

Single Lamp Driver IC

Description

This ASIC provides up to 350mA of drive current for powering bulbs. The typical application for this part is for use in airbag systems using a type 194 bulb. On chip diagnostics provide open circuit and short circuit detection in the output on mode. In addition, the output

driver will turn on (sink current) when V_{CC} is low. $\overline{\text{Fault}}$ is an active-low output which reports in the output-on mode. Internal pull-up circuitry is provided to ensure the output pin turns on when the Control pin is floating.

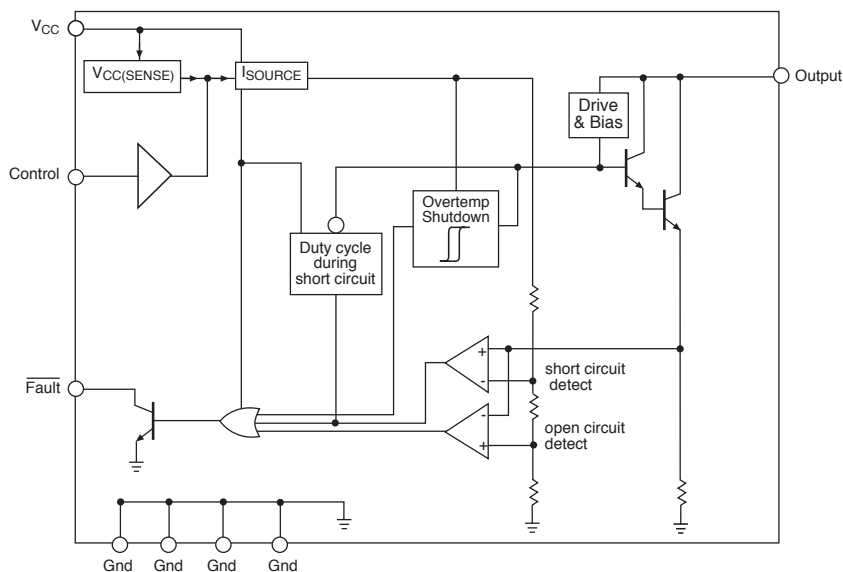
Features

- **Fault Detection**
 - Open Circuit
 - Short Circuit
 - Over Temperature
- **V_{CC} Sense: Output Turns On with Loss of V_{CC}**
- **Low Standby Current**

Absolute Maximum Ratings

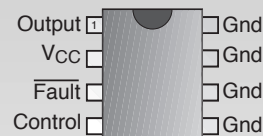
Storage Temperature -65°C to 150°C
 V_{CC} , $\overline{\text{Fault}}$, Control -0.5V to 6V
 ESD Capability (Human Body Model) 2kV
 Peak Transient Voltage (output off mode, output pin only)
 (26V load Dump @ 14V V_{BAT}) 40V
 Lead Temperature Soldering
 Reflow (SMD styles only) 60 sec. max above 183°C, 230°C peak

Block Diagram



Package Options

8 Lead SO (internally fused leads)



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Electrical Characteristics: $4.75\text{V} \leq V_{CC} \leq 5.25\text{V}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$; $-40^{\circ} \leq T_J \leq 150^{\circ}\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Requirements					
V_{CC} Quiescent Current	Output ON		3	6	mA
V_{CC} Quiescent Current	Output OFF		100	250	μA
Output					
Leakage Current	$V_{BAT} = 14\text{V}$		16	100	μA
Saturation Voltage	$I_{OUTPUT} = 350\text{mA}$		1.1	1.5	V
	$I_{OUTPUT} = 180\text{mA}$		0.9	1.3	V
V_{OUTPUT} (self-bias)	$V_{CC} < 4.5\text{V}$, $I_{OUTPUT} < 200\text{mA}$			3.5	V
Current Sense					
Short Circuit Current		350	500	650	mA
Open Circuit Current	Output in the ON state	20	40	60	mA
Control - Input					
Input Voltage	Logic = High	2.0			V
	Logic = Low			0.8	V
Input Current	Logic = V_{CC}	-50	20	40	μA
	Logic = 0V		-20		μA
Fault Output - (Open Collector)					
Output Low Voltage	$I_{FAULT} = 250\mu\text{A}$ (sink)		0.24	0.40	V
Overtemperature Shutdown					
T_J Output Disable Threshold	(guaranteed by design)	150	180		$^{\circ}\text{C}$
T_J Hysteresis	(guaranteed by design)	5			$^{\circ}\text{C}$

Note: A fault signal will be shown (at the fault pin) during inrush as the short circuit threshold is exceeded.

Package Pin Description

PACKAGE PIN #	PIN SYMBOL	FUNCTION
8 Lead SO Narrow		
1	Output	Open collector output.
2	V_{CC}	5V regulated supply input.
3	Fault	Open collector diagnostic output low during open load, short circuit and overtemperature conditions.
4	Control	TTL compatible input.
5, 6, 7, 8	Ground	Signal ground.

Circuit Description

The CS1108 lamp driver IC provides up to 350mA of drive current in a low-side configuration. The Output driver pin is controlled through the TTL compatible Control input pin. A high condition on the Control pin turns the output pin on.

