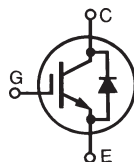


1200V XPT™ IGBT GenX3™ w/ Diode

MMIX1Y82N120C3H1

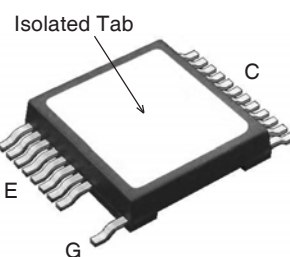
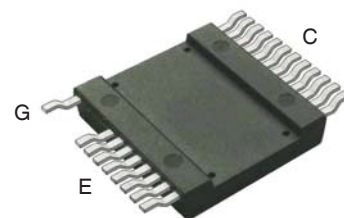
(Electrically Isolated Tab)

High-Speed IGBT
for 20-50 kHz Switching



$V_{CES} = 1200V$
 $I_{C110} = 36A$
 $V_{CE(sat)} \leq 3.4V$
 $t_{fi(typ)} = 93ns$

| Symbol | Test Conditions | Maximum Ratings | |
|----------------|-----------------------------------------------------------|-------------------------|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 1200 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 1200 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 78 | A |
| I_{C110} | $T_C = 110^\circ C$ | 36 | A |
| I_{F110} | $T_C = 110^\circ C$ | 34 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 320 | A |
| SSOA | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 2\Omega$ | $I_{CM} = 164$ | A |
| (RBSOA) | Clamped Inductive Load | @ $V_{CE} \leq V_{CES}$ | |
| P_C | $T_C = 25^\circ C$ | 320 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering | 300 | $^\circ C$ |
| T_{SOLD} | 1.6 mm (0.062 in.) from Case for 10 | 260 | $^\circ C$ |
| V_{ISOL} | 50/60Hz, 1 minute | 2500 | V~ |
| F_C | Mounting Force | 50..200/11..45 | N/lb. |
| Weight | | 8 | g |



G = Gate E = Emitter
C = Collector

Features

- Optimized for Low Switching Losses
- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Square RBSOA
- Isolation Voltage 2500V~
- Anti-Parallel Ultra Fast Diode
- Positive Thermal Coefficient of $V_{ce(sat)}$
- High Current Handling Capability
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

| Symbol | Test Conditions | Characteristic Values | | |
|---------------|-------------------------------------------------------------------|-----------------------|------------|--------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1200 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | 5.0 V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$ | | | 50 μA 3 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 82A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | | 2.9 3.5 | 3.4 V V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 60\text{A}, V_{CE} = 10\text{V}$, Note 1 | 30 | 50 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 4060 | pF |
| C_{oes} | | | 285 | pF |
| C_{res} | | | 110 | pF |
| $Q_{g(on)}$ | $I_C = 82\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 215 | nC |
| Q_{ge} | | | 26 | nC |
| Q_{gc} | | | 84 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 80\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 3 | | 29 | ns |
| t_{ri} | | | 78 | ns |
| E_{on} | | | 4.95 | mJ |
| $t_{d(off)}$ | | | 192 | 280 ns |
| t_{fi} | | | 93 | ns |
| E_{off} | | | 2.78 | 5.00 mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 80\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 3 | | 29 | ns |
| t_{ri} | | | 90 | ns |
| E_{on} | | | 7.45 | mJ |
| $t_{d(off)}$ | | | 200 | ns |
| t_{fi} | | | 95 | ns |
| E_{off} | | | 3.70 | mJ |
| R_{thJC} | | | | 0.39 $^\circ\text{C/W}$ |
| R_{thCS} | | 0.05 | | $^\circ\text{C/W}$ |
| R_{thJA} | | 30 | | $^\circ\text{C/W}$ |

Reverse Diode (FRED)

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 60\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 125^\circ\text{C}$ | | 1.9 | 2.7 V |
| I_{RM} | $I_F = 60\text{A}, V_{GE} = 0\text{V}, T_J = 125^\circ\text{C}$ $-di_F/dt = 700\text{A}/\mu\text{s}, V_R = 600\text{V}$ | | 41 | A |
| t_{rr} | | | 420 | ns |
| R_{thJC} | | | | 0.54 $^\circ\text{C/W}$ |

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Part must be heatsunk for high-temp I_{CES} measurement.
3. Switching times & energy losses may increase for higher $V_{CE}(\text{Clamp})$, T_J or R_G .

