



TDE1767, A TDE1787, A

INTERFACE CIRCUIT (RELAY AND LAMP-DRIVER)

- OPEN GROUND PROTECTION
- HIGH OUTPUT CURRENT
- ADJUSTABLE SHORT-CIRCUIT PROTECTION
- INTERNAL THERMAL PROTECTION WITH EXTERNAL RESET
- LARGE SUPPLY VOLTAGE RANGE
- ALARM OUTPUT
- INPUT VOLTAGE CAN BE HIGHER THAN V_{CC}
- OUTPUT VOLTAGE CAN BE LOWER THAN GROUND ($V_{CC} - V_O \leq V_{CC}[\text{max}]$)

DESCRIPTION

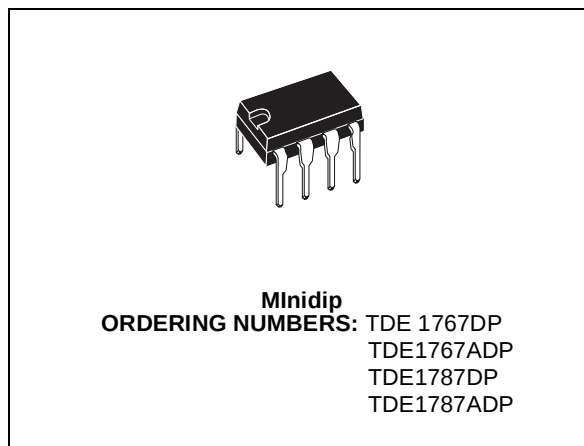
The TDE1767, A / TDE1787, A are a monolithic amplifiers designed for high current and high voltage applications, specifically to drive lamps, relays, stepping motors.

The devices are essentially blow-out proof. The output is protected from short-circuits with the positive supply or drive. In addition thermal shut down is provided to keep the IC from overheating.

If internal dissipation becomes too high, the driver will shut down to prevent excessive heating. The output stays null after the overheating is off, if the reset input is low. If high the output will alternatively switch-on and off until the overload is removed.

The devices operates over a wide range voltages from standard 15V operational amplifier supplies to the single +6V or +48V used for industrial electric systems. Input voltages can be higher than in the V_{CC} .

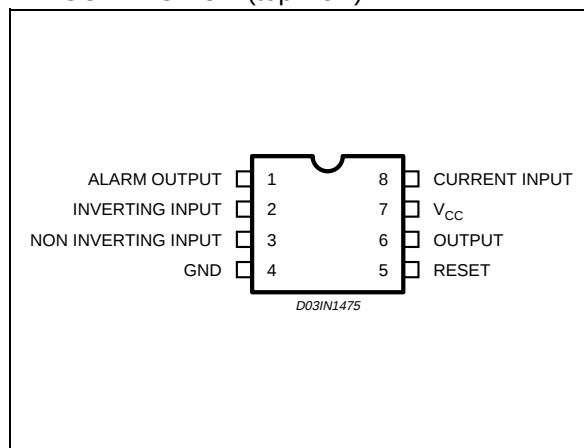
An alarm output suitable for driving a LED is provided.



This LED, normally on (if referred to ground), will die out or flash during an overload depending on the state of the reset input.

The output is low in open ground conditions.

PIN CONNECTION (top view)



THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th j-c}$	Thermal Resistance Junction-Case	max 30	°C/W
$R_{th j-a}$	Thermal Resistance Junction-Ambient	max 80	°C/W

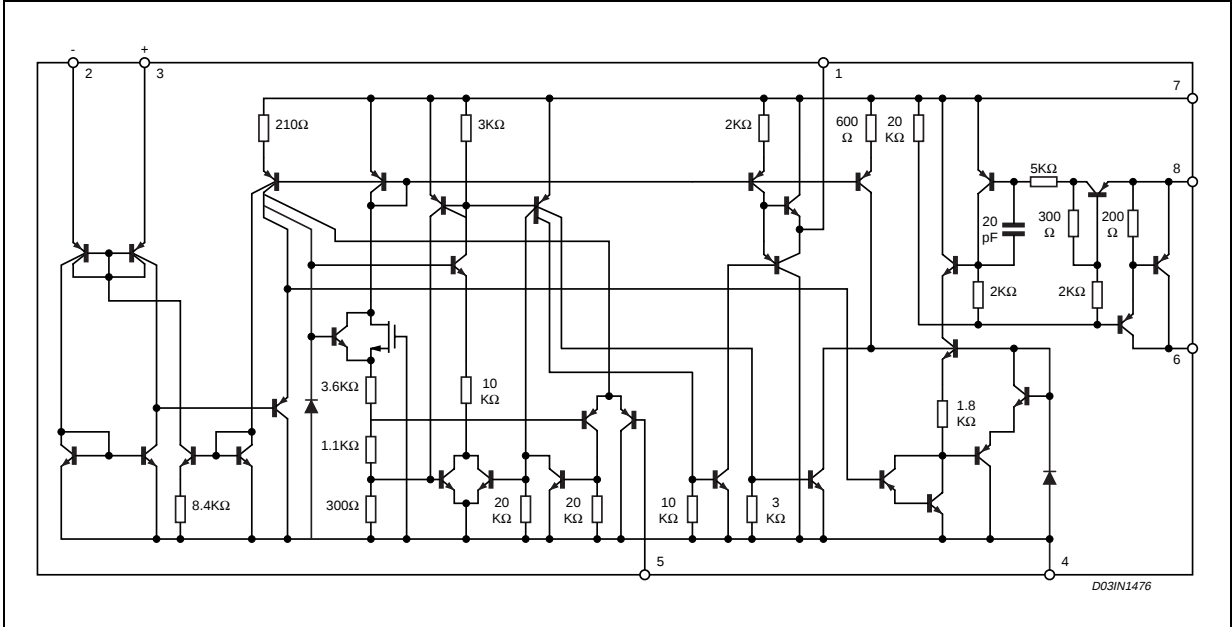
* Devices bonded on a 40 cm² glass-epoxy printed circuit 0.15 cm thick with 4 cm² of copper.

