M54523P/FP

7-UNIT 500mA DARLINGTON TRANSISTOR-ARRAY WITH CLAMP DIODE

DESCRIPTION

M54523P and M54523FP 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 ($BV_{CEO} \geq 50V$)
- High-current driving ($I_{C(max)}$ = 500mA)
- With clamping diodes
- Driving available with PMOS IC ouput
- Wide operating temperature range (Ta = –20 to +75°C)

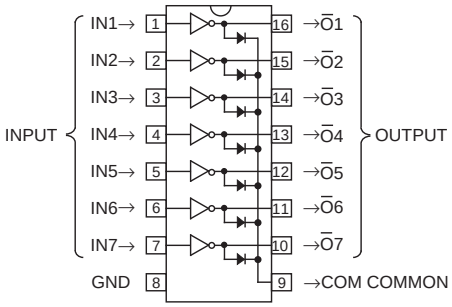
APPLICATION

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

FUNCTION

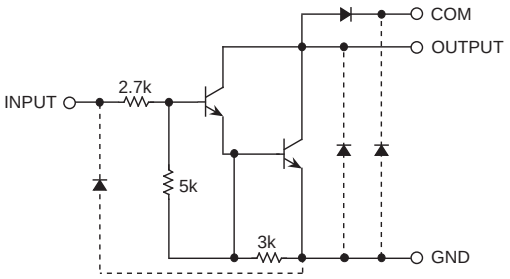
The M54523P and M54523FP each have seven circuits consisting of NPN Darlington transistors. These ICs have resistance of 2.7kΩ between input transistor bases and input pins. A spike-killer clamping diode is provided between each output pin (collector) and COM pin. The output transistor emitters are all connected to the GND pin (pin 8). The collector current is 500mA maximum. Collector-emitter supply voltage is 50V maximum.The M54523FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



16P4(P)
Package type 16P2N-A(FP)

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 ~ +50	V
I_C	Collector current	Current per circuit output, L	500	mA
V_I	Input voltage		–0.5 ~ +30	V
I_F	Clamping diode forward current		500	mA
V_R	Clamping diode reverse voltage		50	V
P_d	Power dissipation	Ta = 25°C, when mounted on board	1.47(P)/1.00(FP)	W
T_{opr}	Operating temperature		–20 ~ +75	°C
T_{stg}	Storage temperature		–55 ~ +125	°C

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_O	Output voltage		0	—	50	V
I_C	Collector current (Current per 1 circuit when 7 circuits are coming on simultaneously)	Duty Cycle P : no more than 8% FP : no more than 8%	0	—	400	mA
		Duty Cycle P : no more than 30% FP : no more than 25%	0	—	200	
V_{IH}	"H" input voltage	$I_C \leq 400mA$	3.85	—	25	V
		$I_C \leq 200mA$	3.4	—	25	
V_{IL}	"L" input voltage		0	—	0.6	V

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

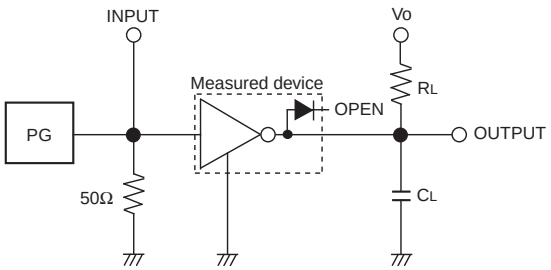
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100μA	50	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_I = 3.85V, I_C = 400mA	—	1.2	2.4	V
		V_I = 3.4V, I_C = 200mA	—	1.0	1.6	
I_I	Input current	V_I = 3.85V	—	1.2	1.8	mA
		V_I = 25V	—	9.5	18	
V_F	Clamping diode forward volltage	I_F = 400mA	—	1.4	2.4	V
I_R	Clamping diode reverse current	V_R = 50V	—	—	100	μA
h_{FE}	DC amplification factor	V_{CE} = 4V, I_C = 350mA, Ta = 25°C	1000	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)

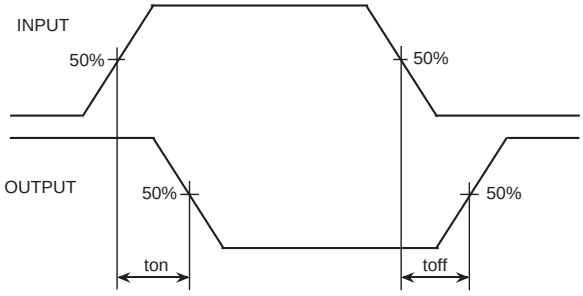
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	10	—	ns
t_{off}	Turn-off time		—	120	—	ns

NOTE 1 TEST CIRCUIT



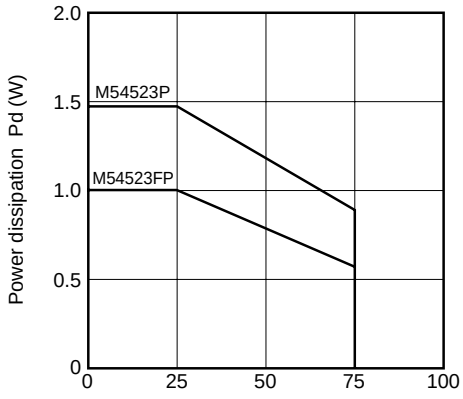
(1)Pulse generator (PG) characteristics : PRR=1kHz,
tw = 10μs, tr = 6ns, tf = 6ns, Zo = 50Ω
V_P = 3.85V_{P-P}
(2)Input-output conditions : R_L = 25Ω, Vo = 10V
(3)Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

