

DC-TO-DC CONTROLLER

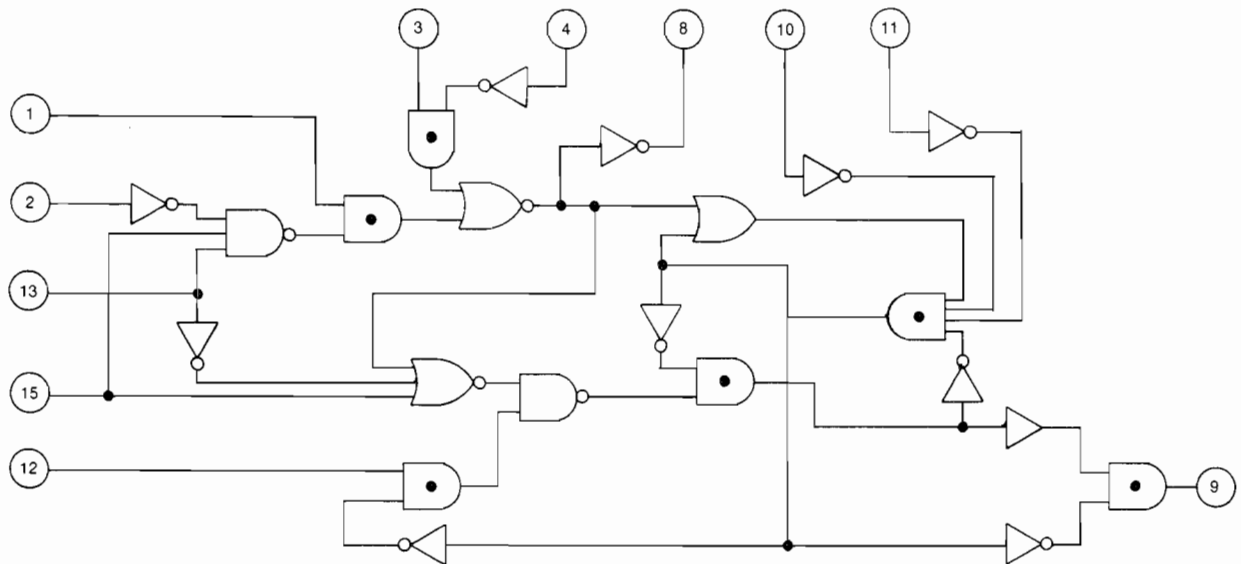
DESCRIPTION

The 155-0067-02 is a DC to DC controller for inverter power supplies. It provides circuitry to do all regulation and protection of the inverter system.

Inputs provided to:

- Sense and control secondary voltage faults
- Sense and limit the maximum inverter current
- Sense line voltage fluctuations
- Sense inverter current phase

