

Design Note

Using the UC3914 Hot Swap Power Manager

By Ed Jung

Introduction

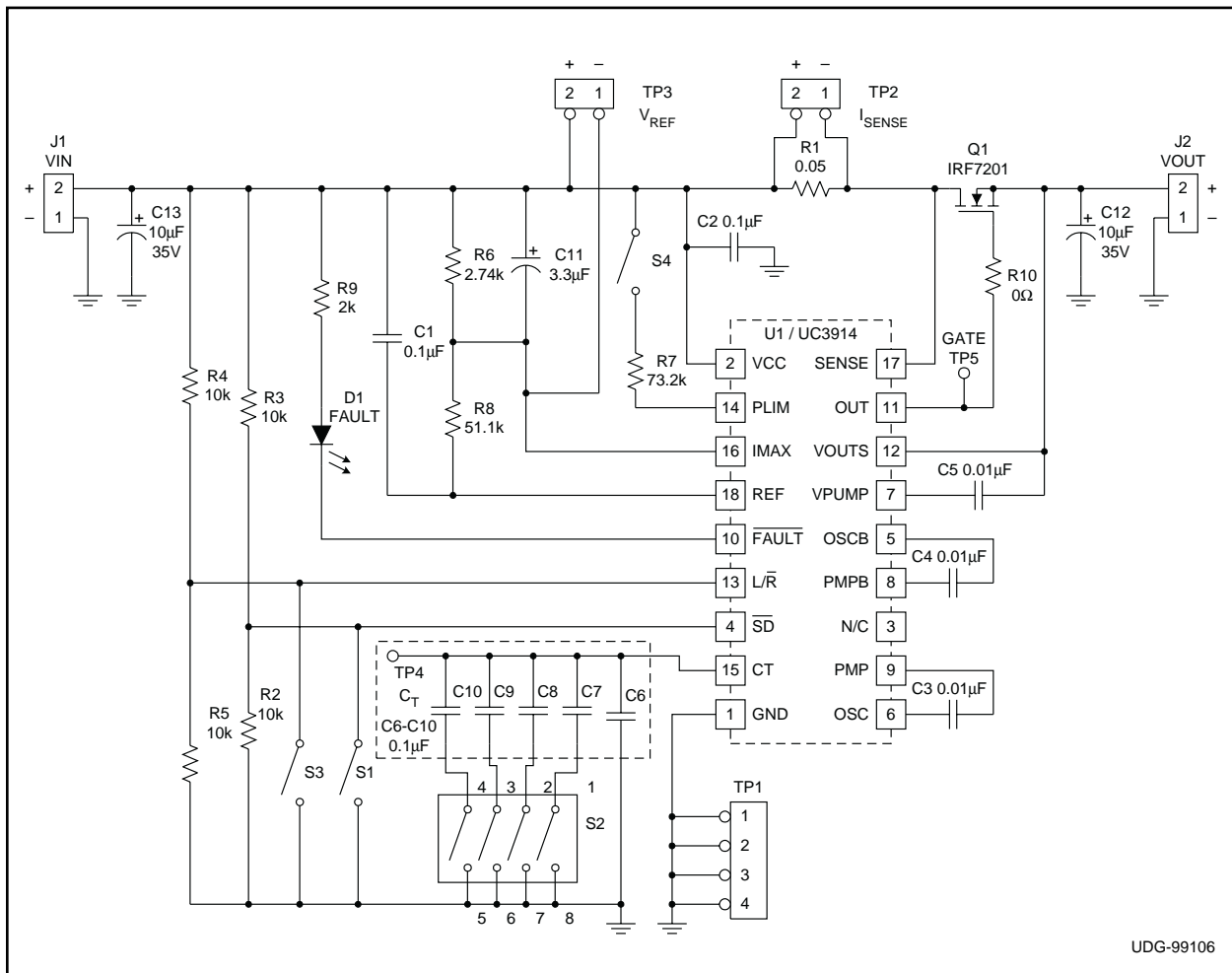
The UC3914 evaluation board allows the designer to evaluate the performance of the UCC3914 Hot Swap Power Manager (HSPM) in a typical application setting. Component selection for the DV3914 is for operation at 15VDC, 1A. Operation at other voltages and currents may be accomplished by proper component selection and replacement. The

DV3914 schematic is shown in Fig. 1. The Bill of Materials with component ratings is specified in Table 1.

