SC1150
Programmable DC/DC Controller

Description

The SC1150 voltage mode controller contains most of the circuitry necessary to implement a DC/DC converter for powering the Intel Pentium® Pro microprocessor, both in single and multiple processor configurations.

The SC1150 features an integrated D/A converter, pulse by pulse current limiting, integrated power good signaling, logic compatible shutdown and on-board over voltage protection (OVP).

The SC1150 operates at a fixed frequency of 200kHz, providing an optimum compromise between size, efficiency and cost in the intended application areas.

The integrated D/A converter provides programmability of output voltage from 2.0V to 3.5V in 100mV increments with no external components. Both the range and the increment value may be changed by adding external components.

The SC1150 provides an OVP output which can be used to trigger a crowbar circuit for true over voltage protection.

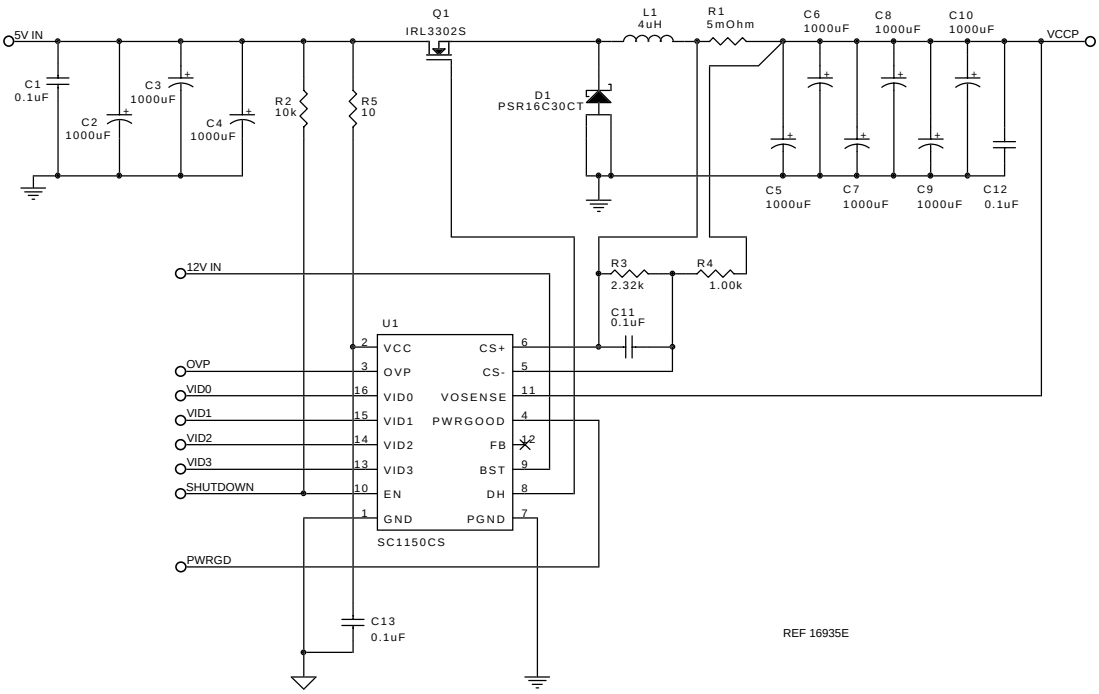
Features

- 85% efficiency
- 4 bit DAC for output programmability
- On chip power good and OVP functions
- Meets Intel Pentium® Pro VRM8.0 specifications

Applications

- Pentium® Pro Processor supplies
- Pentium® Pro Processor VRM modules
- 2.0V to 3.5V microprocessor supplies
- Programmable power supplies

