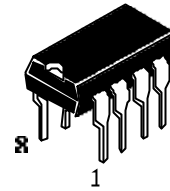


# EARTH LEAKAGE CURRENT DETECTOR

## Description

The SL7101 is designed for use in earth leakage circuit interrupters for operation directly of the AC Line in breakers. It contains pre regulator, main regulator, after regulator, differential amplifier, level comparator, latch circuit. The input in the differential amplifier is connect to the secondary node of zero current transformer. The level comparator generates high level when earth leakage current is greater than some level.



N SUFFIX  
PLASTIC

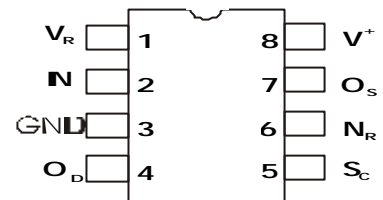


D SUFFIX  
SOIC

## Feature

- Low Power Consumption ( $P_D=5mW$ ) 100V/200V
- 100V/200V Common Built-in Voltage Regulator
- High Gain Differential Amplifier
- High Input Sensitivity
- Minimum External Parts
- Large Surge Margin
- Wide Operating Temperature Range ( $T_A=-30$  to  $85^\circ C$ )
- High Noise Immunity

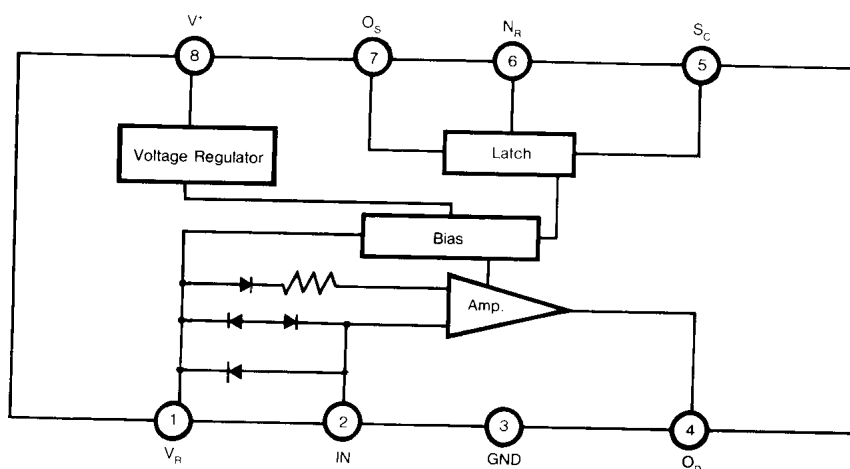
## Pin Configuration (Top View)



## Absolute Maximum Ratings ( $T_A=25^\circ c$ )

- Supply Voltage 20V
- Supply Current 8mA
- Power Dissipation 200mW
- Operating Temperature - 30 to  $85^\circ C$
- Storage Temperature - 55 to  $125^\circ C$

## Block Diagram



## Recommended Operating Condition: $T_A = -30^{\circ}\text{C}$ to $80^{\circ}\text{C}$

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V^+$	12			V
Vs-GND Capacitor	$C_{vs}$	1			$\mu\text{F}$
O <sub>s</sub> -GND Capacitor	$C_{os}$			1	$\mu\text{F}$

