Ordering number : ENA2202

# NGTG20N60L2TF1G

## N-Channel IGBT

### 600V, 20A, $V_{CE}$(sat);1.45V Single TO-3PF-3L

ON Semiconductor®

http://onsemi.com

### Features

- IGBT $V_{CE}$(sat)=1.45V typ. ($I_C$=20A, $V_{GE}$=15V)
- IGBT $t_f$=67ns typ.
- Enhansment type
- Adaption of full isolation type package
- Maxium junction temperature Tj=175°C

### Applications

- Power factor correction of white goods appliance
- General purpose inverter

### Specifications

**Absolute Maximum Ratings** at Ta = 25°C, Unless otherwise specified

| Parameter | Symbol | Conditions | | Ratings | Unit |
|---|---|---|---|---|---|
| Collector to Emitter Voltage | $V_{CES}$ | | | 600 | V |
| Gate to Emitter Voltage | $V_{GES}$ | | | ±20 | V |
| Collector Current (DC) | $I_C$*1 | Limited by Tjmax | @ Tc=25°C *2 | 40 | A |
| | | | @ Tc=100°C *2 | 20 | A |
| Collector Current (Pulse) | $I_{CP}$ | Pulse width Limited by Tjmax | | 105 | A |
| Allowable Power Dissipation | $P_D$ | Tc=25°C (Our ideal heat dissipation condition) *2 | | 64 | W |
| Junction Temperature | Tj | | | 175 | °C |
| Storage Temperature | Tstg | | | - 55 to +175 | °C |

Note : *1 Collector Current is calculated from the following formula.

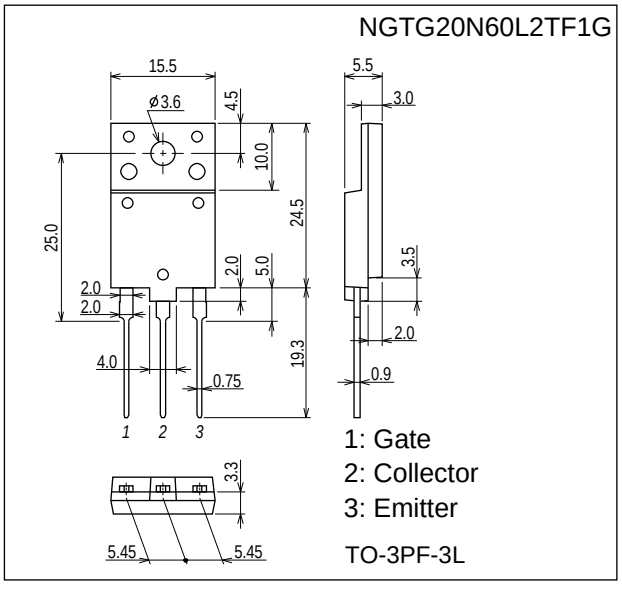
$$I_C(Tc)=\frac{Tjmax - Tc}{R_{th}(j\text{-}c)\times V_{CE}(sat)(Tj, I_C(Tc))}$$

*2 Our condition is radiation from backside.
The method is applying silicone grease to the backside of the device and attaching the device to water-cooled radiator made of aluminium.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

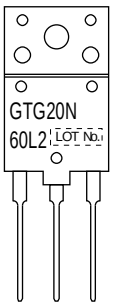
unit : mm (typ) 7538-001



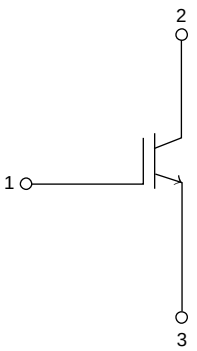

### Ordering & Package Information

| Device | Package | Shipping | note |
|---|---|---|---|
| NGTG20N60L2TF1G | TO-3PF-3L SC-94 | 30 pcs. / tube | Pb-Free |

