

# M54534P/FP

6-UNIT 320mA TRANSISTOR ARRAY WITH CLAMP DIODE AND STROBE

## DESCRIPTION

M54534P and M54534FP are six-circuit transistor arrays. The circuits are made of NPN transistors. Both the semiconductor integrated circuits perform high-current driving with extremely low input-current supply.

## FEATURES

- Medium breakdown voltage ( $BV_{CEO} \geq 20V$ )
- High-current driving ( $I_{c(max)} = 320mA$ )
- With clamping diodes
- Wide input voltage range ( $V_I = -25$  to  $+20V$ )
- Wide operating temperature range ( $T_a = -20$  to  $+75^\circ C$ )
- With strobe input

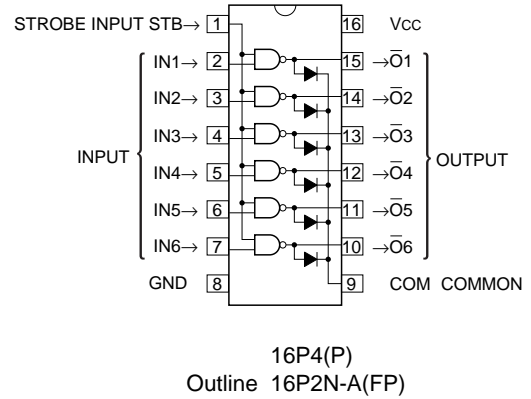
## APPLICATION

Drives of relays and printers, digit drives of indication elements (LEDs and lamps).

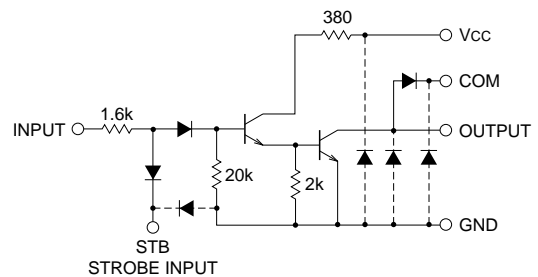
## FUNCTION

The M54534P and M54534FP each have six circuits consisting of NPN transistors. Each input has a diode and  $1.6k\Omega$  resistor in series. Each input is connected, and each output is connected spike-killer clamping diode, emitters of each transistor is connected to GND (pin 8), strobe input is connected to (pin 1), clamping diode is connected COM pin (pin 9) and  $V_{cc}$  is connected to the pin 16 in common. The collector current is 320mA maximum. Collector-emitter supply voltage is 20V maximum. M54534FP is enclosed in a molded small flat package, enabling space-saving design.

## PIN CONFIGURATION (TOP VIEW)



## CIRCUIT SCHEMATIC (EACH CIRCUIT)



The six circuits share the STB, COM,  $V_{cc}$ , GND.

The diodes shown by broken line are parasite diodes and must not be use.

Unit :  $\Omega$

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

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC}$	Supply voltage		10	V
$V_{CEO}$	Collector-emitter voltage	Output, H	$-0.5 \sim +20$	V
$I_C$	Collector current	Current per circuit output, L	320	mA
$V_I$	Input voltage		$-25 \sim +20$	V
$V_{(STB)}$	Strobe input voltage		$-0.5 \sim +20$	V
$I_F$	Clamping diode forward current		320	mA
$V_R$	Clamping diode reverse voltage		20	V
$P_d$	Power dissipation	$T_a = 25^\circ C$ , when mounted on board	1.47/1.00	W
$T_{opr}$	Operating temperature		$-20 \sim +75$	$^\circ C$
$T_{stg}$	Storage temperature		$-55 \sim +125$	$^\circ C$