TDE1767, A TDE1787, A

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	TDE1767A/TDE1787A	TDE1767/TDE1787	Unit
V _{CC}	Supply Voltage	60	50	V
V _{ID}	Input Differential Voltage	60	50	V
V _I	Input Voltage	- 10 to + 60	- 10 to + 50	V
I _O	Output Current	1.3	1.2	A
V _{I(reset)}	Reset Input Voltage	- 0.5 to + 60	- 0.5 to + 50	V
I _{OA}	Alarm Output Current	- 10 to + 20	- 10 to + 20	mA
P _{tot}	Power Dissipation	Internally Limited		mW
T _{oper}	Operating Ambient Temperature Range	- 25 to + 85	- 25 to + 85	°C
T _{stg}	Storage Temperature Range	- 65 to + 150	- 65 to + 150	°C

SCHEMATIC DIAGRAM



EQUIVALENT SCHEMATIC

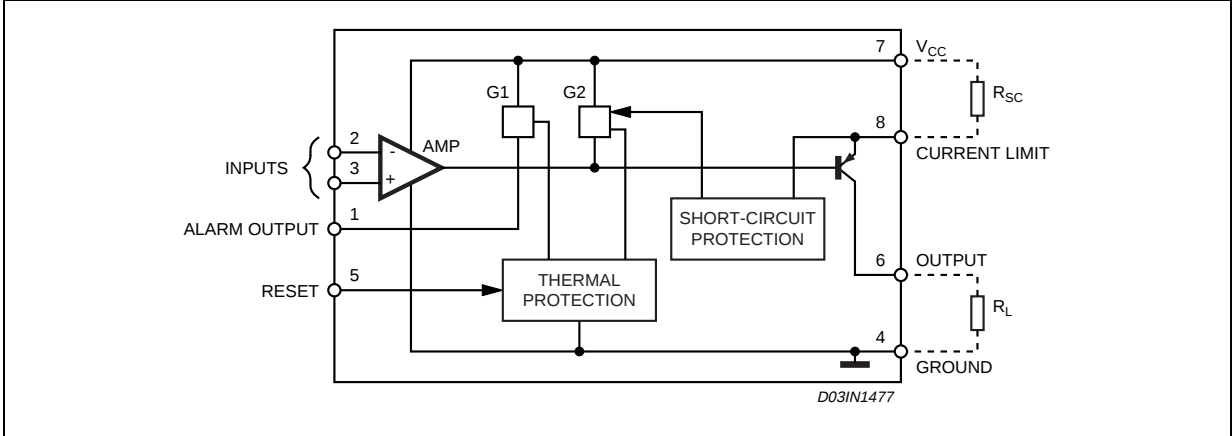
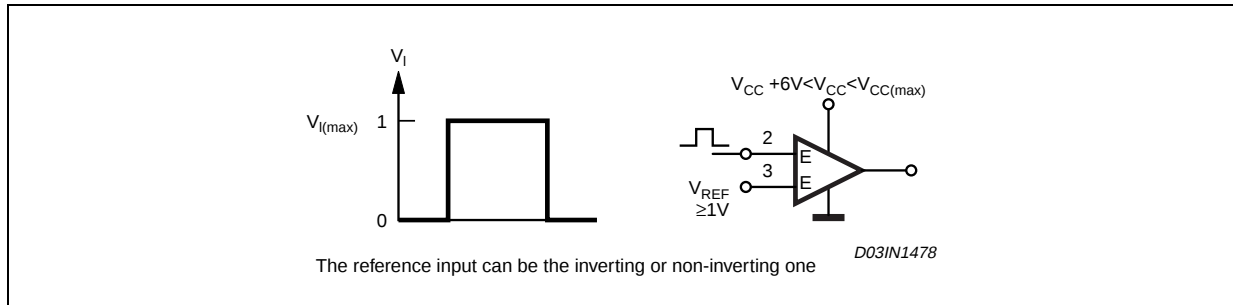


Figure 1.