### Marking




### Electrical Connection



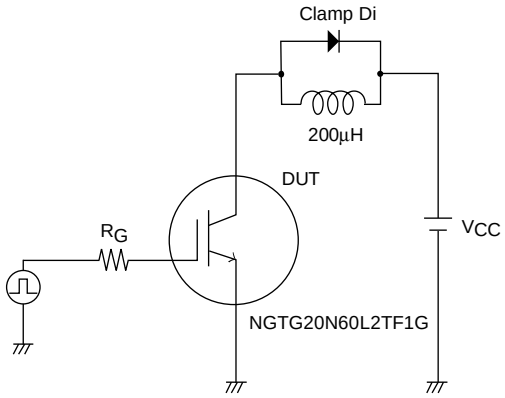
**Electrical Characteristics** at Ta = 25°C, Unless otherwise specified

| Parameter | Symbol | Conditions | | Ratings min | Ratings typ | Ratings max | Unit |
|---|---|---|---|---|---|---|---|
| Collector to Emitter Breakdown Voltage | $V_{(BR)CES}$ | $I_C$=500μA, $V_{GE}$=0V | | 600 | | | V |
| Collector to Emitter Cut off Current | $I_{CES}$ | $V_{CE}$=600V, $V_{GE}$=0V | Tc=25°C | | | 10 | μA |
| | | | Tc=150°C | | | 1 | mA |
| Gate to Emitter Leakage Current | $I_{GES}$ | $V_{GE}$=±20V, $V_{CE}$ =0V | | | | ±100 | nA |
| Gate to Emitter Threshold Voltage | $V_{GE}$(th) | $V_{CE}$ =20V, $I_C$=250μA | | 4.5 | | 6.5 | V |
| Collector to Emitter Saturation Voltage | $V_{CE}$ (sat) | $V_{GE}$=15V, $I_C$=20A | Tc=25°C | | 1.45 | 1.65 | V |
| | | | Tc=150°C | | 1.8 | | V |
| Input Capacitance | Cies | $V_{CE}$ =20V,f=1MHz | | | 2000 | | pF |
| Output Capacitance | Coes | | | | 60 | | pF |
| Reverse Transfer Capacitance | Cres | | | | 50 | | pF |
| Turn-ON Delay Time | $t_{d(on)}$ | $V_{CC}$=300V,$I_C$=20A<br>$R_G$=30Ω,L=200μH<br>$V_{GE}$=0V/15V<br>Vclamp=400V<br>See Fig.1, See Fig.2 | | | 60 | | ns |
| Rise Time | $t_r$ | | | | 37 | | ns |
| Turn-ON Time | ton | | | | 400 | | ns |
| Turn-OFF Delay Time | $t_{d(off)}$ | | | | 193 | | ns |
| Fall Time | $t_f$ | | | | 67 | | ns |
| Turn-OFF Time | toff | | | | 281 | | ns |
| Total Gate Charge | Qg | $V_{CE}$ =300V, $V_{GE}$=15V, $I_C$=20A | | | 84 | | nC |
| Gate to Emitter Charge | Qge | | | | 16 | | nC |
| Gate to Collector “Miller” Charge | Qgc | | | | 37 | | nC |

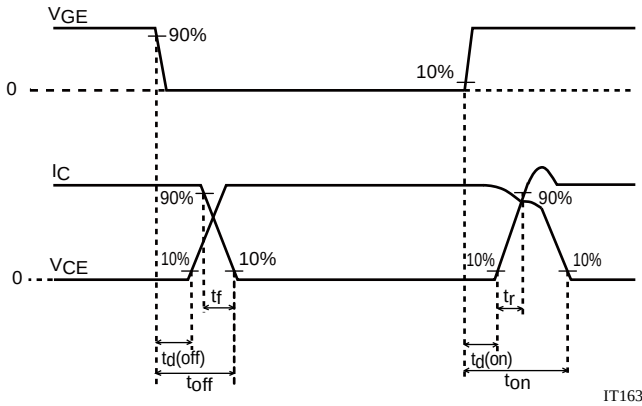
**Thermal Characteristics** at Ta = 25°C, Unless otherwise specified