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**FUNCTIONAL TABLE**

IN	STB	OUT
L	L	H
H	L	H
L	H	H
H	H	L

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

Symbol	Parameter	Limits			Unit	
		min	typ	max		
V <sub>CC</sub>	Supply voltage	3	—	8	V	
V <sub>O</sub>	Output voltage	0	—	20	V	
I <sub>C</sub>	Collector current Per channel	V <sub>CC</sub> = 6.5V, Duty Cycle P : no more than 25% FP : no more than 15%	0	—	300	mA
		V <sub>CC</sub> = 6.5V, Duty Cycle P : no more than 65% FP : no more than 35%	0	—	150	
V <sub>IH</sub>	"H" Input voltage	3.2	—	18	V	
V <sub>IL</sub>	"L" Input voltage	0	—	0.7	V	
V <sub>IH(STB)</sub>	"H" Input voltage (strobe input)	2.4	—	18	V	
V <sub>IL(STB)</sub>	"L" Input voltage (strobe input)	0	—	0.2	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	V <sub>CC</sub> = 8V, V <sub>I</sub> = 3.2V, V <sub>I(STB)</sub> = 0.2V, I <sub>CEO</sub> = 100μA	20	—	—	V
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	V <sub>I</sub> = 3.2V V <sub>I(STB)</sub> = 2.4V	—	0.3	0.85	V
		V <sub>CC</sub> = 6.5V, I <sub>C</sub> = 250mA V <sub>CC</sub> = 3V, I <sub>C</sub> = 120mA	—	0.15	0.5	
I <sub>I</sub>	Input current	V <sub>CC</sub> = 8V, V <sub>I</sub> = 3.2V, V <sub>I(STB)</sub> = 2.4V	—	0.5	1.4	mA
I <sub>IR</sub>	Input reverse current	V <sub>CC</sub> = 8V, V <sub>I</sub> = -25V	—	—	-20	μA
I <sub>I(STB)</sub>	Strobe input current	V <sub>CC</sub> = 8V, V <sub>I</sub> = 3.2V (all input), V <sub>I(STB)</sub> = 0.2V	—	-7.9	-20	mA
I <sub>R(STB)</sub>	Strobe input reverse current	V <sub>CC</sub> = 8V, V <sub>I</sub> = 0V, V <sub>I(STB)</sub> = 20V	—	—	20	μA
V <sub>F</sub>	Clamping diode forward voltage	I <sub>F</sub> = 320mA	—	1.4	2.4	V
I <sub>R</sub>	Clamping diode reverse current	V <sub>R</sub> = 20V	—	—	100	μA
I <sub>CC</sub>	Supply current	V <sub>CC</sub> = 8V, V <sub>I</sub> = 3.2V (all input), V <sub>I(STB)</sub> = 2.4V	—	120	200	mA
h <sub>FE</sub>	DC amplification factor	V <sub>CE</sub> = 4V, V <sub>CC</sub> = 6.5V, I <sub>C</sub> = 300mA, Ta = 25°C, V <sub>I(STB)</sub> = 2.4V	1000	3000	—	—

\* : 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.

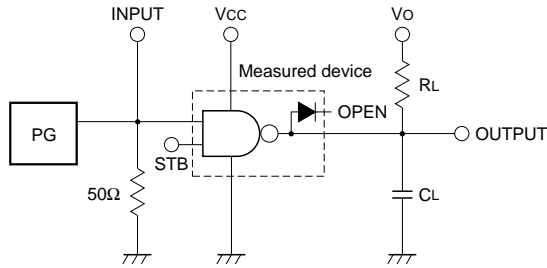
**SWITCHING CHARACTERISTICS** (Unless otherwise noted, Ta = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t <sub>on</sub>	Turn-on time	C <sub>L</sub> = 15pF (note 1)	—	22	—	ns
t <sub>off</sub>	Turn-off time		—	1200	—	ns

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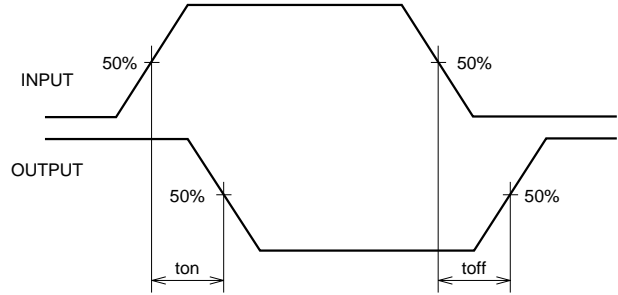
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### NOTE 1 TEST CIRCUIT

