Ordering number : ENA2219

NGTG12N60TF1G

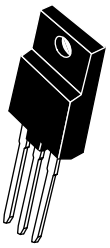
N-Channel IGBT
600V, 12A, V_{CE}(sat);1.4V TO-3PF-3L

ON Semiconductor®

http://onsemi.com

Features

- V_{CE}(sat)=1.4V typ. (I_C=12A, V_{GE}=15V)
- Low switching loss in higher frequency applications
- Enhansment type
- 5μs short circuit capability
- Adoption of full isolation type package



TO-3PF-3L

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	24	A
			@ Tc=100°C *2	12	A
Collector Current (Pulse)	I_{CP}	Pulse width Limited by Tjmax(Ref:ASO graph)		88	A
Allowable Power Dissipation	P_D	Tc=25°C (Our ideal heat dissipation condition) *2		54	W
Junction Temperature	Tj			150	°C
Storage Temperature	Tstg			- 55 to +150	°C

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

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

*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.

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=125°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=12A	Tc=25°C		1.4	1.6	V
			Tc=125°C		1.6		V
Input Capacitance	Cies	V_{CE} =20V,f=1MHz			2000		pF
Output Capacitance	Coes				60		pF
Reverse Transfer Capacitance	Cres				50		pF

Continued on next page.

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

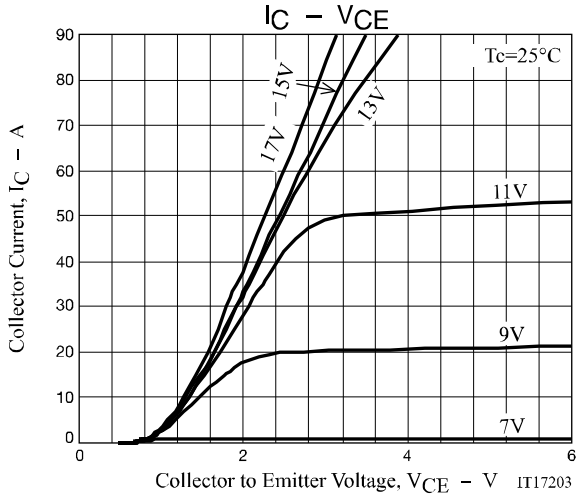
Semiconductor Components Industries, LLC, 2013

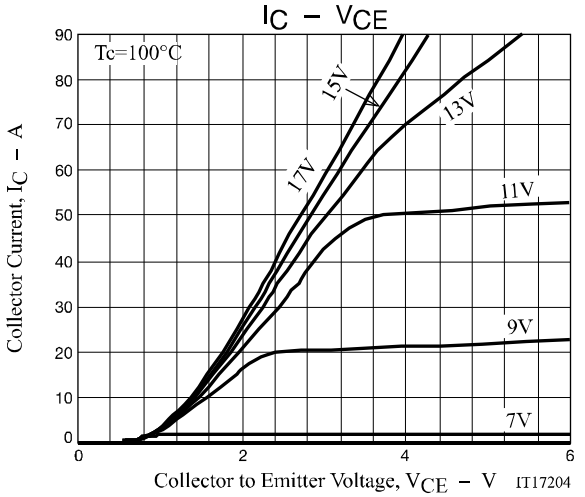
Continued from preceding page.

