



# 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.
- Enhancement type
- Adaption of full isolation type package
- Maximum junction temperature  $T_j$ =175°C

### Applications

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

### Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$ , Unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit	
Collector to Emitter Voltage	$V_{CES}$		600	V	
Gate to Emitter Voltage	$V_{GES}$		$\pm 20$	V	
Collector Current (DC)	$I_C$ *1	Limited by $T_{jmax}$	@ $T_c=25^\circ\text{C}$ *2	40	A
			@ $T_c=100^\circ\text{C}$ *2	20	A
Collector Current (Pulse)	$I_{CP}$	Pulse width Limited by $T_{jmax}$	105	A	
Allowable Power Dissipation	$P_D$	$T_c=25^\circ\text{C}$ (Our ideal heat dissipation condition) *2	64	W	
Junction Temperature	$T_j$		175	°C	
Storage Temperature	$T_{stg}$		-55 to +175	°C	

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

$$I_C(T_c) = \frac{T_{jmax} - T_c}{R_{th(j-c)} \times V_{CE(sat)}(T_j, I_C(T_c))}$$

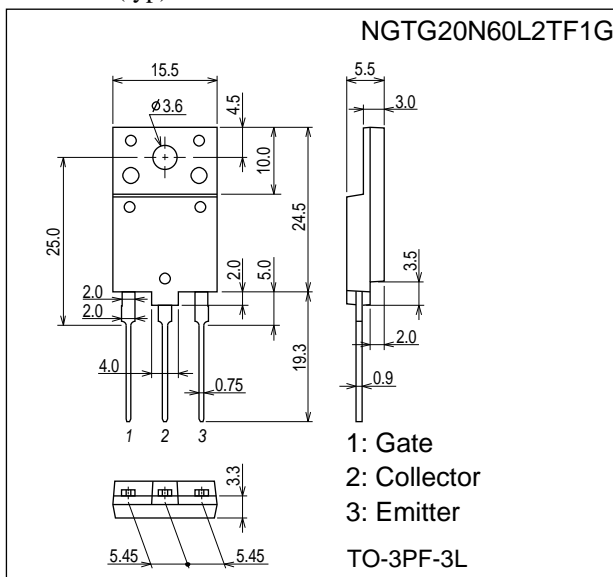
\*2 Our condition is radiation from backside.

