

NGTB03N60RF2DT4G

IGBT 600 V, 4.5 A, N-Channel

Features

- Reverse Conducting II IGBT
- IGBT $V_{CE(sat)} = 1.8$ V (typ) [$I_C = 3$ A, $V_{GE} = 15$ V]
- IGBT $t_f = 36$ ns (typ)
- Diode $V_F = 1.7$ V (typ) [$I_F = 3$ A]
- Diode $t_{rr} = 57$ ns (typ)
- 5 μ s Short Circuit Capability

Applications

- General Purpose Inverter

Specifications

ABSOLUTE MAXIMUM RATINGS

(at $T_A = 25^\circ\text{C}$, Unless otherwise specified)

Parameter	Symbol	Value	Unit	
Collector to Emitter Voltage	V_{CES}	600	V	
Gate to Emitter Voltage	V_{GES}	± 20	V	
Collector Current (DC)	I_C (Note 1)	@ $T_C = 25^\circ\text{C}$ (Note 2)	9	A
Limited by T_{jmax}		@ $T_C = 100^\circ\text{C}$ (Note 2)	4.5	A
Collector Current (Peak) Pulse width Limited by T_{jmax}	I_{CP}	12	A	
Diode Average Output Current	I_O	4.5	A	
Power Dissipation (Note 2) $T_C = 25^\circ\text{C}$ (Our ideal heat dissipation condition)	P_D	49	W	
Junction Temperature	T_j	175	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-55 to +175	$^\circ\text{C}$	

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.

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.

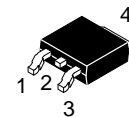
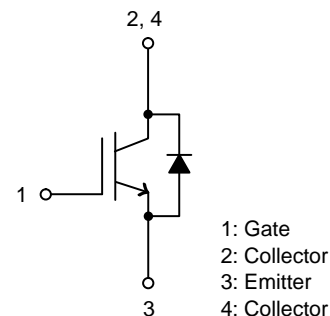


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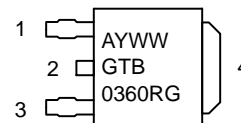
ELECTRICAL CONNECTION

N-Channel



DPAK
CASE 369C

MARKING DIAGRAM



GTB0360R = Device Code

A = Assembly Location

L = Wafer Lot

Y = Year

WW = Work Week

G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

NGTB03N60RF2DT4G

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Collector to Emitter Breakdown Voltage	V _{(BR)CES}	I _C = 1 mA, V _{GE} = 0 V	600			V	
Collector to Emitter Cut off Current	I _{CES}	V _{CE} = 600 V V _{GE} = 0 V	T _C = 25°C		10	μA	
			T _C = 150°C		1	mA	
Gate to Emitter Leakage Current	I _{GES}	V _{GE} = ±20 V, V _{CE} = 0 V			±100	nA	
Gate to Emitter Threshold Voltage	V _{GE(th)}	V _{CE} = 20 V, I _C = 80 μA	4.5		7.0	V	
Collector to Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15 V, I _C = 3 A	T _C = 25°C	1.8	2.1	V	
			T _C = 100°C	2.0	2.3	V	
Forward Diode Voltage	V _F	I _F = 3 A		1.7	2.1	V	
Input Capacitance	C _{ies}	V _{CE} = 20 V, f = 1 MHz		400		pF	
Output Capacitance	C _{oes}			17		pF	
Reverse Transfer Capacitance	C _{res}			10		pF	
Turn-ON Delay Time	t _{d(on)}	V _{CC} = 400 V, I _C = 3 A R _G = 30 Ω, L = 500 μH V _{GE} = 0 V/15 V T _C = 25°C (See Figure 1 and Figure 2)		47		ns	
Rise Time	t _r			17		ns	
Turn-ON Time	t _{on}			134		ns	
Turn-OFF Delay Time	t _{d(off)}			67		ns	
Fall Time	t _f			36		ns	
Turn-OFF Time	t _{off}			105		ns	
Turn-ON Energy	E _{on}			129		μJ	
Turn-OFF Energy	E _{off}			23		μJ	
Total Gate Charge	Q _g		V _{CE} = 300 V, V _{GE} = 15 V, I _C = 3 A		17		nC
Gate to Emitter Charge	Q _{ge}				4.4		nC
Gate to Collector "Miller" Charge	Q _{gc}			7.6		nC	
Diode Reverse Recovery Time	t _{rr}	I _F = 3 A, di/dt = 200 A/μs, V _{CC} = 300 V (See Figure 3)		57		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 (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Condition	Value	Unit
Thermal Resistance IGBT (Junction to Case)	R _{th(j-c)} (IGBT)	T _C = 25°C (Our ideal heat dissipation condition) (Note 3)	3.06	°C/W
Thermal Resistance (Junction to Ambient)	R _{th(j-a)}		100	°C/W

3. 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.

ORDERING INFORMATION

Device	Marking	Package	Shipping† (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](#).