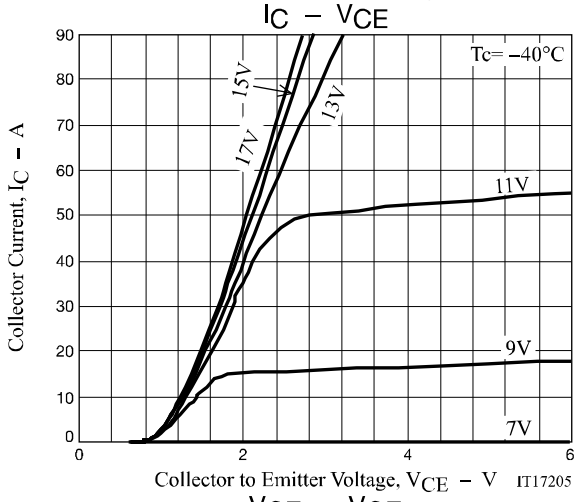
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Turn-ON Delay Time	t_{d}(on)	V_{CC}=300V,I_C=15A R_G=30Ω,L=200μH V_{GE}=0V/15V Vclamp=400V See Fig.1, See Fig.2		55		ns
Rise Time	t_r			30		ns
Turn-ON Time	ton			330		ns
Turn-OFF Delay Time	t_{d}(off)			200		ns
Fall Time	t_f			110		ns
Turn-OFF Time	toff			350		ns
Total Gate Charge	Qg	V_{CE} =300V, V_{GE}=15V, I_C=15A		84		nC
Gate to Emitter Charge	Qge			16		nC
Gate to Collector “Miller” Charge	Qgc			37		nC

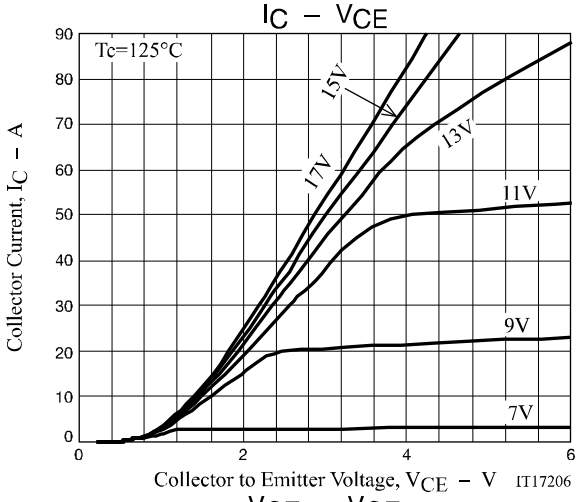
Thermal Characteristics at Ta = 25°C, Unless otherwise specified

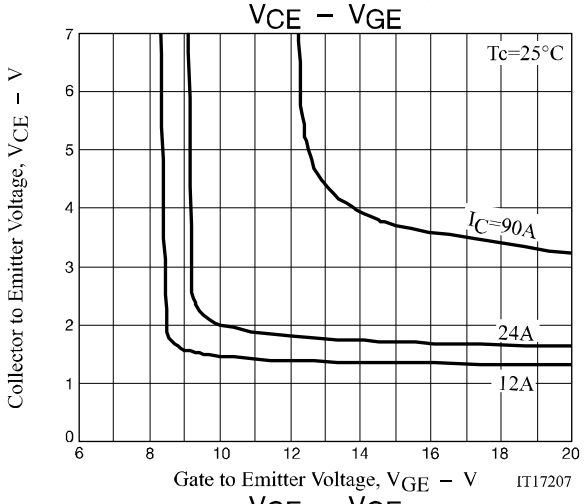
Parameter	Symbol	Conditions	Ratings	Unit
Thermal Resistance (junction- Case)	Rth(j-c)	Tc=25°C (our ideal heat dissipation condition)*2	2.33	°C /W
Thermal Resistance (junction- atmosphere)	Rth(j-a)		47.5	°C /W

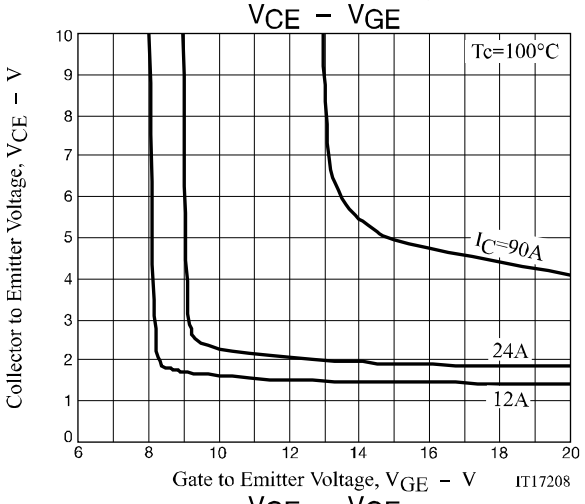

IC – VCE
Tc=25°C
17V
15V
13V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17203

