

# NGTB15N60R2FG

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



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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	24	A
Limited by $T_{jmax}$		@ $T_c=100^\circ C$ *2	14
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.

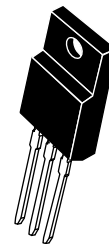
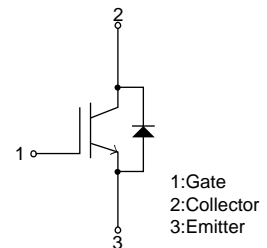
$$I_C(T_c) = \frac{T_{jmax} - T_c}{R_{th(j-c)} \times V_{CE(sat)}(I_C(T_c))}$$

\*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.

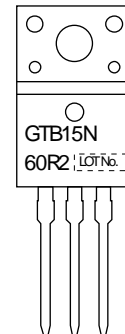
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 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.

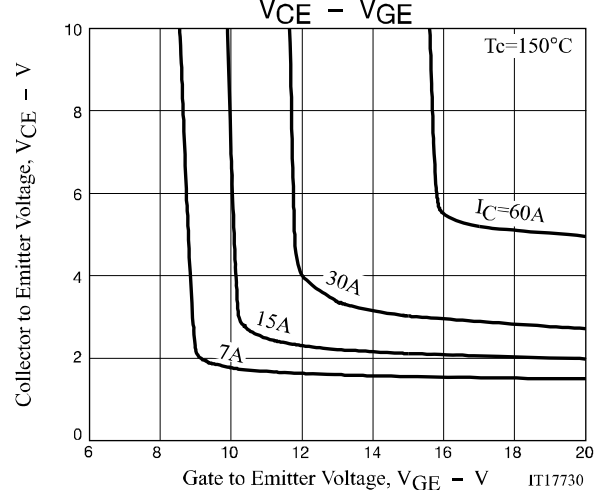
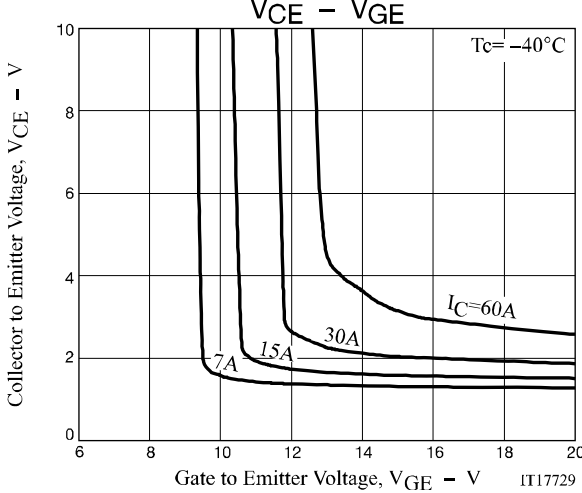
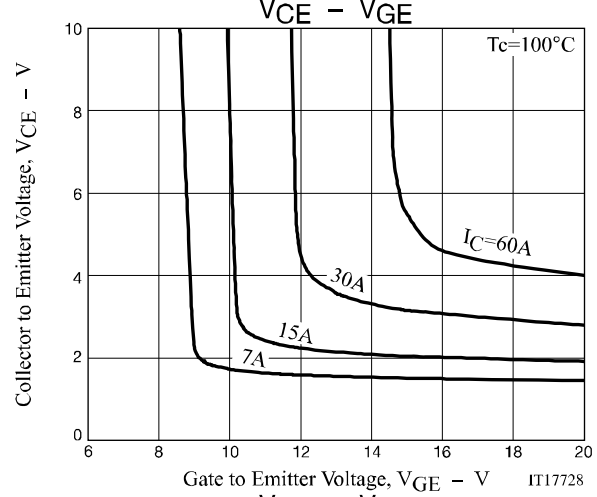
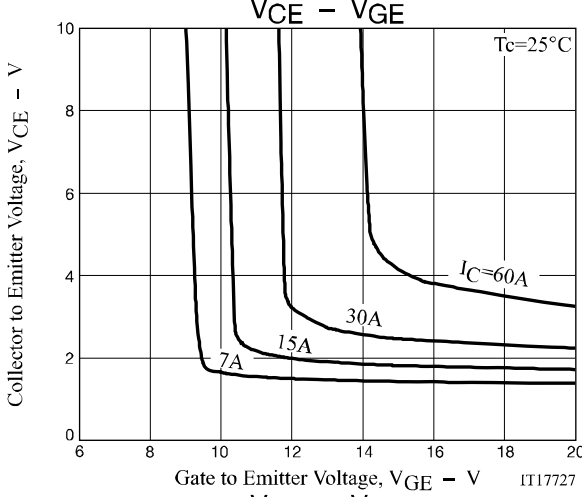
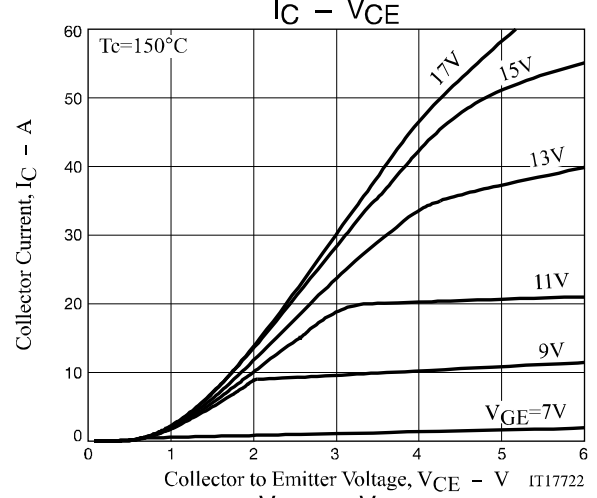
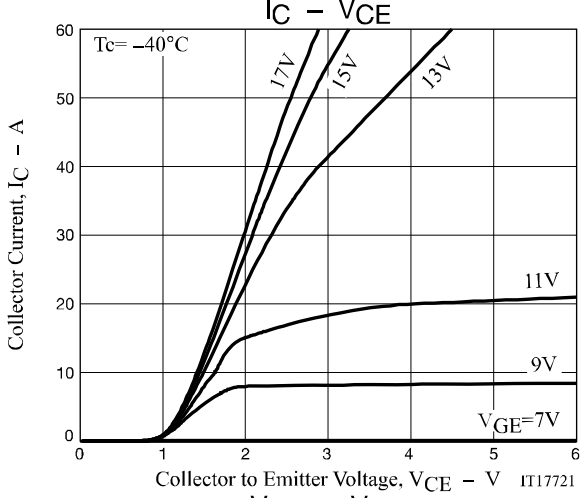
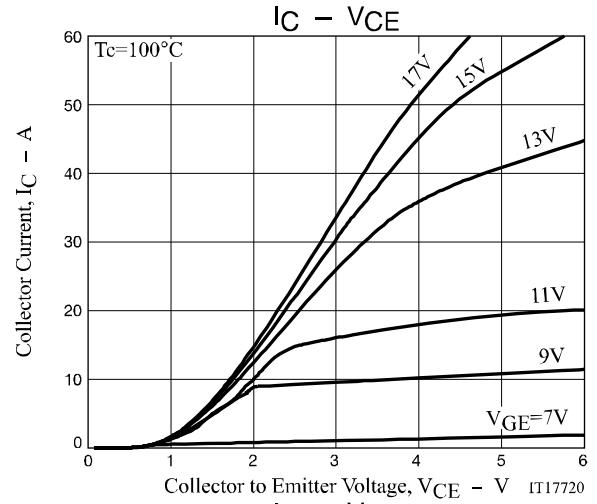
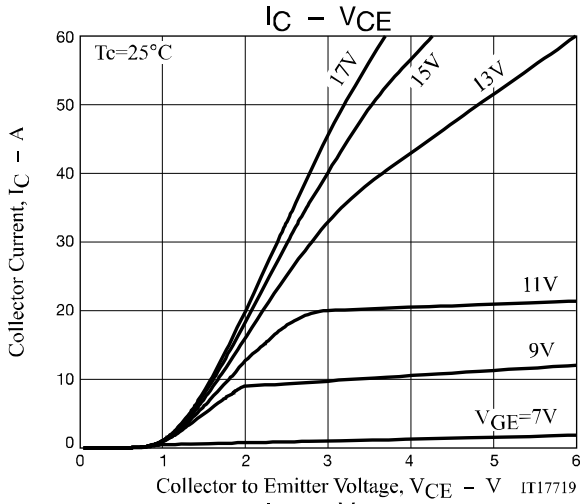
## Thermal Characteristics at Ta = 25°C, Unless otherwise specified

