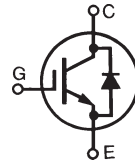


High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

IXBH42N170 IXBT42N170



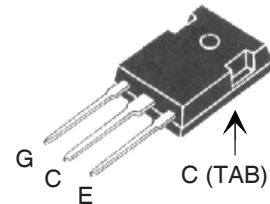
$$V_{CES} = 1700V$$

$$I_{C90} = 42A$$

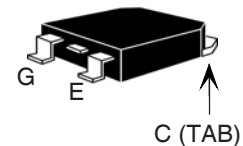
$$V_{CE(sat)} \leq 2.8V$$

| Symbol | Test Conditions | Maximum Ratings | |
|----------------|--|---------------------|------------|
| V_{CES} | $T_C = 25^\circ C$ to $150^\circ C$ | 1700 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 1700 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ | 80 | A |
| I_{LRMS} | Terminal Current Limit | 75 | A |
| I_{C90} | $T_C = 90^\circ C$ | 42 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 300 | A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 10\Omega$ | $I_{CM} = 100$ | A |
| (RBSOA) | Clamped inductive load | $V_{CES} \leq 1350$ | V |
| P_C | $T_C = 25^\circ C$ | 360 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | 1.6mm (0.062 in.) from case for 10s | 300 | $^\circ C$ |
| T_{SOLD} | Plastic body for 10 seconds | 260 | $^\circ C$ |
| M_d | Mounting torque (TO-247) | 1.13/10 | Nm/lb.in. |
| Weight | TO-247 | 6 | g |
| | TO-268 | 4 | g |

TO-247 (IXBH)



TO-268 (IXBT)



G = Gate C = Collector
E = Emitter TAB = Collector

Features

- High blocking voltage
- International standard packages
- Low conduction losses

Advantages

- Low gate drive requirement
- High power density

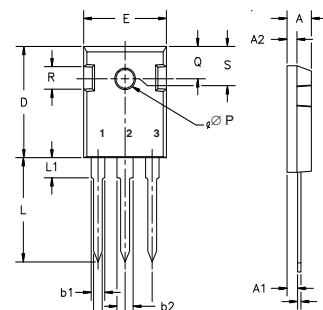
Applications:

- Switched-mode and resonant-mode power supplies
- Uninterruptible power supplies (UPS)
- Laser generator
- Capacitor discharge circuit
- AC switches

| Symbol | Test Conditions ($T_J = 25^\circ C$ unless otherwise specified) | Characteristic Values | | |
|---------------|---|-----------------------|------|----------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1700 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 2.5 | | 5.5 V |
| I_{CES} | $V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 1.5 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 42A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | | 2.7 | 2.8 V V |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|-----------------------|------|--------------|
| | | Min. | Typ. | Max. |
| g_{fS} | $I_C = 42A, V_{CE} = 10V$, Note 1 | 24 | 32 | S |
| C_{ies} | $V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$ | | 3990 | pF |
| C_{oes} | | | 225 | pF |
| C_{res} | | | 70 | pF |
| Q_g | $I_C = 42A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$ | | 188 | nC |
| Q_{ge} | | | 29 | nC |
| Q_{gc} | | | 76 | nC |
| $t_{d(on)}$ | Resistive Switching times, $T_J = 25^\circ C$ $I_C = 42A, V_{GE} = 15V$ $V_{CE} = 850V, R_G = 10\Omega$ | | 37 | ns |
| t_r | | | 139 | ns |
| $t_{d(off)}$ | | | 340 | ns |
| t_f | | | 665 | ns |
| $t_{d(on)}$ | Resistive Switching times, $T_J = 125^\circ C$ $I_C = 42A, V_{GE} = 15V$ $V_{CE} = 850V, R_G = 10\Omega$ | | 36 | ns |
| t_r | | | 188 | ns |
| $t_{d(off)}$ | | | 330 | ns |
| t_f | | | 740 | ns |
| R_{thJC} | | | 0.35 | $^\circ C/W$ |
| R_{thCS} | (TO-247) | 0.25 | | $^\circ C/W$ |

