

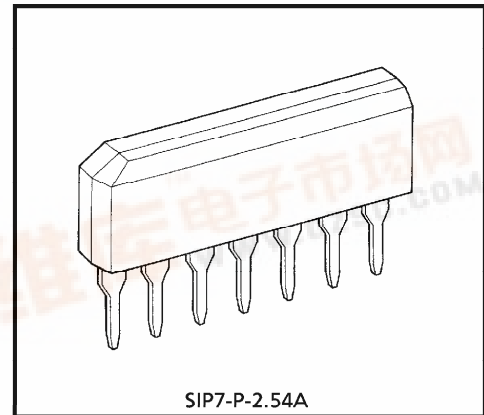
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7510S

## EARTH LEAK BREAKER

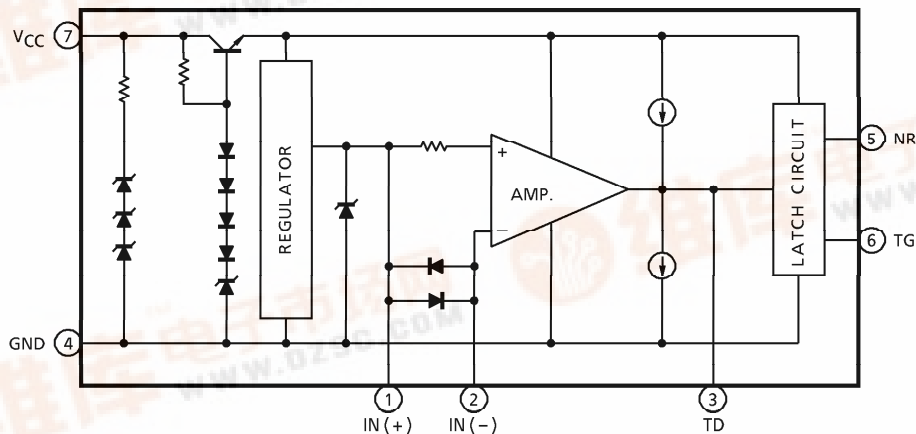
### FEATURES

- High Sensibility :  $V_{Trip} = 7mV$  (Typ.)
- Compose of Toshiba Original SIP (7Pin) so that it is possible to manufacture very small Earth Leak Breaker by using this device.
- Having High Reliability for the swing of supply voltage.
- Be possible to turn on External Thyristor Because of having Regulator Circuit.
- Having stability Trip Voltage Value.
- High Speed Rising Time.



Weight : 0.7g (Typ.)

### BLOCK DIAGRAM

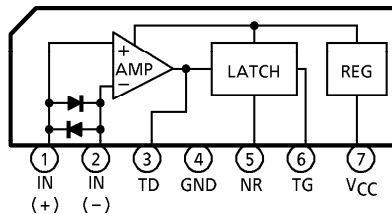


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**PIN CONNECTION**



**MAXIMUM RATINGS (Ta = 25°C)**

| CHARACTERISTIC        | SYMBOL    | CONDITION     | RATING     | UNIT |
|-----------------------|-----------|---------------|------------|------|
| Supply Current        | $I_{CC}$  | —             | 10         | mA   |
| Input Current         | $I_{IM}$  | + IN - (- IN) | 250 (Note) | mA   |
|                       |           | + IN - GND    | 30         |      |
|                       |           | - IN - GND    | 30         |      |
| Power Dissipation     | $P_D$     | —             | 400        | mW   |
| Operating Temperature | $T_{opr}$ | —             | - 30~85    | °C   |
| Storage Temperature   | $T_{stg}$ | —             | - 55~125   | °C   |

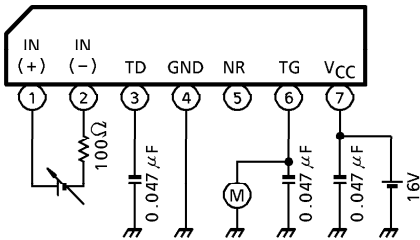
(Note) In case the current between +IN and -IN, Pulse width must be less than 1ms.