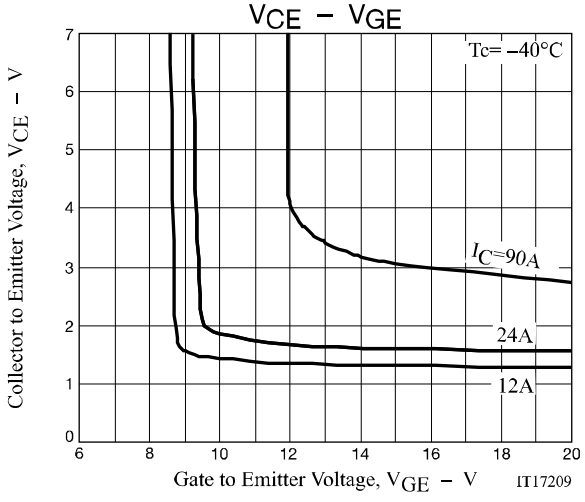

IC – VCE
Tc=100°C
17V
15V
13V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17204

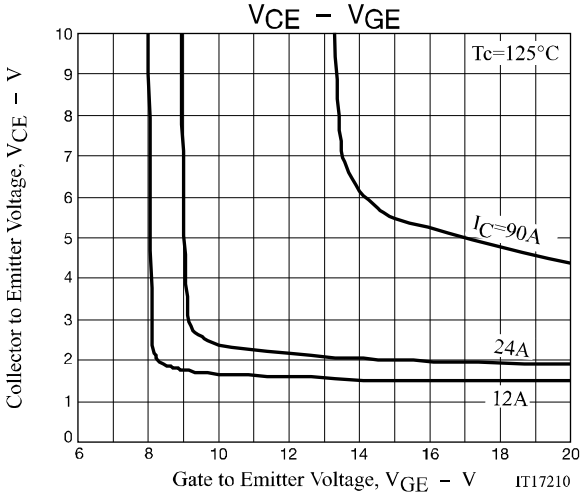

IC – VCE
Tc= –40°C
17V
15V
13V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17205

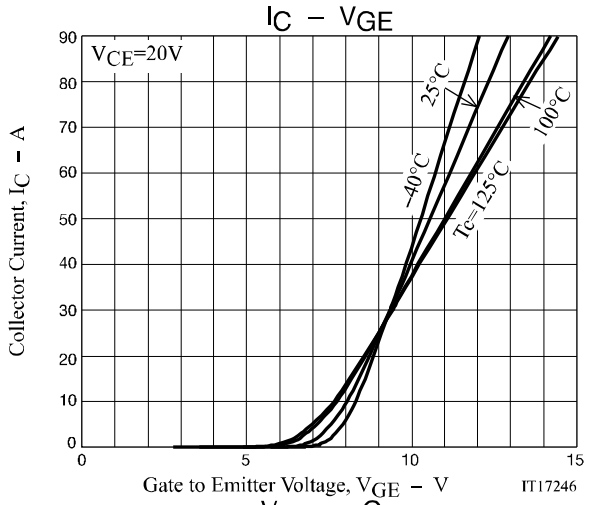

IC – VCE
Tc=125°C
17V
15V
13V
11V
9V
7V
Collector Current, IC – A
Collector to Emitter Voltage, VCE – V
IT17206

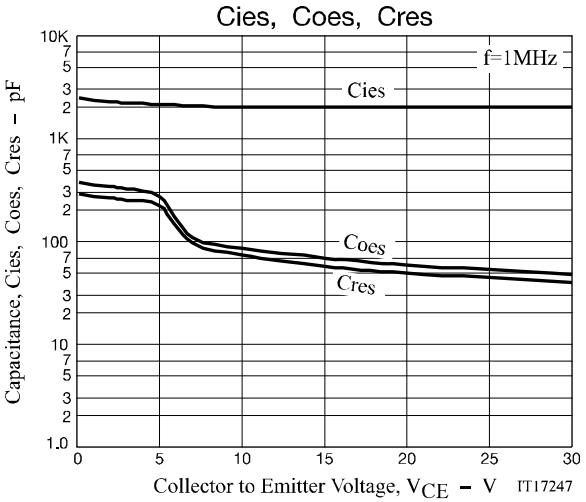

VCE – VGE
Tc=25°C
IC=90A
24A
12A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17207

