M54532P/FP

4-UNIT 1.5A DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54532P and M54532FP are four-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 (Ic(max) = 1.5A)
- With clamping diodes
- Wide operating temperature range (Ta = –20 to +75°C)

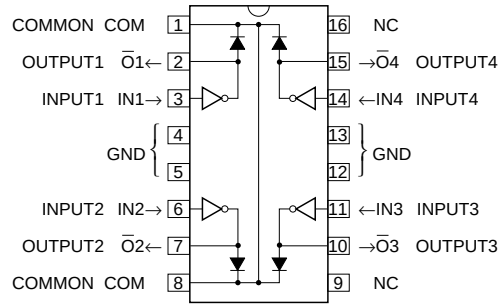
APPLICATION

Drives of relays and printers, digit drives of indication elements (LEDs and lamps), and power amplification

FUNCTION

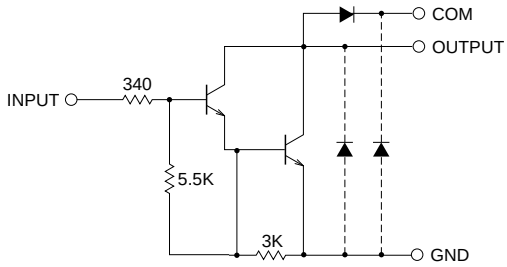
The M54532P and M54532FP each have four circuits consisting of NPN Darlington transistors. They have resistance of 340Ω between input transistor bases and input pins. A clamping diode is provided between each output pin (collector) and COM pin. The output transistor emitters are all connected to the GND pin.
The collector current is 1.5A maximum. Collector-emitter supply voltage is 50V maximum.
The M54532FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



16P4(P)
Package type 16P2N-A(FP) NC : No connection

CIRCUIT DIAGRAM



The four 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	1.5	A
V_I	Input voltage		–0.5 ~ +10	V
V_R	Clamping diode reverse voltage		50	V
I_F	Clamping diode forward current	Pulse Width ≤ 10ms, Duty Cycle ≤ 5%	1.5	A
		Pulse Width ≤ 100ms, Duty Cycle ≥ 5%	1.25	
Pd	Power dissipation	Ta = 25°C, when mounted on board	1.92(P)/1.00(FP)	W
T_{opr}	Operating temperature		–20 ~ +75	°C
T_{stg}	Storage temperature		–55 ~ +125	°C

MITSUBISHI ELECTRIC

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 4 circuits are coming on simultaneously)	Duty Cycle P : no more than 4% FP : no more than 2%	0	—	1.25	A
		Duty Cycle P : no more than 18% FP : no more than 9%	0	—	0.7	
V_{IH}	"H" input voltage		3	—	6	V
V_{IL}	"L" input voltage		0	—	0.4	V

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

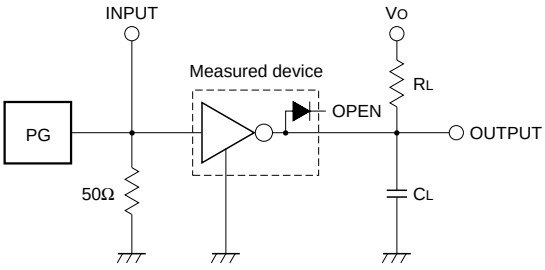
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100μA	50	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_I = 2mA, I_C = 1.25A	—	1.3	2.2	V
		I_I = 2mA, I_C = 0.7A	—	1.1	1.7	
I_I	Input current	V_I = 3V	—	5	8.5	mA
I_R	Clamping diode reverse current	V_R = 50V	—	—	100	μA
V_F	Clamping diode forward voltage	I_F = 1.25A	—	1.6	2.3	V
h_{FE}	DC amplification factor	V_{CE} = 4V, I_C = 1A, Ta = 25°C	800	7000	—	—

* : 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)

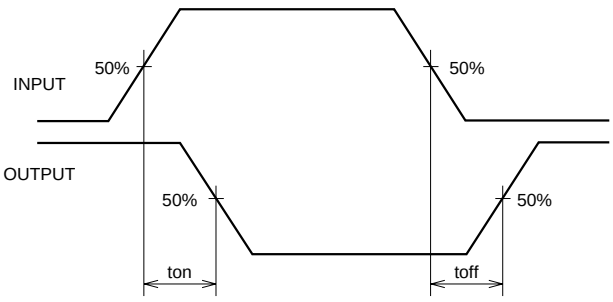
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	10	—	ns
t_{off}	Turn-off time		—	500	—	ns

NOTE 1 TEST CIRCUIT



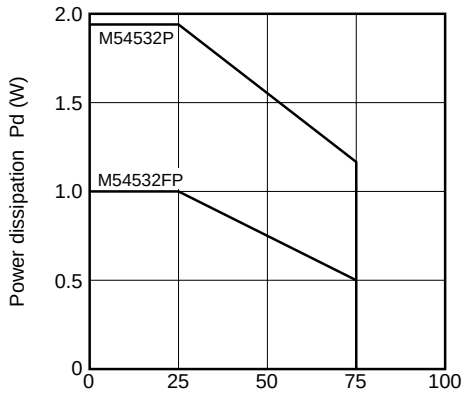
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Z_O = 50Ω
V_P = $3V_{P-P}$
(2) Input-output conditions : R_L = 8.3Ω, V_O = 10V
(3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