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

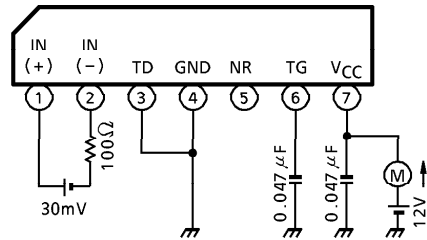
| CHARACTERISTIC                       | SYMBOL                | TEST CIRCUIT | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|-----------------------|--------------|--|------|------|------|------|
| Trip Voltage                         | V <sub>TRIP</sub>     | 1            | V <sub>CC</sub> = 16V, Ta = -30~85°C                                 | 4    | —    | 10   | mV   |
| Supply Current (1)                   | I <sub>CC</sub>       | 2            | V <sub>CC</sub> = 12V<br>(+IN) - (-IN) = 30mV                        | —    | 550  | 900  | μA   |
| Gate Current                         | I <sub>TGH</sub>      | 3            | V <sub>CC</sub> = 16V, V <sub>TG</sub> = 0.8V<br>Ta = 25°C           | 100  | —    | —    | μA   |
|                                      |                       |              | V <sub>CC</sub> = 16V, V <sub>TG</sub> = 0.8V<br>Ta = -30~85°C       | 90   | —    | —    |      |
| Time Current                         | I <sub>TDH</sub>      | 4            | V <sub>CC</sub> = 16V, V <sub>TD</sub> = 0V                          | 30   | —    | 100  | μA   |
| TD Terminal "L" Current              | I <sub>TDL</sub>      | 5            | V <sub>CC</sub> = 16V, V <sub>TD</sub> = 0.8V<br>(+IN) - (-IN) Short | 20   | —    | 70   | μA   |
| ON Voltage Of Internal Latch Circuit | V <sub>ON (SCR)</sub> | 6            | V <sub>CC</sub> = 16V  | 0.7  | —    | 1.6  | V    |
| Output "L" Current                   | I <sub>TGL</sub>      | 7            | V <sub>CC</sub> = 12V, V <sub>TG</sub> = 0.2V<br>Ta = -30~85°C       | 100  | —    | —    | μA   |
| Input Clamp Voltage                  | V <sub>INC</sub>      | 8            | V <sub>CC</sub> = 12V, I <sub>IN</sub> = 30mA                        | 4.6  | —    | 6.9  | V    |
| Differential Input Clamp Voltage     | V <sub>DFC</sub>      | 9            | I <sub>DF</sub> = 100mA  | 0.7  | —    | 1.3  | V    |
| V <sub>CC</sub> Terminal Voltage     | V <sub>CCM</sub>      | 10           | I = 10mA   | 22   | —    | 30   | V    |
| Operating Supply Current (2)         | I <sub>CC (ON)</sub>  | 11           | V <sub>CC</sub> = 16V, V <sub>TG</sub> = 0.8V<br>Ta = -30~85°C       | —    | —    | 2.5  | mA   |
| Output "OFF" Supply Voltage          | V <sub>CC (OFF)</sub> | 12           | —  | —    | 4.5  | —    | V    |
| Operating Time                       | t <sub>ON</sub>       | 13           | V <sub>CC</sub> = 16V<br>(+IN) - (-IN) = 0.3V                        | —    | 1    | —    | ms   |

**TEST CIRCUIT**

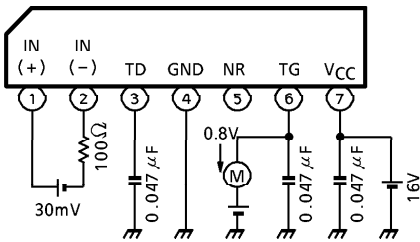
1. Trip voltage  $V_{TRIP}$



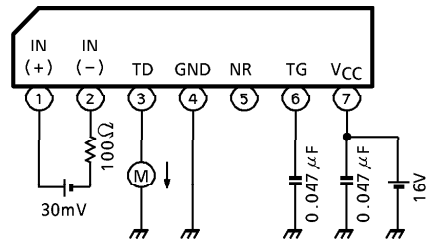
2. Supply current (1)



