



Calculating Maximum Sourcing Current (I_{MAX})

The maximum sourcing current is programmed by selection of R3, connected from pin 9 (I_{MAX}) to GND. R3 can be calculated as:

$$R3 = \frac{126k}{I_{MAX}} \Omega \quad (1)$$

For the UCC3918 evaluation kit R3 is set to 42.2kΩ for I_{MAX} = 3A typical. Please refer to the UCC3918 data sheet for further discussion of I_{MAX}.

Calculating the Fault Current (I_{FAULT})

The I_{FAULT} pin allows linear programming of the fault level current from 0 to 5A. When operating below the fault current the internal FET will be fully enhanced providing low on resistance. When output currents exceed I_{FAULT} the output remains on but the fault timer starts charging CT. R2 sets the current fault level. R2 can be calculated as:

$$R2 = \frac{105k}{I_{FAULT}} \Omega \quad (2)$$

For the UCC3918 evaluation kit R2 is set to 52.3kΩ for I_{FAULT} = 2A typical.

Calculating the Fault and Shutdown Times

The UCC3918 evaluation kit incorporates a 0.1μF timing capacitor, C2 (CT) to set the fault time. The fault and shutdown times can be found by using the following equations.

$$T_{FAULT} = 27.8k \cdot C2 \quad (3)$$

$$T_{SHUTDOWN} = 0.833 \times 10^6 \cdot C2 \quad (4)$$

Where C2 is in Farads and T is in Seconds.

For the evaluation board T_{FAULT} = 2.78mSec and T_{SHUTDOWN} = 83.3mSec.

Estimating Maximum Load Capacitance

The maximum load capacitance that can be charged depends on several factors; the nature of the load (constant current or resistive), the maximum sourcing current, and the allowed fault time.

For a constant current load, the maximum capacitance can be estimated from:

$$C_{OUT} = (I_{MAX} - I_{LOAD}) \cdot \left[\frac{27.8 \times 10^3 \cdot C2}{V_{OUT}} \right] \text{Farads} \quad (5)$$

For a resistive load of value RL, C_{OUT} can be estimated from:

$$C_{OUT} = \frac{27.8 \times 10^3 \cdot C2}{RL \cdot \ln \left[\frac{1}{1 - \frac{V_{OUT}}{I_{MAX} \cdot RL}} \right]} \text{Farads} \quad (6)$$

SAFETY RECOMMENDATIONS

Although the UCC3918 is designed to provide system protection for all fault conditions, all integrated circuits can ultimately fail short. For this reason, if the UCC3918 is intended for use in safety critical applications where UL or some other safety agency rating is required, a redundant safety device such as a fuse should be placed in series with the power MOSFET device. The UCC3918 will prevent the fuse from blowing for virtually all fault conditions, increasing system reliability and reducing maintenance cost, in addition to providing the hot swap benefits of the device.

Note: Capacitor C1 is located on the component side of the input switch and will contribute to the inrush current.

For more complete information, pin descriptions and specifications for the UCC3918 Low On-Resistance Hot Swap Power Manager, please refer to the UCC3918 data sheet or contact your Unitrode Field Applications Engineer at (603) 424-2410.

Reference Designator	Description	Manufacturer	Part Number
C1	22 μ F, 25V Tantalum Capacitor	Sprague	199D226X0025DA1
C2	0.1 μ F, 50V Ceramic Capacitor		
C3	22 μ F, 25V Tantalum Capacitor	Sprague	199D226X0025DA1
C4	Not Populated		
C5	Not Populated		
D1	LED		
R1	300 Ω , 0.25W Resistor		
R2	52.3k Ω , 0.25W Resistor		
R3	42.2k Ω , 0.25W Resistor		
R4	Not Populated		
R5	10k Ω , 0.25W Resistor		
SW1	Slide Switch		
SW2	Slide Switch		
SW3	Dip Switch		
TB1	Terminal Block		
TB2	Terminal Block		
U1	Low On-Resistance Hot Swap Power Manager	Unitrode	UCC3918

Table 1. UCC3918 Evaluation board list of materials.

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.