M54563P/FP

8-UNIT 500mA SOURCE TYPE DARLINGTON TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M54563FP is an eight-circuit output-sourcing Darlington transistor array. The circuits are made of PNP and NPN transistors. This semiconductor integrated circuit performs high-current driving with extremely low input-current supply.

FEATURES

- High breakdown voltage ($BV_{CEO} \geq 50V$)
- High-current driving (Io(max) = –500mA)
- With clamping diodes
- Driving available with PMOS IC output of 6 ~ 16V or with TTL output
- Wide operating temperature range (Ta = –20 to +75°C)
- Output current-sourcing type

APPLICATION

Drives of relays, printers, LEDs, fluorescent display tubes and lamps, and interfaces between MOS-bipolar logic systems and relays, solenoids, or small motors

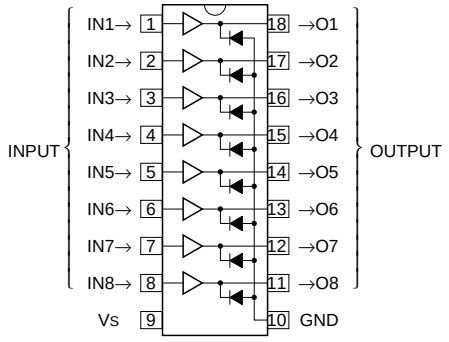
FUNCTION

The M54563P and M54563FP each have eight circuits, which are made of input inverters and current-sourcing outputs. The outputs are made of PNP transistors and NPN Darlington transistors. The PNP transistor base current is constant. A clamping diode is provided between each output and GND. V_S and GND are used commonly among the eight circuits.

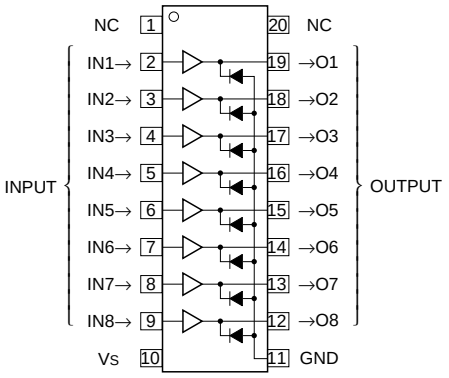
The inputs have resistance of 3kΩ, and voltage of up to 10V is applicable. Output current is 500 mA maximum. Supply voltage V_S is 50V maximum.

The M54563FP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION



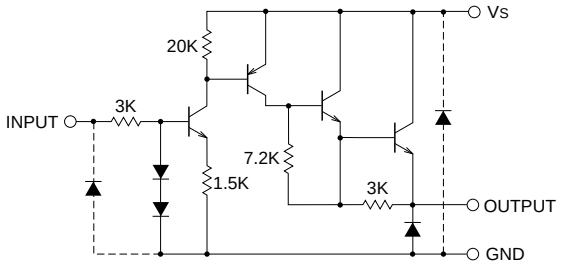
Package type 18P4G(P)



Package type 20P2N-A(FP)

NC : No connection

CIRCUIT DIAGRAM



The eight circuits share the V_S 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, L	–0.5 ~ +50	V
V_S	Supply voltage		50	V
V_I	Input voltage		–0.5 ~ +10	V
I_O	Output current	Current per circuit output, H	–500	mA
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	1.79(P)/1.10(FP)	W
T_{opr}	Operating temperature		–20 ~ +75	°C
T_{stg}	Storage temperature		–55 ~ +125	°C

: Unused I/O pins must be connected to GND.

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

Symbol	Parameter		Limits min	Limits typ	Limits max	Unit
V_S	Supply voltage		0	—	50	V
I_O	Output current (Current per 1 circuit when 8 circuits are coming on simultaneously)	Duty Cycle P : no more than 8% FP : no more than 5%	0	—	–350	mA
		Duty Cycle P : no more than 55% FP : no more than 30%	0	—	–100	
V_{IH}	"H" input voltage		2.4	—	10	V
V_{IL}	"L" input voltage		0	—	0.2	V

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

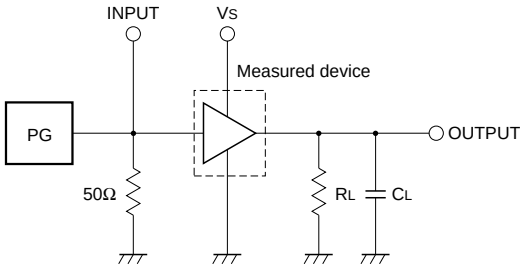
Symbol	Parameter	Test conditions	Limits min	Limits typ*	Limits max	Unit
$I_{S\,(leak)}$ #	Supply leak current	V_S = 50V, V_I = 0.2V	—	—	100	μA
$V_{CE\,(sat)}$	Collector-emitter saturation voltage	V_S = 10V, V_I = 2.4V, I_O = –350mA	—	1.6	2.4	V
		V_S = 10V, V_I = 2.4V, I_O = –100mA	—	1.45	2.0	
I_I	Input current	V_I = 3V	—	0.6	1.0	mA
		V_I = 10V	—	2.9	5.0	
I_S	Supply current	V_S = 50V, V_I = 3V (all input)	—	5.6	15.0	mA
V_F	Clamping diode forward voltage	I_F = –350mA	—	–1.2	–2.4	V
I_R #	Clamping diode reverse current	V_R = 50V	—	—	100	μA

* : 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.
# : Unused I/O pins must be connected to GND.