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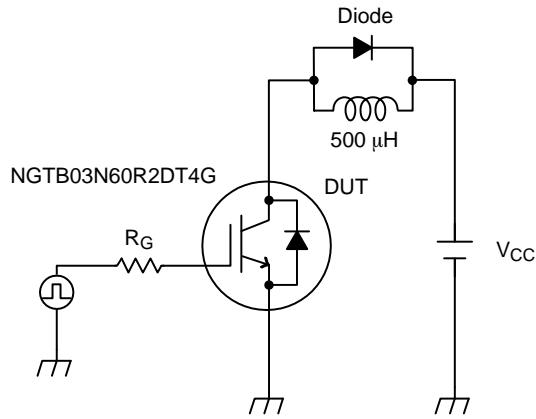


Figure 1. Switching Time Test Circuit

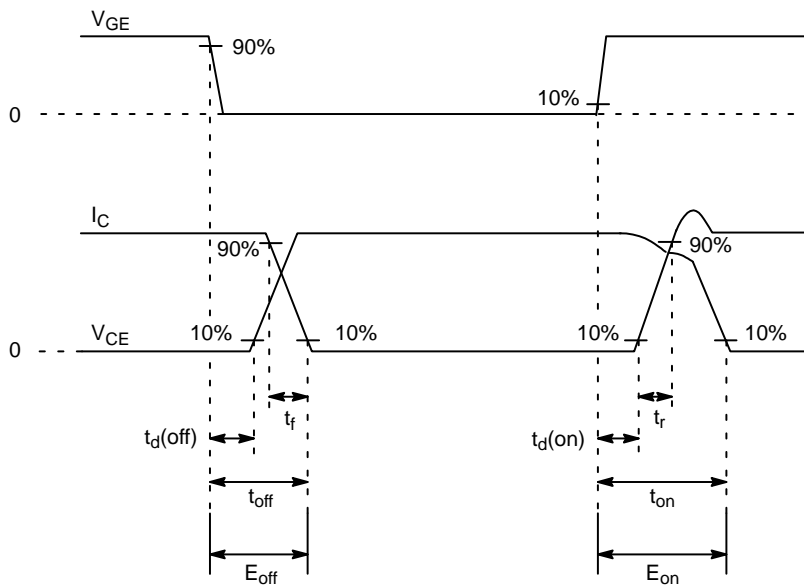


Figure 2. Timing Chart

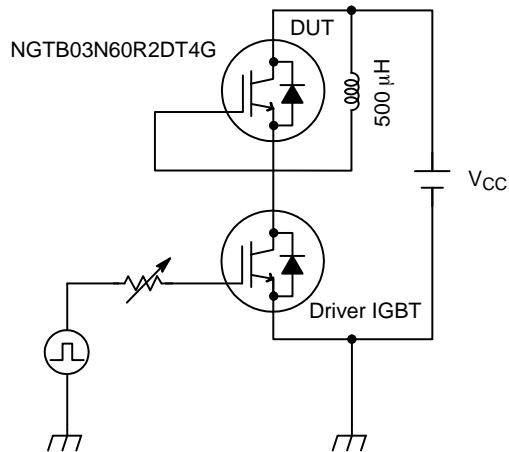
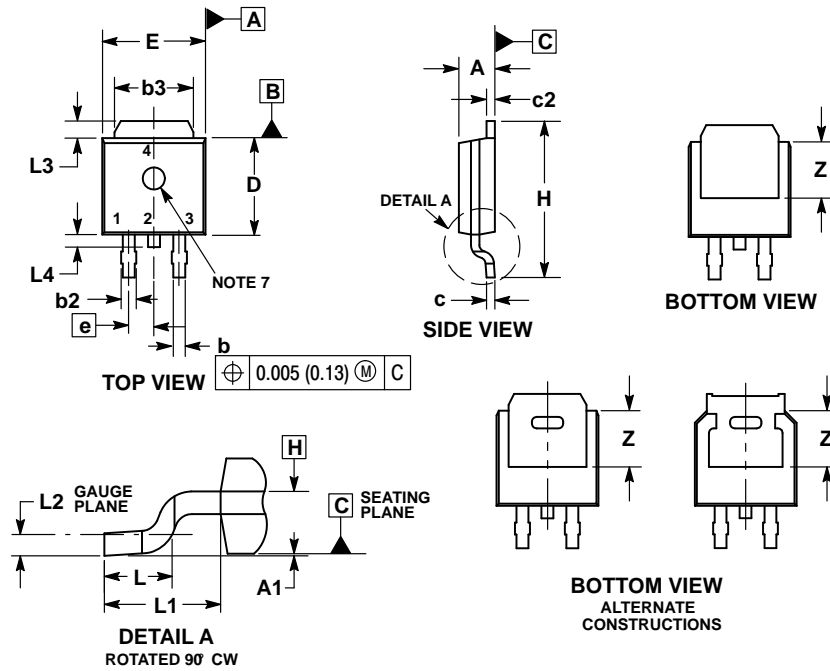


Figure 3. Reverse Recovery Time Test Circuit

NGTB03N60RF2DT4G

PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE) CASE 369C ISSUE F



NOTES:

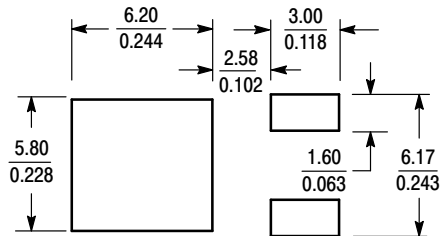
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. 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	---

STYLE 7:

- PIN 1. GATE
- COLLECTOR
- EMITTER
- COLLECTOR

SOLDERING FOOTPRINT*



SCALE 3:1 (mm/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.

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