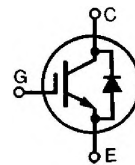


**Low  $V_{CE(sat)}$  IGBT with Diode**  
**High speed IGBT with Diode**

**IXGH 17 N100U1**  
**IXGH 17 N100AU1**

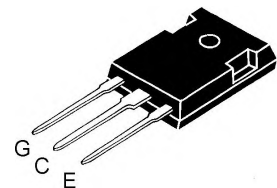
| $V_{CES}$     | $I_{C25}$   | $V_{CE(sat)}$ |
|---------------|-------------|---------------|
| <b>1000 V</b> | <b>34 A</b> | <b>3.5 V</b>  |
| <b>1000 V</b> | <b>34 A</b> | <b>4.0 V</b>  |

## Combi Packs



| Symbol                                                                          | Test Conditions                                                                                                              | Maximum Ratings                  |                  |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| $V_{CES}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                              | 1000                             | V                |
| $V_{CGR}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1\text{ M}\Omega$                                                | 1000                             | V                |
| $V_{GES}$                                                                       | Continuous                                                                                                                   | $\pm 20$                         | V                |
| $V_{GEM}$                                                                       | Transient                                                                                                                    | $\pm 30$                         | V                |
| $I_{C25}$                                                                       | $T_C = 25^\circ\text{C}$                                                                                                     | 34                               | A                |
| $I_{C90}$                                                                       | $T_C = 90^\circ\text{C}$                                                                                                     | 17                               | A                |
| $I_{CM}$                                                                        | $T_C = 25^\circ\text{C}$ , 1 ms                                                                                              | 68                               | A                |
| <b>SSOA (RBSOA)</b>                                                             | $V_{GE} = 15\text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 82\ \Omega$<br>Clamped inductive load, $L = 100\ \mu\text{H}$ | $I_{CM} = 34$<br>@ $0.8 V_{CES}$ | A                |
| $P_c$                                                                           | $T_C = 25^\circ\text{C}$                                                                                                     | 150                              | W                |
| $T_J$                                                                           |                                                                                                                              | -55 ... +150                     | $^\circ\text{C}$ |
| $T_{JM}$                                                                        |                                                                                                                              | 150                              | $^\circ\text{C}$ |
| $T_{slg}$                                                                       |                                                                                                                              | -55 ... +150                     | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque (M3)                                                                                                         | 1.13/10                          | Nm/lb.in.        |
| <b>Weight</b>                                                                   |                                                                                                                              | 6                                | g                |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                                                                              | 300                              | $^\circ\text{C}$ |

TO-247 AD



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

## Features

- International standard package JEDEC TO-247 AD
- IGBT and anti-parallel FRED in one package
- 2nd generation HDMOS™ process
- Low  $V_{CE(sat)}$ 
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Epitaxial Diode (FRED)
  - soft recovery with low  $I_{RM}$

## Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

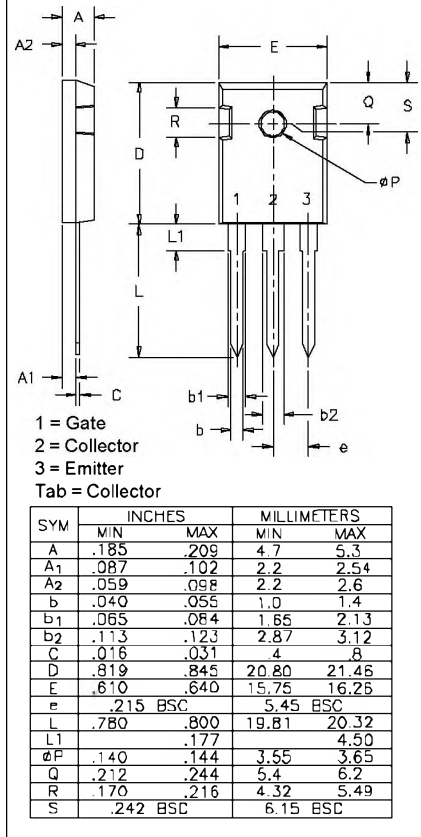
## Advantages

- Saves space (two devices in one package)
- Easy to mount (isolated mounting screw hole)
- Reduces assembly time and cost