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

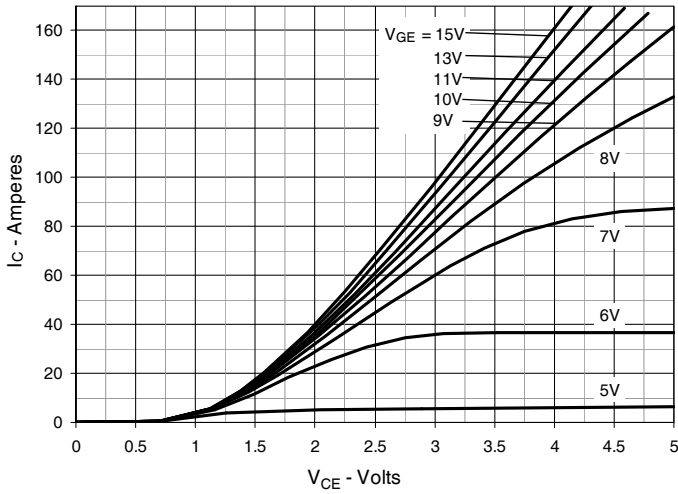


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

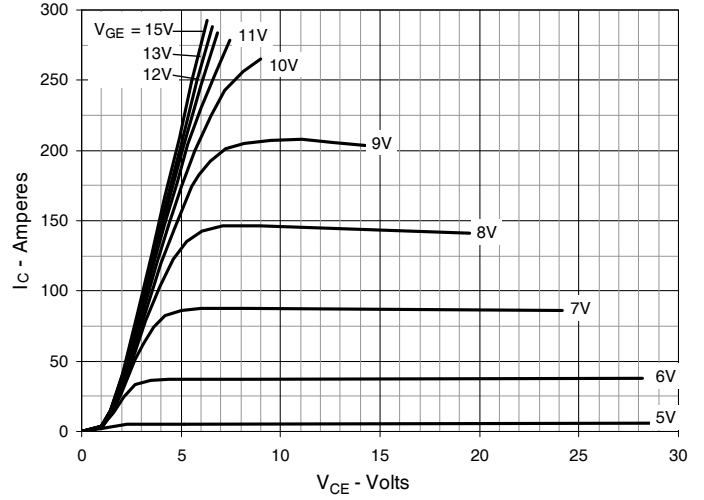


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

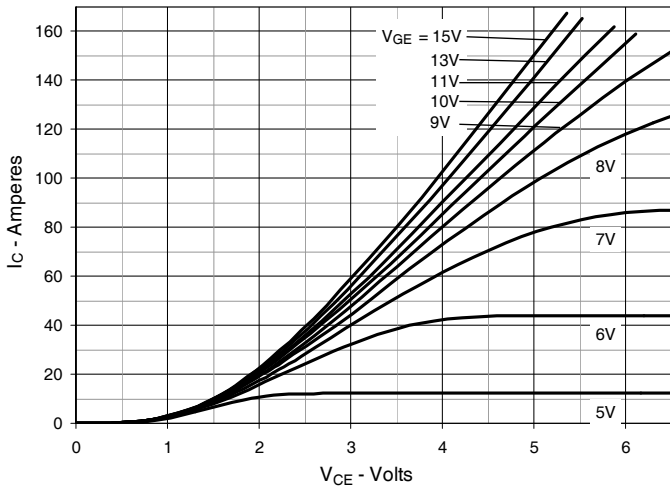


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

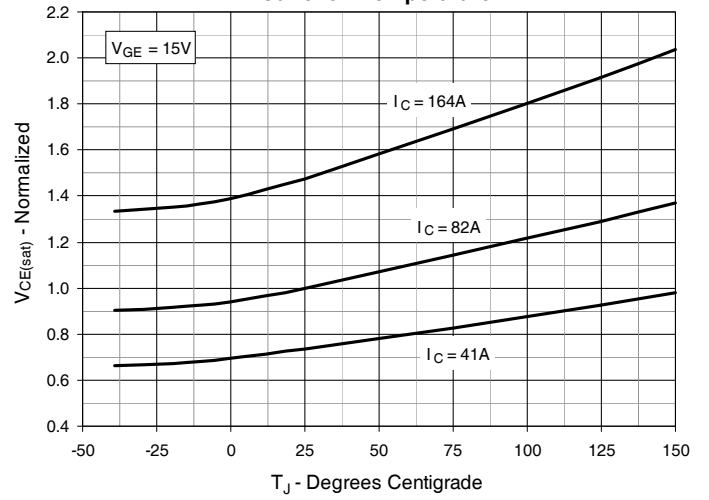


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

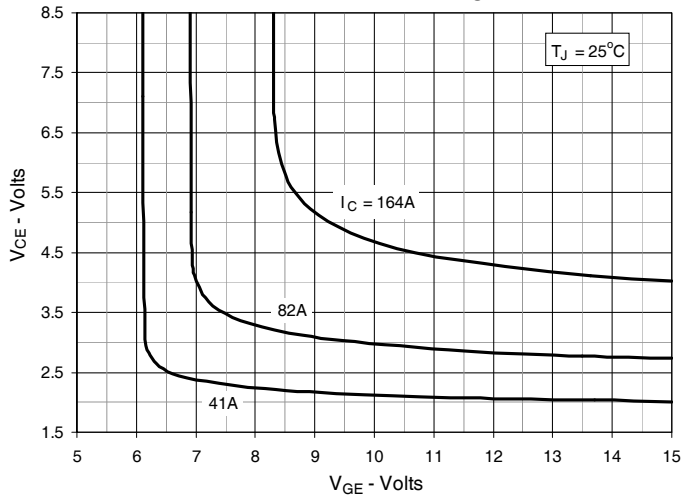


