

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
- Wide operating temperature range ($T_a = -20$ to $+75^\circ C$)

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.

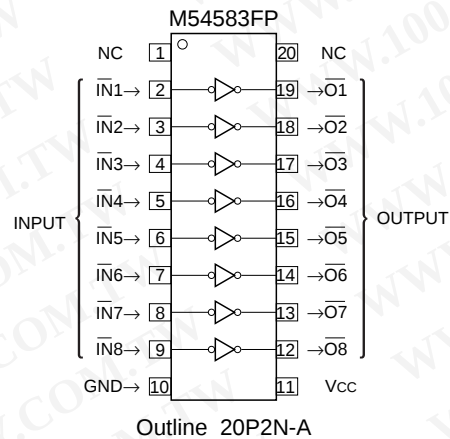
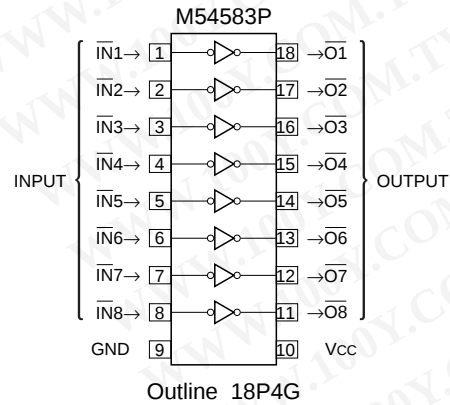
Resistance of $7k\Omega$ and diode are provided in series between each input and PNP transistor base. The input diode is intended to prevent the flow of current from the input to the V_{cc} . Without this diode, the current flow from "H" input to the V_{cc} and the "L" input circuits is activated, in 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.

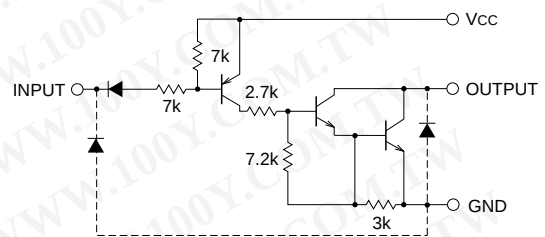
The 54583FP is enclosed in a molded small flat package, enabling space saving design.

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 : Ω

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

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		10	V
V_{CEO}	Collector-emitter voltage	Output, H	$-0.5 \sim +50$	V
V_i	Input voltage		$-0.5 \sim V_{CC}$	V
I_C	Collector current	Current per circuit output, L	400	mA
P_d	Power dissipation	$T_a = 25^\circ\text{C}$, when mounted on board	1.79/1.1	W
T_{opr}	Operating temperature		$-20 \sim +75$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-55 \sim +125$	$^\circ\text{C}$

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V _{CC}	Supply voltage		4	5	8	V
I _C	Collector current Per channel	V _{CC} = 5V, Duty Cycle P : no more than 10% FP : no more than 5%	0	—	350	mA
		V _{CC} = 5V, Duty Cycle P : no more than 34% FP : no more than 15%	0	—	200	
V _{IH}	"H" input voltage		V _{CC} –0.7	—	V _{CC}	V
V _{IL}	"L" input voltage		0	—	V _{CC} –3.6	V

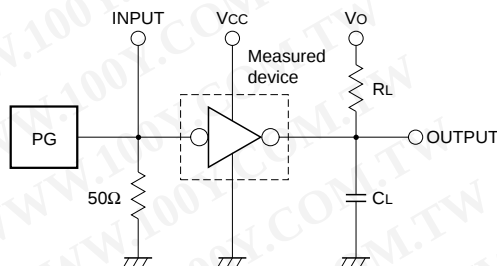
ELECTRICAL CHARACTERISTICS (Unless otherwise noted, $T_a = -20 \sim +75^\circ\text{C}$)

Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_{CEO} = 100\mu\text{A}$, $V_{CC} = 8\text{V}$	50	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_i = V_{CC}-3.6\text{V}$	—	1.1	2.2	V
		$I_C = 350\text{mA}$ $I_C = 200\text{mA}$	—	0.98	1.6	
I_i	Input current	$V_i = V_{CC}-3.6\text{V}$	—	-320	-600	μA
I_{CC}	Supply current (one circuit coming on)	$V_{CC} = 5\text{V}$, $V_i = V_{CC}-3.6\text{V}$	—	—	3	mA
h_{FE}	DC amplification factor	$V_{CE} = 4\text{V}$, $V_{CC} = 5\text{V}$, $I_C = 350\text{mA}$, $T_a = 25^\circ\text{C}$	2000	10000	—	—

