

**M63812P/FP/GP/KP**

7-UNIT 300mA TRANSISTOR ARRAY WITH CLAMP DIODE

**DESCRIPTION**

M63812P, M63812FP, M63812GP and M63812KP are seven-circuit Single 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**

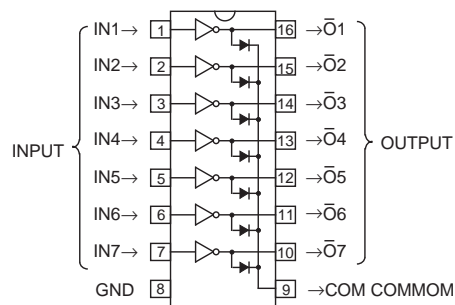
- Four package configurations (P, FP, GP and KP)
- Medium breakdown voltage ( $BV_{CEO} \geq 35V$ )
- Synchronizing current ( $I_{C(max)} = 300mA$ )
- With clamping diodes
- With zener diodes
- Low output saturation voltage
- Wide operating temperature range ( $T_a = -40$  to  $+85^\circ C$ )

**APPLICATION**

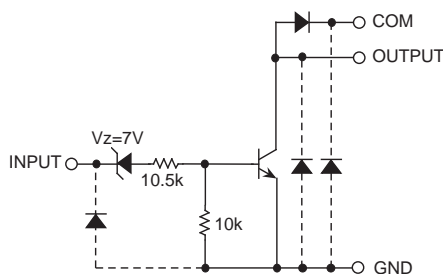
Driving of digit drives of indication elements (LEDs and lamps) with small signals

**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.

**PIN CONFIGURATION**

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

**CIRCUIT DIAGRAM**

The seven circuits share the COM and GND.

The diode, indicated with the dotted line, is parasitic, and cannot be used.

Unit:  $\Omega$

**ABSOLUTE MAXIMUM RATINGS** (Unless otherwise noted,  $T_a = -40 \sim +85^\circ C$ )

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	$T_a = 25^\circ C$ , when mounted on board	M63812P	1.47	W
			M63812FP	1.00	
			M63812GP	0.80	
			M63812KP	0.78	
$T_{opr}$	Operating temperature		-40 ~ +85	$^\circ C$	
$T_{stg}$	Storage temperature		-55 ~ +125	$^\circ C$	

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## 7-UNIT 300mA TRANSISTOR ARRAY WITH CLAMP DIODE

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

Symbol	Parameter	Test conditions	Limits			Unit	
			min	typ	max		
V <sub>o</sub>	Output voltage		0	—	35	V	
I <sub>c</sub>	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 <sub>IN</sub>	Input voltage		0	—	30	V	

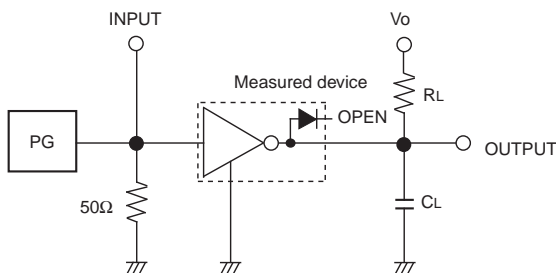
### ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
V <sub>(BR)CEO</sub>	Collector-emitter breakdown voltage	I <sub>CEO</sub> = 10μA	35	—	—	V
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	I <sub>IN</sub> = 1mA, I <sub>c</sub> = 10mA	—	—	0.2	V
		I <sub>IN</sub> = 2mA, I <sub>c</sub> = 150mA	—	—	0.8	
V <sub>IN(on)</sub>	"On" input voltage	I <sub>IN</sub> = 1mA, I <sub>c</sub> = 10mA	13	19	23	V
V <sub>R</sub>	Clamping diode forward voltage	I <sub>F</sub> = 250mA	—	1.2	2.0	V
I <sub>R</sub>	Clamping diode reverse current	V <sub>R</sub> = 35V	—	—	10	μA
h <sub>FE</sub>	DC amplification factor	V <sub>CE</sub> = 10V, I <sub>c</sub> = 10mA	50	—	—	—

