

# M54583P/FP

8-UNIT 400mA DARLINGTON TRANSISTOR ARRAY

### DESCRIPTION

M54583P and M54583FP are eight-circuit collector-current-synchronized Darlington transistor arrays. The circuits are made of PNP and 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 ( $I_{c(max)} = 400mA$ )
- Active L-level input
- With input clamping diodes

### APPLICATION

Interfaces between microcomputers and high-voltage, high-current drive systems, drives of relays and printers, and MOS-bipolar logic IC interfaces

### FUNCTION

The M54583 is produced by adding PNP transistors to M54523 inputs. Eight circuits having active L-level inputs are provided.

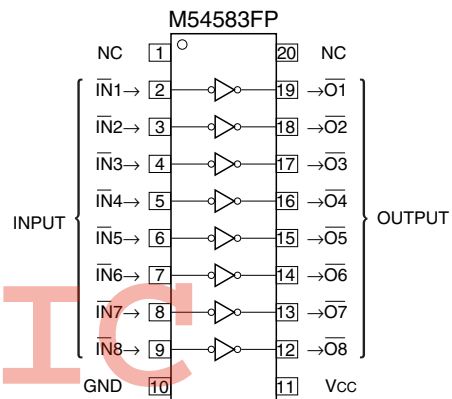
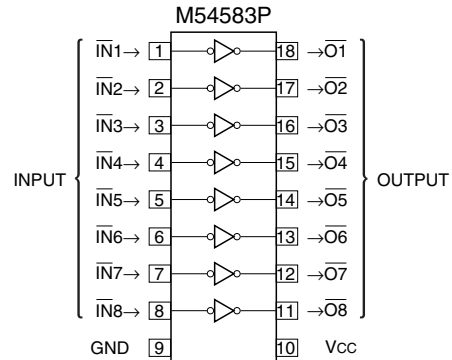
Resistance of  $7k\Omega$  and diode are provided in series between each input and PNP transistor base. The input diode is intended to prevent the flow of current from the input to the  $V_{cc}$ . Without this diode, the current flow from "H" input to the  $V_{cc}$  and the "L" input circuits is activated, in such case where one of the inputs of the 8 circuits is "H" and the others are "L" to save power consumption. The diode is inserted to prevent such misoperation.

This device is most suitable for a driver using NMOS IC output especially for the driver of current sink.

Collector current is 400mA maximum. Collector-emitter supply voltage is 50V.

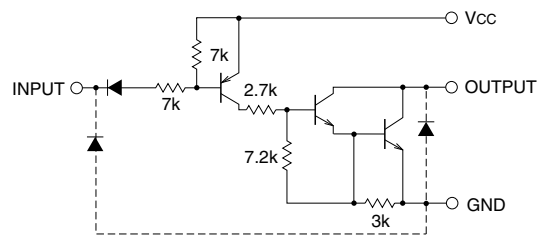
The 54583FP is enclosed in a molded small flat package, enabling space saving design.

### PIN CONFIGURATION (TOP VIEW)



NC : No connection

### CIRCUIT DIAGRAM (EACH CIRCUIT)



The eight circuits share the  $V_{cc}$  and 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>CC</sub>	Supply voltage		10	V
V <sub>CEO</sub>	Collector-emitter voltage	Output, H	-0.5 ~ +50	V
V <sub>I</sub>	Input voltage		-0.5 ~ V <sub>CC</sub>	V
I <sub>C</sub>	Collector current	Current per circuit output, L	400	mA
P <sub>d</sub>	Power dissipation	Ta = 25°C, when mounted on board	1.79/1.1	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>CC</sub>	Supply voltage	4	5	8	V	
I <sub>C</sub>	Collector current Per channel	V <sub>CC</sub> = 5V, Duty Cycle P : no more than 10% FP : no more than 5%	0	—	350	mA
		V <sub>CC</sub> = 5V, Duty Cycle P : no more than 34% FP : no more than 15%	0	—	200	
V <sub>IH</sub>	"H" input voltage	V <sub>CC</sub> -0.7	—	V <sub>CC</sub>	V	
V <sub>IL</sub>	"L" input voltage	0	—	V <sub>CC</sub> -3.6	V	

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

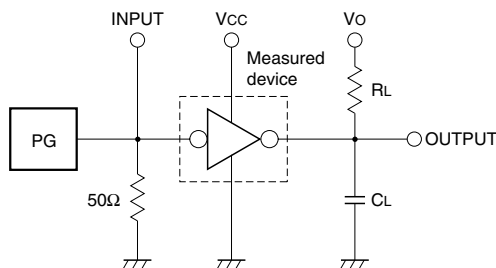
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
V <sub>(BR)CEO</sub>	Collector-emitter breakdown voltage	I <sub>CEO</sub> = 100μA, V <sub>CC</sub> = 8V	50	—	—	V
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	V <sub>I</sub> = V <sub>CC</sub> -3.6V I <sub>C</sub> = 350mA I <sub>C</sub> = 200mA	—	1.2	2.2	V
I <sub>I</sub>	Input current	V <sub>I</sub> = V <sub>CC</sub> -3.6V	—	-320	-600	μA
I <sub>CC</sub>	Supply current (one circuit coming on)	V <sub>CC</sub> = 5V, V <sub>I</sub> = V <sub>CC</sub> -3.6V	—	1.9	3	mA
h <sub>FE</sub>	DC amplification factor	V <sub>CE</sub> = 4V, V <sub>CC</sub> = 5V, I <sub>C</sub> = 350mA, Ta = 25°C	2000	3500	—	—

