M54539P

6-UNIT 700mA TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54539P 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 (Ic(max) = 700mA)
- With output clamping diodes
- Wide operating temperature range (Ta = –20 to +75°C)

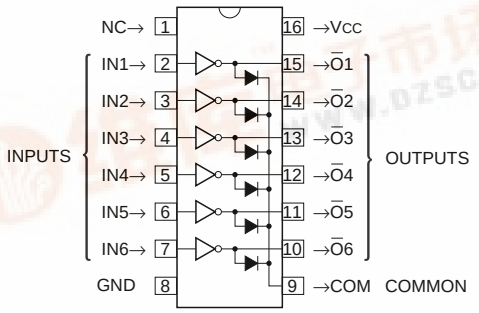
APPLICATION

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

FUNCTION

The M54539P have six circuits consisting of NPN transistors. Resistance of 2kΩ is connected to the inputs. The output transistor emitters are connected to the GND pin (pin 8). A spick-killer clamping diode is provided between each collector and COM pin (pin 9), V_{CC} is connected to pin 16.
The collector current is 700 mA maximum. Collector-emitter supply voltage is 20V maximum.

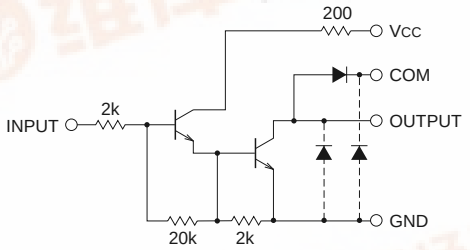
PIN CONFIGURATION (TOP VIEW)



Outline 16P4(P)

NC : No connection

CIRCUIT SCHEMATIC



The six circuits share the Vcc, COM and GND.

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

Unit : Ω

ABSOLUTE MAXIMUM RATINGS (Unless otherwise noted, Ta = –20 ~ +75°C)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		10	V
V_{CEO}	Collector-emitter voltage	Output, H	–0.5 ~ +20	V
I_C	Collector current	Current per circuit output, L	700	mA
V_I	Input voltage		–0.5 ~ +10	V
V_R	Clamping diode reverse voltage		20	V
I_F	Clamping diode forward current	Pulse Width ≤ 35ms, Duty Cycle ≤ 5%	700	mA
			350	
P_d	Power dissipation	Ta = 25°C, when mounted on board	1.47	W
T_{opr}	Operating temperature		–20 ~ +75	°C
T_{stg}	Storage temperature		–55 ~ +125	°C

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_{CC}	Supply voltage		3	5	7	V
V_O	Output voltage		0	—	20	V
I_C	Collector current per channel	V_{CC} = 6.5V, The three outputs conducting simultaneously Percent duty cycle less than 20%	0	—	700	mA
		V_{CC} = 6.5V, The three outputs conducting simultaneously Percent duty cycle less than 90%	0	—	200	
V_{IH}	"H" input voltage	IC ≤ 450mA	3	—	6	V
V_{IL}	"L" input voltage		0	—	0.3	V

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

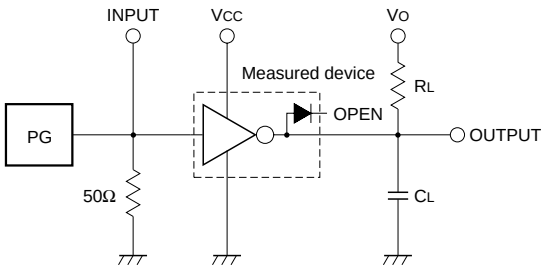
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	V_{CC} = 7V, I_{CEO} = 100μA	20	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_I = 3V, V_{CC} = 5V, I_C = 450mA	—	0.46	0.8	V
		V_I = 3V, V_{CC} = 5V, I_C = 200mA	—	0.2	0.45	
I_I	Input current	V_{CC} = 7V, V_I = 3.2V	—	0.75	1.4	mA
I_R	Clamping diode reverse current	V_R = 20V	—	—	100	μA
V_F	Clamping diode forward voltage	I_F = 350mA	—	1.5	2.7	V
I_{CC}	Supply current	V_{CC} = 7V, V_I = 3.2V (Per operating one circuit)	—	27.5	50	mA
h_{FE}	DC amplification factor	V_{CE} = 4V, V_{CC} = 6V, I_C = 300mA, Ta = 25°C	3000	8000	—	—

* : 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)

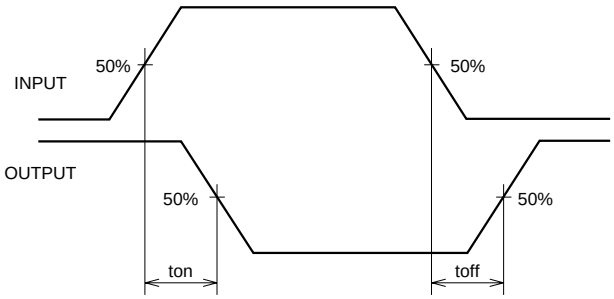
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	16	—	ns
t_{off}	Turn-off time		—	1000	—	ns

NOTE 1 TEST CIRCUIT



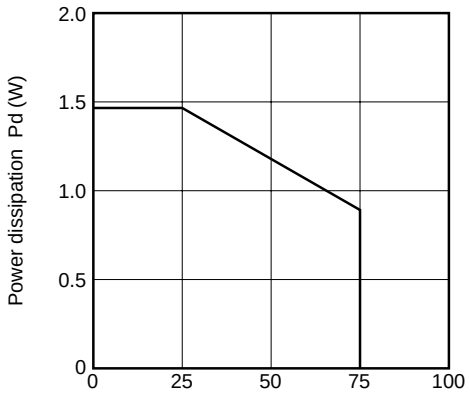
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Z_O = 50Ω
V_P = 3V_{P-P}
(2) Input-output conditions : R_L = 22.5Ω, V_O = 10V, V_{CC} = 5V
(3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

