

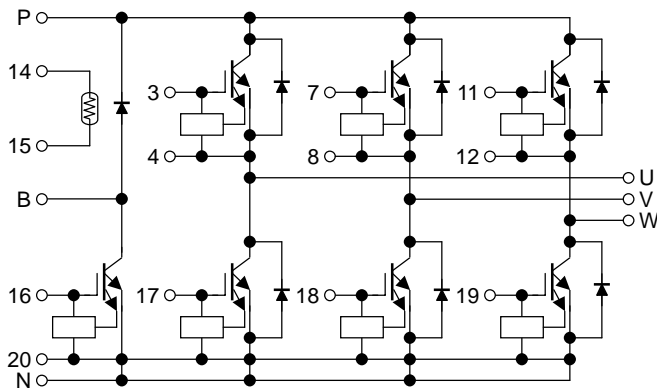
MG150J7KS60 (600V/150A 7in1)

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
- $V_{CE(sat)} = 1.6\text{ V (typ.)}$

Equivalent Circuit

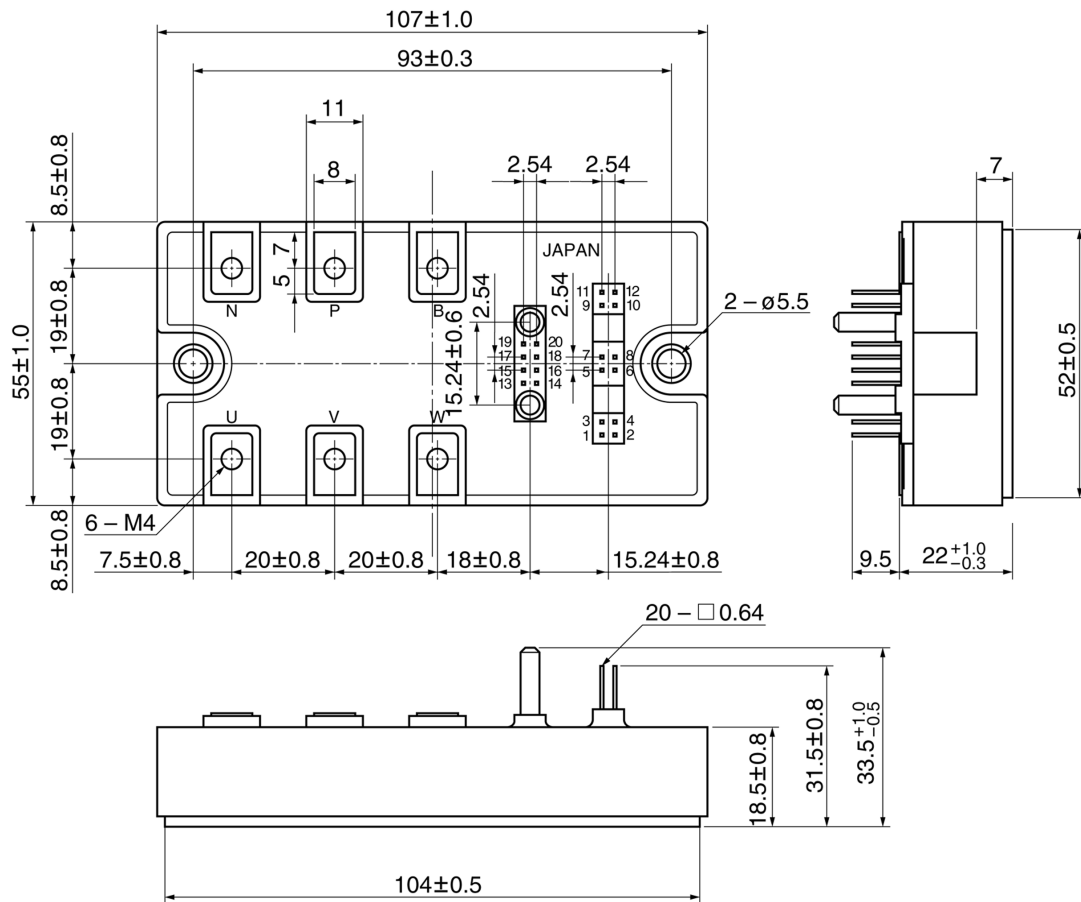


Signal Terminal

| | | | |
|-----------|-----------|-----------|-----------|
| 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: 2-108G1B

