

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 ($I_{c(max)} = 150mA$)
- 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 ($T_a = -20$ to $+75^\circ C$)

APPLICATION

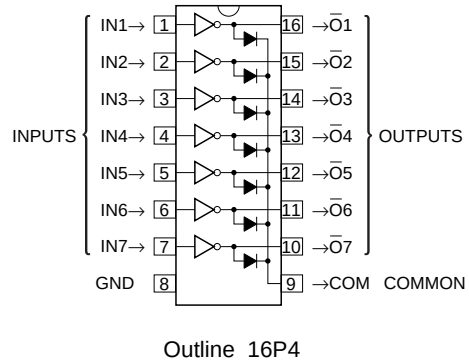
Drives of relays and printers, digit drives of indication elements (LEDs and lamps), and MOS-bipolar logic IC interfaces

FUNCTION

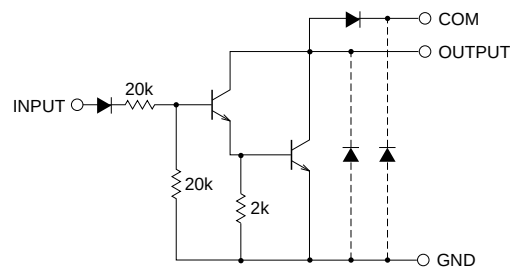
The M54528P have seven circuits consisting of NPN Darlington transistors. These ICs have resistance of $20k\Omega$ between input transistor bases and input pins. A spike-killer clamping diode is provided between each output pin (collector) and COM pin (pin 9). The output transistor emitters are all connected to the GND pin (pin 8).

The collector current is 150mA maximum. Collector-emitter supply voltage is 40V maximum.

PIN CONFIGURATION (TOP VIEW)



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, $T_a = -20 \sim +75^\circ C$)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CEO}	Collector-emitter voltage	Output, H	$-0.5 \sim +40$	V
I_C	Collector current	Current per circuit output, L	150	mA
V_I	Input voltage		$-40 \sim +40$	V
I_F	Clamping diode forward current		150	mA
V_R	Clamping diode reverse voltage		40	V
P_d	Power dissipation	$T_a = 25^\circ C$, when mounted on board	1.47	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_o	Output voltage	0	—	40	V
I_c	Collector current per channel	0	—	150	mA
V_{IH}	"H" input voltage	7	—	35	V
V_{IL}	"L" input voltage	0	—	1	V

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

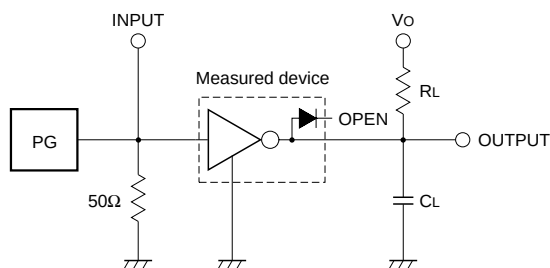
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	$I_{CEO} = 100\mu\text{A}$	40	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_i = 7\text{V}, I_c = 150\text{mA}$	—	1.05	1.7	V
		$V_i = 7\text{V}, I_c = 100\text{mA}$	—	0.95	1.4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

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

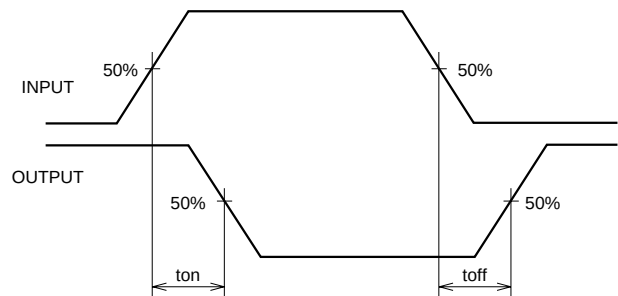
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	$C_L = 15\text{pF}$ (note 1)	—	35	—	ns
t_{off}	Turn-off time		—	300	—	ns