Fig. 6. Input Admittance

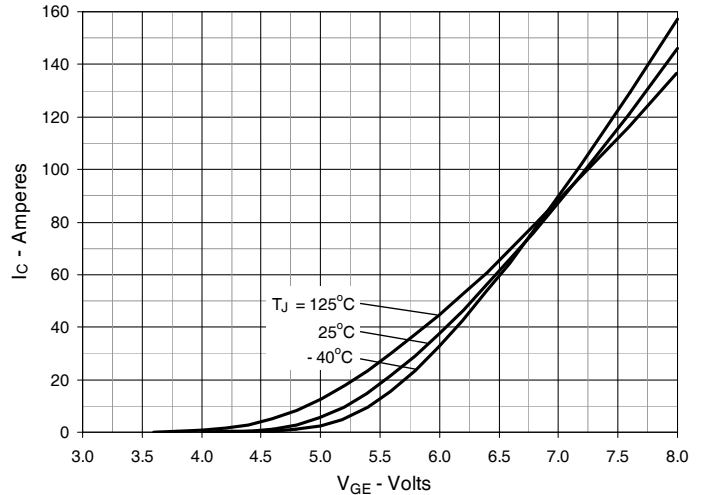


Fig. 7. Transconductance

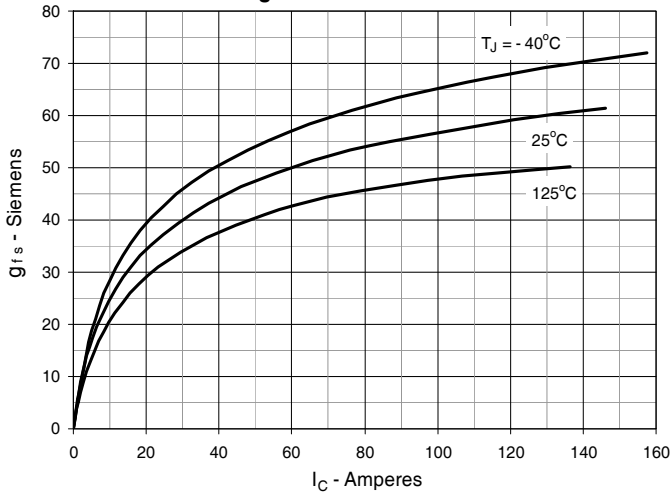


Fig. 8. Gate Charge

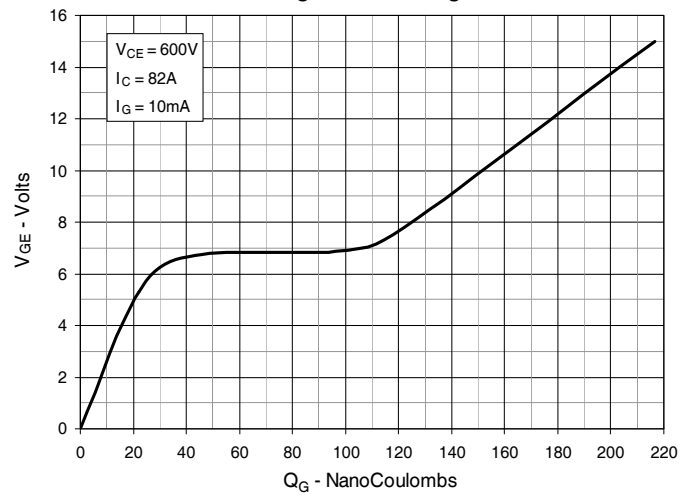


Fig. 9. Capacitance

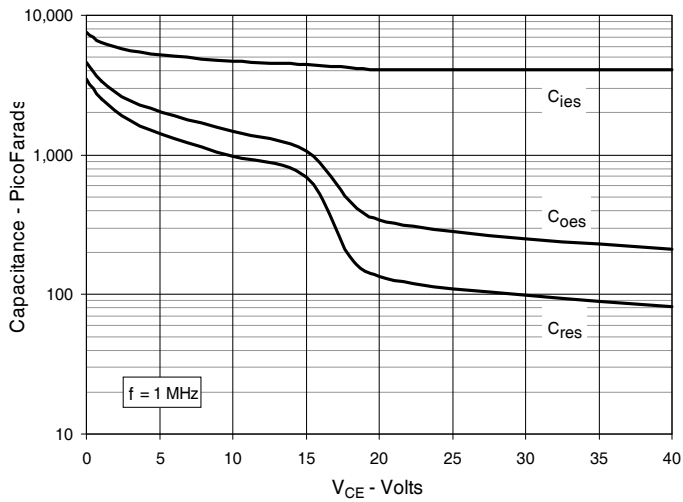


Fig. 10. Reverse-Bias Safe Operating Area

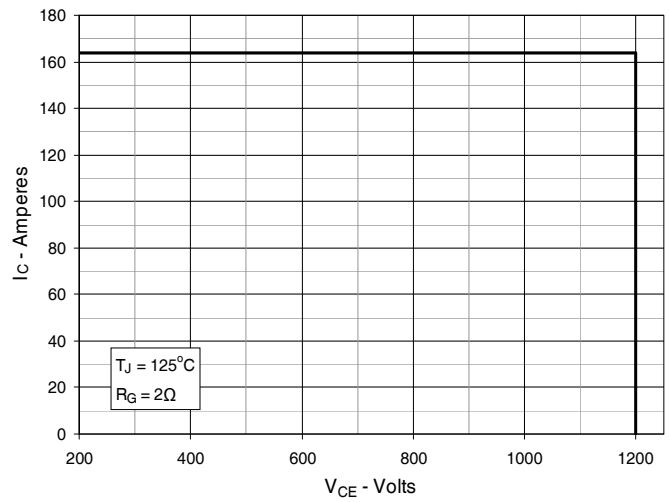


Fig. 11. Maximum Transient Thermal Impedance

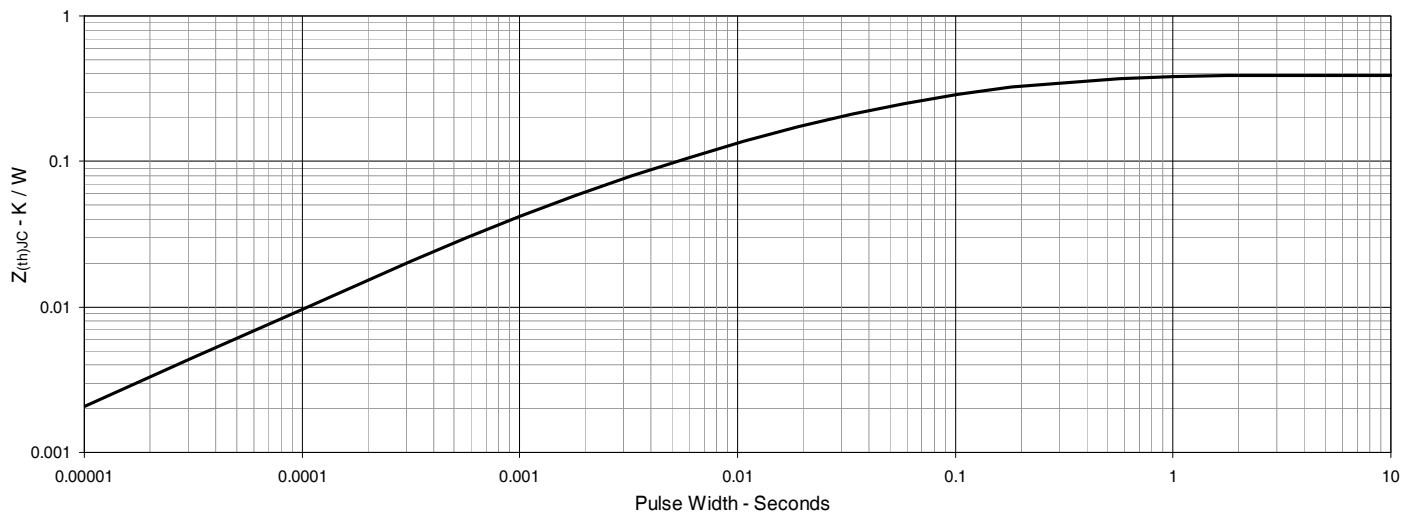