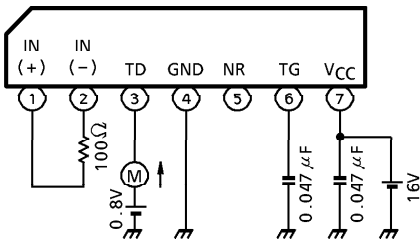
3. Gate current  $I_{TGH}$



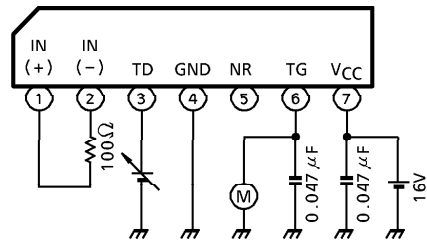
4. Time current  $I_{TDH}$



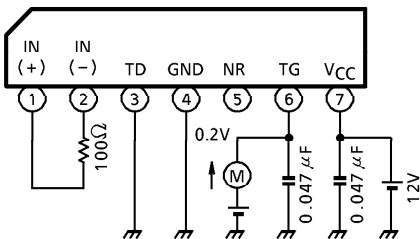
5. TD terminal "L" current  $I_{TDL}$



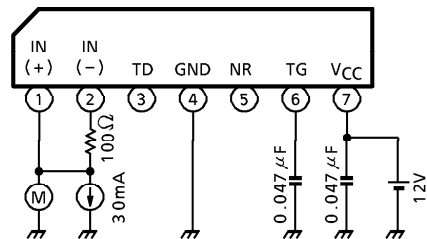
6. On voltage of internal latch circuit  $V_{ON}$  (SCR)



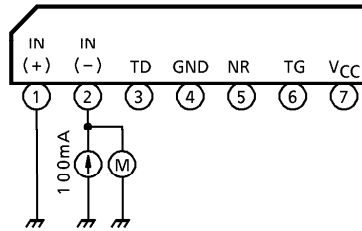
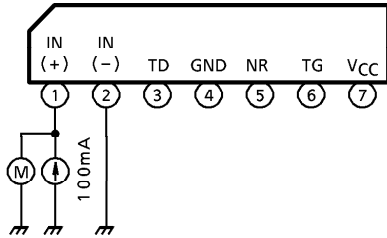
7. Output "L" current  $I_{TGL}$



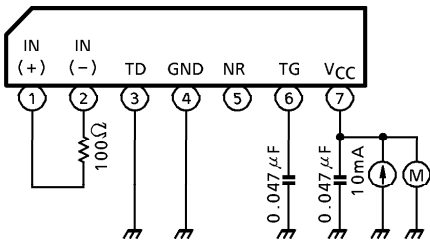
8. Input clamp voltage  $V_{INC}$



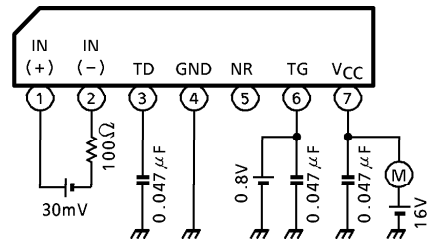
9. Differential input clamp voltage  $V_{DFC}$



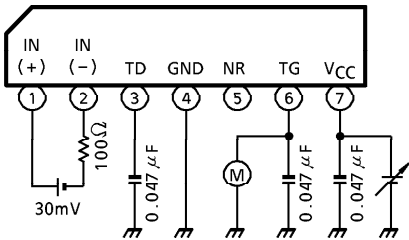
10.  $V_{CC}$  terminal voltage  $V_{CCM}$



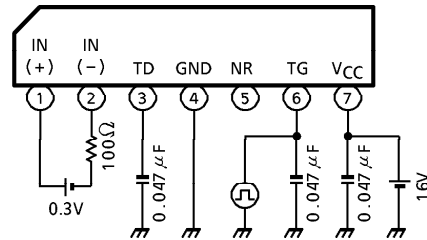
11. Operating current (2)



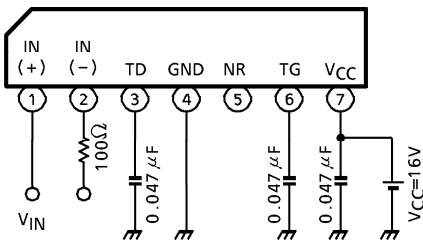
12. Latch "OFF" supply voltage  $V_{CC(OFF)}$