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

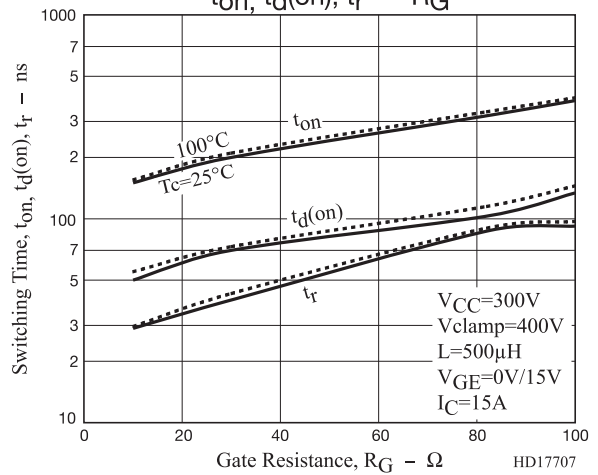
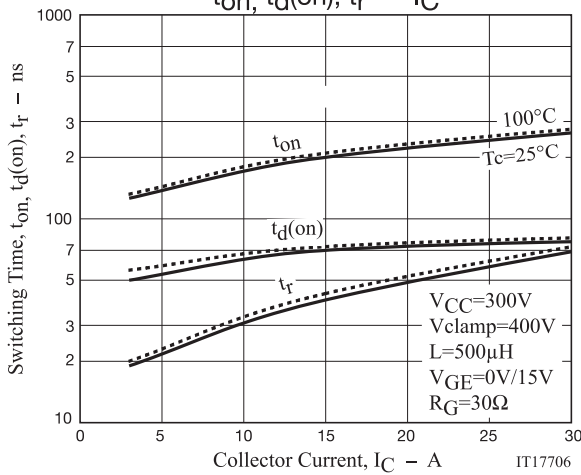
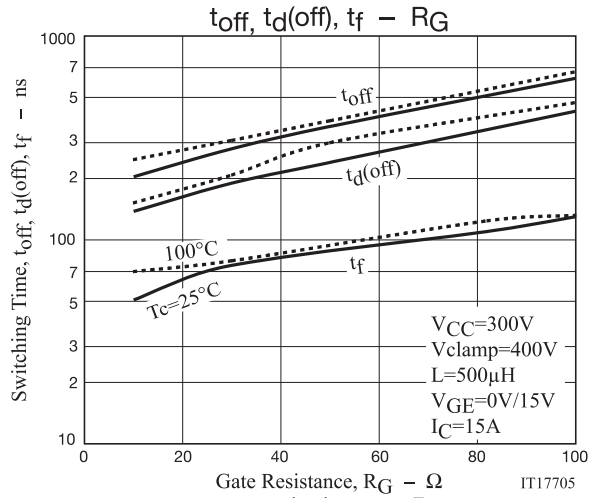
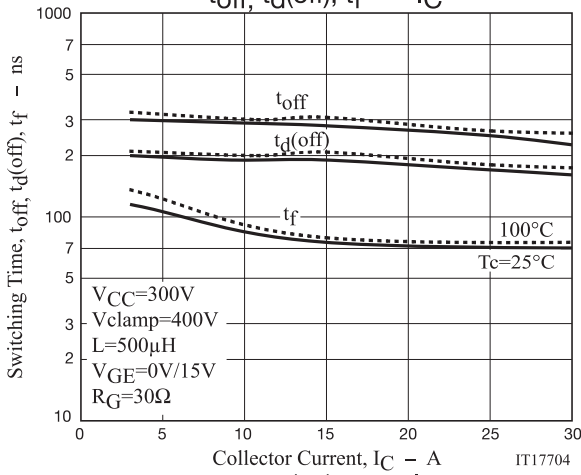
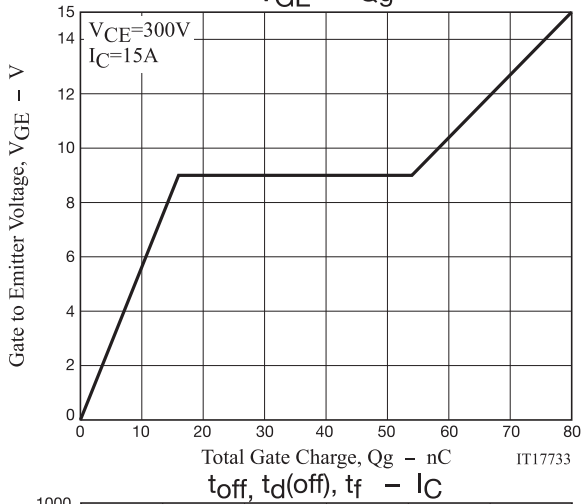
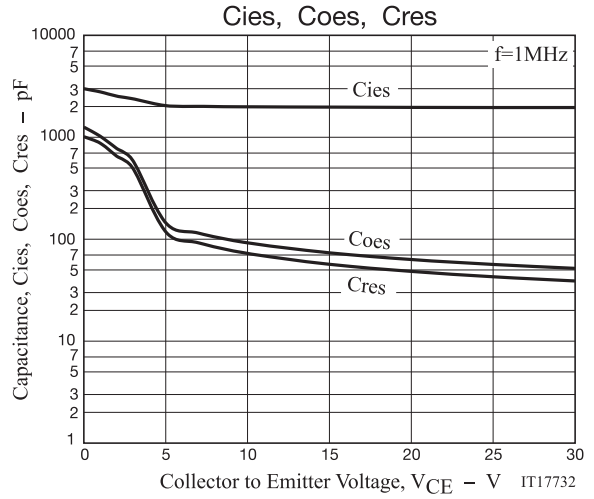