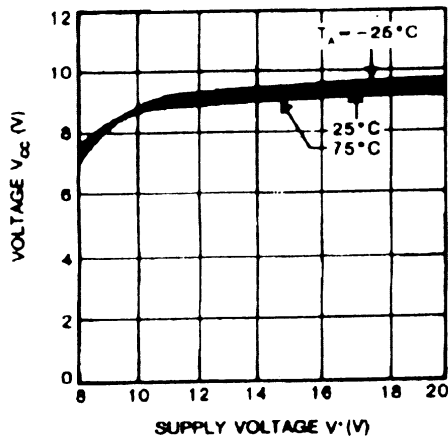
## Electrical Characteristics

PARAMETER	SYMBOL	CONDITIONS	TEMP. (°C)	MIN.	TYP.	MAX.	UNIT
Supply Current 1	$I_{S1}$	$V^+ = 12\text{V}$ , $V_R - V_I = 30\text{ mV}$	-30	-	-	580	$\mu\text{A}$
			25	300	400	530	
			85	-	-	480	
* Trip Voltage	$V_T$	$V^+ = 16\text{V}$ , $V_R - V_I = X$	-30 85	9	13.5	18	mV (rms)
Differential Amplifier Output Current 1	$I_{TD1}$	$V^+ = 16\text{ V}$ , $V_R - V_I = 30\text{ mV}$ $V_{OD} = 1.2\text{ V}$	25	-12	-20	-30	$\mu\text{A}$
Differential Amplifier Output current 2	$I_{TD2}$	$V^+ = 16\text{ V}$ , $V_R - V_I = \text{short}$ $V_{OD} = 0.8\text{ V}$	25	17	27	37	$\mu\text{A}$
Output Current	$I_o$	$V_{SC} = 1.4\text{ V}$ $V_{OS} = 0.8\text{ V}$	$I_{S1} = 580\mu\text{A}$	-30	-200	-	$\mu\text{A}$
			$I_{S1} = 530\mu\text{A}$	25	-100	-	
			$I_{S1} = 480\mu\text{A}$	85	-75	-	
S <sub>c</sub> ON Voltage	$V_{SC\text{ ON}}$	$V^+ = 16\text{ V}$	25	0.7	1.0	1.4	V
S <sub>c</sub> Input Current	$I_{SC\text{ ON}}$	$V^+ = 12\text{V}$	25	-	-	5	$\mu\text{A}$
Output "L" Current	$I_{OSL}$	$V^+ = 12\text{ V}$ , $V_{OSL} = 0.2\text{ V}$	-30 85	200	800	1400	$\mu\text{A}$
Input Clamp Voltage	$V_{IC}$	$V^+ = 12\text{ V}$ , $I_{IC} = 20\text{ mA}$	-30 85	4.3	-	6.7	V
Differential Input Clamp Voltage	$V_{IDC}$	$I_{IDC} = 100\text{mA}$	-30 85	0.4	1.2	2	V
Max. Current Voltage	$V_{SM}$	$I_{SM} = 7\text{ mA}$	25	20	24	28	V
Supply Current 2	$I_{S2}$	$V_{OS} = 0.5\text{ V}$ , $V_R - V_I = X$	-30 85	-	-	1200	$\mu\text{A}$
Latch Circuit Off Supply Voltage	V+ OFF		25	0.5			V
Response Time	$T_{ON}$	$V^+ = 16\text{ V}$ , $V_R - V_I = 0.3\text{ V}$	25	1	3	4	ms