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified)**TDE1767A:** - 25°C ≤ T_{amb} ≤ 85°C, 6V ≤ V_{CC} ≤ 55V, I_O ≤ 500mA, T_j ≤ 150°C**TDE1767:** - 25°C ≤ T_{amb} ≤ 85°C, 6V ≤ V_{CC} ≤ 45V, I_O ≤ 500mA, T_j ≤ 150°C**TDE1787A:** - 25°C ≤ T_{amb} ≤ 85°C, 6V ≤ V_{CC} ≤ 55V, I_O ≤ 300mA, T_j ≤ 150°C**TDE1787:** - 25°C ≤ T_{amb} ≤ 85°C, 6V ≤ V_{CC} ≤ 45V, I_O ≤ 300mA, T_j ≤ 150°C

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V _{IO}	Input Offset Voltage	(note 1)		2	50	mV
I _{CC}	Power Supply Current	(measured on pin 4)				
		Output High (T _{amb} = 25°C)		5.8	8	mA
		Output High (V _{CC} = V _{CCmax} , T _j = 150°C)		5	7	mA
		Output Low (V _{CC} = V _{CCmax} , T _{amb} = 25°C)		1.5	4	mA
I _{IB}	Input Bias Current			15	100	μA
V _{CM}	Common-mode Input Voltage Range	TDE1787A, TDE1767A TDE1787, TDE1767	1 1		60 45	V V
V _I	Input Voltage Range	V _{ref} ≥ 1V (figure1, note2) TDE1787A, TDE1767A TDE1787, TDE1767	1 1		60 45	V V
I _{SC}	Short Circuit Output Current	V _{CC} = 35V, t = 10ms TDE1767A: R _{SC} = 0.22Ω TDE1787A: R _{SC} = 0.33Ω		700 380		mA mA
V _{sense}	Output Limit Sense Voltage	V _O = V _{CC} - 2V, t = 10ms	130	150	170	mV
V _{sense}	Output Limit Sense Voltage	V _O = 0V, t = 10ms	120	140	165	mV
V _{O(sat)}	Output Saturation Voltage	Output High V _I ⁺ - V _I ⁻ ≥ 50mV; R _{SC} = 0; V _{CC} = 30V TDE1787A, TDE1767A: T _j = 25°C TDE1787, TDE1767: T _j = 25°C TDE1787A, TDE1767A: T _j = 150°C TDE1787, TDE1767: T _j = 150°C		1 1 1.1 1.1	1.1 1.2 1.2 1.3	V V V V
I _{OL}	Output Leakage Current	Output Low			100	μA

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_A	Available Alarm Output Current	Output Source Current $V_{AH} = V_{CC} - 2.5V$	-4	-5		mA
		Output Sink Current (in thermal shut-down) $V_A = 1.4V$	5	10		mA
I_{reset}	Reset Input Current			2	40	μA
$V_{th-reset}$	Reset Threshold			1.4		A
	Output Leakage Current	open ground		10		μA

Note: 1. The offset voltage given is the maximum value of different input voltage required to drive the output voltage within 2 V of the ground or the supply voltage.
2. Input voltage range is independent of the supply voltage.

Figure 2. Peak Short-circuit vs Limiting Resistor

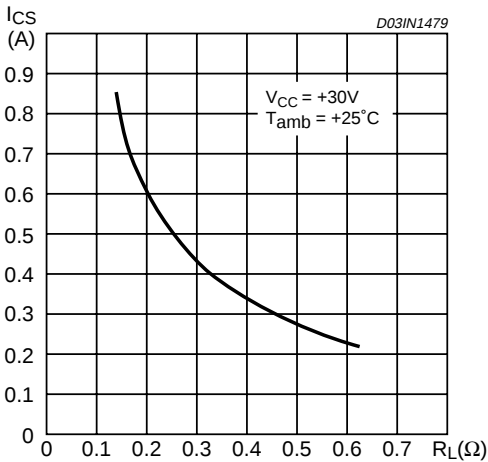


Figure 3. Available Output Current vs Limiting Resistor

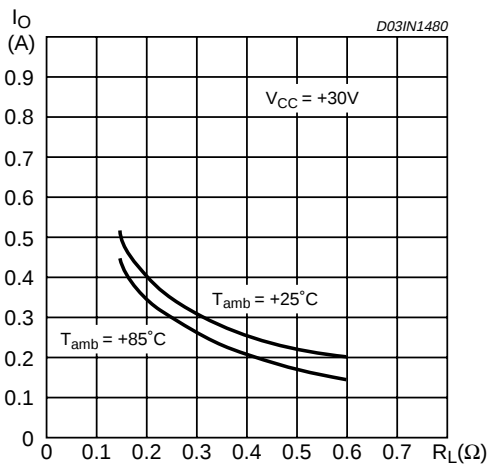


Figure 4. Power Supply Current (pin 4)

