

# NGTB03N60R2DT4G

## IGBT 600V, 4.5A, N-Channel



ON Semiconductor®

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### 主要特长

- 反向导通 IGBT
- IGBT  $V_{CE(sat)}=1.7V$  (typ) [ $I_C=3A$ ,  $V_{GE}=15V$ ]
- IGBT  $t_f=75ns$  (typ)
- Diode  $V_F=1.5V$  (typ) [ $I_F=3A$ ]
- Diode  $t_{rr}=65ns$  (typ)
- $5\mu s$  抗短路能力

### 应用

- 通用变频器 (General-purpose Inverter)

### 规格

绝对最大额定值 /  $T_a = 25^\circ C$  (除非特殊指定)

参数	记号	值	单位
Collector- Emitter 电压	$V_{CES}$	600	V
Gate- Emitter 电压	$V_{GES}$	$\pm 20$	V
Collector 电流 (DC)	$I_C^{*1}$	@ $T_c=25^\circ C^{*2}$	9 A
受限于 $T_{jmax}$		@ $T_c=100^\circ C^{*2}$	4.5 A
Collector 电流 (Peak)	$I_{CP}$		12 A
受限于 $T_{jmax}$ 的脉宽			
二极管平均输出电流	$I_O$	4.5	A
功耗 (Power Dissipation)	$P_D$		49 W
$T_c=25^\circ C$ (我司理想的功耗条件) $^{*2}$			
结温 (Junction Temperature)	$T_j$	175	$^\circ C$
储存温度 (Storage Temperature)	$T_{stg}$	-55 to +175	$^\circ C$

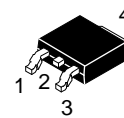
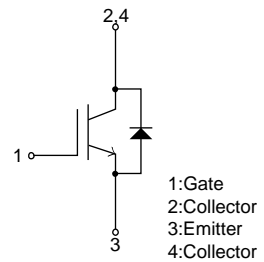
注:\*1 Collector 电流由下式计算:

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

\*2 我司的条件为背面散热。

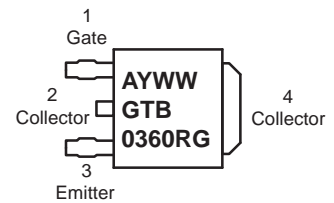
方法为:器件的背面涂上硅脂, 然后将该器件贴在 铝制的水冷散热器上

### 电气连接 N-Channel



DPAK  
CASE 369C

### 印刷图



GTB0360R = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

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.

### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

# NGTB03N60R2DT4G

## 电气特性 / Ta = 25°C (除非特殊指定)

参数	记号	条件	值			Unit
			min	typ	max	
集电极-发射极击穿电压 (Collector to Emitter Breakdown Voltage)	V(BR)CES	IC=1mA, VGE=0V	600			V
集电极-发射极截止电流 (Collector to Emitter Cutoff Current)	ICES	VCE=600V, VGE=0V			10	μA
					1	mA
栅极-发射极漏电流 (Gate to Emitter Leakage Current)	IGES	VGE=±20V, VCE=0V			±100	nA
栅极-发射极阈值电压 (Gate to Emitter threshold voltage)	VGE(th)	VCE=20V, IC=80μA	4.5		7.0	V
集电极-发射极饱和电压 (Collector to Emitter Saturated Voltage)	VCE(sat)	VGE=15V, IC=3A		1.7	2.1	V
				1.9	2.3	V
正向二极管电压(Forward Diode Voltage)	VF	IF=3A		1.5	2.1	V
输入电容(Input Capacitance)	Cies	VCE=20V, f=1MHz		415		pF
输出电容(Output Capacitance)	Coes			17		pF
反向传输电容 (Reverse Transfer Capacitance)	Cres			10		pF
开启延迟时间(Turn-on delay time)	t <sub>d(on)</sub>			27		ns
上升时间(Rise Time)	t <sub>r</sub>	VCC=300V, IC=3A RG=30Ω, L=500μH VGE=0V/15V Vclamp=400V Tc=25°C See Fig.1, See Fig.2		17		ns
开启时间(Turn-ON Time)	ton			85		ns
关断延迟时间(Turn-OFF Delay Time)	t <sub>d(off)</sub>			59		ns
下降时间(Fall Time)	t <sub>f</sub>			75		ns
关断时间(Turn-OFF Time)	toff			172		ns
开启能量(Turn-ON Energy)	Eon			50		μJ
关断能量(Turn-OFF Energy)	Eoff			27		μJ
总栅极电荷(Total Gate Charge)	Qg			17		nC
栅极-发射极(Gate to Emitter charge)	Qge	VCE=300V, VGE=15V, IC=3A		4.4		nC
栅极-集电极米勒电荷 (Gate to Collector "Miller" Charge)	Qgc			7.6		nC
二极管反向恢复时间 (Diode Reverse Recovery Time)	t <sub>rr</sub>	IF=3A, di/dt=200A/μs, VCC=300V, See Fig.3		65		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.

