TOSHIBA GTR Module Silicon N Channel IGBT

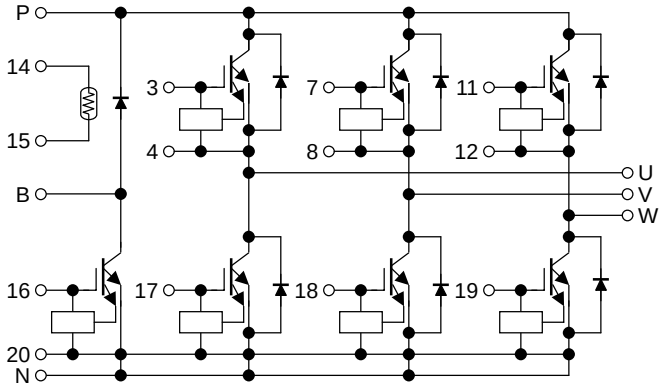
MG150J7KS60 (600V/150A 7in1)

High Power Switching Applications

Motor Control Applications

- Integrates inverter and brake power circuit into a single package
- The electrodes are isolated from case.
- Low thermal resistance
- $V_{CE\ (sat)}$ = 1.6 V (typ.)

Equivalent Circuit

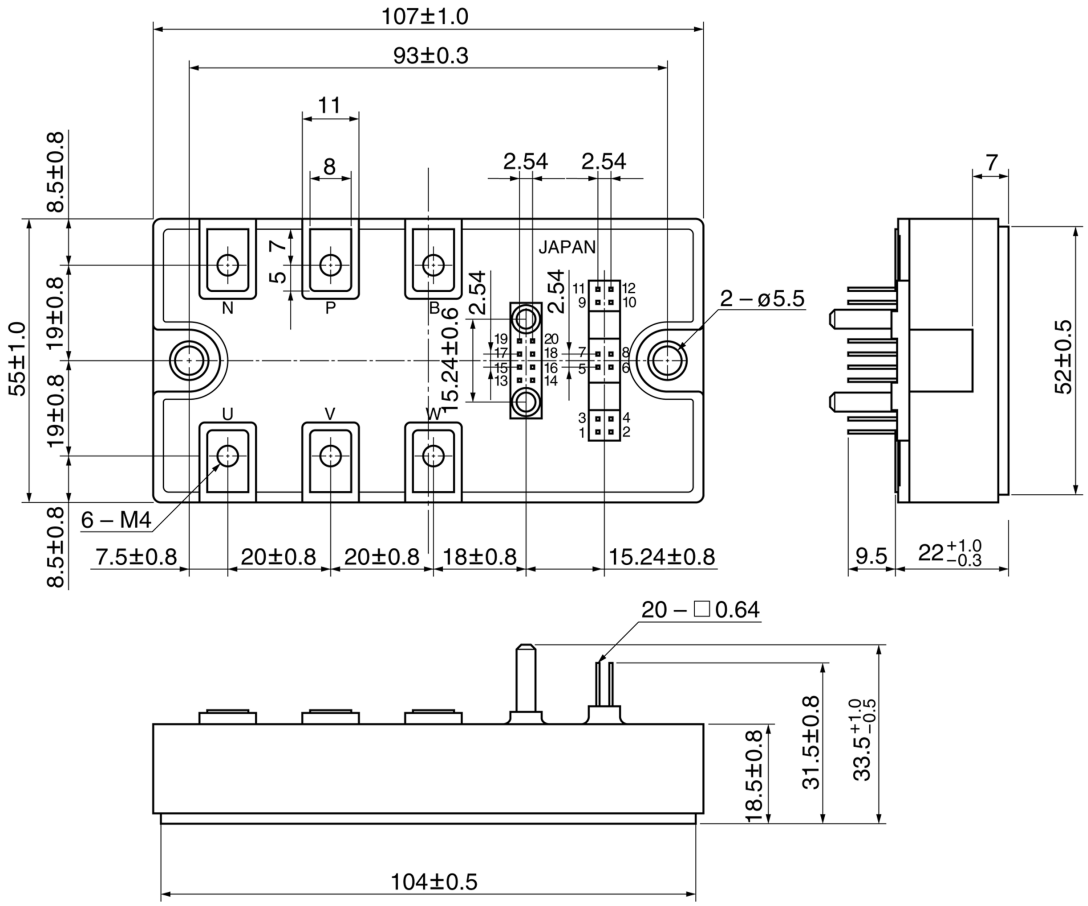


Signal Terminal

1.	Open	2.	Open	3.	G (U)	4.	E (U)
5.	Open	6.	Open	7.	G (V)	8.	E (V)
9.	Open	10.	Open	11.	G (W)	12.	E (W)
13.	Open	14.	TH1	15.	TH2	16.	G (B)
17.	G (X)	18.	G (Y)	19.	G (Z)	20.	E (L)

Package Dimensions: 2-108G1B

Unit: mm



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Maximum Ratings (Ta = 25°C)