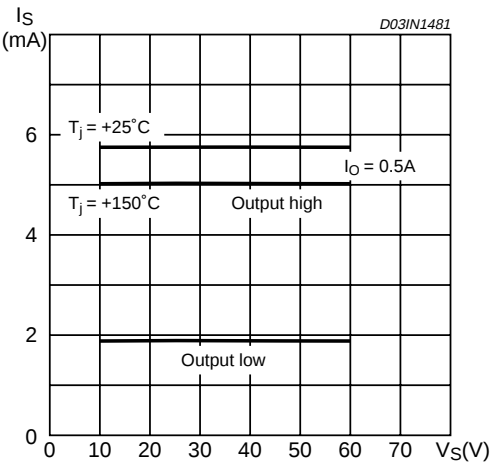


Figure 5. Output Saturation Voltage vs Output Current

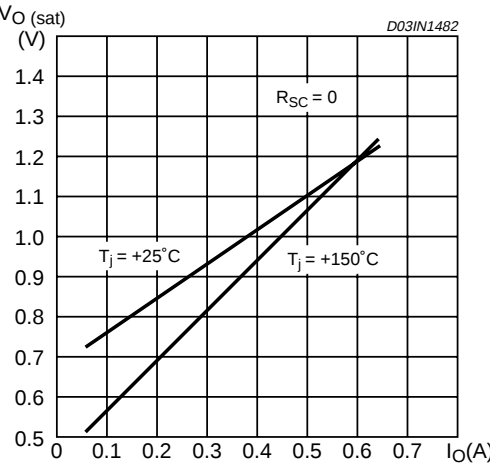


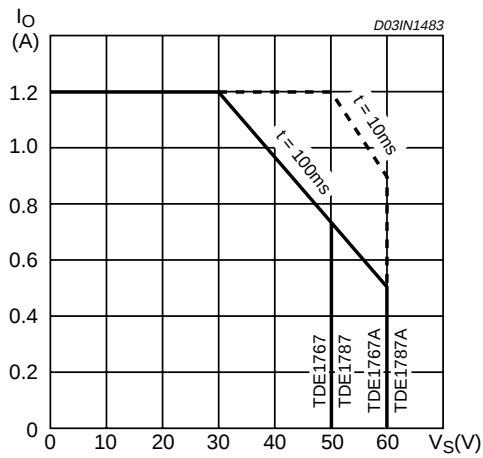
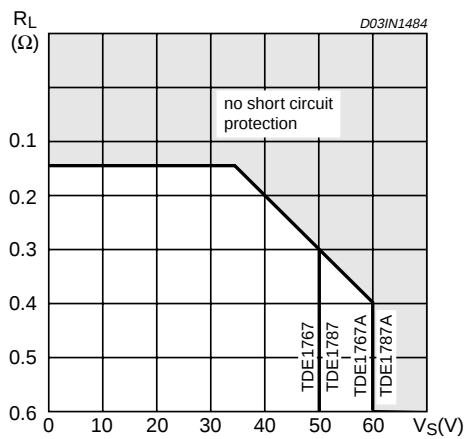
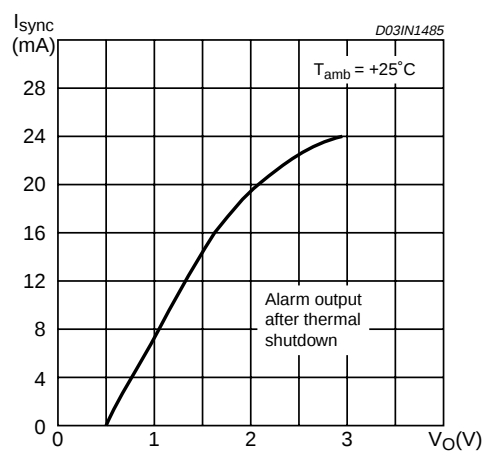
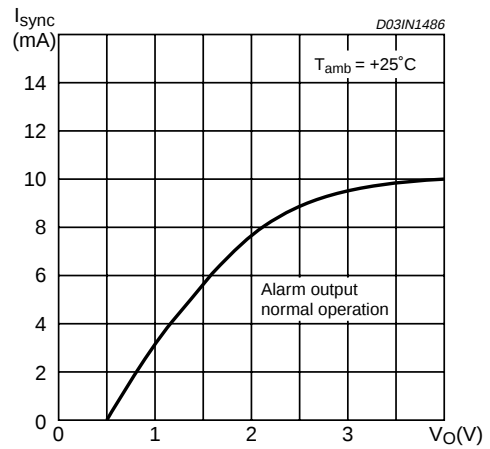
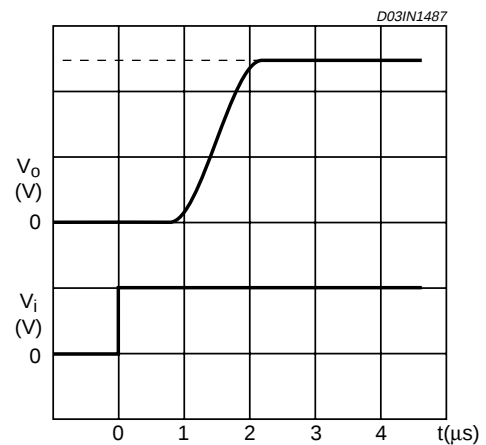
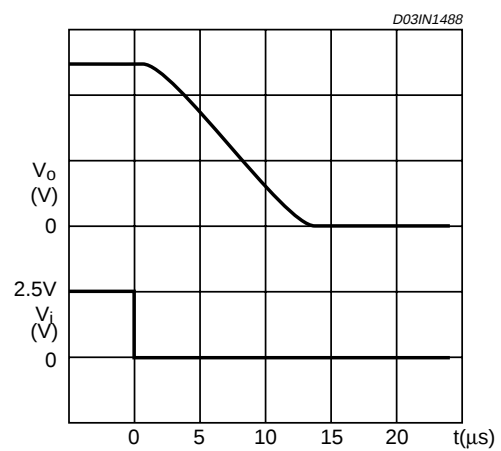
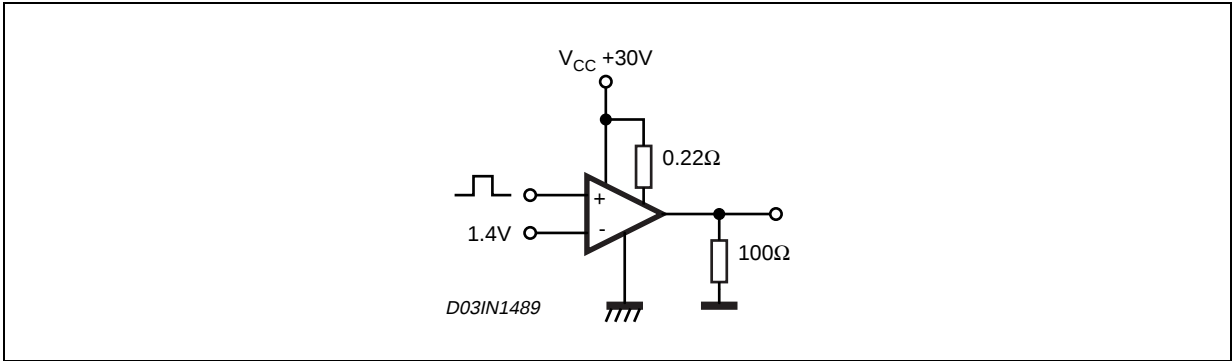
Figure 6. Output Transistor Safe Operating Area (pulsed))**Figure 7. Normal Operating Area (short circuit protected)****Figure 8. Current Sinking****Figure 9. Current Sourcing****Figure 10. Response Time****Figure 11. Response Time**