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

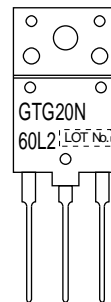
unit : mm (typ) 7538-001



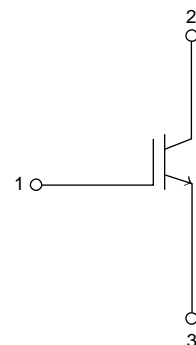
### Ordering & Package Information

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

### Marking



### Electrical Connection



# NGTG20N60L2TF1G

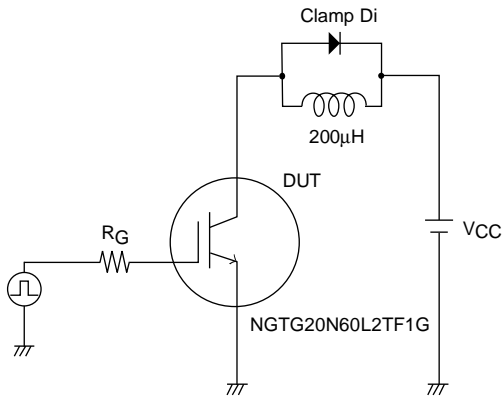
## Electrical Characteristics at Ta = 25°C, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector to Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C=500\mu A, V_{GE}=0V$	600			V
Collector to Emitter Cut off Current	$I_{CES}$	$V_{CE}=600V, V_{GE}=0V$	$T_c=25^\circ C$		10	$\mu A$
			$T_c=150^\circ C$		1	mA
Gate to Emitter Leakage Current	$I_{GES}$	$V_{GE}=\pm 20V, V_{CE}=0V$			$\pm 100$	nA
Gate to Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=20V, I_C=250\mu A$	4.5		6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=20A$	$T_c=25^\circ C$	1.45	1.65	V
			$T_c=150^\circ C$	1.8		V
Input Capacitance	$C_{ies}$	$V_{CE}=20V, f=1MHz$		2000		pF
Output Capacitance	$C_{oes}$			60		pF
Reverse Transfer Capacitance	$C_{res}$			50		pF
Turn-ON Delay Time	$t_{d(on)}$			60		ns
Rise Time	$t_r$	$V_{CC}=300V, I_C=20A$ $R_G=30\Omega, L=200\mu H$		37		ns
Turn-ON Time	$t_{on}$			400		ns
Turn-OFF Delay Time	$t_{d(off)}$	$V_{GE}=0V/15V$ $V_{clamp}=400V$		193		ns
Fall Time	$t_f$	See Fig.1, See Fig.2		67		ns
Turn-OFF Time	$t_{off}$			281		ns
Total Gate Charge	$Q_g$	$V_{CE}=300V, V_{GE}=15V, I_C=20A$		84		nC
Gate to Emitter Charge	$Q_{ge}$			16		nC
Gate to Collector "Miller" Charge	$Q_{gc}$			37		nC

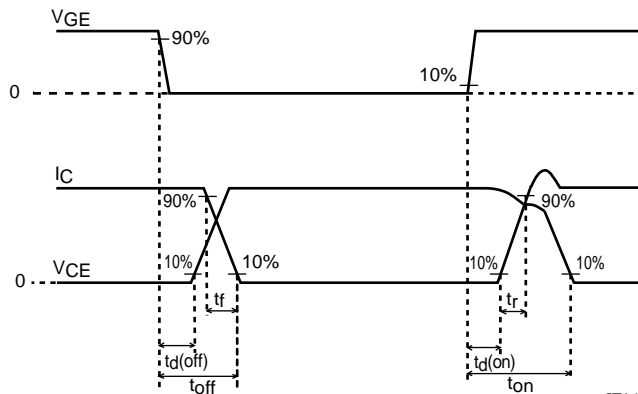
## Thermal Characteristics at Ta = 25°C, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit
Thermal Resistance (junction- Case)	$R_{th(j-c)}$	$T_c=25^\circ C$ (our ideal heat dissipation condition)*2	2.33	$^\circ C/W$
Thermal Resistance (junction- atmosphere)	$R_{th(j-a)}$		47.5	$^\circ C/W$

