MITSUBISHI SEMICONDUCTOR <TRANSISTOR ARRAY>

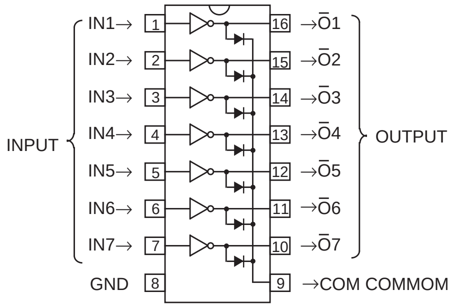
M63812P/FP/GP/KP

7-UNIT 300mA TRANSISTOR ARRAY WITH CLAMP DIODE

DESCRIPTION

M63812P, M63812FP, M63812GP and M63812KP are seven-circuit Singe 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.

PIN CONFIGURATION

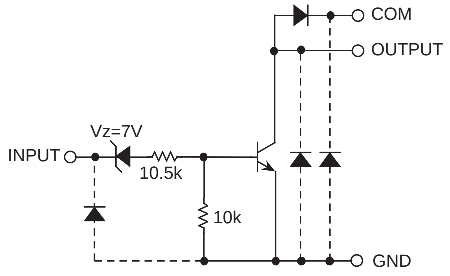


Package type
16P4(P)
16P2N-A(FP)
16P2S-A(GP)
16P2Z-A(KP)

FEATURES

- Four package configurations (P, FP, GP and KP)
- Medium breakdown voltage ($BV_{CEO} \geq 35V$)
- Synchronizing current ($I_{C(max)}$ = 300mA)
- With clamping diodes
- With zener diodes
- Low output saturation voltage
- Wide operating temperature range (Ta=–40 to +85°C)

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

APPLICATION

Driving of digit drives of indication elements (LEDs and lamps) with small signals

FUNCTION

The M63812P, M63812FP, M63812GP and M63812KP each have seven circuits consisting of NPN transistor.A spike-killer clamping diode is provided between each output pin (collector) and COM pin (pin9). The transistor emitters are all connected to the GND pin (pin 8). The transistors allow synchronous flow of 300mA collector current. A maximum of 35V voltage can be applied between the collector and emitter.

ABSOLUTE MAXIMUM RATINGS (Unless otherwise noted, Ta = –40 ~ +85°C)

Symbol	Parameter	Conditions		Ratings	Unit
V_{CEO}	Collector-emitter voltage	Output, H		–0.5 ~ +35	V
I_C	Collector current	Current per circuit output, L		300	mA
V_I	Input voltage			–0.5 ~ +35	V
I_F	Clamping diode forward current			300	mA
V_R	Clamping diode reverse voltage			35	V
P_d	Power dissipation	Ta = 25°C, when mounted on board	M63812P	1.47	W
			M63812FP	1.00	
			M63812GP	0.80	
			M63812KP	0.78	
T_{opr}	Operating temperature			–40 ~ +85	°C
T_{stg}	Storage temperature			–55 ~ +125	°C

RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, Ta = –40 ~ +85°C)

Symbol	Parameter		Test conditions	Limits			Unit
				min	typ	max	
V_O	Output voltage			0	—	35	V
I_C	Collector current (Current per 1 circuit when 7 circuits are coming on simultaneously)	M63812P	Duty Cycle no more than 45%	0	—	250	mA
			Duty Cycle no more than 100%	0	—	160	
		M63812FP	Duty Cycle no more than 30%	0	—	250	
			Duty Cycle no more than 100%	0	—	130	
		M63812GP	Duty Cycle no more than 24%	0	—	250	
			Duty Cycle no more than 100%	0	—	120	
		M63812KP	Duty Cycle no more than 24%	0	—	250	
			Duty Cycle no more than 100%	0	—	120	
V_{IN}	Input voltage			0	—	30	V

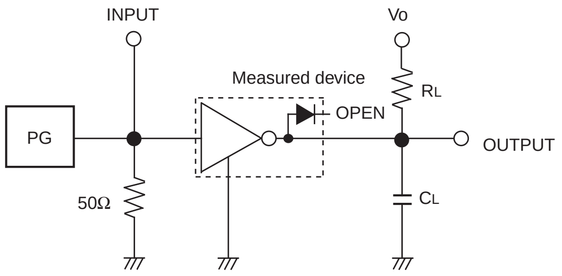
ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_{CEO} = 10µA	35	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_{IN} = 1mA, I_C = 10mA	—	—	0.2	V
		I_{IN} = 2mA, I_C = 150mA	—	—	0.8	
$V_{IN(on)}$	“On” input voltage	I_{IN} = 1mA, I_C = 10mA	13	19	23	V
V_R	Clamping diode forward volltage	I_F = 250mA	—	1.2	2.0	V
I_R	Clamping diode reverse current	V_R = 35V	—	—	10	µA
h_{FE}	DC amplification factor	V_{CE} = 10V, I_C = 10mA	50	—	—	—

