

# NGTB15N60R2FG

## IGBT 600V, 14A, N-Channel



ON Semiconductor®

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### Features

- Reverse Conducting II IGBT
- IGBT  $V_{CE(sat)}=1.85V$  typ. ( $I_C=15A$ ,  $V_{GE}=15V$ )
- IGBT  $t_f=75ns$  typ.
- Diode  $V_F=1.7V$  typ. ( $I_F=15A$ )
- Diode  $t_{rr}=95ns$  typ.
- $10\mu s$  Short Circuit Capability

### Applications

- General Purpose Inverter

### Specifications

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

Parameter	Symbol	Value	Unit	
Collector to Emitter Voltage	$V_{CES}$	600	V	
Gate to Emitter Voltage	$V_{GES}$	$\pm 20$	V	
Collector Current (DC)	$I_C$ *1	@ $T_c=25^\circ C$ *2	24	A
Limited by $T_{jmax}$		@ $T_c=100^\circ C$ *2	14	A
Collector Current (Peak)	$I_{CP}$	60	A	
Pulse width Limited by $T_{jmax}$				
Diode Average Output Current	$I_O$	15	A	
Power Dissipation	$P_D$	54	W	
$T_c=25^\circ C$ (Our ideal heat dissipation condition) *2				
Junction Temperature	$T_j$	175	$^\circ C$	
Storage Temperature	$T_{stg}$	-55 to +175	$^\circ C$	

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

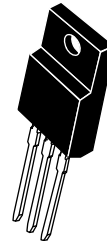
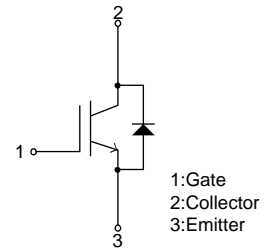
$$I_C(T_c) = \frac{T_{jmax} - T_c}{R_{th(j-c)} \times V_{CE(sat)}(I_C(T_c))}$$

\*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 aluminum.

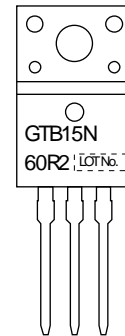
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### Electrical Connection N-Channel



TO-220F-3FS

### Marking



### ORDERING INFORMATION

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

# NGTB15N60R2FG

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

Parameter	Symbol	Conditions	Value			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		10	μA
			Tc=125°C		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		7.0	V
Collector to Emitter Saturation Voltage	VCE(sat)	VGE=15V, IC=15A		1.85	2.1	V
		VGE=15V, IC=14A	Tc=100°C	2.0	2.3	V
Forward Diode Voltage	VF	IF=15A		1.7	2.1	V
Input Capacitance	Cies	VCE=20V, f=1MHz		2000		pF
Output Capacitance	Coes			65		pF
Reverse Transfer Capacitance	Cres			50		pF
Turn-ON Delay Time	t <sub>d(on)</sub>			70		ns
Rise Time	t <sub>r</sub>	VCC=300V, IC=15A RG=30Ω, L=500μH VGE=0V/15V Vclamp=400V Tc=25°C See Fig.1, See Fig.2		40		ns
Turn-ON Time	ton			200		ns
Turn-OFF Delay Time	t <sub>d(off)</sub>			190		ns
Fall Time	t <sub>f</sub>			75		ns
Turn-OFF Time	toff			290		ns
Turn-ON Energy	Eon			550		μJ
Turn-OFF Energy	Eoff			220		μJ
Total Gate Charge	Qg			80		nC
Gate to Emitter Charge	Qge	VCE=300V, VGE=15V, IC=15A		16		nC
Gate to Collector "Miller" Charge	Qgc			38		nC
Diode Reverse Recovery Time	t <sub>rr</sub>	IF=15A, di/dt=300A/μs, VCC=300V, See Fig.3		95		ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