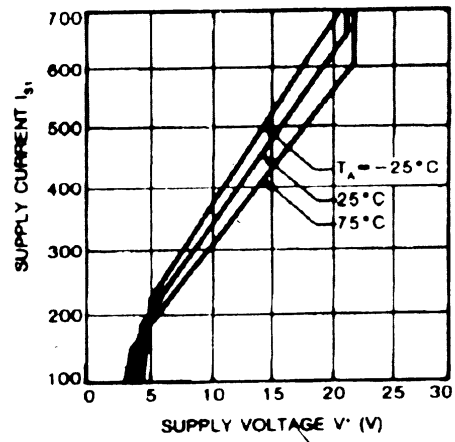
\* A: 9 ~12.5 B: 11.5~15.5 C: 14.5~18

Typical Performance Curves

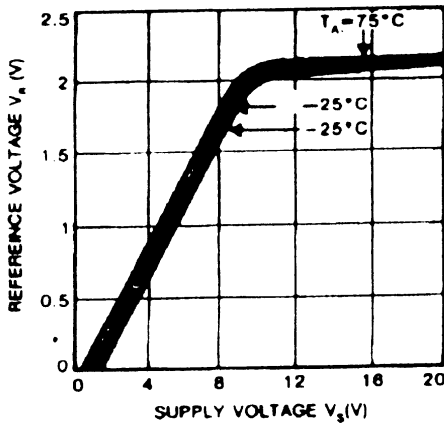
VOLTAGE-SUPPLY VOLTAGE



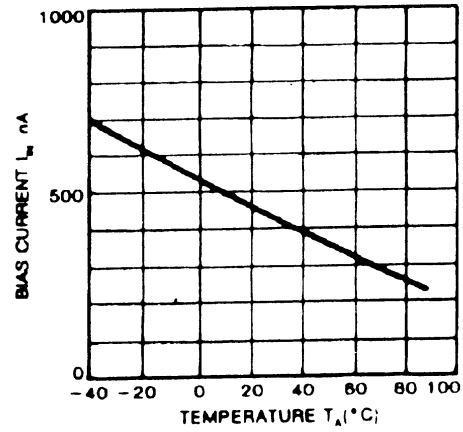
SUPPLY CURRENT-SUPPLY VOLTAGE



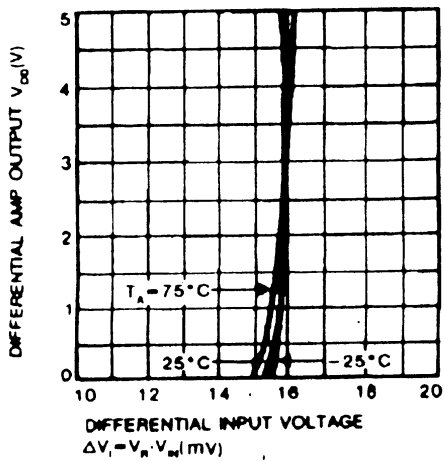
REFERENCE VOLTAGE-SUPPLY VOLTAGE



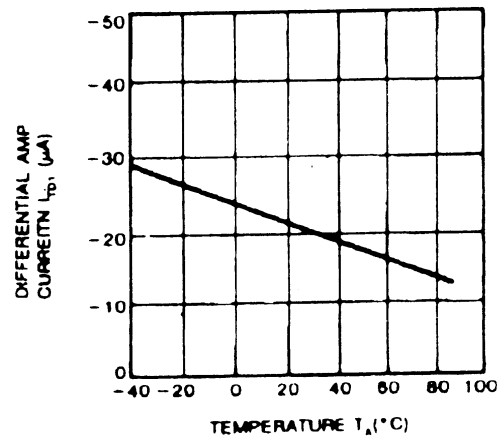
BIAS CURRENT-TEMPERATURE



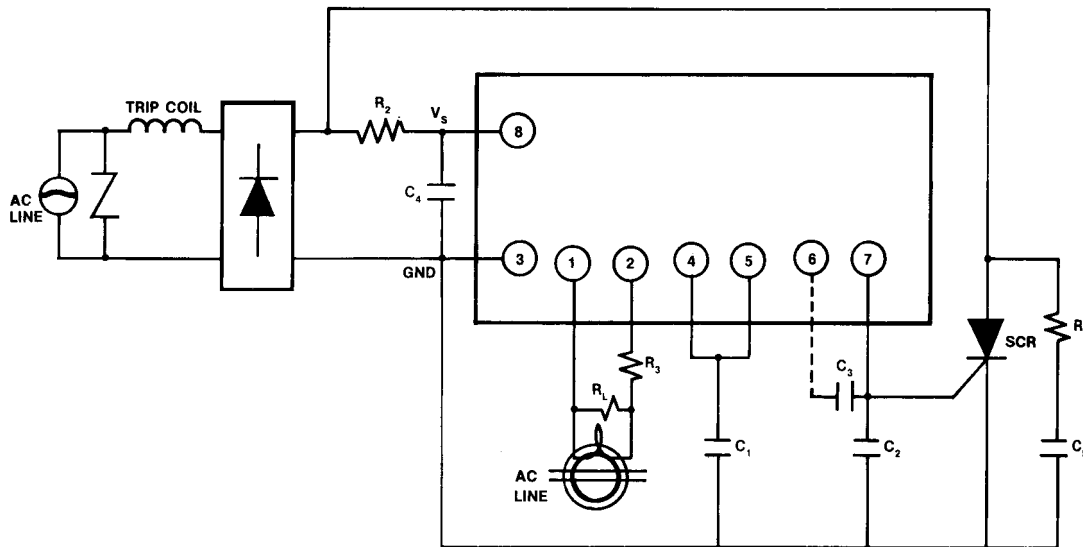
DIFFERENTIAL AMPLIFIER OUTPUT VOLTAGE-DIFFERENTIAL INPUT VOLTAGE



DIFFERENTIAL AMPLIFIER OUTPUT CURRENT-TEMP



## Typical Application



## Description of elements of application diagram

1. The resistance of R1 resistor is chosen in such a way so that to limit IC's consumption current (not more than 8 mA), and here the voltage drop is around 21-28V.
2. R2 resistor provides the necessary bias of the differential cascade.
3. R3 resistor is a loading one per input.
4. R4 resistor limits the charging current of C4 electrolytic capacitor are required to maintain IC performance until the fuse is completely burn out. Its value is chosen correspondingly.
5. C1 electrolytic capacitor is a filtering one as per supply (around 1 – 10  $\mu\text{F}$ ).
6.  $\tilde{N}2$  and C3 capacitors are filtering ones (not more than 1  $\mu\text{F}$ )