

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

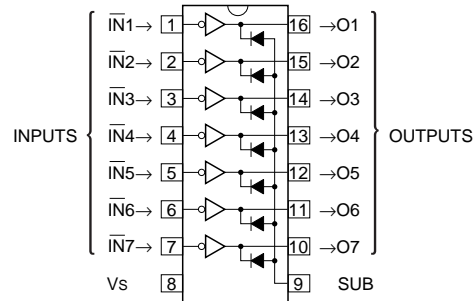
Drives of relays, printers, LEDs, fluorescent display tubes and lamps, and interfaces between MOS-bipolar logic systems and relays, solenoids, or small motors

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.

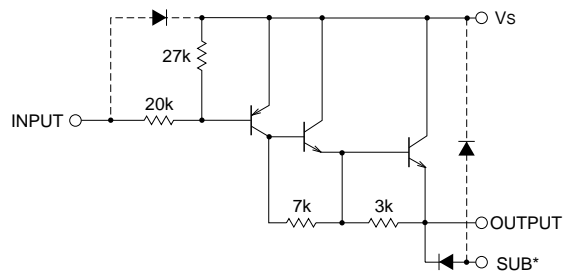
Output current is 300mA maximum and supply voltage V_s is 40V maximum operate Active "L" input.

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 : 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, 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 | | $-55 \sim +125$ | $^\circ C$ |

M54561P

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

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 | — | — |

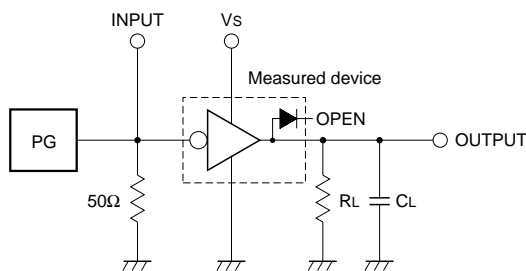
* : The typical values are those measured under ambient temperature (Ta) of 25°C. There is no guarantee that these values are obtained under any conditions.

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 |

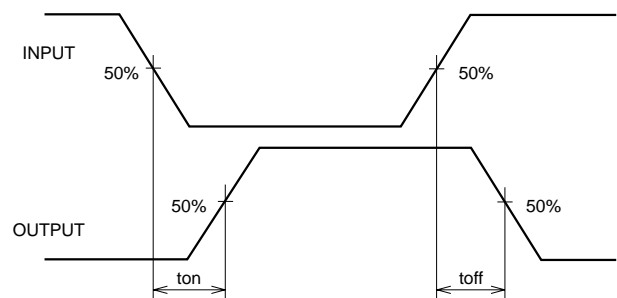
www.DataSheet4U.com

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

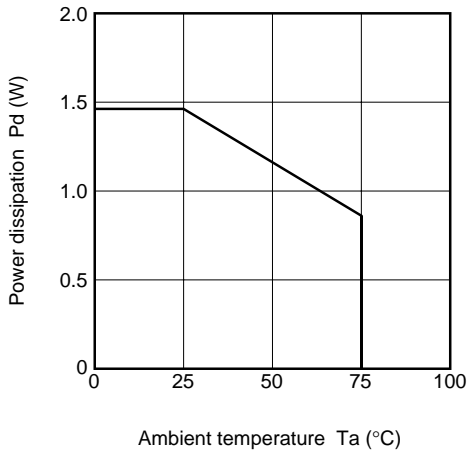


M54561P

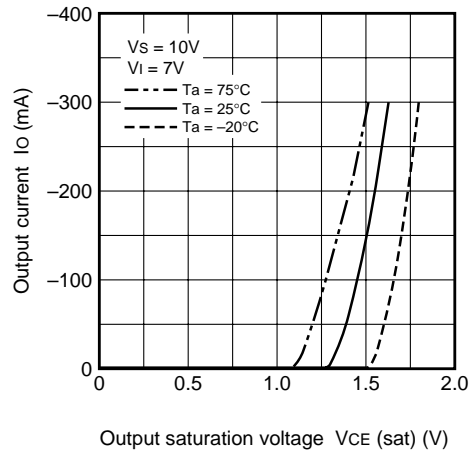
7-UNIT 300mA SOURCE TYPE DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