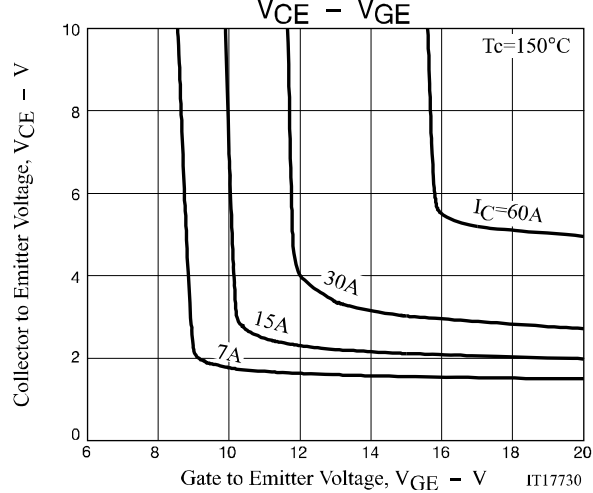
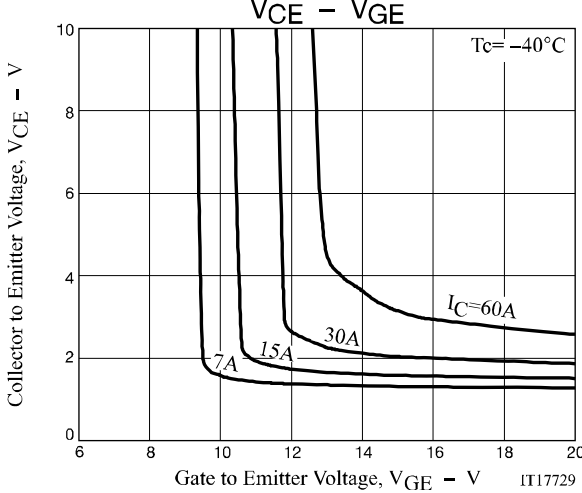
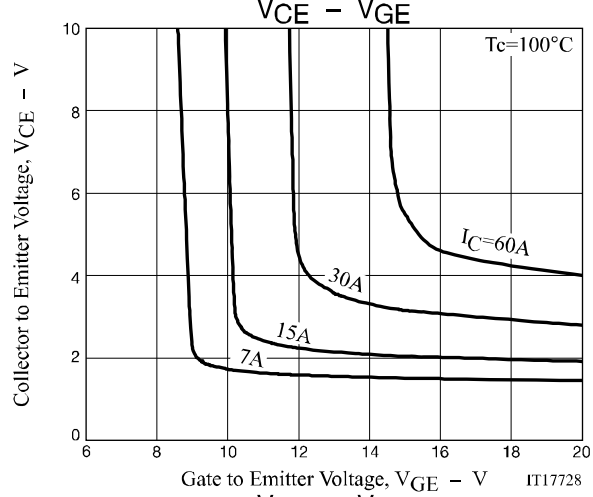
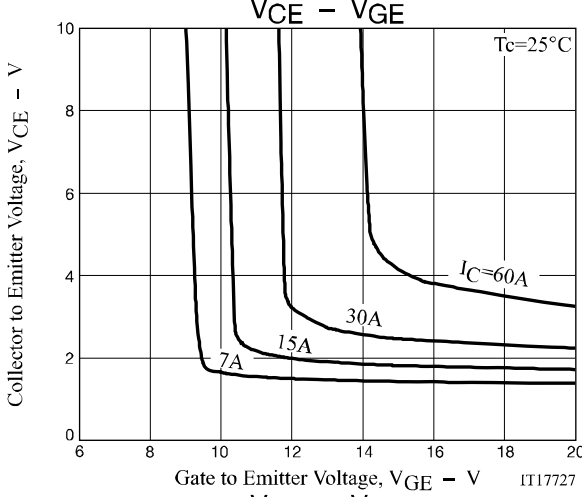
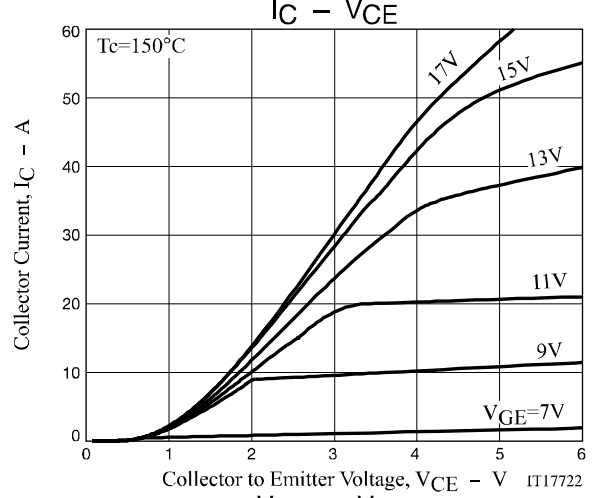
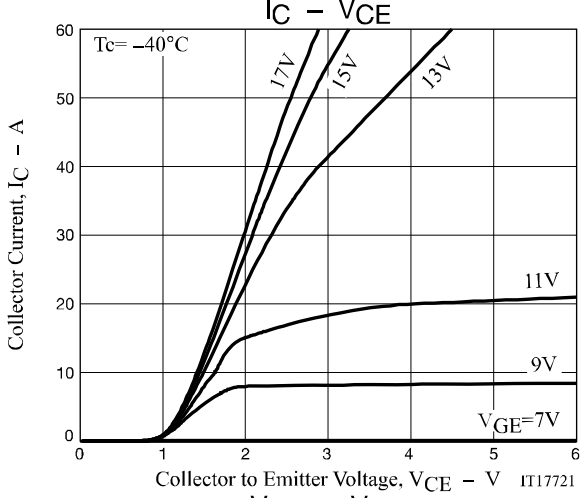
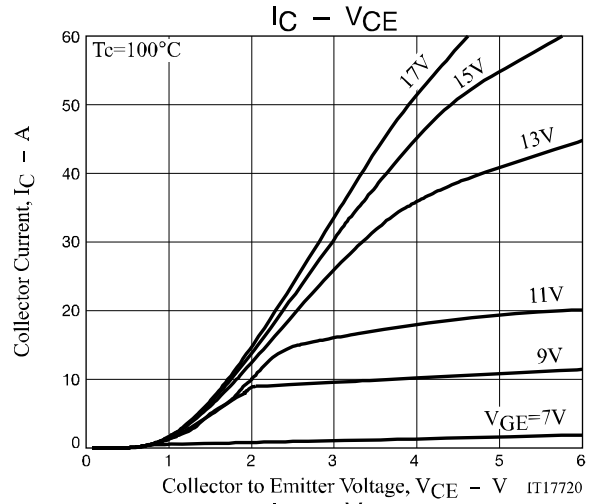
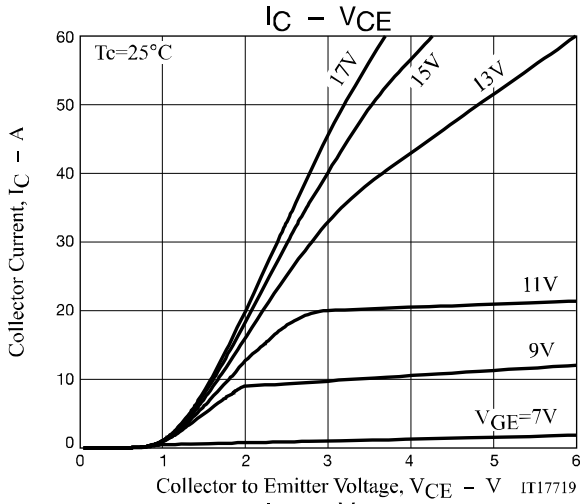
## Thermal Characteristics at Ta = 25°C, Unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Thermal Resistance IGBT (Junction to Case)	Rth(j-c) (IGBT)	Tc=25°C (Our ideal heat dissipation condition) *2	2.78	°C/W
Thermal Resistance (Junction to Ambient)	Rth(j-a)		69	°C/W

