M54661P/FP

4-UNIT 80V/1.5A DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54661P and M54661FP are four-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 ($BV_{CEO} \geq 80V$)
- High-current driving (Ic(max) = 1.5A)
- With clamping diodes
- Driving available with NMOS IC output
- Wide operating temperature range (Ta = –20 to +75°C)

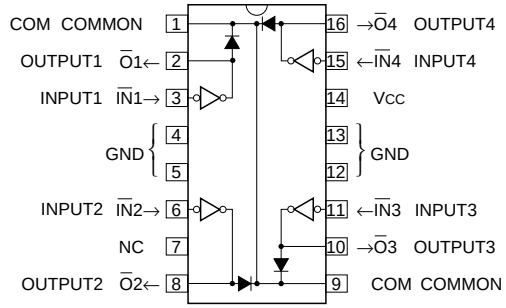
APPLICATION

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

FUNCTION

The M54661P and M54661FP each have four circuits, which are made of PNP transistors and NPN Darlington transistors. The input has 7kΩ, and a spike-killer clamping diode is provided between the output pin (collector) and COM pin. All output transistor emitters are connected to the GND pin.
Collector current is 1.5A maximum. The maximum collector-emitter voltage is 80V.
The M54661FP is enclosed in a molded small flat package, enabling space-saving design.

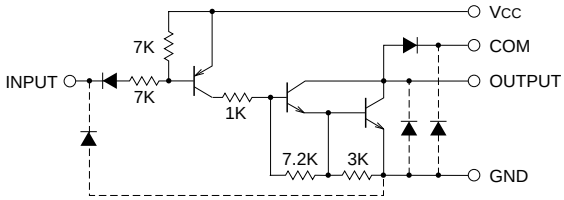
PIN CONFIGURATION



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

NC : No connection

CIRCUIT DIAGRAM



COM, VCC and GND are common for each circuit.
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 ~ +80*	V
I_C	Collector current	Current per circuit output, L	1.5	A
V_I	Input voltage		–0.5 ~ +30	V
V_R	Clamping diode reverse voltage		80*	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
Topr	Operating temperature		–20 ~ +75	°C
Tstg	Storage temperature		–55 ~ +125	°C

* : When output voltage is less than –0.5V, the other circuits are to be used at 50V.

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

Symbol	Parameter		Limits			Unit
			min	typ	max	
V_{CC}	Supply voltage		4	5	6	V
V_O	Output voltage		0	—	80	V
I_C	Collector current (Current per 1 circuit when 4 circuits are coming on simultaneously)	V_{CC} = 5V, Duty Cycle P : no more than 4% FP : no more than 2%	0	—	1.25	A
		V_{CC} = 5V, Duty Cycle P : no more than 18% FP : no more than 9%	0	—	0.7	
V_{IH}	"H" input voltage		V_{CC}–0.5	—	V_{CC}	V
V_{IL}	"L" input voltage		0	—	V_{CC}–3.5	V

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

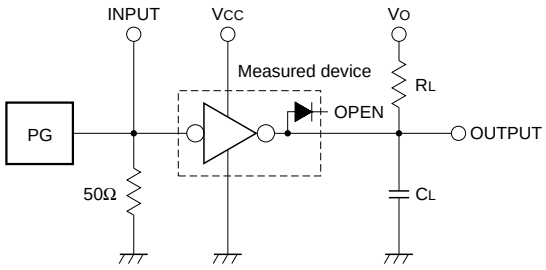
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ*	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 100μA	80	—	—	V
I_{CC}	Supply current (one circuit coming on)	V_{CC} = 6V, V_I = 0.5V	—	4.6	7.5	mA
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{CC} = 4V, V_I = 0.5V, I_C = 1.25A	—	—	2.2	V
		V_{CC} = 4V, V_I = 0.5V, I_C = 0.7A	—	—	1.7	
I_I	Input current	V_I = V_{CC}–3.5V	—	—	–0.6	mA
		V_I = 0V	—	—	–0.95	
I_R	Clamping diode reverse current	V_R = 80V	—	—	100	μA
V_F	Clamping diode forward voltage	I_F = 1.25A, V_{CC} open	—	—	2.3	V
h_{FE}	DC amplification factor	V_{CC} = 4V, V_{CE} = 4V, I_C = 1A, Ta = 25°C	4000	—	—	—

