

M54580P/FP

7-UNIT 150mA SOURCE TYPE DARLINGTON TRANSISTOR ARRAY

DESCRIPTION

M54580P and M54580FP are seven-circuit output-sourcing 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 ($I_o(max) = -150mA$)
- Active L-level input
- With input diodes
- Wide operating temperature range ($T_a = -20$ to $+75^\circ C$)

APPLICATION

Drives of relays, printers and indication elements such as LEDs, fluorescent display tubes and lamps, and interfaces between MOS-bipolar logic systems and relays, solenoids, or small motors

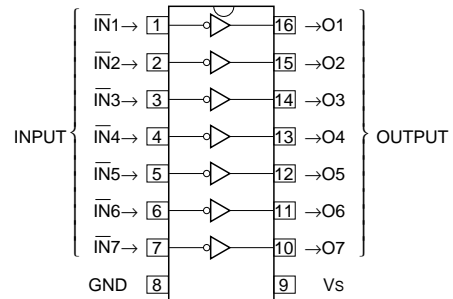
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FUNCTION

The M54580P and M54580FP each have seven circuits, which are made of output current-sourcing Darlington transistors consisting of PNP and NPN transistors. Each PNP transistor has a diode and resistance of $7k\Omega$ between the base and input pin. Its emitter and NPN transistor collectors are connected to the V_s pin (pin 9). Resistance of $50k\Omega$ is connected between each output pin and GND pin (pin 8). Output current is 150mA maximum. Supply voltage V_s is 50V maximum.

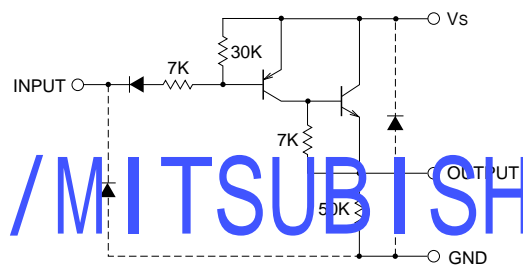
The M54580FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



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

CIRCUIT DIAGRAM



The seven circuits share the V_s 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, L	$-0.5 \sim +50$	V
V_s	Supply voltage		50	V
V_i	Input voltage		$-0.5 \sim V_s$	V
I_o	Output current	Current per circuit output, H	-150	mA
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, $T_a = -20 \sim +75^\circ\text{C}$)

Symbol	Parameter	Limits			Unit	
		min	typ	max		
V_s	Supply voltage	4	—	50	V	
I_o	Output current (Current per 1 circuit when 7 circuits are coming on simultaneously)	Duty Cycle P : no more than 85% FP : no more than 50%	0	—	-100	mA
		Duty Cycle P : no more than 100% FP : no more than 100%	0	—	-50	
V_{IH}	"H" input voltage	$V_s - 0.4$	—	V_s	V	
V_{IL}	"L" input voltage	0	—	$V_s - 3.2$	V	

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

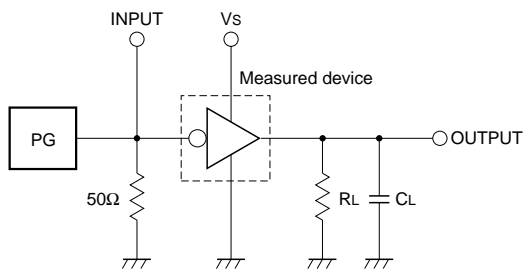
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_{CEO} = 100\mu\text{A}$	50	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_i = V_s - 3.2\text{V}, I_o = -100\text{mA}$	—	0.9	1.5	V
		$V_i = V_s - 3.2\text{V}, I_o = -50\text{mA}$	—	0.8	1.2	
I_i	Input current	$V_i = V_s - 3.5\text{V}$	—	-0.3	-0.6	mA
		$V_i = V_s - 6\text{V}$	—	-0.65	-0.95	
I_R	Clamping diode reverse current	$V_i = 40\text{V}$	—	—	100	μA
h_{FE}	DC amplification factor	$V_{CE} = 4\text{V}, V_s = 10\text{V}, I_c = -100\text{mA}, T_a = 25^\circ\text{C}$	800	3000	—	—

