

M54523P/FP

7-UNIT 500mA DARLINGTON TRANSISTOR-ARRAY WITH CLAMP DIODE

DESCRIPTION

M54523P and M54523FP are seven-circuit Darlington transistor arrays with clamping diodes. 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 ($BV_{CEO} \geq 50V$)
- High-current driving ($I_{C(max)} = 500mA$)
- With clamping diodes
- Driving available with PMOS IC output
- Wide operating temperature range ($T_a = -20$ to $+75^\circ C$)

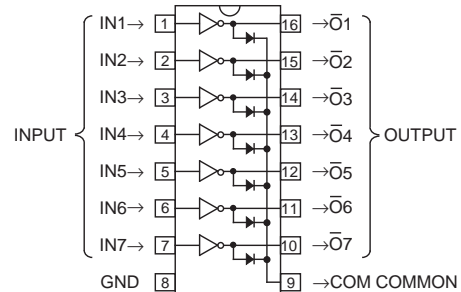
APPLICATION

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

FUNCTION

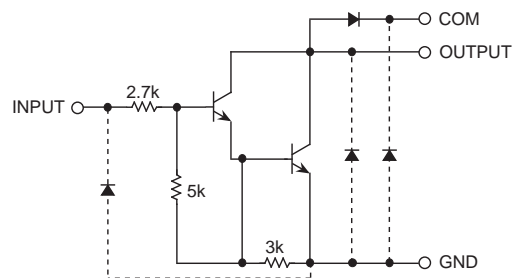
The M54523P and M54523FP each have seven circuits consisting of NPN Darlington transistors. These ICs have resistance of $2.7k\Omega$ between input transistor bases and input pins. A spike-killer clamping diode is provided between each output pin (collector) and COM pin. The output transistor emitters are all connected to the GND pin (pin 8). The collector current is 500mA maximum. Collector-emitter supply voltage is 50V maximum. The M54523FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



16P4(P)
Package type 16P2N-A(FP)

CIRCUIT DIAGRAM



The seven circuits share the COM and GND

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

Unit : Ω

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 | $-0.5 \sim +50$ | V |
| I_C | Collector current | Current per circuit output, L | 500 | mA |
| V_I | Input voltage | | $-0.5 \sim +30$ | V |
| I_F | Clamping diode forward current | | 500 | mA |
| V_R | Clamping diode reverse voltage | | 50 | V |
| P_d | Power dissipation | $T_a = 25^\circ C$, when mounted on board | 1.47(P)/1.00(FP) | W |
| T_{opr} | Operating temperature | | $-20 \sim +75$ | $^\circ C$ |
| T_{stg} | Storage temperature | | $-55 \sim +125$ | $^\circ C$ |

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

| Symbol | Parameter | Limits | | | Unit | |
|-----------------|---|---|------|-----|------|----|
| | | min | typ | max | | |
| V _o | Output voltage | 0 | — | 50 | V | |
| I _c | Collector current (Current per 1 circuit when 7 circuits are coming on simultaneously) | Duty Cycle P : no more than 8% FP : no more than 8% | 0 | — | 400 | mA |
| | | Duty Cycle P : no more than 30% FP : no more than 25% | 0 | — | 200 | |
| V _{IH} | "H" input voltage | I _c ≤ 400mA | 3.85 | — | 25 | V |
| | | I _c ≤ 200mA | 3.4 | — | 25 | |
| V _{IL} | "L" input voltage | | 0 | — | 0.6 | V |

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

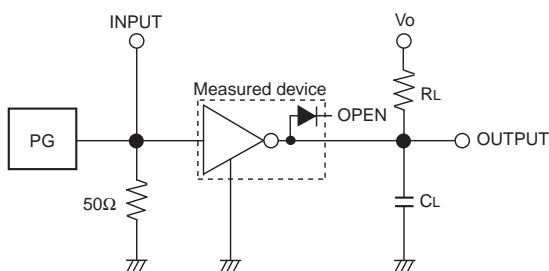
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|----------------------|--------------------------------------|---|--------|------|-----|------|
| | | | min | typ* | max | |
| V (BR) CEO | Collector-emitter breakdown voltage | I _{CEO} = 100μA | 50 | — | — | V |
| V _{CE(sat)} | Collector-emitter saturation voltage | V _I = 3.85V, I _c = 400mA | — | 1.2 | 2.4 | V |
| | | V _I = 3.4V, I _c = 200mA | — | 1.0 | 1.6 | |
| I _i | Input current | V _I = 3.85V | — | 1.2 | 1.8 | mA |
| | | V _I = 25V | — | 9.5 | 18 | |
| V _F | Clamping diode forward voltage | I _F = 400mA | — | 1.4 | 2.4 | V |
| I _R | Clamping diode reverse current | V _R = 50V | — | — | 100 | μA |
| h _{FE} | DC amplification factor | V _{CE} = 4V, I _c = 350mA, Ta = 25°C | 1000 | 2500 | — | — |

