ADVANCE INFORMATION

DS3849 -1.0

TDA2088

PHASE CONTROL INTEGRATED CIRCUIT FOR CURRENT FEEDBACK APPLICATIONS

The TDA2088 is a bipolar integrated circuit phase controller, optimised for use in current feedback applications. It can also be used in open loop mode. The circuit was primarily designed for motor speed control in applications such as power tools and domestic appliances (foodmixers etc.).

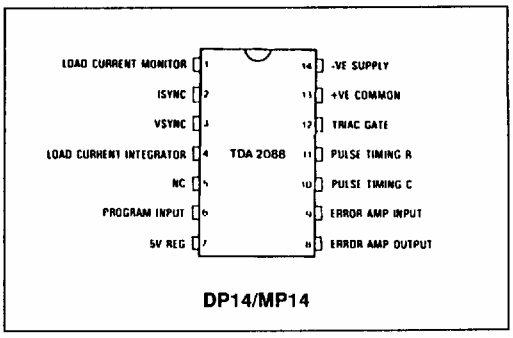


Fig.1 Pin Connections (top view)

FEATURES

- Powered direct from AC Mains or DC line.
- -5V supply available for ancillary circuitry.
- Low supply current consumption.
- Negative triac firing pulses.
- Guaranteed minimum 100mA triac drive current.
- Well-defined control voltage/phase angle relationship.
- Speed compensated by sensing motor current.
- Simple optimisation of control loop parameters.

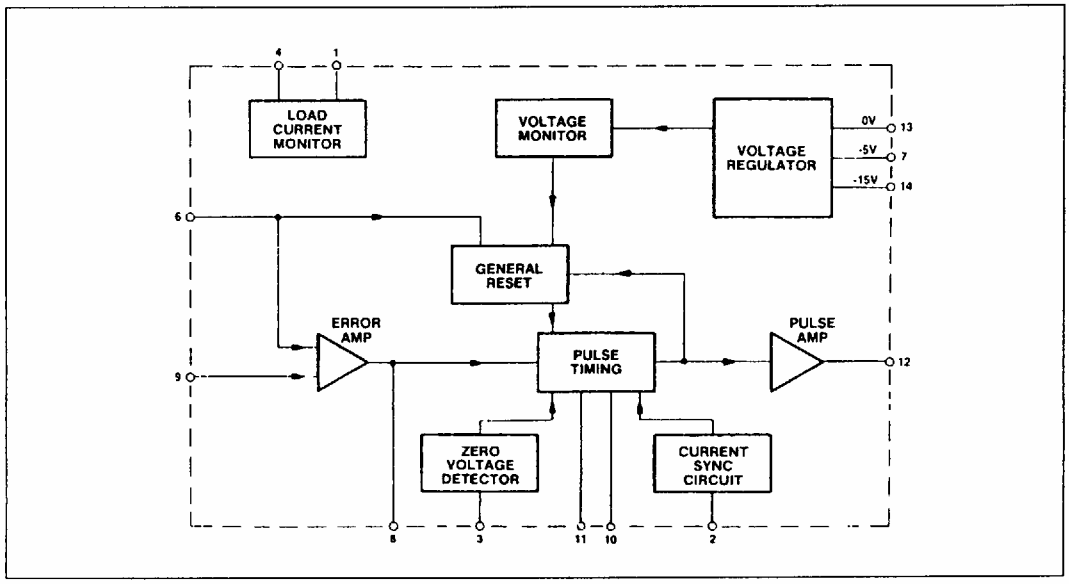


Fig. 2 Block Diagram of TDA2088

ELECTRICAL CHARACTERISTICS

These Characteristics are guaranteed at the following temperatures (unless otherwise stated).
T_{amb} = +25°C
All potentials measured with respect to common (Pin 13) (unless otherwise stated).