* : 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, $T_a = 25^\circ\text{C}$)

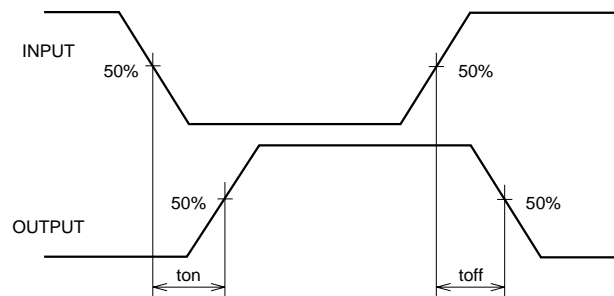
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	$C_L = 15\text{pF}$ (note 1)	—	200	—	ns
t_{off}	Turn-off time		—	7500	—	ns

NOTE 1 TEST CIRCUIT



- (1) Pulse generator (PG) characteristics : PRR = 1kHz,
 $t_w = 10\mu\text{s}, t_r = 6\text{ns}, t_f = 6\text{ns}, Z_o = 50\Omega$
 $V_i = 0.8 \text{ to } 4\text{V}$
- (2) Input-output conditions : $R_L = 40\Omega, V_s = 4\text{V}$
- (3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

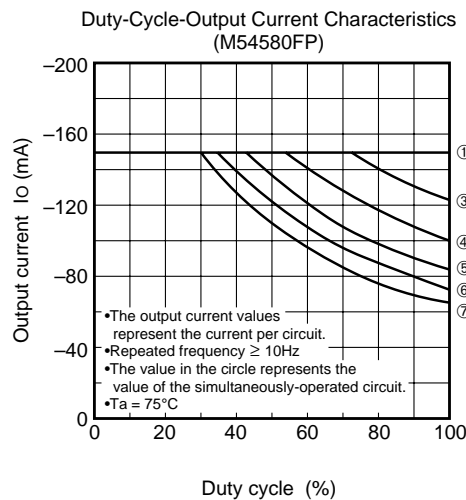
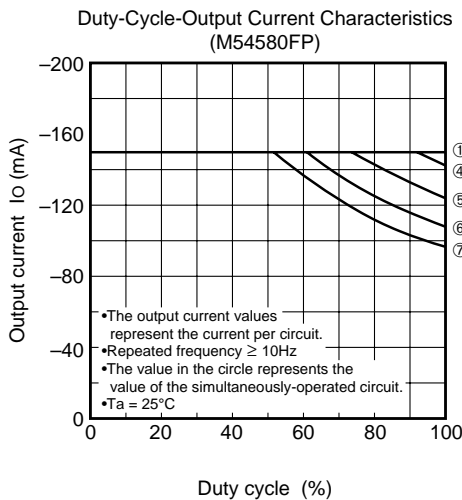
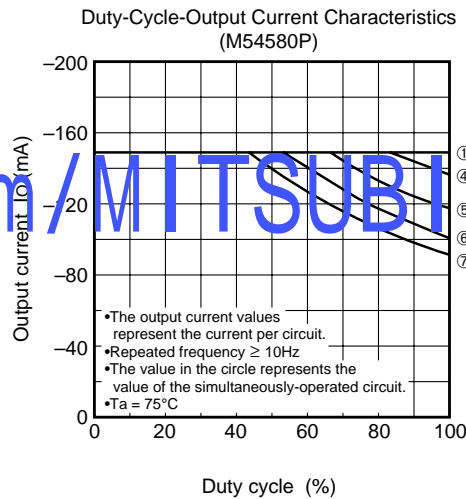
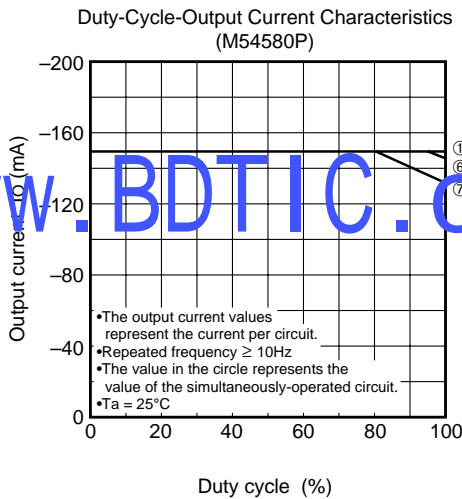
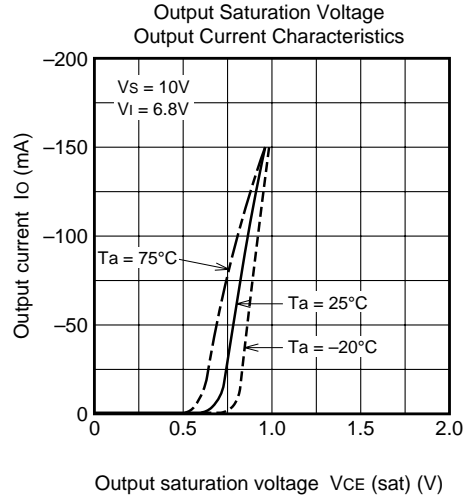
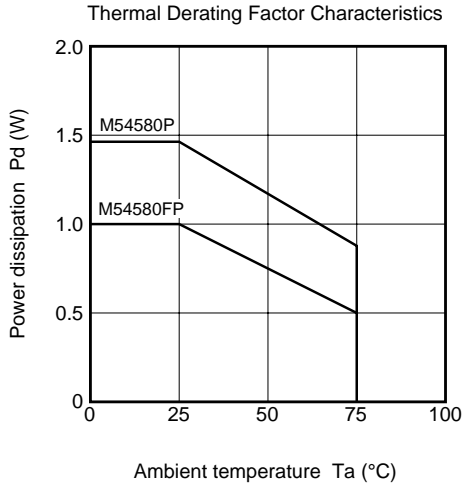
TIMING DIAGRAM