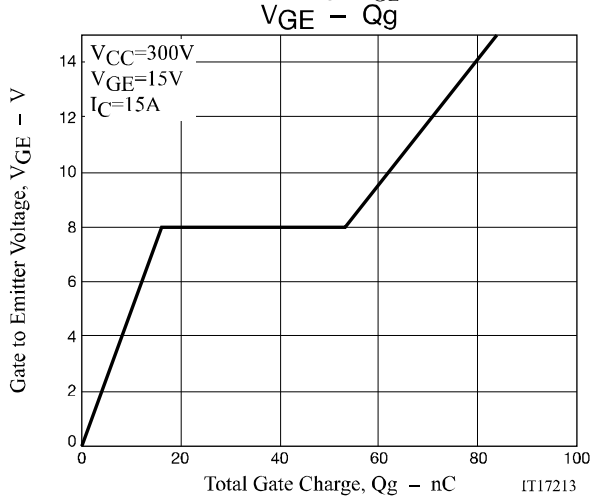

VCE – VGE
Tc=100°C
IC=90A
24A
12A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17208

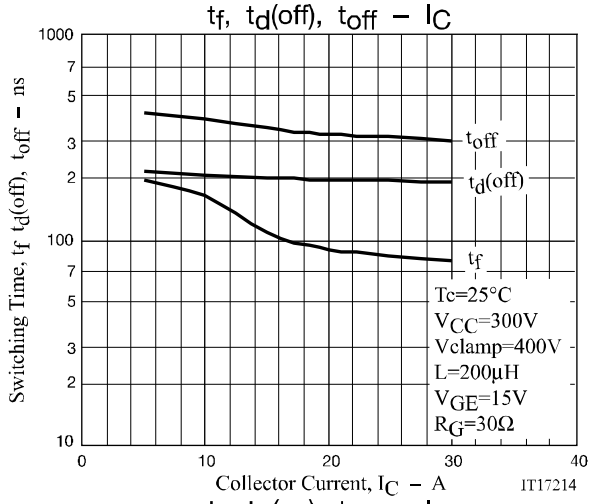

VCE – VGE
Tc= –40°C
IC=90A
24A
12A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17209

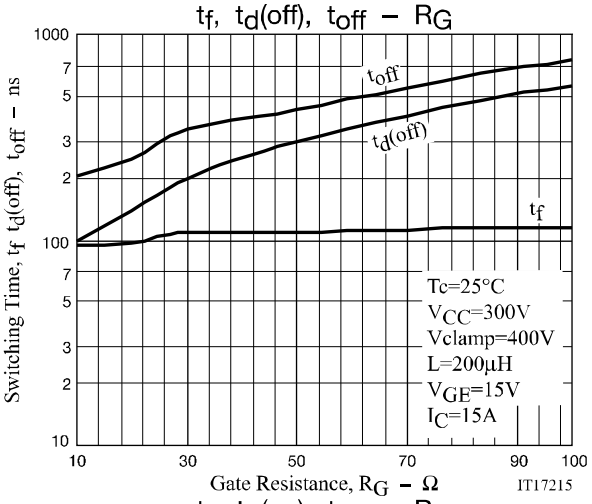

VCE – VGE
Tc=125°C
IC=90A
24A
12A
Collector to Emitter Voltage, VCE – V
Gate to Emitter Voltage, VGE – V
IT17210

