

CS1108

Single Lamp Driver IC

This ASIC provides up to 350 mA 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. 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
 - Overtemperature
- V_{CC} Sense: Output Turns On with Loss of V_{CC}
- Low Standby Current
- Internally Fused Leads in SO-8 Package

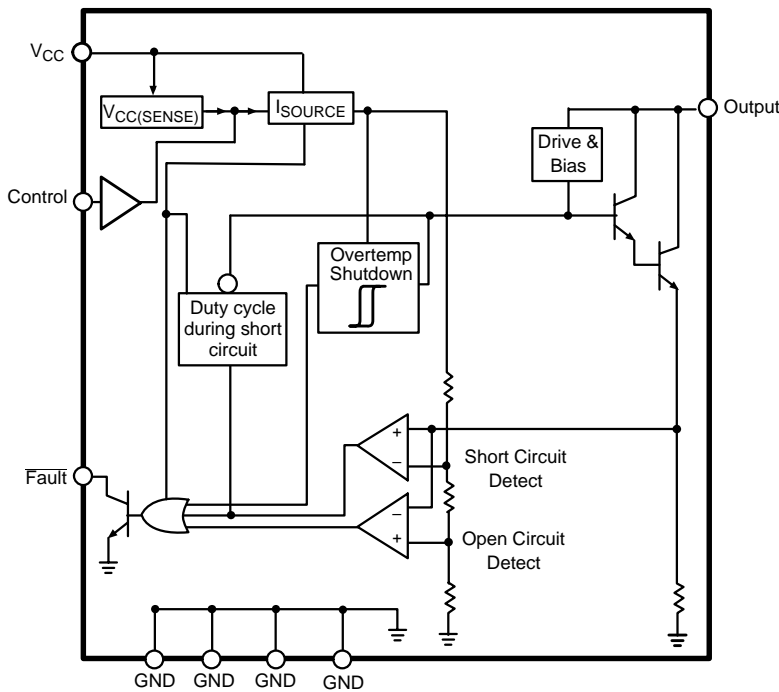


Figure 1. Block Diagram



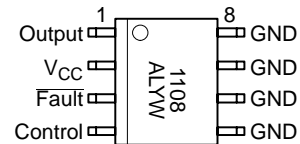
ON Semiconductor™

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SO-8
DF SUFFIX
CASE 751

PIN CONNECTIONS AND MARKING DIAGRAM



A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

ORDERING INFORMATION

Device	Package	Shipping
CS1108EDF8	SO-8	95 Units/Rail
CS1108EDFR8	SO-8	2500 Tape & Reel

CS1108

MAXIMUM RATINGS*

Rating	Value	Unit
Storage Temperature	-65 to +150	°C
V_{CC} , $\overline{\text{Fault}}$, Control	-0.5 to 6.0	V
ESD Capability (Human Body Model)	2.0	kV
Peak Transient Voltage (output off mode, output pin only)	(26 V Load Dump @ 14 V V_{BAT})	40
Lead Temperature Soldering:	Reflow: (SMD styles only) (Note 1)	230 peak

1. 60 second maximum above 183°C.

*The maximum package power dissipation must be observed.

ELECTRICAL CHARACTERISTICS ($4.75 \leq V_{CC} \leq 5.25$ V, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, $-40^{\circ}\text{C} \leq T_J \leq 150^{\circ}\text{C}$; unless otherwise specified.)

Characteristic	Test Conditions	Min	Typ	Max	Unit
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Supply Requirements

V_{CC} Quiescent Current	Output ON	–	3.0	6.0	mA
V_{CC} Quiescent Current	Output OFF	–	100	250	μA

Output

Leakage Current	$V_{BAT} = 14$ V	–	16	100	μA
Saturation Voltage	$I_{OUTPUT} = 350$ mA $I_{OUTPUT} = 180$ mA	–	1.1	1.5	V
		–	0.9	1.3	V
V_{OUTPUT} (self-bias)	$V_{CC} < 4.5$ V, $I_{OUTPUT} < 200$ 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}	–	20	40	μA
	Logic = 0 V	-50	-20	–	μA

Fault Output – (Open Collector)

Output Low Voltage	$I_{FAULT} = 250$ μA (sink)	–	0.24	0.40	V
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Overtemperature Shutdown

T_J Output Disable Threshold	(Guaranteed by Design)	150	180	–	°C
T_J Hysteresis	(Guaranteed by Design)	5.0	–	–	°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}	5.0 V regulated supply input.
3	$\overline{\text{Fault}}$	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.