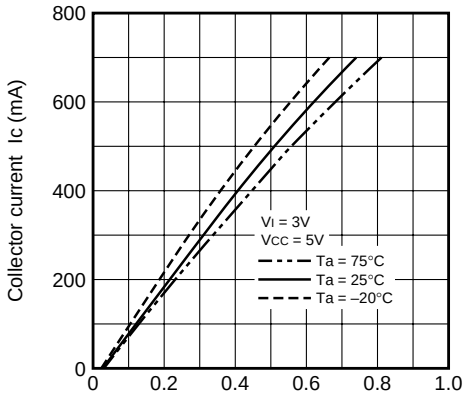


TYPICAL CHARACTERISTICS

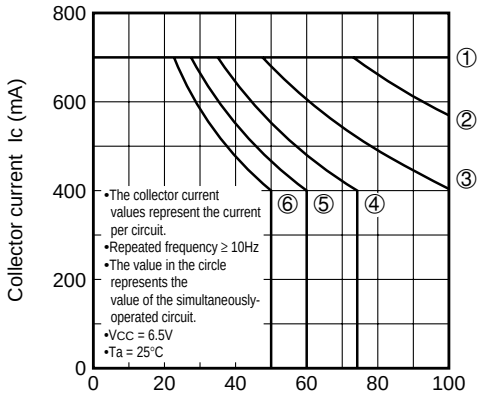
Thermal Derating Factor Characteristics



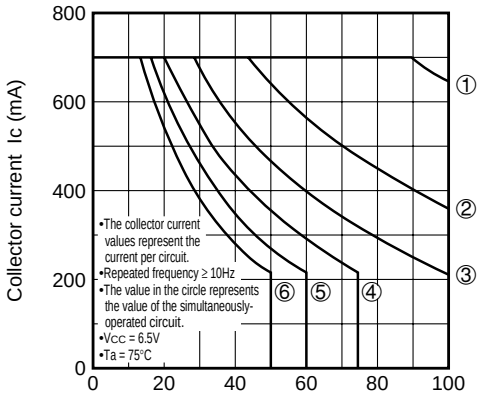
Output Saturation Voltage Collector Current Characteristics



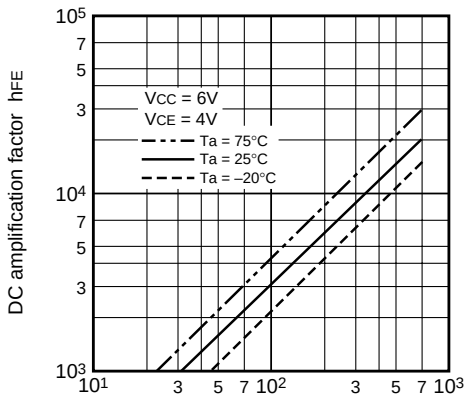
Duty-Cycle-Collector Characteristics



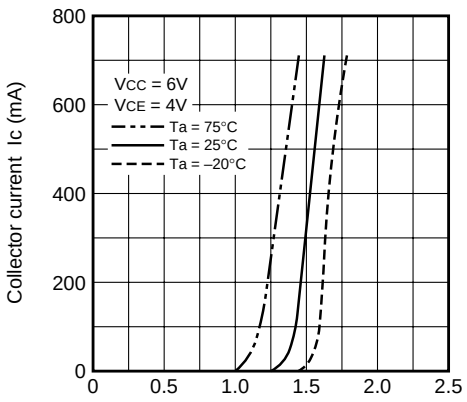
Duty-Cycle-Collector Characteristics



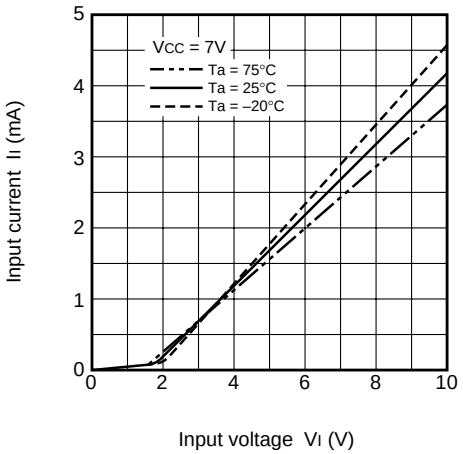
DC Amplification Factor Collector Current Characteristics



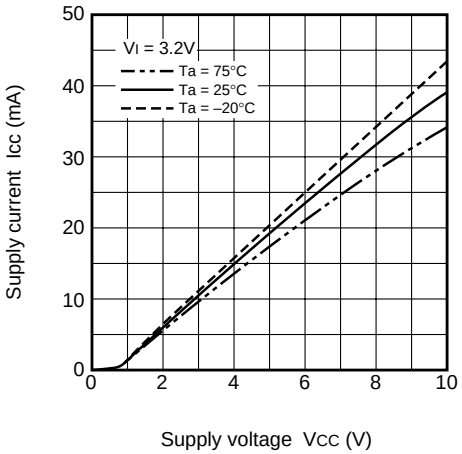
Grounded Emitter Transfer Characteristics



Input Characteristics



Supply Current Characteristics



Clamping Diode Characteristics