TRIAC PHASE ANGLE CONTROLLER

ILA1185A

The ILA1185A generates controlled triac triggering pulses and allows tachless speed stabilization of universal motors by an integrated positive feedback function. Typical applications are power hand tools, vacuum cleaners, mixers, light dimmer and other small appliances.

- Supply Power Obtained from AC Line
- Can be used with 220 V/50 Hz or 110 V/60 Hz
- Low Count/Cost External Components
- Optimum Triac Firing (2nd and 3rd Quadrants)
- Repetitive Trigger Pulses when Triac Current is Interrupted by Motor Brush Bounce
- Triac Current Sensing to Allow Inductive Loads
- Programmable Soft-Start
- Power Failure Detection and General Circuit Reset
- Low Power Consumption; 6.0 mA

Pin Connection

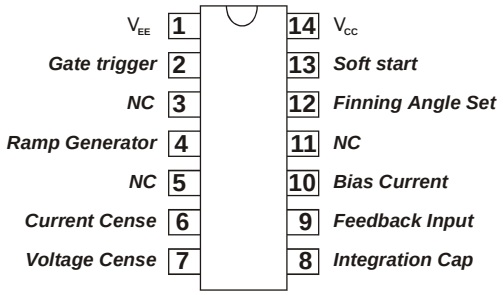
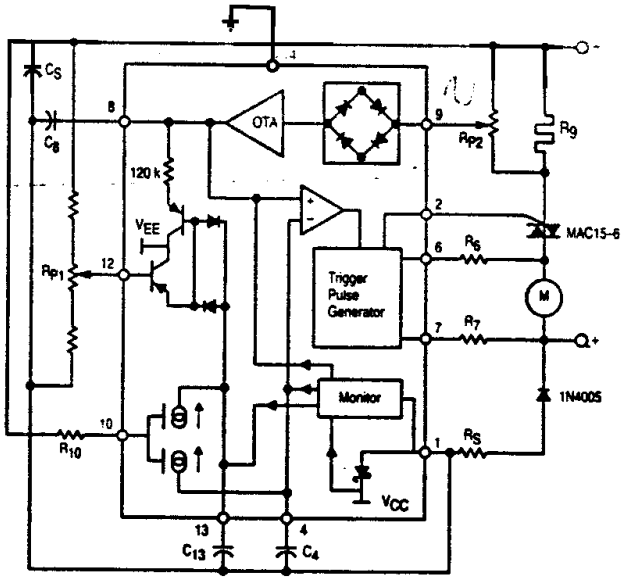


Figure 1. **Representative Block Diagram**



MAXIMUM RATINGS (voltages are referenced to Pin 14 (ground) unless other noted)

Rating	**Symbol**	**Value**	**Unit**
Maximum Voltage Range per Listed Pin Pins3. 5,11 (not connected) Pins 4,8.13 Pin 2 Maximum Positive Voltage (No minimum value allowed; see current ratings)	V_{pin} V_{pin12} V_{pin1}	 -20 to+20 $-V_{CC}$ to 0 -3.0 to +3.0 0 0.5	 V
Maximum Current per Listed pin Pin 1 Pin 6 and 7 Pin 9 Pin 10 Pin12	I_{pin}	 ±20 ±2.0 ±0.5 ±300 -500	 mA mA mA µA µA
Maximum Power Dissipation (T_A=25°C)	P_D	250	mW
Maximum Thermal Resistance, .Junction-to-Ambient	$R_{\theta JA}$	100	°C/W
Operating Ambient Temperature Range	T_A	0 to + 70	°C
Storage Temperature Range	Tstg	-55 to <+ 125	°C

* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied.
Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_A= 25°C, voltages are referenced to Pin 14 (ground) unless other noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Power Supply Zener Regulated Voltage, (Vpin1) I_{pin1}= 2.0 mA Circuit Current Consumption. Ipin1 V_{pin1}=-6,0V,I_{pin2}=0A	 $-V_{CC}$ $-I_{CC}$	 -9.6 -2.0	 -8.6 -1.0	 -7.6 -	 V mA
Monitoring Enable Supply Voltage (V_{EN}) Monitoring Disable Supply Voltage (V_{DIS})	V_{pin1EN} $V_{pin1DIS}$	V_{CC}+0.2 V_{EN}+0.12		V_{CC}+0.5 V_{EN}+0.3	V
Phase Set Control Voltage Static Offset $V_{pin3} - V_{pin12}$ Pin 12 Input Bias Current $V_{pin4} - V_{pin12}$ Residual Offset	 V_{off} I_{pin12}	 1.2 -200 -	 - - 180	 2.0 0 -	 V nA mV
Soft-Start Capacitor Charging Current R_{pin10} = 100 kΩ V_{pin13} from -Vcc to - 3.0V	I_{pin13}	-17'	-14	-11	µA
Sawtooth Generator Sawtooth Capacitor Discharge Current R_{10}=100 kΩ, Vpin4 from -2.0 to -6.0V Capacitor Charging Current Sawtooth -High Voltage ($V_{pin\ 4}$) Sawtooth Minimum Low Voltage (V_{pin4})	 I_{pin4} I_{pin4} V_{HTH} V_{LTH}	 67 -10 -2.5 -	 70 - -1.6 -7.1	 73 -1.5 -1.0 -	 µA mA V . V

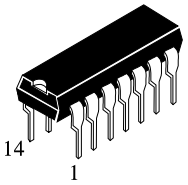
ELECTRICAL CHARACTERISTICS (T_A= 25°C, voltages are referenced to Pin 14 (ground) unless other noted.)

