M54531WP

7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54531WP are 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} ≧ 40V)
- High-current driving ($I_{C(max)}$ = 400mA)
- With clamping diodes
- Driving available with PMOS IC output
- Wide input voltage range (V_I = −40 to +40V)

APPLICATION

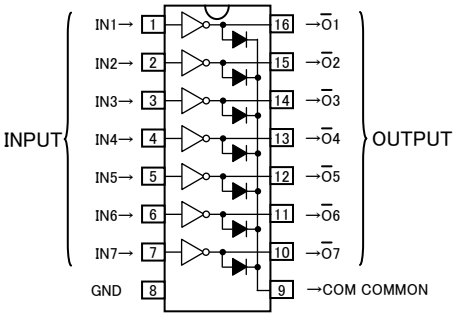
Drives of relays and printers, digit drives of indication elements (LEDs and lamps), and MOS-bipolar logic IC interfaces

FUNCTION

The M54531WP each have seven circuits consisting of NPN Darlington transistors. A serial circuit including a diode and resistance of 20kΩ is provided 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).

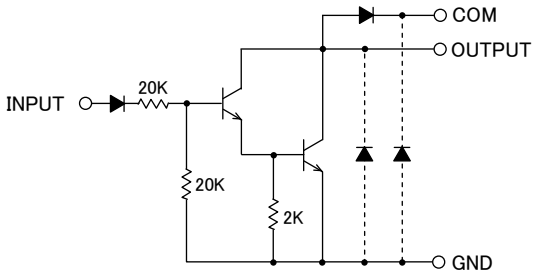
The collector current is 400mA maximum. Collector-emitter supply voltage is 40V maximum.

PIN CONFIGURATION



Package type 16P4X

CIRCUIT DIAGRAM



The seven circuits share the COM and GND.

The diode, indicated with the dotted line, is parasitic, and cannot 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	400	mA
V_I	Input voltage		−40 ～ +40	V
I_F	Clamping diode forward current		400	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

RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, Ta = −20 ～ +75℃)

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_O	Output voltage		0	—	40	V
I_C	Collector current (Current per 1 circuit when 7 circuits are coming on simultaneously)	Duty Cycle no more than 8%	0	—	400	mA
		Duty Cycle no more than 30%	0	—	200	
V_{IH}	"H" input voltage	$I_C \leqq$ 400mA	9	—	35	V
		$I_C \leqq$ 200mA	6	—		
V_{IL}	"L" input voltage		0	—	1	V

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta = −20 ～ +75℃)

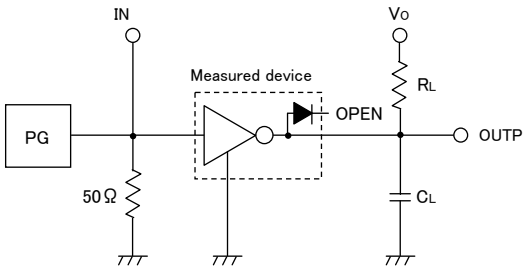
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ *	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100 μA	40	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_I = 9V, I_C = 400mA	—	1.3	2.4	V
		V_I = 6V, I_C = 200mA	—	1.0	1.6	
I_I	Input current	V_I = 18V	—	1.1	1.8	mA
		V_I = 35V	—	2.0	3.8	
I_{IR}	Input reverse current	V_I = −35V	—	—	−20	μA
V_F	Clamping diode forward voltage	I_F = 400mA	—	1.4	2.4	V
I_R	Clamping diode reverse current	V_R = 40V	—	—	100	μA
h_{FE}	DC amplification factor	V_{CE} = 4V, I_C = 300mA, Ta = 25℃	1000	3500	—	—

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

SWITCHING CHARACTERISTICS (Unless otherwise noted, Ta = 25℃)

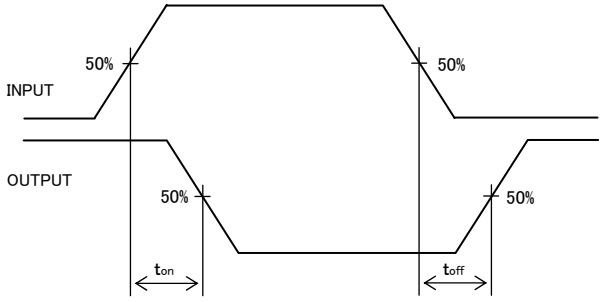
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	30	—	ns
t_{off}	Turn-off time		—	680	—	ns