Typical Application Circuit



Absolute Maximum Ratings

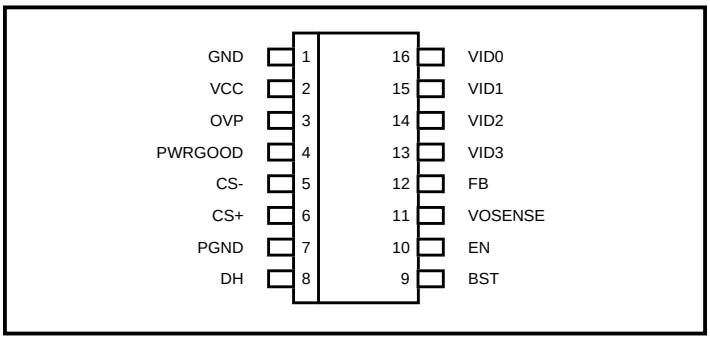
Parameter	Symbol	Maximum	Units
V_{CC} to GND	V_{IN}	-0.3 to 7	V
PGND to GND		± 1	V
BST to GND		-0.3 to 15	V
Operating Junction Temperature Range	T_A	0 to 70	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Lead Temperature (Soldering) 10 Sec.	T_{LEAD}	300	°C

Electrical Characteristics

Unless specified: V_{CC} = 4.75V to 5.25V; GND = PGND = 0V; V_{OSENSE} = V_O; 0mV < (CS+ - CS-) < 60mV; T_A = 25°C

Parameter	Conditions	VID 3210	Min	Typ	Max	Units
Output Voltage	I_O = 2A in Application circuit 16935E	1111	1.980	2.000	2.020	V
		1110	2.079	2.100	2.121	
		1101	2.178	2.200	2.222	
		1100	2.277	2.300	2.323	
		1011	2.376	2.400	2.424	
		1010	2.475	2.500	2.525	
		1001	2.574	2.600	2.626	
		1000	2.673	2.700	2.727	
		0111	2.772	2.800	2.828	
		0110	2.871	2.900	2.929	
		0101	2.970	3.000	3.030	
		0100	3.069	3.100	3.131	
		0011	3.168	3.200	3.232	
		0010	3.267	3.300	3.333	
		0001	3.366	3.400	3.434	
		0000	3.465	3.500	3.535	
Load Regulation	I_O = 0.3A to 13A	xxxx		1		%
Line Regulation		xxxx		0.5		%
UV Lockout		xxxx			4.2	V
Current Limit Voltage		xxxx	60	70	80	mV
Oscillator Frequency		xxxx	180	200	220	kHz
Oscillator Max Duty Cycle		xxxx	90	95		%
DH Sink/Source Current	BST - DH = 4.5V, DH - PGND = 2V	xxxx	1			A
Output Voltage Tempco		xxxx		65		ppm/°C