| Symbol        | Test Conditions                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|---------------|-------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
|               |                                                       | min.                                                                              | typ. | max.                      |
| $BV_{CES}$    | $I_C = 4.5\text{ mA}$ , $V_{GE} = 0\text{ V}$         | 1000                                                                              |      | V                         |
| $V_{GE(th)}$  | $I_C = 500\ \mu\text{A}$ , $V_{CE} = V_{GE}$          | 2.5                                                                               |      | 5.5 V                     |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$<br>$V_{GE} = 0\text{ V}$ |                                                                                   |      | 500 $\mu\text{A}$<br>8 mA |
| $I_{GES}$     | $V_{CE} = 0\text{ V}$ , $V_{GE} = \pm 20\text{ V}$    |                                                                                   |      | $\pm 100\text{ nA}$       |
| $V_{CE(sat)}$ | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$              |                                                                                   |      | 3.5 V<br>4.0 V            |
|               |                                                       |                                                                                   |      | 17N100U1<br>17N100AU1     |

| Symbol       | Test Conditions                                                                                                                                                                                                                                                                                                                            | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |          |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|----------|
|              |                                                                                                                                                                                                                                                                                                                                            | min.                                                                              | typ. | max.     |
| $g_{fs}$     | $I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$                                                                                                                                                                                                                          | 6                                                                                 | 15   | S        |
| $C_{ies}$    | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                                                                                                                                                                                                                        |                                                                                   | 1500 | pF       |
| $C_{oes}$    |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 210  | pF       |
| $C_{res}$    |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 40   | pF       |
| $Q_g$        | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$                                                                                                                                                                                                                                                                          |                                                                                   | 100  | nC       |
| $Q_{ge}$     |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 20   | nC       |
| $Q_{gc}$     |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 60   | nC       |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 300\text{ }\mu\text{H}$ ,<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 82\text{ }\Omega$<br>Remarks: Switching times<br>may increase<br>for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ ,<br>higher $T_J$ or increased $R_G$  |                                                                                   | 100  | ns       |
| $t_{ri}$     |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 200  | ns       |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 500  | 1000     |
| $t_{fi}$     |                                                                                                                                                                                                                                                                                                                                            | 17N100U1                                                                          | 750  | ns       |
|              |                                                                                                                                                                                                                                                                                                                                            | 17N100AU1                                                                         | 450  | 750      |
| $E_{off}$    |                                                                                                                                                                                                                                                                                                                                            | 17N100AU1                                                                         | 3    | mJ       |
| $t_{d(on)}$  | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 300\text{ }\mu\text{H}$ ,<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 82\text{ }\Omega$<br>Remarks: Switching times<br>may increase<br>for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ ,<br>higher $T_J$ or increased $R_G$ |                                                                                   | 100  | ns       |
| $t_{ri}$     |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 200  | ns       |
| $E_{on}$     |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 2.5  | mJ       |
| $t_{d(off)}$ |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 700  | 1000     |
| $t_{fi}$     |                                                                                                                                                                                                                                                                                                                                            | 17N100U1                                                                          | 1200 | 2000     |
| $E_{off}$    |                                                                                                                                                                                                                                                                                                                                            | 17N100AU1                                                                         | 750  | 1000     |
|              |                                                                                                                                                                                                                                                                                                                                            | 17N100U1                                                                          | 8    | mJ       |
|              |                                                                                                                                                                                                                                                                                                                                            | 17N100AU1                                                                         | 6    | mJ       |
| $R_{thJC}$   |                                                                                                                                                                                                                                                                                                                                            |                                                                                   |      | 0.83 K/W |
| $R_{thCK}$   |                                                                                                                                                                                                                                                                                                                                            |                                                                                   | 0.25 | K/W      |

TO-247 AD Outline



| Symbol     | Test Conditions                                                                                                                                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |       |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|
|            |                                                                                                                                                                                             | min.                                                                              | typ. | max.  |
| $V_F$      | $I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $d \leq 2\%$                                                                          |                                                                                   |      | 2.5 V |
| $I_{RM}$   | $I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ , $-di_F/dt = 240\text{ A}/\mu\text{s}$<br>$V_R = 540\text{ V}$<br>$I_F = 1\text{ A}$ , $-di_F/dt = 100\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ |                                                                                   | 16   | 18 A  |
| $t_{rr}$   |                                                                                                                                                                                             |                                                                                   | 120  | ns    |
|            |                                                                                                                                                                                             |                                                                                   | 35   | 50 ns |
| $R_{thJC}$ |                                                                                                                                                                                             |                                                                                   |      | 1 K/W |