TO-247 (IXBH) Outline



Terminals: 1 - Gate
2 - Drain
3 - Source
Tab - Drain

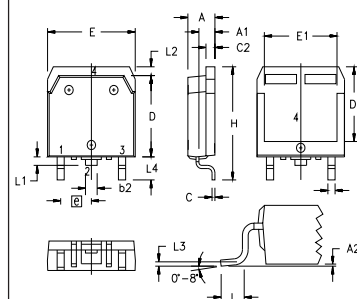
| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.7 | 5.3 | .185 | .209 |
| A ₁ | 2.2 | 2.54 | .087 | .102 |
| A ₂ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| b ₁ | 1.65 | 2.13 | .065 | .084 |
| b ₂ | 2.87 | 3.12 | .113 | .123 |
| C | .4 | .8 | .016 | .031 |
| D | 20.80 | 21.46 | .819 | .845 |
| E | 15.75 | 16.26 | .610 | .640 |
| e | 5.20 | 5.72 | 0.205 | 0.225 |
| L | 19.81 | 20.32 | .780 | .800 |
| L ₁ | | 4.50 | | .177 |
| ∅P | 3.55 | 3.65 | .140 | .144 |
| Q | 5.89 | 6.40 | 0.232 | 0.252 |
| R | 4.32 | 5.49 | .170 | .216 |
| S | 6.15 | BSC | 242 | BSC |

Reverse Diode

| Symbol | Test Conditions | Characteristic Values | | |
|----------|---|-----------------------|------|---------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 42A, V_{GE} = 0V$ | | | 2.8 V |
| t_{rr} | $I_F = 21A, V_{GE} = 0V, -di_F/dt = 100A/\mu s$ $V_R = 100V$ | | 1.32 | μs |
| I_{RM} | | | 36 | A |

Note 1: Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.

TO-268 (IXBT) Outline



| SYM | INCHES | | MILLIMETERS | |
|----------------|----------|------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .193 | .201 | 4.90 | 5.10 |
| A ₁ | .106 | .114 | 2.70 | 2.90 |
| A ₂ | .001 | .010 | 0.02 | 0.25 |
| b | .045 | .057 | 1.15 | 1.45 |
| b ₂ | .075 | .083 | 1.90 | 2.10 |
| C | .016 | .026 | 0.40 | 0.65 |
| C ₂ | .057 | .063 | 1.45 | 1.60 |
| D | .543 | .551 | 13.80 | 14.00 |
| D ₁ | .488 | .500 | 12.40 | 12.70 |
| E | .624 | .632 | 15.85 | 16.05 |
| E ₁ | .524 | .535 | 13.30 | 13.60 |
| e | .215 BSC | | 5.45 BSC | |
| H | .736 | .752 | 18.70 | 19.10 |
| L | .094 | .106 | 2.40 | 2.70 |
| L ₁ | .047 | .055 | 1.20 | 1.40 |
| L ₂ | .039 | .045 | 1.00 | 1.15 |
| L ₃ | .010 BSC | | 0.25 BSC | |
| L ₄ | .150 | .161 | 3.80 | 4.10 |

IXYS reserves the right to change limits, test conditions and dimensions.

IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2
by one or more of the following U.S. patents: 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

