

# M54517P

7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY

## DESCRIPTION

M54517P is seven-circuit Darlington transistor arrays. The circuits are made of NPN transistors. Both the semiconductor integrated circuits perform high-current driving with extremely low input-current supply.

## FEATURES

- Medium breakdown voltage ( $BV_{CEO} \geq 25V$ )
- High-current driving ( $I_{c(max)} = 400mA$ )
- Driving available with PMOS IC output
- Wide operating temperature range ( $T_a = -20$  to  $+75^\circ C$ )

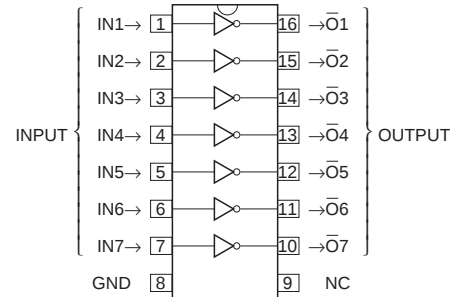
## APPLICATION

Drives of relays and printers, digit drives of indication elements (LEDs and lamps), and MOS-bipolar logic IC interfaces

## FUNCTION

The M54517P has seven circuits consisting of NPN Darlington transistors. These ICs have resistance of  $20k\Omega$  between input transistor bases and input pins. The output transistor emitters are all connected to the GND pin (pin 8). Collector current is 400mA maximum. Collector-emitter supply voltage is 25V maximum.

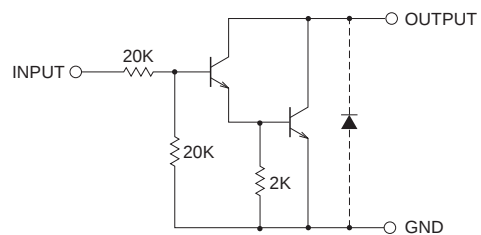
## PIN CONFIGURATION



Package type 16P4

NC : No connection

## CIRCUIT DIAGRAM



The seven circuits share the GND.

The diode, indicated with the dotted line, is parasitic, and cannot be used.

Unit :  $\Omega$

## ABSOLUTE MAXIMUM RATINGS (Unless otherwise noted, $T_a = -20 \sim +75^\circ C$ )

| Symbol    | Parameter                 | Conditions                                 | Ratings         | Unit       |
|-----------|---------------------------|--------------------------------------------|-----------------|------------|
| $V_{CEO}$ | Collector-emitter voltage | Output, H                                  | $-0.5 \sim +25$ | V          |
| $I_c$     | Collector current         | Current per circuit output, L              | 400             | mA         |
| $V_i$     | Input voltage             |                                            | $-0.5 \sim +25$ | V          |
| $P_d$     | Power dissipation         | $T_a = 25^\circ C$ , when mounted on board | 1.47            | W          |
| $T_{opr}$ | Operating temperature     |                                            | $-20 \sim +75$  | $^\circ C$ |
| $T_{stg}$ | Storage temperature       |                                            | $-55 \sim +125$ | $^\circ C$ |

**RECOMMENDED OPERATING CONDITIONS** (Unless otherwise noted,  $T_a = -20 \sim +75^\circ\text{C}$ )

| Symbol | Parameter                                                                                 |                             | Limits |     |     | Unit |
|--------|-------------------------------------------------------------------------------------------|-----------------------------|--------|-----|-----|------|
|        |                                                                                           |                             | min    | typ | max |      |
| Vo     | Output voltage                                                                            |                             | 0      | —   | 25  | V    |
| Ic     | Collector current<br>(Current per 1 circuit when 7 circuits are coming on simultaneously) | Duty Cycle no more than 8%  | 0      | —   | 400 | mA   |
|        |                                                                                           | Duty Cycle no more than 40% | 0      | —   | 200 |      |
| VIH    | “H” input voltage                                                                         | Ic ≤ 400mA                  | 8      | —   | 20  | V    |
|        |                                                                                           | Ic ≤ 200mA                  | 5      | —   |     |      |
| VIL    | “L” input voltage                                                                         |                             | 0      | —   | 0.5 | V    |