NOTE 1 TEST CIRCUIT

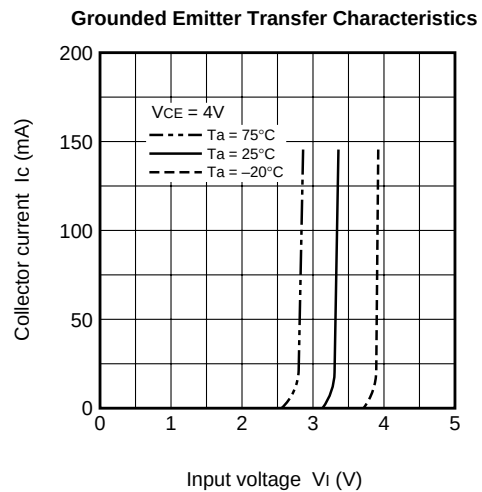
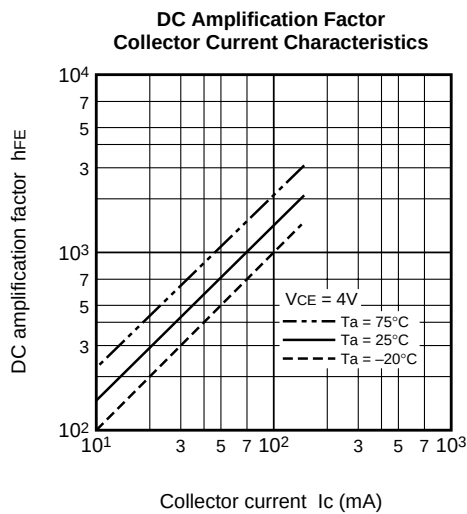
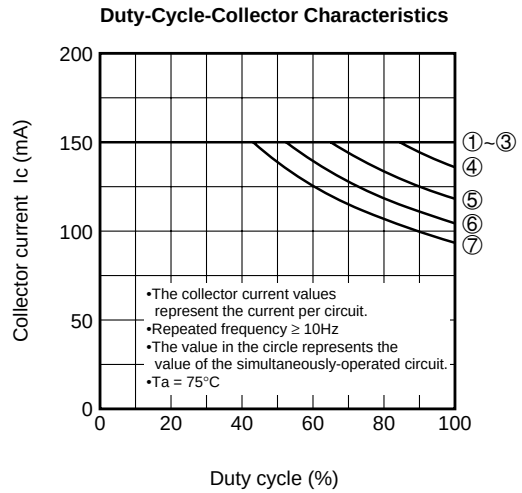
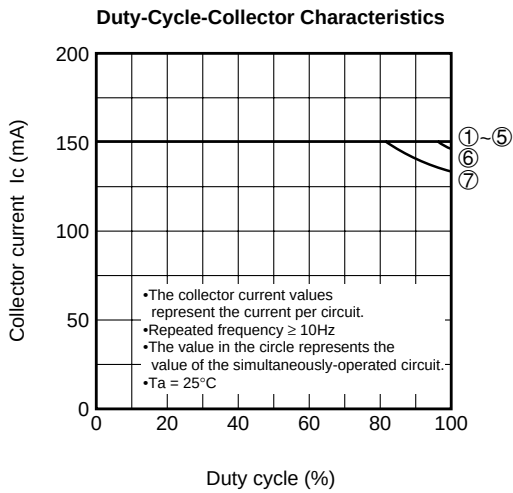
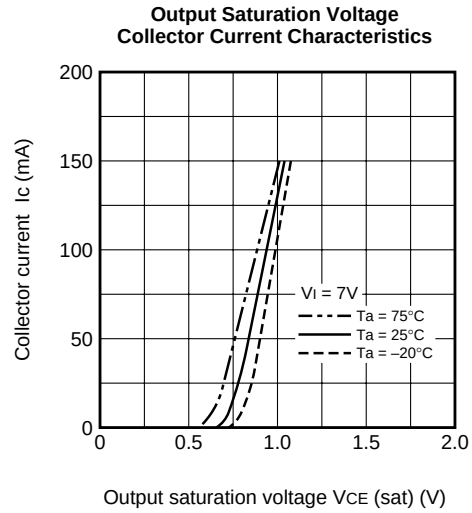
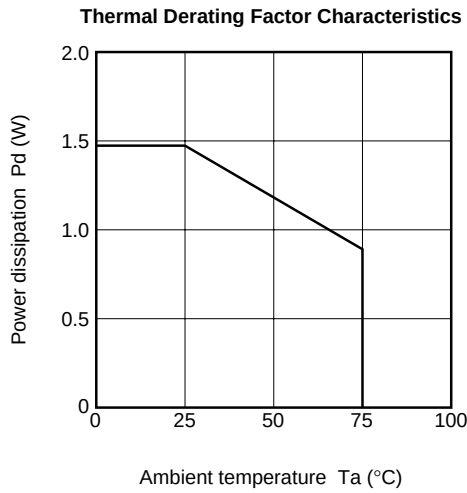


- (1) Pulse generator (PG) characteristics : PRR = 1kHz, $t_w = 10\mu\text{s}$, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $Z_o = 50\Omega$, $V_P = 7V_{P-P}$
- (2) Input-output conditions : $R_L = 67.5\Omega$, $V_o = 10\text{V}$
- (3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM



TYPICAL CHARACTERISTICS



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