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Thermal Resistance (junction- Case) | Rth(j-c) | Tc=25°C (our ideal heat dissipation condition)*2 | 2.33 | °C /W |
| Thermal Resistance (junction- atmosphere) | Rth(j-a) | | 47.5 | °C /W |

## Fig.1 Switching Time Test Circuit




## Fig.2 Timing Chart

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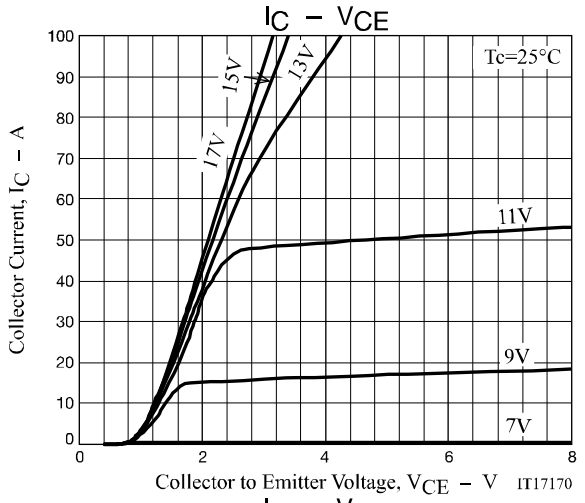
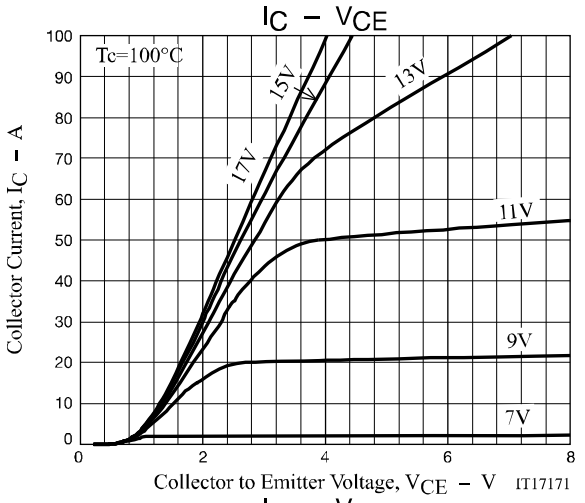
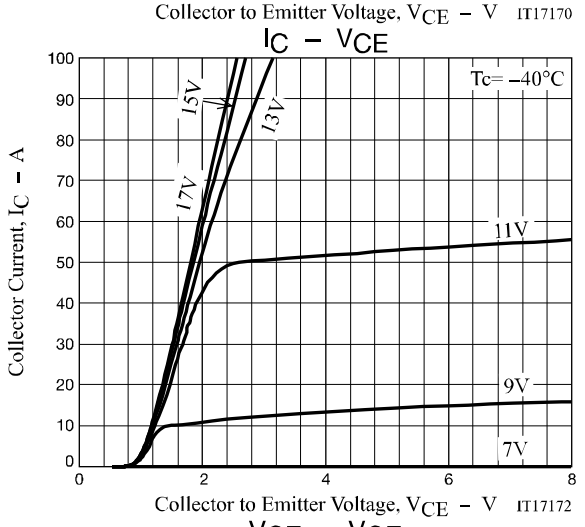
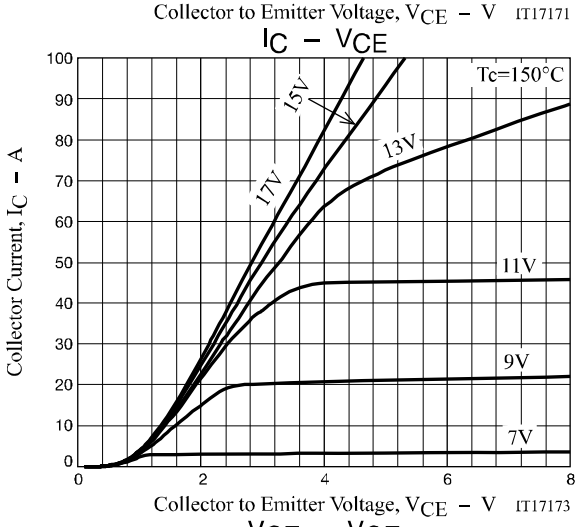
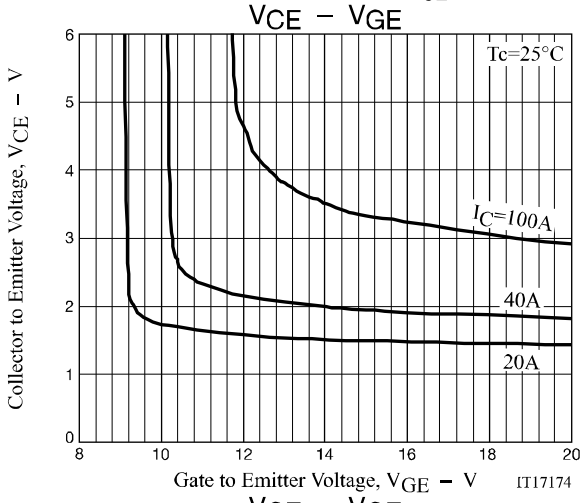
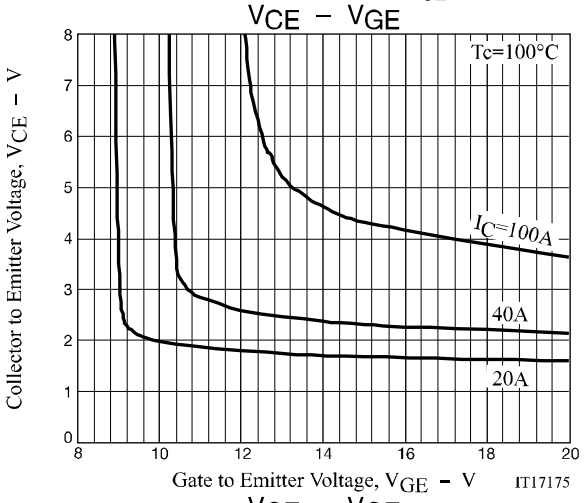


