

TOSHIBA Power Module

# MP7003

## 1. Maximum Ratings (Ta = 25°C)

### Diode

Characteristics	Symbol	Rating	Unit
Repetitive peak reverse voltage	$V_{RRM}$	600	V
Peak one cycle surge forward current (D1, D2, D3, D4) (50 Hz, non-repetitive)	$I_{FSM}$	220	A
Forward current	$I_F$	25	A
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-40~125	°C

### IGBT

Characteristics	Symbol	Rating	Unit	
Collector-emitter voltage	$V_{CES}$	600	V	
Gate-emitter voltage	$V_{GES}$	±20	V	
Collector current	DC	$I_C$	40	A
	1 ms	$I_{CP}$	80	A
Collector power dissipation (Tc = 25°C)	$P_C$	37	W	
Junction temperature	$T_j$	150	°C	
Storage temperature range	$T_{stg}$	-40~125	°C	

### All system

Characteristics	Symbol	Condition	Rating	Unit
Isolation voltage	$V_{ISO}$	AC 1 minute	2500	V

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## 2. Electrical Characteristics (Ta = 25°C)

### Diode

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage (1)	$V_{FM(1)}$	$I_F = 12.5 \text{ A}$	—	1.0	1.2	V
Peak forward voltage (2)	$V_{FM(2)}$	$I_F = 30 \text{ A}$	—	1.20	1.55	V
Repetitive peak reverse Current	$I_{RRM}$	$V_{RRM} = 600 \text{ V}$			10	$\mu\text{A}$
Peak reverse current (D1, D2, D3, D4)	$I_{rr}$	$I_F = 30 \text{ A}$			100	A
Thermal resistance	$R_{th(j-c)}$	—	—	—	3.5	$^{\circ}\text{C/W}$

### IGBT

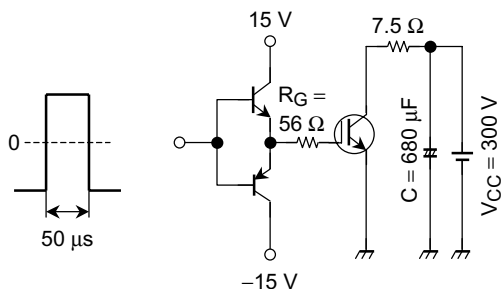
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GES}$	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	$\pm 500$	nA
Collector cut-off current	$I_{CES}$	$V_{CE} = 600 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage	$V_{GE(OFF)}$	$I_C = 40 \text{ mA}, V_{CE} = 5 \text{ V}$	3.0	—	6.0	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 40 \text{ A}, V_{GE} = 15 \text{ V}$	—	1.9	2.7	V
Input capacitance	$C_{ies}$	$V_{CE} = 10 \text{ V}, V_{GE} = 0,$ $f = 1 \text{ MHz}$	—	2900	—	pF
Switching time	Rise time	Load resistance $V_{CC} = 300 \text{ V}, I_C = 40 \text{ A}$ $V_{GE} = \pm 15 \text{ V}, (R_G = 56 \Omega)$ (Note)	—	0.4	—	$\mu\text{s}$
	Turn-on time		—	0.7	—	
	Fall time		—	0.3	0.42	
	Turn-off Time		—	0.7	—	
Thermal Resistance	$R_{th(j-c)}$		—	—	3.3	$^{\circ}\text{C/W}$

## 3. Mechanical Rating

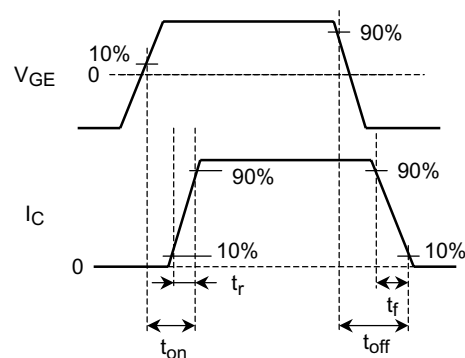
Characteristics	Min	Typ.	Max	Unit
Fastening torque	—	—	1.5	Nm

