M54566P/FP

7-UNIT 400mA DARLINGTON TRANSISTOR ARRAY

DESCRIPTION

M54566P and M54566FP are seven-circuit collector-current-synchronized 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 ($BV_{CEO} \geq 50V$)
- High-current driving (Ic(max) = 400mA)
- Active L-level input
- Wide operating temperature range (Ta = –20 to +75°C)

APPLICATION

Interfaces between microcomputers and high-voltage, high-current drive systems, drives of relays and printers, and MOS-bipolar logic IC interfaces

FUNCTION

The M54566 is produced by adding PNP transistors to M54222 inputs. Seven circuits having active L-level inputs are provided.

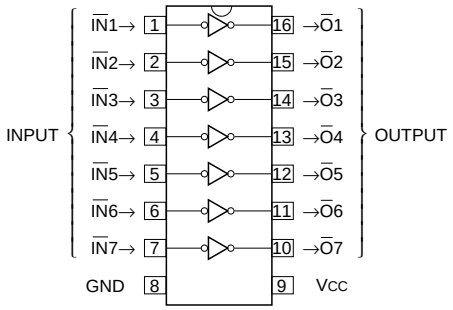
Resistance of 8kΩ is provided between each input and PNP transistor base. The input emitters are connected to V_{CC} pin (pin 9). Output transistor emitters are all connected to the GND pin (pin 8).

Collector current is 400mA maximum. Collector-emitter supply voltage is 50V maximum.

These ICs are optimal for drivers that are driven with N-MOS IC output and absorb collector current.

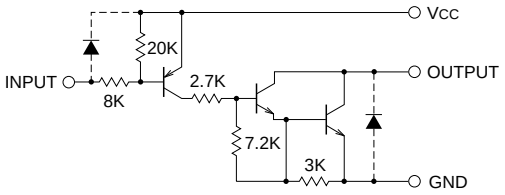
The M54566FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



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

CIRCUIT DIAGRAM



The seven circuits share the V_{CC} 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_{CC}	Supply voltage		10	V
V_{CEO}	Collector-emitter voltage	Output, H	–0.5 ~ +50	V
I_C	Collector current	Current per circuit output, L	400	mA
V_I	Input voltage		–0.5 ~ V_{CC}	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

MITSUBISHI ELECTRIC

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_{CC}	Supply voltage		4	5	8	V
V_O	Output voltage		0	—	50	V
I_C	Collector current (Current per 1 circuit when 7 circuits are coming on simultaneously)	V_{CC} = 5V, Duty Cycle P : no more than 10% FP : no more than 6%	0	—	350	mA
		V_{CC} = 5V, Duty Cycle P : no more than 30% FP : no more than 20%	0	—	200	
V_{IH}	"H" input voltage		V_{CC}–0.2	—	V_{CC}	V
V_{IL}	"L" input voltage		0	—	V_{CC}–3	V

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

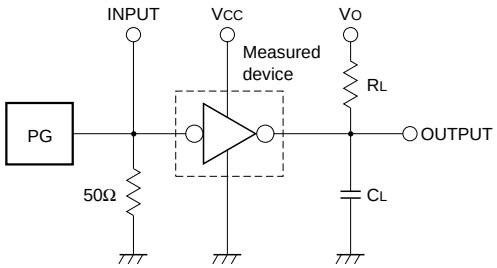
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100μA	50	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_I = V_{CC}–3V, I_C = 350mA	—	1.1	2.2	V
		V_I = V_{CC}–3V, I_C = 200mA	—	0.9	1.6	
I_I	Input current	V_I = V_{CC}–3.5V	—	–0.38	–0.58	mA
I_{CC}	Supply current (one circuit coming on)	V_{CC} = 5V, V_I = V_{CC}–3.5V	—	1.4	3.0	mA
h_{FE}	DC amplification factor	V_{CE} = 4V, V_{CC} = 5V, I_C = 350mA, Ta = 25°C	2000	10000	—	—

* : 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)

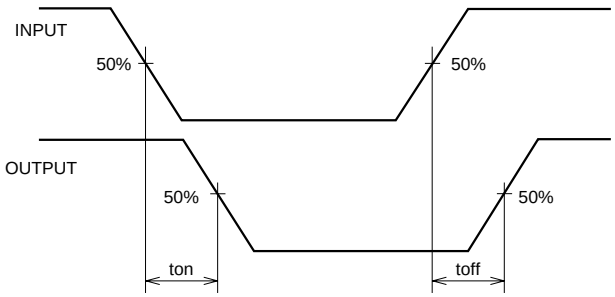
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	95	—	ns
t_{off}	Turn-off time		—	2500	—	ns

NOTE 1 TEST CIRCUIT



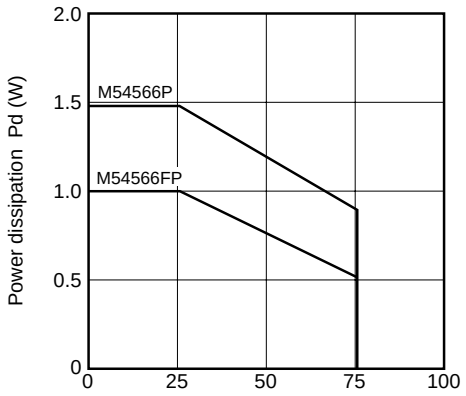
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Z_O = 50Ω
V_I = 1 to 4V
(2) Input-output conditions : R_L = 30Ω, V_O = 10V, V_{CC} = 4V
(3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