TYPICAL CHARACTERISTICS

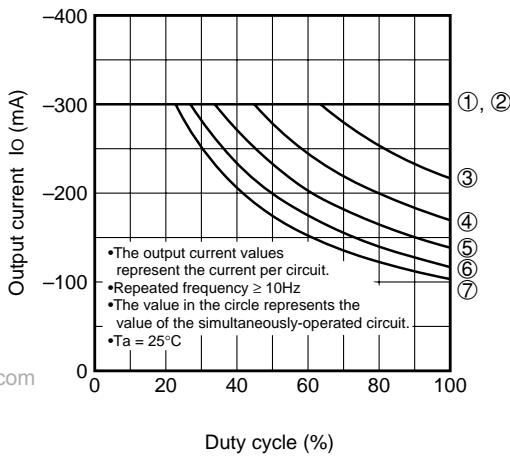
Thermal Derating Factor Characteristics



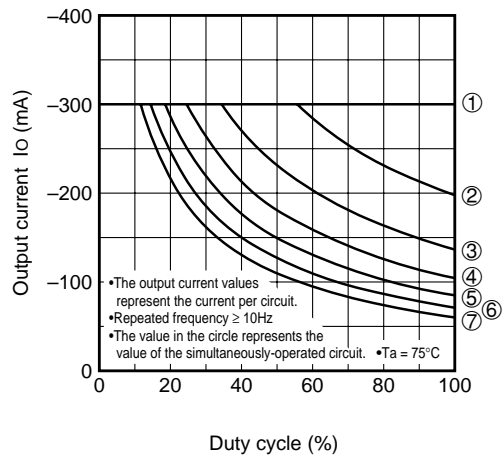
Output Saturation Voltage Output Current Characteristics



Duty-Cycle-Output Current Characteristics

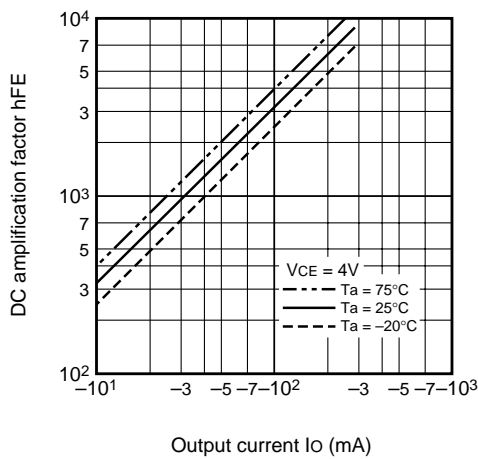


Duty-Cycle-Output Current Characteristics

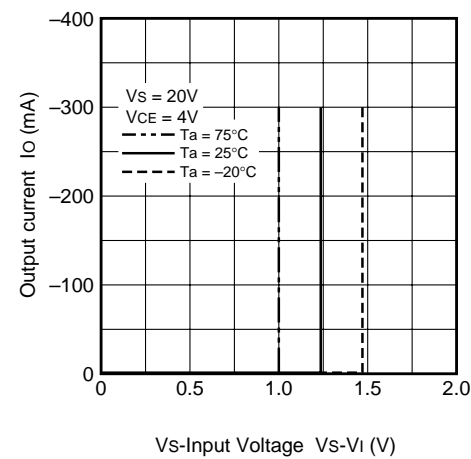


www.DataSheet4U.com

DC Amplification Factor output Current Characteristics



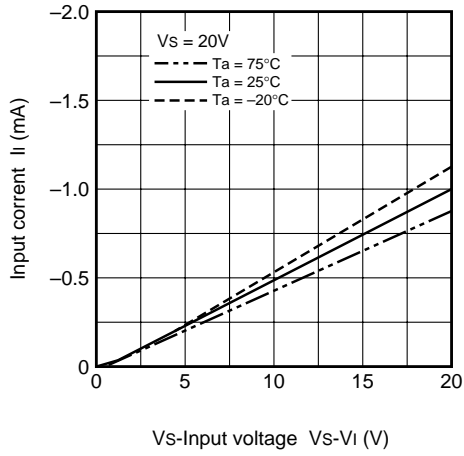
Grounded Emitter Transfer Characteristics



M54561P

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

Input Characteristics



Clamping Diode Characteristics