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

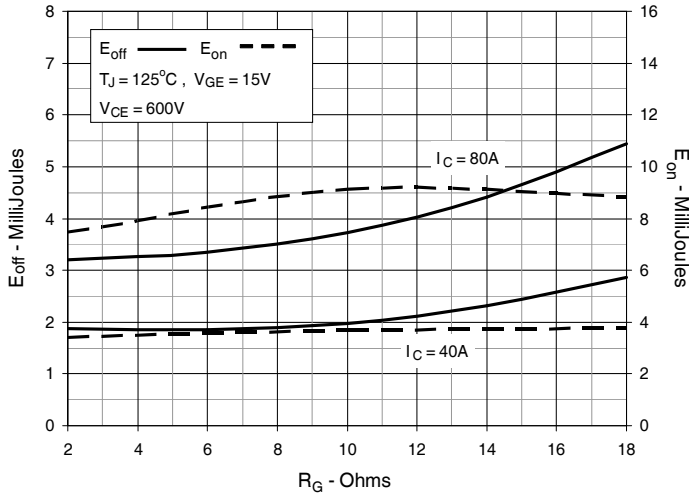


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

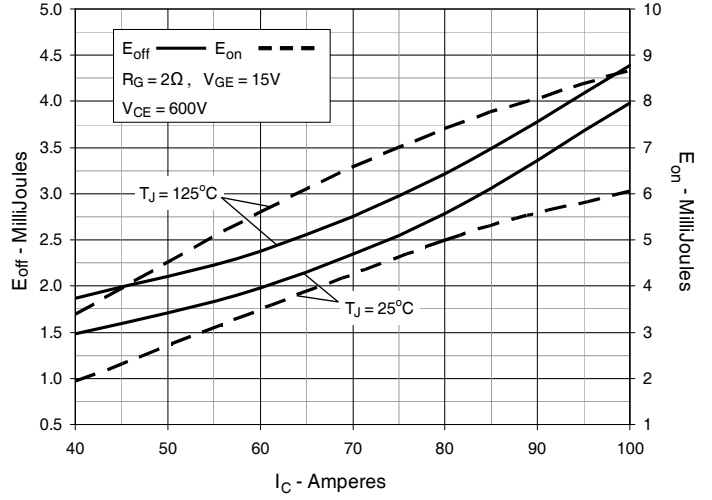


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

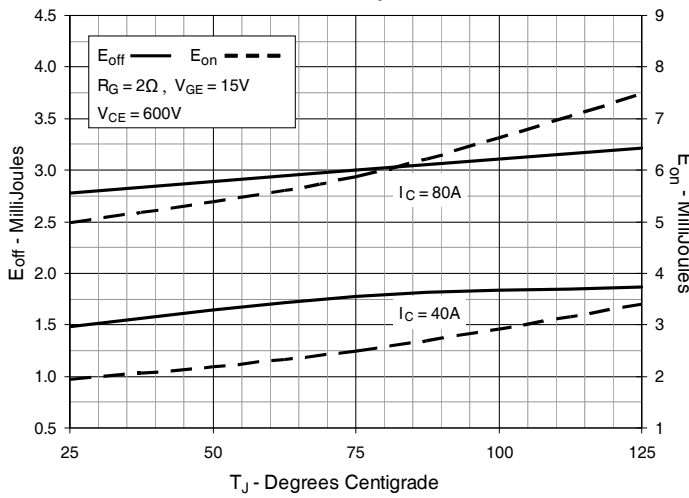


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

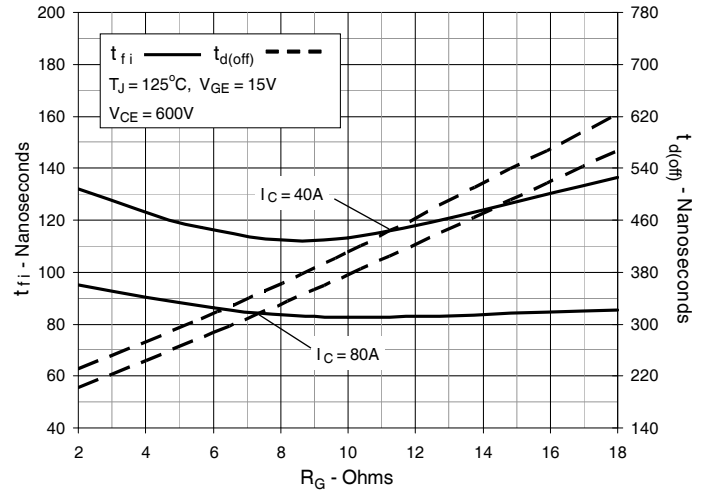


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

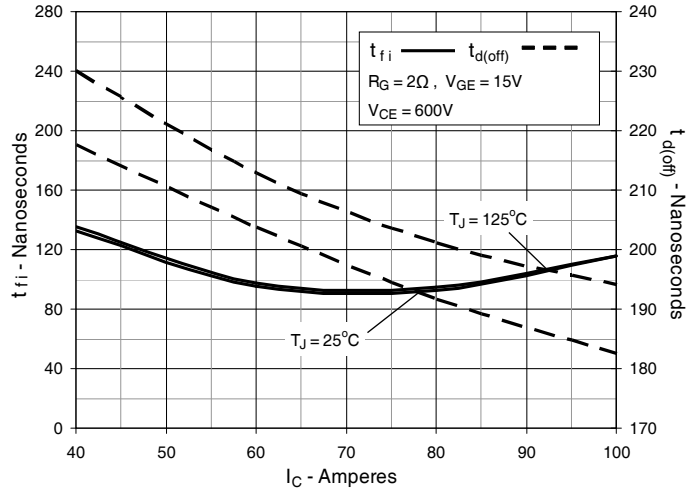