Pin Configuration



Ordering Information

Device (1)	Package	Temp Range (T_J)
SC1150CS.TR	SO-16	0° to 125°C

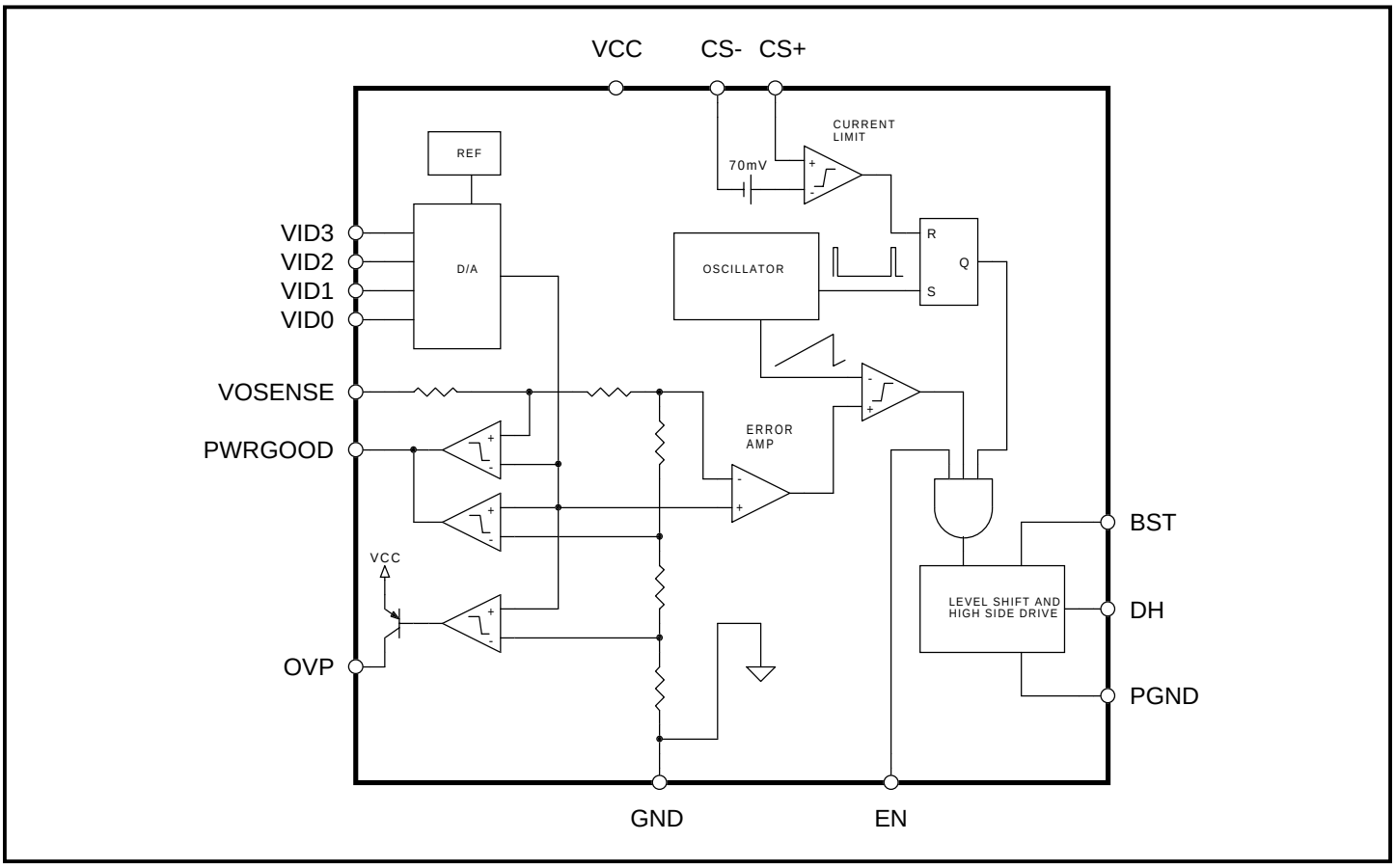
Note:
(1) Only available in tape and reel packaging. A reel contains 1000 devices.

Pin Descriptions

Pin #	Pin Name	Pin Function
1	GND	Small Signal Analog and Digital Ground
2	VCC	Chip Supply Voltage
3	OVP (1)	High Signal out if V_O>setpoint +20%
4	PWRGOOD (1)	Open collector logic output, high if V_O within 10% of setpoint
5	CS-	Current Sense Input (negative)
6	CS+	Current Sense Input (positive)
7	PGND	Power Ground
8	DH	High side Driver Output
9	BST	Supply for high side Driver
10	EN (1)	Enable Pin, Logic low shuts down the converter
11	VOSENSE	Top end of internal feedback chain
12	FB	Voltage Feedback input (normally not used)
13	VID3 (1)	Programming Input (MSB)
14	VID2 (1)	Programming Input
15	VID1 (1)	Programming Input
16	VID0 (1)	Programming Input (LSB)