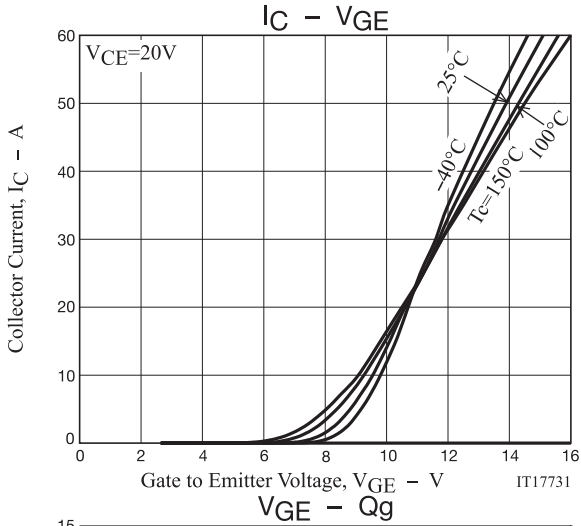
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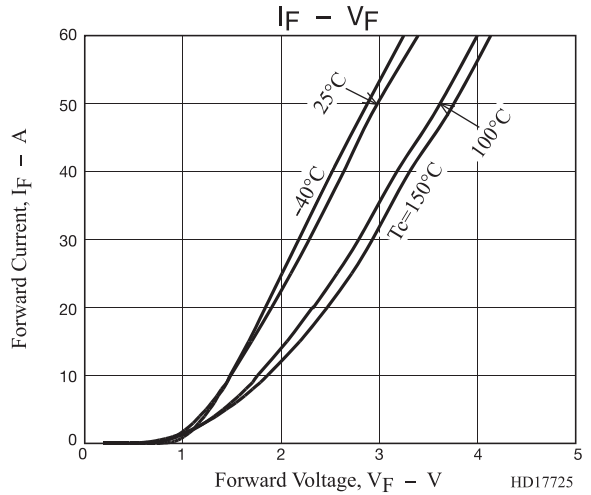
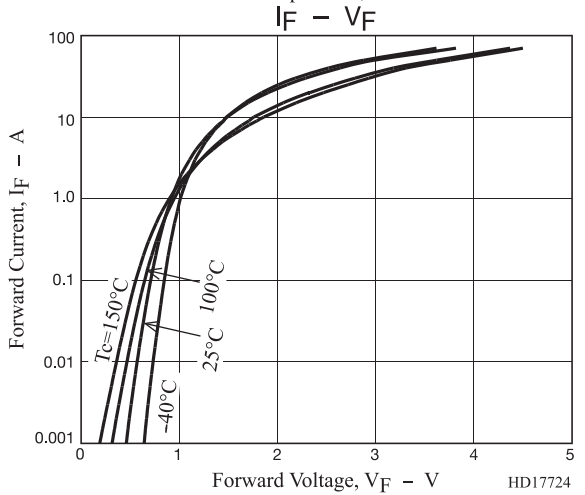
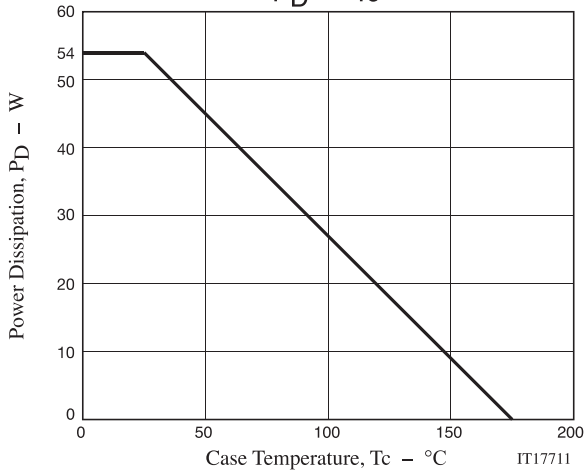
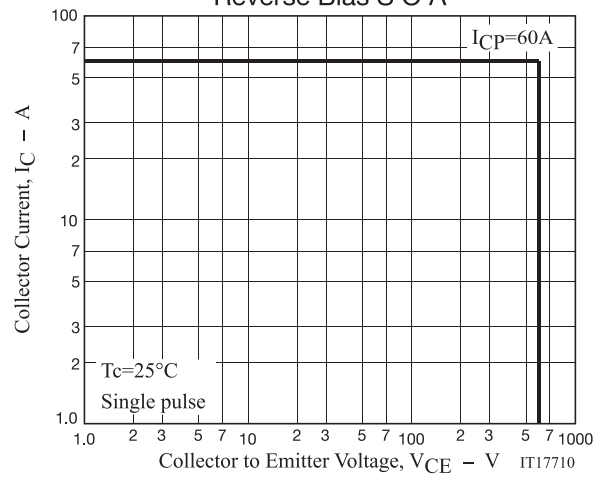
