



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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NGTG12N60TF1G

N-Channel IGBT

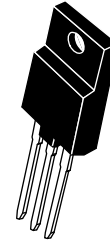
600V, 12A, $V_{CE(sat)}$;1.4V TO-3PF-3L

ON Semiconductor®

<http://onsemi.com>

Features

- $V_{CE(sat)}$ =1.4V typ. (I_C =12A, V_{GE} =15V)
- Low switching loss in higher frequency applications
- Enhancement type
- 5 μ s short circuit capability
- Adoption of full isolation type package



TO-3PF-3L

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} | @ $T_c=25^\circ\text{C}$ *2 | 24 | A |
| | | | @ $T_c=100^\circ\text{C}$ *2 | 12 | A |
| Collector Current (Pulse) | I_{CP} | Pulse width Limited by T_{jmax} (Ref:ASO graph) | 88 | A | |
| Allowable Power Dissipation | P_D | $T_c=25^\circ\text{C}$ (Our ideal heat dissipation condition) *2 | 54 | W | |
| Junction Temperature | T_j | | 150 | $^\circ\text{C}$ | |
| Storage Temperature | T_{stg} | | - 55 to +150 | $^\circ\text{C}$ | |

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

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

*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.

Electrical Characteristics at $T_a = 25^\circ\text{C}$, Unless otherwise specified

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---------------|--|-------------------------|------|-----------|---------------|
| | | | min | typ | max | |
| Collector to Emitter Breakdown Voltage | $V_{(BR)CES}$ | $I_C=500\mu\text{A}$, $V_{GE}=0\text{V}$ | 600 | | | V |
| Collector to Emitter Cut off Current | I_{CES} | $V_{CE}=600\text{V}$, $V_{GE}=0\text{V}$ | $T_c=25^\circ\text{C}$ | | 10 | μA |
| | | | $T_c=125^\circ\text{C}$ | | 1 | mA |
| Gate to Emitter Leakage Current | I_{GES} | $V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$ | | | ± 100 | nA |
| Gate to Emitter Threshold Voltage | $V_{GE(th)}$ | $V_{CE}=20\text{V}$, $I_C=250\mu\text{A}$ | 4.5 | | 6.5 | V |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15\text{V}$, $I_C=12\text{A}$ | $T_c=25^\circ\text{C}$ | 1.4 | 1.6 | V |
| | | | $T_c=125^\circ\text{C}$ | 1.6 | | V |
| Input Capacitance | C_{ies} | | | 2000 | | pF |
| Output Capacitance | C_{oes} | $V_{CE}=20\text{V}$, $f=1\text{MHz}$ | | 60 | | pF |
| Reverse Transfer Capacitance | C_{res} | | | 50 | | pF |

