RS31312 4.5 V to V, 15 A eFuse with Current Monitoring

Features

Performance

- Wide input voltage range: 4.5 V to 16 V
- Integrated 2.7 mΩ pass MOSFET
- Supports up to 15 A continuous current
- Accurate current monitor output

Protection Features

- Adjustable current limit
- Fast short-circuit protection (<200 ns typical)
- Configurable input over-voltage protection (OVP)
- Integrated over-temperature protection (OTP)
- Input-to-output short-circuit detection

Control & Configuration

- Adjustable soft-start time
- Adjustable hot-plug insertion delay and fault delay
- Load enable (LOADEN) control
- Programmable LOADEN blanking time

Compliance & Package

- ROHS compliant
- 3 mm × 5 mm QFN package

Applications

- Server and AUX supplies
- PCI and PCIe cards
- Router and switch optical modules
- Digital TV

Description

The RS31312 is an integrated eFuse that provides active circuit protection for systems operating from 4.5 V to 16 V. It integrates a low 2.7 mΩ pass MOSFET to protect downstream loads against over-current, short-circuit, over-voltage, and over-temperature fault conditions while limiting inrush current during startup.

The output current limit is programmable using an external resistor connected to the ISET pin. An analog current monitor output provides a voltage proportional to the load current, enabling real-time current monitoring without requiring an external current-sense resistor.

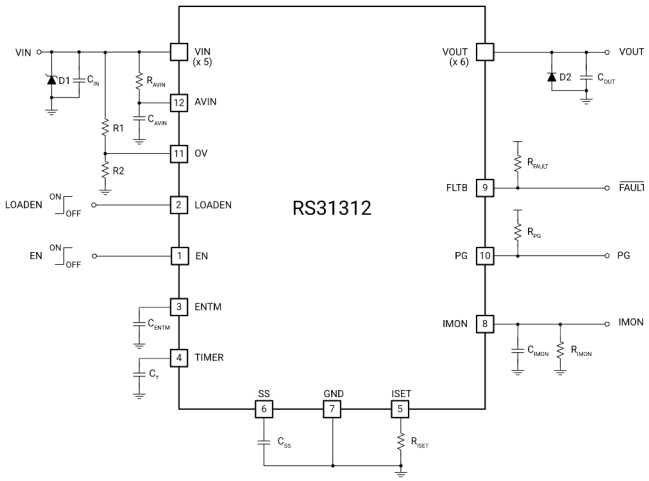
To minimize inrush current during startup, the output soft-start time is programmable using an external capacitor connected to the SS pin. The device also supports programmable hot-plug insertion delay, fault blanking time, and LOADEN blanking time, providing flexibility to accommodate system startup and transient load conditions.

The RS31312 includes configurable input over-voltage protection (OVP), fast short-circuit protection, and integrated over-temperature protection to improve system robustness and reliability.

The device is available in a compact 3 mm × 5 mm QFN-22 package and is fully RoHS compliant.

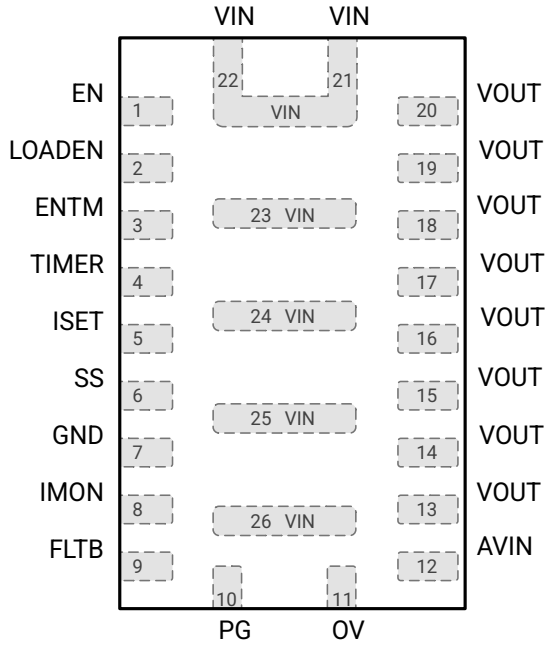
PART NUMBER	PACKAGE	BODY SIZE
RS31312	QFN-22	3 × 5 mm

