



NGTB20N60L2TF1G

N-Channel IGBT

600V, 20A, $V_{CE(sat)}$;1.45V TO-3PF-3L
with Low V_F Switching Diode

ON Semiconductor®

<http://onsemi.com>

Features

- IGBT $V_{CE(sat)}$ =1.45V typ. (I_C =20A, V_{GE} =15V)
- IGBT t_f =67ns typ.
- Diode V_F =1.5V typ. (I_F =20A)
- Diode t_{rr} =70ns typ.
- Adaption of full isolation type package
- Enhancement type
- 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}			±20	V
Collector Current (DC)	I _C *1	Limited by T _{jmax}	@ T _c =25°C *2	40	A
			@ T _c =100°C *2	20	A
Collector Current (Pulse)	I _{CP}	Pulse width Limited by T _{jmax}		80	A
Diode Average Output Current	I _O			20	A
Allowable Power Dissipation	P _D	T _c =25°C (Our ideal heat dissipation condition) *2		64	W

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

Continued on next page.

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

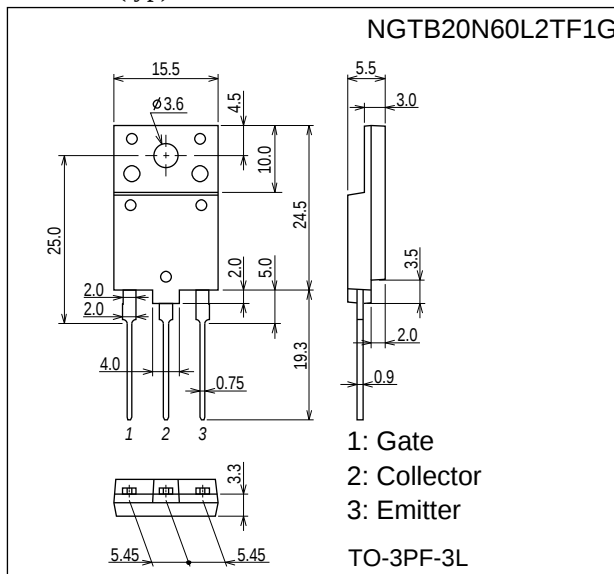
*2 Our condition is radiation from backside.

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

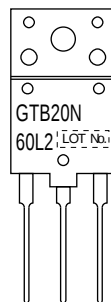
unit : mm (typ) 7538-001



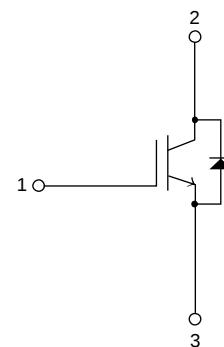
Ordering & Package Information

Device	Package	Shipping	note
NGTB20N60L2TF1G	TO-3PF-3L SC-94	30 pcs. / tube	Pb-Free

Marking



Electrical Connection



NGTB20N60L2TF1G

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Junction Temperature	Tj		175	°C
Storage Temperature	Tstg		- 55 to +175	°C

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	IC=500μA, VGE=0V	600			V
Collector to Emitter Cut off Current	ICES	VCE=600V, VGE=0V Tc=25°C Tc=150°C			10	μA
					1	mA
Gate to Emitter Leakage Current	IGES	VGE=±20V, VCE=0V			±100	nA
Gate to Emitter Threshold Voltage	VGE(th)	VCE=20V, IC=250μA	4.5		6.5	V
Collector to Emitter Saturation Voltage	VCE(sat)	VGE=15V, IC=20A Tc=25°C Tc=150°C		1.45	1.65	V
				1.8		V
Diode Forward Voltage	VF	IF=20A		1.5		V
Input Capacitance	Cies	VCE=20V, f=1MHz		2000		pF
Output Capacitance	Coes			60		pF
Reverse Transfer Capacitance	Cres			50		pF
Turn-ON Delay Time	td(on)			60		ns
Rise Time	tr	VCC=300V, IC=20A RG=30Ω, L=200μH VGE=0V/15V, Vclamp=400V See Fig.1, Fig.2		37		ns
Turn-ON Time	ton			400		ns
Turn-OFF Delay Time	td(off)			193		ns
Fall Time	tf			67		ns
Turn-OFF Time	toff			281		ns
Total Gate Charge	Qg	VCE=300V, VGE=15V, IC=20A		84		nC
Gate to Emitter Charge	Qge			16		nC
Gate to Collector "Miller" Charge	Qgc			37		nC
Diode Reverse Recovery Time	trr	IF=10A, di/dt=100A/μs, VCC=50V See Fig.3		70		ns