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ORDERING INFORMATION

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

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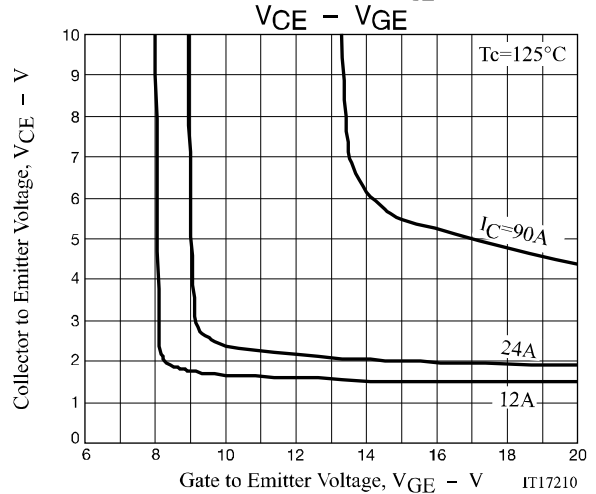
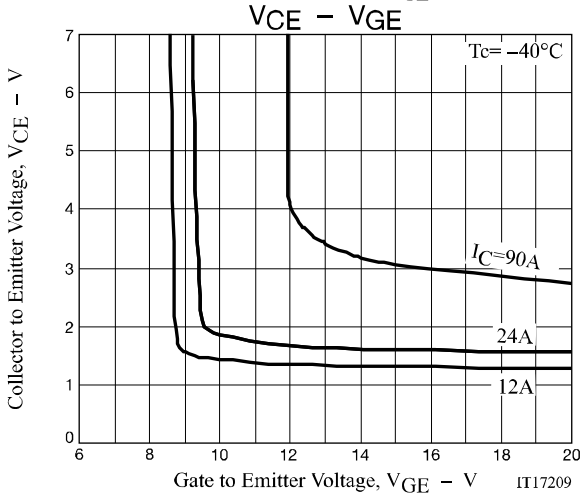
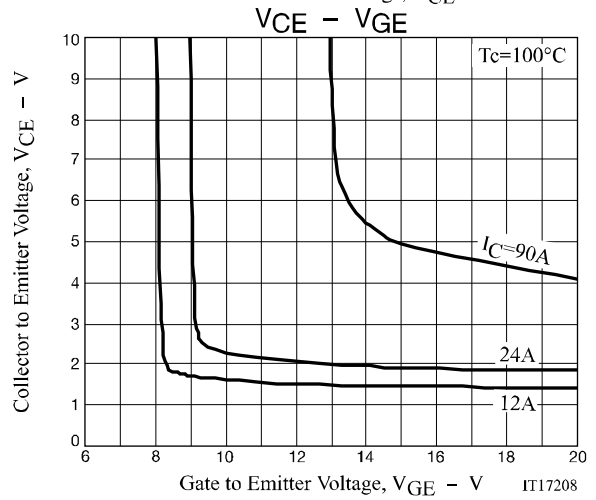
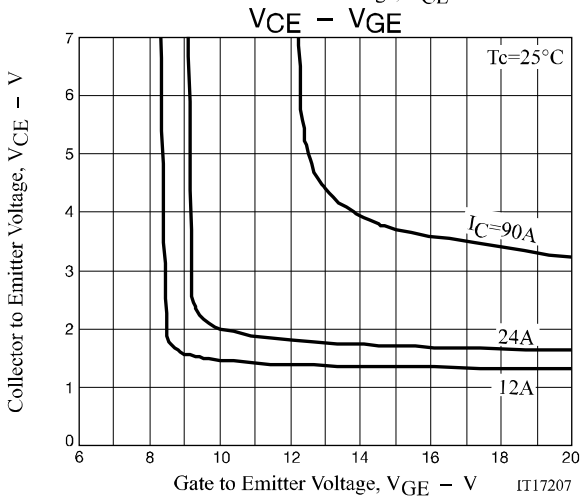
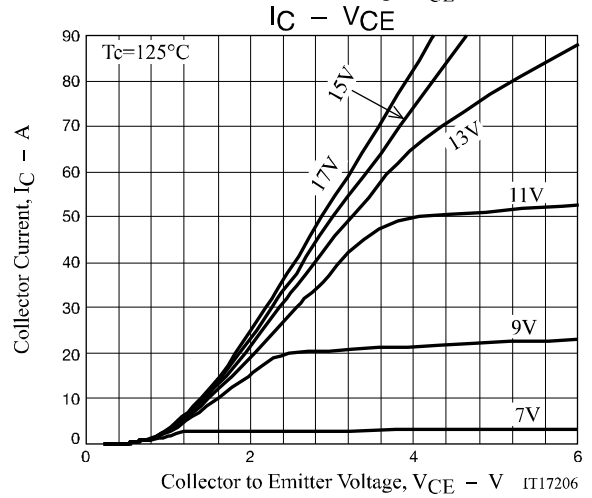
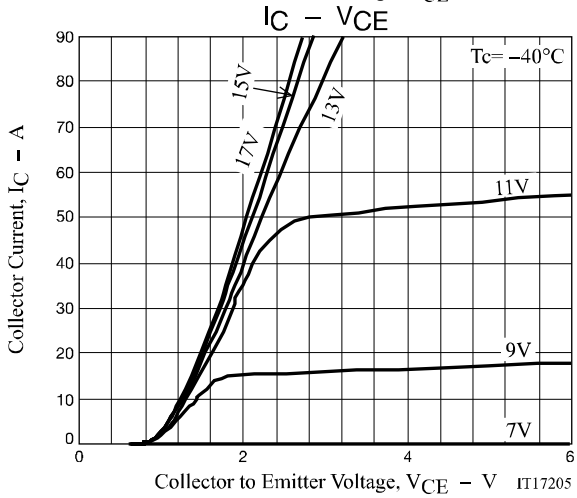
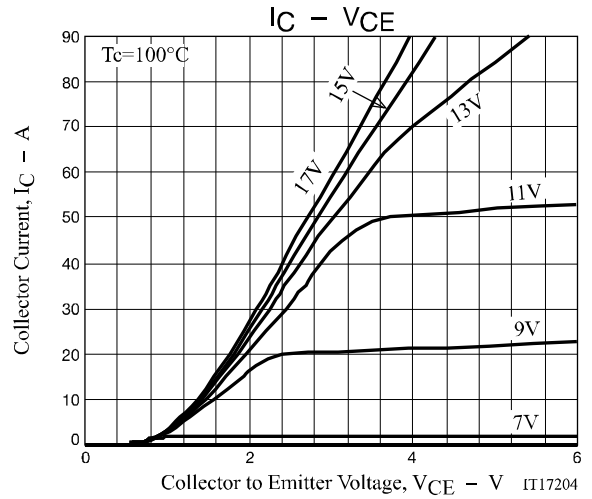
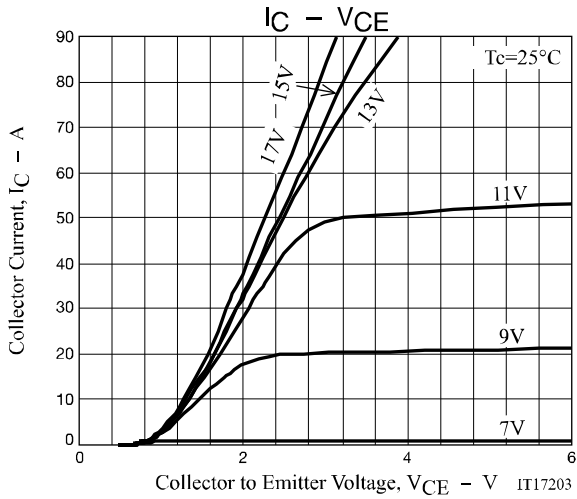
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| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-----------------------------------|--------------|---|---------|-----|-----|------|
| | | | min | typ | max | |
| Turn-ON Delay Time | $t_{d(on)}$ | $V_{CC}=300V, I_C=15A$ $R_G=30\Omega, L=200\mu H$ $V_{GE}=0V/15V$ $V_{clamp}=400V$ See Fig.1, See Fig.2 | | 55 | | ns |
| Rise Time | t_r | | | 30 | | ns |
| Turn-ON Time | t_{on} | | | 330 | | ns |
| Turn-OFF Delay Time | $t_{d(off)}$ | | | 200 | | ns |
| Fall Time | t_f | | | 110 | | ns |
| Turn-OFF Time | t_{off} | | | 350 | | ns |
| Total Gate Charge | Q_g | $V_{CE} =300V, V_{GE}=15V, I_C=15A$ | | 84 | | nC |
| Gate to Emitter Charge | Q_{ge} | | | 16 | | nC |
| Gate to Collector "Miller" Charge | Q_{gc} | | | 37 | | nC |