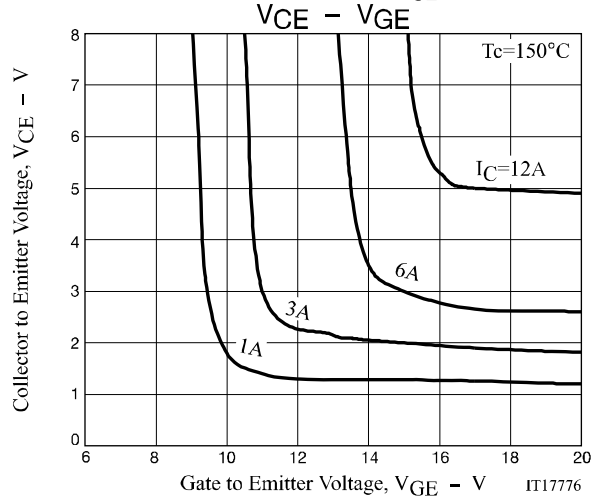
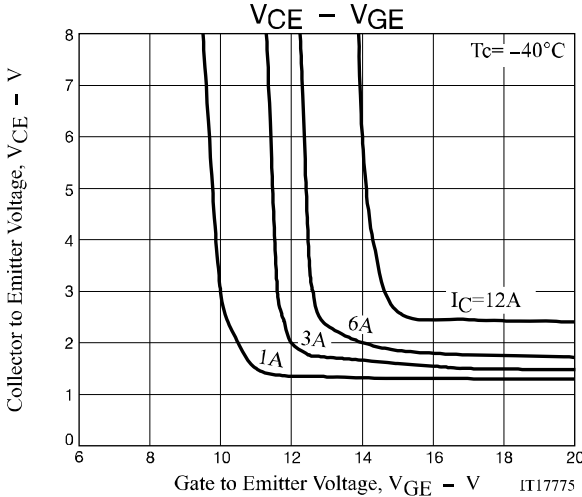
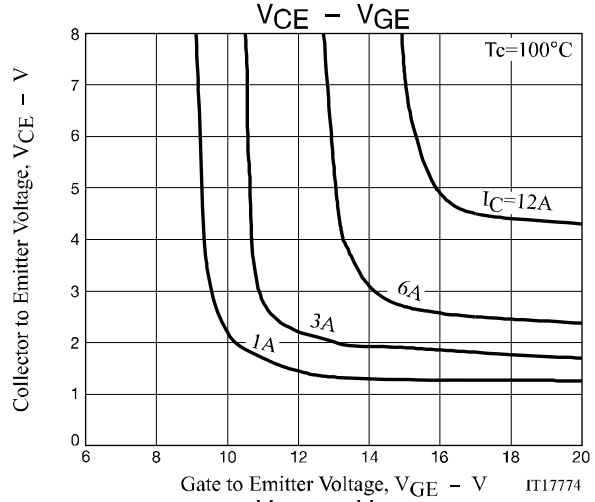
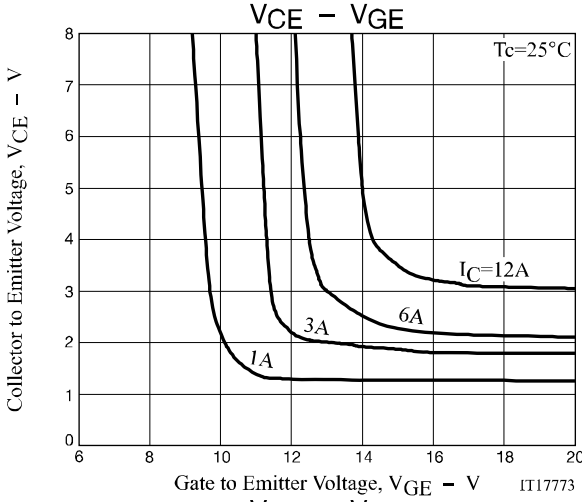