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

Parameter	Symbol	Conditions	Ratings	Unit
Thermal Resistance IGBT (junction- case)	Rth(j-c)(IGBT)	Tc=25°C (our ideal heat dissipation condition)*2	2.33	°C /W
Thermal Resistance Diode (junction- case)	Rth(j-c)(Diode)	Tc=25°C (our ideal heat dissipation condition)*2	2.36	°C /W
Thermal Resistance (junction- atmosphere)	Rth(j-a)		47.5	°C /W

Fig.1 Switching Time Test Circuit

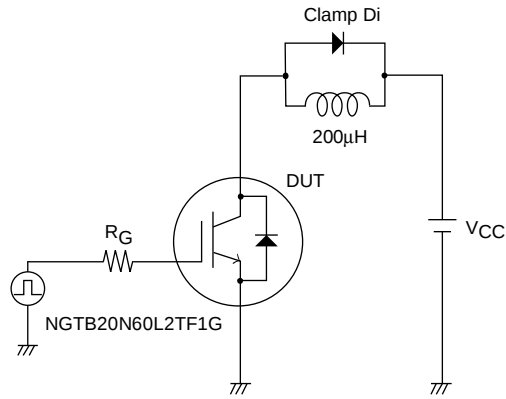


Fig.2 Timing Chart

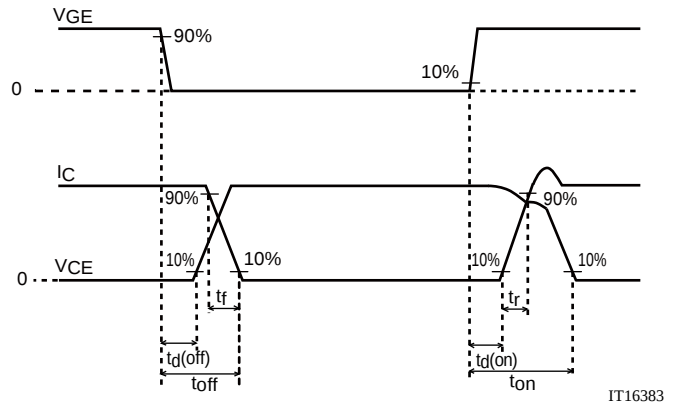
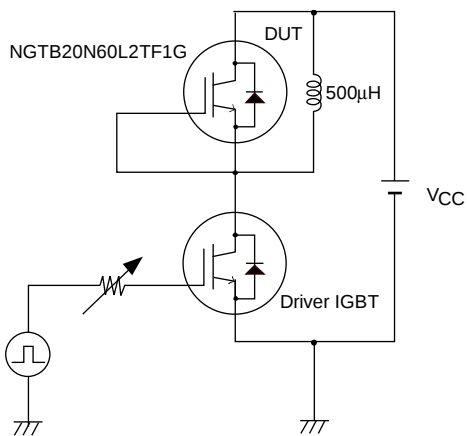
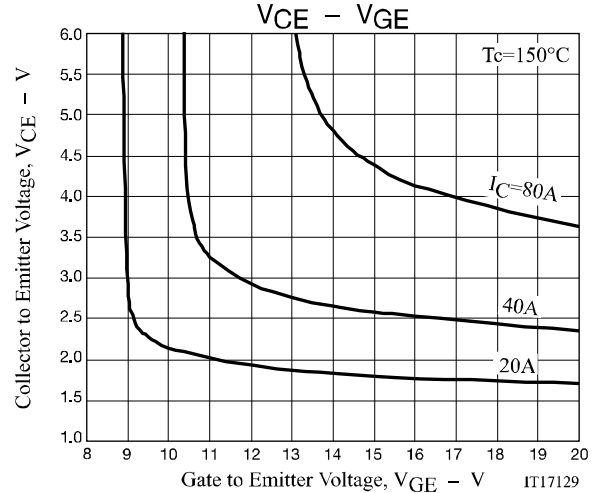
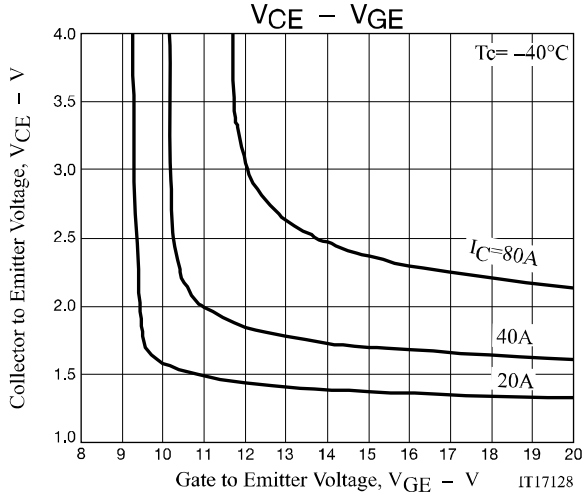
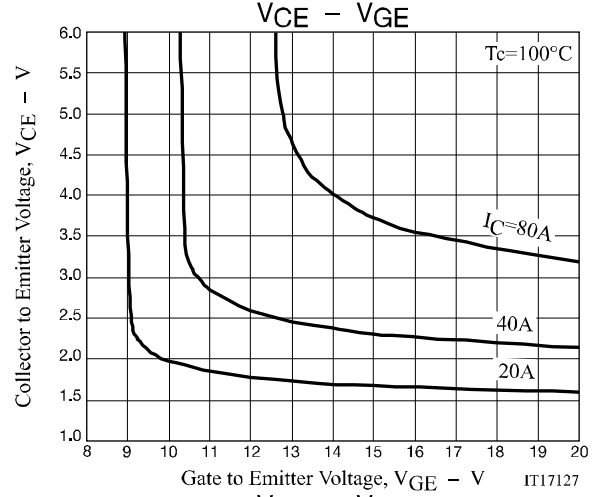
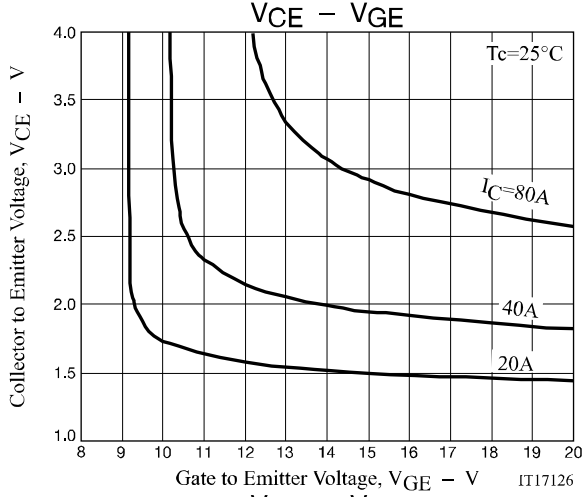
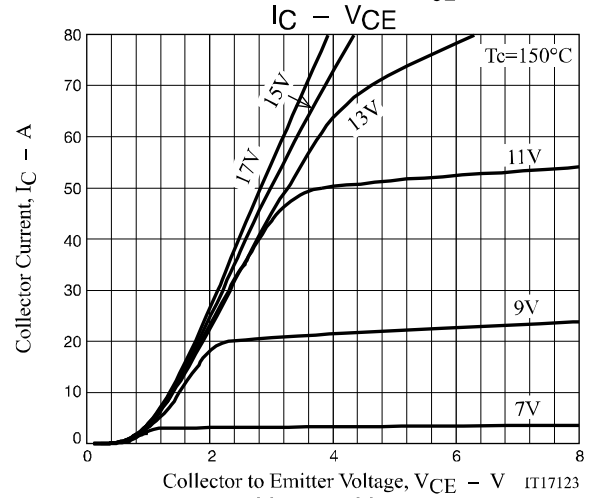
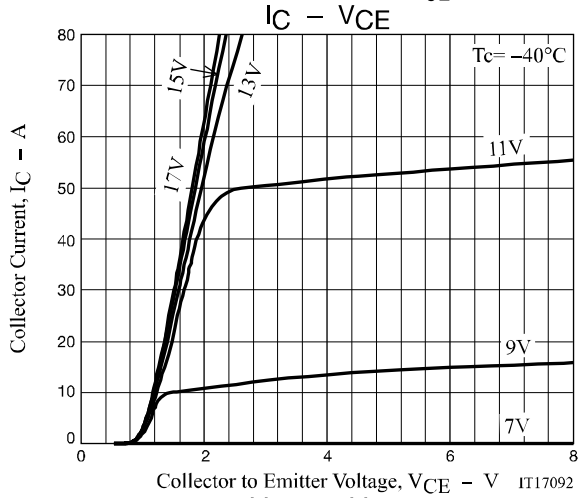
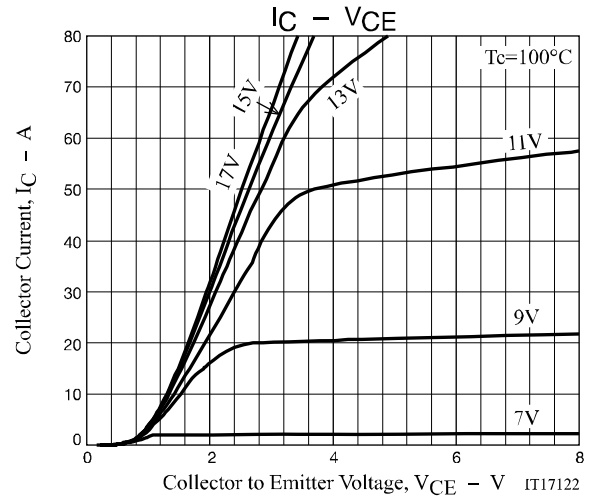
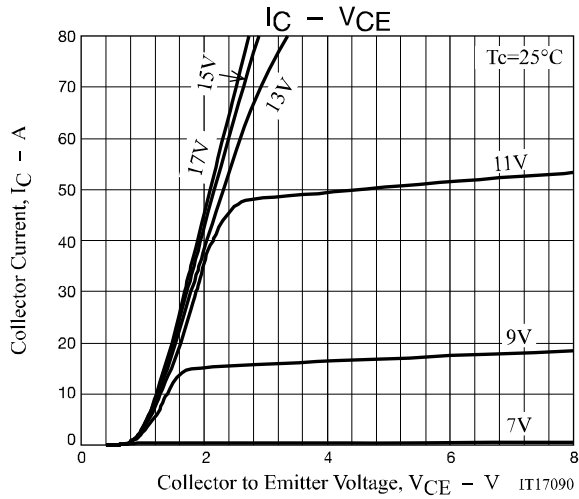