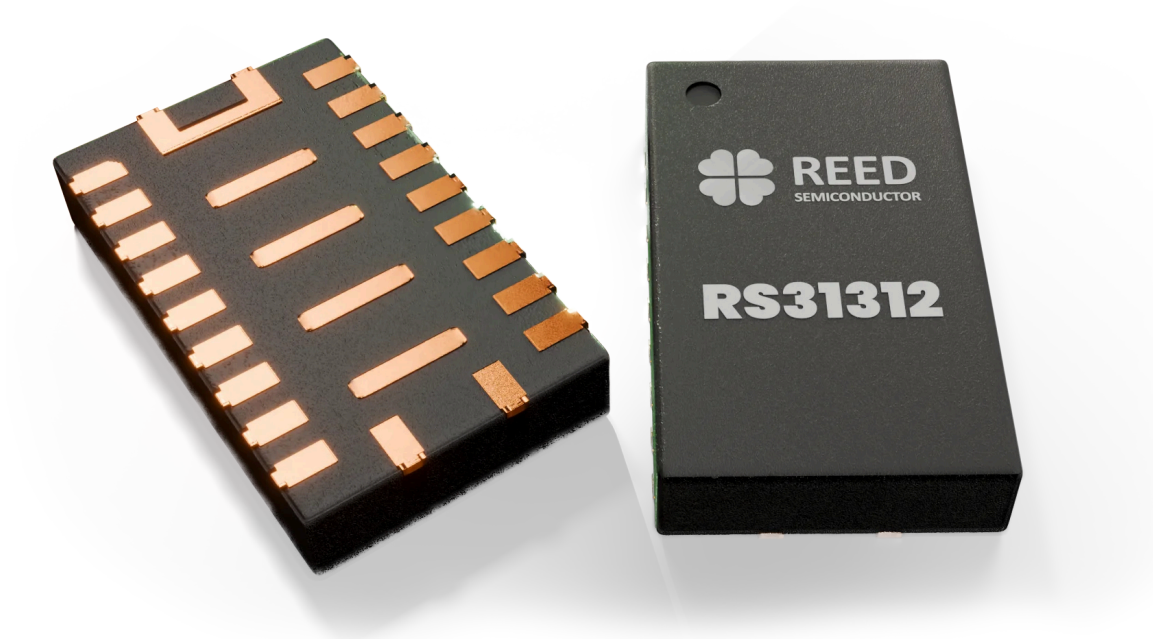
Typical Application Circuit



Package Reference

Top View





Pin Descriptions

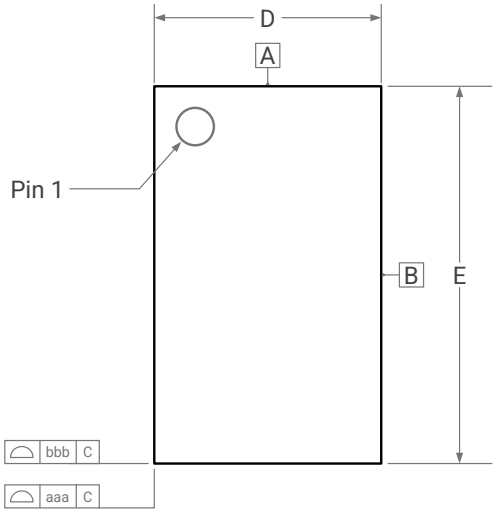
PIN	NAME	TYPE	DESCRIPTION
1	EN	I	Enable input. Pull EN high to enable the device and low to disable it. An internal pull-up resistor pulls EN high by default.
2	LOADEN	I	Load enable input. Used with EN to control the power MOSFET. During the LOADEN blanking interval, the device is controlled by EN only. After the blanking interval expires, LOADEN can disable the device but cannot re-enable it without toggling EN.
3	ENTM	I	LOADEN blanking timer. Connect a capacitor from ENTM to GND to set the LOADEN blanking interval. During this interval, the device is controlled by EN only.
4	TIMER	I	Fault timer. Connect a capacitor from TIMER to GND to set the hot-plug insertion delay and fault timeout period.
5	ISET	I	Current-limit programming pin. Connect a resistor from ISET to GND to set the overcurrent limit threshold.
6	SS	I	Soft-start programming pin. Connect a capacitor from SS to GND to set the output voltage soft-start time.
7	GND	G	Ground reference.
8	IMON	O	Output current monitor. IMON sources a current proportional to the load current (10 μA/A). Connect a 10 kΩ resistor from IMON to GND to generate a 0 V to 1.5 V output corresponding to 0 A to 15 A. A 10 nF (minimum) capacitor in parallel with the resistor is recommended to reduce output noise.
9	FLTB	O	Open-drain fault indicator. Pull FLTB up to an external supply with a 10 kΩ to 100 kΩ resistor. FLTB is asserted low during an overcurrent fault or thermal shutdown.
10	PG	O	Open-drain power-good output. Pull PG up to an external supply with a 10 kΩ to 100 kΩ resistor.
11	OV	I	Input overvoltage programming pin. Connect OV to a resistor divider from VIN to GND to set the input overvoltage threshold. Driving OV high disables the power MOSFET.
12	AVIN	P	Input supply for the internal VCC regulator. Connect VIN to AVIN through a 49.9 Ω resistor and place a 2.2 μF bypass capacitor from AVIN to GND. This maintains regulator operation if VIN collapses during an output short circuit.
13 - 20	VOUT	P	Power output. Place a Schottky diode between VOUT and GND to clamp negative voltage transients.
21 - 26	VIN	P	Input supply voltage.