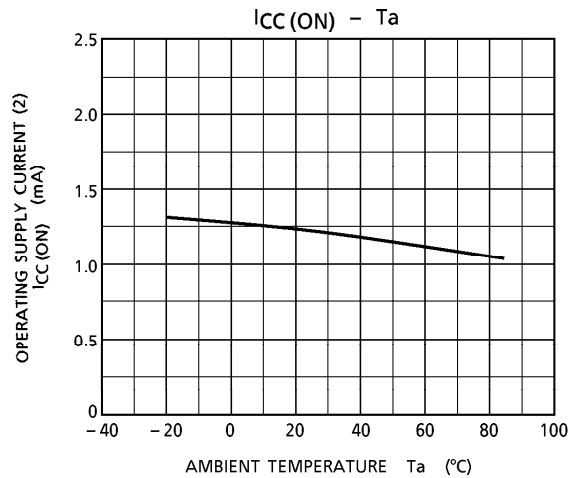
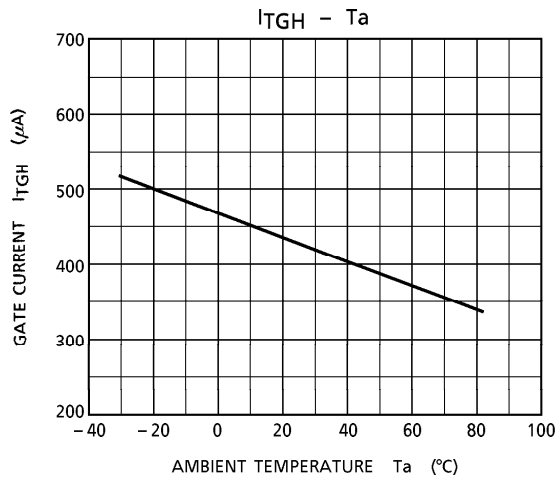
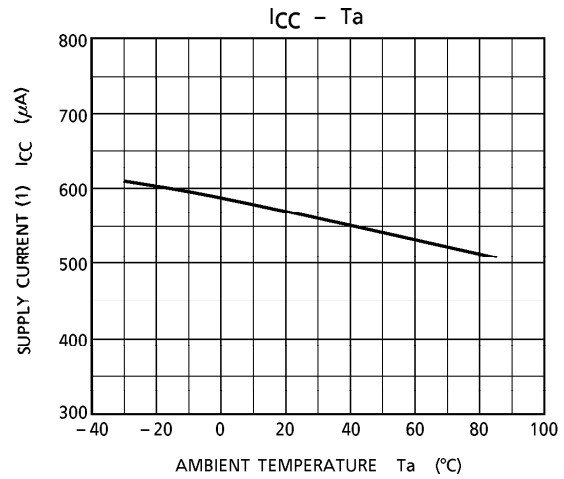
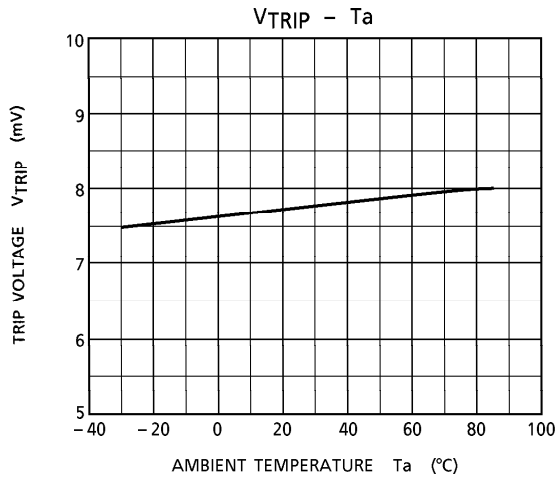