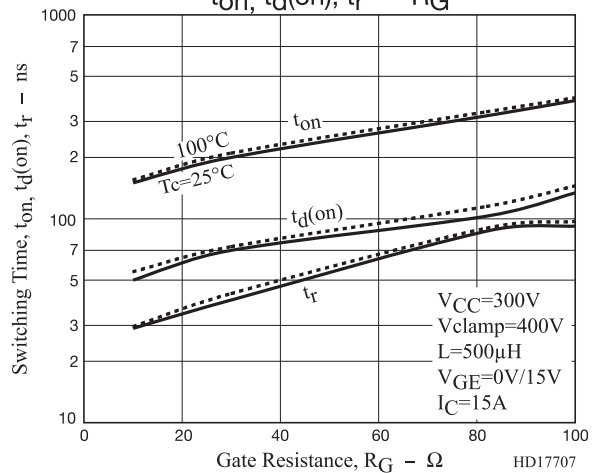
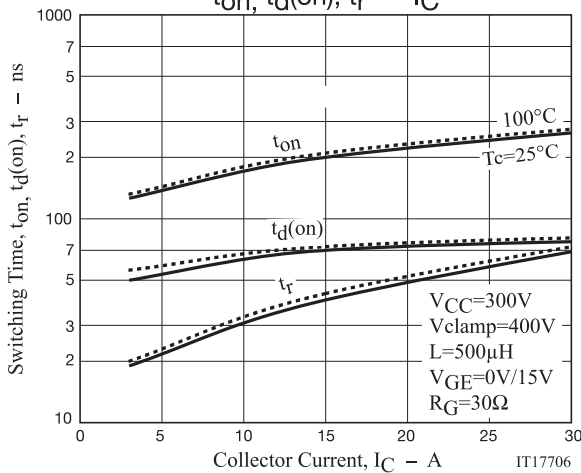
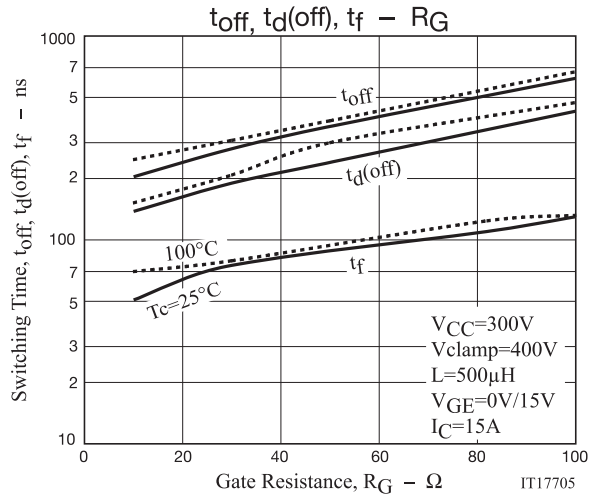
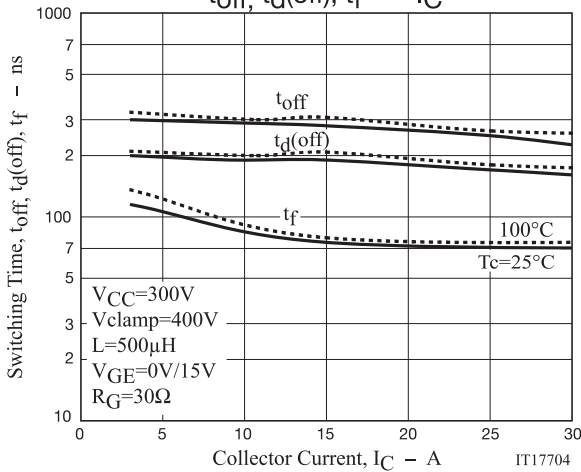
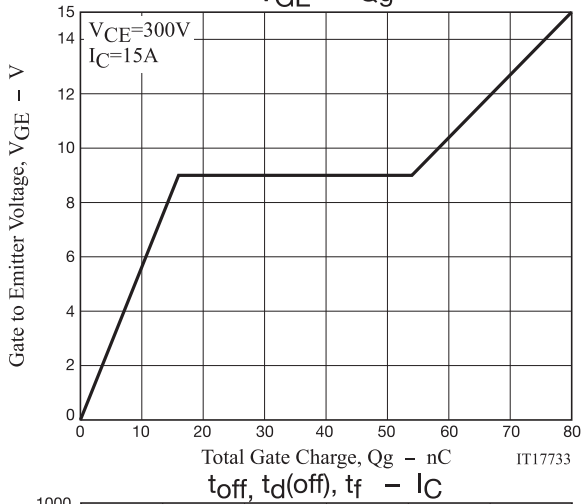