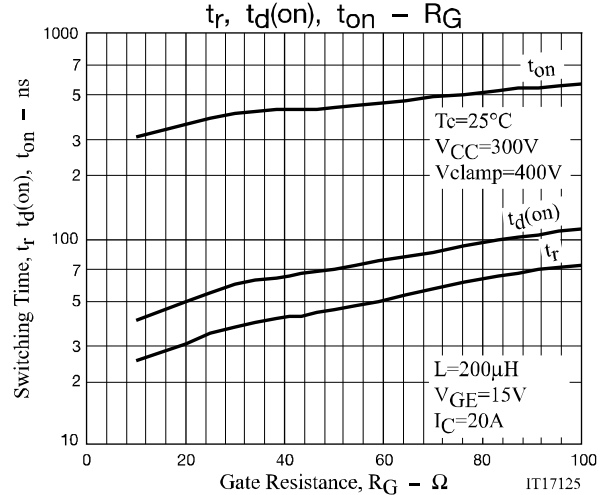
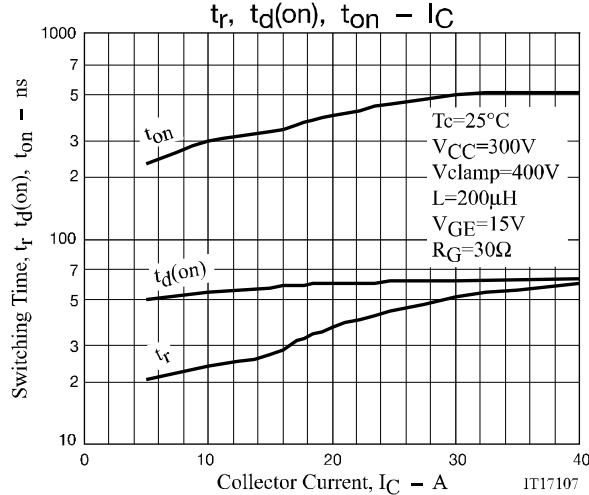
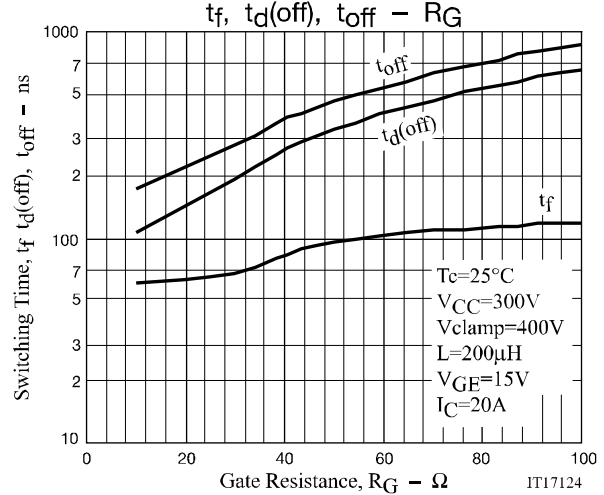
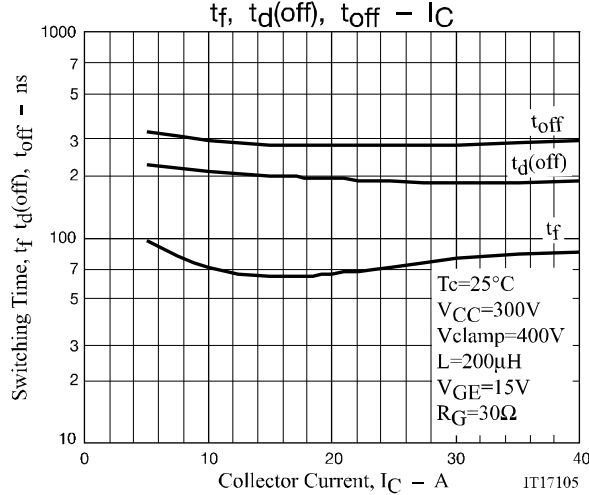