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

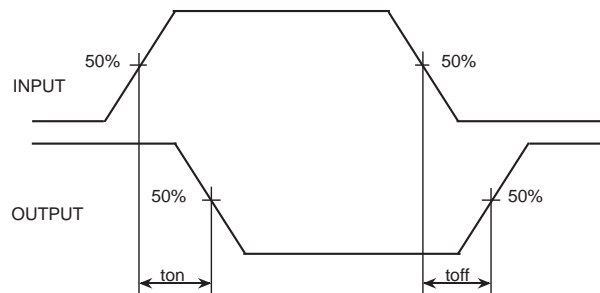
Symbol	Parameter	Test conditions	Limits			Unit
			min	typ	max	
t <sub>on</sub>	Turn-on time	C <sub>L</sub> = 15pF (note 1)	—	140	—	ns
t <sub>off</sub>	Turn-off time		—	240	—	ns

#### NOTE 1 TEST CIRCUIT



- (1) Pulse generator (PG) characteristics : PRR = 1kHz, t<sub>w</sub> = 10μs, t<sub>r</sub> = 6ns, t<sub>f</sub> = 6ns, Z<sub>o</sub> = 50Ω, V<sub>IH</sub> = 18V
- (2) Input-output conditions : R<sub>L</sub> = 220Ω, V<sub>o</sub> = 35V
- (3) Electrostatic capacity C<sub>L</sub> includes floating capacitance at connections and input capacitance at probes

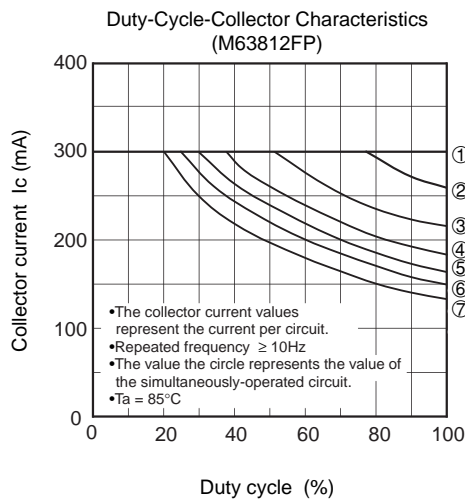
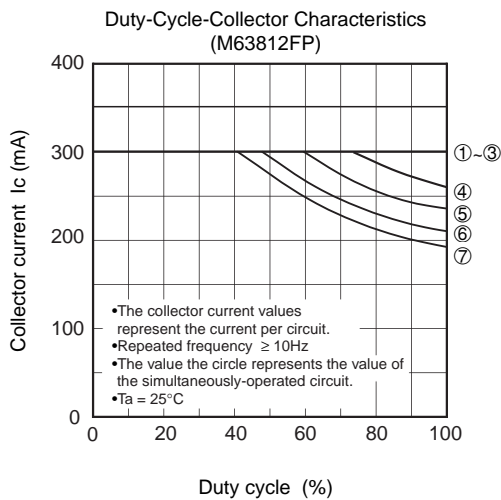
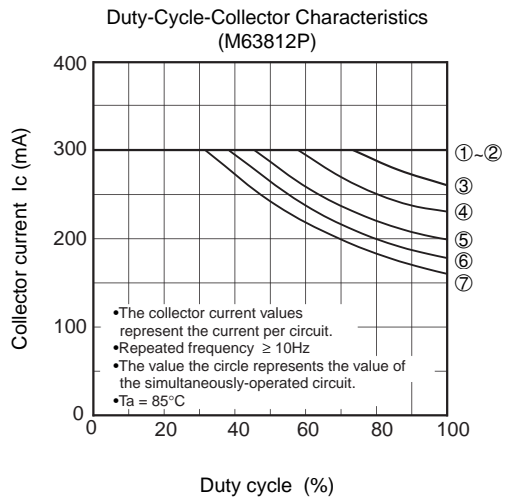
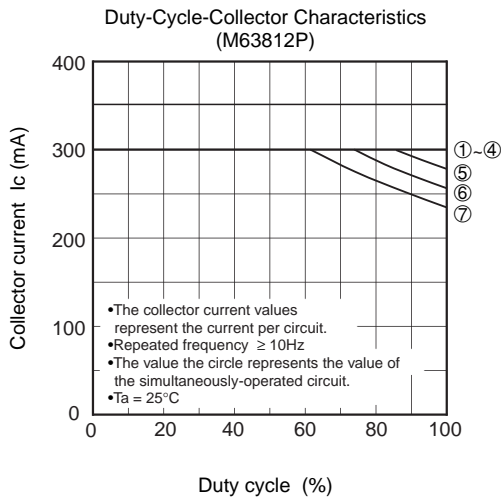
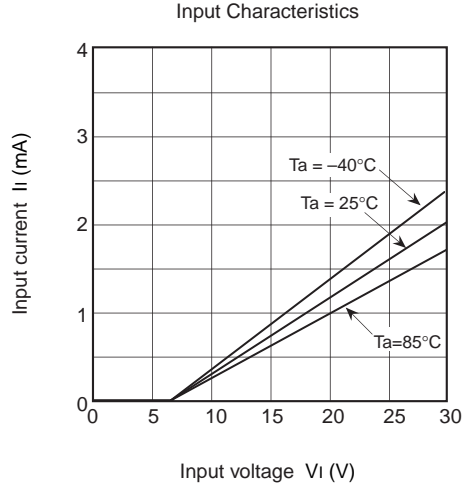
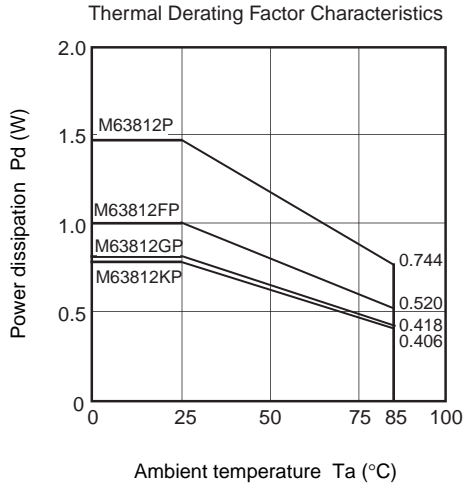
#### TIMING DIAGRAM



