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# CS1107

## Single Relay Driver IC

This ASIC provides up to 350 mA of drive current for driving a relay. On-chip diagnostic features include open and short circuit detection in the on state, duty cycle current limit control, and thermal shutdown. Faults are reported on the  $\overline{\text{Fault}}$  lead.  $\overline{\text{Fault}}$  is an active-low output. An on-chip zener provides protection from flyback pulses from the relay. Internal pull-down circuitry is provided to ensure the output pin turns off when the Control pin is floating.

### Features

- Fault Detection
  - Open Circuit
  - Short Circuit
  - Overtemperature
- On-Chip Flyback Protection
- Low Standby Current
- Internally Fused Leads in SO-8 Package

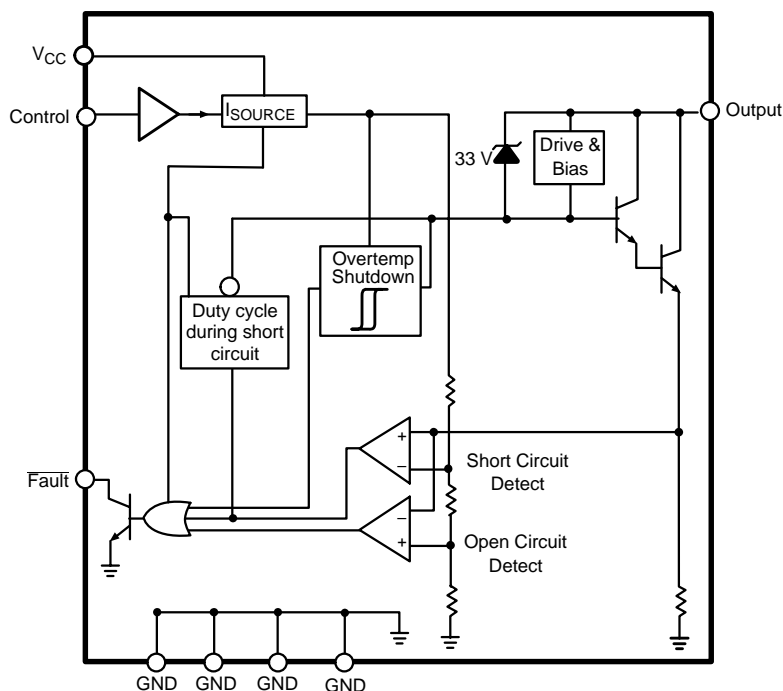


Figure 1. Block Diagram



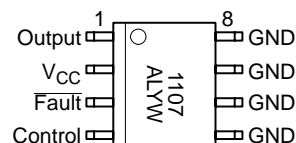
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SO-8  
DF SUFFIX  
CASE 751

### PIN CONNECTIONS AND MARKING DIAGRAM



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

### ORDERING INFORMATION

Device	Package	Shipping
CS1107EDF8	SO-8	95 Units/Rail
CS1107EDFR8	SO-8	2500 Tape & Reel

## MAXIMUM RATINGS\*

Rating	Value	Unit
Storage Temperature	–65 to +150	°C
V <sub>CC</sub> , 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 <sub>BAT</sub> )	V
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 ≤ V<sub>CC</sub> ≤ 5.25 V, –40°C ≤ T<sub>A</sub> ≤ 85°C, –40°C ≤ T<sub>J</sub> ≤ 150°C; unless otherwise specified.)

Characteristic	Test Conditions	Min	Typ	Max	Unit
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**Supply Requirements**

V <sub>CC</sub> Quiescent Current	Output ON	–	3.0	6.0	mA
V <sub>CC</sub> Quiescent Current	Output OFF	–	70	250	μA

**Output**

Leakage Current	V <sub>BAT</sub> = 14 V	–	0	100	μA
Saturation Voltage	I <sub>OUTPUT</sub> = 350 mA	–	1.1	1.5	V
	I <sub>OUTPUT</sub> = 180 mA	–	0.9	1.3	V
V <sub>CLAMP</sub>	V <sub>CC</sub> < 4.5 V, I <sub>OUTPUT</sub> = 180 mA	29	33	36	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	Control = V <sub>CC</sub>	–	40	80	μA

**Fault Output – (Open Collector)**

Output Low Voltage	I <sub>FAULT</sub> = 250 μA (sink)	–	0.24	0.40	V
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**Overtemperature Shutdown**

T <sub>J</sub> Output Disable Threshold	(Guaranteed by Design)	150	180	–	°C
T <sub>J</sub> Hysteresis	(Guaranteed by Design)	5.0	–	–	°C

## PACKAGE PIN DESCRIPTION

PACKAGE PIN #	PIN SYMBOL	FUNCTION
8 Lead SO Narrow		
1	Output	Open collector output.
2	V <sub>CC</sub>	5.0 V regulated supply input.
3	Fault	Open collector diagnostic output low during open load, short circuit and overtemperature conditions.
4	Control	TTL compatible input. A high on this pin turns the output on.
5, 6, 7, 8	Ground	Signal ground.