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

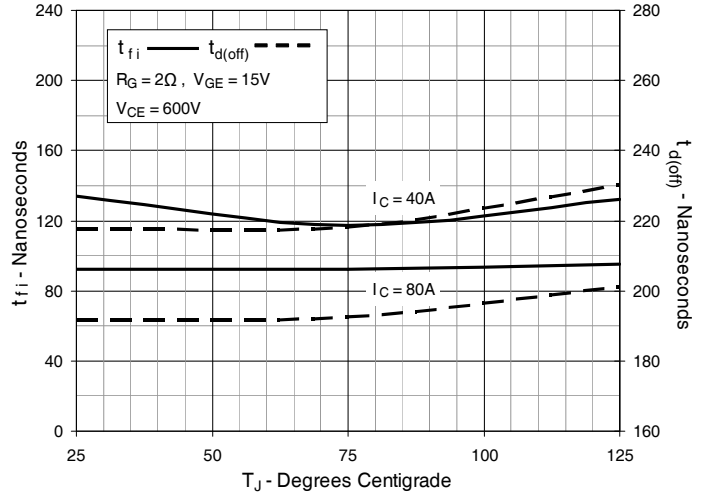


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

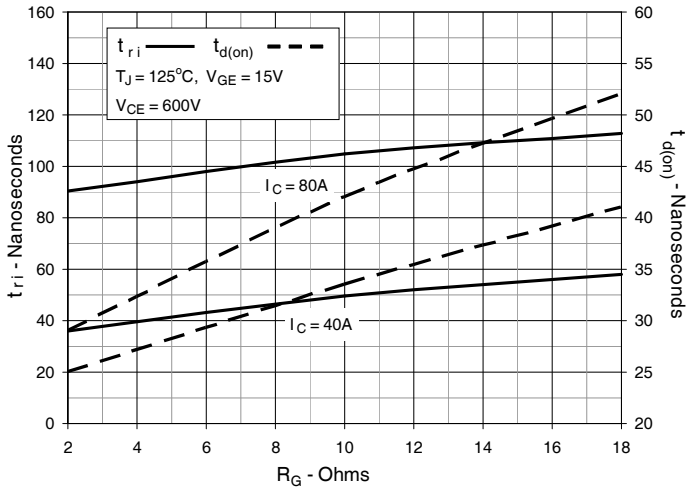


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

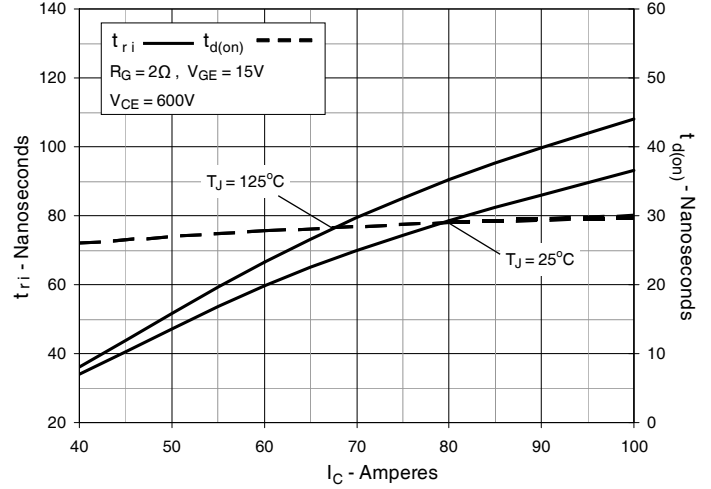


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

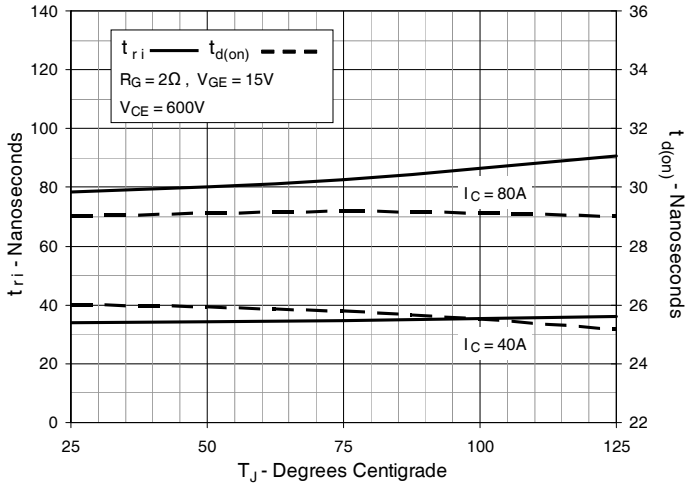


Fig. 21. Forward Characteristics

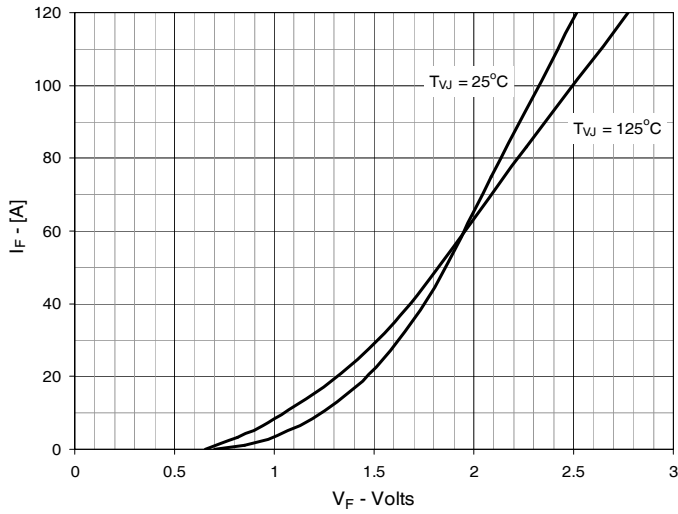