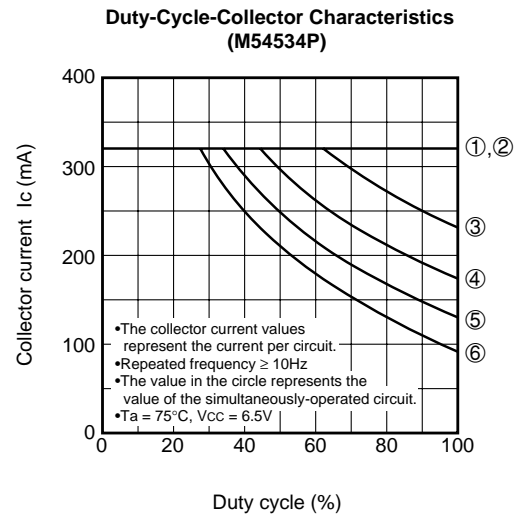
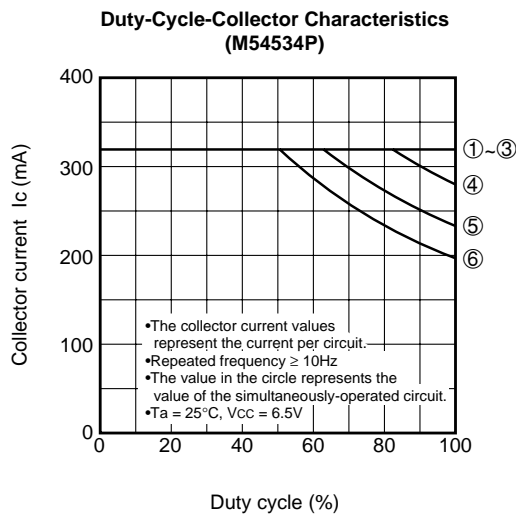
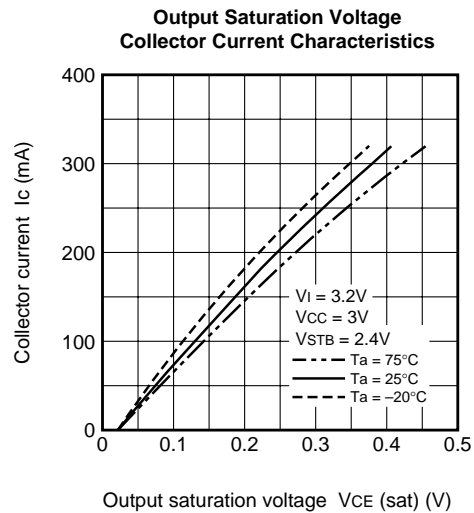
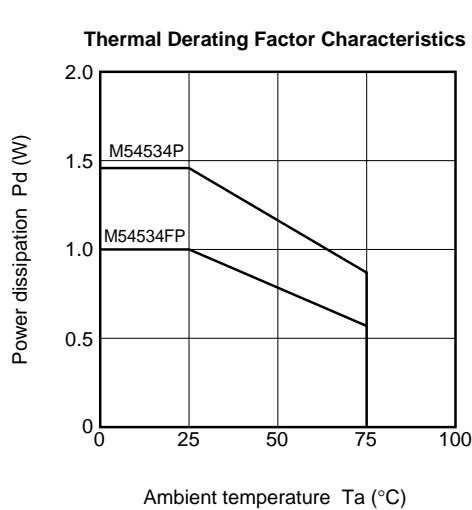


- (1) Pulse generator (PG) characteristics : PRR = 1kHz,  
 $t_w = 10\mu s$ ,  $t_r = 6ns$ ,  $t_f = 6ns$ ,  $Z_O = 50\Omega$   
 $V_P = 3.2V_{P-P}$
- (2) Input-output conditions :  $R_L = 40\Omega$ ,  $V_O = 10V$ ,  $V_{CC} = V_{STB} = 6.5V$
- (3) Electrostatic capacity  $C_L$  includes floating capacitance at connections and input capacitance at probes

