CA3273

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^{o}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

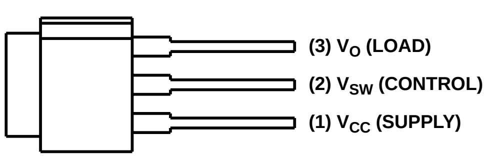
The CA3273 is a power IC equivalent of a P-N-P pass transistor operated as a high-side-driver current switch in either the saturated (ON) or cutoff (OFF) modes. The CA3273 incorporates circuitry to protect the pass currents, excessive input voltage, and thermal overstress. The high-side driver is intended 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

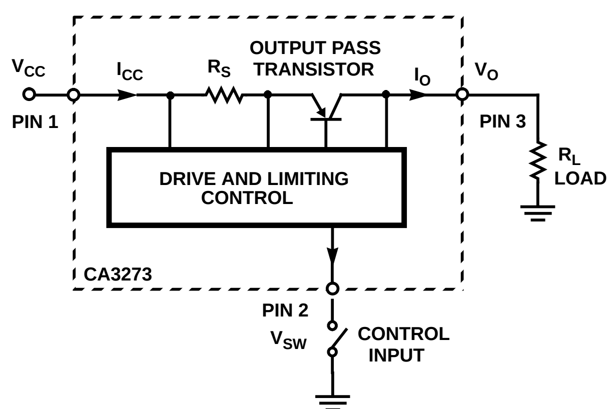
PART NUMBER	TEMPERATURE RANGE	PACKAGE
CA3273	-40^{o}C to +85^{o}C	TO-202 Modified SIP

Pinout

CA3273 (SIP)
TOP VIEW



Block Diagram



CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
407-727-9207 |

File Number **2113.4**

Absolute Maximum Ratings

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

Thermal Information

Thermal Resistance θ_{JA}
Plastic SIP Package . . . . +70^{o}C/W
Maximum Power Dissipation, P_D
At +25^{o}C Ambient, T_A (Note 1) 1.8W
Derate above +25^{o}C (No Heat Sink) . . . . . 14.3mW/^{o}C
Maximum Junction Temperature, T_J (Note 2) . . . . . 150^{o}C
Ambient Operating Temperature Range . . . . -40^{o}C to +85^{o}C
Storage Temperature Range . . . . -40^{o}C to +150^{o}C
Lead Temperature (Soldering 10s max) . . . . . . +265^{o}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^{o}C to +85^{o}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 = -400mA, V_{SW} = 0V, V_{CC} = 16V	-	-	0.5	V
Operating Load	R_L	V_{SW} = 0V (Switch ON)				
		T_A = +85^{o}C, V_{CC} = 16V	40	-	-	Ω
		T_A = +25^{o}C, V_{CC} = 24V	40			Ω
Over-Voltage Shutdown Threshold	$V_{CC(THD)}$	V_{SW} = 0V, R_L = 1kΩ, Increase V_{CC}, (V_O goes low)	25	33	40	V
Over-Current Limiting	$I_{O(LIM)}$	V_{CC} =16V, V_{SW} = 1V (Switch ON)	-	-	1.2	A
Over-Temperature Limiting	T_{LIM}		-	150	-	^{o}C
Control Current, Switch ON	I_{SW}	V_{CC} =16V, V_{SW} = 0V				
		I_O = 0mA	-	-15	-	mA
		I_O = -400mA	-	-22	-	mA
Control Current, Max. Load, Switch ON		V_{CC} = 24V, V_{SW} = 0V, I_O = -600mA	-	-33	-	mA
Max. Control Current, High and Low V_{CC}	$I_{SW(MAX)}$	R_L = 40Ω, V_{SW} = 1V				
		V_{CC} = 24V	-50	-	-	mA
		V_{CC} = 7V	-50	-	-	mA
Min. Control Current, No Load, Switch OFF	$I_{SW(NL)}$	V_O = Open, (Switch OFF)				
		V_{CC} = 24V, V_{SW} = 23V	-200	-	+50	µA
		V_{CC} = 7V, V_{SW} = 6V	-200	-	+50	µA
Output Current Leakage	$I_{O(LEAK)}$	V_O = 0V, V_{CC} = 16V, (Switch OFF)				
		V_{SW} =16V	-100	-	+100	µA
		V_{SW} =15V	-100	-	+100	µA

NOTES:

1. 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 θ_{JA} is the junction-to-ambient thermal resistance.
2. Thermal limiting occurs at +150^{o}C on the chip.

