

April 1994

## High-Side Driver

### Features

- Equivalent High Pass P-N-P Transistor
- Current Limiting.....0.6A to 1.2A
- Over-Voltage Shutdown .....+25V to +40V
- Junction Temperature Thermal Limit.....+150°C
- Equivalent Beta of 25.....400mA/0.5V
- Internal Bandgap Voltage and Current Reference

### Applications

- Fuel Pump Driver
- Relay Driver
- Solenoid Driver
- Stepper Motor Driver
- Remote Power Switch
- Logic Control Switch

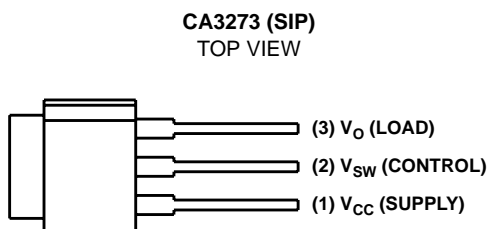
### Description

The CA3273 is a power IC equivalent of a P-N-P pass transistor operated as a high-side-driver current switch in either the saturated (ON) or cutoff (OFF) modes. The CA3273 incorporates circuitry to protect the pass currents, excessive input voltage, and thermal overstress. The high-side driver is intended for general purpose, automotive and potentially high-stress applications. If high-stress conditions exist, the use of an external zener diode of 35V or less between supply and load terminals may be required to prevent damage due to severe conditions (such as load dump, reverse battery and positive or negative transients). The CA3273 is designed to withstand a nominal reverse-battery (VBAT = 13V) condition without permanent damage to the IC. The CA3273 is supplied in a modified 3-lead TO-202 plastic power package.

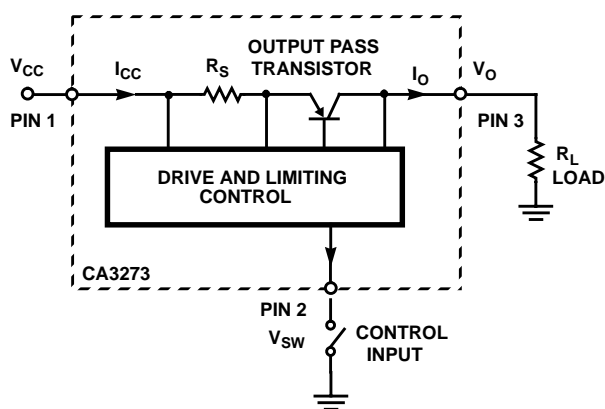
### Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
CA3273	-40°C to +85°C	TO-202 Modified SIP

### Pinout



### Block Diagram



## Specifications CA3273

### Absolute Maximum Ratings

Fault Max, Supply Voltage,  $V_{CC}$  ..... 40V  
 Maximum Operating  $V_{CC}$ :  
     At  $I_O = 400\text{mA}$  (-40°C to +85°C Ambient) ..... 16V  
     At  $I_O = 600\text{mA}$  (-40°C to +25°C Ambient) ..... 24V  
 Max. Positive Output Peak Pulse,  $V_{SW}$  Open .....  $V_{CC} + 12\text{V}$   
 Max. Operating Output Load Current ..... 600mA  
 Short Circuit Load Current,  $I_{SC}$  ..... Internal Limiting  
 Reverse Battery ..... -13V

### Thermal Information

Thermal Resistance  $\theta_{JA}$   
 Plastic SIP Package ..... +70°C/W  
 Maximum Power Dissipation,  $P_D$   
     At +25°C Ambient,  $T_A$  (Note 1) ..... 1.8W  
     Derate above +25°C (No Heat Sink) ..... 14.3mW/°C  
 Maximum Junction Temperature,  $T_J$  (Note 2) ..... 150°C  
 Ambient Operating Temperature Range ..... -40°C to +85°C  
 Storage Temperature Range ..... -40°C to +150°C  
 Lead Temperature (Soldering 10s max) ..... +265°C

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### Electrical Specifications $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ , Unless Otherwise Noted, See Block Diagram for Test Pin Reference

