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.

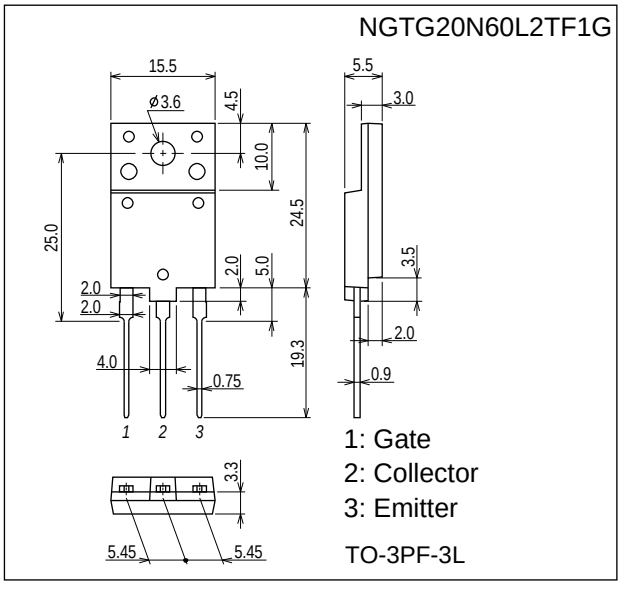
$$I_C(Tc)= \frac{Tjmax - Tc}{R_{th}(j\text{-}c)\times V_{CE}(sat)(Tj, I_C(Tc))}$$

*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

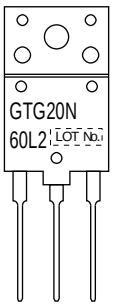
unit : mm (typ) 7538-001



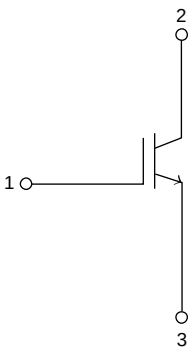
Ordering & Package Information

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 R_G=30Ω,L=200μH V_{GE}=0V/15V Vclamp=400V 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

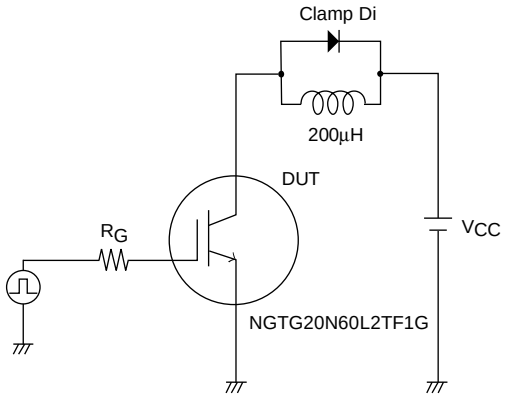
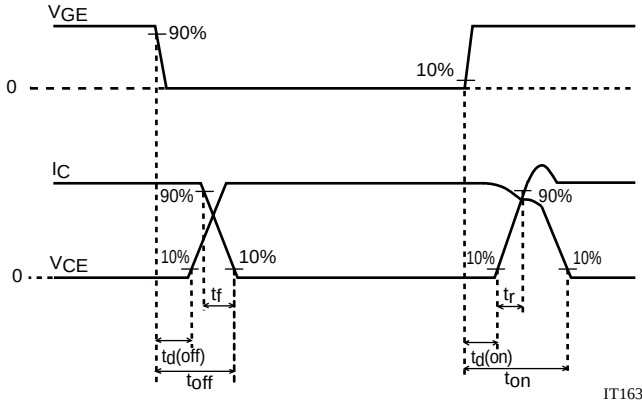
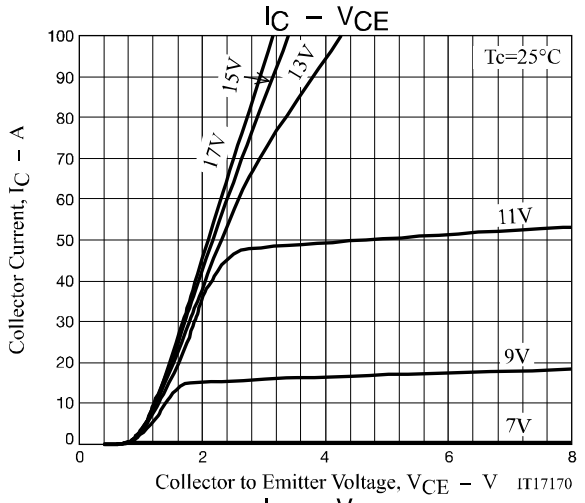
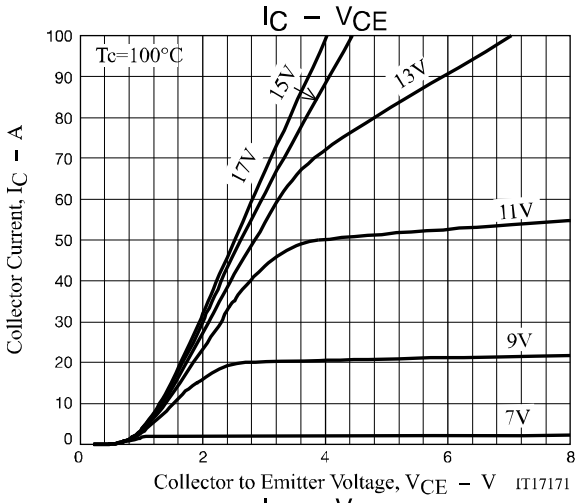