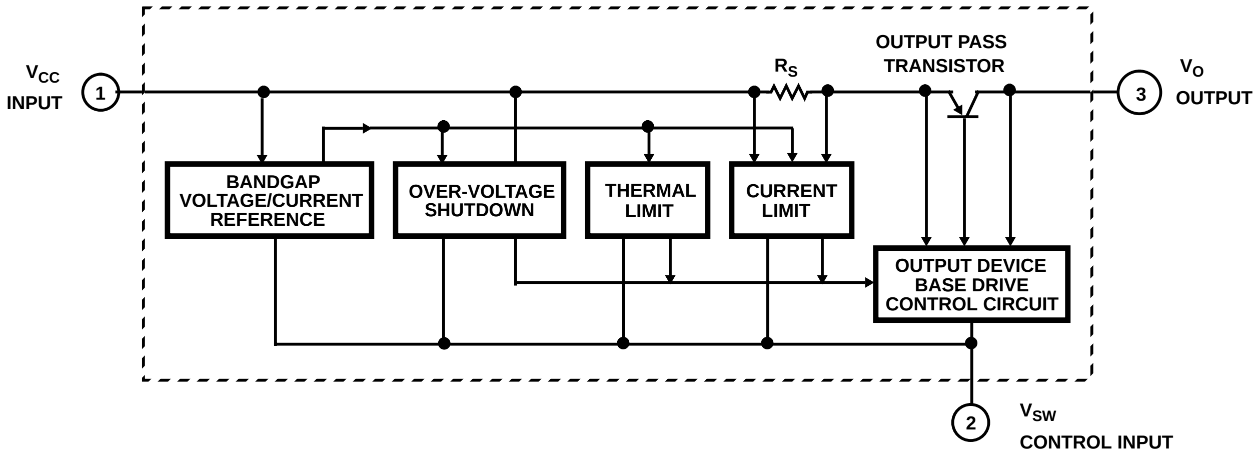


FIGURE 1. FUNCTIONAL BLOCK DIAGRAM OF CA3273

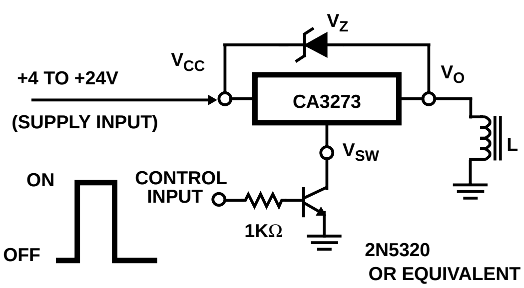


FIGURE 2. TYPICAL APPLICATION WITH ZENER DIODE FOR OVER-VOLTAGE PROTECTION WITH INDUCTIVE LOAD SWITCHING. V_Z SHOULD BE LESS THAN 35V. WHEN CURRENT IS SWITCHED OFF IN THE OUTPUT LOAD (L), THE INDUCTIVE KICK PULSE GOES NEGATIVE. THE CLAMPED CLAMP LEVEL OF THE NEGATIVE GOING PULSE IS V_{CC} - V_Z.

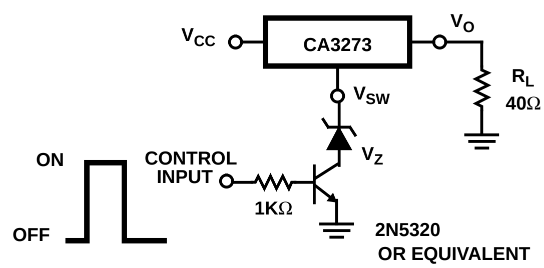


FIGURE 3. OPTIONAL RANGE SHIFTING OF THE V_{CC} INPUT VOLTAGE USING A ZENER DIODE TO OFFSET THE V_{SW} CONTROL PIN. (I.E.,THE OVER-VOLTAGE SHUTDOWN THRESHOLD WILL BE INCREASED TO $V_{CC(THD)}$ + V_Z AND THE MINIMUM V_{CC} OPERATING VOLTAGE IS V_Z + 4V).

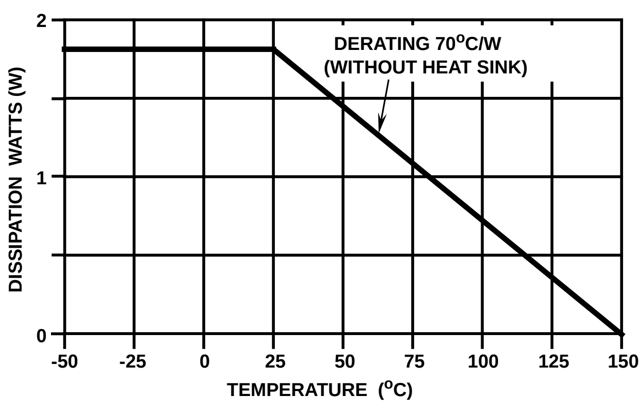


FIGURE 4. DISSIPATION DERATING CURVES

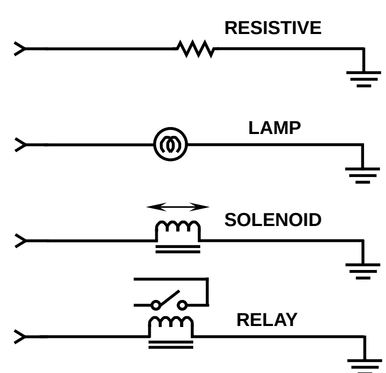


FIGURE 5. TYPICAL LOADS

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