M54528P

7-UNIT 150mA DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54528P is seven-circuit Darlington transistor arrays with clamping diodes. The circuits are made of NPN transistors. Both the semiconductor integrated circuits perform high-current driving with extremely low input-current supply.

FEATURES

- High breakdown voltage ($BV_{CEO} \geq 40V$)
- High-current driving (Ic(max) = 150mA)
- With clamping diodes
- Driving available with PMOS IC output of 8-18V
- Wide input voltage range (V_I = –40 to +40V)
- Wide operating temperature range (Ta = –20 to +75°C)

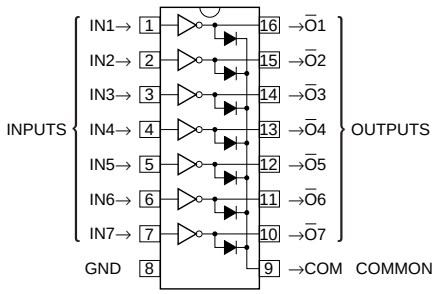
APPLICATION

Drives of relays and printers, digit drives of indication elements (LEDs and lamps), and MOS-bipolar logic IC interfaces

FUNCTION

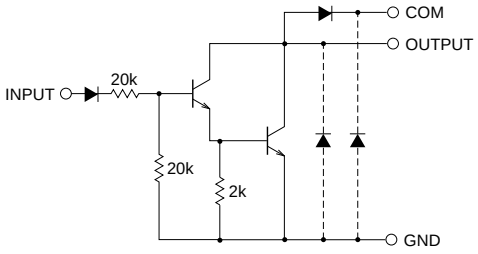
The M54528P have seven circuits consisting of NPN Darlington transistors. These ICs have resistance of 20kΩ between input transistor bases and input pins. A spike-killer clamping diode is provided between each output pin (collector) and COM pin (pin 9). The output transistor emitters are all connected to the GND pin (pin 8).
The collector current is 150mA maximum. Collector-emitter supply voltage is 40V maximum.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

CIRCUIT SCHEMATIC



The seven circuits share the 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_{CEO}	Collector-emitter voltage	Output, H	–0.5 ~ +40	V
I_C	Collector current	Current per circuit output, L	150	mA
V_I	Input voltage		–40 ~ +40	V
I_F	Clamping diode forward current		150	mA
V_R	Clamping diode reverse voltage		40	V
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

MITSUBISHI ELECTRIC

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_O	Output voltage		0	—	40	V
I_C	Collector current per channel	Percent duty cycle less than 40%	0	—	150	mA
V_{IH}	"H" input voltage		7	—	35	V
V_{IL}	"L" input voltage		0	—	1	V

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

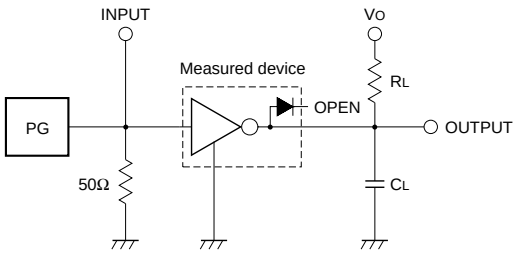
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100µA	40	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_I = 7V, I_C = 150mA	—	1.05	1.7	V
		V_I = 7V, I_C = 100mA	—	0.95	1.4	
I_I	Input current	V_I = 18V	—	0.9	1.8	mA
		V_I = 35V	—	1.9	5.0	
I_{IR}	Input reverse current	V_I = –35V	—	—	–20	µA
V_F	Clamping diode forward voltage	I_F = 150mA	—	1.15	1.6	V
I_R	Clamping diode reverse current	V_R = 40V	—	—	100	µA
h_{FE}	DC amplification factor	V_{CE} = 4V, I_C = 150mA, Ta = 25°C	800	2500	—	—

* : 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)

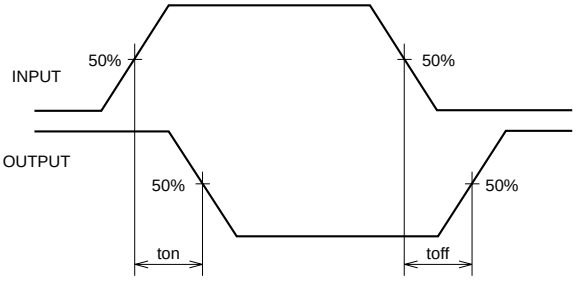
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	35	—	ns
t_{off}	Turn-off time		—	300	—	ns