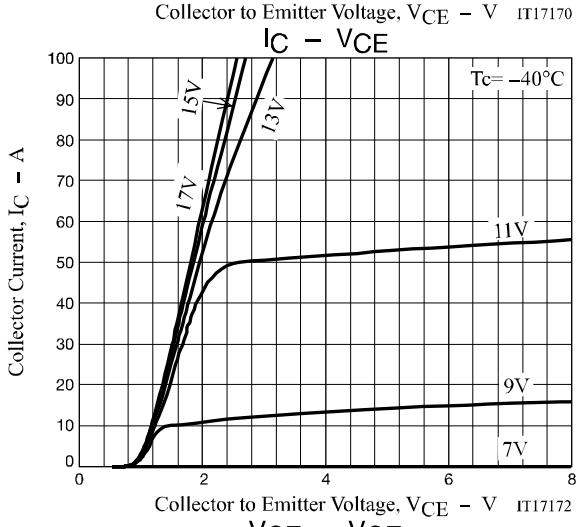
Fig.2 Timing Chart

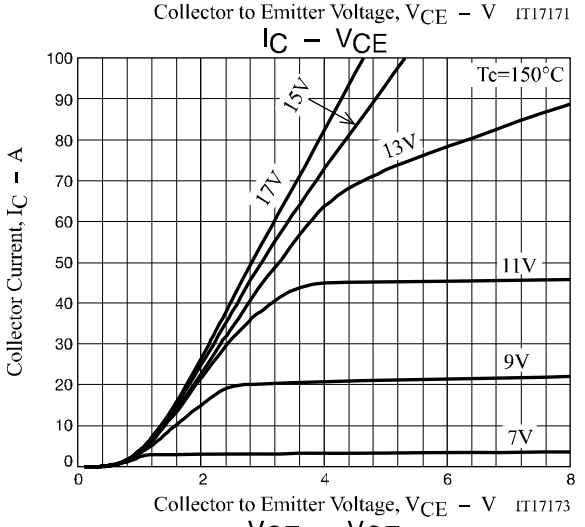


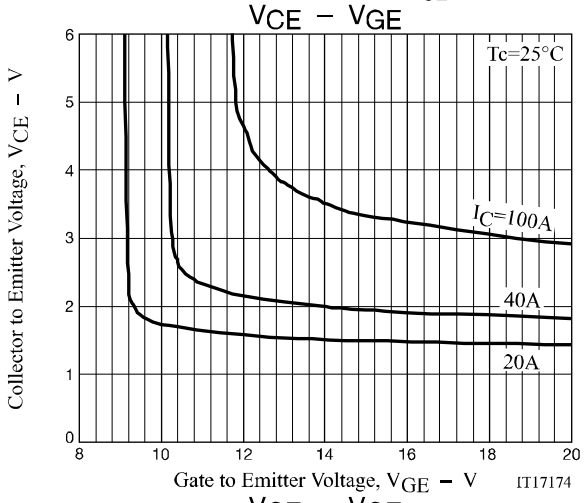
IT16383

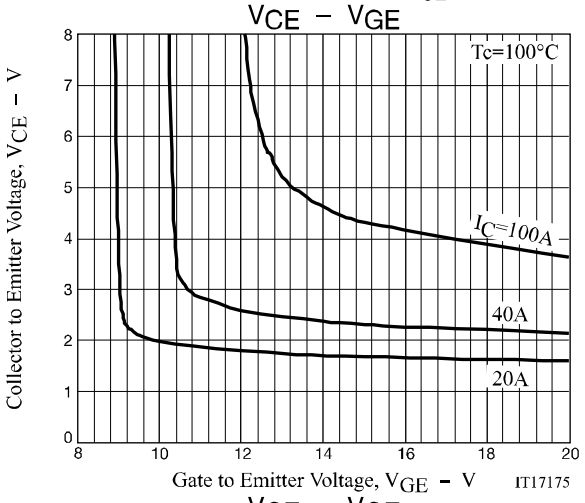

IC – VCE
Tc=25°C
15V
13V
17V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17170

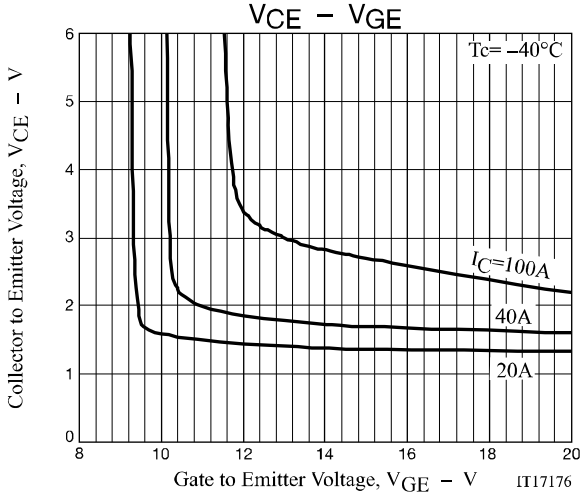

IC – VCE
Tc=100°C
15V
13V
17V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17171