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

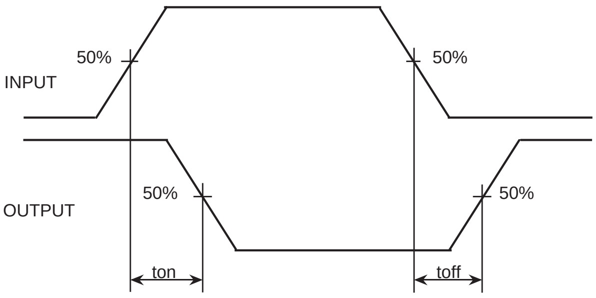
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t_{on}	Turn-on time	C_L = 15pF (note 1)	—	140	—	ns
t_{off}	Turn-off time		—	240	—	ns

NOTE 1 TEST CIRCUIT



(1)Pulse generator (PG) characteristics : PRR = 1kHz,
tw = 10µs, tr = 6ns, tf = 6ns, Zo = 50Ω, V_{IH} = 18V
(2)Input-output conditions : R_L=220Ω,V_o=35V
(3)Electrostatic capacity C_L includes floating capacitance at
connections and input capacitance at probes

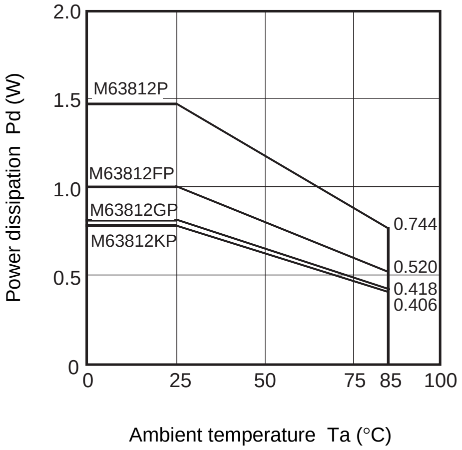
TIMING DIAGRAM



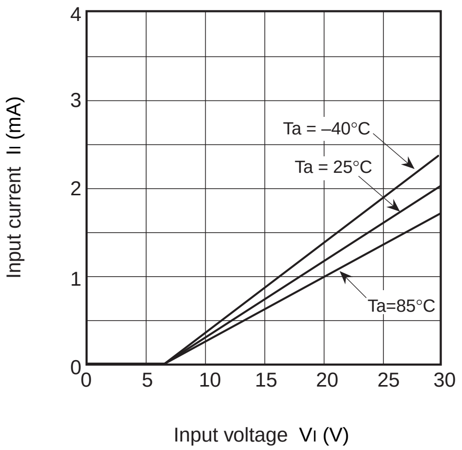
MITSUBISHI ELECTRIC

TYPICAL CHARACTERISTICS

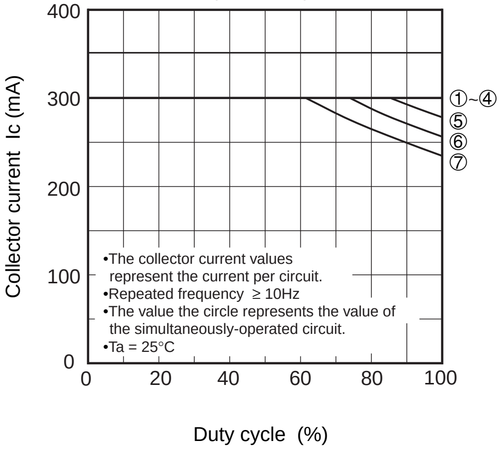
Thermal Derating Factor Characteristics



Input Characteristics

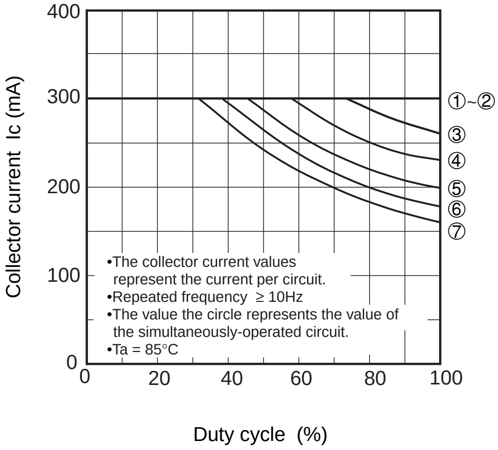


Duty-Cycle-Collector Characteristics (M63812P)