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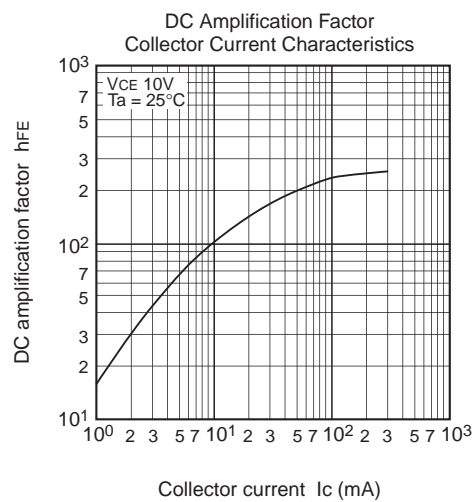
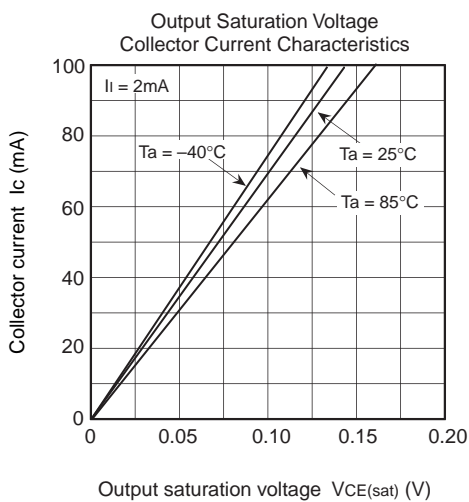
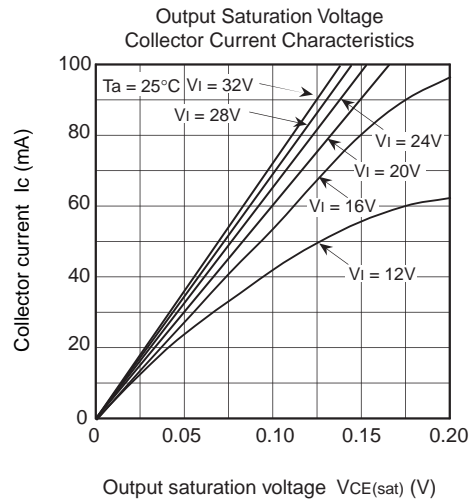
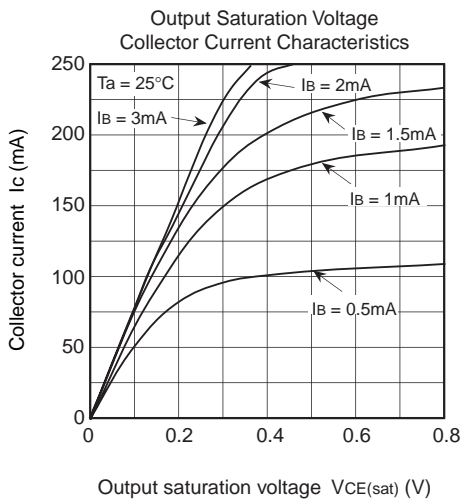
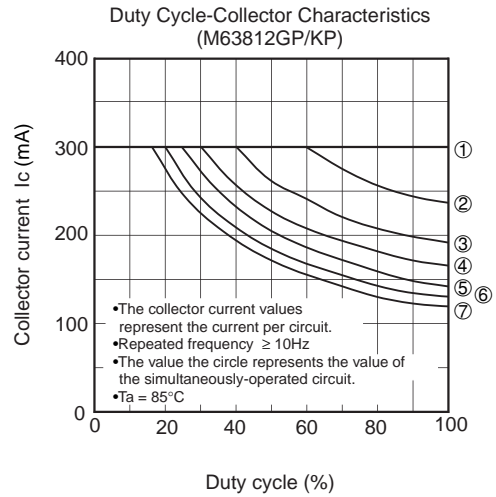
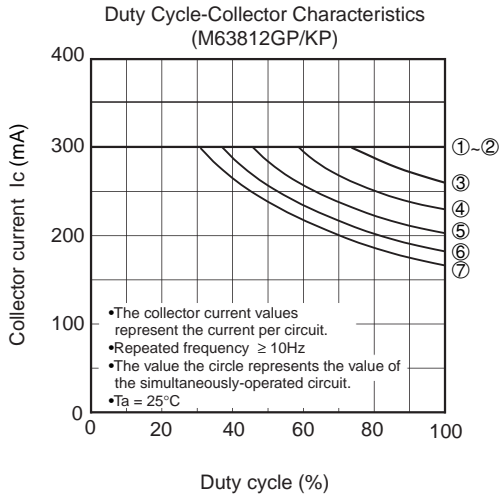
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## TYPICAL CHARACTERISTICS