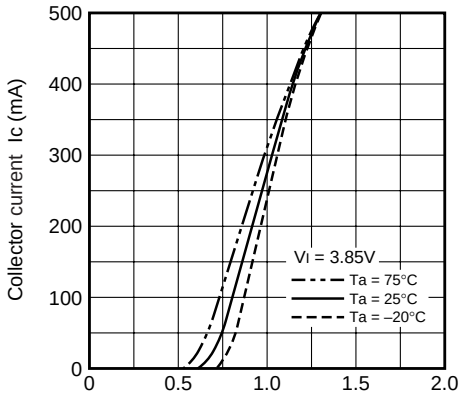


TYPICAL CHARACTERISTICS

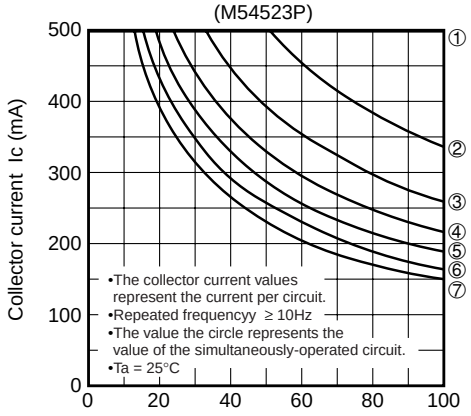
Thermal Derating Factor Characteristics



Output Saturation Voltage
Collector Current Characteristics



Duty Cycle-Collector Characteristics
(M54523P)



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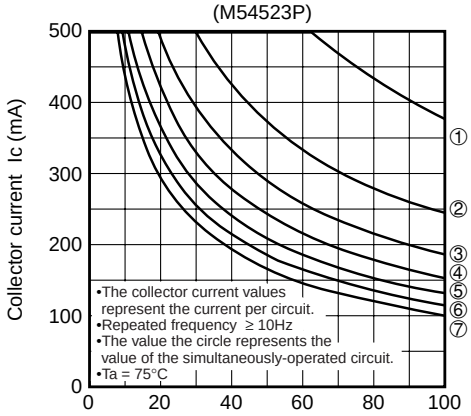
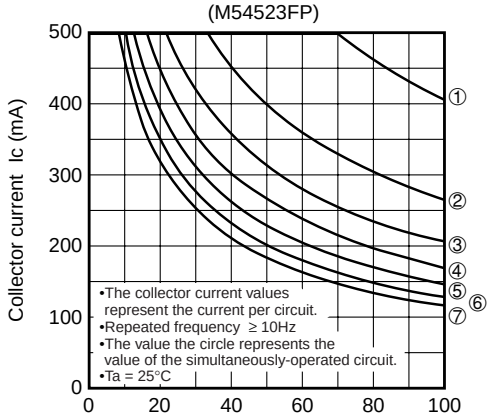
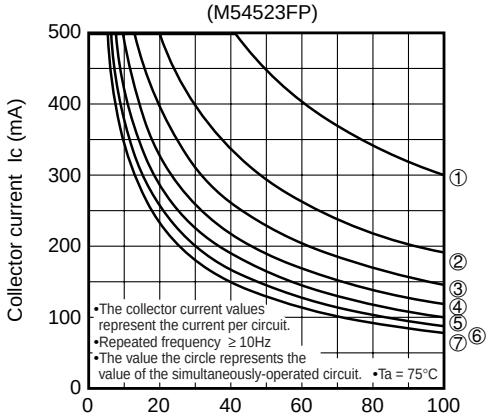
(M54523P)



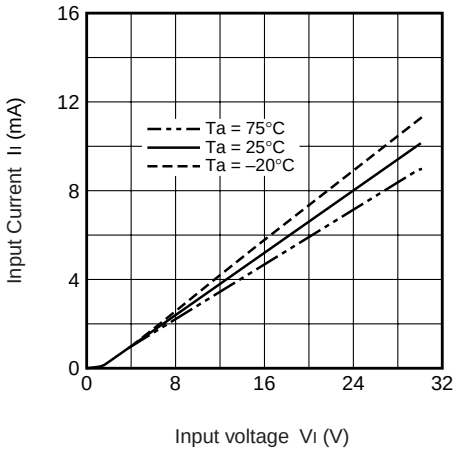
Duty Cycle-Collector Characteristics
(M54523FP)



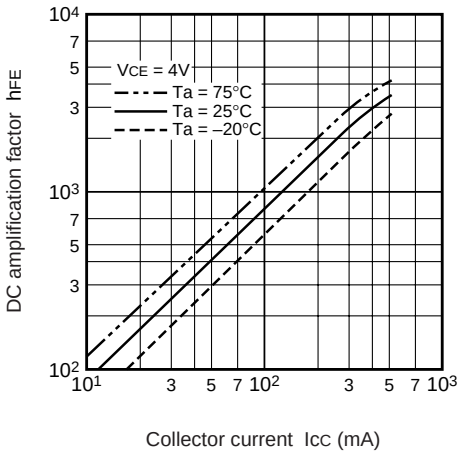
Duty Cycle-Collector Characteristics
(M54523FP)



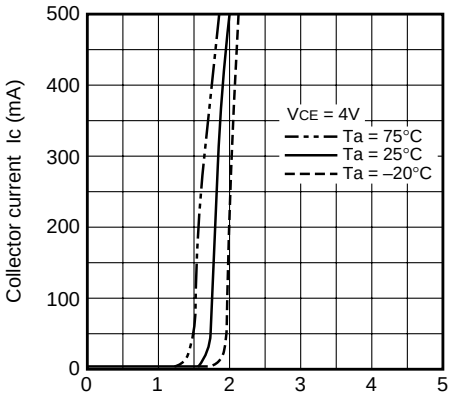
Input Characteristics



DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Clamping Diode Characteristics