

**M63823P/FP/GP**

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

**DESCRIPTION**

M63823P, M63823FP and M63823GP are seven-circuit Darlington transistor arrays with clamping diodes. The circuits are made of NPN transistors. Both the semi-conductor integrated circuits perform high-current driving with extremely low input-current supply.

Production lineup has been newly expanded with the addition of 225mil (GP) package.

M63823P and M63823FP have the same pin connection as M54523P and M54523FP. (Compatible with M54523P and M54523FP) More over, the features of M63823P and M63823FP are equal or superior to those of M54523P and M54523FP.

**FEATURES**

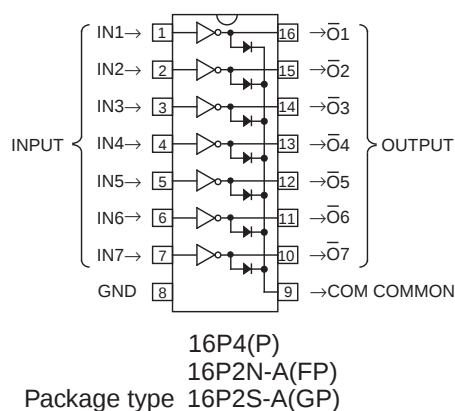
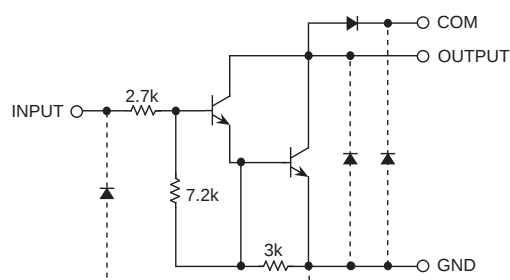
- Three package configurations (P, FP and GP)
- Pin connection Compatible with M54523P and M54523FP
- High breakdown voltage ( $BV_{CEO} \geq 50V$ )
- High-current driving ( $I_{C(max)} = 500mA$ )
- With clamping diodes
- PMOS Compatible input
- Wide operating temperature range ( $T_a = -40$  to  $+85^\circ C$ )

**APPLICATION**

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

**FUNCTION**

The M63823P, M63823FP and M63823GP 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 (pin 9). 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 M63823FP and M63823GP is enclosed in molded small flat package, enabling space-saving design.

**PIN CONFIGURATION****CIRCUIT DIAGRAM**

The seven circuits share the COM and GND

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

Unit :  $\Omega$

**ABSOLUTE MAXIMUM RATINGS** (Unless otherwise noted,  $T_a = -40 \sim +85^\circ C$ )

| 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)/0.80(GP) | W          |
| $T_{opr}$ | Operating temperature          |                                            | $-40 \sim +85$            | $^\circ C$ |
| $T_{stg}$ | Storage temperature            |                                            | $-55 \sim +125$           | $^\circ C$ |

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### RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, Ta = -40 ~ +85°C)

| Symbol | Parameter                                                                                 |                                                                                      | Limits |     |     | Unit |
|--------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------|-----|-----|------|
|        |                                                                                           |                                                                                      | min    | typ | max |      |
| Vo     | Output voltage                                                                            |                                                                                      | 0      | —   | 50  | V    |
| Ic     | Collector current<br>(Current per 1 circuit when 7 circuits are coming on simultaneously) | Duty Cycle<br>P : no more than 8%<br>FP : no more than 5%<br>GP : no more than 4%    | 0      | —   | 400 | mA   |
|        |                                                                                           | Duty Cycle<br>P : no more than 30%<br>FP : no more than 20%<br>GP : no more than 15% | 0      | —   | 200 |      |
| VIH    | “H” input voltage                                                                         | IC ≤ 400mA                                                                           | 3.85   | —   | 25  | V    |
|        |                                                                                           | IC ≤ 200mA                                                                           | 3.4    | —   | 25  |      |
| VIL    | “L” input voltage                                                                         |                                                                                      | 0      | —   | 0.6 | V    |

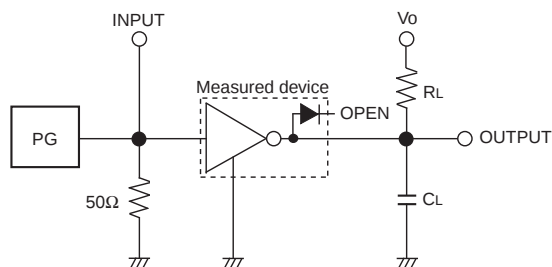
### ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta = 25°C)

| Symbol     | Parameter                            | Test conditions        | Limits |      |     | Unit |
|------------|--------------------------------------|------------------------|--------|------|-----|------|
|            |                                      |                        | min    | typ  | max |      |
| V (BR) CEO | Collector-emitter breakdown voltage  | ICEO = 100μA           | 50     | —    | —   | V    |
| VCE(sat)   | Collector-emitter saturation voltage | II = 500μA, IC = 350mA | —      | 1.2  | 1.6 | V    |
|            |                                      | II = 350μA, IC = 200mA | —      | 1.0  | 1.3 |      |
|            |                                      | II = 250μA, IC = 100mA | —      | 0.9  | 1.1 |      |
| II         | Input current                        | VI = 3.85V             | —      | 0.9  | 1.4 | mA   |
| VF         | Clamping diode forward voltage       | IF = 350mA             | —      | 1.4  | 2.0 | V    |
| IR         | Clamping diode reverse current       | VR = 50V               | —      | —    | 100 | μA   |
| hFE        | DC amplification factor              | VCE = 4V, IC = 350mA   | 1000   | 2000 | —   | —    |