Figure 12. Test Circuit



TYPICAL APPLICATION

Figure 13. Open Load Detection.4

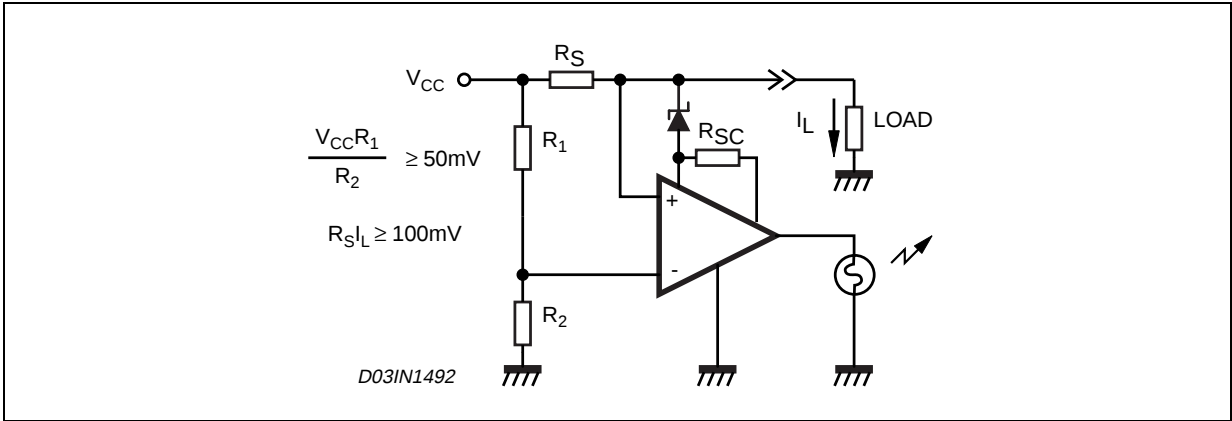


Figure 14. Driving Lamps, Relays, Etc...