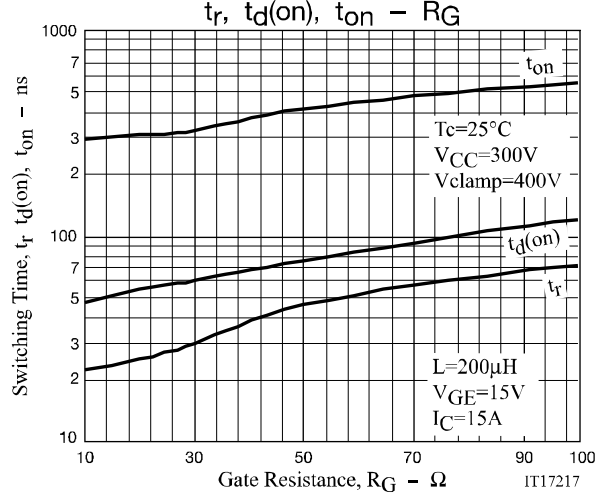
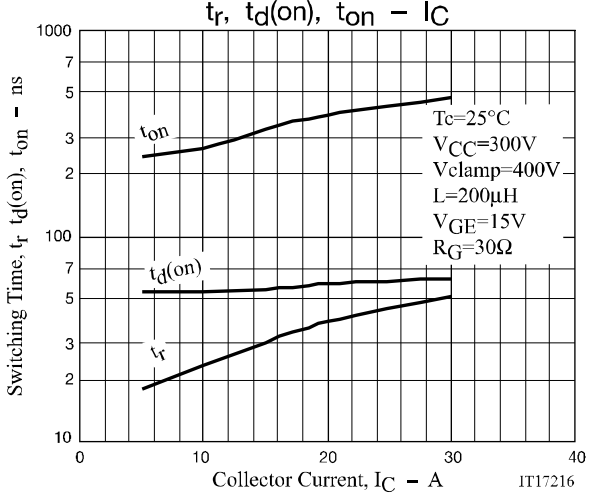
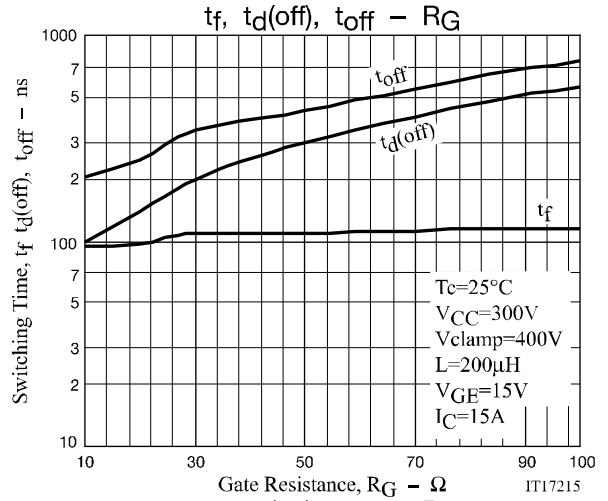
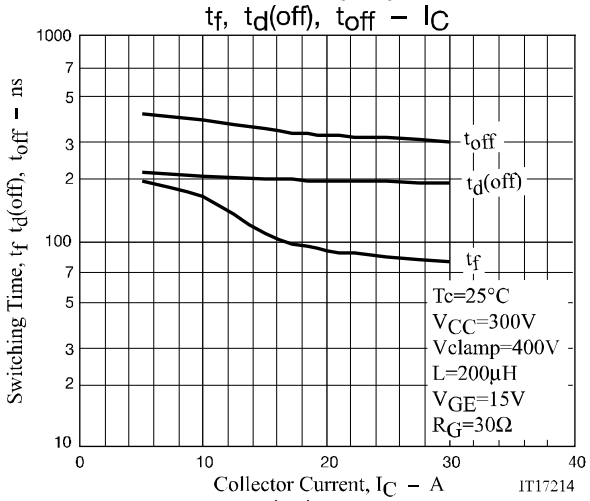
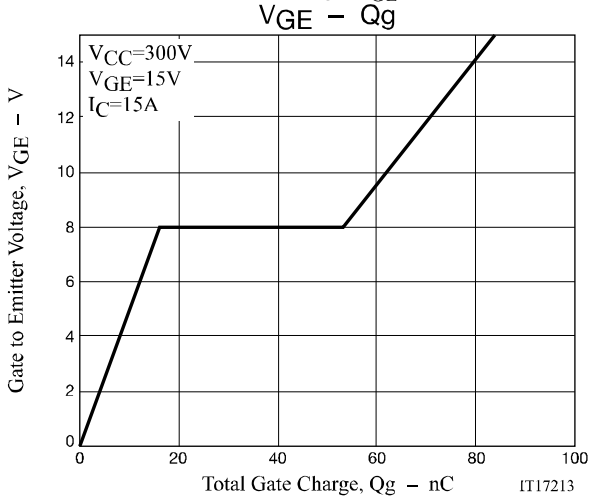
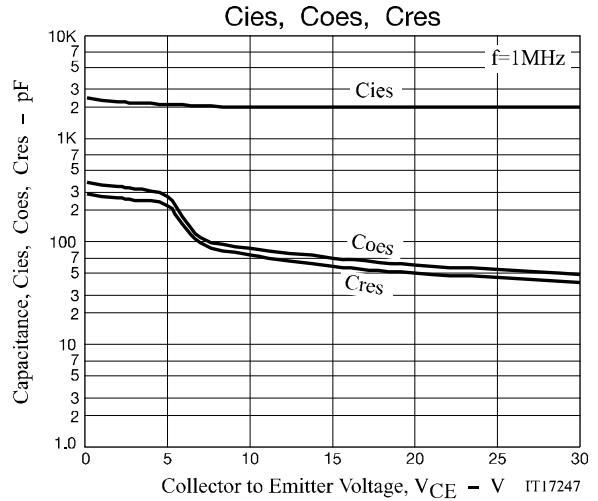
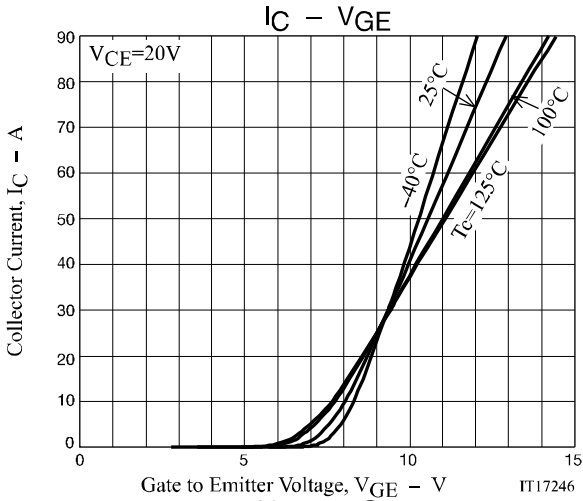
Thermal Characteristics at $T_a = 25^\circ C$, Unless otherwise specified

