

# M54561P

7-UNIT 300mA SOURCE TYPE DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

## DESCRIPTION

M54561P is 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 ( $BV_{CEO} \geq 40V$ )
- High-current driving ( $I_o(max) = -300mA$ )
- With output clamping diodes
- Active "L" input
- Wide operating temperature range ( $T_a = -20$  to  $+75^\circ C$ )

## APPLICATION

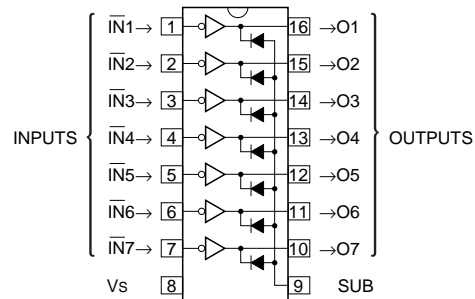
Drives of relays, printers, LEDs, fluorescent display tubes and lamps, and interfaces between MOS-bipolar logic systems and relays, solenoids, or small motors

## FUNCTION

The M54561P have seven circuits of current-sourcing outputs. Darlington transistor, which are made of PNP transistor and NPN transistor. Resistance of  $20k\Omega$  is connected between PNP transistor base and input pin. PNP transistor emitters and NPN transistor collector is connected  $V_s$  (pin 8), and spike killer clamping diode is provided between each output pins.

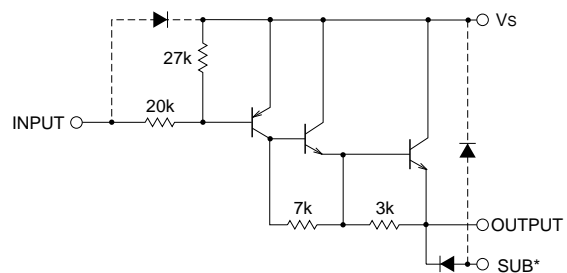
Output current is 300mA maximum and supply voltage  $V_s$  is 40V maximum operate Active "L" input.

## PIN CONFIGURATION (TOP VIEW)



Outline 16P4

## CIRCUIT SCHEMATIC



\* SUB must be the lowest voltage in a circuit.

The seven circuits share the  $V_s$  and SUB.

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

Unit :  $\Omega$

## 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	$-0.5 \sim V_s$	V
$V_s$	Supply voltage		40	V
$V_i$	Input voltage		$-0.5 \sim V_s$	V
$I_o$	Output current	Current per circuit output, H	-300	mA
$I_F$	Clamping diode forward current		-300	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, Ta = -20 ~ +75°C)

Symbol	Parameter	Limits			Unit	
		min	typ	max		
Vs	Supply voltage	0	—	40	V	
Io	Output current per channel	Percent duty cycle less than 10%	0	—	-300	mA
		Percent duty cycle less than 50%	0	—	-100	
VIH	"H" input voltage	Vs-0.2	—	Vs+0.3	V	
VIL	"L" input voltage	0	—	Vs-3	V	

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

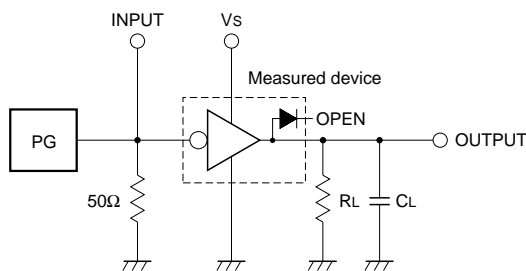
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
IS (leak)	Supply leak current	Vs = 40V	—	—	100	μA
VCE (sat)	Collector-emitter saturation voltage	VI = Vs-3V, Io = -300mA	—	1.65	2.4	V
		VI = Vs-3V, Io = -100mA	—	1.45	2.0	
Ii	Input current	VI = Vs-3.5V,	—	-150	-250	μA
VF	Clamping diode forward voltage	IF = -300mA	—	-1.6	-2.4	V
IR	Clamping diode reverse current	VR = 40V	—	—	100	μA
hFE	DC amplification factor	VCE = 4V, Io = -300mA, Ta = 25°C	1000	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)

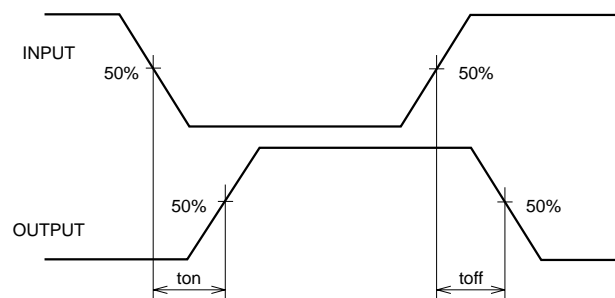
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
ton	Turn-on time	CL = 15pF (note 1)	—	200	—	ns
toff	Turn-off time		—	2500	—	ns