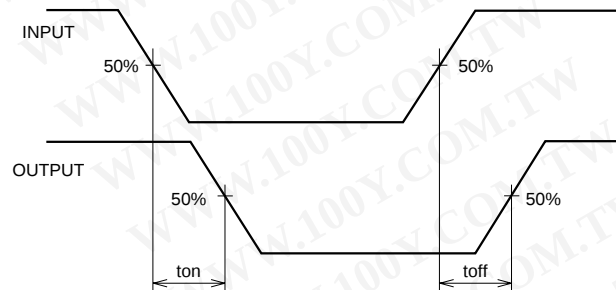
* : The typical values are those measured under ambient temperature (T_a) of 25°C . There is no guarantee that these values are obtained under any conditions.

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)	—	130	—	ns
t_{off}	Turn-off time		—	3200	—	ns

NOTE 1 TEST CIRCUIT

- (1) Pulse generator (PG) characteristics : PRR = 1kHz, $t_w = 10\mu\text{s}$, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $Z_o = 50\Omega$, $V_i = 0.4$ to 4V
- (2) Input-output conditions : $R_L = 30\Omega$, $V_o = 10\text{V}$, $V_{CC} = 4\text{V}$
- (3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

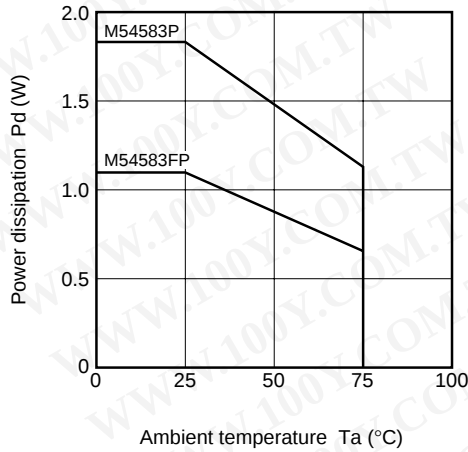
TIMING DIAGRAM

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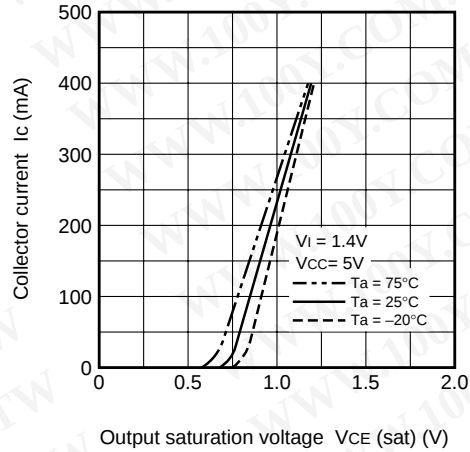
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TYPICAL CHARACTERISTICS

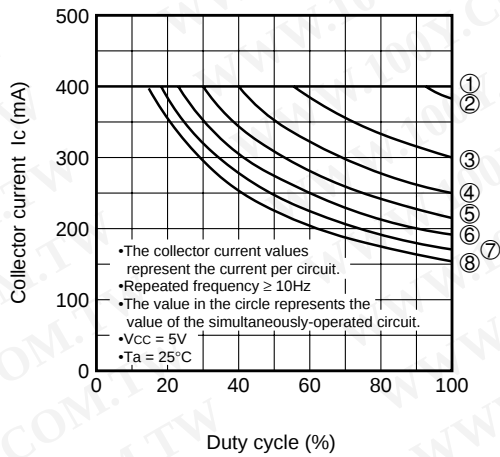
Thermal Derating Factor Characteristics



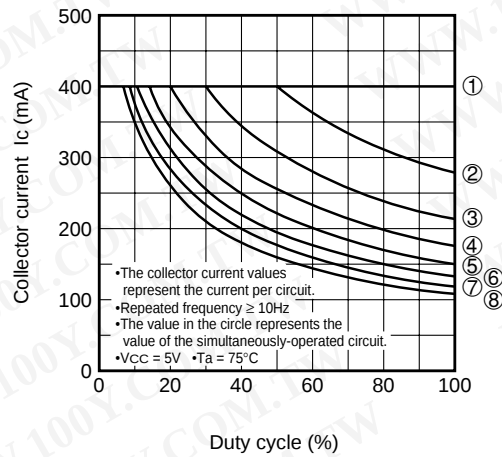
Output Saturation Voltage
Collector Current Characteristics