\* : 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)

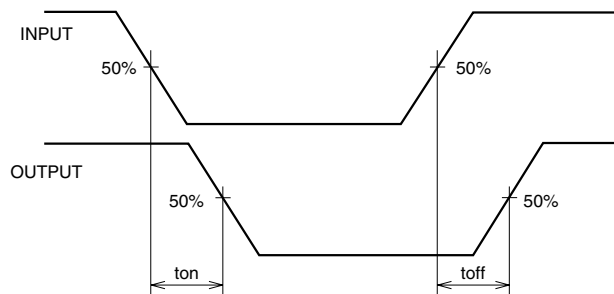
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t <sub>on</sub>	Turn-on time	C <sub>L</sub> = 15pF (note 1)	—	130	—	ns
t <sub>off</sub>	Turn-off time		—	3200	—	ns

**NOTE 1 TEST CIRCUIT**



- (1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Zo = 50Ω, V<sub>I</sub> = 0.4 to 4V
- (2) Input-output conditions : R<sub>L</sub> = 30Ω, V<sub>O</sub> = 10V, V<sub>CC</sub> = 4V
- (3) Electrostatic capacity C<sub>L</sub> includes floating capacitance at connections and input capacitance at probes

**TIMING DIAGRAM**

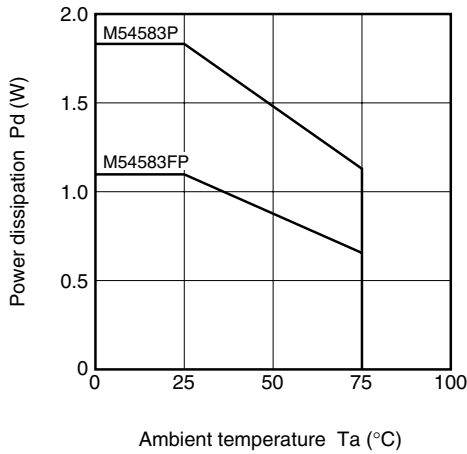


**M54583P/FP**

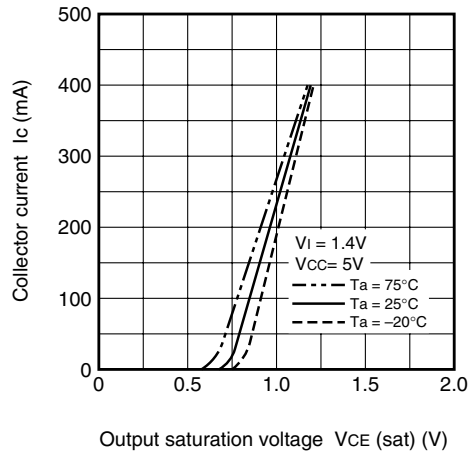
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**TYPICAL CHARACTERISTICS**

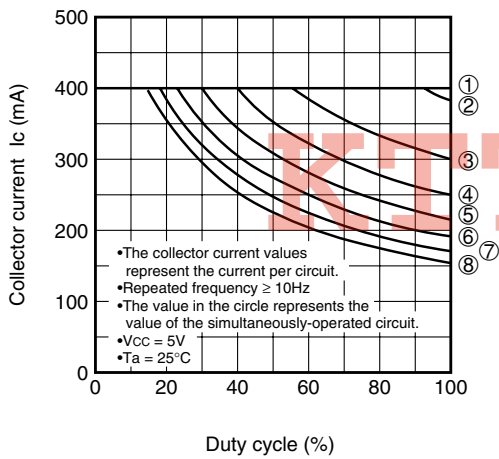
**Thermal Derating Factor Characteristics**



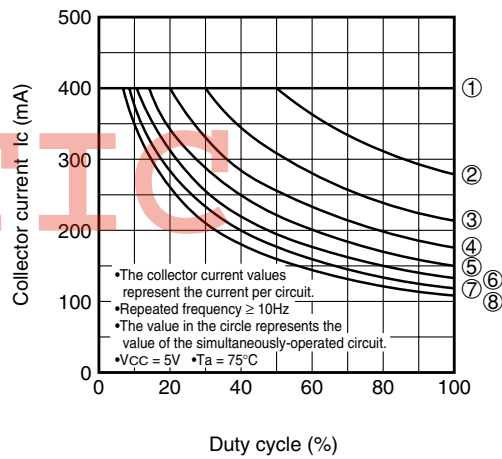
**Output Saturation Voltage Collector Current Characteristics**