* : 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)

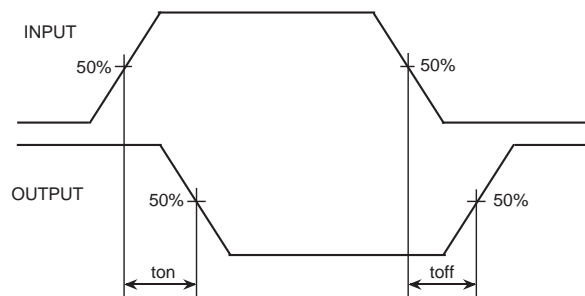
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|------------------|---------------|--------------------------------|--------|-----|-----|------|
| | | | min | typ | max | |
| t _{on} | Turn-on time | C _L = 15pF (note 1) | — | 10 | — | ns |
| t _{off} | Turn-off time | | — | 120 | — | ns |

NOTE 1 TEST CIRCUIT



- (1) Pulse generator (PG) characteristics : PRR=1kHz,
tw = 10μs, tr = 6ns, tf = 6ns, Zo = 50Ω
VP = 3.85VP-P
- (2) Input-output conditions : RL = 25Ω, Vo = 10V
- (3) Electrostatic capacity CL includes floating capacitance at connections and input capacitance at probes

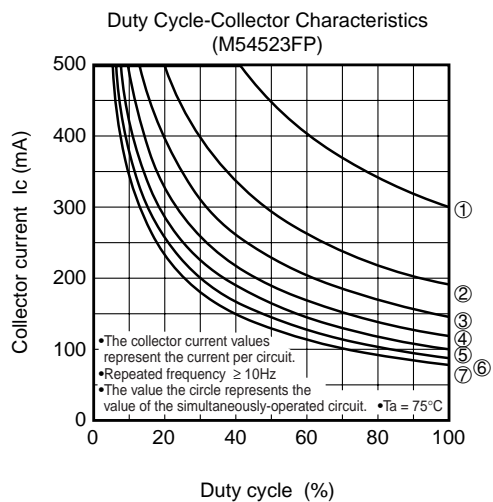
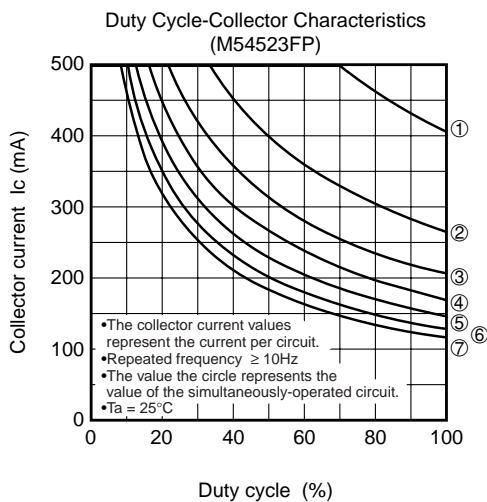
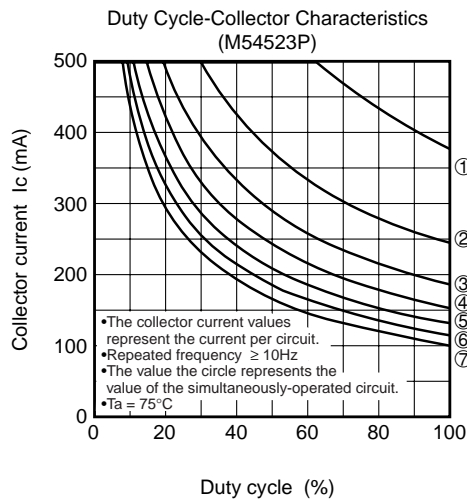
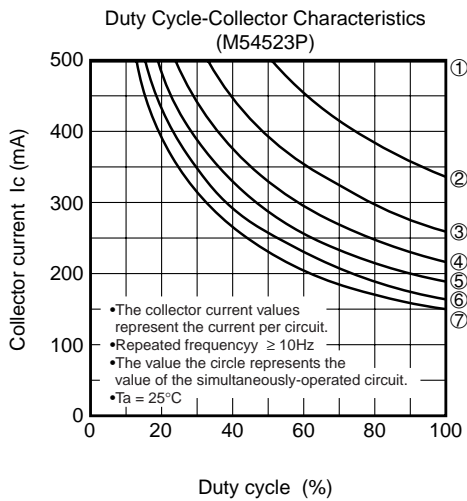
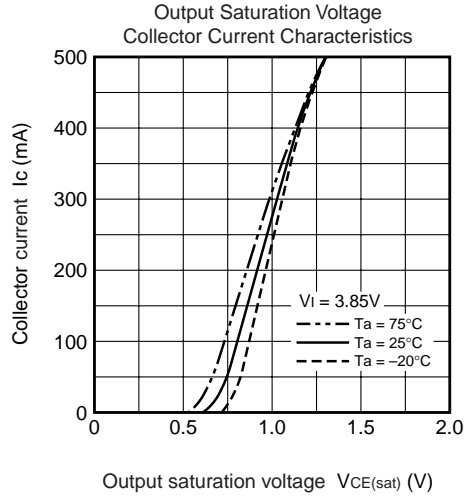
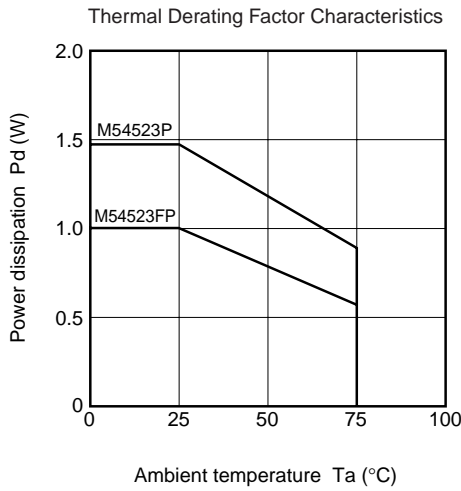
TIMING DIAGRAM