PARAMETERS	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage Range	$V_{CC}$	$V_{CC}$ Reference to $V_{SW}$	4	-	24	V
Saturation Voltage( $V_{CC} - V_O$ )	$V_{SAT}$	$I_O = -400\text{mA}$ , $V_{SW} = 0\text{V}$ , $V_{CC} = 16\text{V}$	-	-	0.5	V
Operating Load	$R_L$	$V_{SW} = 0\text{V}$ (Switch ON)				
		$T_A = +85^\circ\text{C}$ , $V_{CC} = 16\text{V}$	40	-	-	$\Omega$
		$T_A = +25^\circ\text{C}$ , $V_{CC} = 24\text{V}$	40			$\Omega$
Over-Voltage Shutdown Threshold	$V_{CC(THD)}$	$V_{SW} = 0\text{V}$ , $R_L = 1\text{k}\Omega$ , Increase $V_{CC}$ , ( $V_O$ goes low)	25	33	40	V
Over-Current Limiting	$I_{O(LIM)}$	$V_{CC} = 16\text{V}$ , $V_{SW} = 1\text{V}$ (Switch ON)	-	-	1.2	A
Over-Temperature Limiting	$T_{LIM}$		-	150	-	°C
Control Current, Switch ON	$I_{SW}$	$V_{CC} = 16\text{V}$ , $V_{SW} = 0\text{V}$				
		$I_O = 0\text{mA}$	-	-15	-	mA
		$I_O = -400\text{mA}$	-	-22	-	mA
Control Current, Max. Load, Switch ON		$V_{CC} = 24\text{V}$ , $V_{SW} = 0\text{V}$ , $I_O = -600\text{mA}$	-	-33	-	mA
Max. Control Current, High and Low $V_{CC}$	$I_{SW(MAX)}$	$R_L = 40\Omega$ , $V_{SW} = 1\text{V}$				
		$V_{CC} = 24\text{V}$	-50	-	-	mA
		$V_{CC} = 7\text{V}$	-50	-	-	mA
Min. Control Current, No Load, Switch OFF	$I_{SW(NL)}$	$V_O = \text{Open}$ , (Switch OFF)				
		$V_{CC} = 24\text{V}$ , $V_{SW} = 23\text{V}$	-200	-	+50	$\mu\text{A}$
		$V_{CC} = 7\text{V}$ , $V_{SW} = 6\text{V}$	-200	-	+50	$\mu\text{A}$
Output Current Leakage	$I_{O(LEAK)}$	$V_O = 0\text{V}$ , $V_{CC} = 16\text{V}$ , (Switch OFF)				
		$V_{SW} = 16\text{V}$	-100	-	+100	$\mu\text{A}$
		$V_{SW} = 15\text{V}$	-100	-	+100	$\mu\text{A}$

#### NOTES:

- The calculation for dissipation and junction temperature rise due to dissipation is:  $P_D = (V_{CC} - V_O) \times I_O + V_{CC} \times I_{SW}$  and  $T_J = T_A + P_D \times \theta_{JA}$  where  $T_J$  is device junction temperature,  $T_A$  is ambient temperature and  $\theta_{JA}$  is the junction-to-ambient thermal resistance.
- Thermal limiting occurs at +150°C on the chip.