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

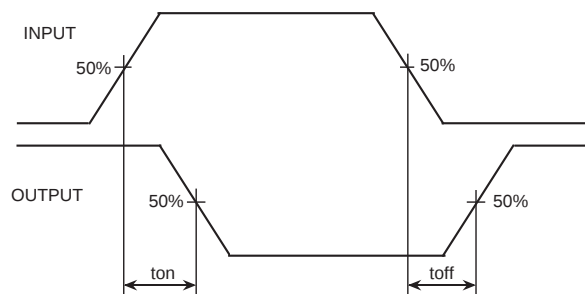
| Symbol | Parameter     | Test conditions    | Limits |     |     | Unit |
|--------|---------------|--------------------|--------|-----|-----|------|
|        |               |                    | min    | typ | max |      |
| ton    | Turn-on time  | CL = 15pF (note 1) | —      | 15  | —   | ns   |
| toff   | Turn-off time |                    | —      | 350 | —   | 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

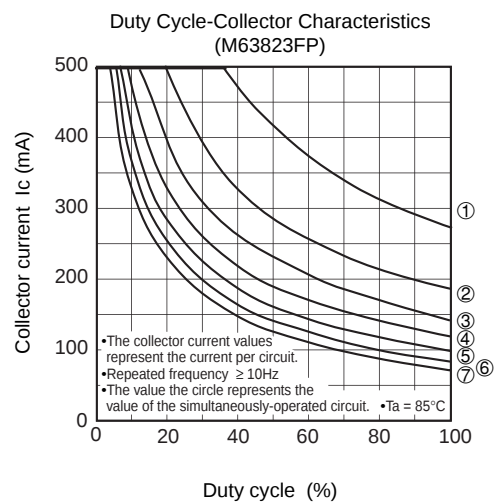
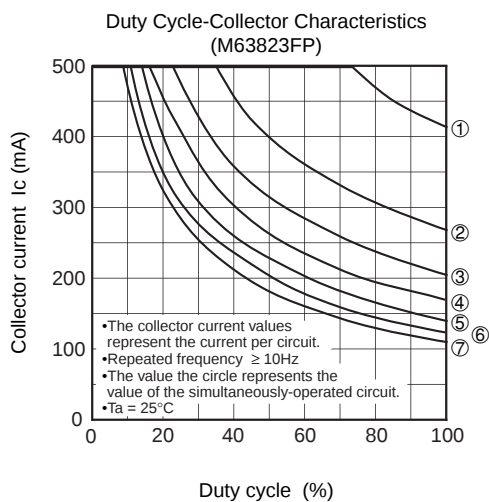
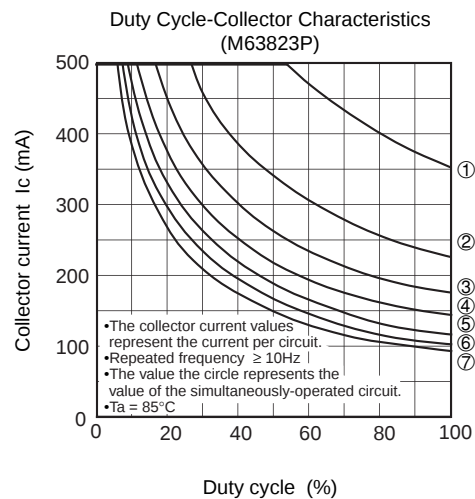
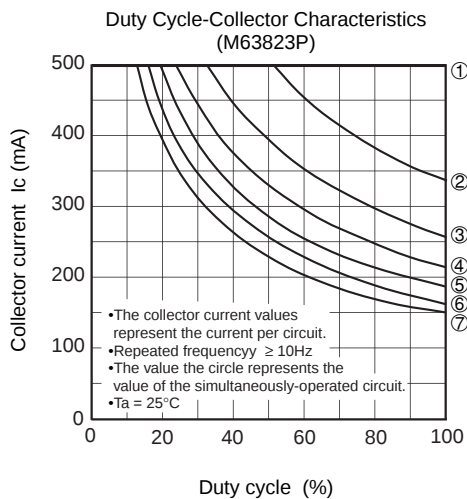
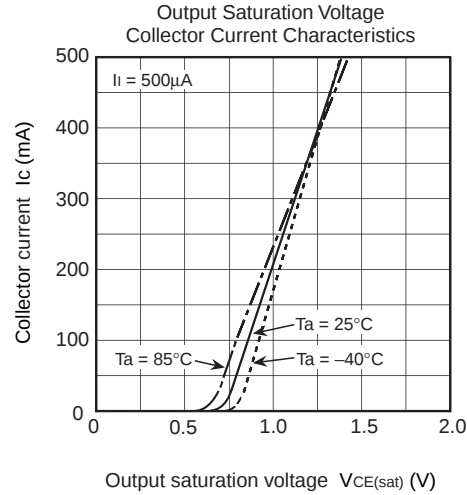
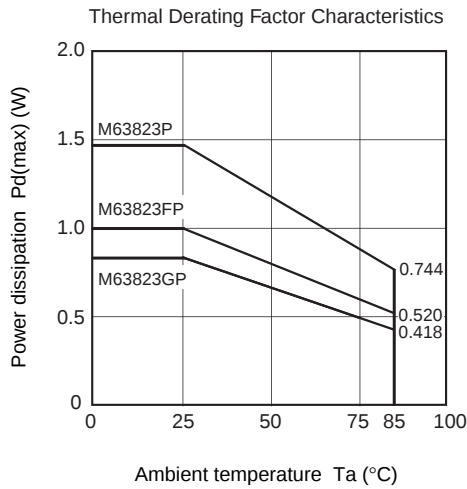
### TIMING DIAGRAM



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### TYPICAL CHARACTERISTICS



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