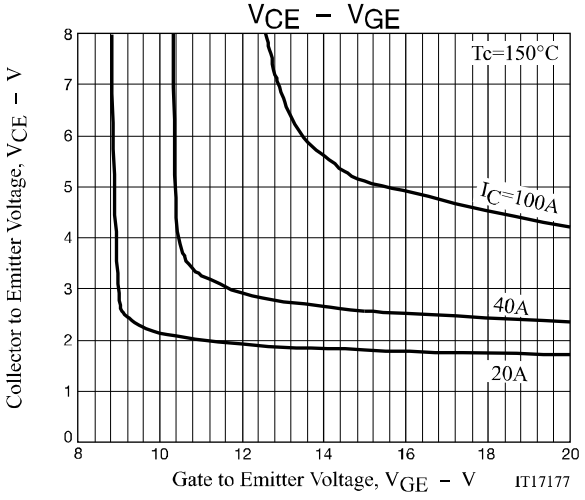

IC – VCE
Tc= –40°C
15V
13V
17V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17172

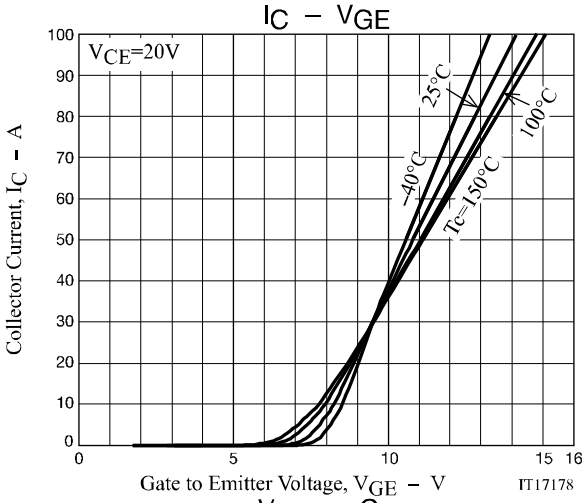

IC – VCE
Tc=150°C
15V
13V
17V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17173

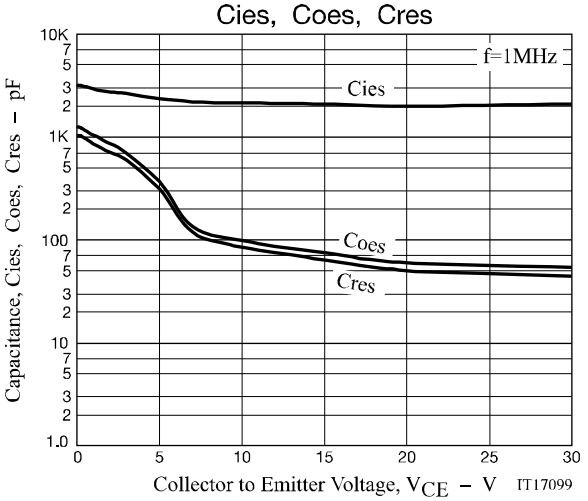

VCE – VGE
Tc=25°C
IC=100A
40A
20A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17174