Type: I = Input, O = Output, I/O = Bidirectional, P = Power, G = Ground, — = No Connect.

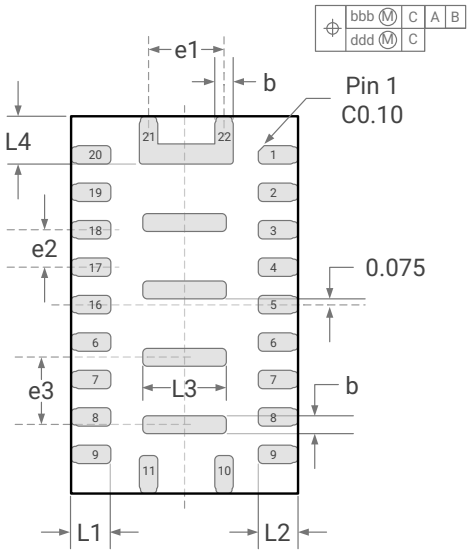
Ordering Information

PART NUMBER	PACKAGE	SIZE (mm)	MSL	SHIPPING METHOD	PACKAGE MARKING
RS31312R	QFN-22	3 × 5 mm	Level-1	5000u Tape & Reel	R31312

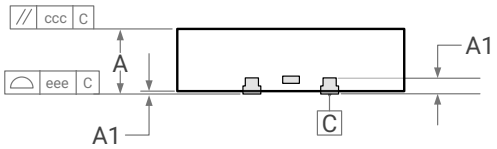
Package Dimensions



TOP VIEW



BOTTOM VIEW



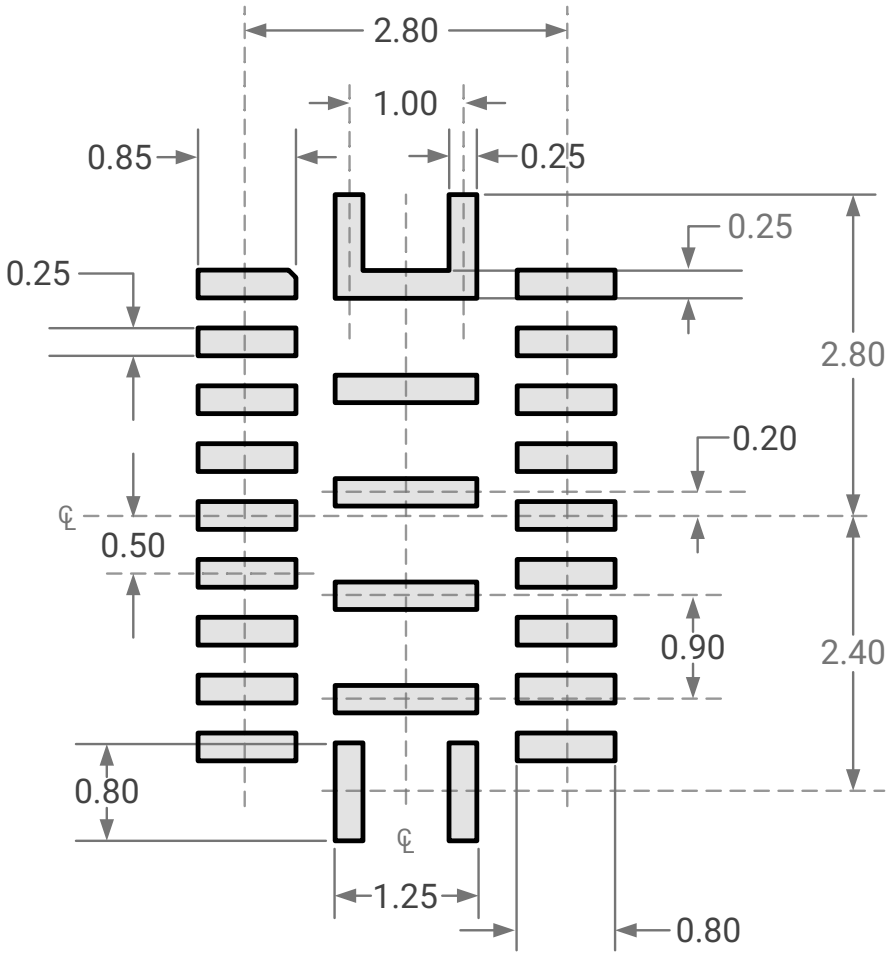
SIDE VIEW

REF	MIN	NOM	MAX
A	0.800	–	1.000
A1	–	–	0.05
A3		0.203 Ref.	
D	2.900	3.000	3.100
E	4.900	5.000	5.100
b	0.200	0.250	0.300