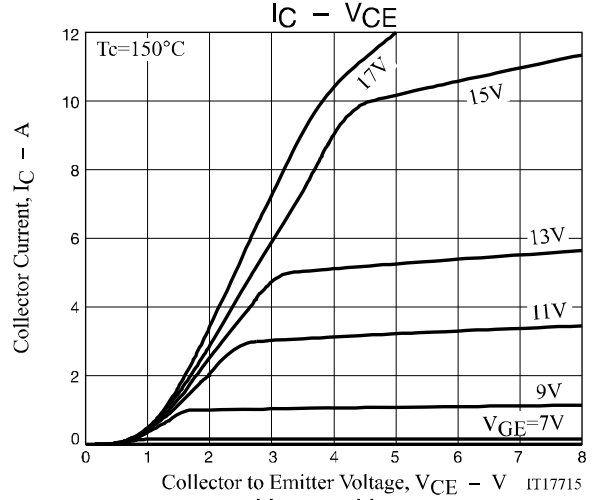
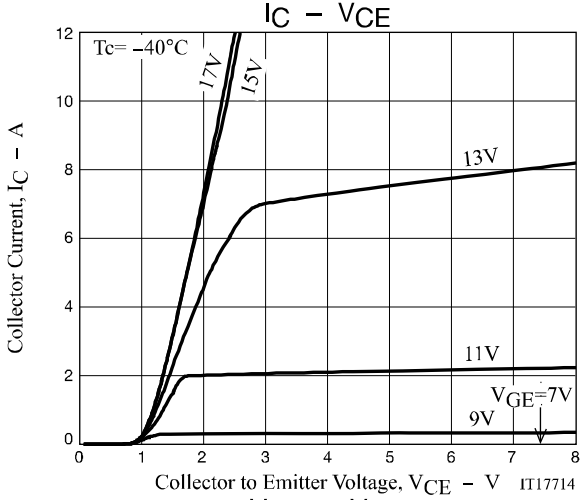
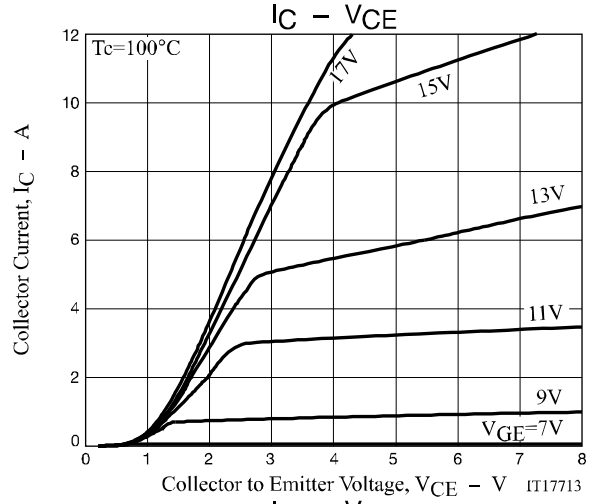
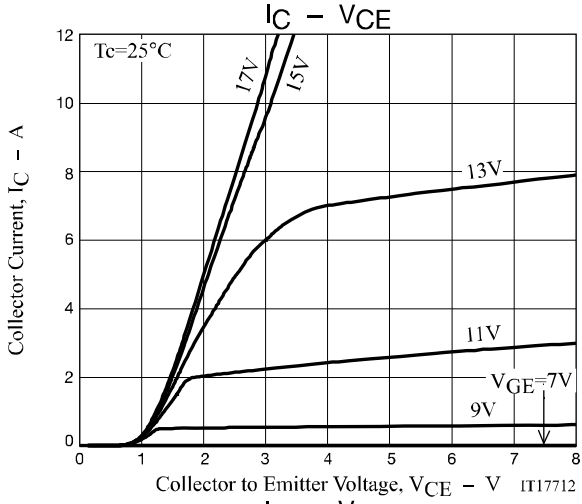
## 热特性 / Ta = 25°C (除非特殊指定)