Note: Switching time test circuit & timing chart

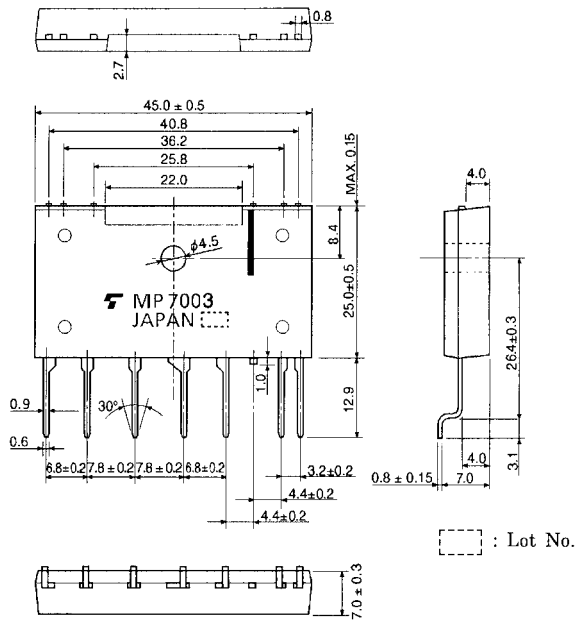
### Load Resistance Test Circuit



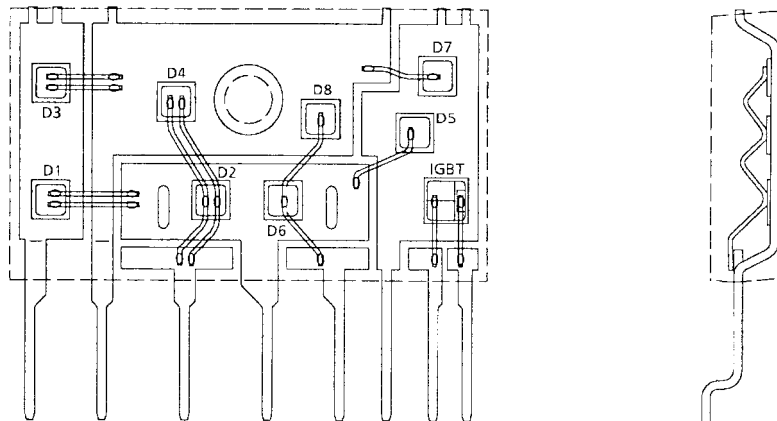
### Waveform



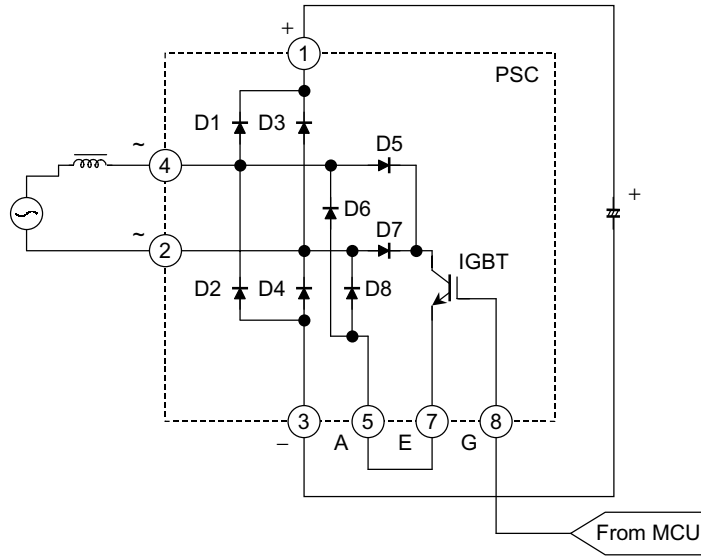
4. Package Dimension



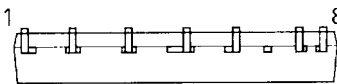
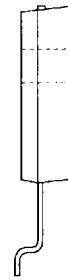
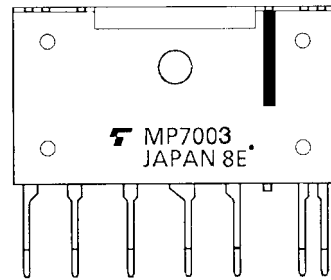
5. Image of Chips Mounting



**6. PSC Equivalent Circuit Diagram (including application circuit)**



**7. Pin Assignment**



- 1. + pin
- 2. ~ pin
- 3. - pin
- 4. ~ pin
- 5. A pin
- 6. C pin (TOSHIBA test pin)
- 7. E pin
- 8. G pin