e1		1.000 BSC	
e2		0.500 BSC	
e3		0.900 BSC	
L1	0.450	0.500	0.550
L2	0.500	0.550	0.600
L3	1.050.	1.100	1.150
L4	0.575	0.625	0.675
Geometric Tolerances			
aaa		0.10	
bbb		0.10	
ccc		0.10	
ddd		0.05	
eee		0.08	

Notes:

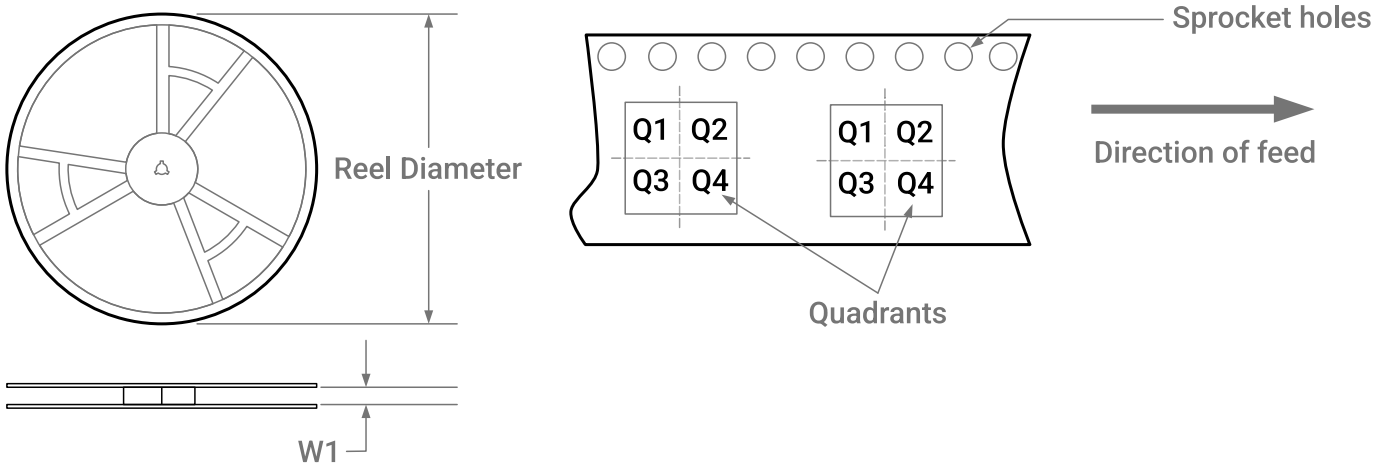
1. All dimensions are in millimeters.
2. Dimension b is measured on the metallized terminal between 0.15 mm and 0.30 mm from the terminal tip. If the terminal includes an optional end radius, do not measure within the radius.
3. Coplanarity applies to the exposed thermal pad and all terminals.

