\text{V}, T_A=70^\circ\text{C}$			3 50	μA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	2	$I_C=100\text{mA}, I_B=250\mu\text{A}$ $I_C=200\text{mA}, I_B=350\mu\text{A}$ $I_C=350\text{mA}, I_B=500\mu\text{A}$		0.8 0.9 1.0	1.1 1.3 1.5	V
Input Current	$I_{IN(ON)}$	3	$V_{IN}=3.85\text{V}$		0.93	1.35	mA
	$I_{IN(OFF)}$	4	$I_C=500\mu\text{A}, T_A=70^\circ\text{C}$	50	65		μA
Input voltage	$V_{IN(ON)}$	5	$V_{CE}=2.0\text{V}, I_C=200\text{mA}$			2.3	V
			$V_{CE}=2.0\text{V}, I_C=250\text{mA}$			2.4	
			$V_{CE}=2.0\text{V}, I_C=300\text{mA}$			2.5	
Input Capacitance	C_{IN}				15	25	pF
Turn-On Delay	t_{ON}		$0.5 E_{IN}$ to $0.5 E_{OUT}$		0.25	1.0	μS
Turn-off Delay	t_{OFF}		$0.5 E_{IN}$ to $0.5 E_{OUT}$		0.25	1.0	μS
Clamp Diode Leakage Current	I_R	6	$V_R=35\text{V}, T_A=25^\circ\text{C}$			3	μA
			$V_R=35\text{V}, T_A=70^\circ\text{C}$			50	μA
Clamp Diode Forward Voltage	V_F	7	$I_F=350\text{mA}$		1.4	1.8	V

Note 1: Specifications are production tested at $T_A=25^\circ\text{C}$. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

■ TYPICAL PERFORMANCE CHARACTERISTICS

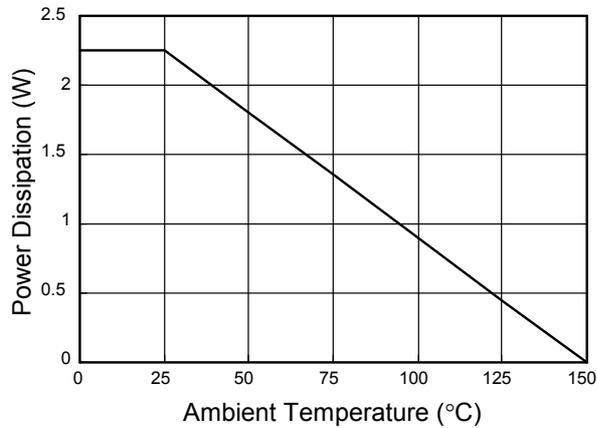
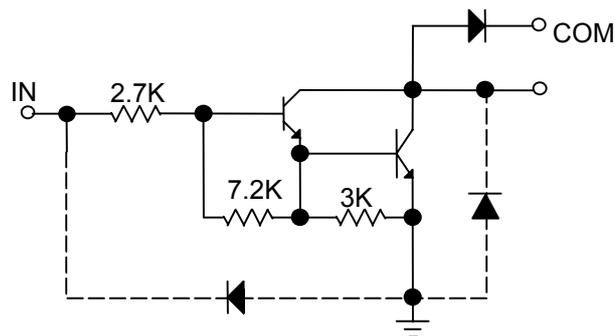


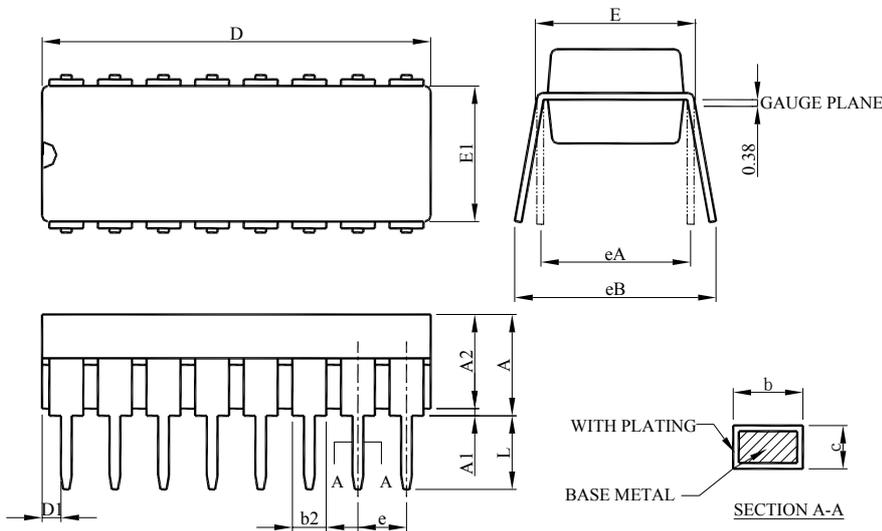
Fig. 8 Power Dissipation vs. Ambient Temperature

■ BLOCK DIAGRAM



■ PIN DESCRIPTIONS

- PIN 1~7: IN1~IN7 - Control signal input pin.
- PIN 8: GND - Power ground.
- PIN 9: COM - The output pin (Cathode) of freewheeling diode.
- PIN 10~16: C1~C7 - Each of the pins may individually sink load current from some controlled circuits. The sink current should be under 500mA in a continuous mode.

PHYSICAL DIMENSIONS (unit: mm)
DIP-16


SYMBOL	DIP-16	
	MILLIMETERS	
	MIN.	MAX.
A		5.33
A1	0.38	
A2	2.92	4.95
b	0.36	0.56
b2	1.14	1.78
c	0.20	0.35
D	18.66	19.69
D1	0.13	
E	7.62	8.26
E1	6.10	7.11
e	2.54 BSC	
eA	7.62 BSC	
eB		10.92
L	2.92	3.81

Note:

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