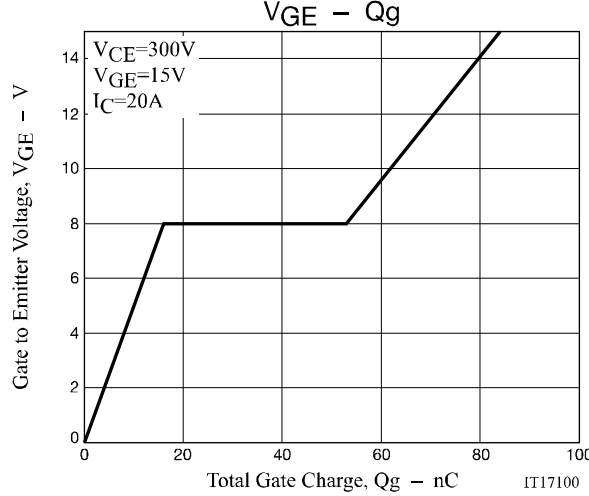
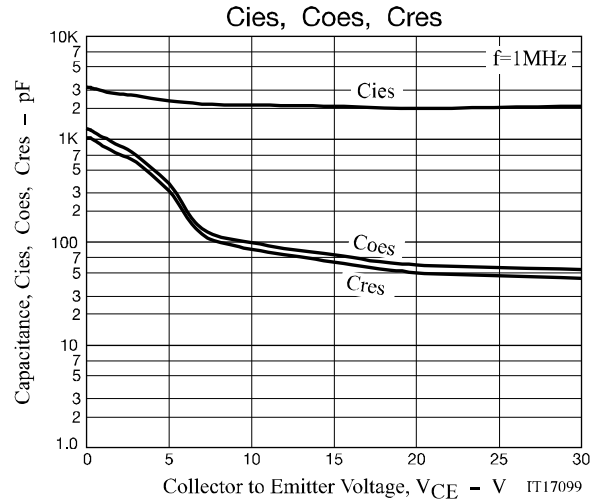
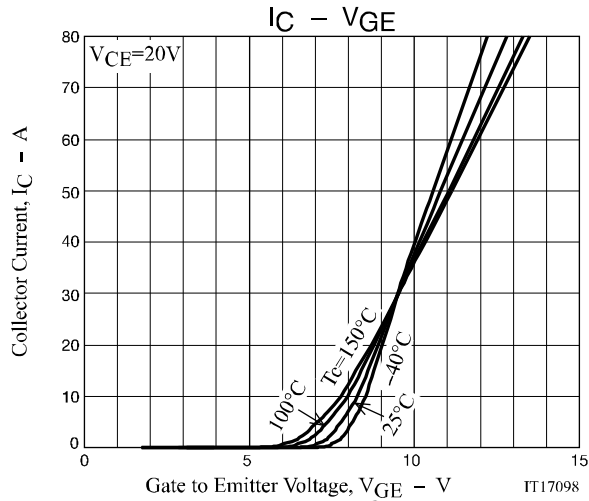
Fig.3 Reverse Recovery Time Test Circuit