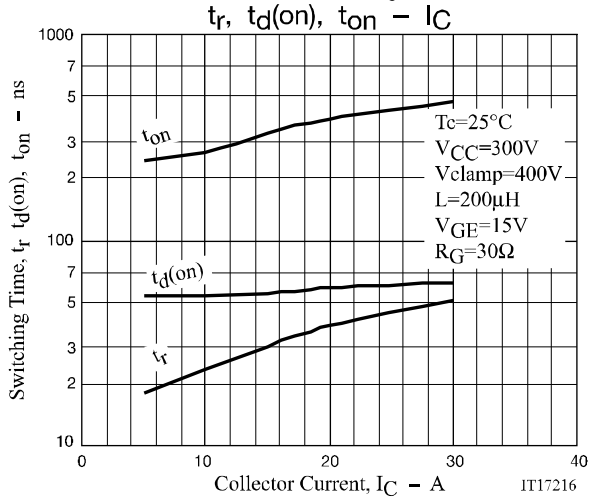

IC – VGE
VCE=20V
25°C
–40°C
Tc=125°C
100°C
Collector Current, IC – A
Gate to Emitter Voltage, VGE – V
IT17246

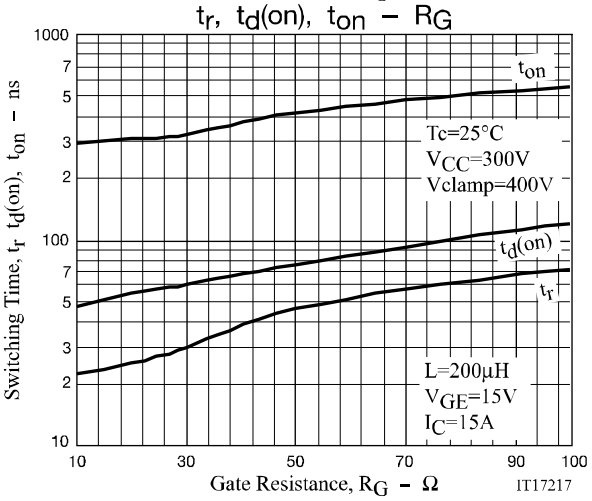

Cies, Coes, Cres
f=1MHz
Cies
Coes
Cres
Capacitance, Cies, Coes, Cres – pF
Collector to Emitter Voltage, VCE – V
IT17247


VGE – Qg
VCC=300V
VGE=15V
IC=15A
Gate to Emitter Voltage, VGE – V
Total Gate Charge, Qg – nC
IT17213

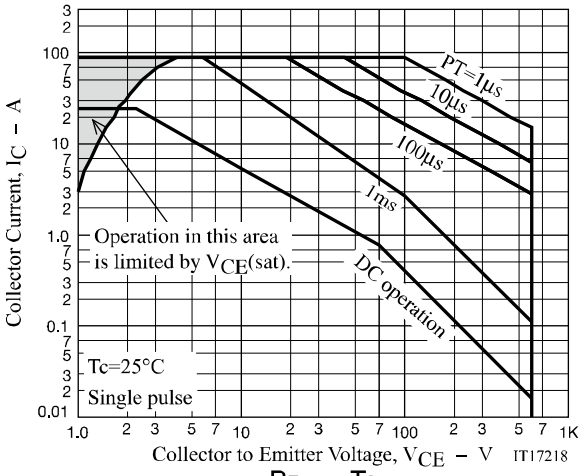

tf, td(off), toff – IC
toff
td(off)
tf
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
RG=30Ω
Switching Time, tf, td(off), toff – ns
Collector Current, IC – A
IT17214


tf, td(off), toff – RG
toff
td(off)
tf
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
IC=15A
Switching Time, tf, td(off), toff – ns
Gate Resistance, RG – Ω
IT17215