Connectors

J1 is connected to a 15V power supply. This power supply must be able to source at least 3A.

J2 is connected to the load.



UCC3914 Block diagram.

Test Points and Indicators

TP1 is connected to circuit ground. TP1 is typically connected to the ground lead of an oscilloscope or voltmeter.

TP2 (+,-) is connected across the current sense resistor. The load current is measured by monitoring the voltage across TP2. The load current is $I = V(\text{TP2})/R1$.

TP3 (+,-) is connected across R6; R6 sets the current limit (I_{MAX}) for the DV3914. The voltage across the current sense resistor at current limit is the same as the voltage across R6.

TP4 is connected to the CT pin of the UC3914.

TP5 is connected to the MOSFET gate drive output of the UC3914.

D1 is the FAULT indicator LED. D1 turns on if an over-current fault occurs or if the UC3914 is in UVLO or Shutdown.

Switch Functions

S1. In the STOP mode, the MOSFET turns off to disconnect the load from input power and the UC3914 is put into low power mode. In the RUN mode, the UC3914 resumes normal operation.

S2. This switch sets the fault time. The fault time is set in 2ms increments from 2ms to 10ms according to the equation $t = 0.2\text{ms} \cdot (1+N)$, where N is the number of switches in the "ON" position (i.e., 0 to 4). The UC3914 ignores an over-current condition until the fault timer expires, upon which the external FET shuts off.

S3. An over-current fault causes the external FET to latch off with S3 set to LATCHED. The FET is re-

set by toggling S1 or S3, or by cycling power to the DV3914. The UC3914 repeatedly resets in a fault with S3 set to RETRY.

S4. PLIM-ON enables the power limiting feature of the UC3914. This feature limits the average MOSFET power dissipation to 0.44W in the RETRY mode by lowering the MOSFET duty cycle below 3%. PLIM-OFF disables power limiting, fixing the MOSFET duty cycle at 3%.

Host and plug-in card simulation

The UC3914 is located in either the host or plug-in card. To simulate plugging a card+UC3914 into a live host, apply power to J1 with the load connected to J2. To simulate plugging a card into a live host+UC3914, connect the load to J2 with power present at J1.

Safety Considerations

Although the UC3914 is designed to provide system protection for all fault conditions, all integrated circuits can ultimately fail short. For this reason, if the UC3914 is intended for use in safety critical applications, where UL of some other safety agency requires a redundant safety device such as a fuse, it should be placed in series with the power MOSFET device. In addition to providing the hot swap benefits of the device, the UC3914 will prevent the fuse from blowing for virtually all fault conditions increasing system reliability and reducing maintenance cost.

For further information, consult the UC3914 Data Sheet or contact a local Unitrode Representative or Field Applications Engineer at (603) 424-2410.

Table 1. UC3914 evaluation board list of materials.

Designator	Description	Part Value	Manufacturer
U1	IC, UC3914DW, SOIC-18		Unitrode
Q1	MOSFET, IRF7201, N-CH, 0.030Ω, SOIC-8		Intl. Rectifier
D1	Diode, LED, Red, Gull Wing, S-Type, LN1271R		Panasonic
R10	Resistor	0Ω, 0805	
R1	Resistor	0.05Ω, 1W, 2%, 2512	IRC
R9	Resistor	2.0kΩ, 1%, 0805	Venkel
R6	Resistor	2.74kΩ, 1%, 0.1W, 0805	
R2-R5	Resistor	10k 1%, 0.1W, 0805	Venkel
R8	Resistor	51.1k 1%, 0.1W, 0805	
R7	Resistor	73.2k 1%, 0.1W, 0805	
C3, C4, C5	Capacitor	0.01μF, 10%, 50V, X7R, 0805	Panasonic
C1, C2, C6-C10	Capacitor	0.1μF, X7R, 25V, 10%, 805	Samsung
C11	Capacitor, Tantalum	3.3μF, 6.3V, 3216	Panasonic:
C12, C13	Capacitor, Tantalum	10μF, 35V, 7343	AVX
S1, S3, S4	Slide Switch, SPDT		EAO
S2	Switch, DIP, 4-position, SMT, 219-4MST		CTS
TP4, TP5	Header, 1-pin		
TP2, TP3	Header, 2-pin, 0.1" center		
TP1	Header, 4-pin, 0.1" center		
J1, J2	Connector, Lever		RDI
REF	PCB		

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