BLOCK DIAGRAM



ABSOLUTE MAXIMUMS

Electrical

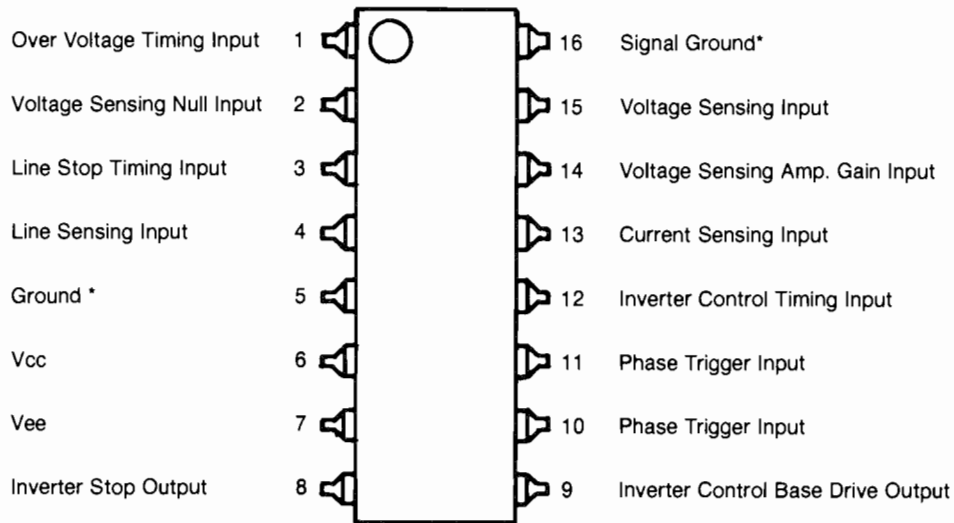
MAX RATING

Pin 1	-6.0 to + 2.0	V
Pin 2	-6.0 to + 0.5	V
Pin 3	-6.0 to + 2.0	V
Pin 4	-6.0 to + 2.0	V
Pin 5	----- GROUND -----	
Pin 6 NEVER APPLY VOLTAGE TO THIS PIN	8 to 30	mA
Pin 7	-15.0 to + 6.0	V
Pin 8	0 to + 10.0	V
Pin 9	0 to + 5.0	V
Pins 10 & 11	±2	mA
Pin 12	0 to + 2.5	V
Pin 13	-6.0 to + 6.0	V
Pin 14	-0.6 to + 0.6	V
Pin 15	-0.6 to + 1.0	V
Pin 16	----- GROUND -----	

Environmental

Operating Temperature Range	-20°C to +75°C
Storage Temperature Range	-55°C to +125°C

PIN CONNECTIONS



*Short together outside of package.



ELECTRICAL CHARACTERISTICS

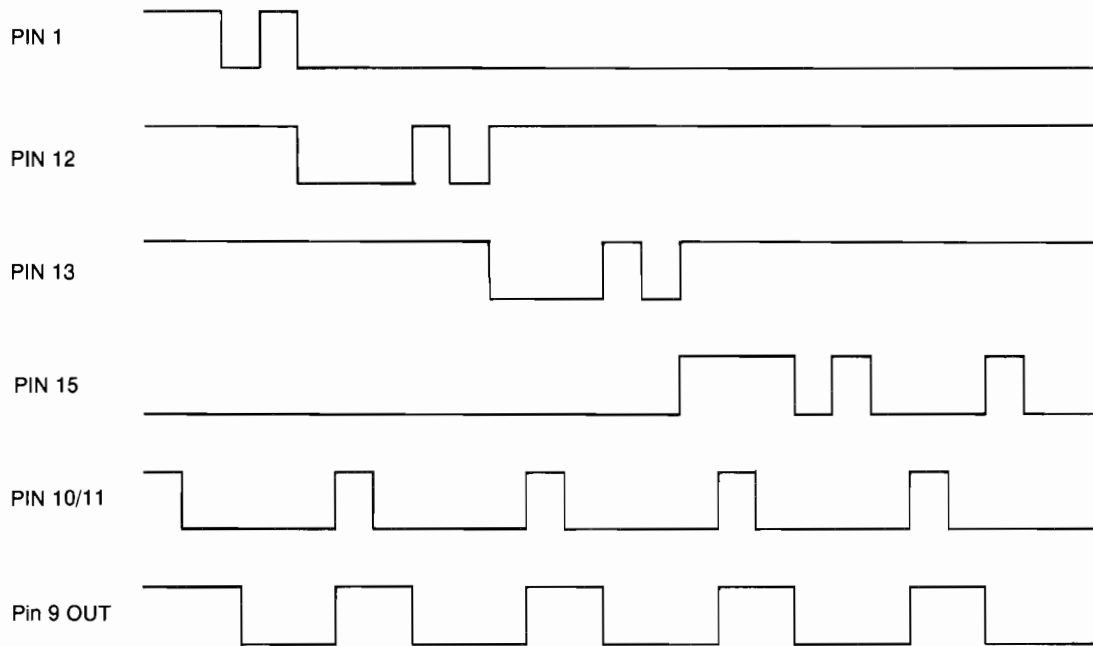
Pin #	Parameter	Conditions	Limits		Units
			Min	Max	
1	Over voltage timing	Logic "0" at I1 = .1 mA Logic "1"	0.02	0.30	V
2	Voltage sense null (Fault)	Threshold (neg.) (pos.) If pin 2 > Vth, then V1 = logic "1" Input bias current: V2 > 210 mV V2 > 150 mV	-210 +150	-150 +210	 μA μA
3	Stop timing	Logic "0" at I3 = 2 mA Logic "1"	0.02 0.85	0.49 1.10	V V
4	Line sensing (stop delay)	Logic "0" Logic "1" Input bias current: V4 = 0.85 V	0.02 0.85 0.0	0.30 1.10 500	V V μA
5	GROUND	Connect to pin 16 external to package			
6	Vcc (internal)	Drive with an external current source from 9.0 mA to 30.0 mA	7.15	7.75	V
7	Vee (substrate)	Applied voltage Iee at V7 = -2.0 V	-3.0 1.8	-1.8 4.0	V mA
8	Inverter stop	Logic "0" at I8 = 2 mA Logic "1"	0.02 0.85	0.30 10.0	V V
9	Inverter control	0.5 V source to pin 9 Logic "0" (sinking) Logic "1" (sourcing)	4.0 -12.0	8.0 -4.0	mA mA
10/11	Phase triggers	In = -1 mA (logic "0") In = +1 mA (logic "1")	-0.85 0.02	0.02 0.85	V V
12	Inverter control timing	Logic "0" at I12 = 1.5 mA Logic "1"	0.15 0.85	0.48 10.0	V V
13	Current sense	Logic "0" Logic "1"	0.0 0.85	0.05 10.0	V V
14	Gain adjust	Resistance to ground	260	400	Ω