* : 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)

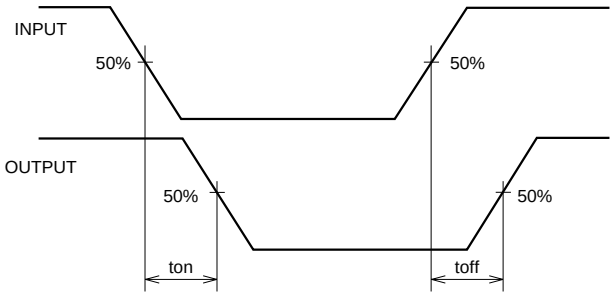
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	170	—	ns
t_{off}	Turn-off time		—	4000	—	ns

NOTE 1 TEST CIRCUIT



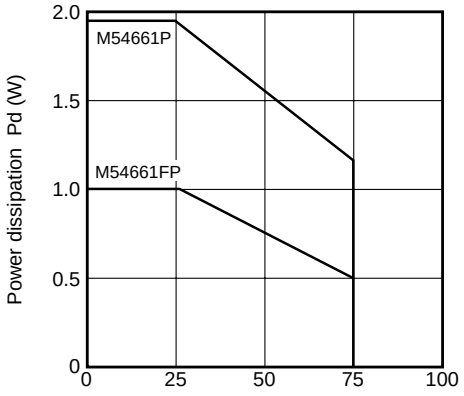
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Z_O = 50Ω
V_I = 3.5V_{P-P}(0.5 to 4V)
(2) Input-output conditions : R_L = 8.3Ω, V_O = 10V, V_{CC} = 4V
(3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes

TIMING DIAGRAM

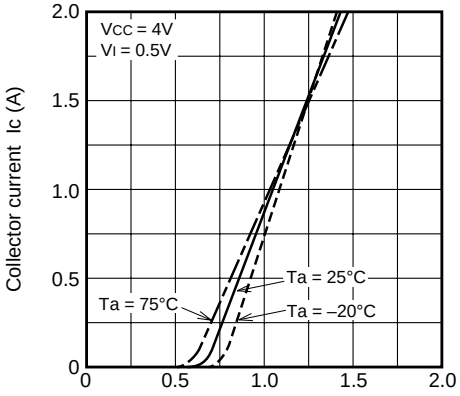


TYPICAL CHARACTERISTICS

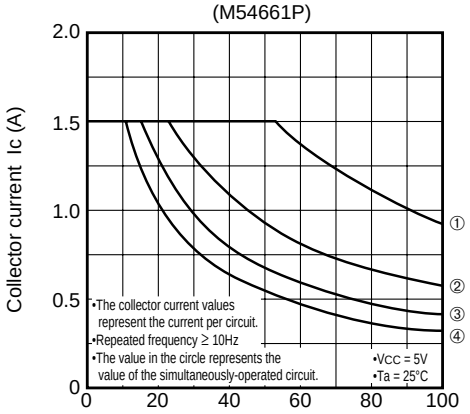
Thermal Derating Factor Characteristics



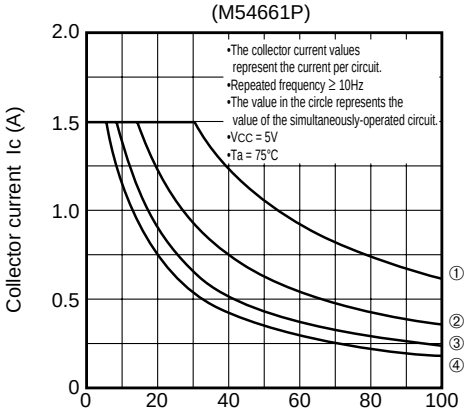
Output Saturation Voltage
Collector Current Characteristics