Fig. 1. Output Characteristics
@ 25°C

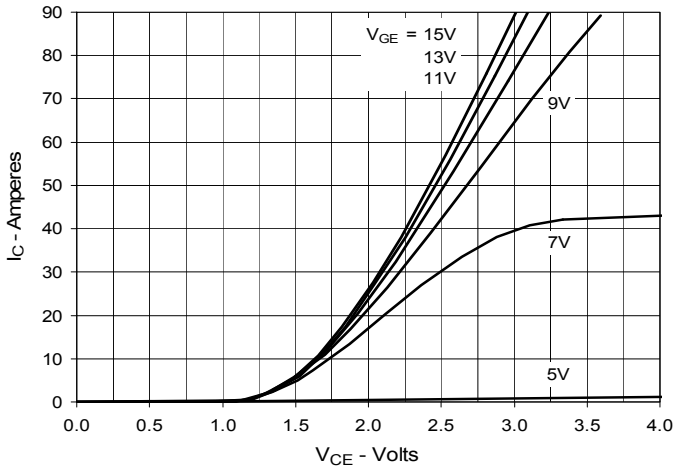


Fig. 2. Extended Output Characteristics
@ 25°C

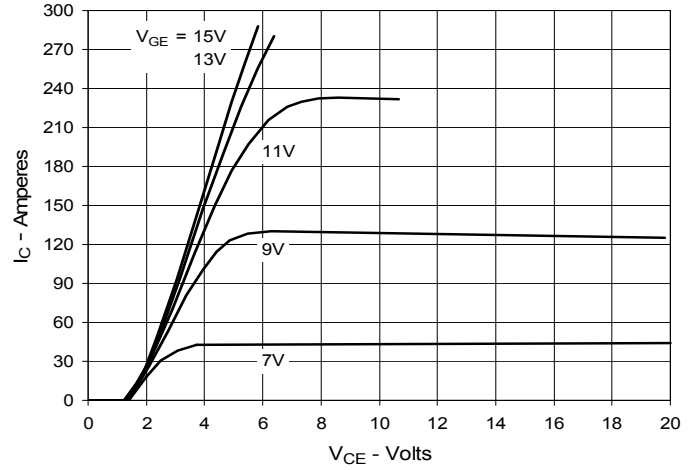


Fig. 3. Output Characteristics
@ 125°C

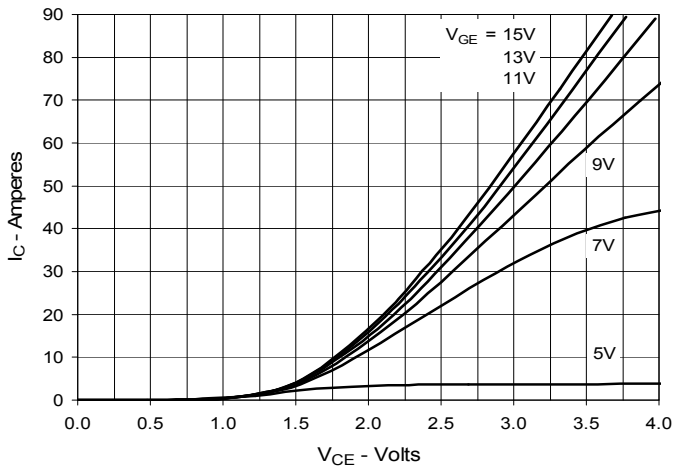


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