**Fig.1 Switching Time Test Circuit**

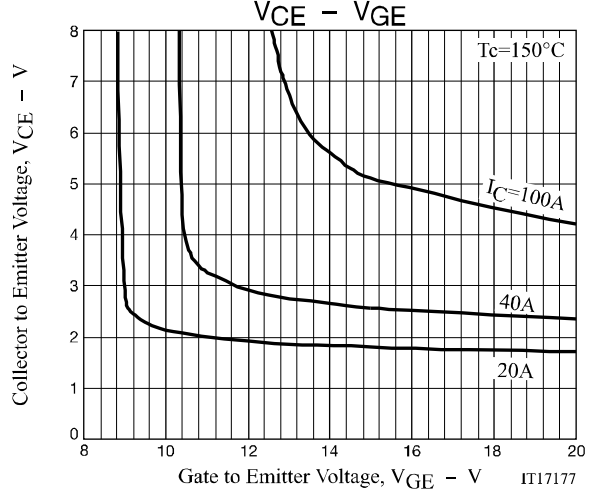
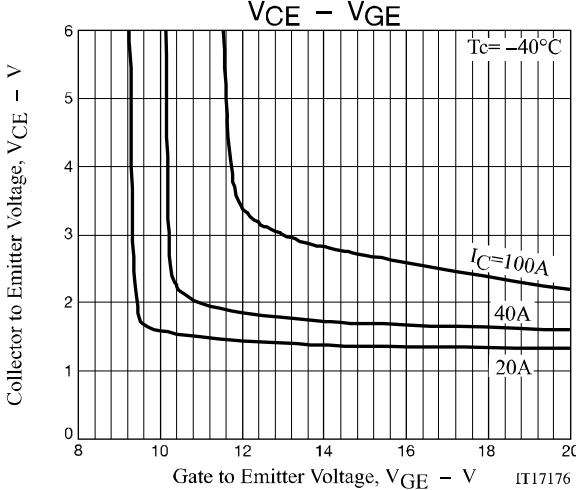
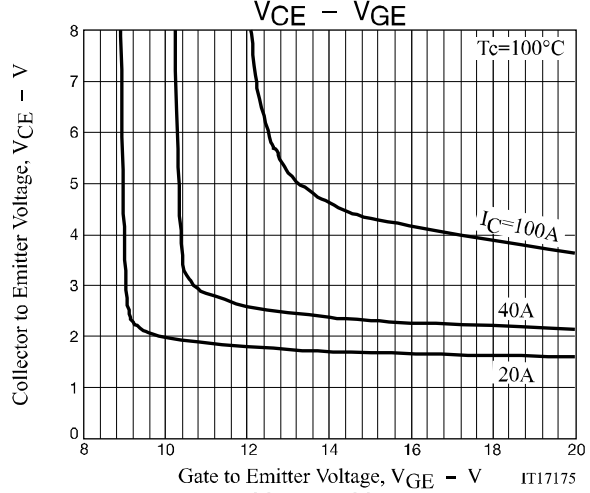
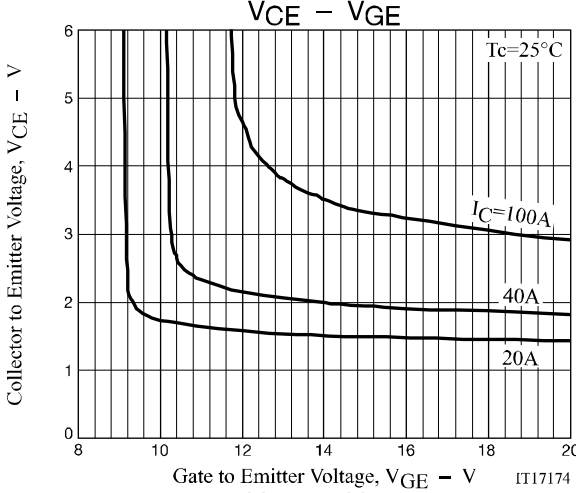
