

TOSHIBA INTELLIGENT GTR MODULE SILICON N CHANNEL IGBT

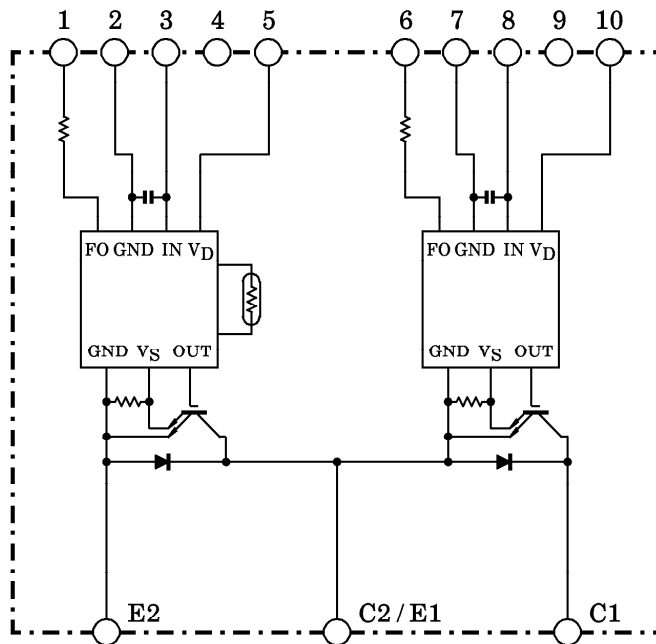
MIG200Q101H

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter Power Circuits & Control Circuits (IGBT drive units, Protection units for Over-Current, Under-Voltage & Over-Temperature) in One Package.
- The Electrodes are Isolated from Case.
- High Speed Type IGBT : $V_{CE(sat)}=3.5V$ (Max.)
 $t_{off}=3.8\mu s$ (Max.)
 $t_{rr}=0.24\mu s$ (Max.)
- Outline : TOSHIBA 2-121A1A
- Weight : 510g

EQUIVALENT CIRCUIT



- | | | | | |
|-----------|------------|-----------|---------|---------------|
| 1. FO (L) | 2. GND (L) | 3. IN (L) | 4. Open | 5. V_D (L) |
| 6. FO (H) | 7. GND (H) | 8. IN (H) | 9. Open | 10. V_D (H) |

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MAXIMUM RATINGS ($T_j = 25^\circ\text{C}$)

| STAGE | CHARACTERISTIC | CONDITION | SYMBOL | RATINGS | UNIT |
|----------|-----------------------------|-------------------------------|-----------|----------|------------------|
| Inverter | Supply Voltage | P-N power terminal | V_{CC} | 900 | V |
| | Collector-Emitter Voltage | — | V_{CES} | 1200 | V |
| | Collector Current | $T_c = 25^\circ\text{C}$, DC | I_C | 200 | A |
| | Forward Current | $T_c = 25^\circ\text{C}$, DC | I_F | 200 | A |
| | Collector Power Dissipation | $T_c = 25^\circ\text{C}$ | P_C | 1600 | W |
| | Junction Temperature | — | T_j | 150 | $^\circ\text{C}$ |
| Control | Control Supply Voltage | V_D -GND terminal | V_D | 20 | V |
| | Input Voltage | IN-GND terminal | V_{IN} | 20 | V |
| | Fault Output Voltage | FO-GND (L) terminal | V_{FO} | 20 | V |
| | Fault Output Current | FO sink current | I_{FO} | 14 | mA |
| Module | Operating Temperature | — | TC | -20~+100 | $^\circ\text{C}$ |
| | Storage Temperature Range | — | T_{stg} | -40~+125 | $^\circ\text{C}$ |
| | Isolation Voltage | AC 1 minute | V_{ISO} | 2500 | V |
| | Screw Torque | M6 | — | 3 | Nm |