**ELECTRICAL CHARACTERISTICS** (Unless otherwise noted,  $T_a = -20 \sim +75^\circ\text{C}$ )

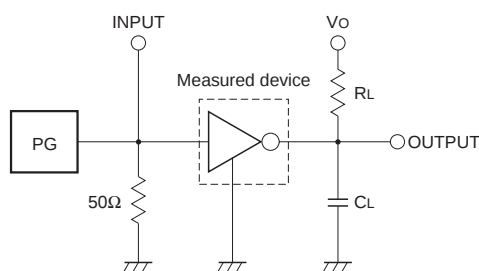
| Symbol        | Parameter                            | Test conditions                                                  | Limits |      |     | Unit |
|---------------|--------------------------------------|------------------------------------------------------------------|--------|------|-----|------|
|               |                                      |                                                                  | min    | typ* | max |      |
| $V_{(BR)CEO}$ | Collector-emitter breakdown voltage  | $I_{CEO} = 100\mu\text{A}$                                       | 25     | —    | —   | V    |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $V_I = 8\text{V}, I_c = 400\text{mA}$                            | —      | 1.15 | 2.2 | V    |
|               |                                      | $V_I = 5\text{V}, I_c = 200\text{mA}$                            | —      | 0.95 | 1.4 |      |
| $I_i$         | Input current                        | $V_I = 17\text{V}$                                               | 0.3    | 0.8  | 1.8 | mA   |
| $h_{FE}$      | DC amplification factor              | $V_{CE} = 4\text{V}, I_c = 400\text{mA}, T_a = 25^\circ\text{C}$ | 1000   | 4500 | —   | —    |

\* : The typical values are those measured under ambient temperature ( $T_a$ ) of  $25^\circ\text{C}$ . There is no guarantee that these values are obtained under any conditions.

**SWITCHING CHARACTERISTICS** (Unless otherwise noted,  $T_a = 25^\circ\text{C}$ )

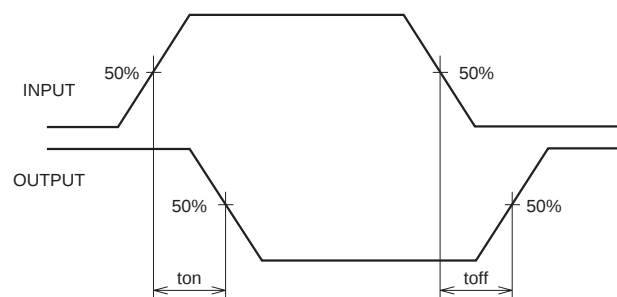
| Symbol    | Parameter     | Test conditions              | Limits |     |     | Unit |
|-----------|---------------|------------------------------|--------|-----|-----|------|
|           |               |                              | min    | typ | max |      |
| $t_{on}$  | Turn-on time  | $C_L = 15\text{pF}$ (note 1) | —      | 50  | —   | ns   |
| $t_{off}$ | Turn-off time |                              | —      | 500 | —   | ns   |

**NOTE 1 TEST CIRCUIT**



- (1) Pulse generator (PG) characteristics : PRR = 1kHz,  
 $t_w = 10\mu\text{s}$ ,  $t_r = 6\text{ns}$ ,  $t_f = 6\text{ns}$ ,  $Z_o = 50\Omega$   
 $V_P = 8\text{V}_{P-P}$
- (2) Input-output conditions :  $R_L = 25\Omega$ ,  $V_o = 10\text{V}$
- (3) Electrostatic capacity  $C_L$  includes floating capacitance at connections and input capacitance at probes

**TIMING DIAGRAM**



TYPICAL CHARACTERISTICS