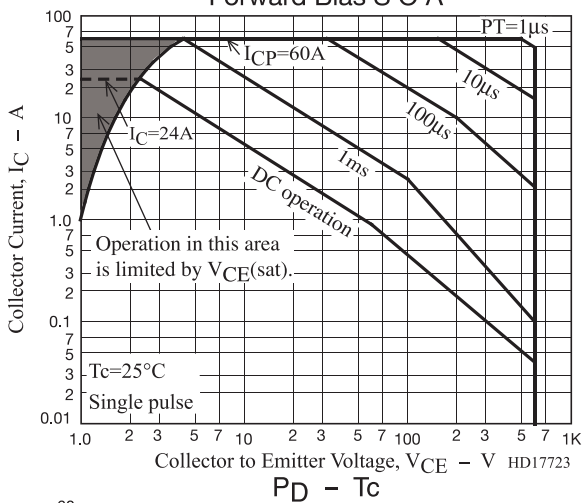
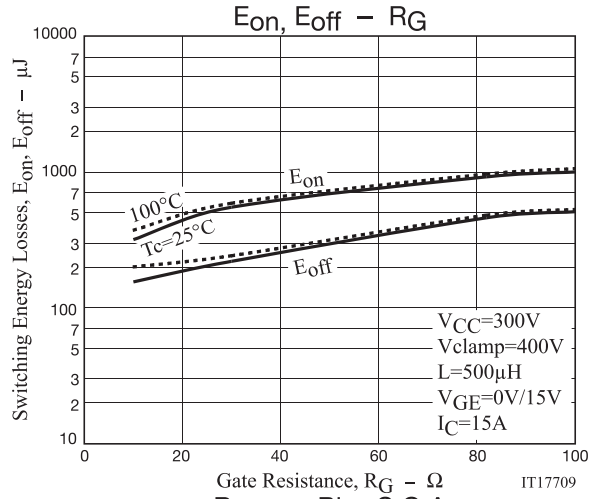
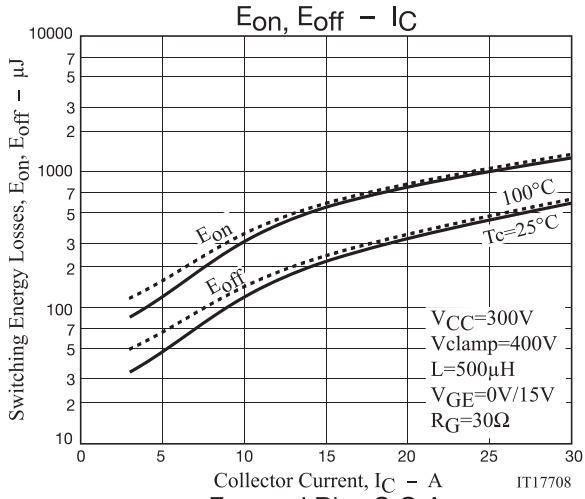
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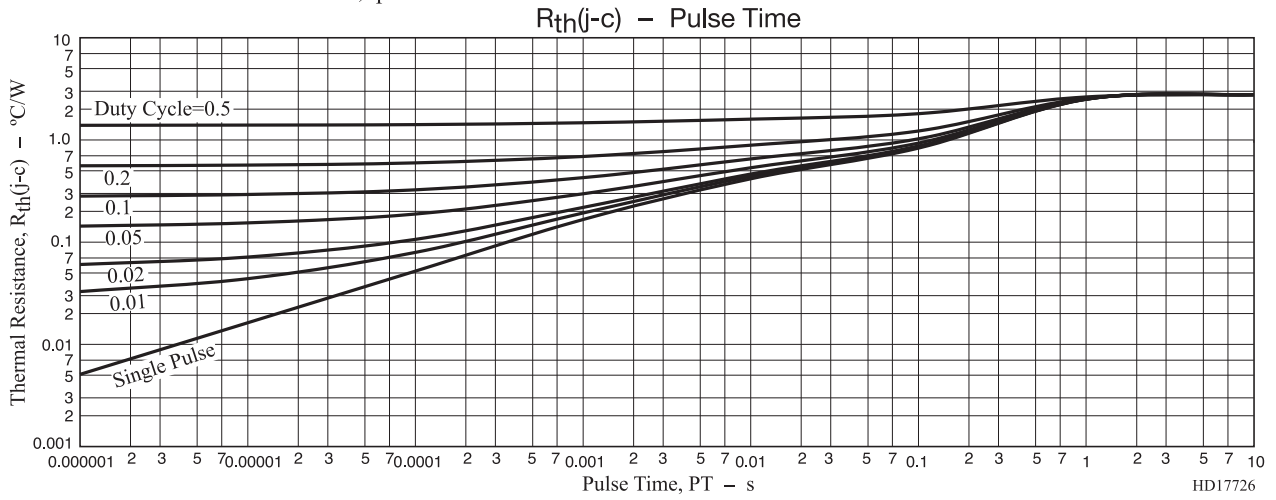
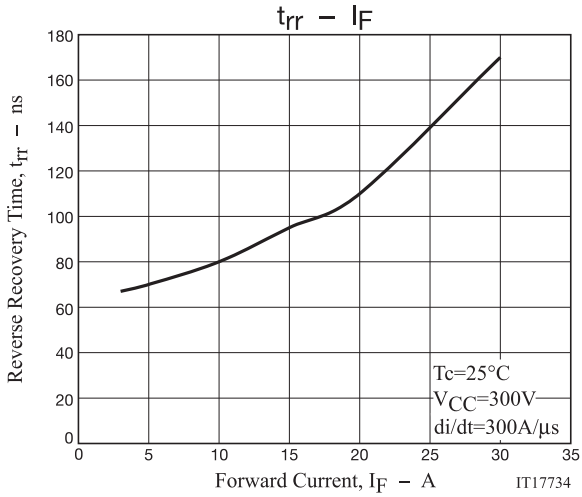