# CA3273

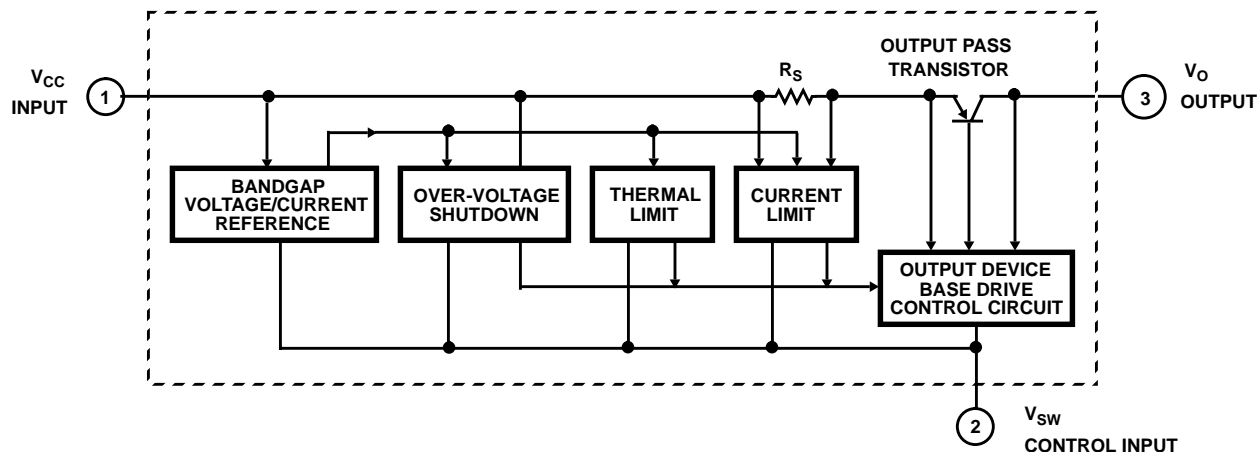


FIGURE 1. FUNCTIONAL BLOCK DIAGRAM OF CA3273

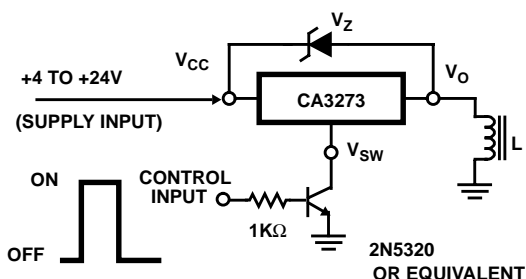


FIGURE 2. TYPICAL APPLICATION WITH ZENER DIODE FOR OVER-VOLTAGE PROTECTION WITH INDUCTIVE LOAD SWITCHING.  $V_Z$  SHOULD BE LESS THAN 35V. WHEN CURRENT IS SWITCHED OFF IN THE OUTPUT LOAD (L), THE INDUCTIVE KICK PULSE GOES NEGATIVE. THE CLAMPED CLAMP LEVEL OF THE NEGATIVE GOING PULSE IS  $V_{CC} - V_Z$ .

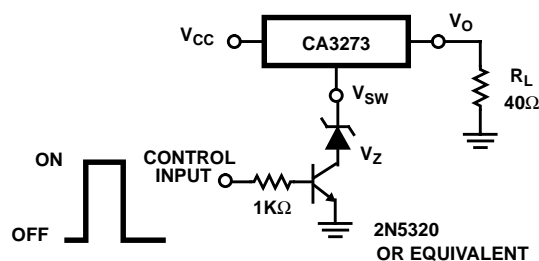


FIGURE 3. OPTIONAL RANGE SHIFTING OF THE  $V_{CC}$  INPUT VOLTAGE USING A ZENER DIODE TO OFFSET THE  $V_{SW}$  CONTROL PIN. (I.E., THE OVER-VOLTAGE SHUTDOWN THRESHOLD WILL BE INCREASED TO  $V_{CC(THD)} + V_Z$  AND THE MINIMUM  $V_{CC}$  OPERATING VOLTAGE IS  $V_Z + 4V$ ).

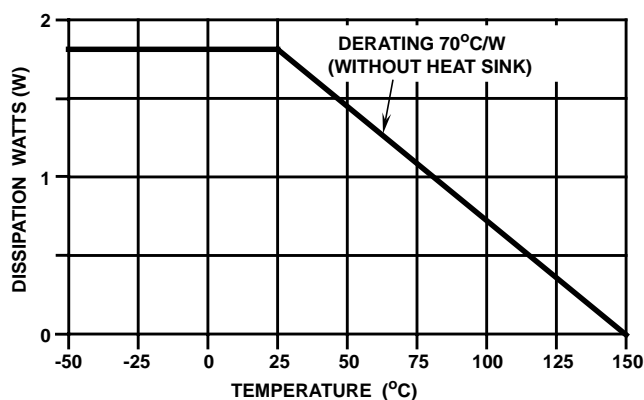


FIGURE 4. DISSIPATION DERATING CURVES

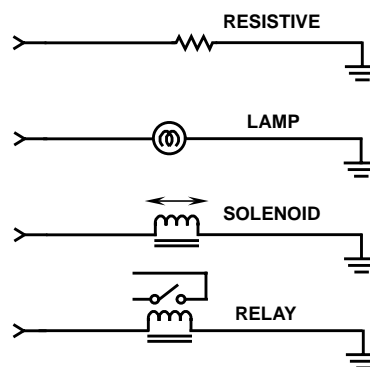


FIGURE 5. TYPICAL LOADS

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