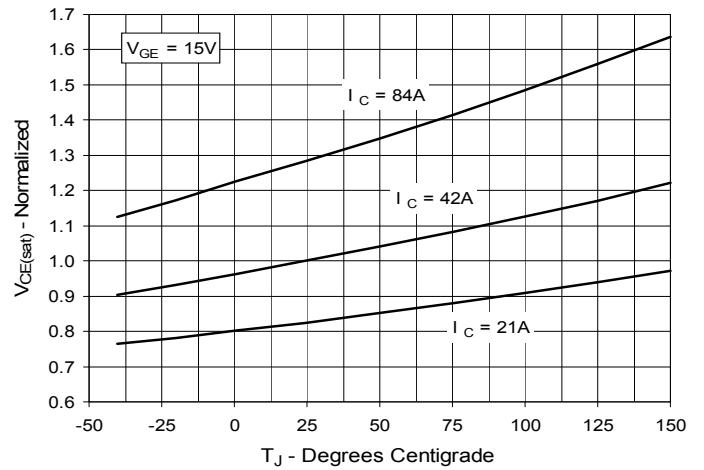


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

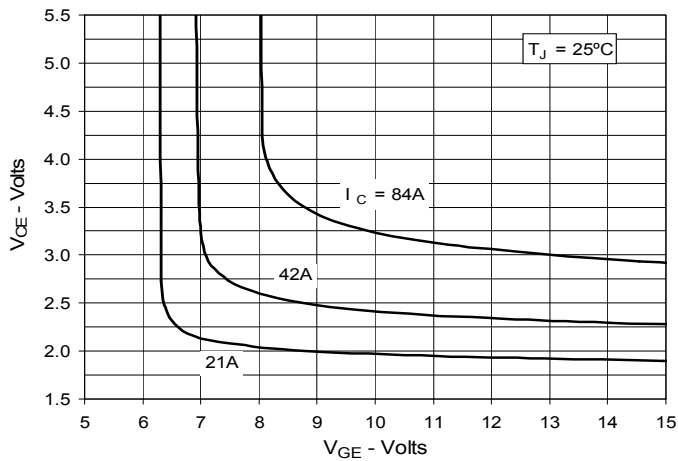


Fig. 6. Input Admittance

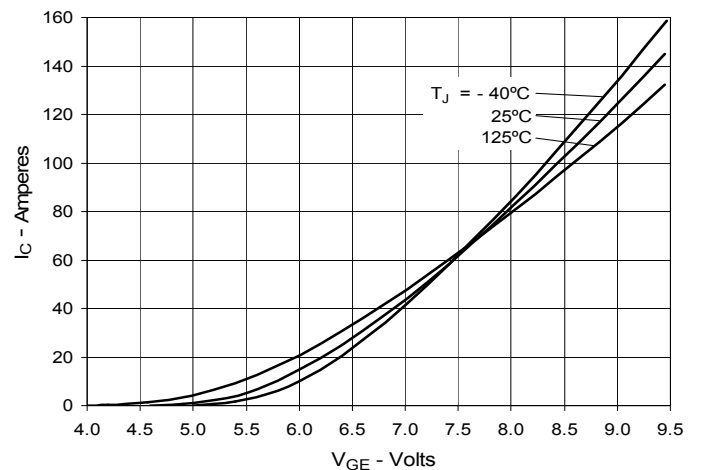


Fig. 7. Transconductance

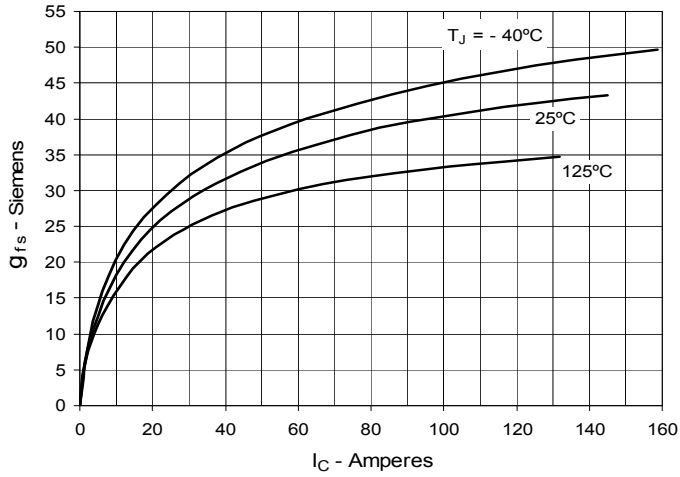