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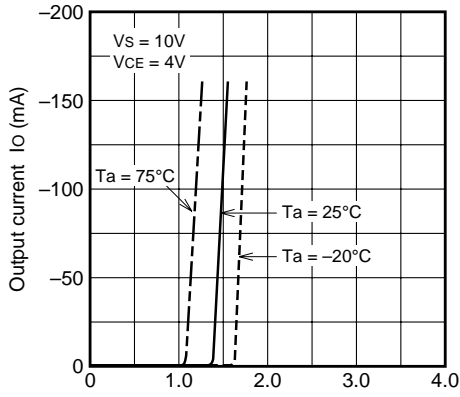
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TYPICAL CHARACTERISTICS



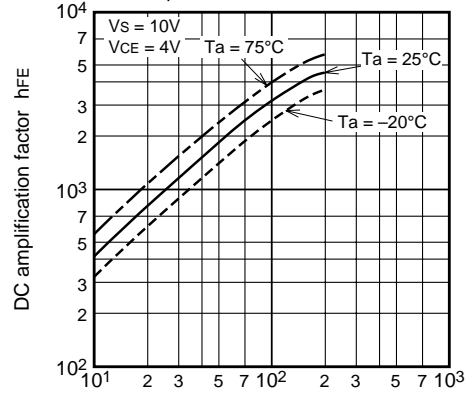
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Grounded Emitter Transfer Characteristics



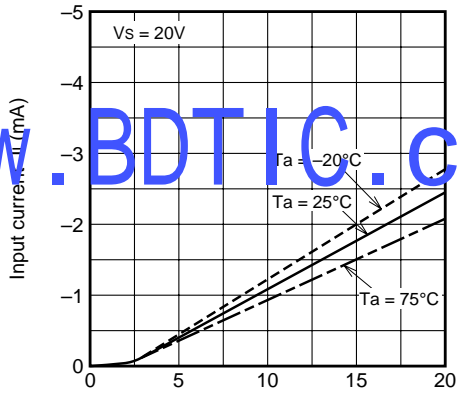
Supply voltage-Input voltage $V_s - V_i$ (V)

DC Amplification Factor Output Current Characteristics



Output current I_o (mA)

Input Characteristics



Supply voltage-Input voltage $V_s - V_i$ (V)

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