Fig. 22. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

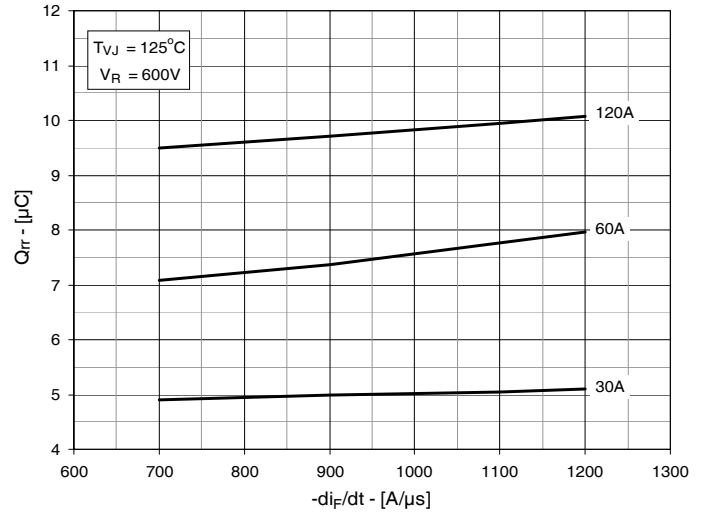


Fig. 23. Peak Reverse Current I_{RM} vs. $-di_F/dt$

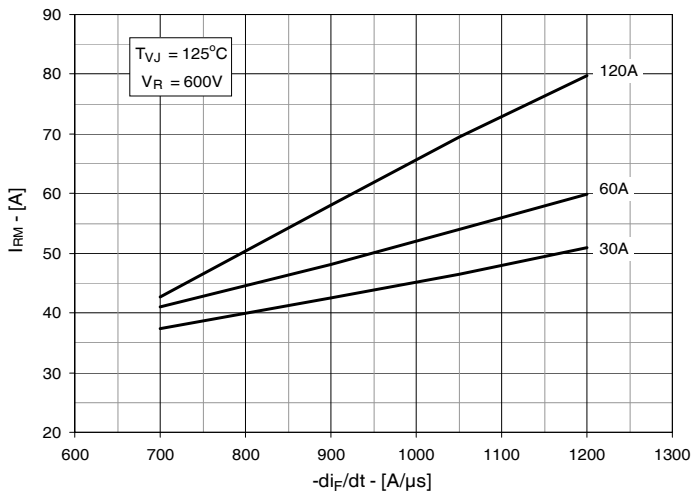


Fig. 24. Recovery Time t_{rr} vs. $-di_F/dt$

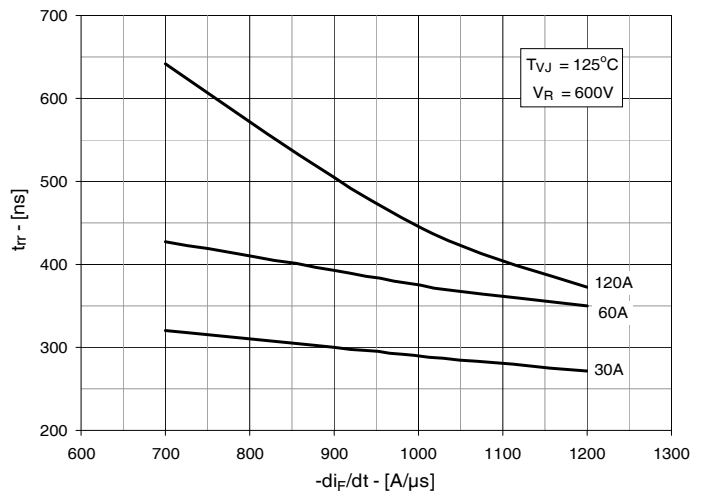


Fig. 25. Recovery Energy E_{rec} vs. $-di_F/dt$

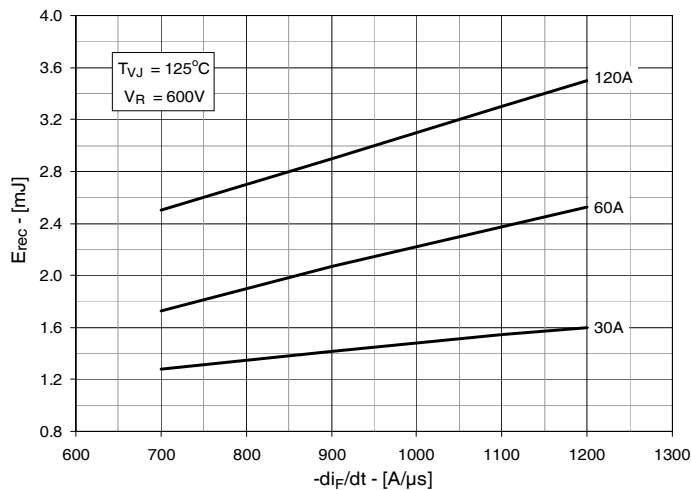
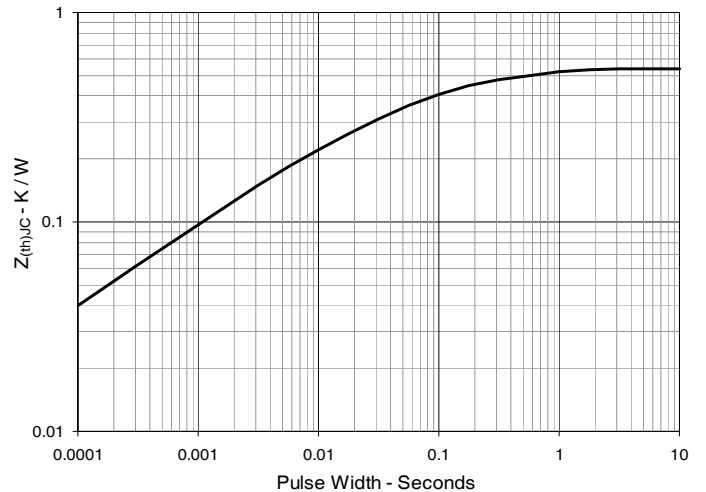
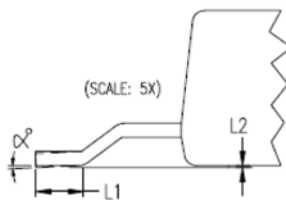