SWITCHING CHARACTERISTICS (Unless otherwise noted, Ta = 25°C)

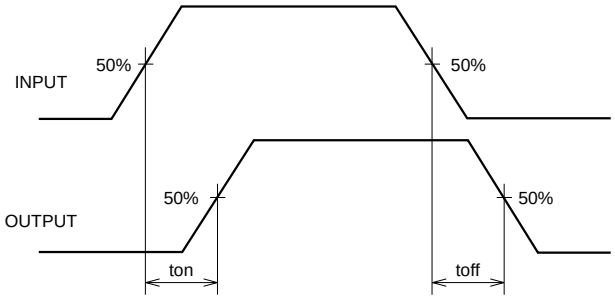
Symbol	Parameter	Test conditions	Limits min	Limits typ	Limits max	Unit
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	100	—	ns
t_{off}	Turn-off time		—	4800	—	ns

NOTE 1 TEST CIRCUIT

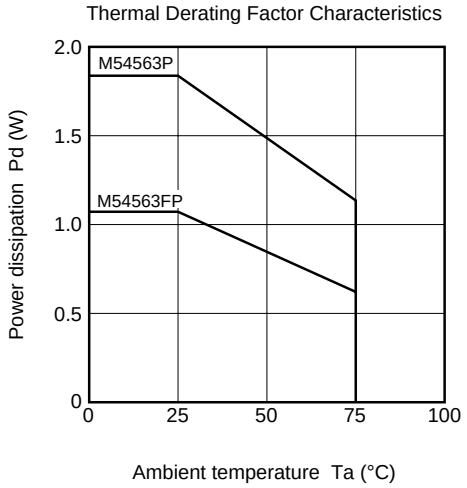


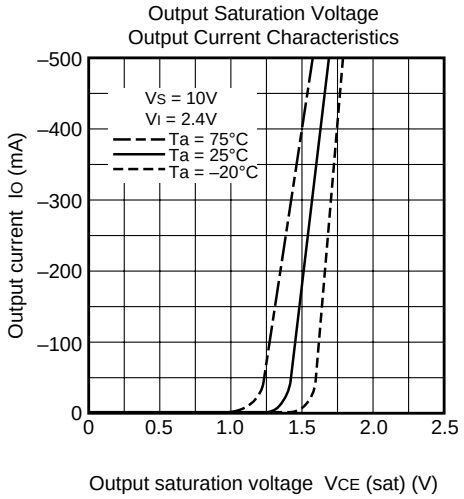
(1) Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, ZO = 50Ω
VI = 0 to 2.4V
(2) Input-output conditions : RL = 30Ω, VS = 10V
(3) Electrostatic capacity CL includes floating capacitance at connections and input capacitance at probes

