

# M54513P/FP

8-UNIT 50mA TRANSISTOR ARRAY

## DESCRIPTION

M54513P and M54513FP are eight-circuit 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

- High breakdown voltage ( $BV_{CEO} \geq 40V$ )
- Synchronizing current ( $I_c(max) = 50mA$ )
- Wide operating temperature range ( $T_a = -20$  to  $+75^\circ C$ )

## APPLICATION

Driving of digit drives of indication elements (LEDs and lamps) with small signals

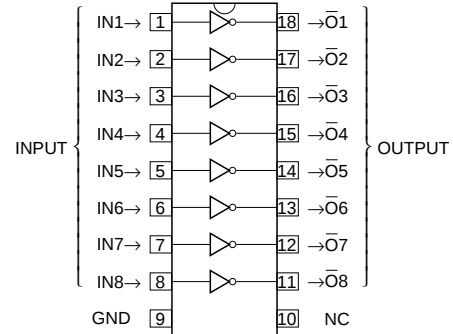
## FUNCTION

The M54513P and M54513FP each have eight circuits consisting of NPN transistors. These ICs have resistance of 2 k $\Omega$  at inputs and of 13.6k $\Omega$  between the base and emitter. The GND is used in common in each circuit.

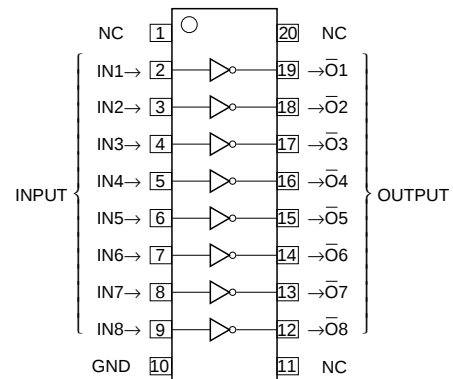
The transistors allow synchronous flow of 50mA collector current. A maximum of 40V voltage can be applied between the collector and emitter.

The M54513FP is enclosed in a molded small flat package, enabling space-saving design.

## PIN CONFIGURATION

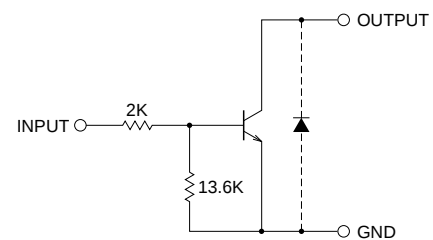


Package type 18P4G(P) NC : No connection



Package type 20P2N-A(FP) NC : No connection

## CIRCUIT DIAGRAM



The eight circuits share the GND.

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

Unit :  $\Omega$

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## ABSOLUTE MAXIMUM RATINGS (Unless otherwise noted, Ta = -20 ~ +75°C)

| Symbol           | Parameter                 | Conditions                       | Ratings          | Unit |
|------------------|---------------------------|----------------------------------|------------------|------|
| V <sub>CEO</sub> | Collector-emitter voltage | Output, H                        | -0.5 ~ +40       | V    |
| I <sub>C</sub>   | Collector current         | Current per circuit output, L    | 50               | mA   |
| V <sub>I</sub>   | Input voltage             |                                  | -0.5 ~ +10       | V    |
| P <sub>d</sub>   | Power dissipation         | Ta = 25°C, when mounted on board | 1.79(P)/1.10(FP) | W    |
| T <sub>opr</sub> | Operating temperature     |                                  | -20 ~ +75        | °C   |
| T <sub>stg</sub> | Storage temperature       |                                  | -55 ~ +125       | °C   |

## RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, Ta = -20 ~ +75°C)

| Symbol          | Parameter         | Limits |     |     | Unit |
|-----------------|-------------------|--------|-----|-----|------|
|                 |                   | min    | typ | max |      |
| V <sub>O</sub>  | Output voltage    | 0      | —   | 40  | V    |
| I <sub>C</sub>  | Collector current | 0      | —   | 30  | mA   |
| V <sub>IH</sub> | "H" input voltage | 2      | —   | 8   | V    |
| V <sub>IL</sub> | "L" input voltage | 0      | —   | 0.2 | V    |

## ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta = -20 ~ +75°C)

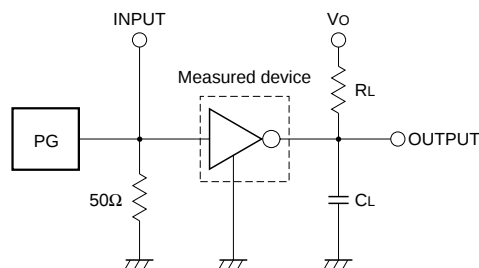
| Symbol                | Parameter                            | Test conditions                                        | Limits |      |     | Unit |
|-----------------------|--------------------------------------|--------------------------------------------------------|--------|------|-----|------|
|                       |                                      |                                                        | min    | typ* | max |      |
| V (BR) CEO            | Collector-emitter breakdown voltage  | I <sub>CEO</sub> = 100μA                               | 40     | —    | —   | V    |
| V <sub>CE</sub> (sat) | Collector-emitter saturation voltage | V <sub>I</sub> = 2V, I <sub>C</sub> = 10mA             | —      | 25   | 100 | mV   |
|                       |                                      | V <sub>I</sub> = 2.5V, I <sub>C</sub> = 30mA           | —      | 70   | 170 |      |
| I <sub>I</sub>        | Input current                        | V <sub>I</sub> = 2.5V                                  | —      | 0.85 | 1.7 | mA   |
| h <sub>FE</sub>       | DC amplification factor              | V <sub>CE</sub> = 4V, I <sub>C</sub> = 30mA, Ta = 25°C | 80     | 200  | —   | —    |

\* : The typical values are those measured under ambient temperature (Ta) of 25°C. There is no guarantee that these values are obtained under any conditions.

## SWITCHING CHARACTERISTICS (Unless otherwise noted, Ta = 25°C)

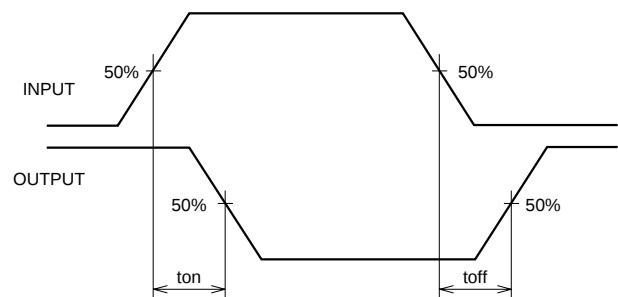
| Symbol | Parameter     | Test conditions    | Limits |      |     | Unit |
|--------|---------------|--------------------|--------|------|-----|------|
|        |               |                    | min    | typ  | max |      |
| ton    | Turn-on time  | CL = 15pF (note 1) | —      | 65   | —   | ns   |
| toff   | Turn-off time |                    | —      | 1200 | —   | ns   |

### NOTE 1 TEST CIRCUIT



- (1) Pulse generator (PG) characteristics : PRR = 1kHz,  
tw = 10μs, tr = 6ns, tf = 6ns, Zo = 50Ω  
Vp = 2.5Vp-p
- (2) Output conditions : RL = 300Ω, Vo = 10V
- (3) Electrostatic capacity CL includes floating capacitance at connections and input capacitance at probes

### TIMING DIAGRAM



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## TYPICAL CHARACTERISTICS

