

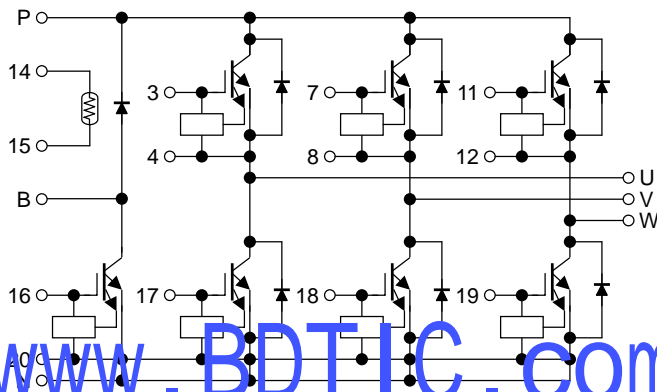
## MG150J7KS61 (600V/150A 7in1)

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
- $V_{CE(sat)} = 1.8\text{ V (typ.)}$

### Equivalent Circuit

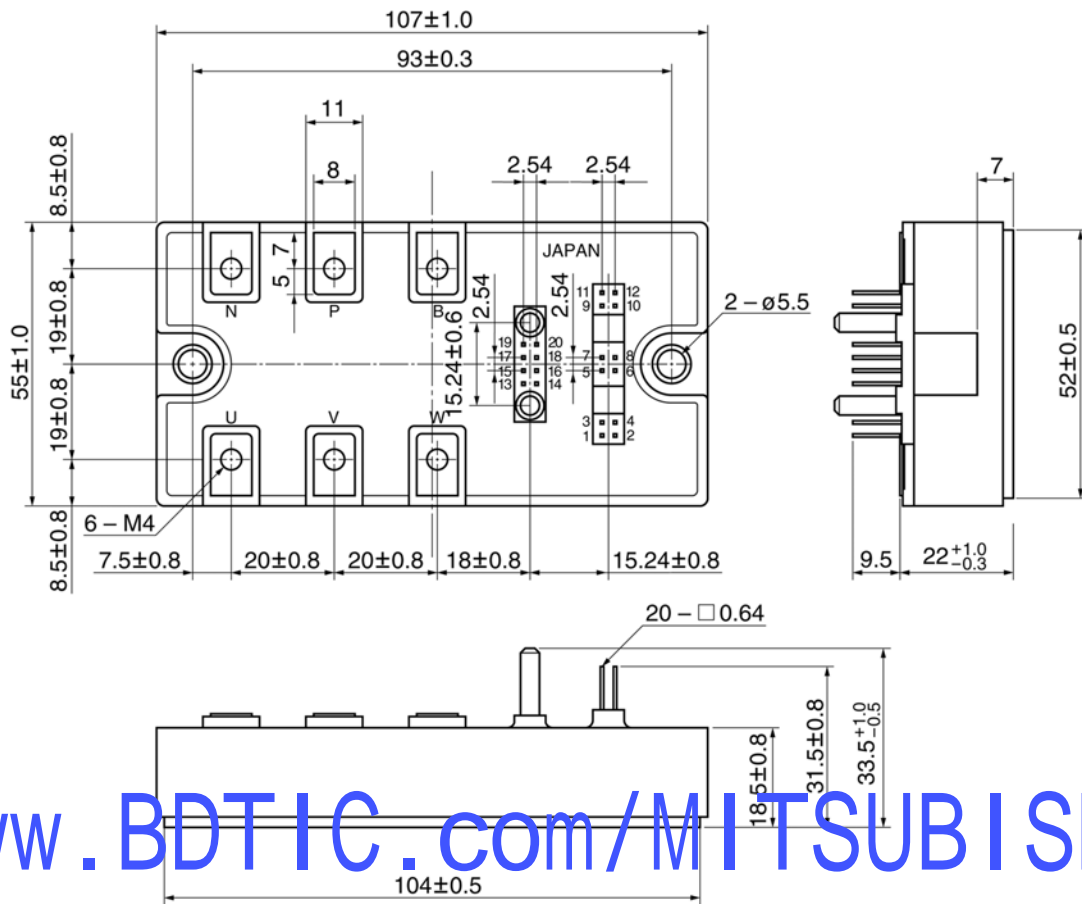


### Signal Terminal

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:

Unit: mm



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17. G (X)	18. G (Y)	19. G (Z)	20. E (L)

## Maximum Ratings (Ta = 25°C)

Stage	Characteristics	Symbol	Rating	Unit	
Inverter	Collector-emitter voltage	V <sub>CEs</sub>	600	V	
	Gate-emitter voltage	V <sub>GEs</sub>	±20	V	
	Collector current	DC	I <sub>C</sub>	150	A
		1 ms	I <sub>CP</sub>	300	
	Forward current	DC	I <sub>F</sub>	150	A
		1 ms	I <sub>FM</sub>	300	
Collector power dissipation (Tc = 25°C)		P <sub>C</sub>	750	W	
Brake	Collector-emitter voltage	V <sub>CEs</sub>	600	V	
	Gate-emitter voltage	V <sub>GEs</sub>	±20	V	
	Collector current	DC	I <sub>C</sub>	75	A
		1 ms	I <sub>CP</sub>	150	
	Collector power dissipation (Tc = 25°C)		P <sub>C</sub>	375	W
	Reverse voltage		V <sub>R</sub>	600	V
	Forward current	DC	I <sub>F</sub>	75	A
		1 ms	I <sub>FM</sub>	150	
Module	Junction temperature		T <sub>j</sub>	150	°C
	Storage temperature range		T <sub>stg</sub>	-40~125	°C
	Isolation voltage		V <sub>isol</sub>	2500 (AC 1 min)	V
	Screw torque	Terminal	—	2 (M4)	N·m
		Mounting	—	3 (M5)	