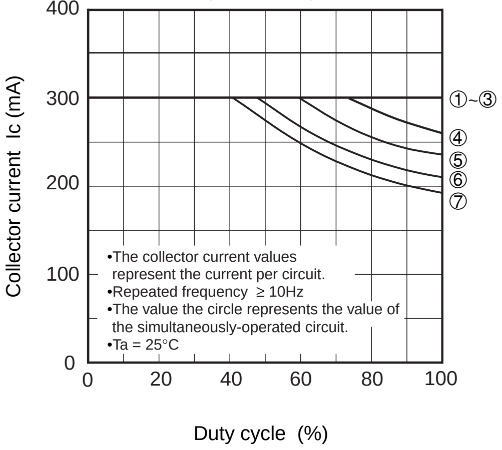
- The collector current values represent the current per circuit.
- Repeated frequency ≥ 10Hz
- The value the circle represents the value of the simultaneously-operated circuit.
- Ta = 25°C

Duty-Cycle-Collector Characteristics (M63812P)



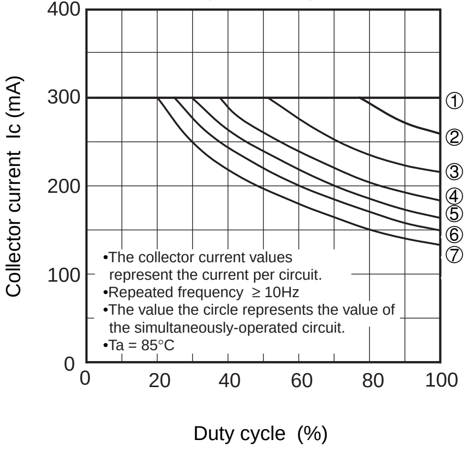
- The collector current values represent the current per circuit.
- Repeated frequency ≥ 10Hz
- The value the circle represents the value of the simultaneously-operated circuit.
- Ta = 85°C

Duty-Cycle-Collector Characteristics (M63812FP)



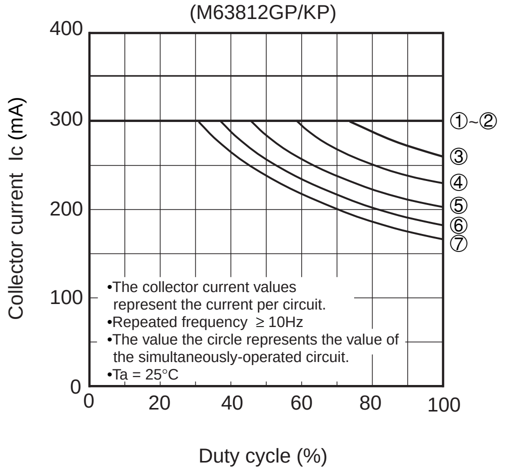
- The collector current values represent the current per circuit.
- Repeated frequency ≥ 10Hz
- The value the circle represents the value of the simultaneously-operated circuit.
- Ta = 25°C

Duty-Cycle-Collector Characteristics (M63812FP)

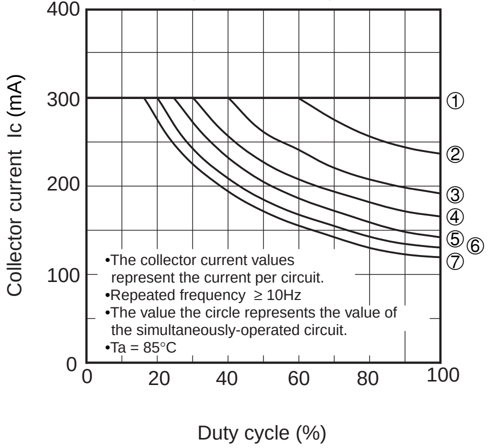


- The collector current values represent the current per circuit.
- Repeated frequency ≥ 10Hz
- The value the circle represents the value of the simultaneously-operated circuit.
- Ta = 85°C