参数	记号	条件	值	单位
热阻 IGBT(结到外壳) Thermal Resistance IGBT (Junction to Case)	Rth(j-c) (IGBT)	Tc=25°C (我司理想的散热条件)*2	3.06	°C/W
热阻(结到环境) Thermal Resistance (Junction to Ambient)	Rth(j-a)		100	°C/W

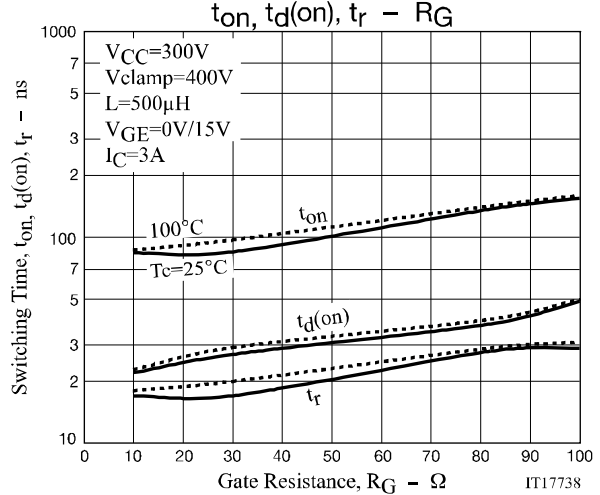
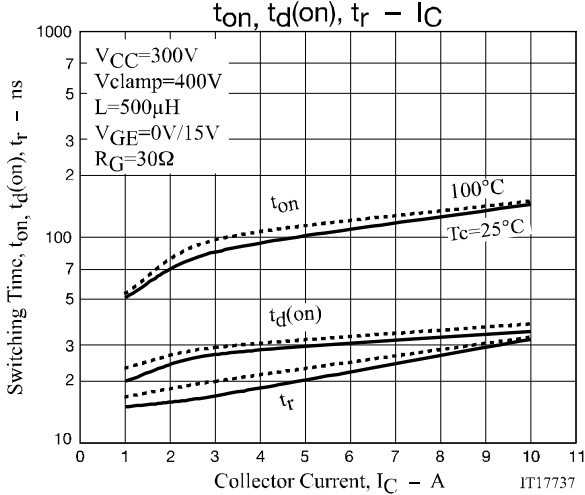
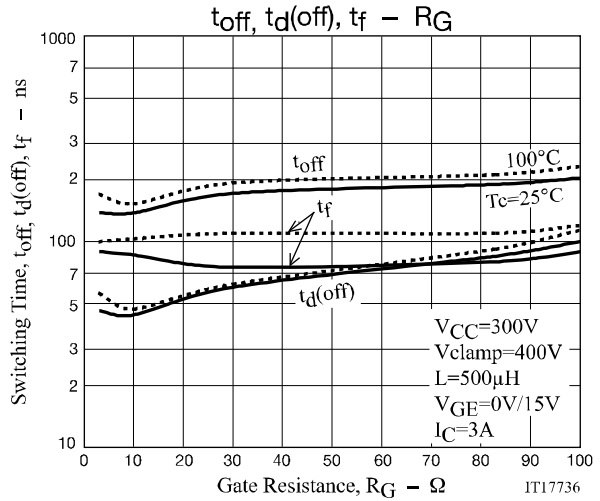
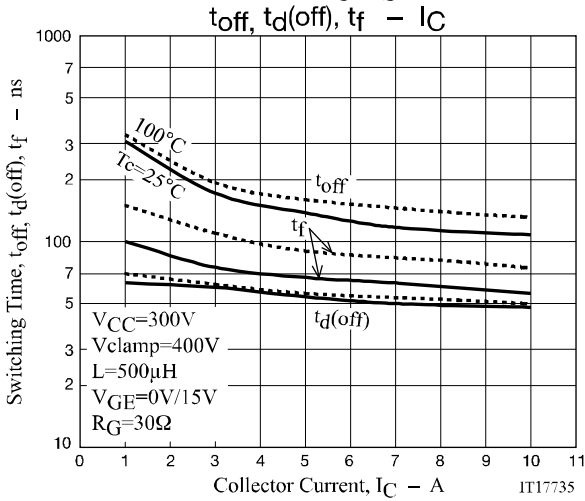
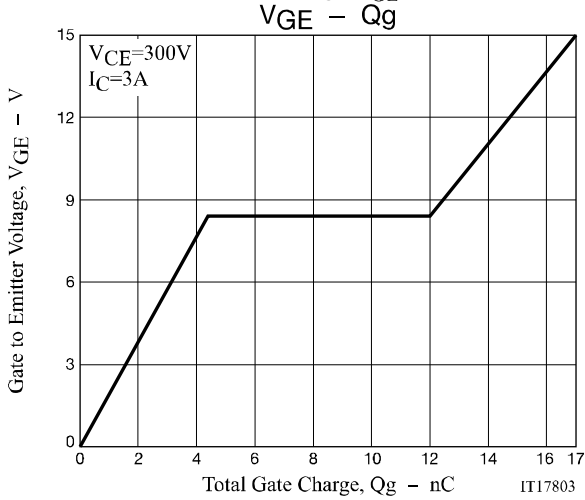
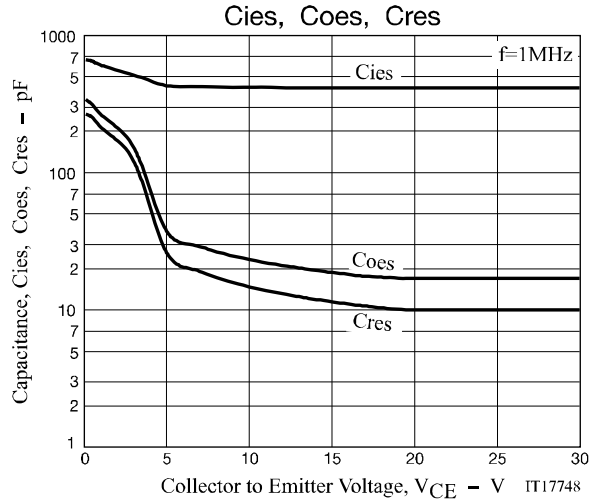
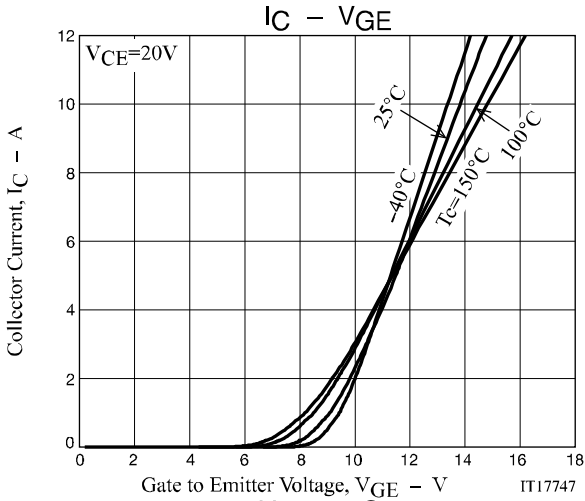
注: \*2 我司的条件为背面散热。