Stage	Characteristics		Symbol	Rating	Unit
Inverter	Collector-emitter voltage		V_{CES}	600	V
	Gate-emitter voltage		V_{GES}	±20	V
	Collector current	DC	I_C	150	A
		1 ms	I_{CP}	300	
	Forward current	DC	I_F	150	A
		1 ms	I_{FM}	300	
	Collector power dissipation (Tc = 25°C)		P_C	750	W
Brake	Collector-emitter voltage		V_{CES}	600	V
	Gate-emitter voltage		V_{GES}	±20	V
	Collector current	DC	I_C	75	A
		1 ms	I_{CP}	150	
	Collector power dissipation (Tc = 25°C)		P_C	375	W
	Reverse voltage		V_R	600	V
	Forward current	DC	I_F	75	A
		1 ms	I_{FM}	150	
Module	Junction temperature		T_j	150	°C
	Storage temperature range		T_{stg}	−40~125	°C
	Isolation voltage		V_{isol}	2500 (AC 1 min)	V
	Screw torque	Terminal	—	2 (M4)	N·m
		Mounting	—	3 (M5)	

Electrical Characteristics (T_j = 25°C)

1. Inverter stage

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20 V, V_{CE} = 0		—	—	±500	nA
Collector cut-off current		I_{CES}	V_{CE} = 600 V, V_{GE} = 0		—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	V_{CE} = 5 V, I_C = 150 mA		5.0	6.5	8.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	V_{GE} = 15 V, I_C = 150 A	T_j = 25°C	—	1.6	2.2	V
				T_j = 125°C	—	—	2.2	
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1 MHz		—	25000	—	pF
Switching time	Turn-on delay time	$t_{d\ (on)}$	V_{CC} = 300 V, I_C = 150 A V_{GE} = ±15 V, R_G = 15 Ω (Note 1)		—	—	1.00	μs
	Turn-off time	t_{off}			—	—	1.20	
	Fall time	t_f			—	—	0.50	
Reverse recovery time		t_{rr}			—	—	0.30	
Forward voltage		V_F	I_F = 150 A		—	2.0	2.2	V

Note 1: Switching time test circuit & timing chart

2. Brake stage

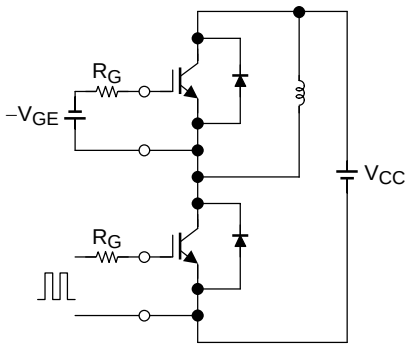
Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Gate leakage current		I_{GES}	V_{GE} = ±20 V, V_{CE} = 0		—	—	±500	nA
Collector cut-off current		I_{CES}	V_{CE} = 600 V, V_{GE} = 0		—	—	1.0	mA
Gate-emitter cut-off voltage		$V_{GE\ (off)}$	V_{CE} = 5 V, I_C = 75 mA		5.0	6.5	8.0	V
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	V_{GE} = 15 V, I_C = 75 A	T_j = 25°C	—	1.6	2.2	V
				T_j = 125°C	—	—	2.2	
Input capacitance		C_{ies}	V_{CE} = 10 V, V_{GE} = 0, f = 1MHz		—	12000	—	pF
Switching time	Turn-on delay time	$t_{d\ (on)}$	V_{CC} = 300 V, I_C = 75 A V_{GE} = ±15 V, R_G = 24 Ω (Note 1)		—	—	1.00	μs
	Turn-off time	t_{off}			—	—	1.20	
	Fall time	t_f			—	—	0.50	
Reverse current		I_R	V_R = 600 V		—	—	1.0	mA
Forward voltage		V_F	I_F = 75 A		—	2.1	2.6	V

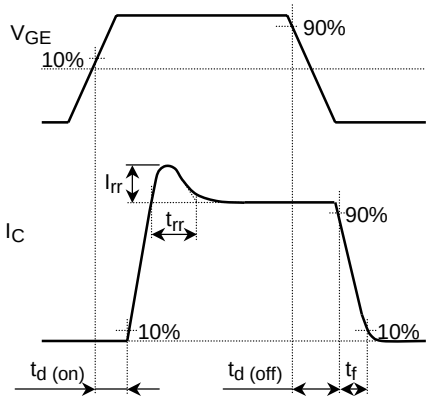
Note 1: Switching time test circuit & timing chart

3. Module (Tc = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Zero-power resistance	R25	ITM = 0.2 mA	—	100	—	kΩ
B value	B25/85	Tc = 25°C/Tc = 85°C	—	4390	—	K
Junction to case thermal resistance	$R_{th\ (j-c)}$	Inverter IGBT stage	—	—	0.167	°C/W
		Inverter FRD stage	—	—	0.313	
		Brake IGBT stage	—	—	0.333	
		Brake FRD stage	—	—	1.000	
Case to fin thermal resistance	$R_{th\ (c-f)}$	—	—	0.05	—	°C/W

Switching Time Test Circuit & Timing Chart





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