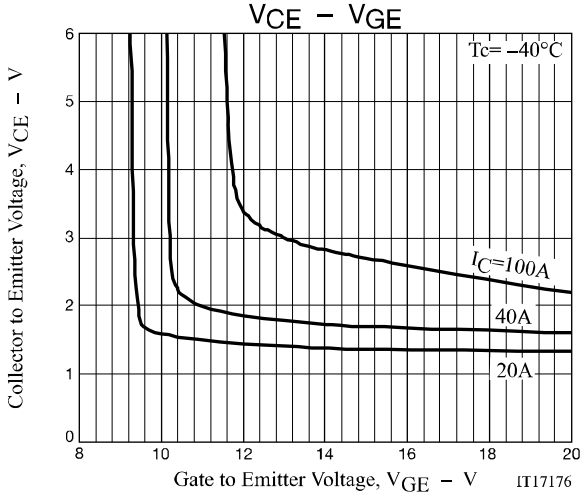



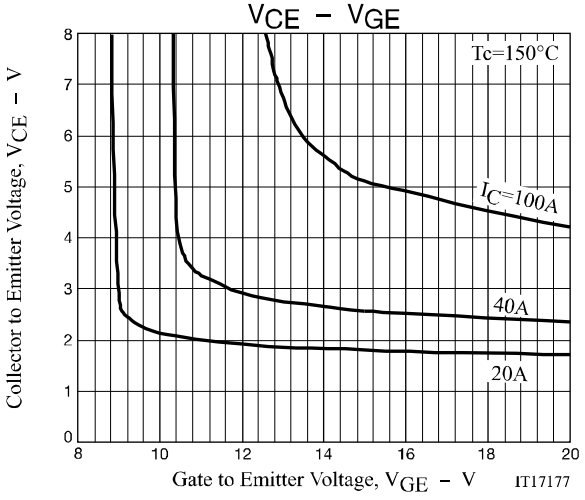



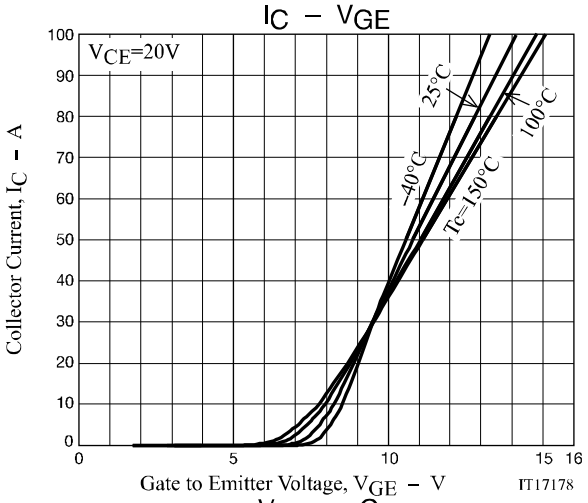



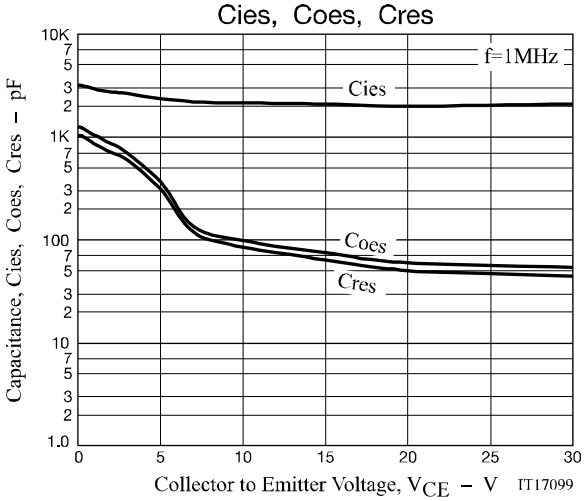



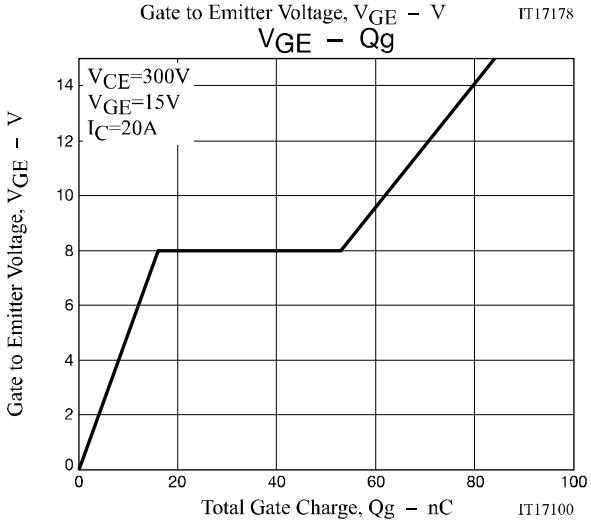