(1) All logic level inputs and outputs are open collector TTL compatible

Block Diagram

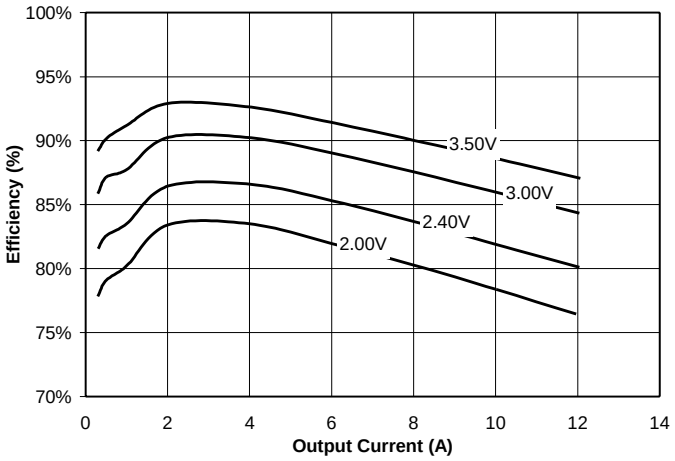


Evaluation Board Bill of Materials

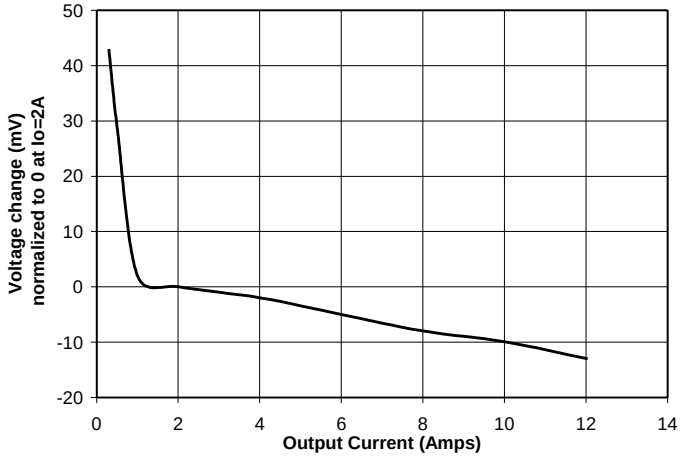
Quantity	Reference	Part/Description	Vendor	Notes
4	C1, C11-C13	0.1µF Ceramic	Various	
9	C2-C10	1000µF/6.3V	SANYO	MV-GX or equiv. Low ESR
1	D1	PSR16C30CT	PHOTRON	
1	L1	4µH		8 Turns 16AWG on MICROMETALS T50-52D core
1	Q1	IRL3302S	I.R.	Logic Level FET, ≤22mΩ, 30V
1	R1	5mΩ	IRC	OAR-1 Series
1	R2	10kΩ, 5%, 1/8W	Various	
1	R3	2.32k Ω, 1%, 1/8W	Various	
1	R4	1kΩ, 1%, 1/8W	Various	
1	R5	10Ω, 5%, 1/8W	Various	
1	U1	SC1150CS	SEMTECH	

Typical Characteristics

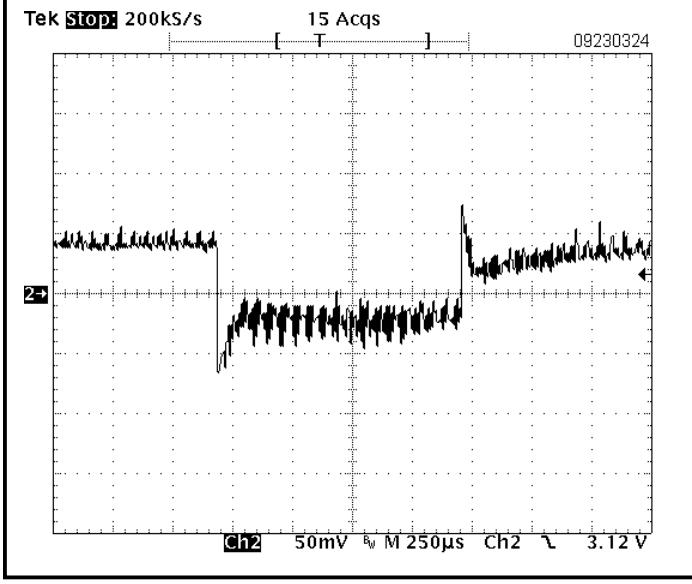
SC1150 Efficiency in Application circuit 16935E



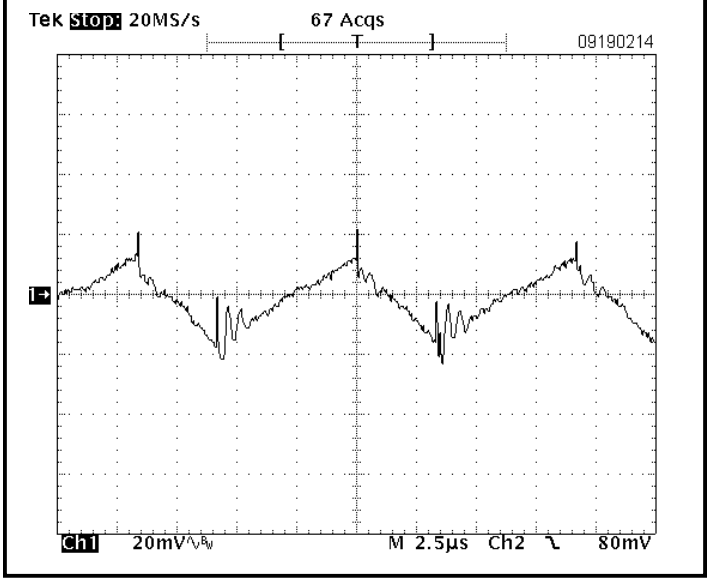
SC1150 Regulation in Application circuit 16935E



