

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	μA
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

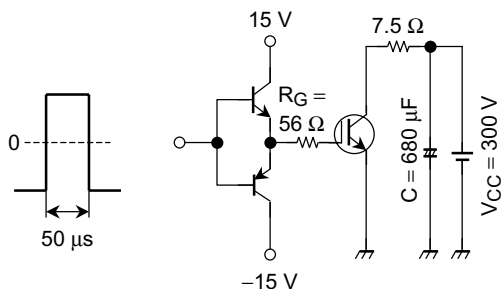
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GES}	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0$	—	—	± 500	nA
Collector cut-off current	I_{CES}	$V_{CE} = 600 \text{ V}, V_{GE} = 0$	—	—	1.0	mA
Gate-emitter cut-off voltage	$V_{GE(OFF)}$	$I_C = 40 \text{ mA}, V_{CE} = 5 \text{ V}$	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	—	μs
	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

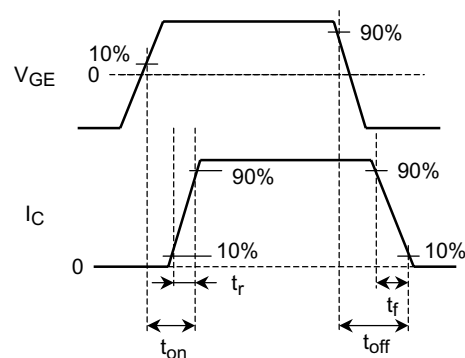
Characteristics	Min	Typ.	Max	Unit
Fastening torque	—	—	1.5	Nm

Note: Switching time test circuit & timing chart

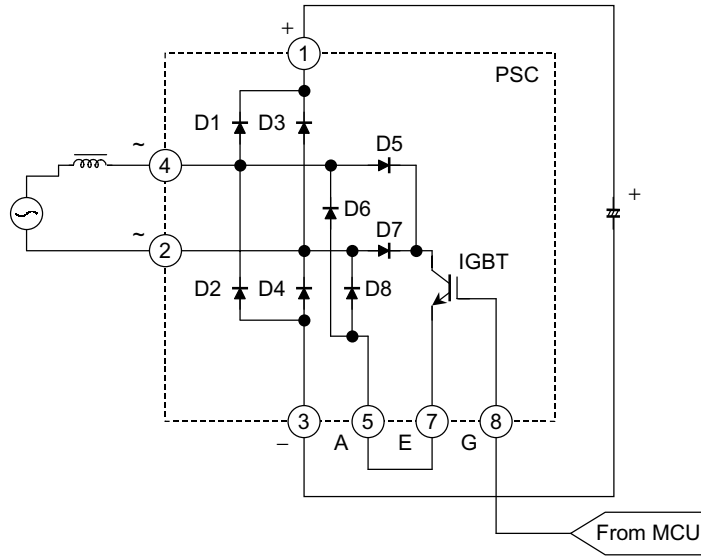
Load Resistance Test Circuit



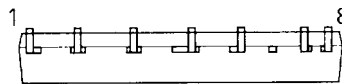
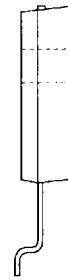
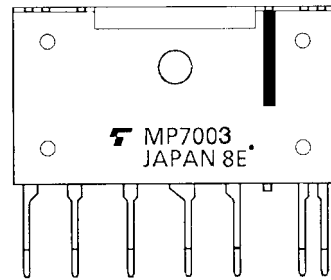
Waveform



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