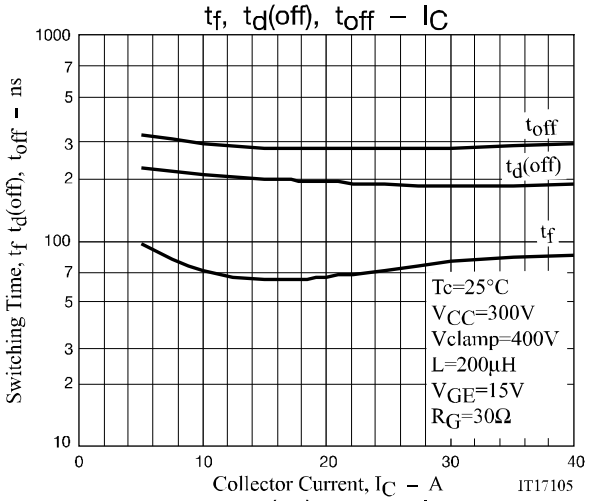



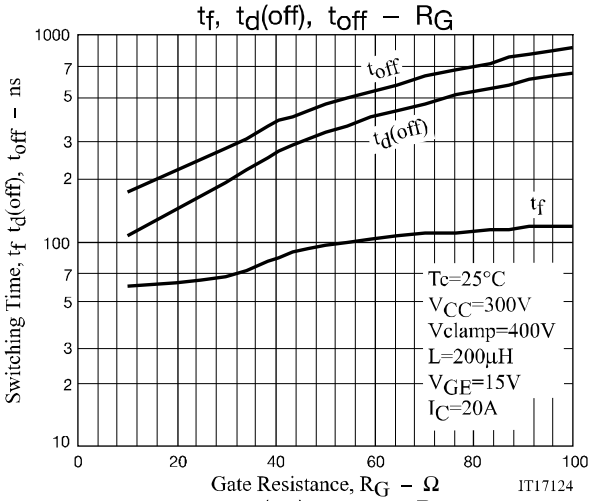



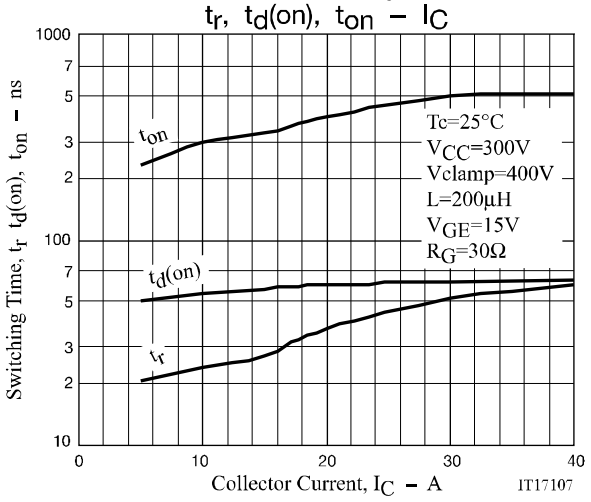


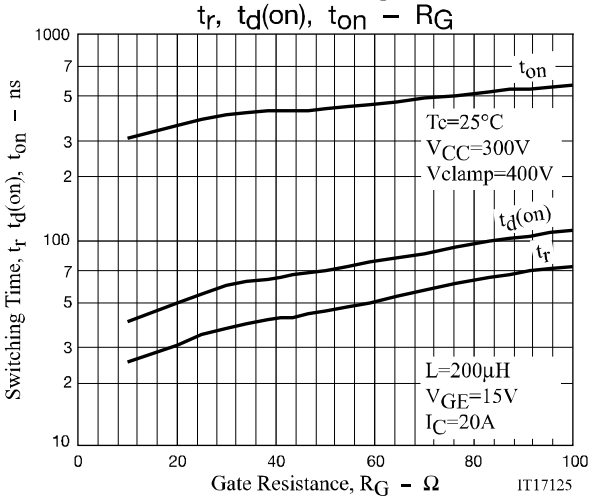



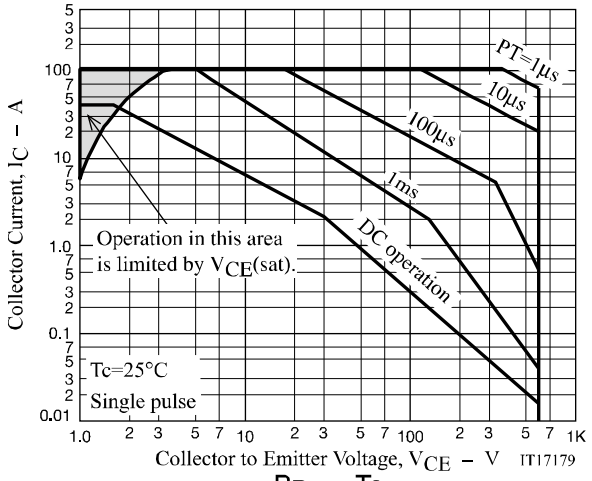