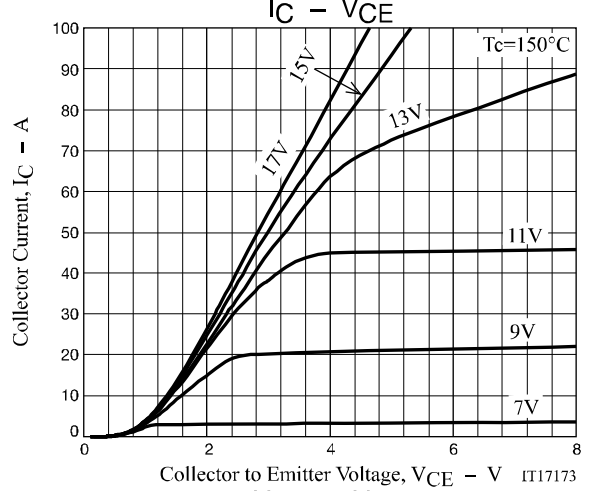
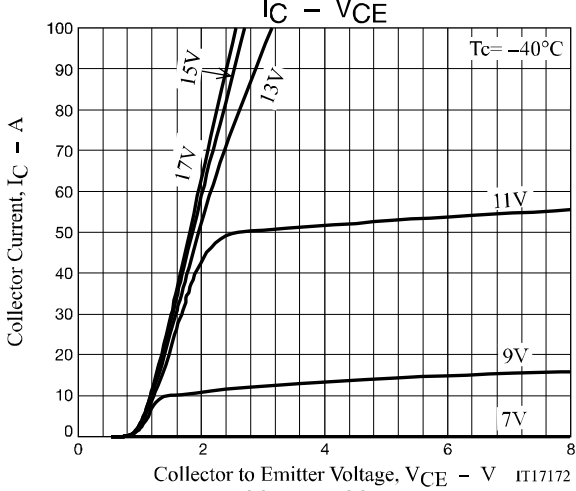
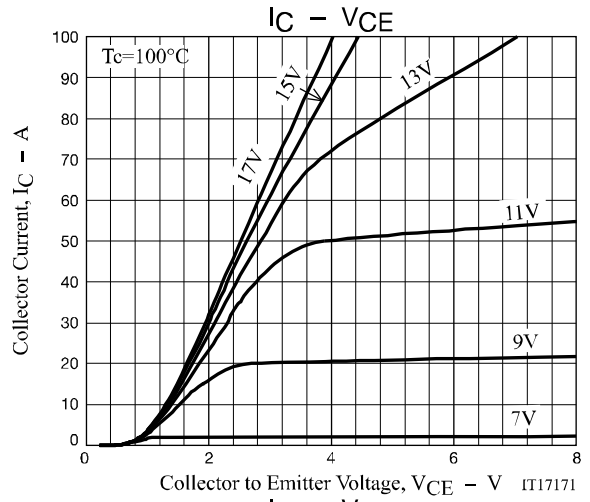
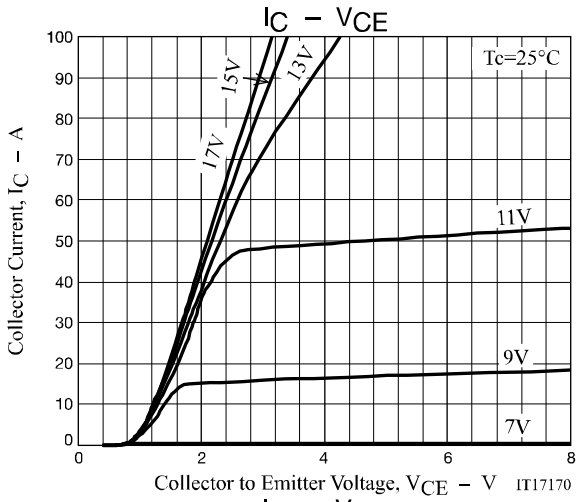


