

High voltage, high current Darlington transistor array

BA12001B / BA12003B / BA12003BF / BA12004B

The BA12001B, BA12003B, BA12003BF, and BA12004B are high voltage, high current, high sustain voltage transistor arrays consisting of seven circuits of Darlington transistors.

Because it incorporates built-in surge-absorbing diodes and base current-control resistors needed when using inductive loads such as relay coils, attachments can be kept to a minimum.

With an output sustain voltage as high as 60V and an output current (sink current) of 500mA, this product is ideal for use with various drivers and as an interface with other elements.

●Applications

Drivers for LEDs, lamps, relays and solenoids

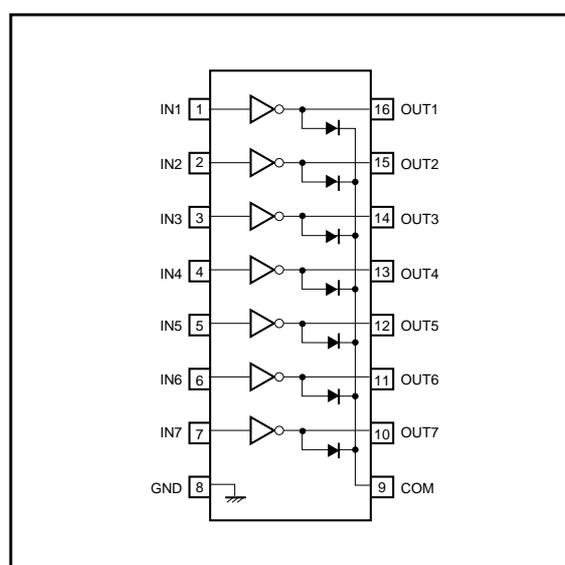
Interface with other elements

●Features

- 1) High output current. ($I_{OUT}=500\text{mA Max.}$)
- 2) High output sustain voltage. ($V_{OUT}=50\text{V Max.}$)
- 3) Seven Darlington transistors built in.
- 4) Built-in surge-absorbing clamp diode.

(Note : Refer to the "Reference items when using in application.")

●Block diagram



BA12001B / BA12003B / BA12003BF / BA12004B

Standard ICs

●Internal circuit configuration

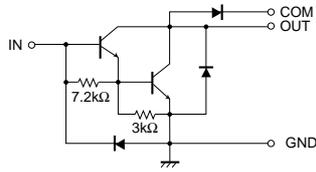


Fig.1 BA12001B

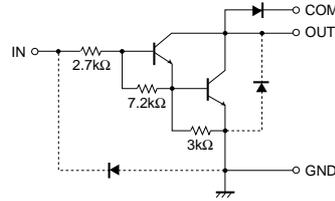


Fig.2 BA12003B / BF

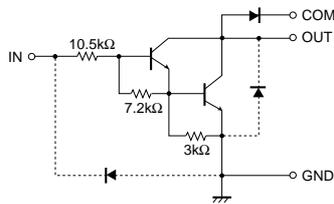


Fig.3 BA12004B

●Absolute maximum ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Power supply voltage		V _{CE}	60	V
Input voltage	other than BA12001B	V _{IN}	-0.5~+30	V
Input current	BA12001B	I _{IN}	25	mA / unit
Output current		I _{OUT}	500	mA / unit
Ground pin current		I _{GND}	2.3*1	A
Power dissipation	DIP package	P _d	1250*2	mW
	SOP package		625*3	
Diode reverse voltage		V _R	60	V
Diode forward current		I _F	500	mA
Operating temperature		T _{opr}	-25~+75	°C
Storage temperature		T _{stg}	-55~+150	°C

*1 Pulse width ≤ 20ms, duty cycle ≤ 10%, same current for all 7 circuits

*2 Reduced by 10mW for each increase in Ta of 1°C over 25°C .

*3 Reduced by 50mW for each increase in Ta of 1°C over 25°C .

●Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output current	I _{OUT}	-	-	350	mA	Fig.9, 10
Power supply voltage	V _{CE}	-	-	55	V	-
Input voltage (excluding BA12001B)	V _{IN}	-	-	30	V	-
Input current (BA12001B only)	I _{IN}	-	-	25	mA / unit	-

BA12001B / BA12003B / BA12003BF / BA12004B

Standard ICs

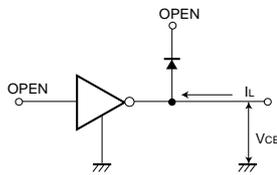
●Electrical characteristics (Ta=25°C)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Output leakage current		I_L	–	0	10	μA	$V_{CE} = 60\text{V}$
DC current transfer ratio		h_{FE}	1000	2400	–	V	$V_{CE} = 2\text{V}, I_{OUT} = 350\text{mA}$
Output saturation voltage		$V_{CE(sat)}$	–	0.94	1.1	V	$I_{OUT} = 100\text{mA}, I_{IN} = 250\mu\text{A}$
				1.14	1.3		$I_{OUT} = 200\text{mA}, I_{IN} = 350\mu\text{A}$
				1.46	1.6		$I_{OUT} = 350\text{mA}, I_{IN} = 500\mu\text{A}$
Input voltage	BA12003B / BF	V_{IN}	–	1.75	2	V	$V_{CE} = 2\text{V}, I_{OUT} = 100\text{mA}$
	BA12004B			2.53	5		
	BA12003B / BF	V_{IN}	–	1.91	2.4	V	$V_{CE} = 2\text{V}, I_{OUT} = 200\text{mA}$
	BA12004B			2.75	6		
	BA12003B / BF	V_{IN}	–	2.17	3.4	V	$V_{CE} = 2\text{V}, I_{OUT} = 350\text{mA}$
	BA12004B			3.27	8		
Input current	BA12003B / BF	I_{IN}	–	0.90	1.35	mA	$V_{IN} = 3.85\text{V}$
	BA12004B			0.39	0.5		$V_{IN} = 5\text{V}$
Diode reverse current		I_R	–	0	50	μA	$V_R = 60\text{V}$
Diode forward voltage		V_F	–	1.73	2	V	$I_F = 350\text{mA}$
Input capacitance		C_{IN}	–	30	–	pF	$V_{IN} = 0\text{V}, f = 1\text{MHz}$

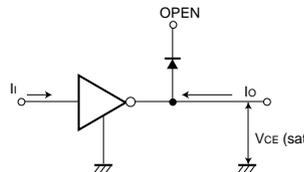
Note: Input voltage and input current for BA12001 vary based on external resistor.

●Measurement circuits

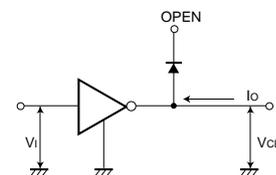
(1) Output leakage current I_L



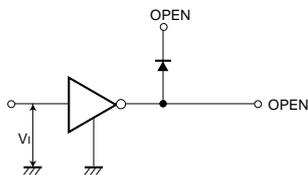
(2) DC current transfer ratio $h_{FE} = \frac{I_o}{I_i}$
Output saturation voltage $V_{CE(sat)}$



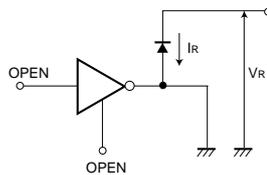
(3) Input voltage V_{IN}



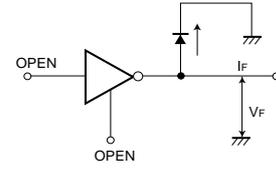
(4) Input current I_{IN}



(5) Diode reverse current I_R



(6) Diode forward voltage I_F



(7) Input capacitance C_{IN}

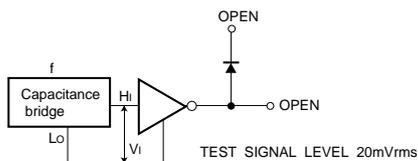


Fig.4