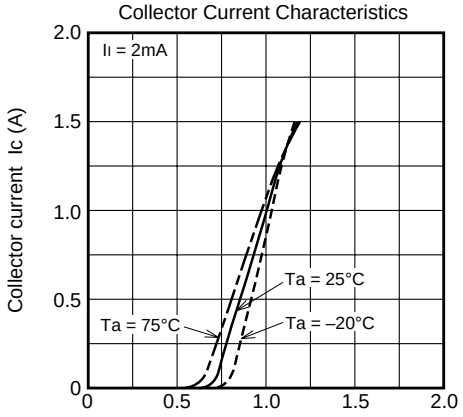


TYPICAL CHARACTERISTICS

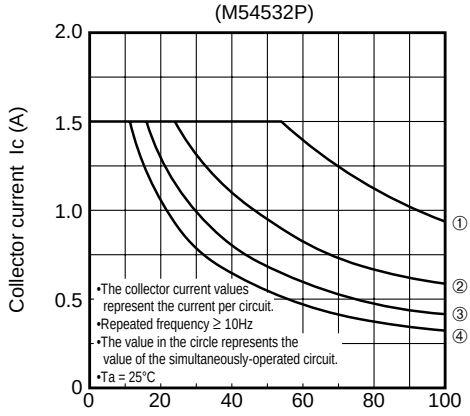
Thermal Derating Factor Characteristics



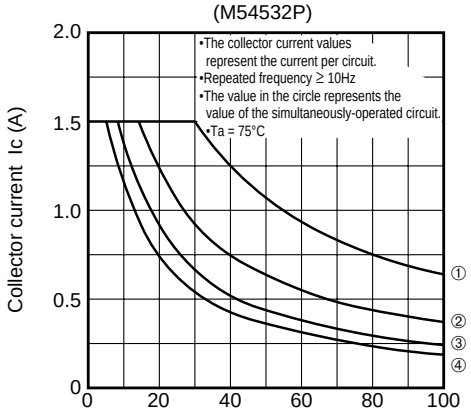
Output Saturation Voltage
Collector Current Characteristics



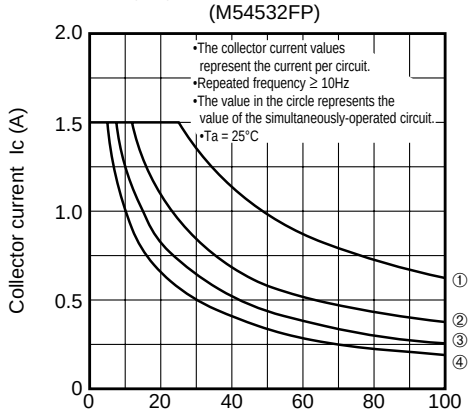
Duty-Cycle-Collector Characteristics
(M54532P)



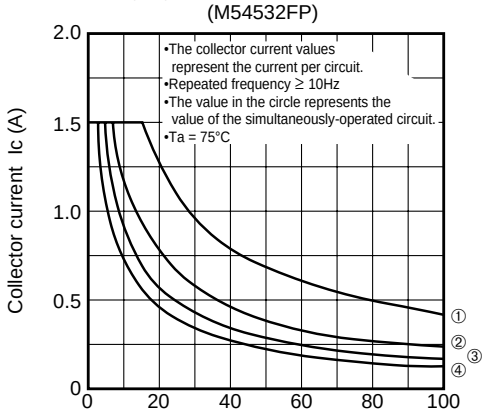
Duty-Cycle-Collector Characteristics
(M54532P)



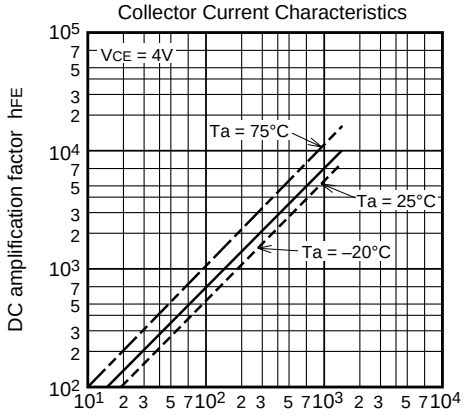
Duty-Cycle-Collector Characteristics
(M54532FP)



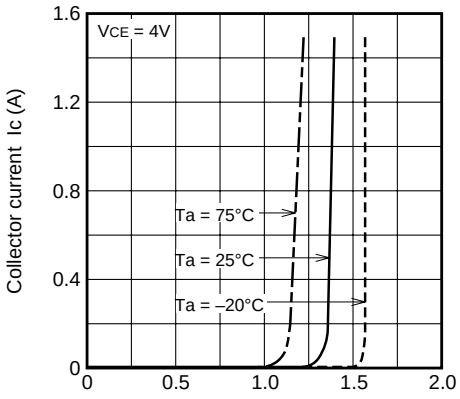
Duty-Cycle-Collector Characteristics
(M54532FP)



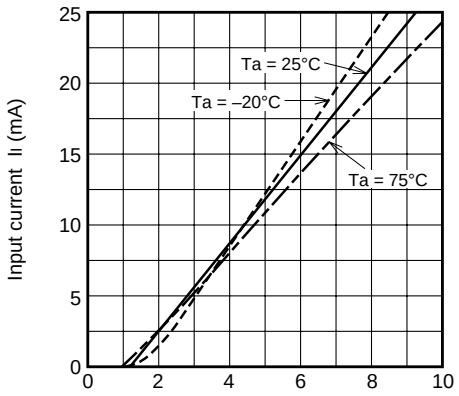
DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Input Characteristics



Clamping Diode Characteristics