**Fig.2 Timing Chart**

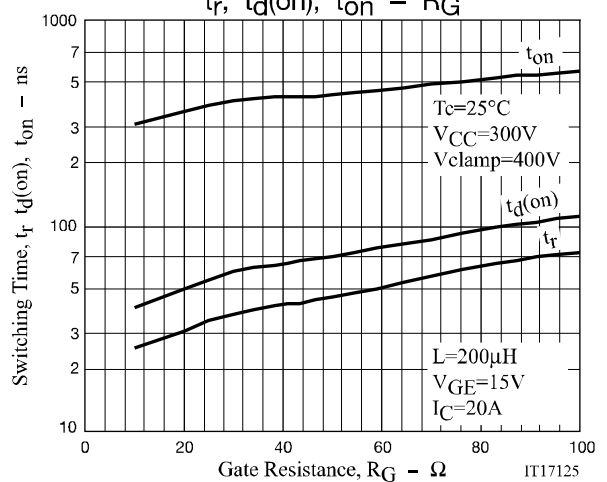
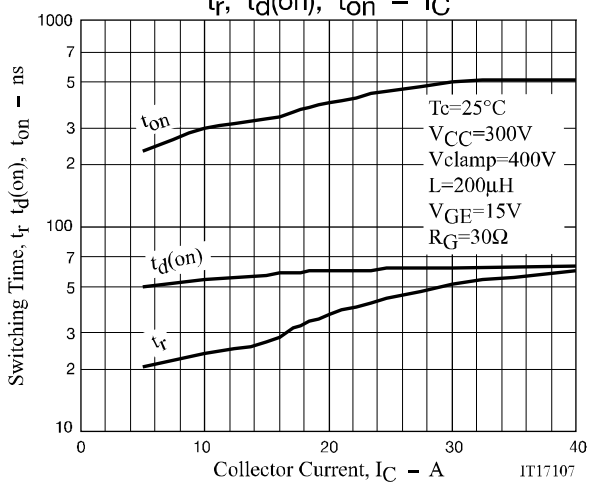
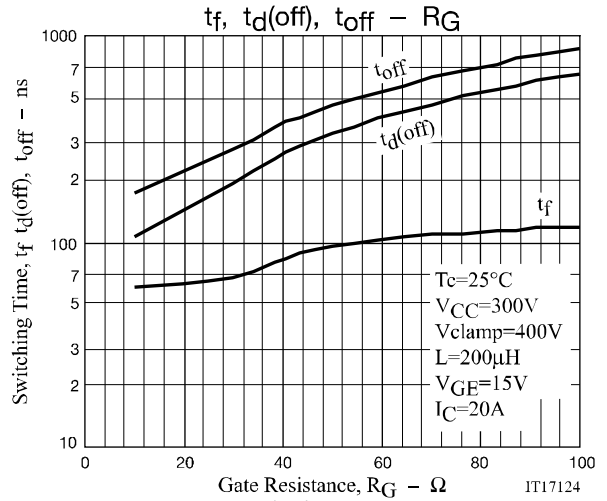
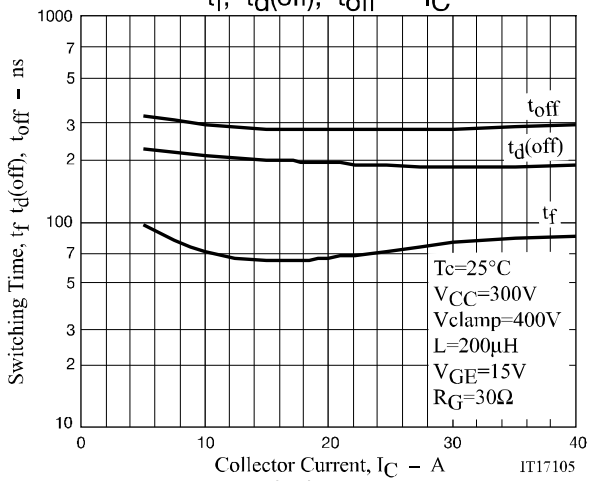
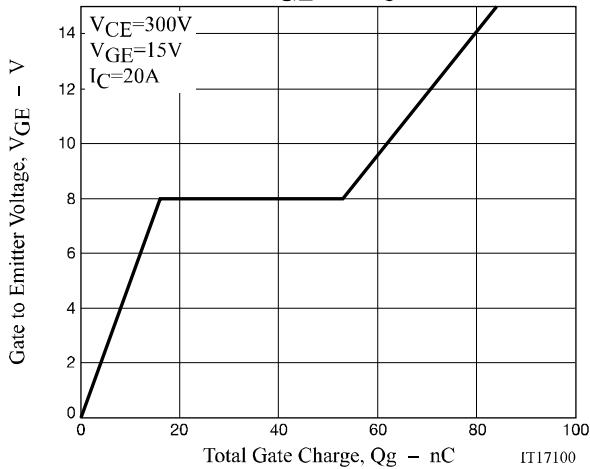
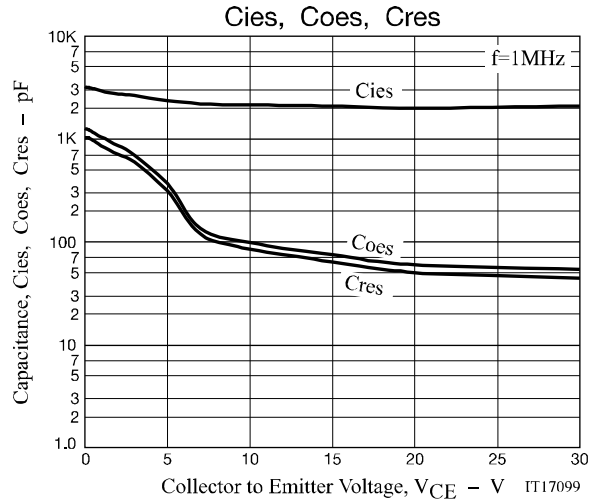
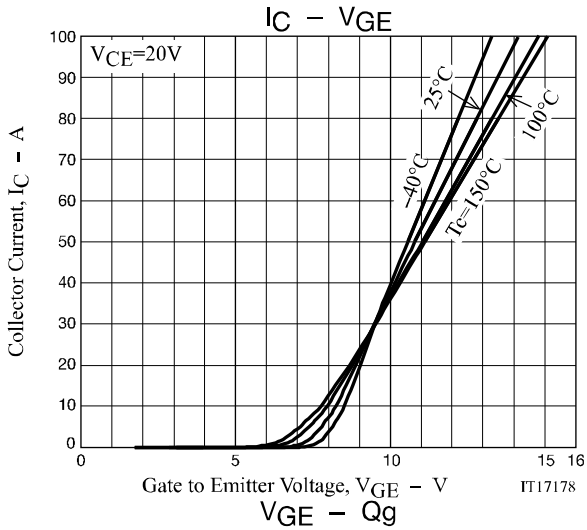