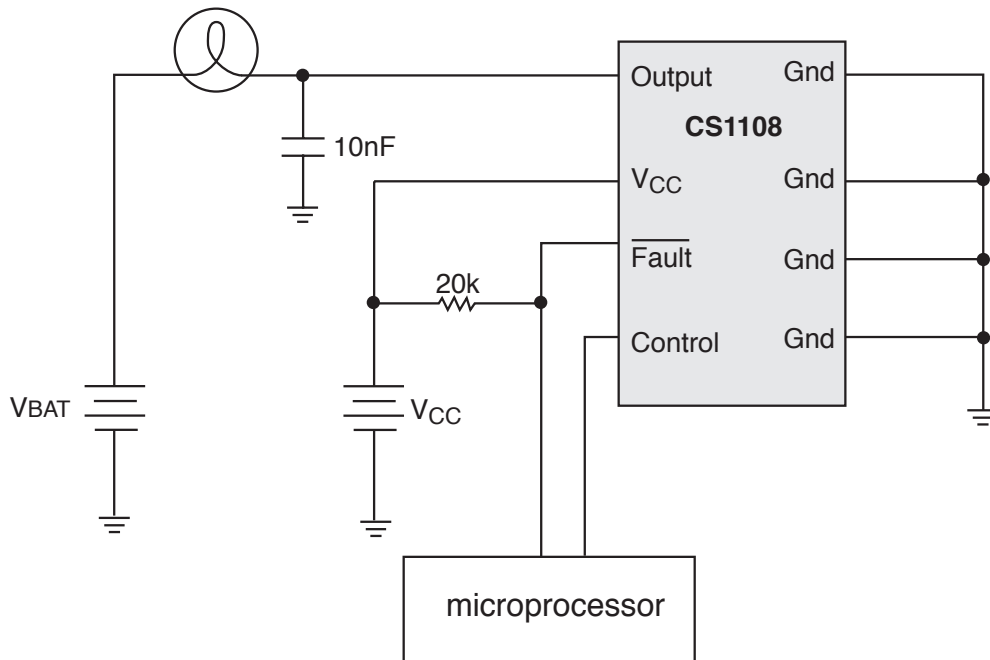
The $\overline{\text{Fault}}$ pin reports short circuit, open circuit, and overtemperature conditions on the IC. If a fault is present, the open collector output $\overline{\text{Fault}}$ pin will be low. Typical numbers for faults are: exceeding 500mA of drive current will report a short circuit. Less than 40mA (typical) will report an open circuit. A temperature fault will be reported when the die temperature exceeds 180°C (typical). Faults are only reported when the Control pin is high, due to the low quiescent current when the Control pin is low and the output device is turned off.

The CS1108 is designed to provide overcurrent protection by duty cycle control. When the lamp current exceeds the internally programmed current limit threshold (typically 500mA), the output enters duty cycle mode to reduce power dissipation of the IC to a safe level.

Typical lamps have a low resistance when off and the current will exceed the current limit threshold during the initial inrush period. During this inrush time, the IC will be operating in the duty cycle mode. Due to characteristics of lamps in this mode, they may appear dimly lit. This condition will persist for a brief time until the lamp resistance has increased enough to reduce its current below the threshold. Once this occurs the lamp will appear at full brightness. During the inrush period the Fault pin will be forced low indicating that duty cycle mode is in operation.

Thermal protection has been designed into this IC. Should duty cycle mode operate for an extended amount of time and the power limitations of the IC are exceeded the IC die temperature will rise. Once the die temperature reaches the thermal temperature limit, the internal circuitry will shut-off the output and the lamp will turn off. Once the die temperature lowers below the thermal threshold then the output will be allowed to turn back on.

Applications Diagram



Package Specification

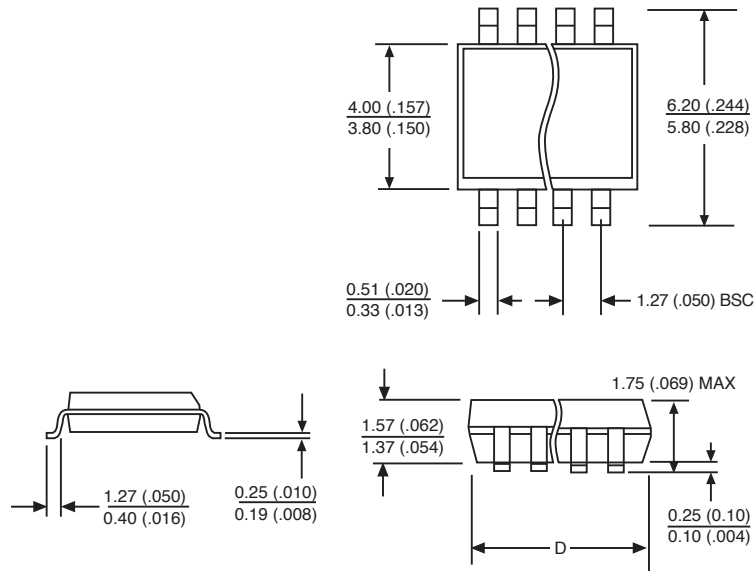
PACKAGE DIMENSIONS IN mm (INCHES)

Lead Count	D			
	Metric		English	
	Max	Min	Max	Min
8 Lead SO Narrow	5.00	4.80	.197	.189

PACKAGE THERMAL DATA

Thermal Data		8 Lead SO Narrow (internally fused leads)	
$R_{\theta JC}$	typ	25	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	typ	110	$^{\circ}\text{C}/\text{W}$

8 Lead SO Narrow; 150 mil wide



Ordering Information

Part Number	Description
CS1108EDF8	8 Lead SO Narrow (internally fused leads)
CS1108EDFR8	8 Lead SO Narrow (internally fused leads) (tape & reel)

Cherry Semiconductor Corporation reserves the right to make changes to the specifications without notice. Please contact Cherry Semiconductor Corporation for the latest available information.