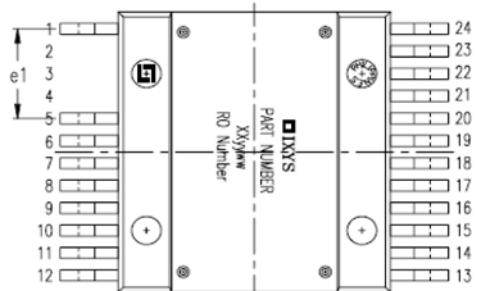
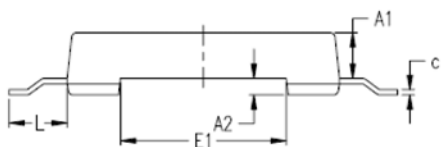
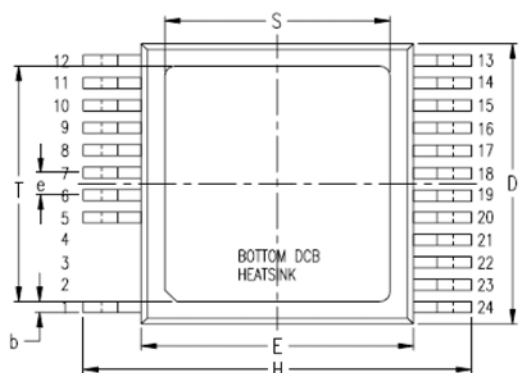


Fig. 26. Maximum Transient Thermal Impedance





| SYM | INCHES | | MILLIMETERS | |
|-----|----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | .209 | .224 | 5.30 | 5.70 |
| A1 | .154 | .161 | 3.90 | 4.10 |
| A2 | .055 | .063 | 1.40 | 1.60 |
| b | .035 | .045 | 0.90 | 1.15 |
| c | .018 | .026 | 0.45 | 0.65 |
| D | .976 | .994 | 24.80 | 25.25 |
| E | .898 | .915 | 22.80 | 23.25 |
| E1 | .543 | .559 | 13.80 | 14.20 |
| e | .079 BSC | | 2.00 BSC | |
| e1 | .315 BSC | | 8.00 BSC | |
| H | 1.272 | 1.311 | 32.30 | 33.30 |
| L | .181 | .209 | 4.60 | 5.30 |
| L1 | .051 | .067 | 1.30 | 1.70 |
| L2 | .000 | .006 | 0.00 | 0.15 |
| S | .736 | .760 | 18.70 | 19.30 |
| T | .815 | .839 | 20.70 | 21.30 |
| α | 0 | 4° | 0 | 4° |

PIN: 1 = Gate
 5-12 = Emitter
 13-24 = Collector



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.