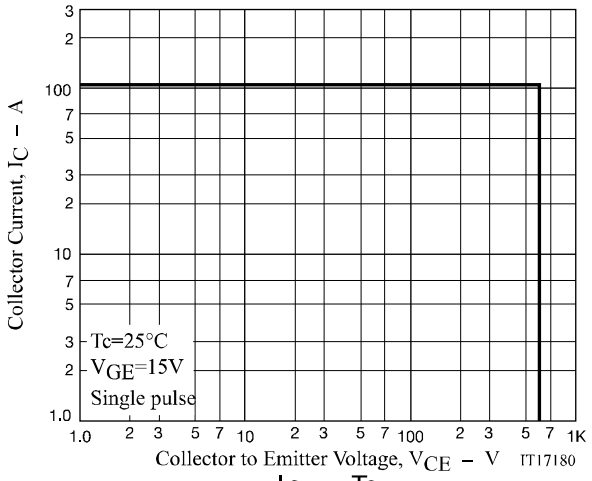



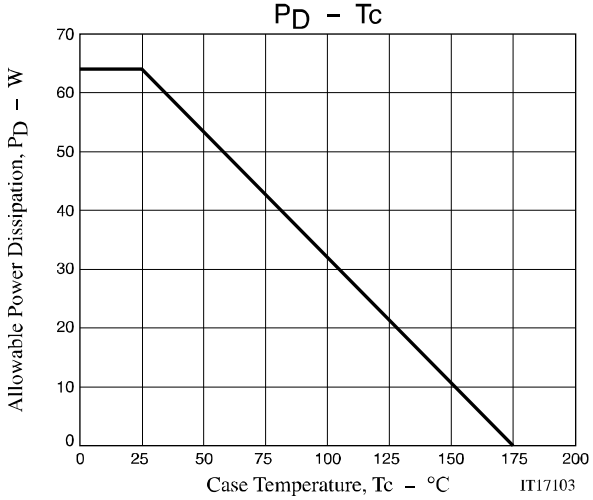
Forward Bias A S O



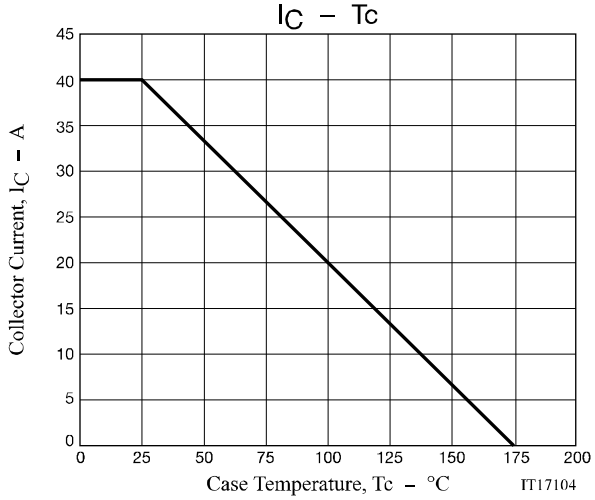

Reverse Bias A S O




PD – Tc




IC – Tc



## Outline Drawing

NGTG20N60L2TF1G