方法为:器件的背面涂上硅脂,然后将该器件贴在铝制的水冷散热器上。

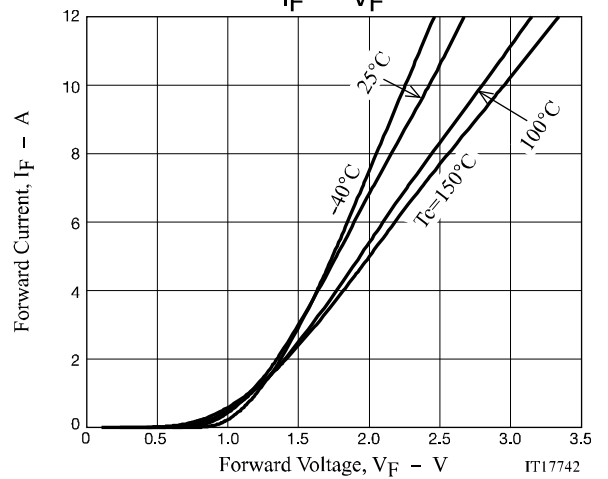
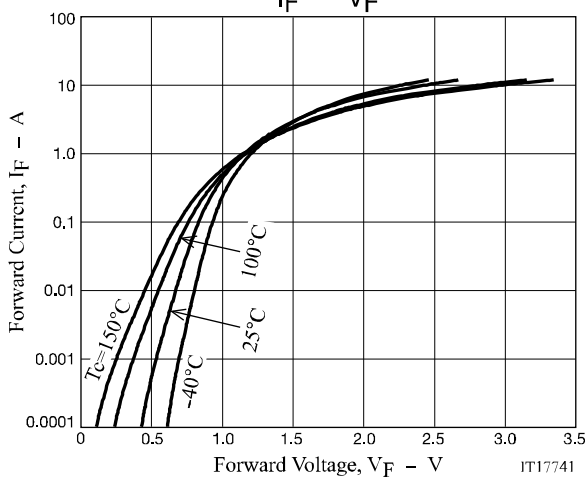
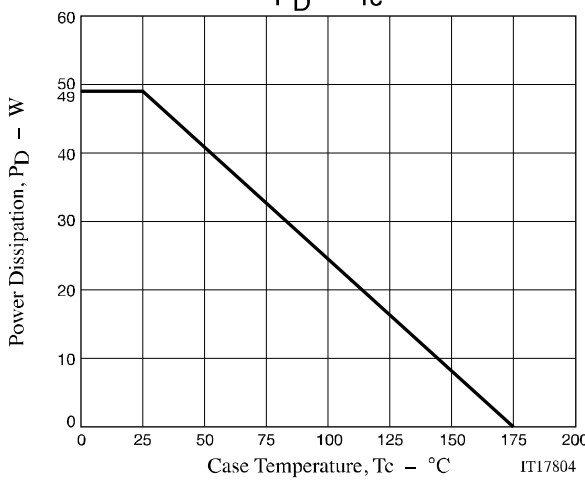
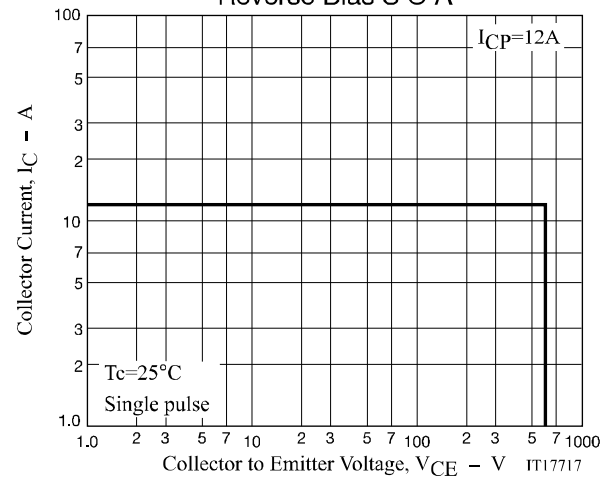
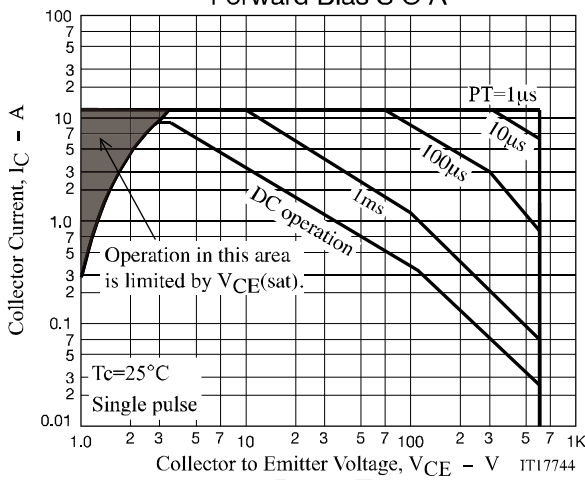