Fig. 8. Forward Voltage Drop of Intrinsic Diode

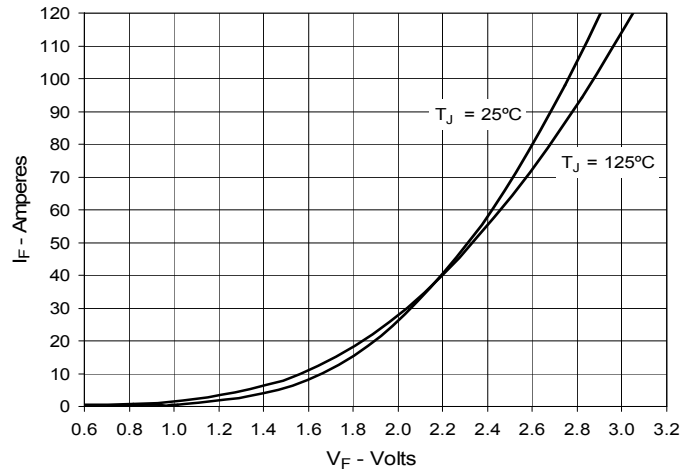


Fig. 9. Gate Charge

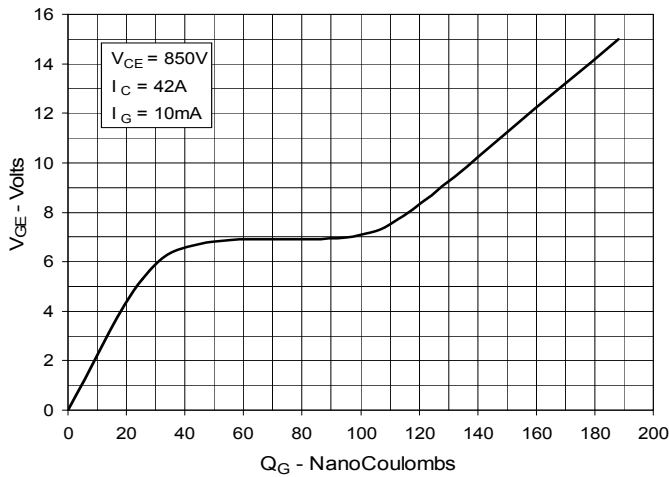


Fig. 10. Capacitance

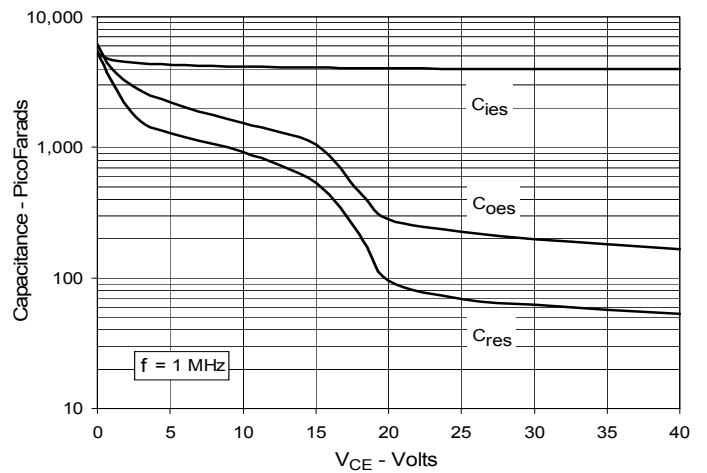


Fig. 11. Reverse-Bias Safe Operating Area

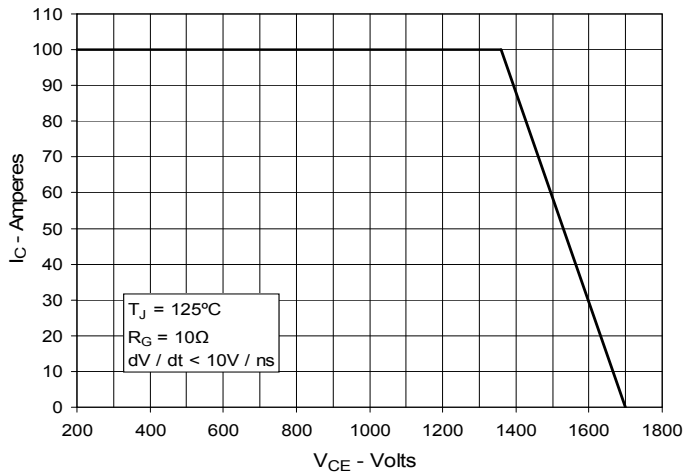