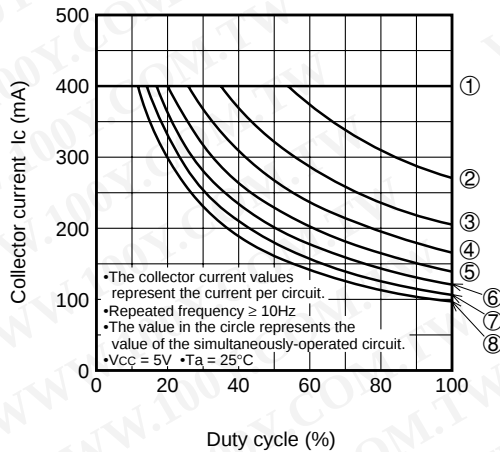
Duty-Cycle-Collector Characteristics
(M54583P)



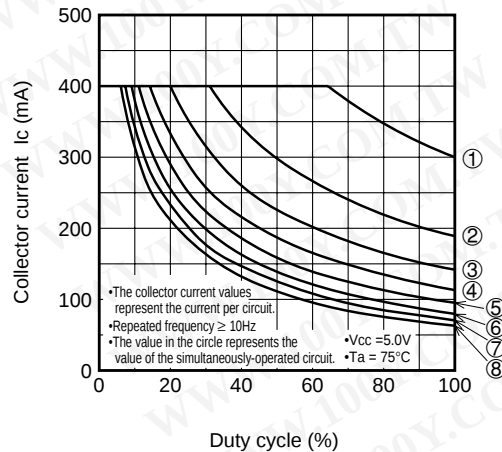
Duty-Cycle-Collector Characteristics
(M54583P)



Duty-Cycle-Collector Characteristics
(M54583FP)



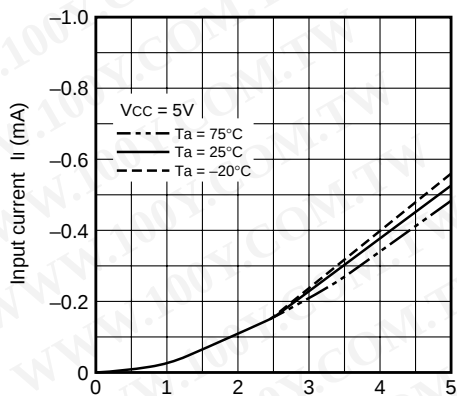
Duty-Cycle-Collector Characteristics
(M54583FP)



M54583P/FP

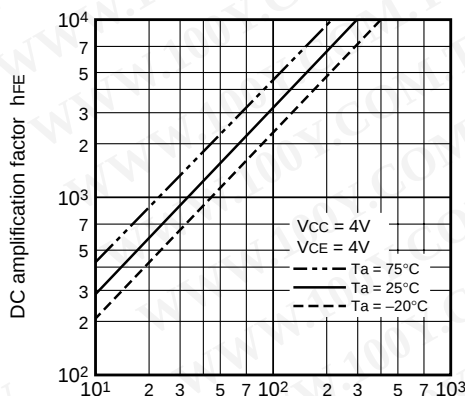
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Input Characteristics



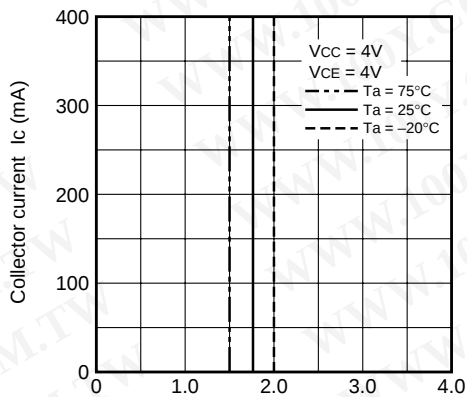
Supply voltage-Input voltage $V_{CC}-V_i$ (V)

DC Amplification Factor
Collector Current Characteristics



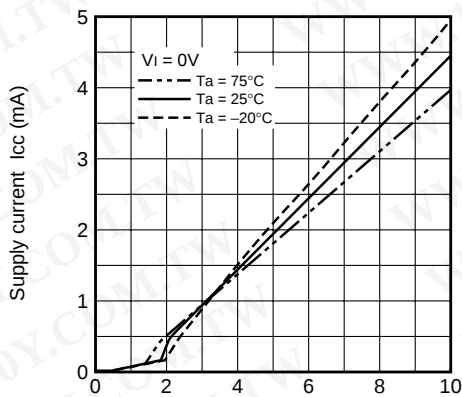
Collector current I_c (mA)

Grounded Emitter Transfer Characteristics



Supply voltage-Input voltage $V_{CC}-V_i$ (V)

Supply Current Characteristics



Supply voltage V_{CC} (V)