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---------------|---|---------|----------------|
| Thermal Resistance (junction- Case) | $R_{th(j-c)}$ | $T_c=25^\circ C$ (our ideal heat dissipation condition)*2 | 2.33 | $^\circ C / W$ |
| Thermal Resistance (junction- atmosphere) | $R_{th(j-a)}$ | | 47.5 | $^\circ C / W$ |

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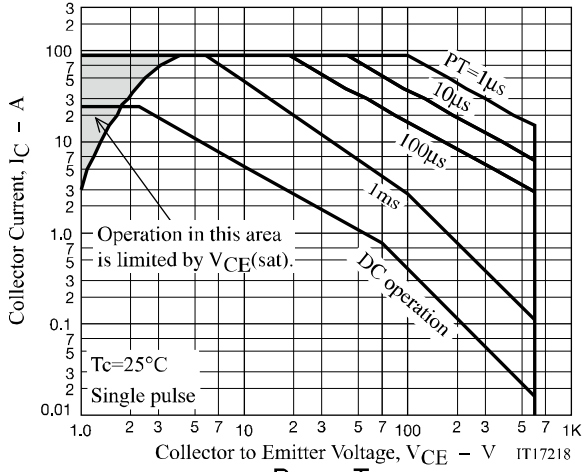


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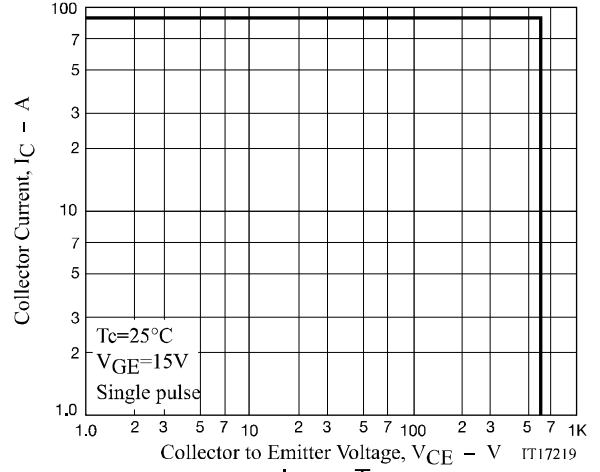