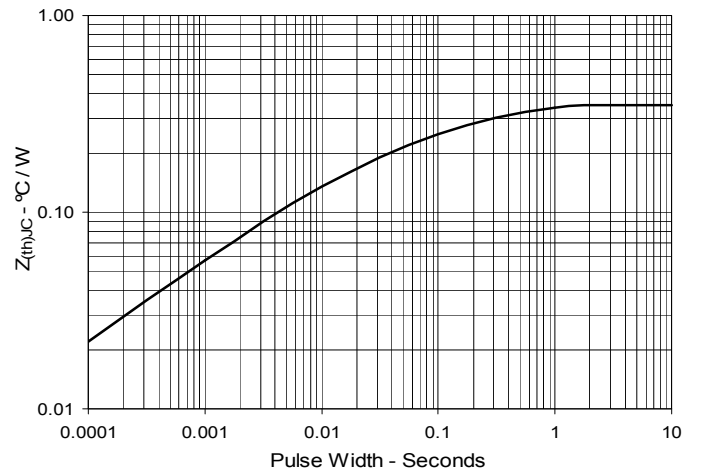
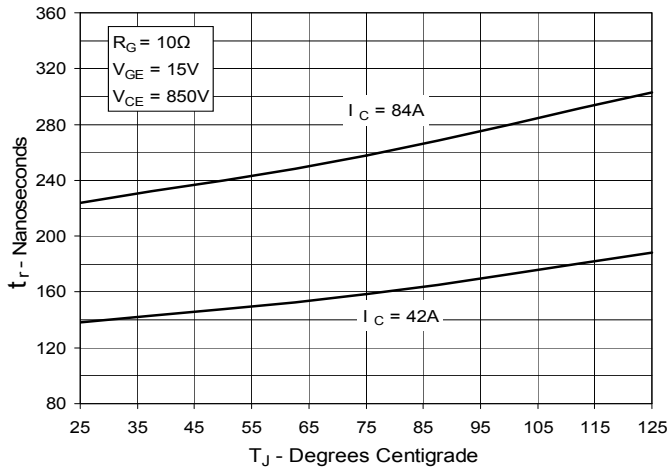


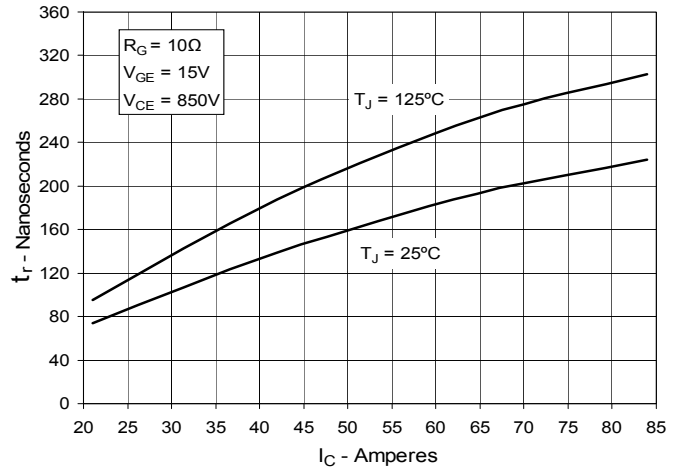
Fig. 12. Maximum Transient Thermal Impedance



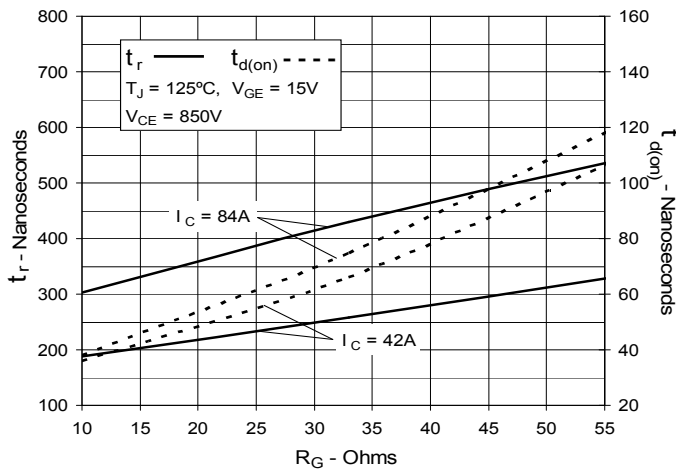
**Fig. 13. Resistive Turn-on
Rise Time vs. Junction Temperature**