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## Electrical Characteristics (Tj = 25°C)

### 1. Inverter stage

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I <sub>GES</sub>	V <sub>GE</sub> = ±20 V, V <sub>CE</sub> = 0	—	—	±500	nA	
Collector cut-off current	I <sub>CES</sub>	V <sub>CE</sub> = 600 V, V <sub>GE</sub> = 0	—	—	1.0	mA	
Gate-emitter cut-off voltage	V <sub>GE (off)</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 150 mA	5.0	6.5	8.0	V	
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	V <sub>GE</sub> = 15 V, I <sub>C</sub> = 150 A	T <sub>j</sub> = 25°C	—	1.8	2.3	V
			T <sub>j</sub> = 125°C	—	—	2.5	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0, f = 1 MHz	—	30000	—	pF	
Switching time	Turn-on delay time	t <sub>d (on)</sub>	V <sub>CC</sub> = 300 V, I <sub>C</sub> = 150 A V <sub>GE</sub> = ±15 V, R <sub>G</sub> = 15 Ω (Note 1)	—	—	1.00	μs
	Turn-off time	t <sub>off</sub>		—	—	1.20	
	Fall time	t <sub>f</sub>		—	—	0.50	
Reverse recovery time	t <sub>rr</sub>		—	—	0.30		
Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 150 A	—	2.4	2.8	V	

Note 1: Switching time test circuit & timing chart

## 2. Brake stage

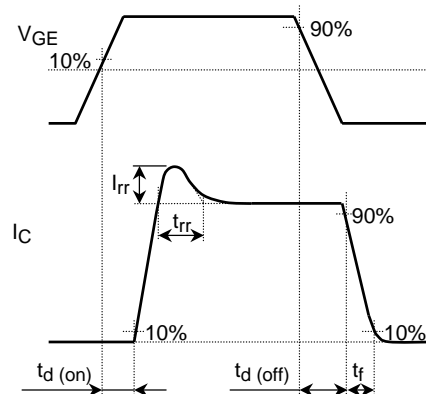
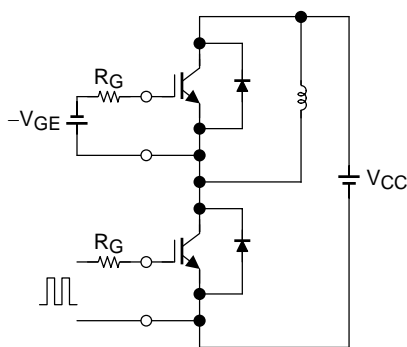
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GES}$	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0$	—	—	$\pm 500$	nA	
Collector cut-off current	$I_{CES}$	$V_{CE} = 600\text{ V}, V_{GE} = 0$	—	—	1.0	mA	
Gate-emitter cut-off voltage	$V_{GE (off)}$	$V_{CE} = 5\text{ V}, I_C = 75\text{ mA}$	5.0	6.5	8.0	V	
Collector-emitter saturation voltage	$V_{CE (sat)}$	$V_{GE} = 15\text{ V}, I_C = 75\text{ A}$	$T_j = 25^\circ\text{C}$	—	1.8	2.2	V
			$T_j = 125^\circ\text{C}$	—	—	2.2	
Input capacitance	$C_{ies}$	$V_{CE} = 10\text{ V}, V_{GE} = 0, f = 1\text{ MHz}$	—	15000	—	pF	
Switching time	Turn-on delay time	$V_{CC} = 300\text{ V}, I_C = 75\text{ A}$ $V_{GE} = \pm 15\text{ V}, R_G = 24\ \Omega$ (Note 1)	—	—	1.00	$\mu\text{s}$	
	Turn-off time		—	—	1.20		
	Fall time		—	—	0.50		
Reverse current	$I_R$	$V_R = 600\text{ V}$	—	—	1.0	mA	
Forward voltage	$V_F$	$I_F = 75\text{ A}$	—	2.1	2.6	V	

Note 1: Switching time test circuit & timing chart

## 3. Module ( $T_c = 25^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Zero-power resistance	R25	ITM = 0.2 mA	—	100	—	k $\Omega$
B value	B25/85	$T_c = 25^\circ\text{C}/T_c = 85^\circ\text{C}$	—	4390	—	K
Junction to case thermal resistance	$R_{th (j-c)}$	Inverter IGBT stage	—	—	0.167	$^\circ\text{C/W}$
		Inverter FRD stage	—	—	0.313	
		Brake IGBT stage	—	—	0.333	
		Brake FRD stage	—	—	1.000	
Case to fin thermal resistance	$R_{th (c-f)}$	—	—	0.017	—	$^\circ\text{C/W}$

## Switching Time Test Circuit & Timing Chart



## Recommended conditions for application

Characteristics	Symbol	Min	Typ.	Max	Unit
P-N power terminal supply voltage	$V_{CC}$	—	300	400	V
Gate voltage	$V_{GE}$	13.5	15	16.5	V
Switching frequency	$f_c$	—	—	20	kHz