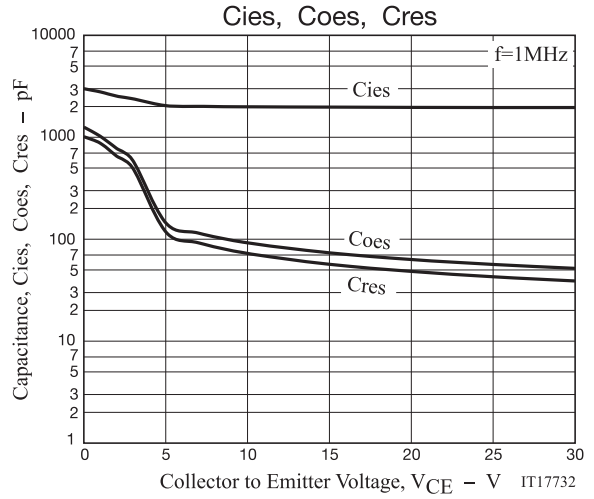
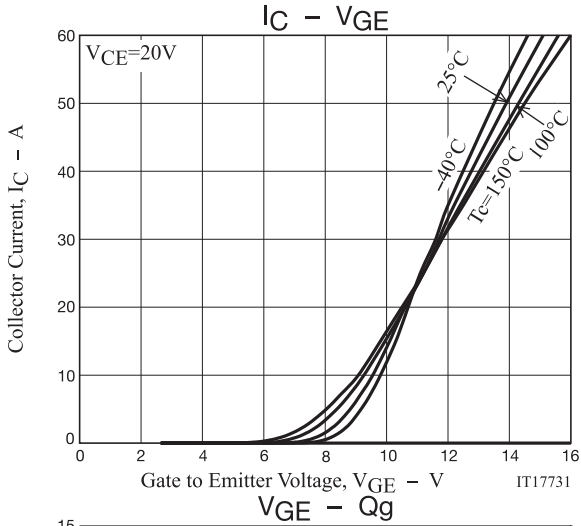
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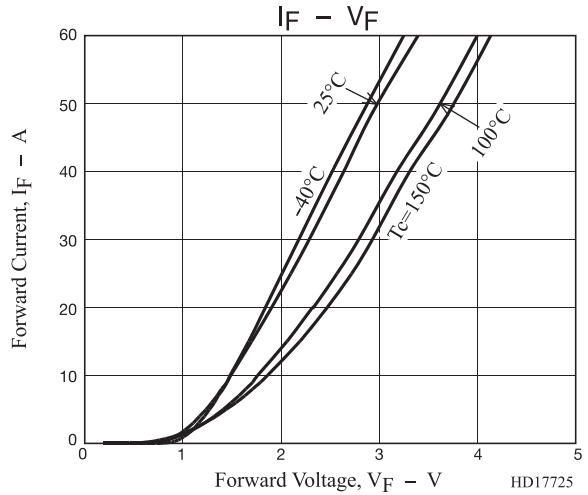