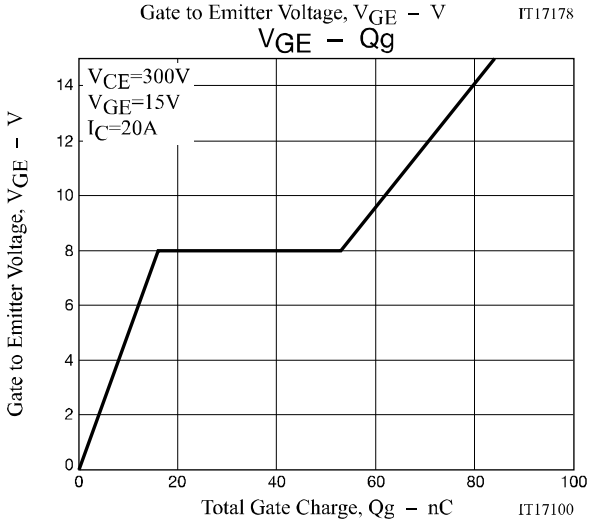

VCE – VGE
Tc=100°C
IC=100A
40A
20A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17175

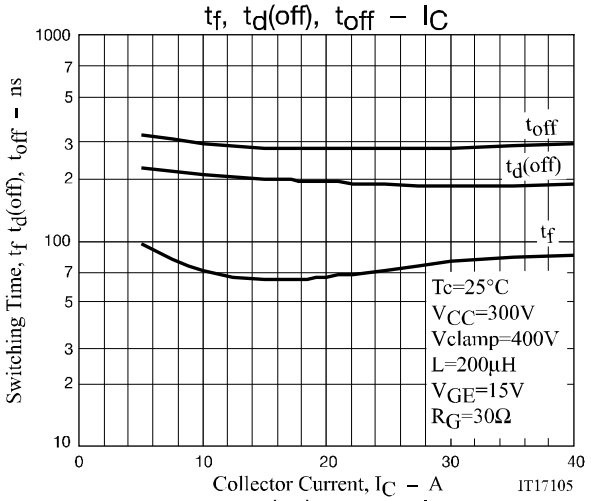

VCE – VGE
Tc= –40°C
IC=100A
40A
20A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17176

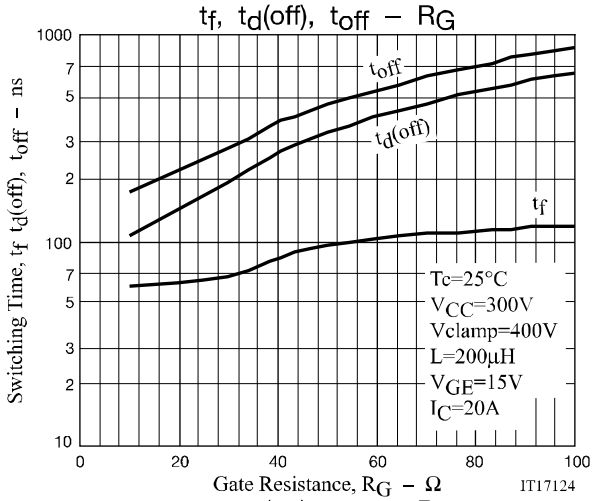

VCE – VGE
Tc=150°C
IC=100A
40A
20A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17177

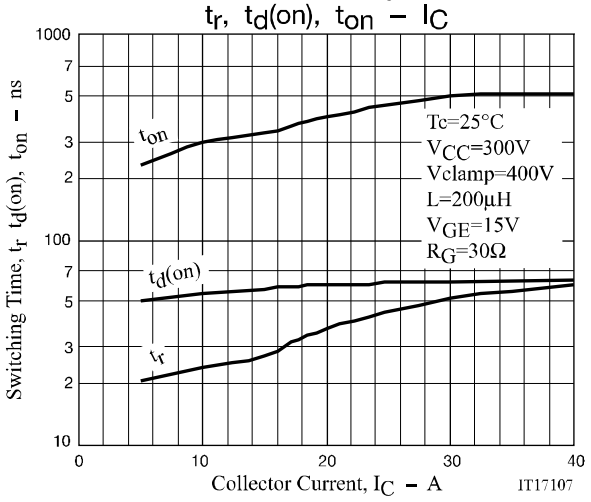

IC – VGE
VCE=20V
25°C
40°C
Tc=150°C
100°C
Collector Current, IC – A
Gate to Emitter Voltage, VGE – V
IT17178