Characteristic	Value			Units	Conditions
	Min.	Typ.	Max.		
CURRENT CONSUMPTION					
Pin 14					
IC operating current		2.8	3.8	mA	Includes triac gate current for 50µs pulse
SHUNT VOLTAGE REGULATOR					
Pin 14					
Regulating voltage	-16	-14.75	-13.5	V	Full temperature range
Voltage monitor enable level	-11		-9	V	
SERIES REGULATOR					
Pin 7					
Regulating voltage (Vreg)	-5.35	-5	-4.65	V	1mA external load
Temperature coefficient			±1	mV/°C	
External load			10	mA	
Regulation	-75		+75	mV	For 0-5mA external load change
SPEED PROGRAM INPUT					
Pin 6					
Input voltage range	Vreg -0.5		0	V	
Input bias current			1	µA	
Zero power demand voltage	-100	-75	-50	mV	
ERROR AMPLIFIER					
Pin 6, 8 and 9					
Input offset voltage	-5		+15	mV	$V_6 - V_9$ to give $I_8 = 0$
Transconductance	80	100	120	µA/V	
Pin 8					
Output current drive	±20		±35	µA	
FIRING PULSE TIMING					
Pin 3					
Voltage SYNC trip level	±35	±50	±65	µA	
Pin 2					
Current SYNC trip level	±35	±50	±65	µA	
Pin 8					
Phase control voltage swing	Vreg		0	V	
Pin 10					
Firing pulse width		50		µs	C pin 16 = 47nF
Pulse repetition time		100		µs	C pin 16 = 47nF, R pin 11 = 200k
FIRING PULSE OUTPUT					
Pin 12					
Drive current	100	125	150	mA	Pin 12 V = -3V
Leakage current			10	µA	Pin 12 V = 0V
LOAD CURRENT SENSING					
Pin 1					
Offset voltage		±20	mV		
Pin 1 and 4					
Current gain	0.475	0.5	0.525		Pin 1 current = 100µA

ABSOLUTE MAXIMUM RATINGS

ELECTRICAL	Value	Units
Triac gate voltage pin 12	4	V
Repetitive peak input current pin 14	80	mA
Non repetitive peak input current pin 14 (tp = 250μs)	200	mA
Non repetitive peak input current pin 1 negative half cycle (tp = 250μs)	200	mA
Peak input current (I_{SYNC}) pin 2	±1	mA
Peak input current (V_{SYNC}) pin 3	±1	mA
-5V regulator current pin 7	10	mA
Control amp input voltage pin 9	Vreg	V
THERMAL		
Operating ambient temperature	0 to +85	°C
Storage temperature	-55 to +150	°C

SPECIAL FEATURES

Low Supply Current Consumption

Due to the low current consumption of the device the power dissipation in the mains dropper resistor may be as low as 1.1W on a 220V AC supply (0.5W on 110V).

By incorporating both a shunt and a series voltage regulator in the IC desion, a high ripple voltage can be accommodated on the supply smoothing capacitor.

The combination of the above two features result in reduced size and a minimum count of components used in the power supply circuitry.

Powered Direct from AC Mains or DC Line

This device incorporates a shunt regulator (-15V) such that it may be powered from an AC or DC supply via current limiting components or the device may be powered direct from a -12V DC supply.

-5V Supply available for Ancillary Circuitry

A -5V series regulator is incorporated to provide a smooth supply for the internal analog control functions. This supply may be used externally to power ancillary circuitry such as timing circuits and other logic control circuits etc. as well as driving potentiometers for the analog control inputs.

Due to this supply technique, greater symmetry between positive and negative half cycle firing phase angle will result.

Low Supply Inhibit Circuit

Timing functions and triac gate drive pulses are inhibited until there is sufficient supply voltage across the device to guarantee complete gate drive pulses.

This ensures that bulk conduction is established in the triac and correct linear operation of the control system is maintained.

Negative Triac Gate Firing Pulses

Since the device works with the positive supply common, the triac gate pulses are negative going. This is an advantage when selecting a suitable triac since most triac manufacturers prefer this drive polarity.

The device is designed to give a triac pulse that is greater than 100mA for a period of 50 microseconds with standard pulse timing components (47nF. pin 10). Repeated triac gate pulses are given if the triac fails to latch or becomes unlatched due to motor brush bounce.

Well-Defined Control Voltage/Phase Angle Relationship

An internal -5V reference circuit is used as the charging voltage for the pulse timing ramp capacitor and as the reference voltage for the speed input potentiometer. This ensures that maximum phase angle can be obtained by adjusting the resistor or capacitor on the pulse timing circuit without affecting the maximum setting.

Average Load Current Sensing

The load current is normally sensed in the positive mains half cycle by means of a low impedance resistor in series with the triac and load. The voltage drop across this resistor is converted back into a low current source by a second resistor and fed into the load current sensing input (pin 1) of the IC. In high load current applications where the power dissipated in a series sensing resistor would be unacceptable, a current transformer may he utilised.