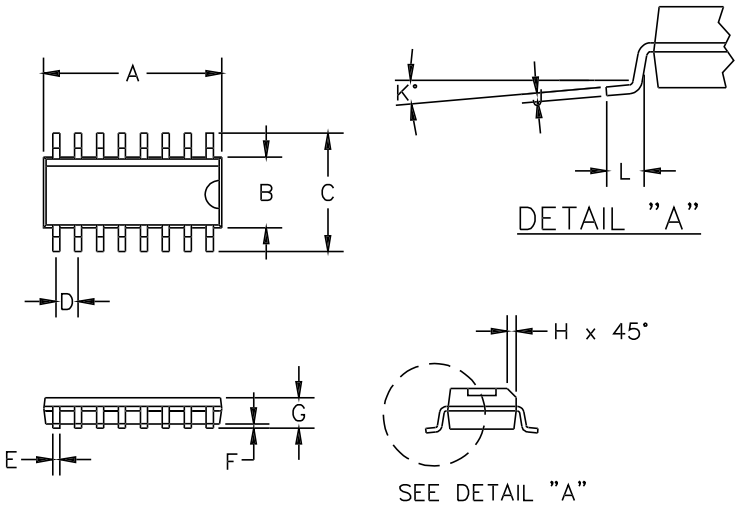
App. circuit 16935E Transient Response, 3.1V, 0.3A to 10A



Application circuit 16935E Ripple, 3.1V, 10A out



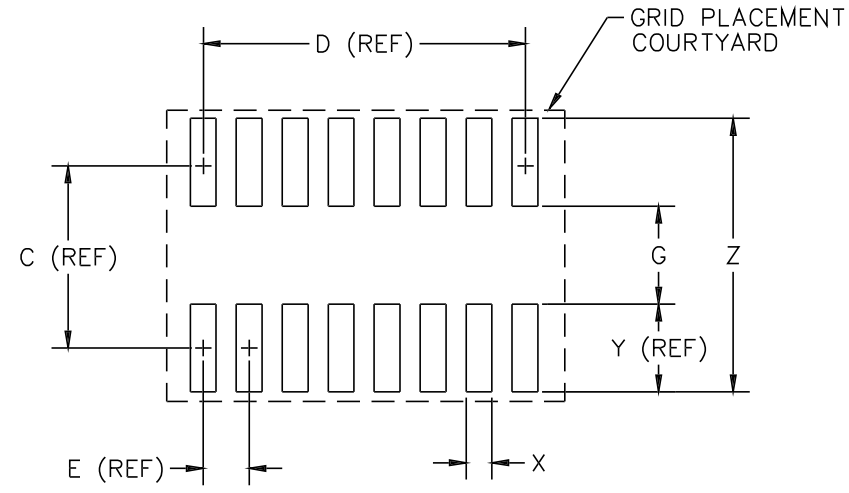
Outline Drawing - SO-16



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.386	.393	9.80	10.0	[2]
B	.150	.158	3.80	4.00	[2]
C	.228	.244	5.80	6.20	–
D	.050 BSC		1.27 BSC		–
E	.013	.020	0.33	0.51	–
F	.004	.010	.10	.25	–
G	.053	.069	1.35	1.75	–
H	.010	.020	.25	.50	–
J	.007	.010	.19	.25	–
K	0°	8°	0°	8°	–
L	.016	.050	.40	1.27	–

[2] DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTUSIONS

Land Pattern - SO-16



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.197	–	5.00	–
D	–	.35	–	8.89	–
E	–	.05	–	1.27	–
G	.102	.110	2.60	2.80	–
X	.02	.03	.60	.80	–
Y	–	.095	–	2.40	–
Z	.28	.29	7.20	7.40	–

[1] GRID PLACEMENT COURTYARD IS 22 X 16 ELEMENTS (11mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

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