NOTE 1 TEST CIRCUIT



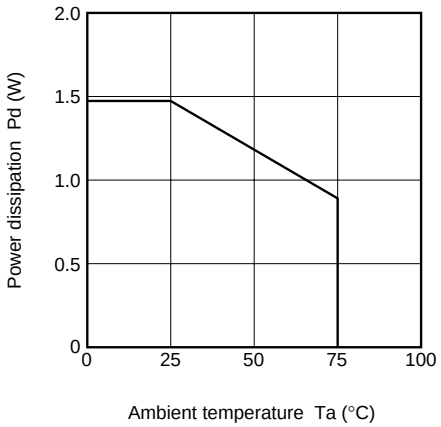
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10µs, tr = 6ns, tf = 6ns, Z_O = 50Ω
V_P = 7V_{P-P}
(2) Input-output conditions : R_L = 67.5Ω, V_O = 10V
(3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

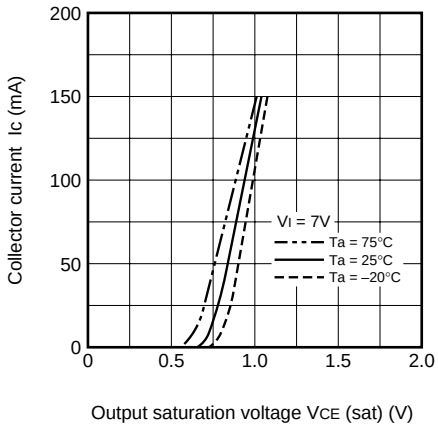


TYPICAL CHARACTERISTICS

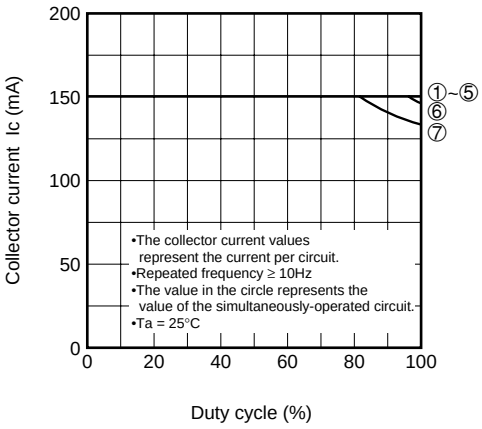
Thermal Derating Factor Characteristics



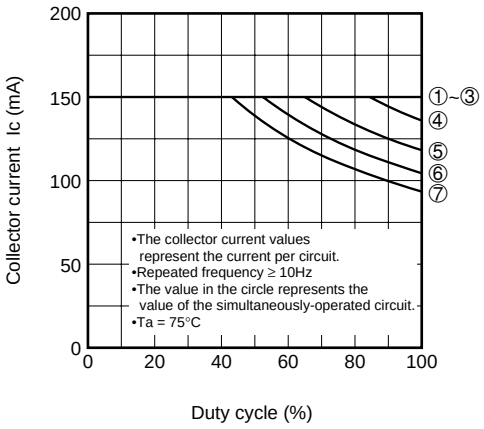
Output Saturation Voltage Collector Current Characteristics



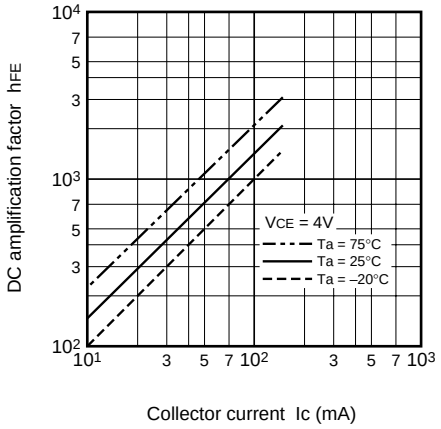
Duty-Cycle-Collector Characteristics



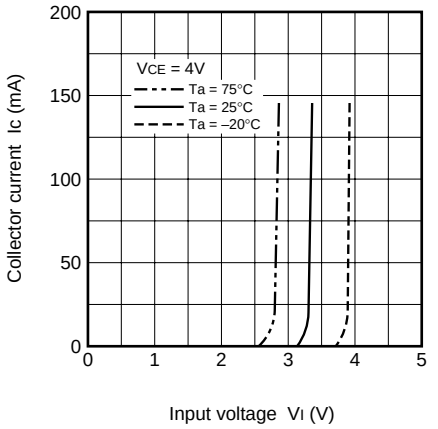
Duty-Cycle-Collector Characteristics



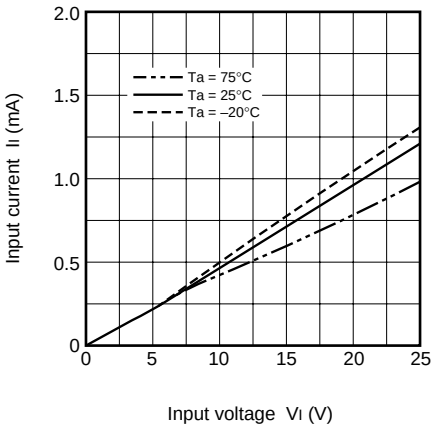
DC Amplification Factor Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Input Characteristics



Clamping Diode Characteristics