ELECTRICAL CHARACTERISTICS ($T_j = 25^\circ\text{C}$)

a. Inverter stage

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | |
|--------------------------------------|----------------------|---|---------------------------|------|------|---------------|----|
| Collector Cut-Off Current | I_{CEX} | $V_{CEX} = 1200\text{V}$ | $T_j = 25^\circ\text{C}$ | — | — | 2 | mA |
| | | | $T_j = 125^\circ\text{C}$ | — | — | 40 | |
| Collector-Emitter Saturation Voltage | $V_{CE}(\text{sat})$ | $V_D = 15\text{V}$, $I_C = 200\text{A}$ $V_{IN} = 3\text{V} \rightarrow 0\text{V}$ | $T_j = 25^\circ\text{C}$ | — | 2.7 | 3.5 | V |
| | | | $T_j = 125^\circ\text{C}$ | — | 2.6 | — | |
| Forward Voltage | V_F | $I_F = 200\text{A}$ | — | 2.0 | 2.7 | V | |
| Switching Time | t_{on} | $V_{CC} = 600\text{V}$, $I_C = 200\text{A}$ $V_D = 15\text{V}$, $V_{IN} = 3\text{V} \leftrightarrow 0\text{V}$ Inductive load (Note 1) | 0.8 | 1.5 | 2.2 | μs | |
| | $t_c(\text{on})$ | | — | 0.5 | 1.0 | | |
| | t_{rr} | | — | 0.16 | 0.24 | | |
| | t_{off} | | — | 3.3 | 3.8 | | |
| | $t_c(\text{off})$ | | — | 0.4 | 0.8 | | |

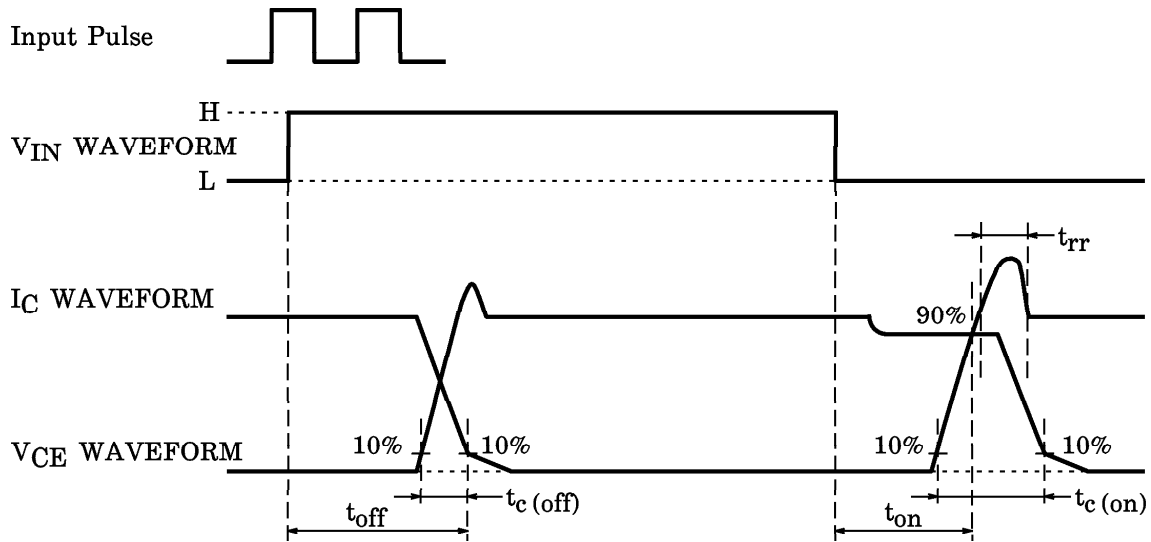
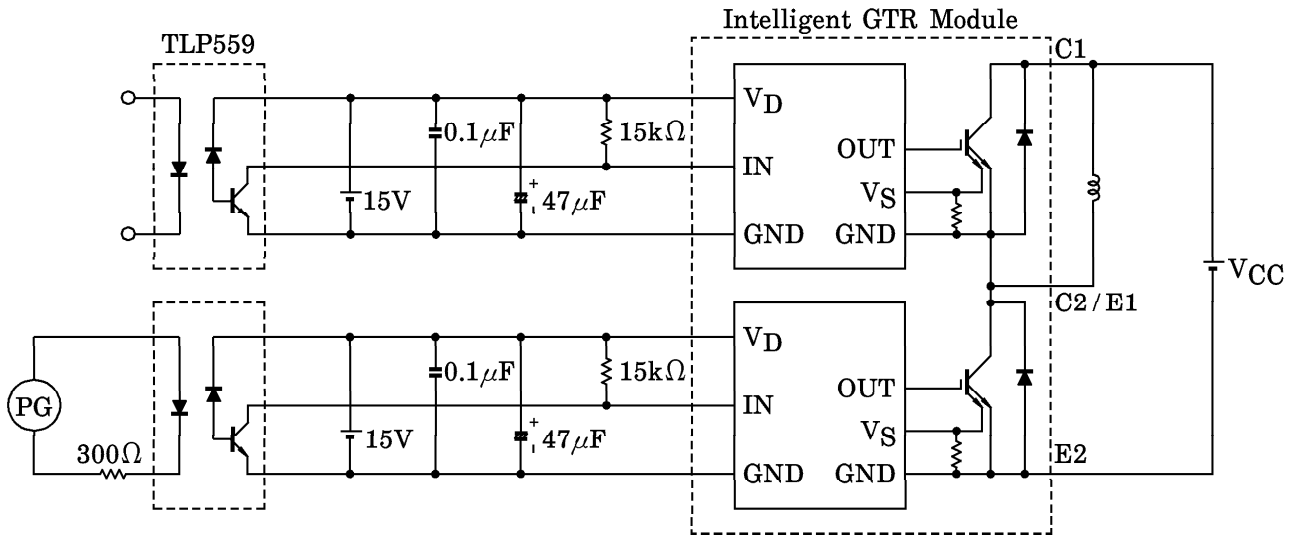
b. Control stage ($T_j = 25^\circ\text{C}$)