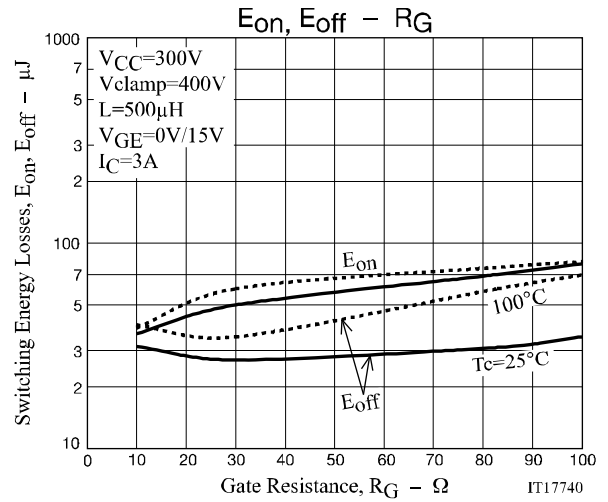
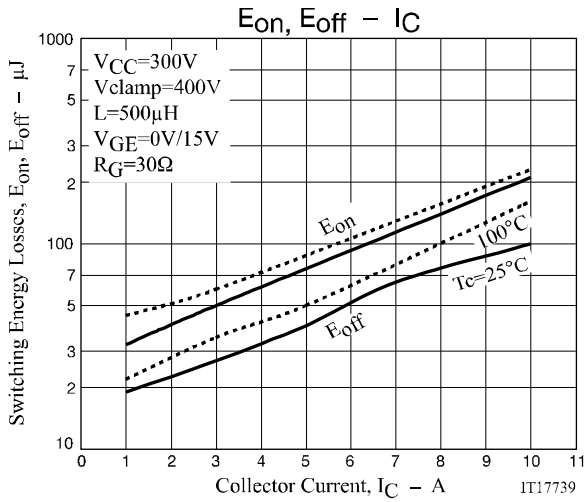
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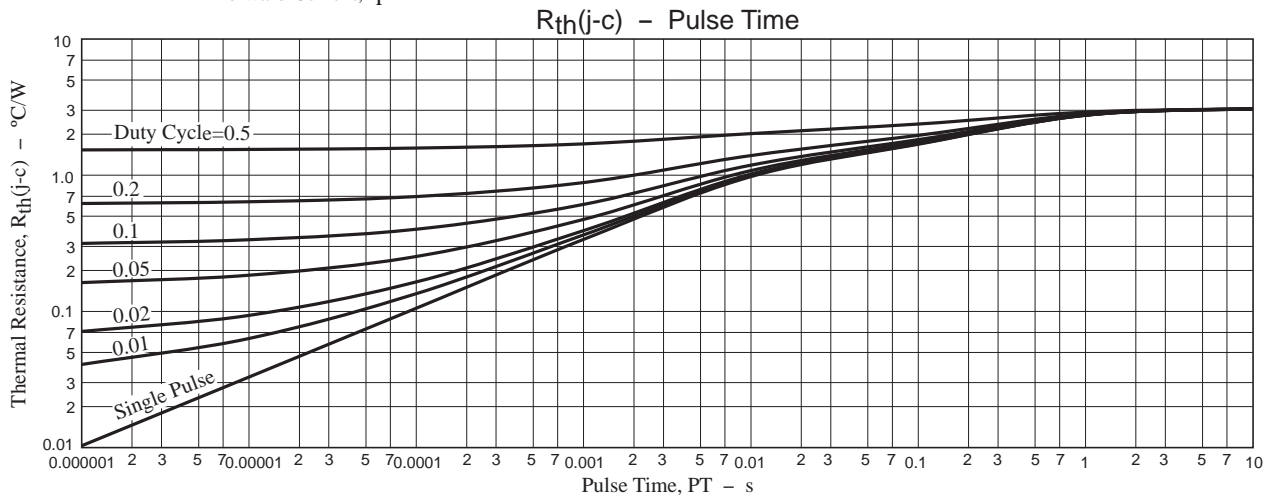
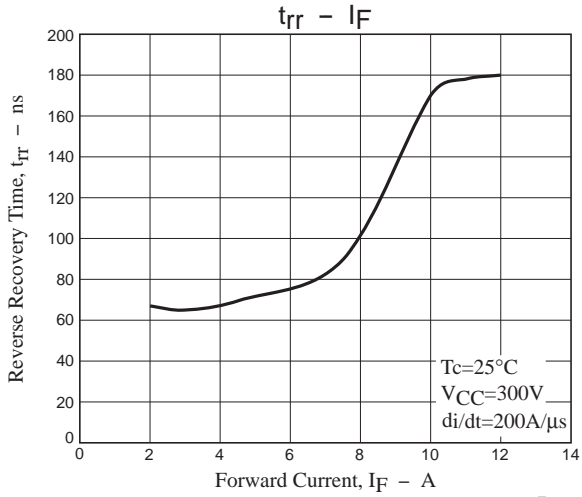