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ELECTRICAL CHARACTERISTICS (cont)

Pin #	Parameter	Conditions	Limits		Units
			Min	Max	
15	Voltage sense	Logic "0"	-1.0	-0.2	V
		Logic "1"	0.3	1.0	V
		Input bias current: V15 = logic "1"	0.001	10.0	μ A
16	Reference ground	Connect to pin 5 external to package			

TIMING DIAGRAM



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APPLICATIONS INFORMATION

Functional Description

The power available from the inverter on switching power supplies is dependent on the amount of energy fed to the inverter regulator. The 155-0067-02 allows the regulator to vary the energy delivered to the inverter by controlling the frequency at which the regulator is pulsed. This control is accomplished through the use of a variable pulse-width, monostable multivibrator, initially triggered by current-phase information fed back from the inverter to pins 10 and 11.

The multivibrator charge ramp is applied to pin 12. When this ramp moves through a level set by one of the sensing inputs, the output at pin 9 sinks drive current away from the inverter regulator until the inverter passes through a zero crossing sending a trigger pulse to either pin 10 or in 11 and the output once again is allowed to provide drive to the inverter.

The time during which the ramp at pin 12 is charging determines how long the inverter is held off. The duration of the "on" state of the multivibrator is determined by the voltage level on pin 15. If this level is low, the duration is short. As this voltage increases, the duration increases.

When a fault is detected at either pin 2 or pin 13 a capacitor externally connected to pin 1 begins to charge up. If the fault lasts longer than the time it takes for the ramp at pin 1 to reach $1 V_{be}$, then Q42 turns on causing a positive inverter stop trigger output at pin 8, and the inverter shuts down.

The discharge rate of the capacitor on pin 1 must be set external to the IC and must be approximately five times the charge rate.

Product Precautions

Input Protection

Reference voltage (pin 6) is developed by current driving pin 6. NEVER apply a voltage source to this pin.

Pins 1, 2, 3, 4, 10 and 11 all connect to the bases of grounded emitter transistors. When voltage driven, the current must be limited in order that damage does not occur.

The substrate voltage applied to pin 7 is typically from $-2 V$ to $-3 V$ in all present applications. Internal current sources have a measure of dependence on the substrate voltage. A voltage applied to pin 7 which is outside this range will inhibit the functionality of the device.

Output Loading

This device has two main outputs (pins 8 and 9). Pin 8 should never see a voltage transient greater than 15 V. Pin 9 is a current source/sink output. It must, therefore, be loaded in such a manner so as to perform both the sourcing and sinking functions interchangeably.

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Power Supply Turn-on/Turn-off Sequence

Power should come up either simultaneously or with the substrate voltage (pin 7) slightly ahead of the reference current driving pin 6.

The current driving pin 6 should be removed either simultaneously or slightly ahead of the substrate voltage (pin 7).

Handling Procedures

This device is sensitive to static discharge. Care should be taken in handling.

Reliability

λ failure rate \leq .02%/1K hours at 75°C Tj

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