13. Operating time

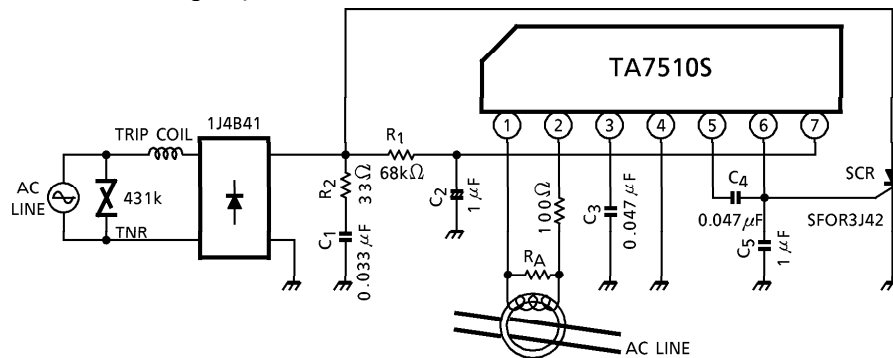


14. Latch operation



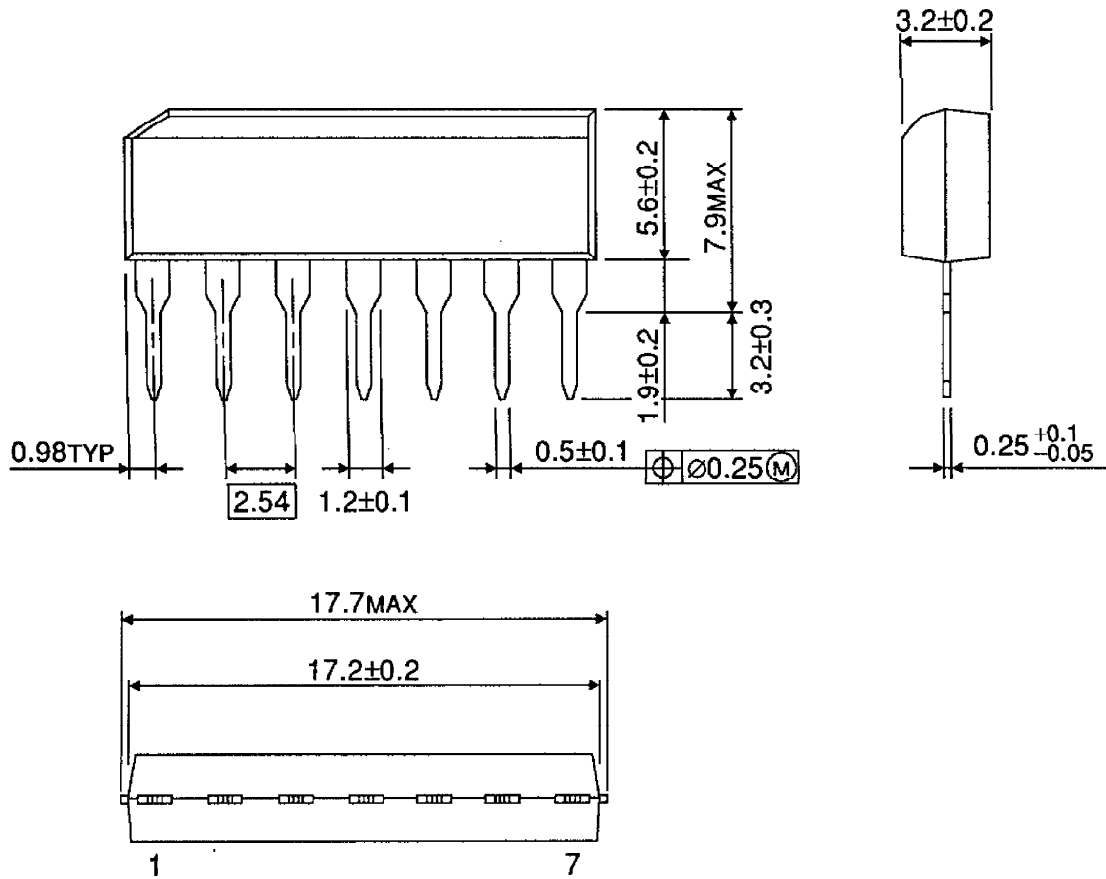


**APPLICATION CIRCUIT (High speed earth leak breaker at 100V or 200V)**



OUTLINE DRAWING  
SIP7-P-2.54A

Unit : mm



Weight : 0.7g (Typ.)