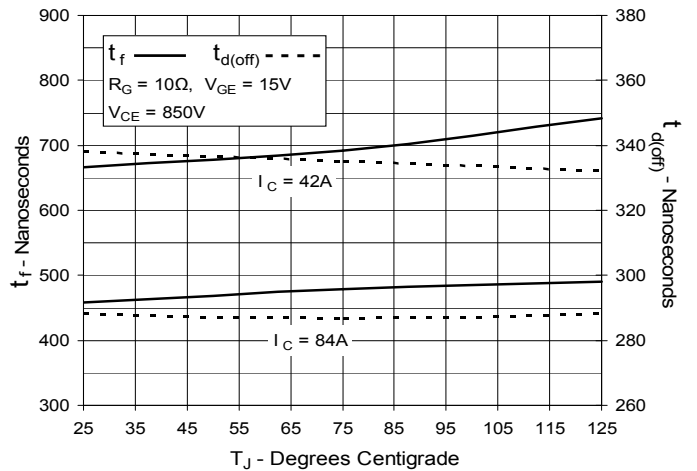
**Fig. 14. Resistive Turn-on
Rise Time vs. Drain Current**



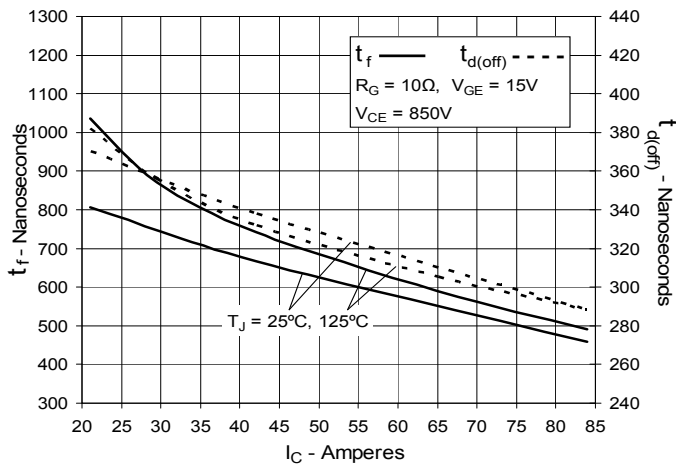
**Fig. 15. Resistive Turn-on
Switching Times vs. Gate Resistance**



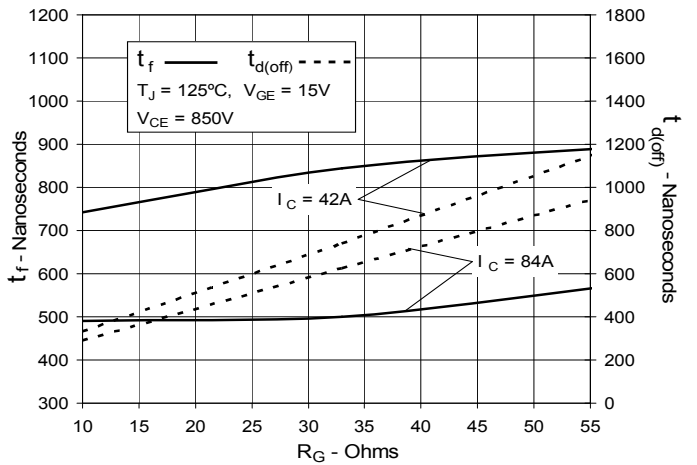
**Fig. 16. Resistive Turn-off
Switching Times vs. Junction Temperature**



**Fig. 17. Resistive Turn-off
Switching Times vs. Drain Current**



**Fig. 18. Resistive Turn-off
Switching Times vs. Gate Resistance**





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