M54523P/FP

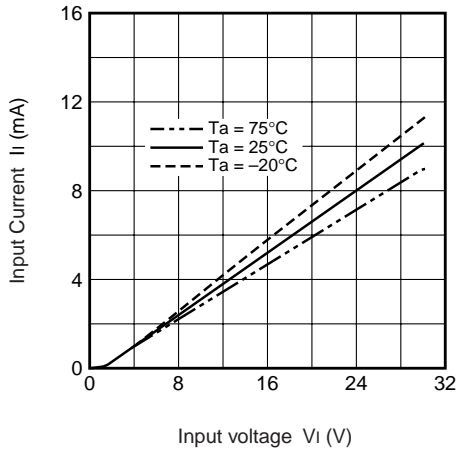
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TYPICAL CHARACTERISTICS

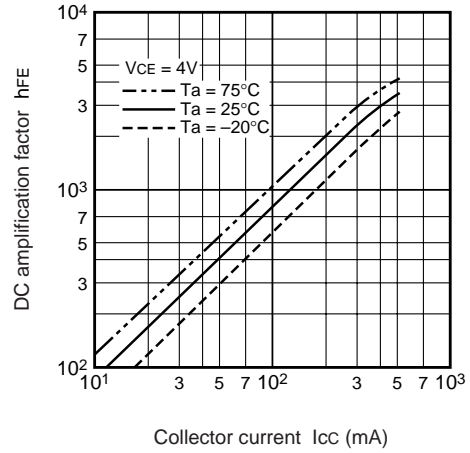


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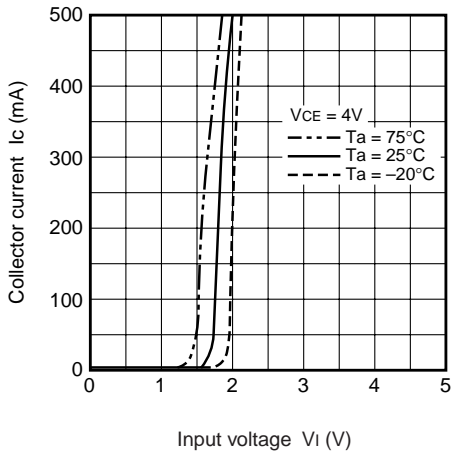
Input Characteristics



DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Clamping Diode Characteristics