**NOTE 1 TEST CIRCUIT**



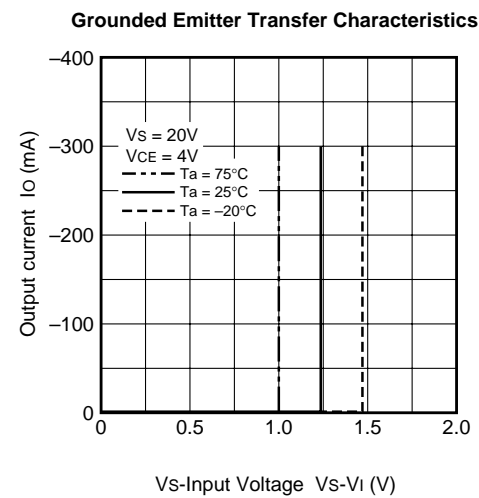
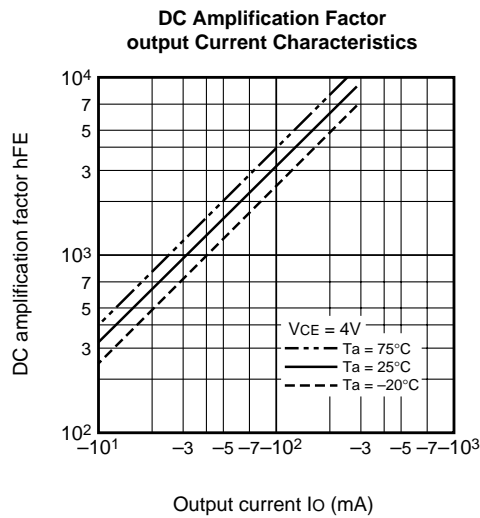
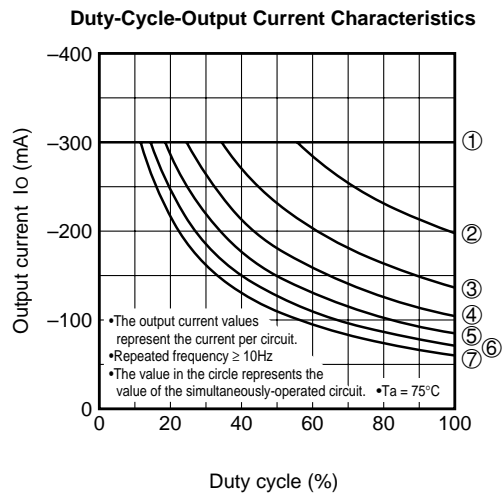
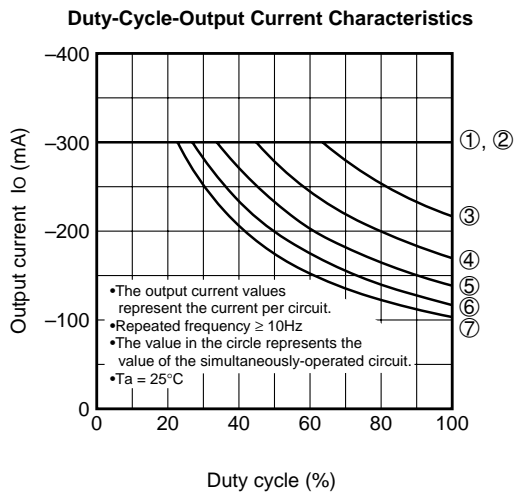
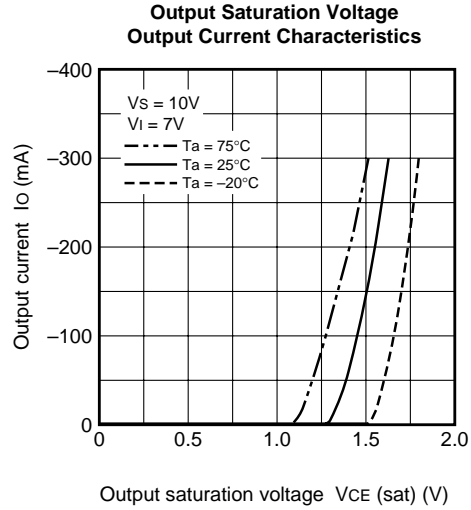
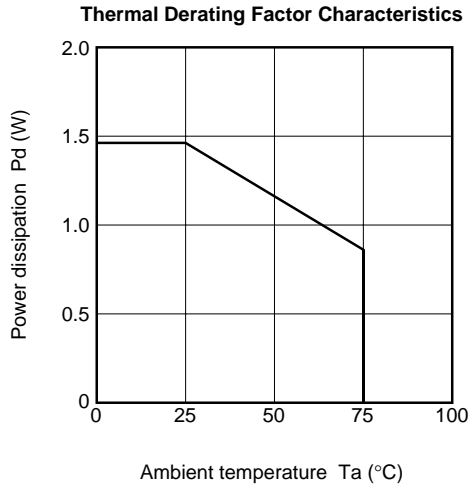
- (1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, ZO = 50Ω, VIN = 7 to 10.3V
- (2) Input-output conditions : RL = 40Ω, Vs = 10V
- (3) Electrostatic capacity CL includes floating capacitance at connections and input capacitance at probes

**TIMING DIAGRAM**



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TYPICAL CHARACTERISTICS



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