图 1 : 开关时间测试电路

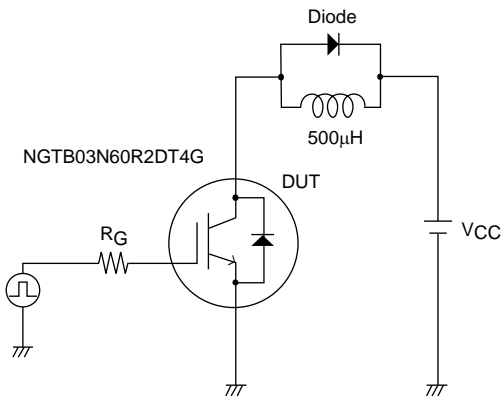


图 2 : 时间图

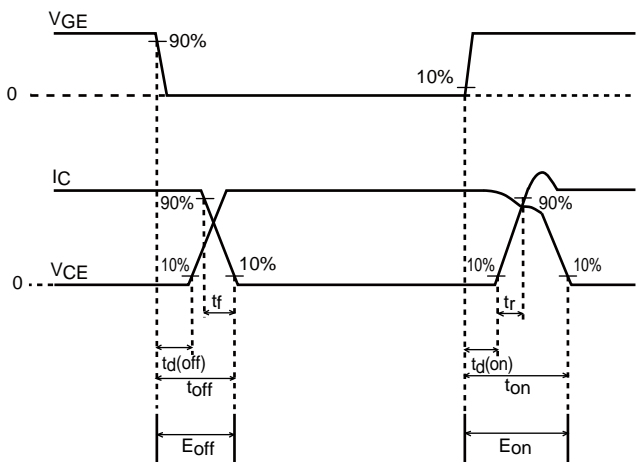
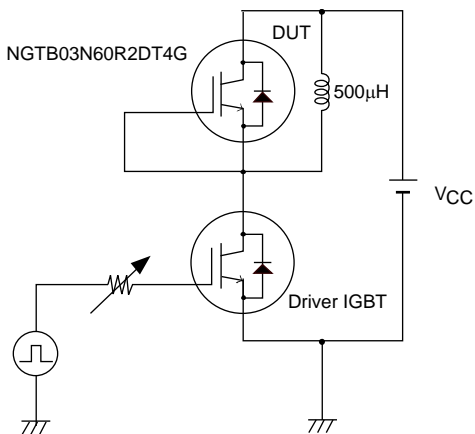