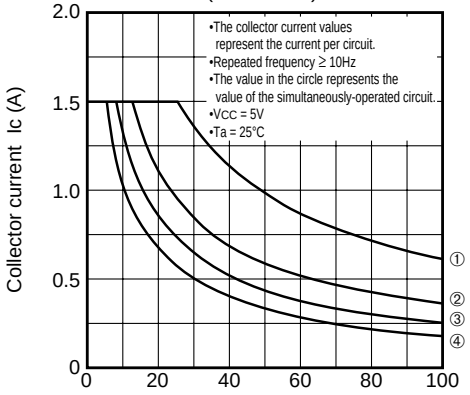
Duty-Cycle-Collector Characteristics
(M54661P)



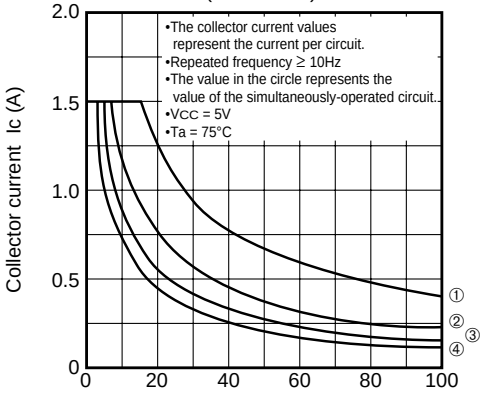
Duty-Cycle-Collector Characteristics
(M54661P)



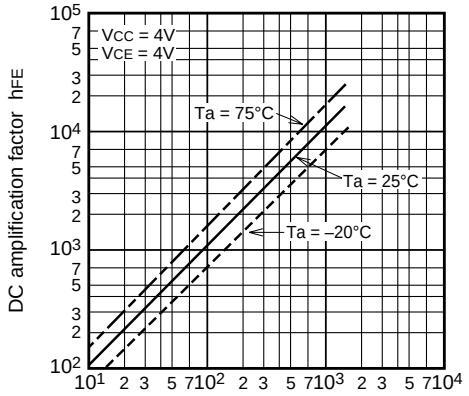
Duty-Cycle-Collector Characteristics
(M54661FP)



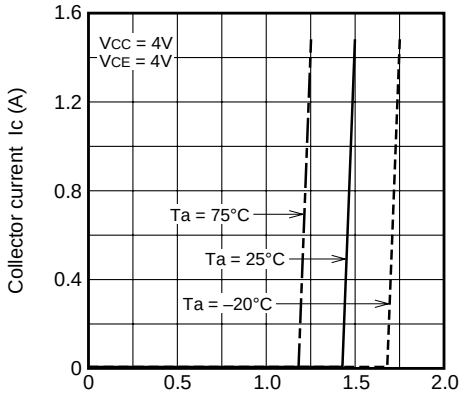
Duty-Cycle-Collector Characteristics
(M54661FP)



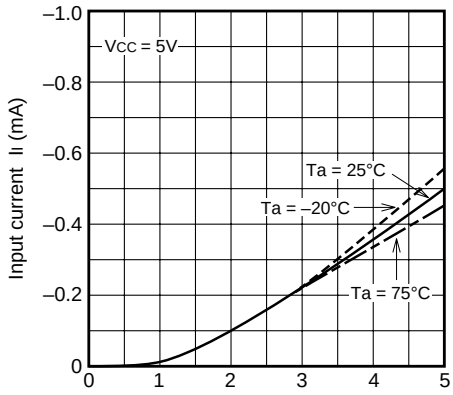
DC Amplification Factor
Collector Current Characteristics



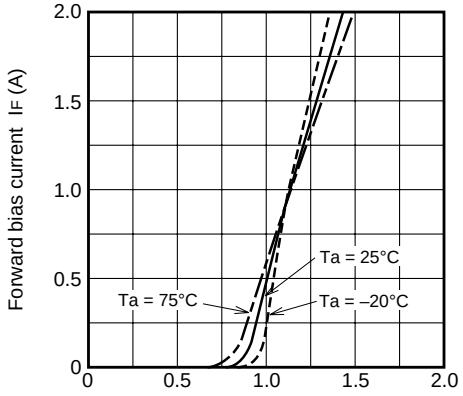
Grounded Emitter Transfer Characteristics



Input Characteristics



Clamping Diode Characteristics



Supply Current Characteristics