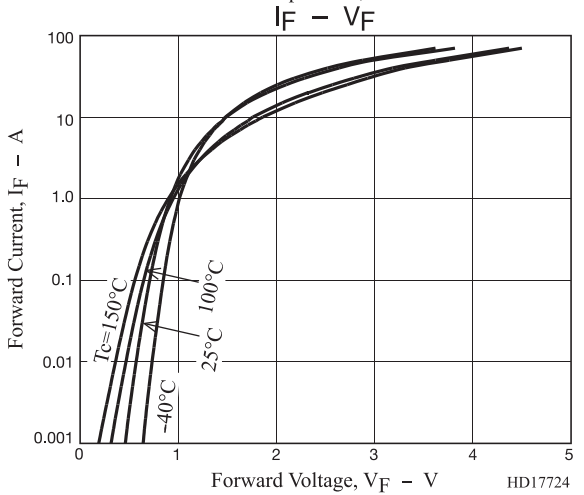
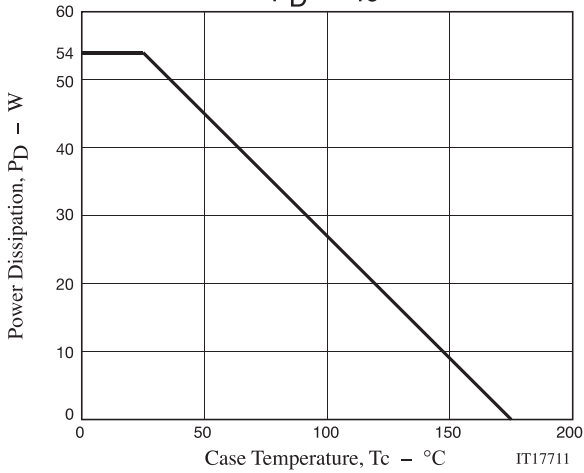
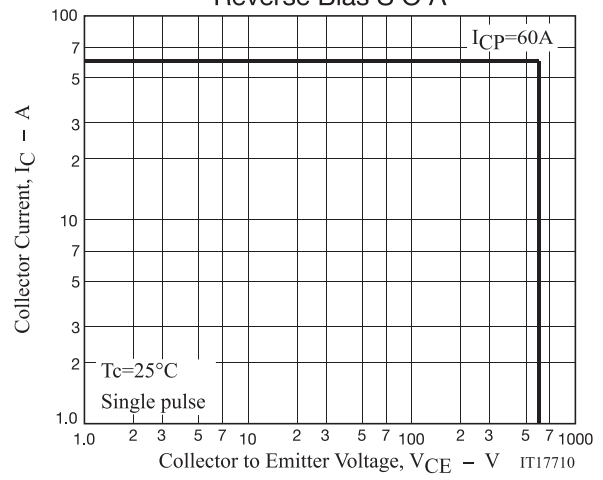
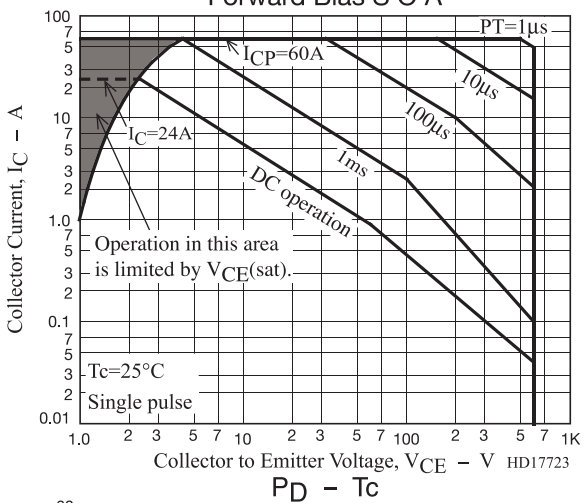
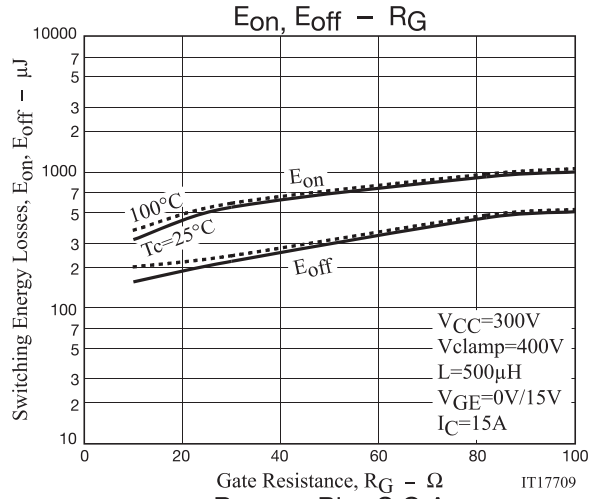