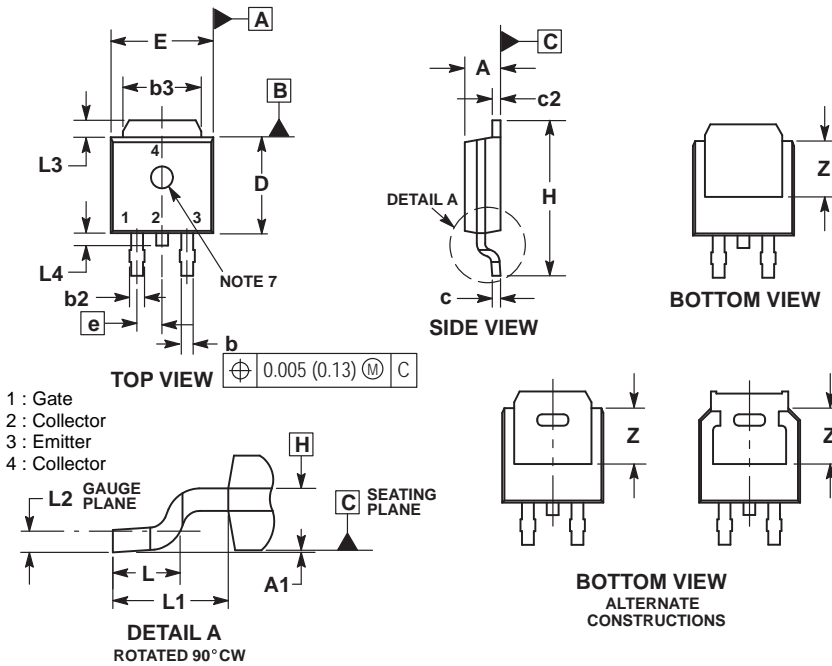
图 3 : 反向恢复时间测试电路



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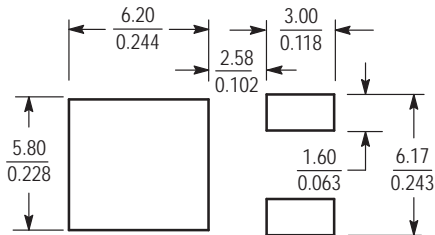
## 封装尺寸

**DPAK (SINGLE GAUGE)**  
CASE 369C  
ISSUE F



- |   |   |  |  |   |
|---|---|--|--|---|
| STYLE 1:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 2:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN          | STYLE 3:<br>PIN 1. ANODE<br>2. CATHODE<br>3. ANODE<br>4. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE              | STYLE 5:<br>PIN 1. GATE<br>2. ANODE<br>3. CATHODE<br>4. ANODE     |
| STYLE 6:<br>PIN 1. MT1<br>2. MT2<br>3. GATE<br>4. MT2                 | STYLE 7:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 8:<br>PIN 1. N/C<br>2. CATHODE<br>3. ANODE<br>4. CATHODE   | STYLE 9:<br>PIN 1. ANODE<br>2. CATHODE<br>3. RESISTOR ADJUST<br>4. CATHODE | STYLE 10:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. ANODE |

### SOLDERING FOOTPRINT\*



SCALE 3:1 ( $\frac{\text{mm}}{\text{inches}}$ )

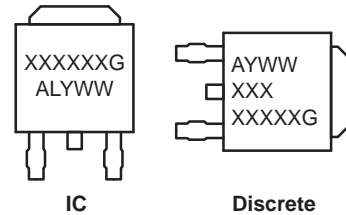
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

### NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- CONTROLLING DIMENSION: INCHES.
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
- DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
- OPTIONAL MOLD FEATURE.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29	BSC
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	REF	2.90	REF
L2	0.020	BSC	0.51	BSC
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

### GENERIC MARKING DIAGRAM\*



- XXXXXX = Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking.

# NGTB03N60R2DT4G

## 订单情况

器件名称	印刷图	封装	出货包装 (Qty / Packing)
NGTB03N60R2DT4G	AYWW GTB 0360RG	DPAK (SINGLE GAUGE) (Pb-Free / Halogen Free)	2500 / Tape & Reel

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. [http://www.onsemi.com/pub\\_link/Collateral/BRD8011-D.PDF](http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF)

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