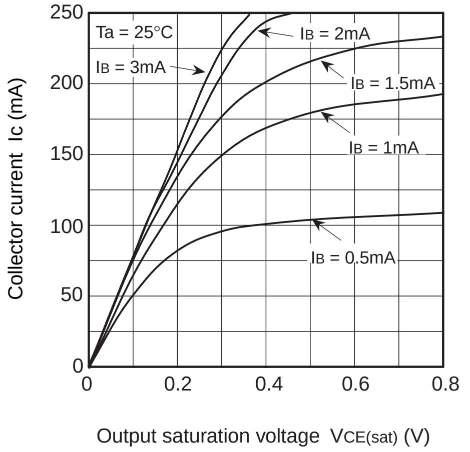
Duty Cycle-Collector Characteristics
(M63812GP/KP)



Duty Cycle-Collector Characteristics
(M63812GP/KP)



Output Saturation Voltage
Collector Current Characteristics



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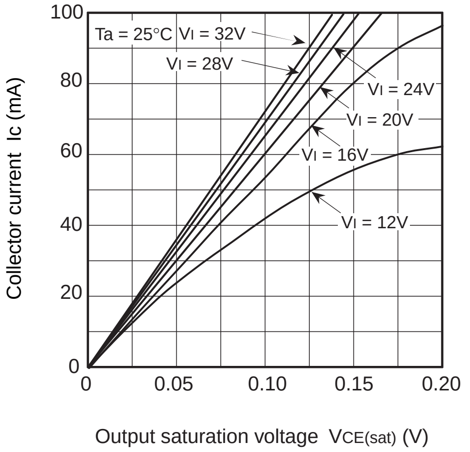
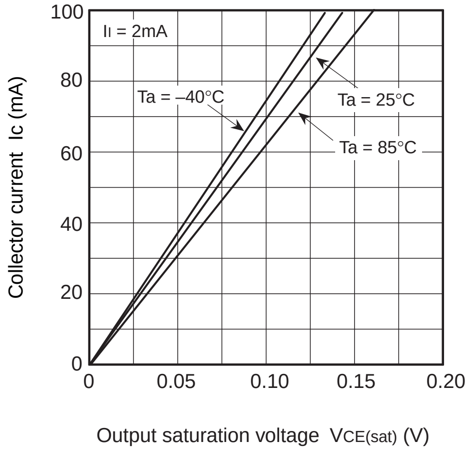
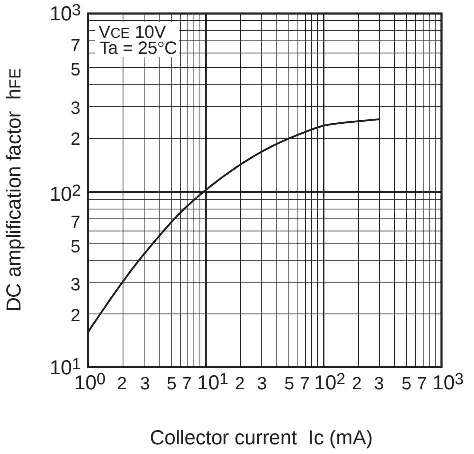
Collector Current Characteristics



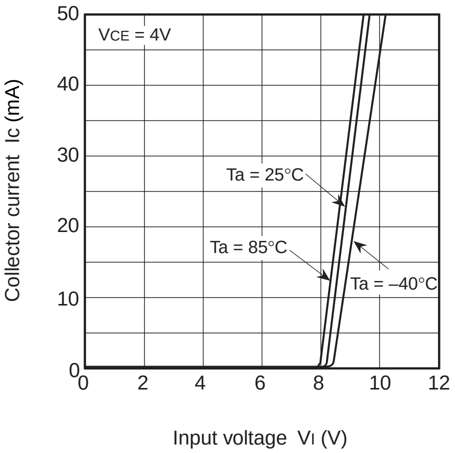
Output Saturation Voltage
Collector Current Characteristics



DC Amplification Factor
Collector Current Characteristics



Grounded Emitter Transfer Characteristics



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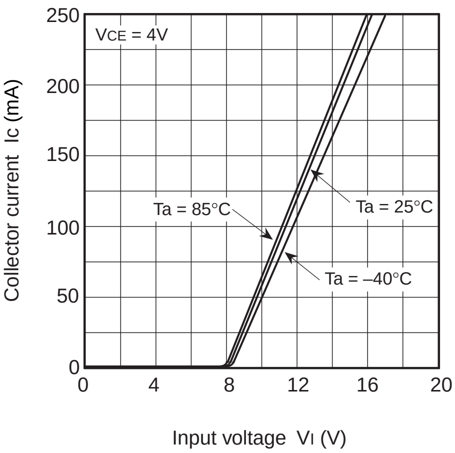

Clamping Diode Characteristics