CS1108

CIRCUIT DESCRIPTION

The CS1108 lamp driver IC provides up to 350 mA 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 500 mA of drive current will report a short circuit. Less than 40 mA (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 500 mA), 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 shutoff the output and the lamp will turn off. Once the die temperature lowers below the thermal threshold, the output will be allowed to turn back on.

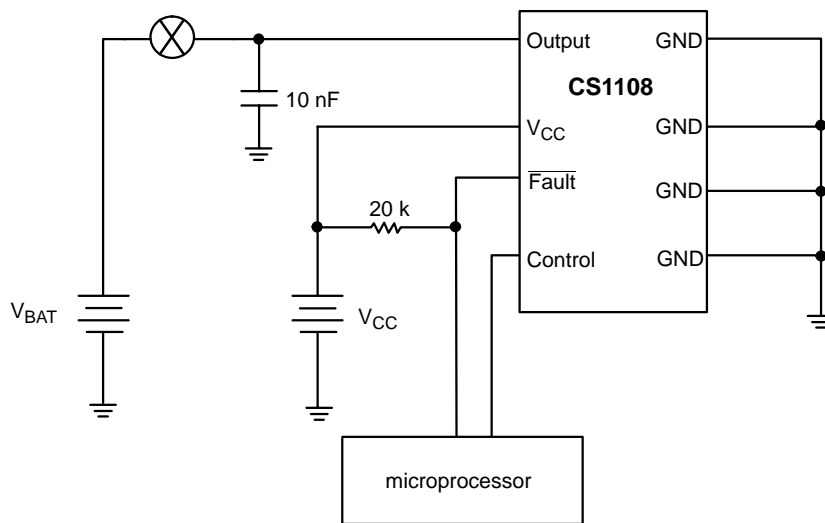
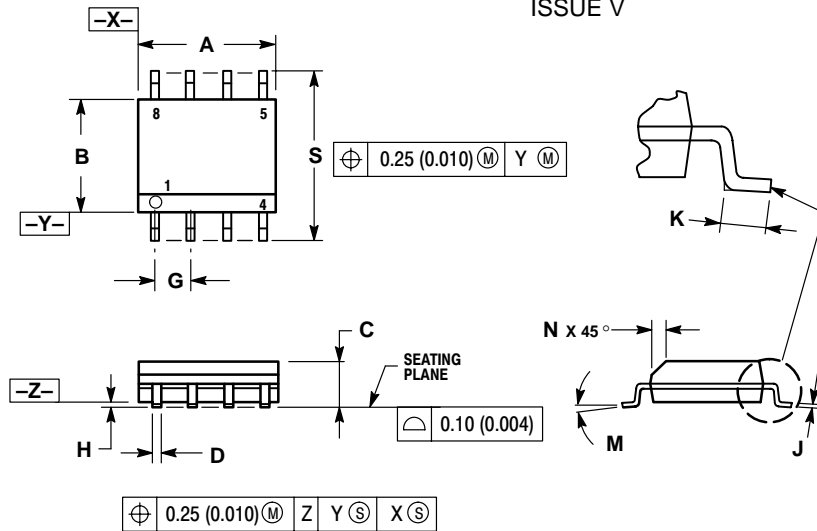


Figure 2. Applications Diagram

CS1108

PACKAGE DIMENSIONS


SO-8
DF SUFFIX
CASE 751-07
ISSUE V



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

PACKAGE THERMAL DATA

Parameter		SO-8	Unit
R _{θJC}	Typical	25	°C/W
R _{θJA}	Typical	110	°C/W

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