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

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

Fig. 1 Saturation Characteristics

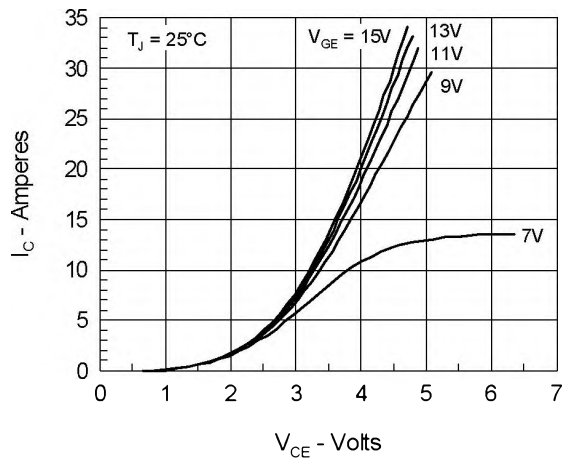


Fig. 2 Output Characteristics

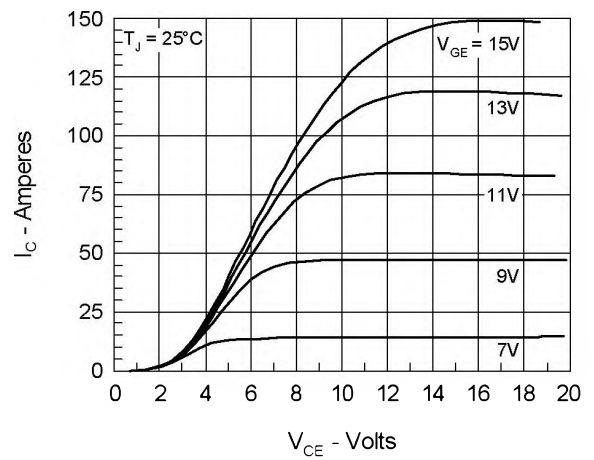


Fig. 3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

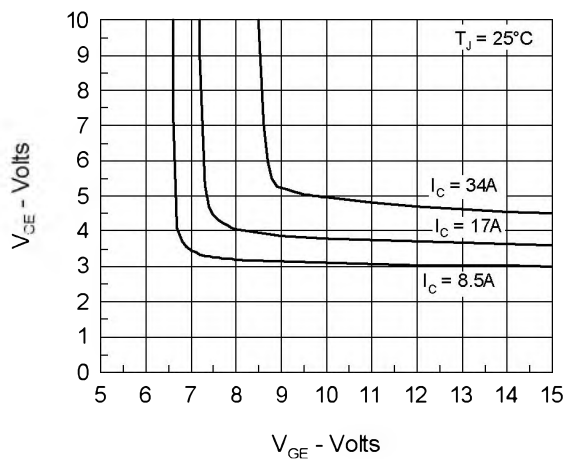


Fig. 4 Temperature Dependence of Output Saturation Voltage