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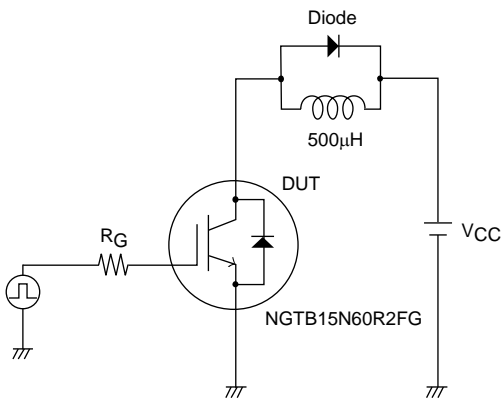
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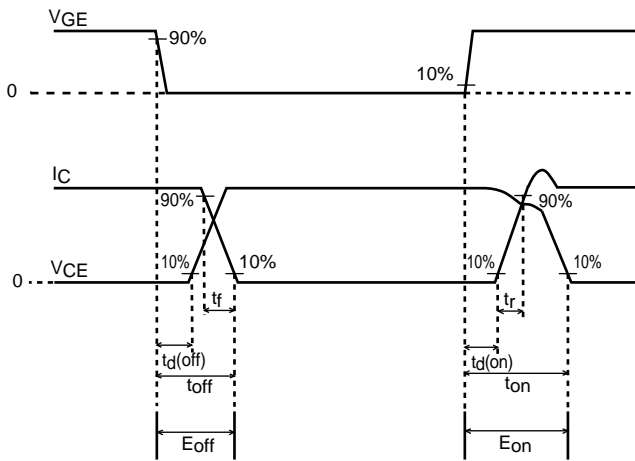
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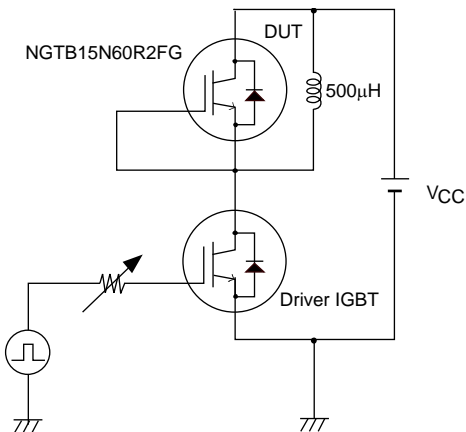
**Fig.1 Switching Time Test Circuit**