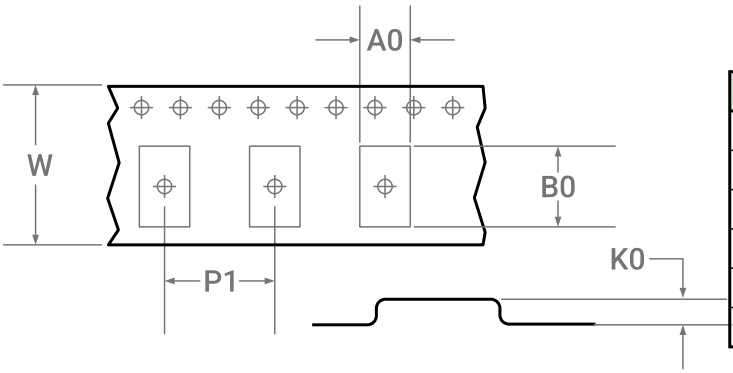
RECOMMENDED LAND PATTERN



Note: All dimensions are in millimeters

TAPE AND REEL INFORMATION



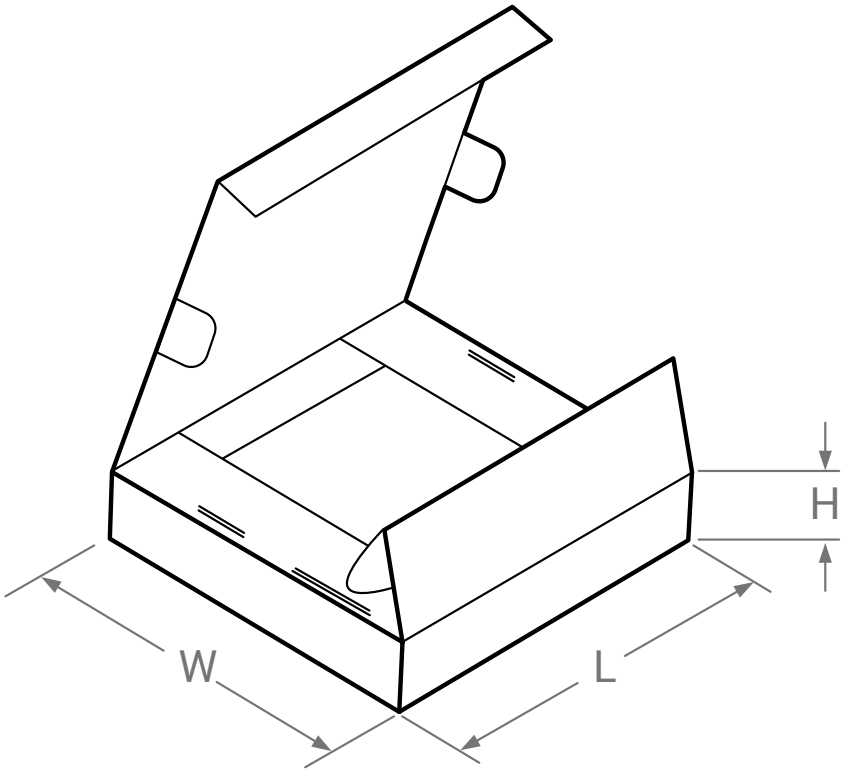


DIMENSION	DESCRIPTION
A0	Pocket width
B0	Pocket length
K0	Pocket depth
W1	Reel width
W	Carrier tape width
P1	Pocket pitch

DEVICE SIZE	REEL DIAMETER	W1	A0	B0	K0	P1	W	QUAD
3 × 5	330	12.8	3.25	5.25	0.80	8.00	12.0	Q1

Note:
1. All dimensions are nominal
2. All dimensions are in millimeters (mm)

PIZZA BOX DIMENSIONS



DEVICE DIM (mm)	**UNITS / BOX**	**L (mm)**	**W (mm)**	**H (mm)**
3 ×5	5000	355	340	50

Note: All measurements are nominal