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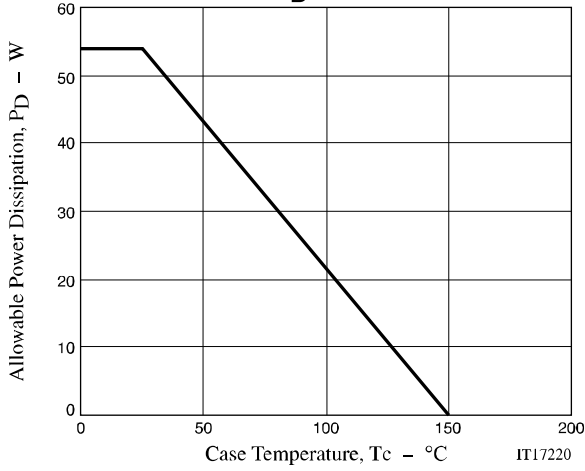
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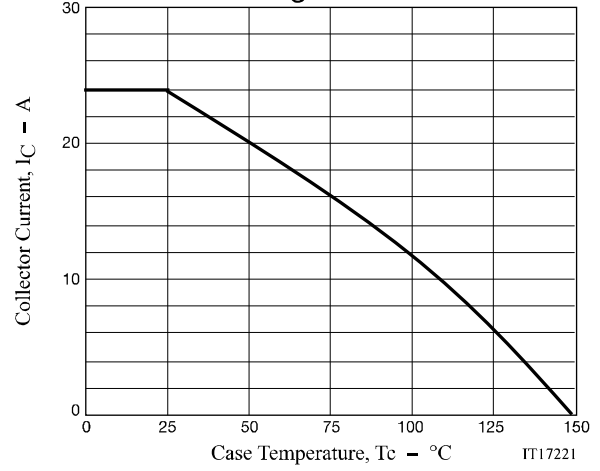
Reverse Bias A S O



$P_D - T_c$



$I_C - T_c$



NGTG12N60TF1G

Ordering & Package Information

| Device | Package | Shipping | note |
|---------------|--------------------|-------------------|---------|
| NGTG12N60TF1G | TO-3PF-3L SC-94 | 30 pcs. / tube | Pb-Free |

Marking

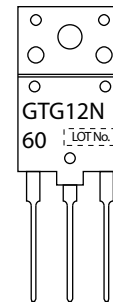


Fig.1 Switching Time Test Circuit

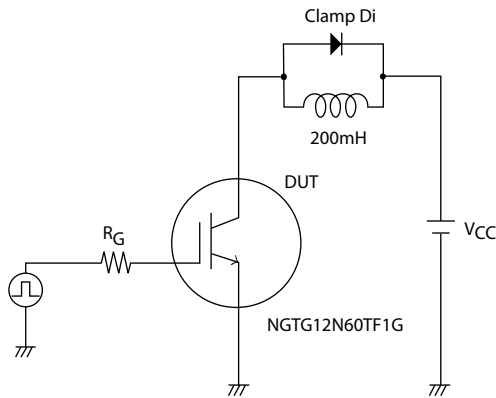
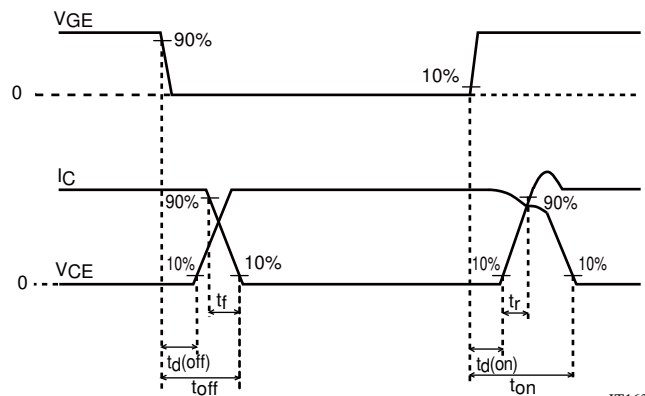


Fig.2 Timing Chart



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