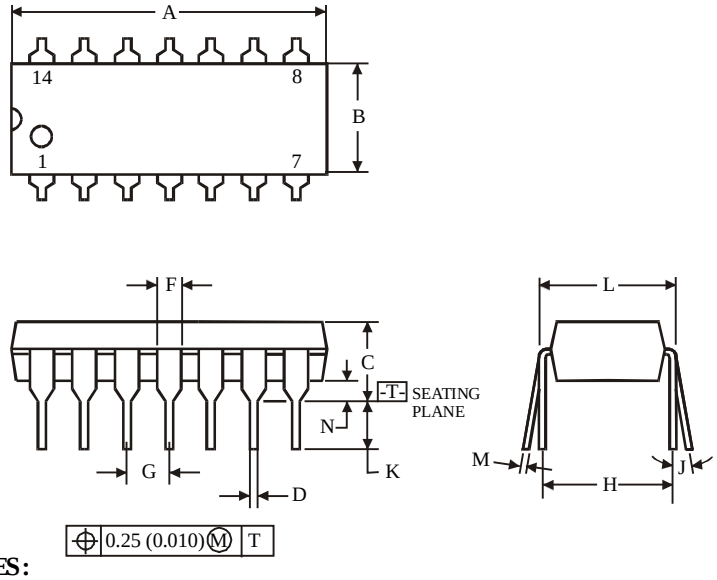
Characteristics	Symbol	Min	Typ	Max	Unit
Positive Feedback					
Pin 9 Input Bias Current, V_{pin9} = 0	I_{Pin9}	-	$2xI_{pin10}$	-	V
Programming pin voltage related to Pin 1	V_{pin10}	1.0	1.25	1.5	
Transfer Function Gain $\Delta V_{pin8}/\Delta V_{pin9}$					
R_{10}=100 kΩ.ΔV_{pin9}=50 mV	A	-	75	-	
R_{10}=270 kΩ.ΔV_{pin9}=50 mV	A	-	36	-	
Pin 8 Output Internal Impedance	Z_{pin8}	-	120	-	kΩ
Trigger Pulse Generator					
Output Current (Sink) V_{pin2}=0V	I_{Pin2}	60	-	80	mA
Output Leakage Current V_{pin2}=+2.0V		-	-	4.0	µA
Output Pulse Width	t_P				
C_4=47nF, R_{10}=270kΩ		-	55	-	µs
Output Pulse Repetition Period	t				
C_4=47nF R_{10}=270 kΩ		-	420	-4	µs
Current Synchronization Threshold Levels I_{pin6}, I_{pin7}	I_{sync}	-40	-	+40	µA

PIN FUNCTION DESCRIPTION

Pin No.	Function	Description
1	V_{EE}	This pin is the negative supply for the chip and clamped at -8.6 V by an internal zener.
2	Gate Trigger Pulse	This pin supplies - 1.0V triac trigger pulse at twice the line frequency.
3	NC	Not connected.
4	Ramp Generator	The value of the capacitor at this pin determines the slope of the ramp.
5	NC	Not connected.
6	Current Sense	This pin senses if the triac is on, and if so, will disable the gate trigger pulse.
7	Voltage Sense	The internal timing of the chip is set by the frequency of the voltage at this pin
8	Integration Capacitor	This pin is the output of the feedback and the variation in voltage is averaged out by the capacitor.
9	Feedback Input	The change in load current is detected by the change in voltage across R9.
10	Current Program	The bias current for the circuit is determined by the resistor value at this pin.
11	NC	Not connected.
12	Phase Angle Set	The voltage at this pin sets the no-toad firing angle.
13	Soft-Start	The firing angle is slowly increased from 180° to the set value of Pin 12.
14	V_{CC}	Ground

N SUFFIX PLASTIC DIP
(MS - 001AA)



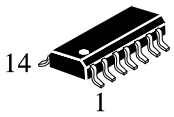


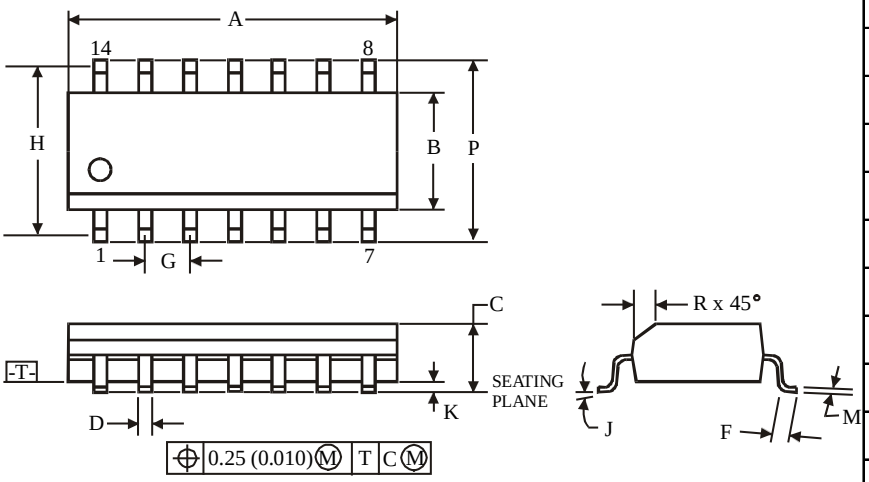
	Dimension, mm	
Symbol	MIN	MAX
A	18.67	19.69
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

1. Dimensions “A”, “B” do not include mold flash or protrusions.
   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AB)





	Dimension, mm	
Symbol	MIN	MAX
A	8.55	8.75
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.27	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

NOTES:

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side
   for A; for B – 0.25 mm (0.010) per side.