**Fig.2 Timing Chart**



**Fig.3 Reverse Recovery Time Test Circuit**



# NGTB15N60R2FG

## Package Dimensions

NGTB15N60R2FG

### TO-220F-3FS

CASE 221AM

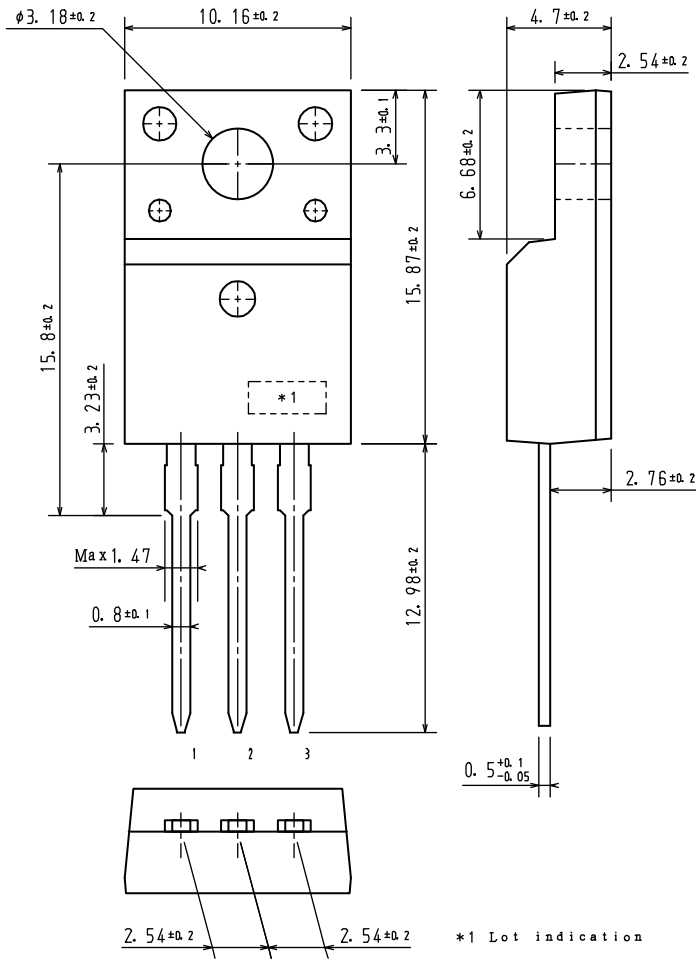
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unit : mm

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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