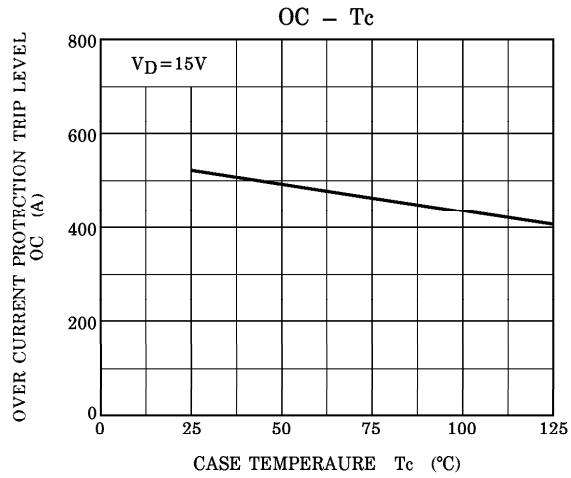
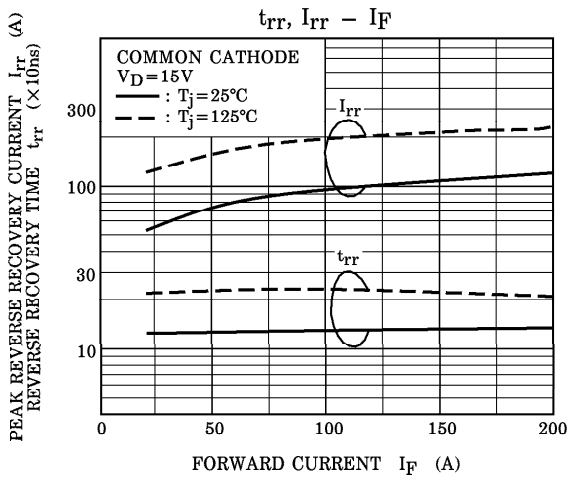
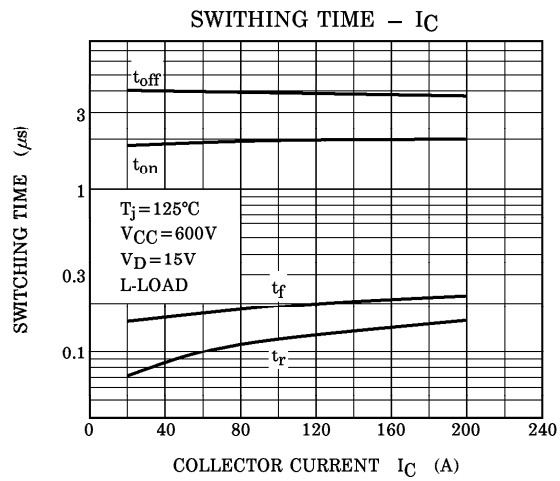
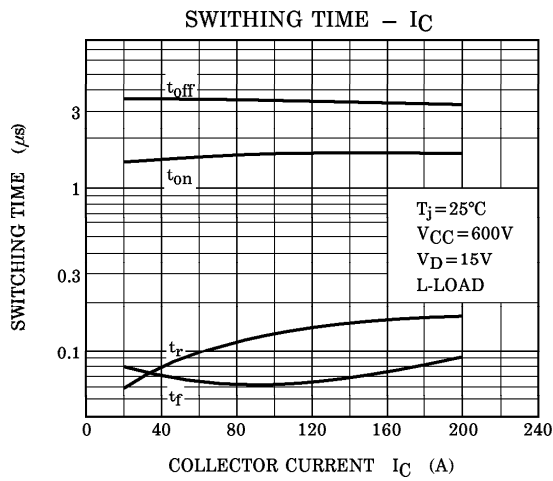
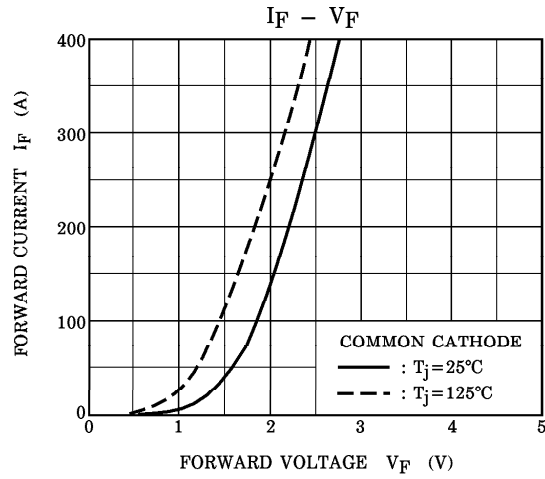
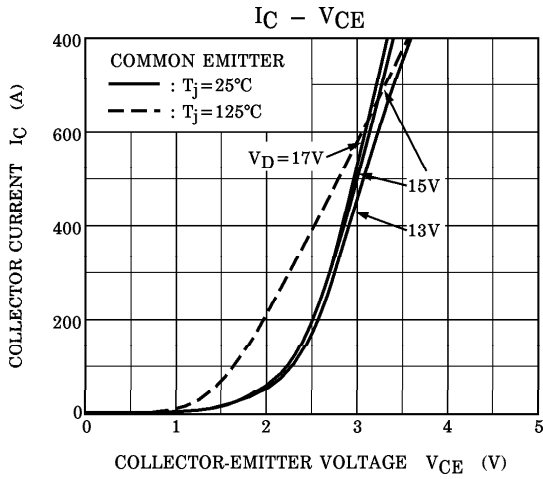
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|-------------|----------------|---|------|------|------|------------------|
| Control Circuit Current | | I_D | $V_D = 15\text{V}$ | — | 20 | 30 | mA |
| Input On Signal Voltage | | $V_{IN (on)}$ | $V_D = 15\text{V}, I_C = 200\text{mA}$ | 0.9 | 1.1 | 1.3 | V |
| Fault Output Current | Protection | $I_{FO (on)}$ | $V_D = 15\text{V}$ | 8 | 10 | 12 | mA |
| | Normal | $I_{FO (off)}$ | | — | — | 1 | |
| Over Current Protection Trip Level | | OC | $V_D = 15\text{V}, T_j = 125^\circ\text{C}$ | 280 | 400 | — | A |
| Short Circuit Protection Trip Level | | SC | $V_D = 15\text{V}, T_j = 125^\circ\text{C}$ | 420 | 600 | — | A |
| Over Current Cut-Off Time | | $t_{off (OC)}$ | $V_D = 15\text{V}$ | — | 10 | — | μs |
| Over Temperature Protection | Trip Level | OT | Case temperature | 111 | 118 | 125 | $^\circ\text{C}$ |
| | Reset Level | OTr | | 93 | 100 | 107 | |
| Control Supply Under Voltage Protection | Trip Level | UV | — | 11.3 | 12.0 | 12.7 | V |
| | Reset Level | UVr | | 11.8 | 12.5 | 13.2 | |
| Fault Output Pulse Width | | t_{FO} | $V_D = 15\text{V}$ | 1 | 2 | 3 | ms |