Unit: mm



| | | | |
|-----------|-----------|-----------|-----------|
| 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) |

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 (Tj = 25°C)

1. Inverter stage

| 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 | $V_{GE (off)}$ | $V_{CE} = 5 \text{ V}, I_C = 150 \text{ mA}$ | 5.0 | 6.5 | 8.0 | V | |
| Collector-emitter saturation voltage | $V_{CE (sat)}$ | $V_{GE} = 15 \text{ V}, I_C = 150 \text{ A}$ | $T_j = 25^\circ\text{C}$ | — | 1.6 | 2.2 | V |
| | | | $T_j = 125^\circ\text{C}$ | — | — | 2.2 | |
| Input capacitance | C_{ies} | $V_{CE} = 10 \text{ V}, V_{GE} = 0, f = 1 \text{ MHz}$ | — | 25000 | — | pF | |
| Switching time | Turn-on delay time | $t_{d (on)}$ | — | — | 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 | $I_F = 150 \text{ A}$ | — | 2.0 | 2.2 | V | |

Note 1: Switching time test circuit & timing chart

2. Brake stage

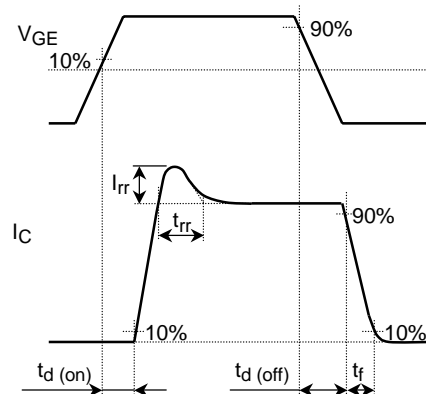
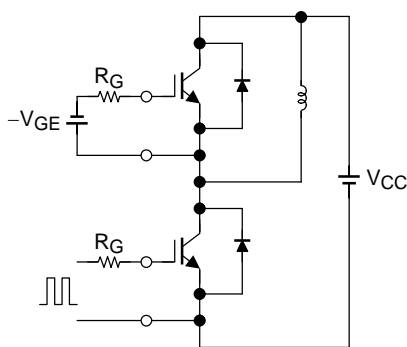
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit | |
|--------------------------------------|--------------------|--|---------------------------|-------|-----------|---------------|---|
| Gate leakage current | I_{GES} | $V_{GE} = \pm 20\text{ V}, V_{CE} = 0$ | — | — | ± 500 | nA | |
| Collector cut-off current | I_{CES} | $V_{CE} = 600\text{ V}, V_{GE} = 0$ | — | — | 1.0 | mA | |
| Gate-emitter cut-off voltage | $V_{GE (off)}$ | $V_{CE} = 5\text{ V}, I_C = 75\text{ mA}$ | 5.0 | 6.5 | 8.0 | V | |
| Collector-emitter saturation voltage | $V_{CE (sat)}$ | $V_{GE} = 15\text{ V}, I_C = 75\text{ A}$ | $T_j = 25^\circ\text{C}$ | — | 1.6 | 2.2 | V |
| | | | $T_j = 125^\circ\text{C}$ | — | — | 2.2 | |
| Input capacitance | C_{ies} | $V_{CE} = 10\text{ V}, V_{GE} = 0, f = 1\text{ MHz}$ | — | 12000 | — | 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 | μs | |
| | 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 Ω |
| 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 | $R_{th (c-f)}$ | — | — | 0.05 | — | $^\circ\text{C/W}$ |

Switching Time Test Circuit & Timing Chart



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