### TIMING DIAGRAM



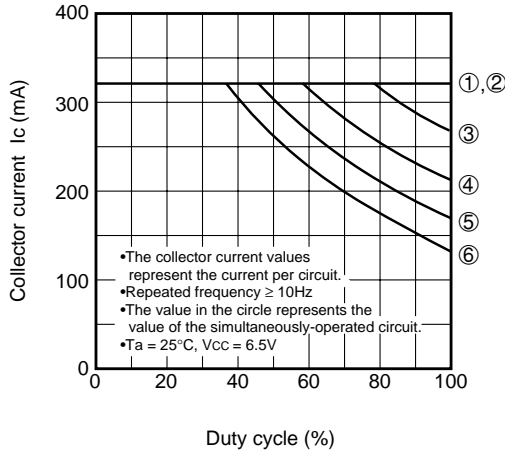
### TYPICAL CHARACTERISTICS



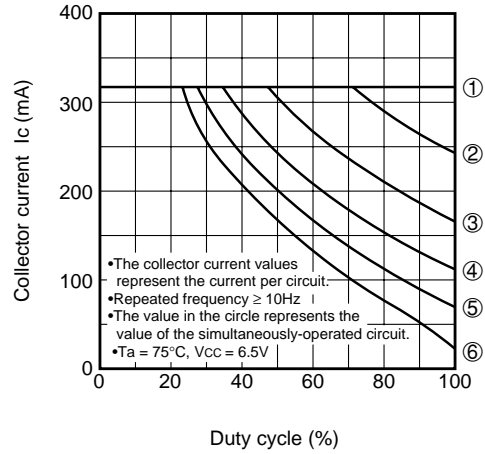
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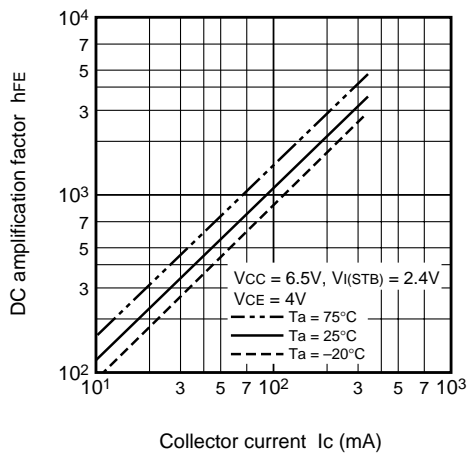
Duty-Cycle-Collector Characteristics (M54534FP)



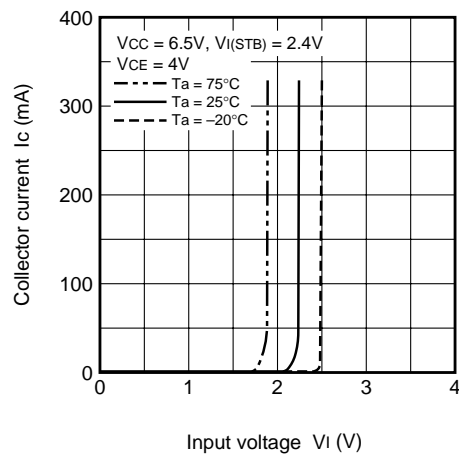
Duty-Cycle-Collector Characteristics (M54534FP)



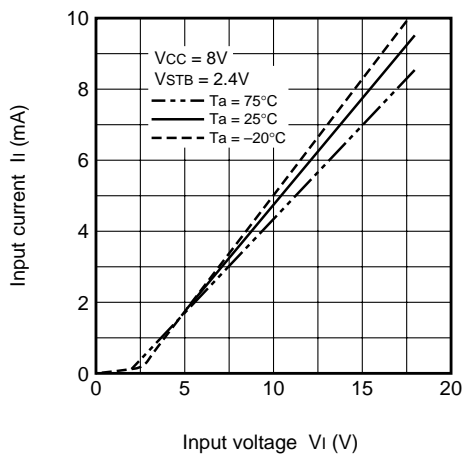
DC Amplification Factor Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Input Characteristics



Supply Current Characteristics (common)

