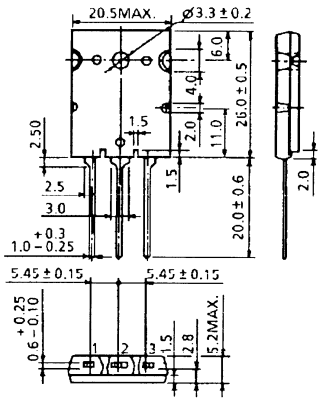
TOSHIBA Insulated Gate Bipolar Transistor Silicon N Channel IGBT

# GT60N323

Voltage Resonance Inverter Switching Application

- diode included between emitter and collector
- Enhancement mode type
- High speed IGBT : $t_f$ = 0.19 μs (typ.) ($I_C$ = 60 A)
  diode : $t_{rr}$ = 0.35 μs (max.) (di/dt = −200 A/μs)

Unit: mm




1. GATE
2. COLLECTOR (HEAT SINK)
3. EMITTER

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-21F2C |

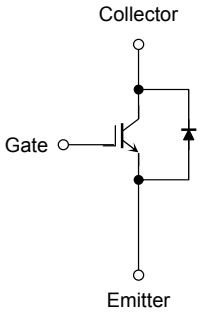
Weight: 9.75 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

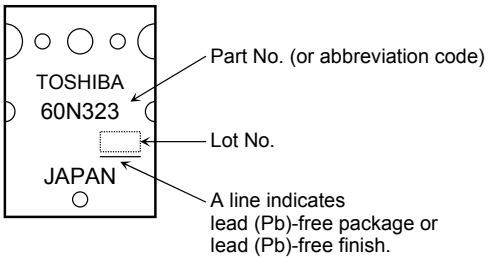
| Characteristics | | symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 1050 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ±25 | V |
| Collector Current | DC | $I_C$ | 60 | A |
| | 1 ms | $I_{CP}$ | 120 | |
| Diode forward current | DC | $I_F$ | 25 | A |
| | 1 ms | $I_{FP}$ | 50 | |
| Collector Power Dissipation (Tc = 25°C) | | $P_C$ | 190 | W |
| Junction Temperature | | $T_j$ | 150 | °C |
| Storage Temperature | | $T_{stg}$ | −55~150 | °C |
| Screw Torque | | — | 0.8 | N·m |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

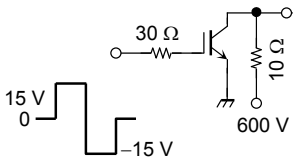
## Equivalent Circuit




## Marking



## Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate Leakage Current | | $I_{GES}$ | $V_{GE}$ = ±25 V, $V_{CE}$ = 0 | — | — | ±500 | nA |
| Collector Cut-off Current | | $I_{CES}$ | $V_{CE}$ = 1050 V, $V_{GE}$ = 0 | — | — | 1.0 | mA |
| Gate-Emitter Cut-off Voltage | | $V_{GE\ (OFF)}$ | $I_C$ = 60 mA, $V_{CE}$ = 5 V | 6.0 | — | 9.0 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE\ (sat)}$ (1) | $I_C$ = 10 A, $V_{GE}$ = 15 V | — | 2.2 | 2.8 | V |
| Collector-Emitter Saturation Voltage | | $V_{CE\ (sat)}$ (2) | $I_C$ = 60 A, $V_{GE}$ = 15 V | — | 2.7 | 3.3 | V |
| Input Capacitance | | $C_{ies}$ | $V_{CE}$ = 10 V, $V_{GE}$ = 0, f = 1 MHz | — | 6800 | — | pF |
| Switching Time | Rise Time | $t_r$ |  | — | 0.4 | — | μs |
| | Turn-on Time | $t_{on}$ | | — | 0.6 | — | |
| | Fall Time | $t_f$ | | — | 0.19 | 0.25 | |
| | Turn-off Time | $t_{off}$ | | — | 0.5 | — | |
| Diode forward voltage | | $V_F$ | $I_F$ = 25 A, $V_{GE}$ = 0 | — | — | 3.0 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$ = 25 A, $V_{GE}$ = 0, di/dt = −200 A/μs | — | — | 0.35 | μs |
| Thermal Resistance（IGBT） | | $R_{th(j-c)}$ | — | — | — | 0.66 | °C/W |
| Thermal Resistance（diode） | | $R_{th(j-c)}$ | — | — | — | 1.38 | °C/W |

## RESTRICTIONS ON PRODUCT USE

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