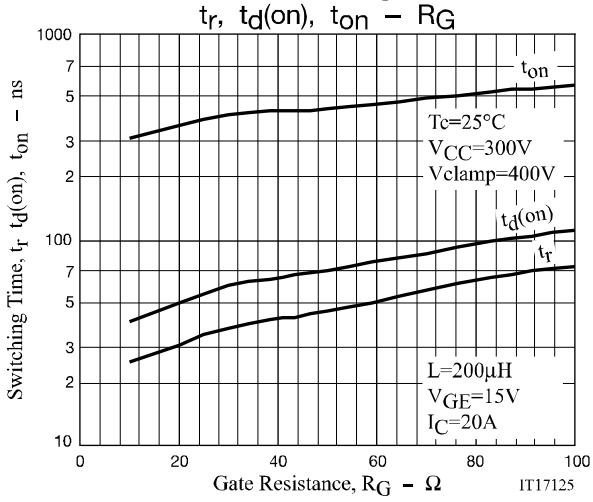

Cies, Coes, Cres
f=1MHz
Cies
Coes
Cres
Capacitance, Cies, Coes, Cres – pF
Collector to Emitter Voltage, VCE – V
IT17099


VGE – Qg
VCE=300V
VGE=15V
IC=20A
Gate to Emitter Voltage, VGE – V
Total Gate Charge, Qg – nC
IT17100

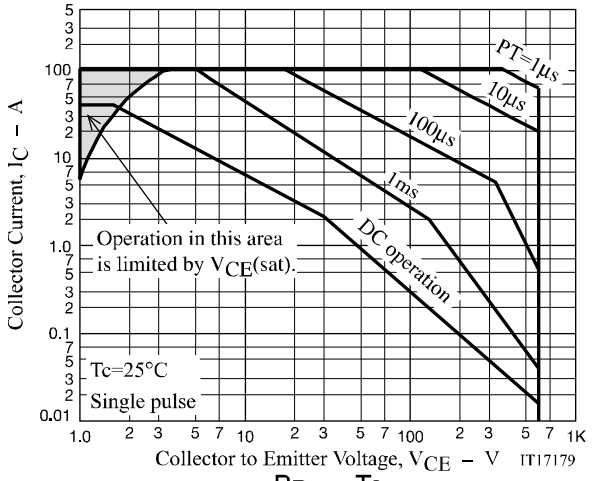

tf, td(off), toff – IC
toff
td(off)
tf
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
RG=30Ω
Switching Time, tf, td(off), toff – ns
Collector Current, IC – A
IT17105


tf, td(off), toff – RG
toff
td(off)
tf
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
IC=20A
Switching Time, tf, td(off), toff – ns
Gate Resistance, RG – Ω
IT17124

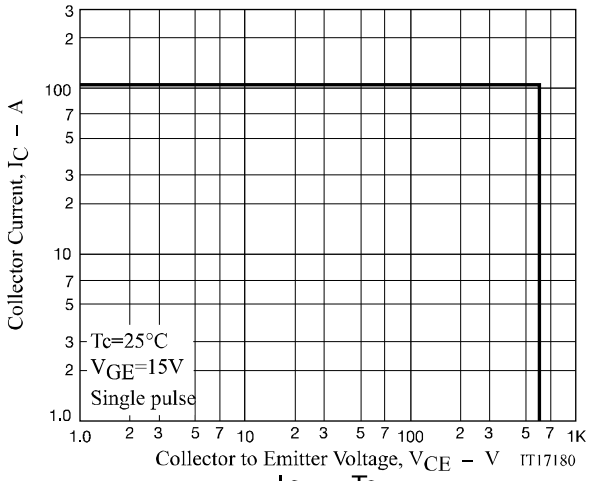

tr, td(on), ton – IC
ton
td(on)
tr
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
RG=30Ω
Switching Time, tr, td(on), ton – ns
Collector Current, IC – A
IT17107


tr, td(on), ton – RG
ton
td(on)
tr
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
IC=20A
Switching Time, tr, td(on), ton – ns
Gate Resistance, RG – Ω
IT17125