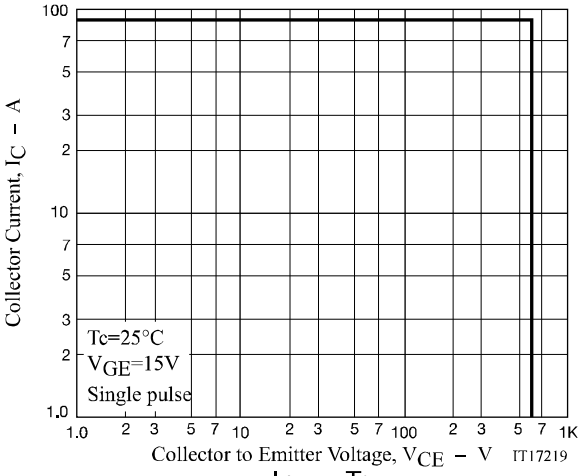

tr, td(on), ton – IC
ton
td(on)
tr
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
RG=30Ω
Switching Time, tr, td(on), ton – ns
Collector Current, IC – A
IT17216


tr, td(on), ton – RG
ton
td(on)
tr
Tc=25°C
VCC=300V
Vclamp=400V
L=200µH
VGE=15V
IC=15A
Switching Time, tr, td(on), ton – ns
Gate Resistance, RG – Ω
IT17217