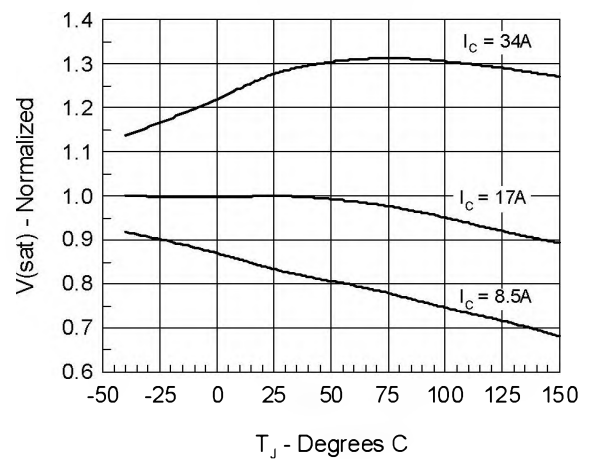


Fig. 5 Input Admittance

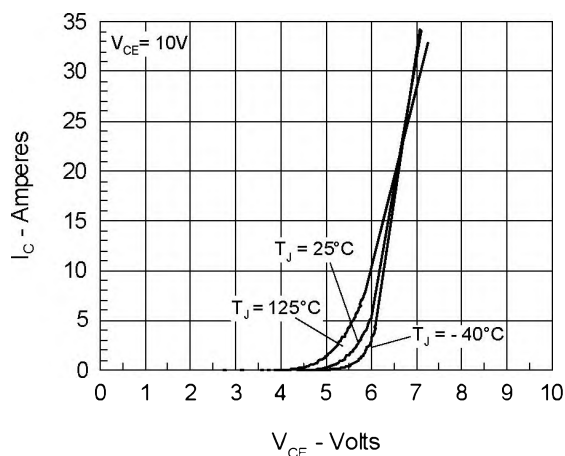


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

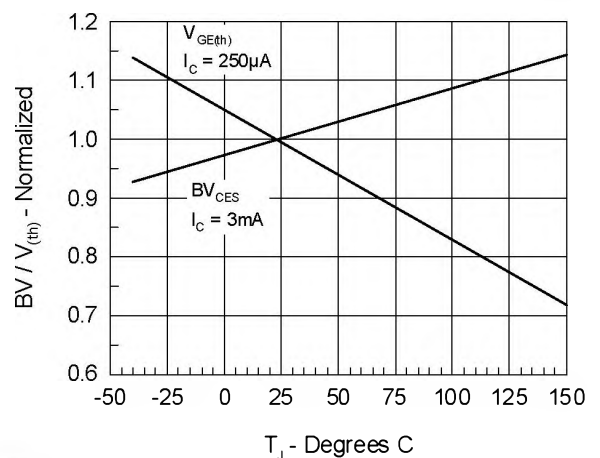


Fig.7 Gate Charge

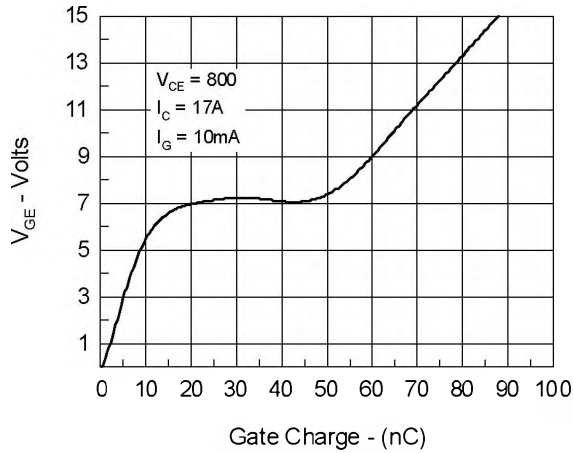


Fig.8 Turn-Off Safe Operating Area

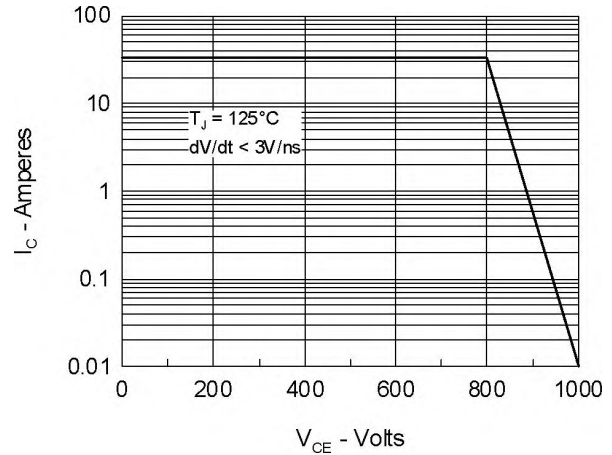


Fig.9 Capacitance Curves