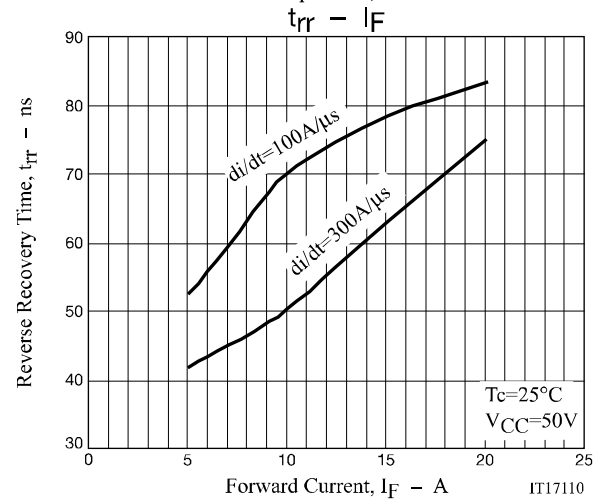
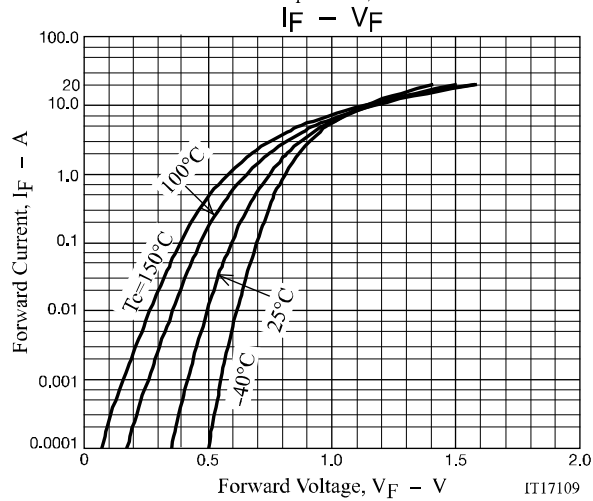
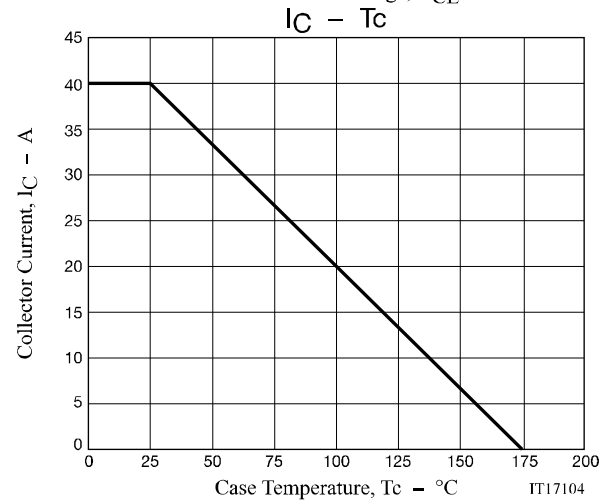
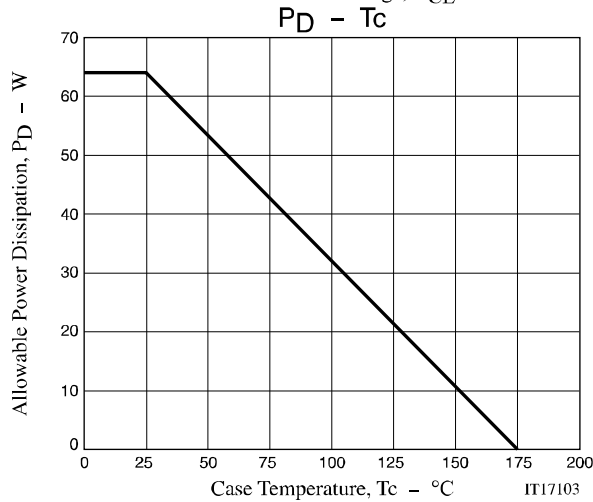
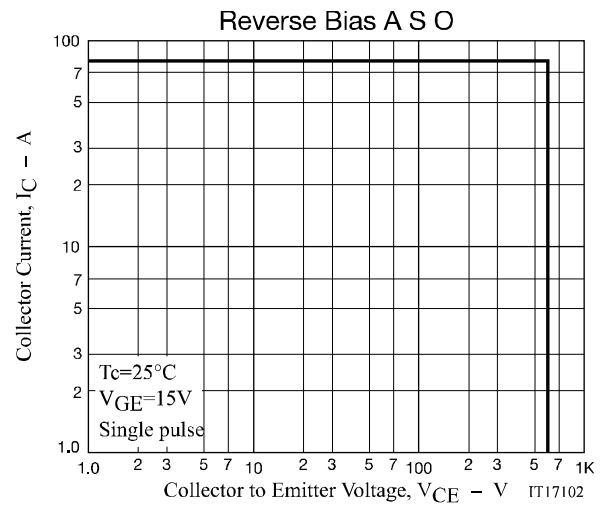
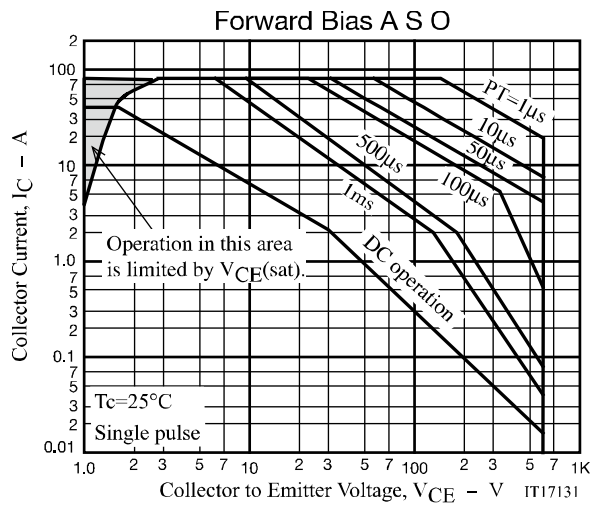