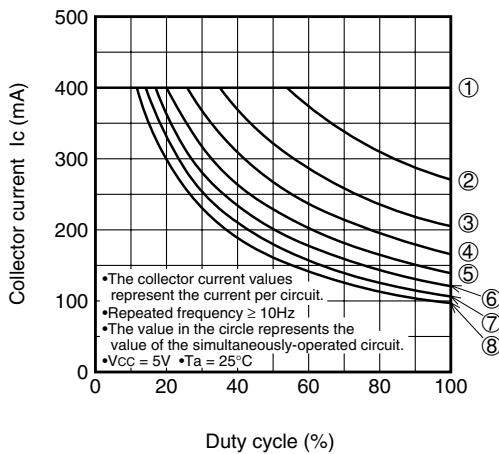
**Duty-Cycle-Collector Characteristics (M54583P)**



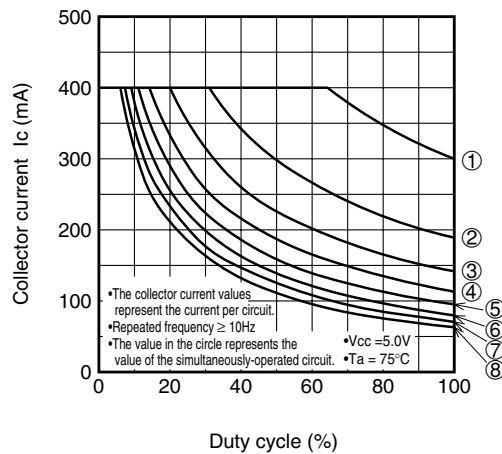
**Duty-Cycle-Collector Characteristics (M54583P)**



**Duty-Cycle-Collector Characteristics (M54583FP)**



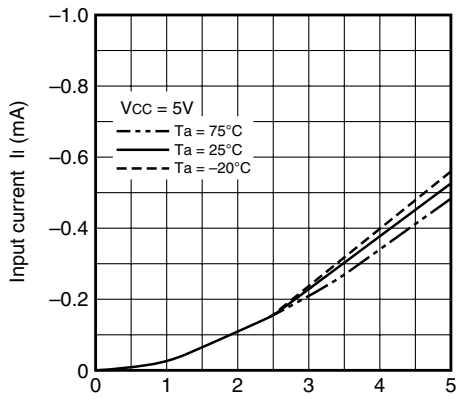
**Duty-Cycle-Collector Characteristics (M54583FP)**



**M54583P/FP**

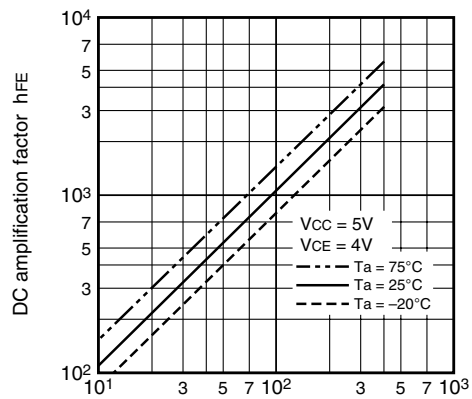
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**Input Characteristics**



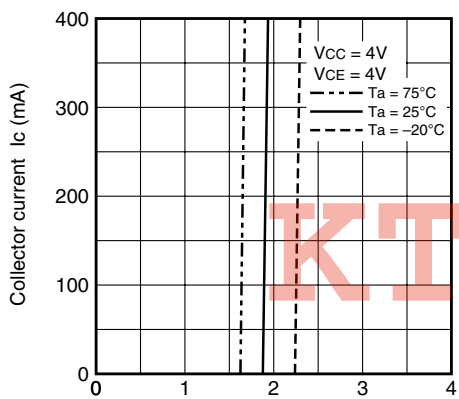
Supply voltage-Input voltage V<sub>CC</sub>-V<sub>i</sub> (V)

**DC Amplification Factor  
Collector Current Characteristics**



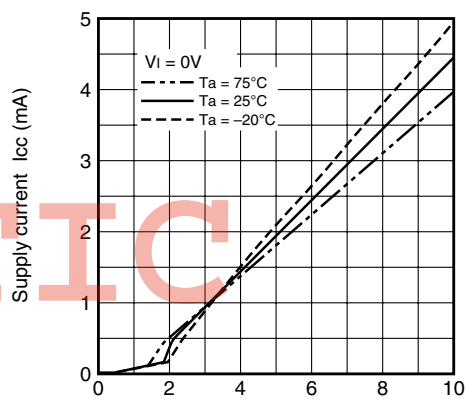
Collector current I<sub>c</sub> (mA)

**Grounded Emitter Transfer Characteristics**



Supply voltage-Input voltage V<sub>CC</sub>-V<sub>i</sub> (V)

**Supply Current Characteristics**



Supply voltage V<sub>CC</sub> (V)