NOTE 1 TEST CIRCUIT



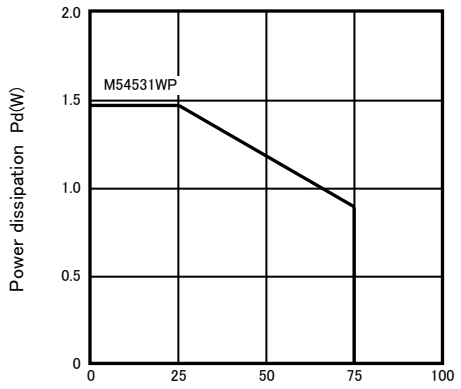
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10ms, tr = 6ns, tf = 6ns, ZO = 50Ω ,VP = 9VP-P
(2) Input-output conditions : RL = 25Ω, VO = 10V
(3) Electrostatic capacity CL includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

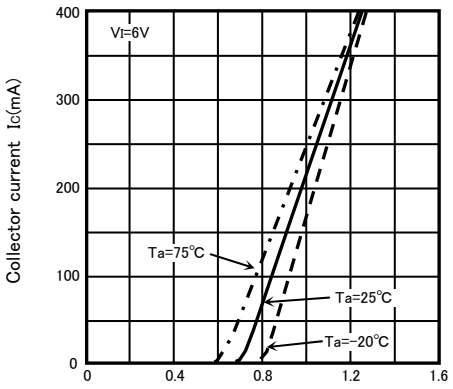


TYPICAL CHARACTERISTICS

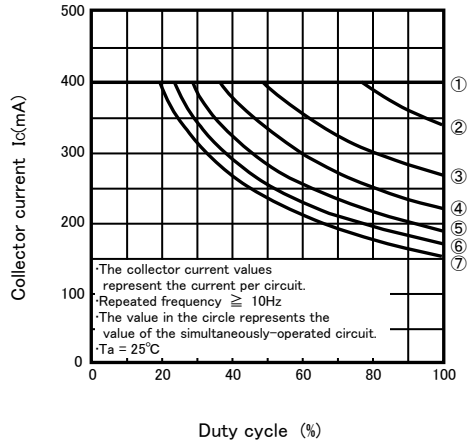
Thermal Derating Factor Characteristics



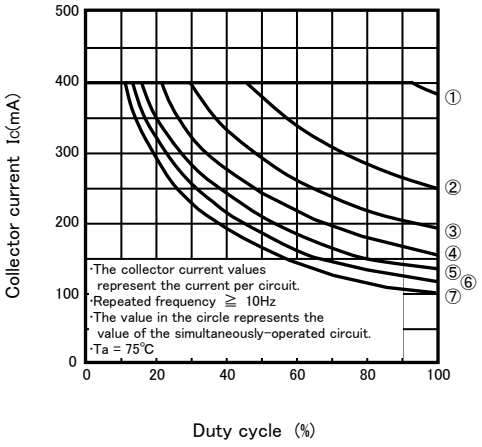
Output Saturation Voltage
Collector Current Characteristics



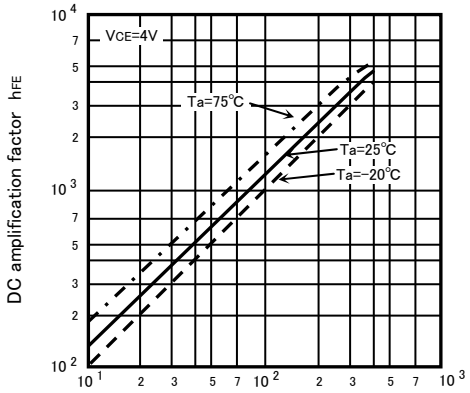
Duty-Cycle-Collector Characteristics



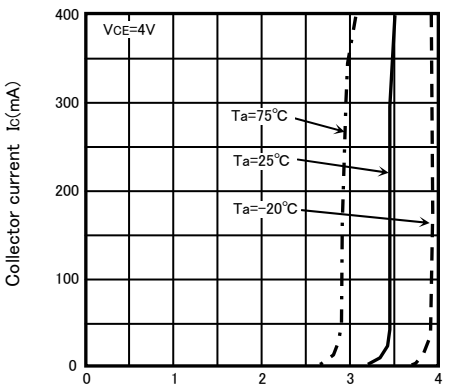
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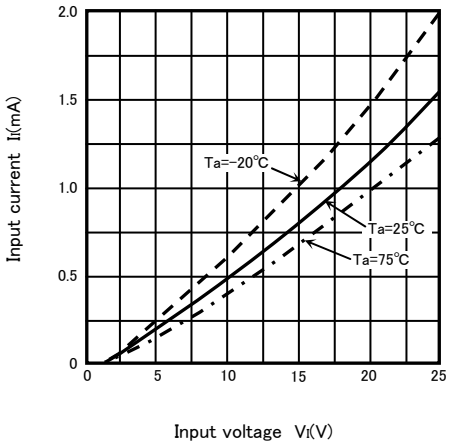
DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Input Characteristics



Clamping Diode Characteristics