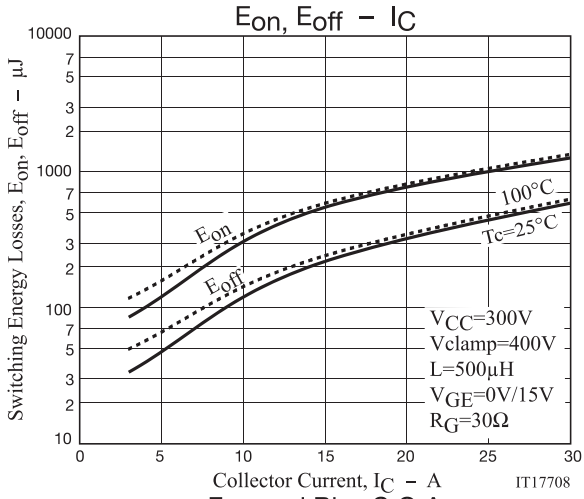
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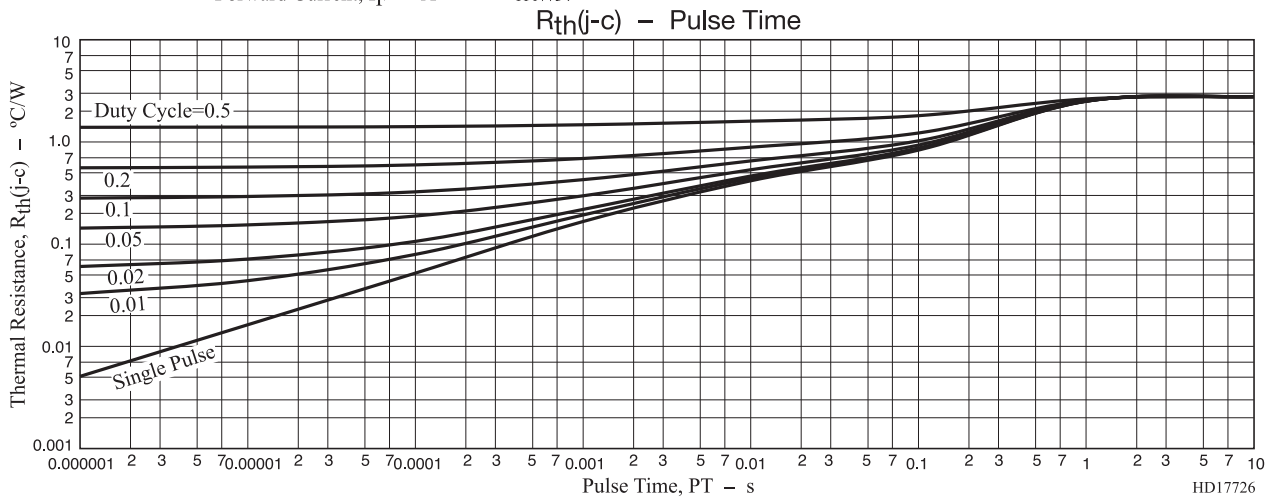
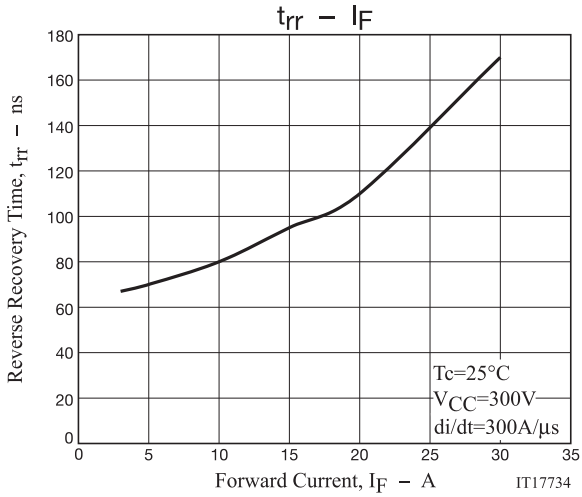