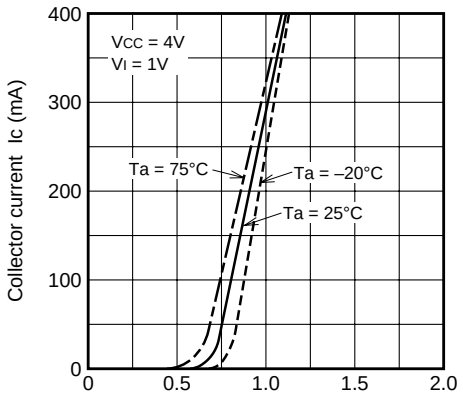


TYPICAL CHARACTERISTICS

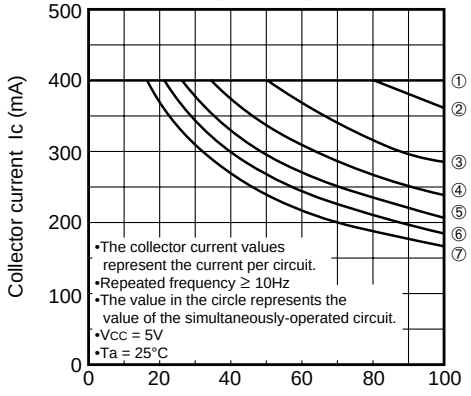
Thermal Derating Factor Characteristics



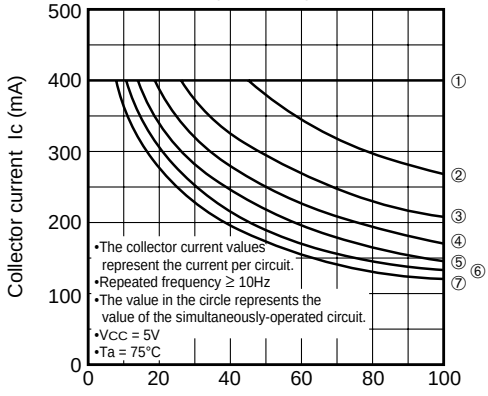
Output Saturation Voltage
Collector Current Characteristics



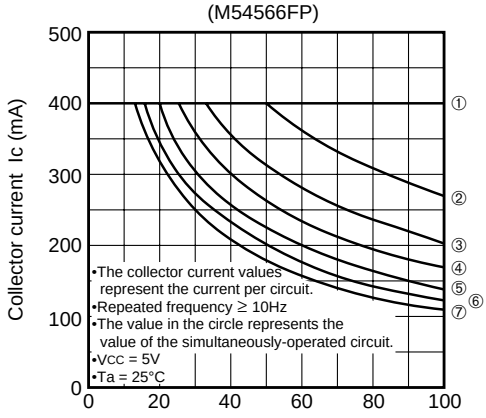
Duty-Cycle-Collector Characteristics
(M54566P)



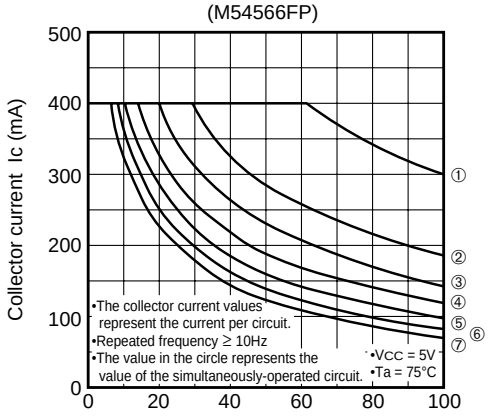
Duty-Cycle-Collector Characteristics
(M54566P)



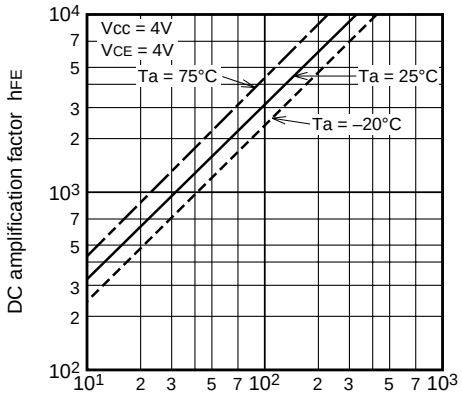
Duty-Cycle-Collector Characteristics
(M54566FP)



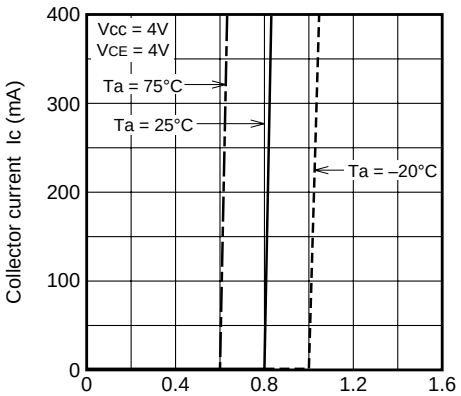
Duty-Cycle-Collector Characteristics
(M54566FP)



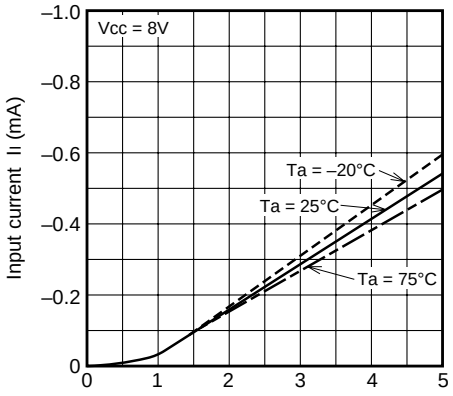
DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



Input Characteristics



Supply Current Characteristics