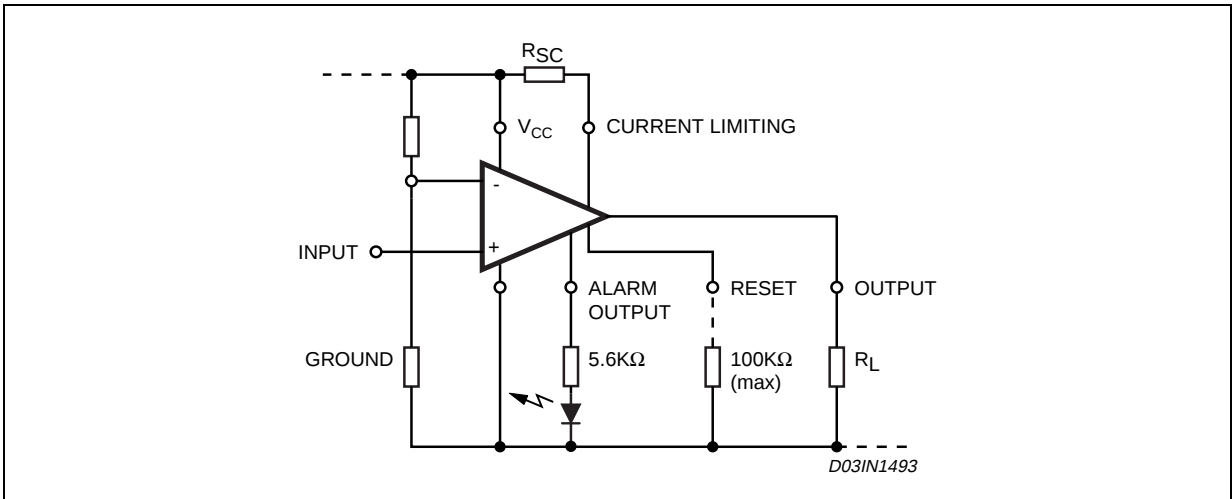


Figure 15. Common Reset.

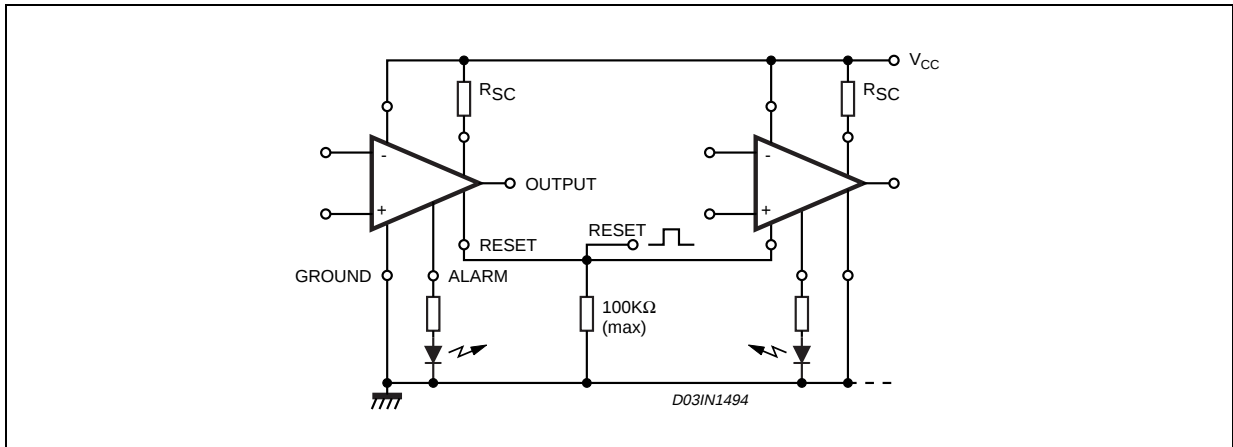
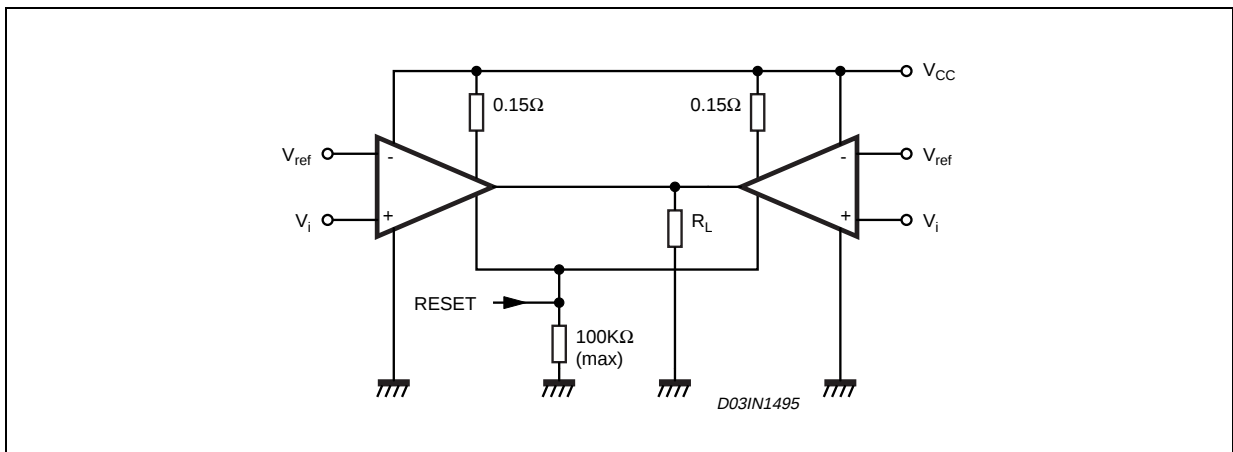