Fig.1 Switching Time Test Circuit

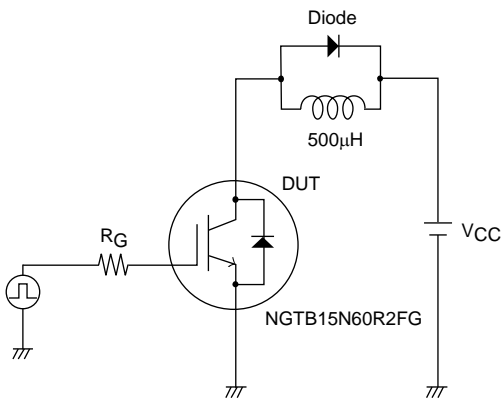


Fig.2 Timing Chart

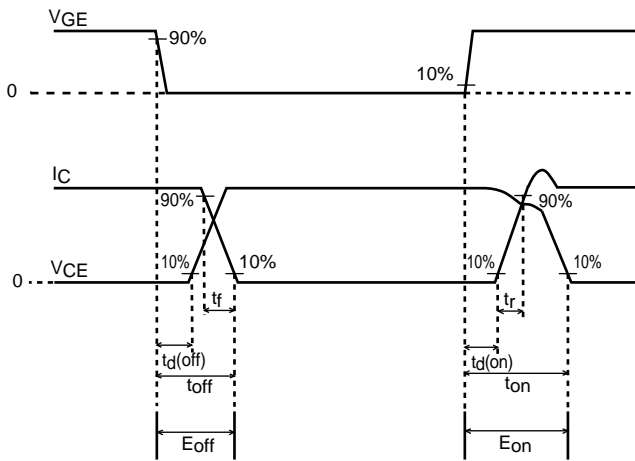
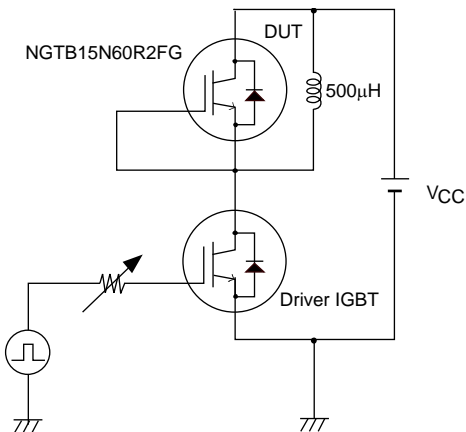


Fig.3 Reverse Recovery Time Test Circuit



# NGTB15N60R2FG

## Package Dimensions

NGTB15N60R2FG

### TO-220F-3FS

CASE 221AM

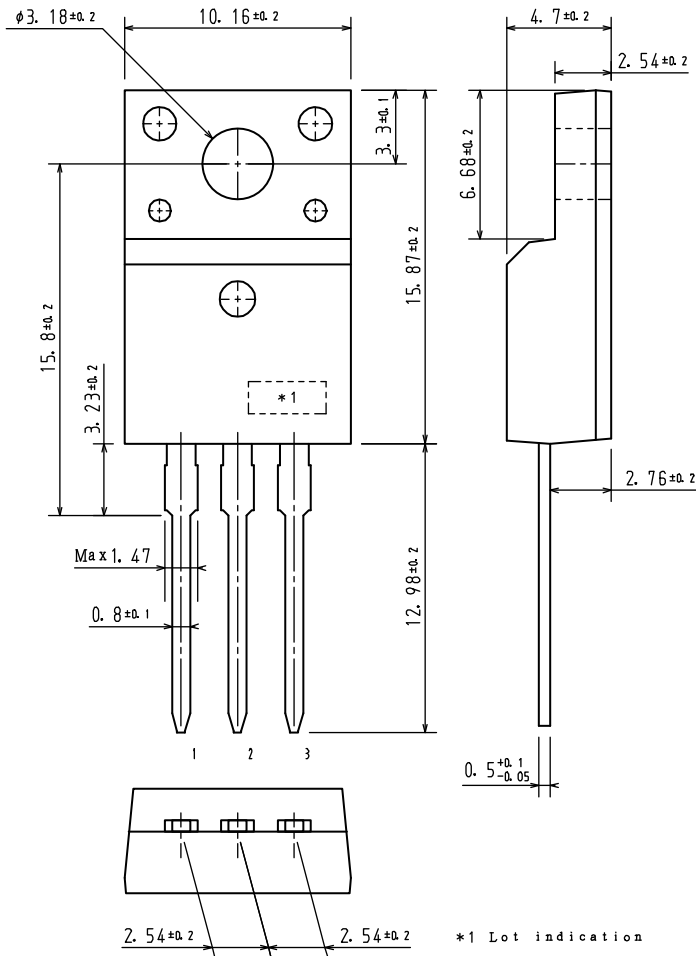
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unit : mm

1:Gate

2:Collector

3:Emitter



## ORDERING INFORMATION

Device	Package	Shipping	note
NGTB15N60R2FG	TO-220F-3FS	50 pcs. / tube	Pb-Free and Halogen Free

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