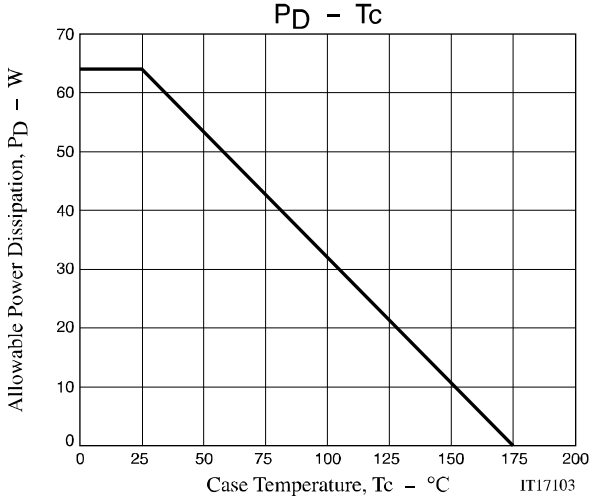
Forward Bias A S O



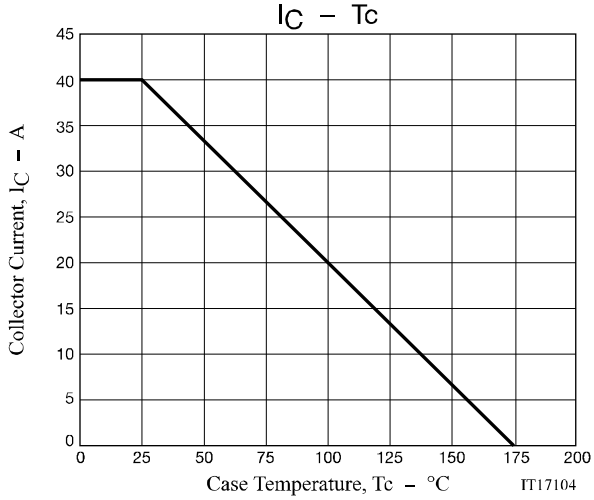
Reverse Bias A S O



P_D – Tc

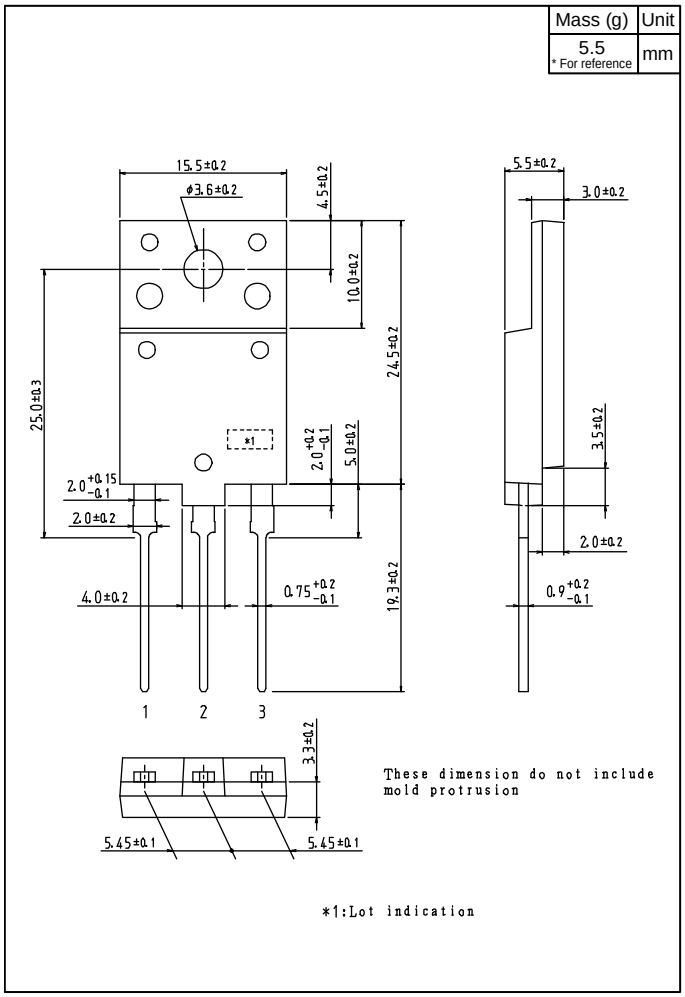


I_C – Tc



Outline Drawing

NGTG20N60L2TF1G



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