Figure 16. Parallel Driving of Loads Up to 1 A.



USING ALARM OUTPUT

Figure 17. Parallel Alarm Output

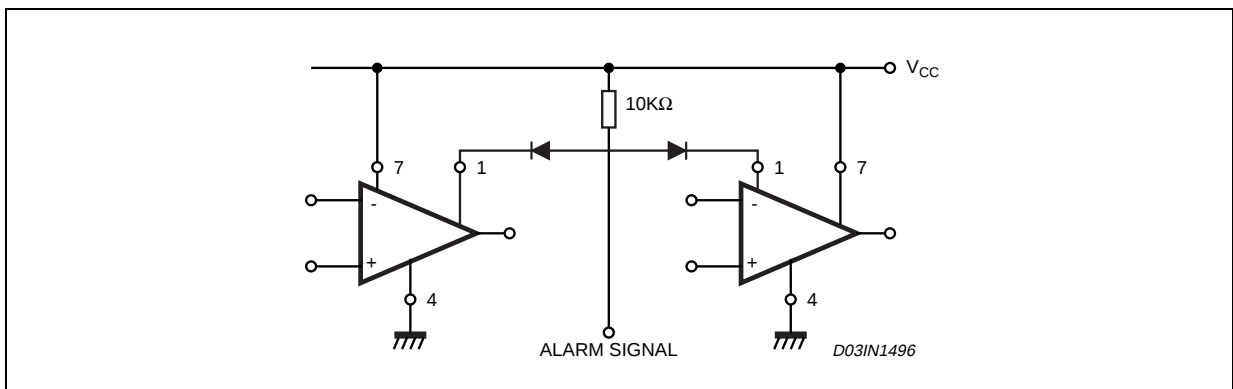


Figure 18. Led to VCC.

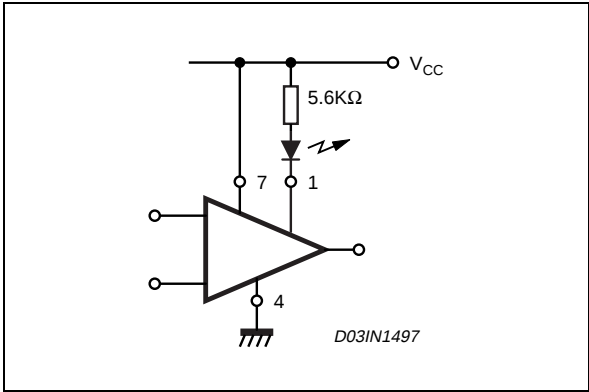


Figure 19. Led to Ground

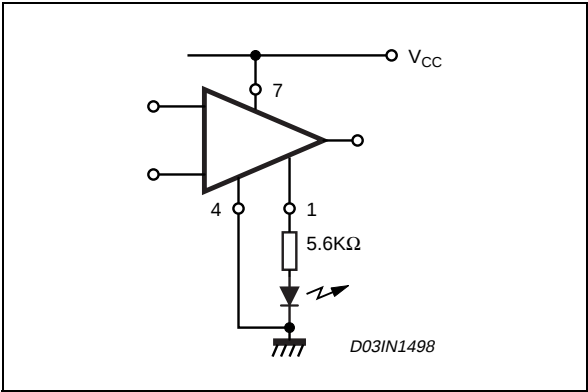


Figure 20. Interface Between High Voltage and Low Voltage System.