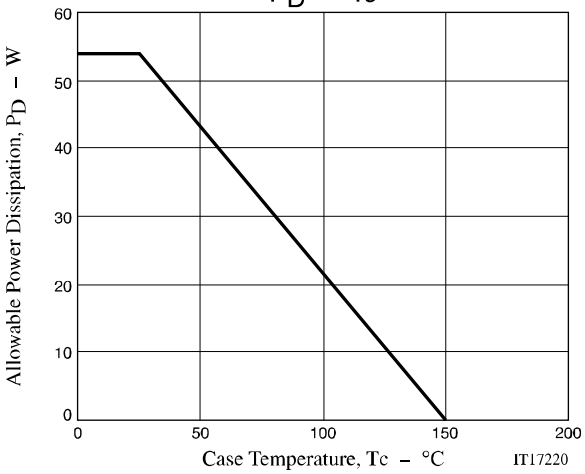
Forward Bias A S O



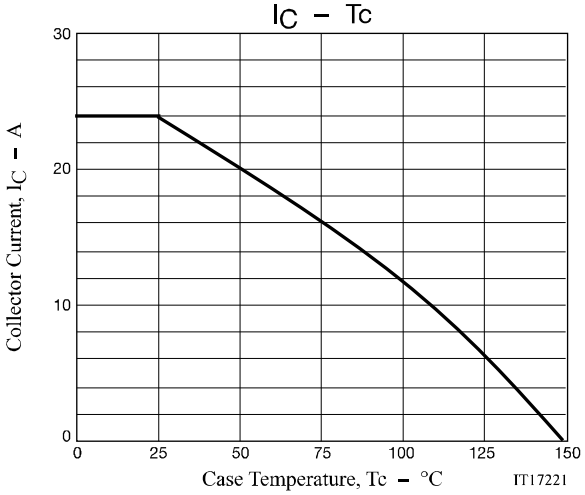
Reverse Bias A S O



P_D – Tc



I_C – Tc



Package Dimensions

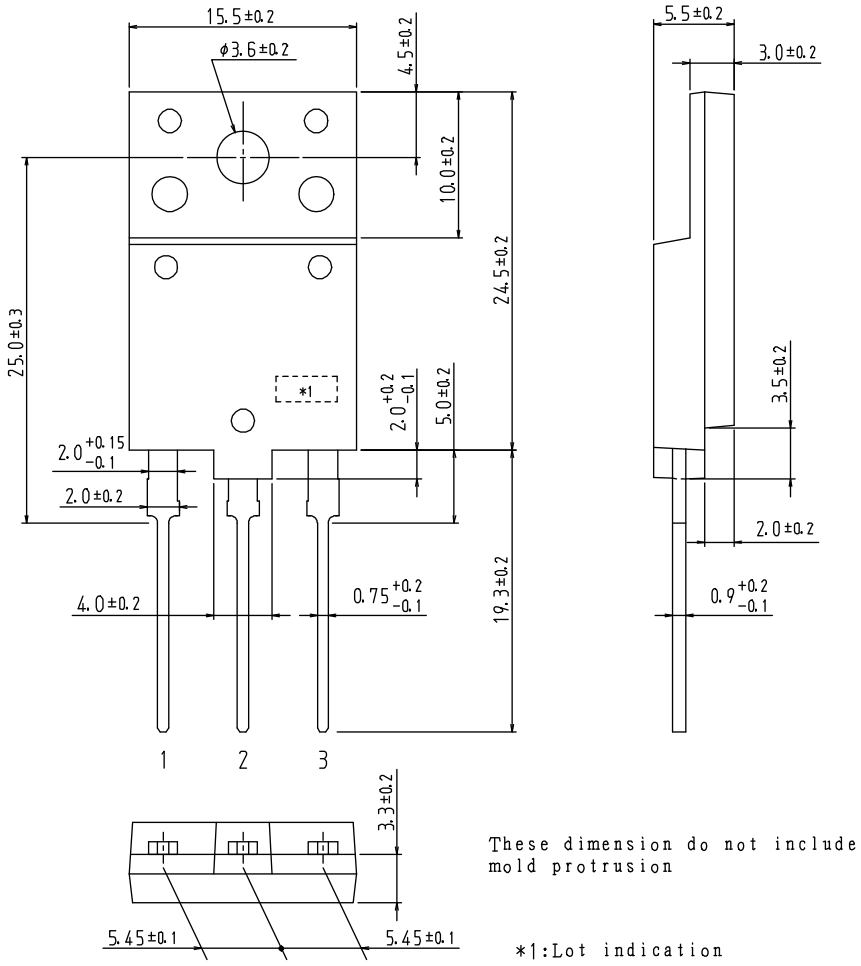
NGTG12N60TF1G

TO-3PF-3L

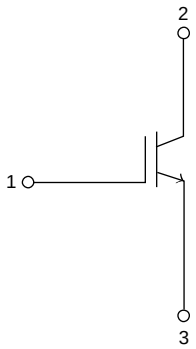
CASE 340AH
ISSUE O

Unit : mm

1: Gate
2: Collector
3: Emitter



Electrical Connection



Ordering & Package Information

Device	Package	Shipping	note
NGTG12N60TF1G	TO-3PF-3L SC-94	30 pcs. / tube	Pb-Free

Marking

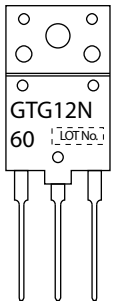


Fig.1 Switching Time Test Circuit

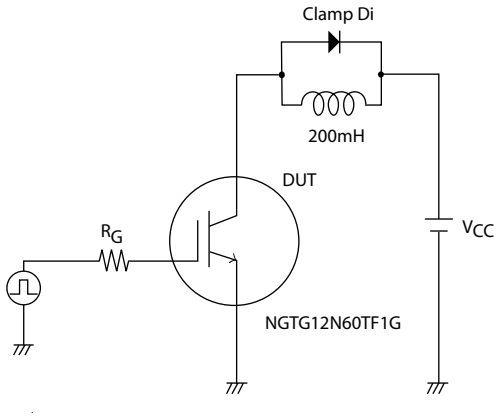
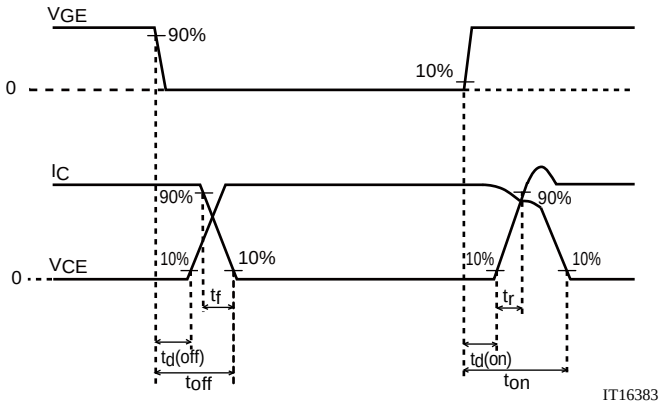


Fig.2 Timing Chart



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