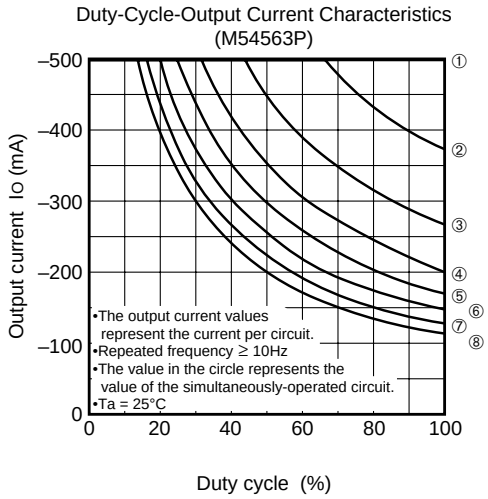
TIMING DIAGRAM

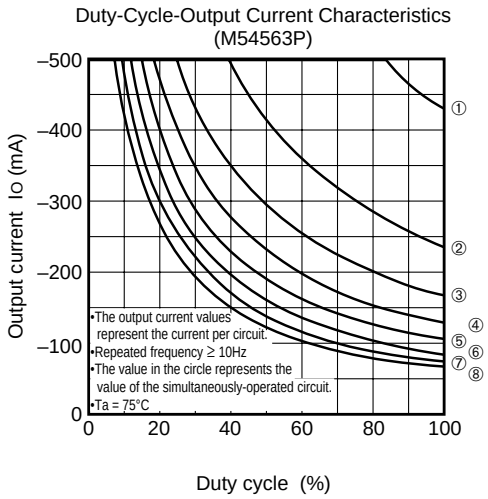


TYPICAL CHARACTERISTICS

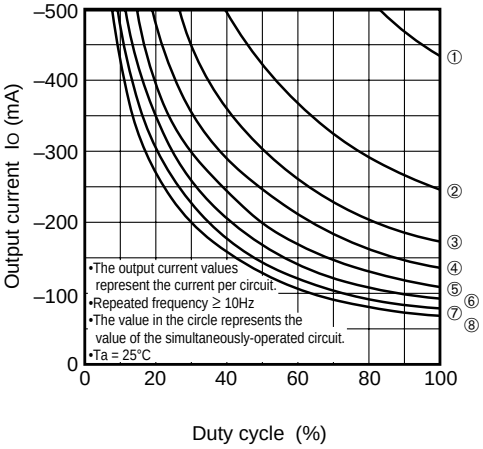








Duty-Cycle-Output Current Characteristics
(M54563FP)



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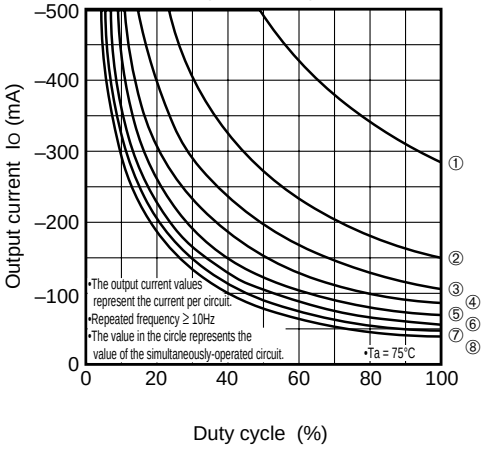
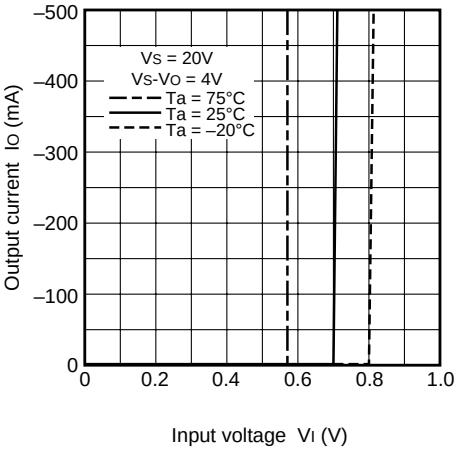
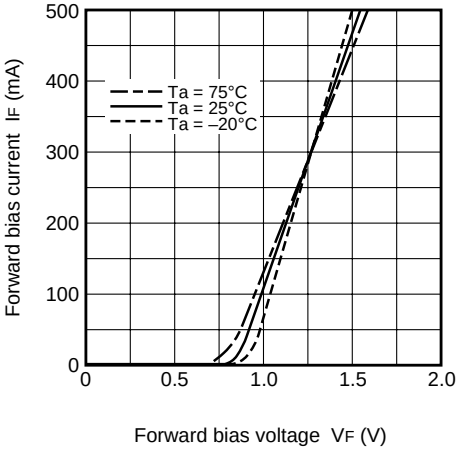


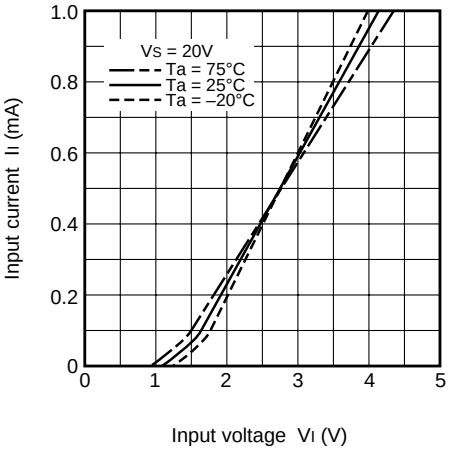
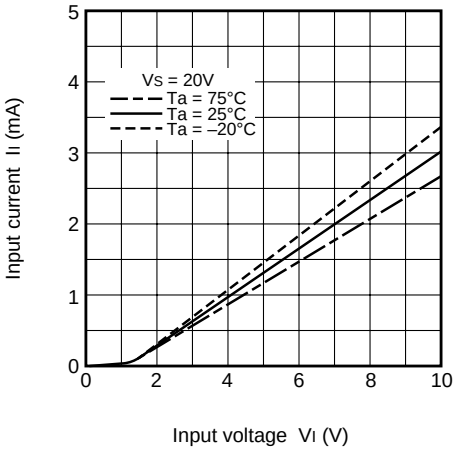
Grounded Emitter Transfer Characteristics



Clamping Diode Characteristics



Input Characteristics



Input Characteristics