## CIRCUIT DESCRIPTION

The CS1107 relay 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.

Overcurrent protection is provided by duty cycle control. When the Output current exceeds the current limit threshold, the output enters duty cycle mode to reduce power dissipation of the IC to a safe level. The higher the threshold is exceeded the lower the duty cycle becomes.

A 33 V on-chip zener diode on the Output pin protects the device from flyback pulses when a relay is turned off. The saturation voltage of this pin will not exceed 1.5 V at 350 mA.

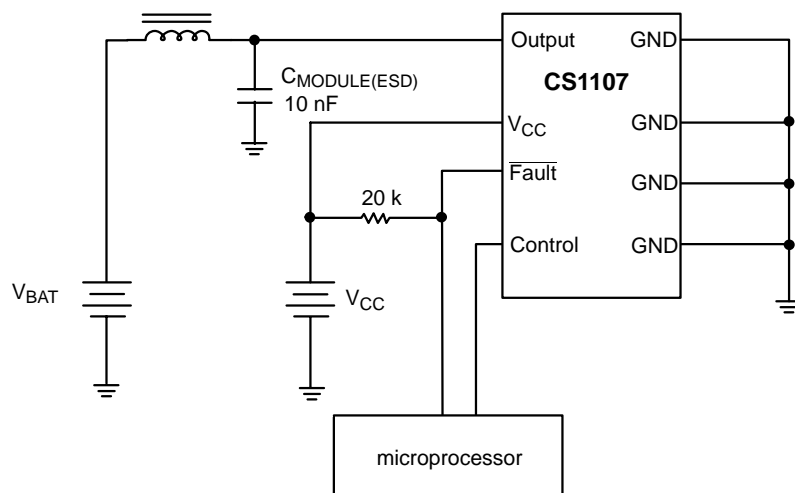
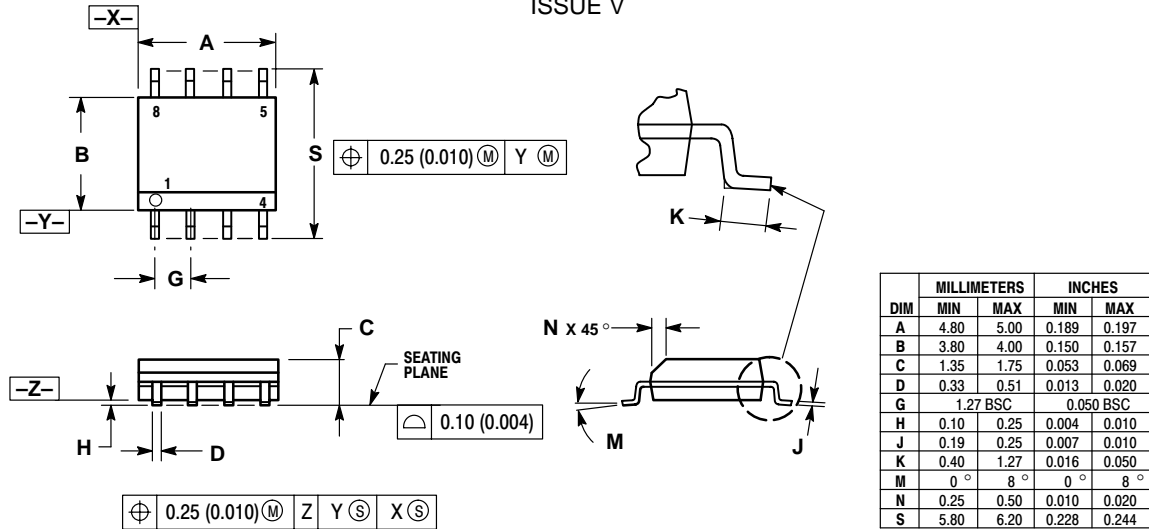


Figure 2. Applications Diagram

PACKAGE DIMENSIONS

SO-8  
DF SUFFIX  
CASE 751-07  
ISSUE V



PACKAGE THERMAL DATA

Parameter		SO-8	Unit
R <sub>θJC</sub>	Typical	25	°C/W
R <sub>θJA</sub>	Typical	110	°C/W

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