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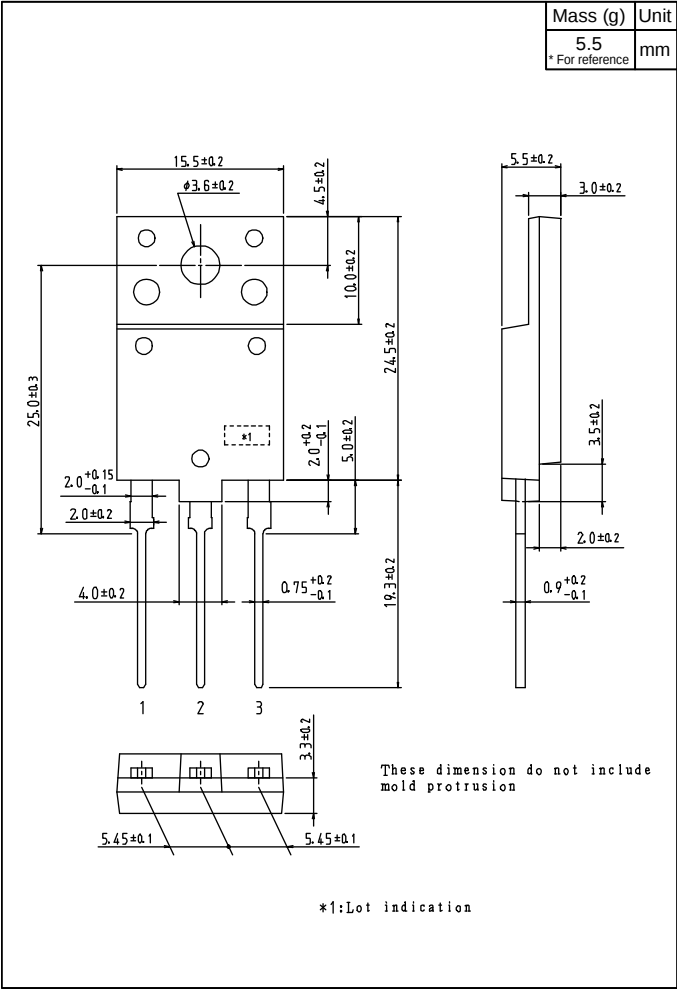
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Outline Drawing
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