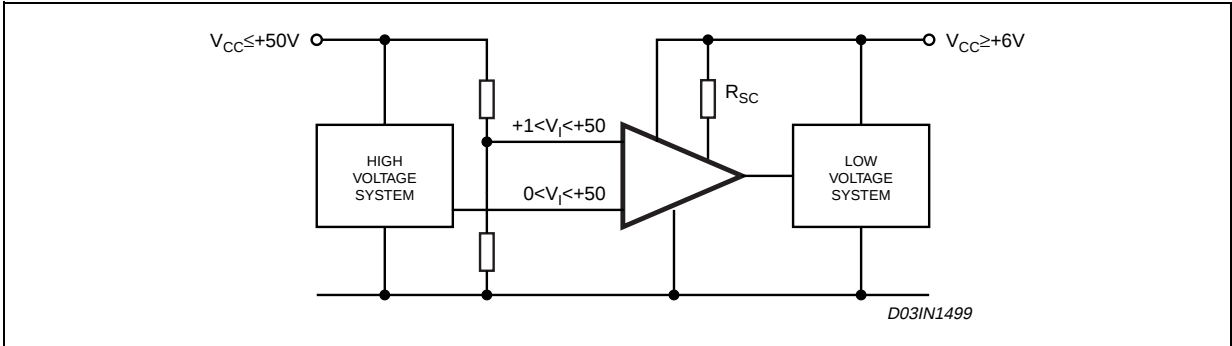
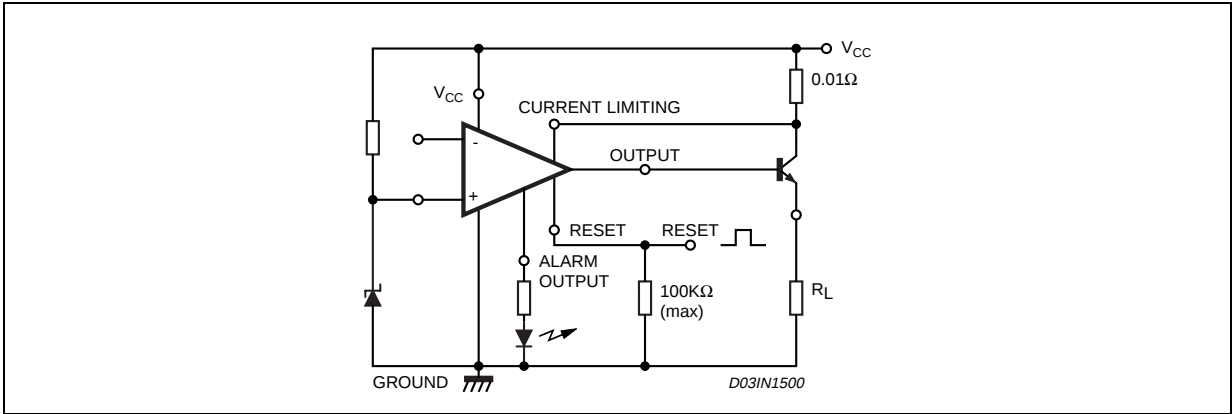
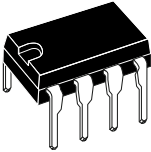


Figure 21. Increasing Current Up to 10A.

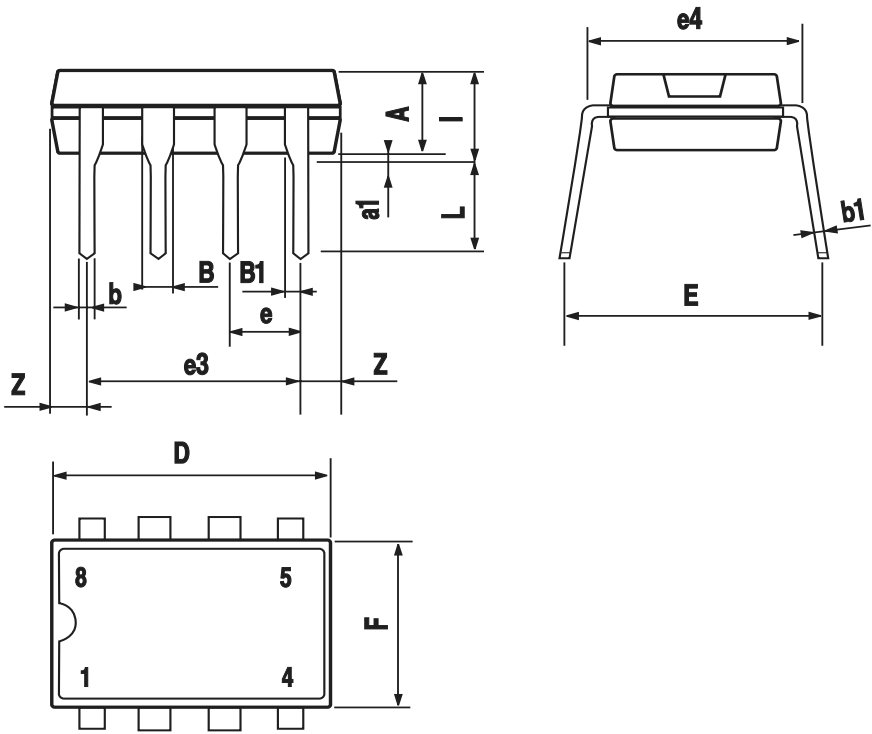


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

OUTLINE AND MECHANICAL DATA



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