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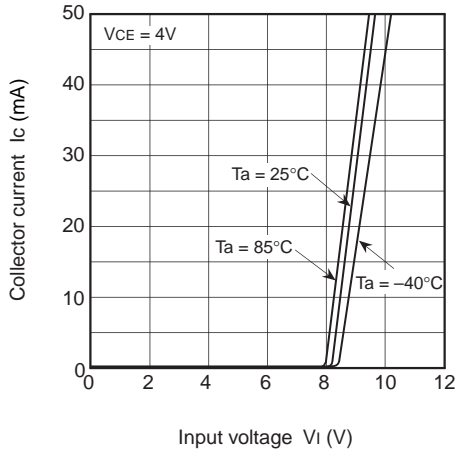
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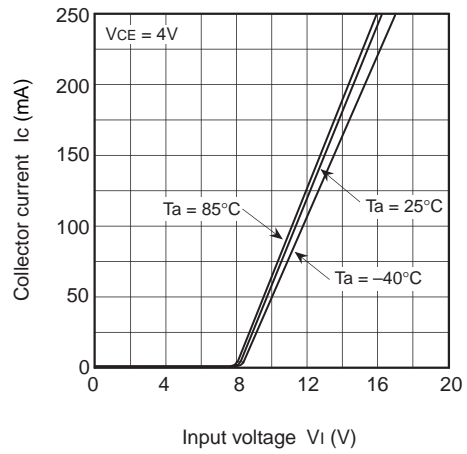
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Grounded Emitter Transfer Characteristics



Grounded Emitter Transfer Characteristics



Clamping Diode Characteristics