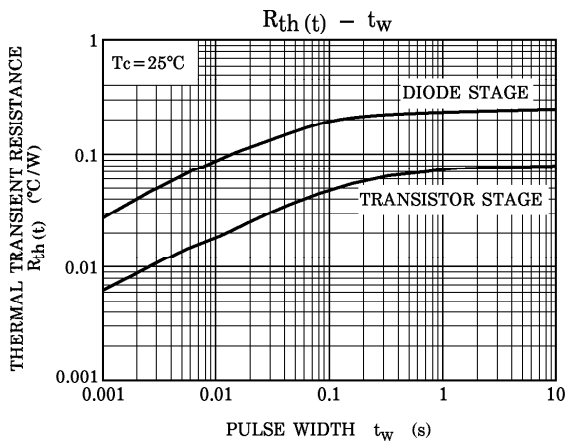
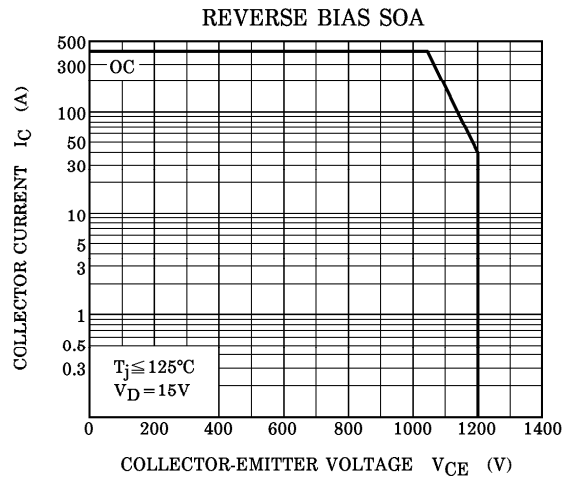
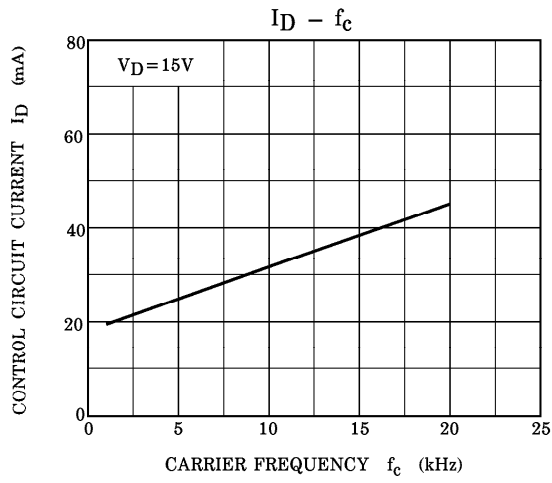
c. Thermal resistance ($T_j = 25^\circ\text{C}$)

| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------------|----------------|---------------------|------|------|-------|-----------------------------|
| Junction to Case Thermal Resistance | $R_{th (j-c)}$ | IGBT | — | — | — | 0.078 | $^\circ\text{C} / \text{W}$ |
| | | FRD | | — | — | 0.25 | |
| Case to Fin Thermal Resistance | | $R_{th (c-f)}$ | Compound is applied | — | 0.03 | — | $^\circ\text{C} / \text{W}$ |

Note 1 : Switching time test circuit & timing chart

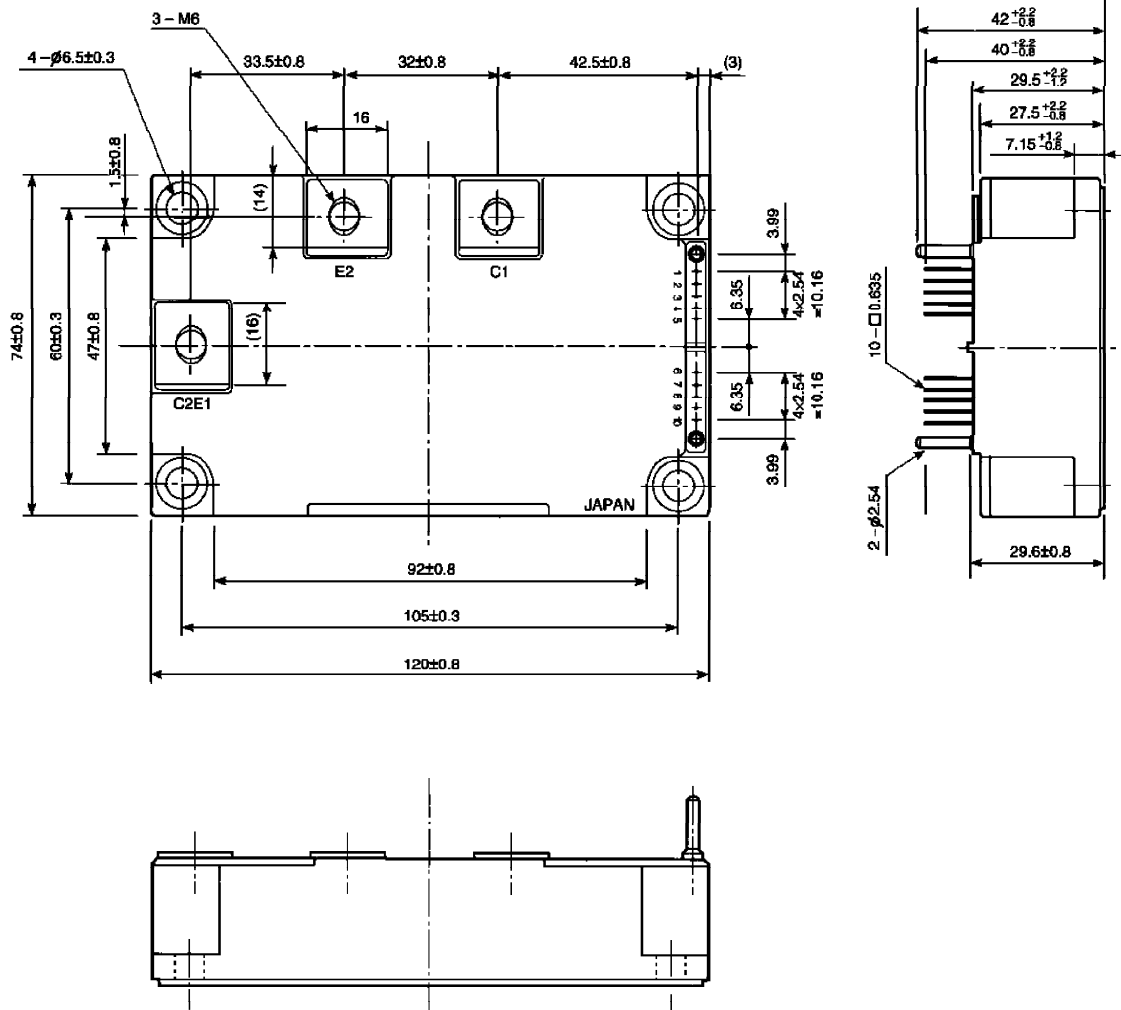






OUTLINE : TOSHIBA

Unit : mm



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|-----------|------------|-----------|---------|---------------|
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