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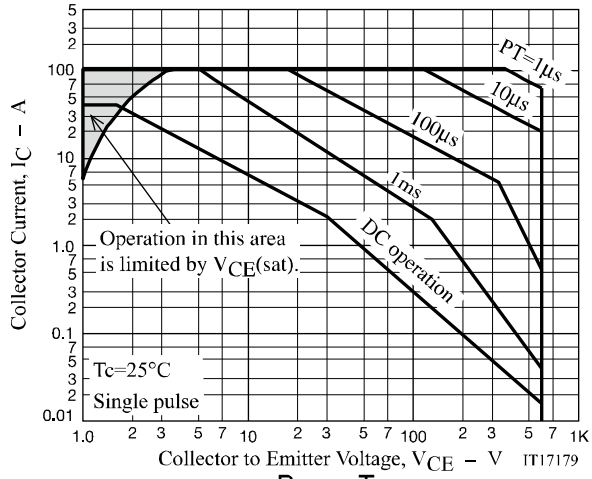


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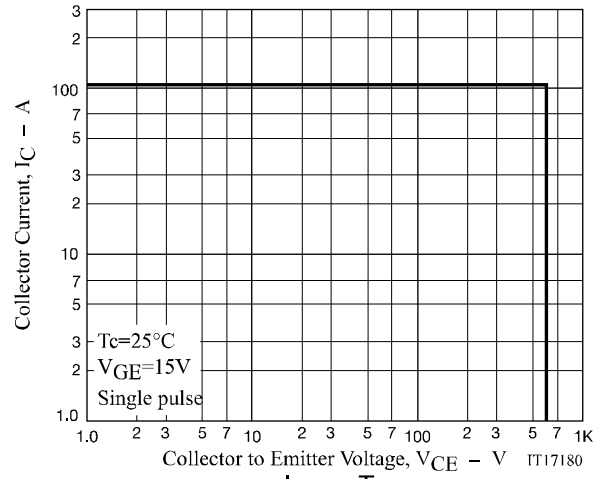


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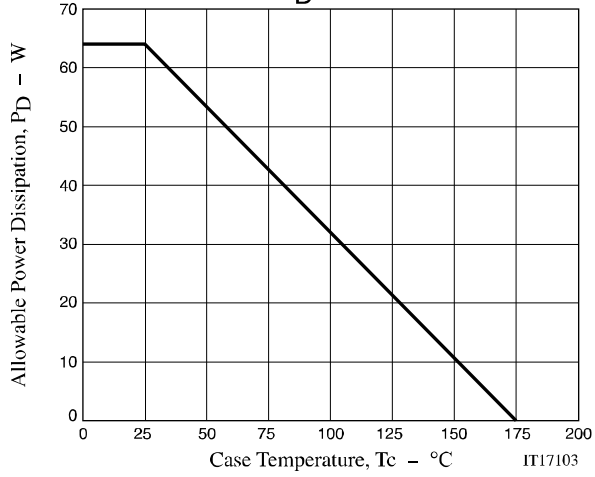
### Forward Bias A S O



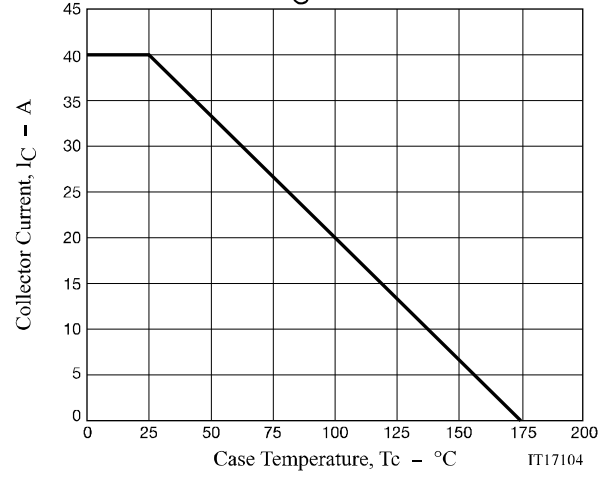
### Reverse Bias A S O



### $P_D - T_c$



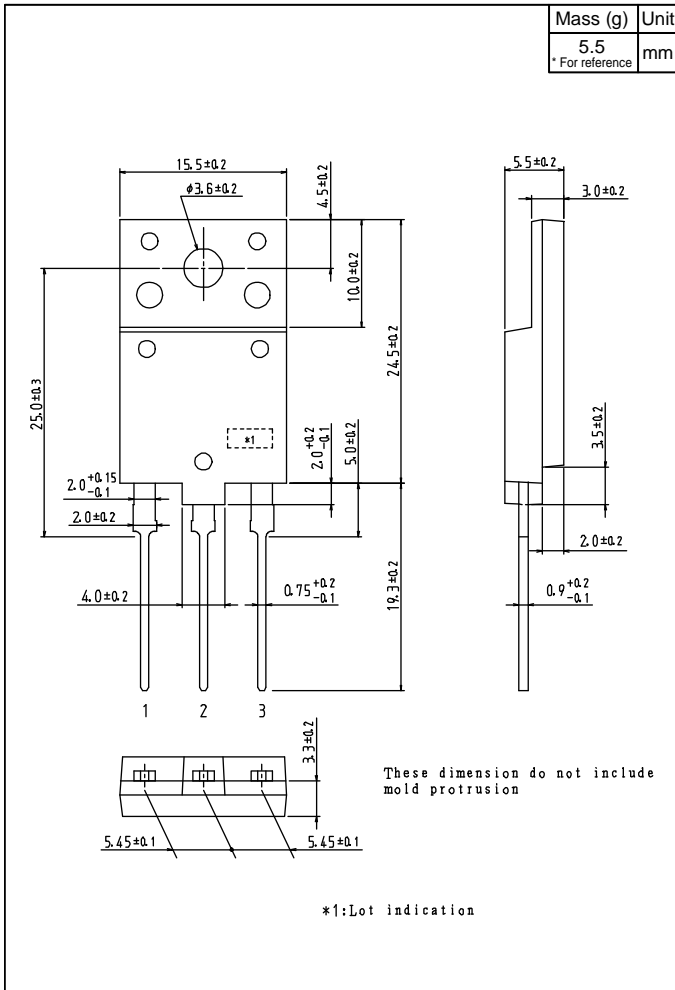
### $I_C - T_c$



# NGTG20N60L2TF1G

## Outline Drawing

NGTG20N60L2TF1G



# NGTG20N60L2TF1G

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