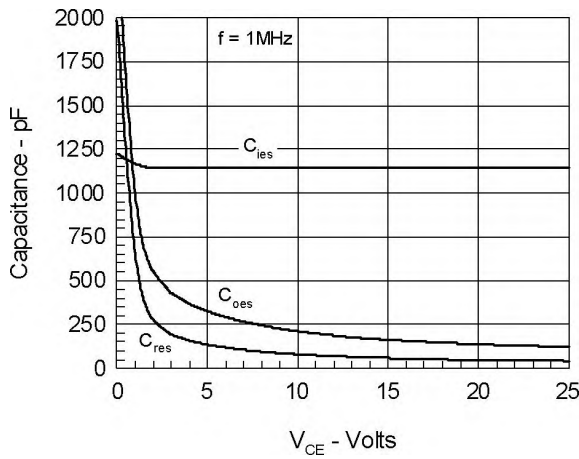
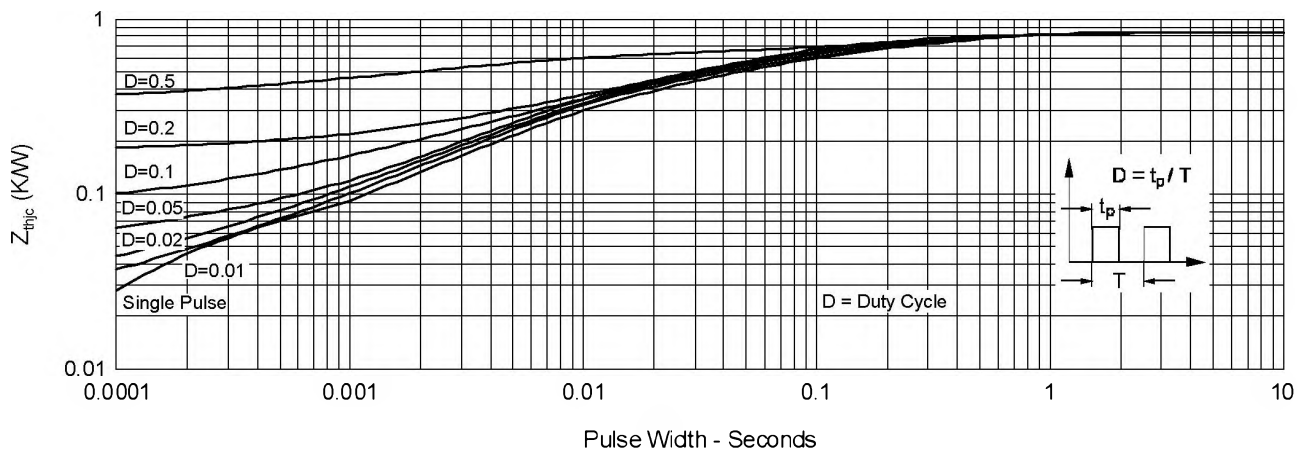


Fig.10 Transient Thermal Impedance



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

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 |
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |

Fig.11 Maximum Forward Voltage Drop

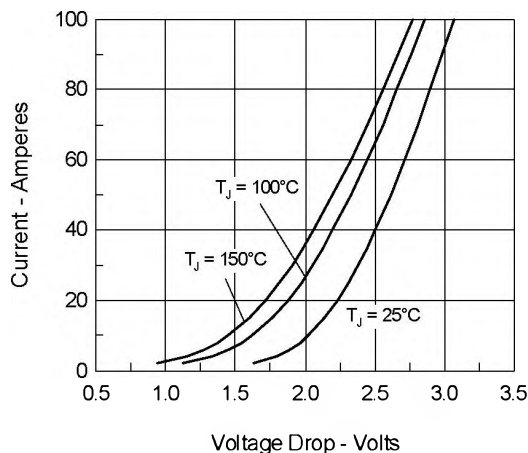
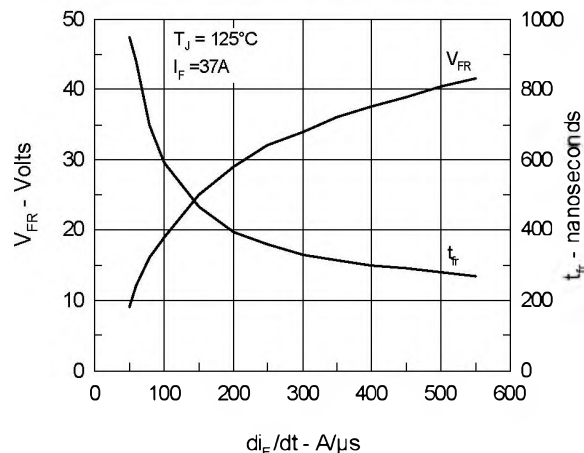
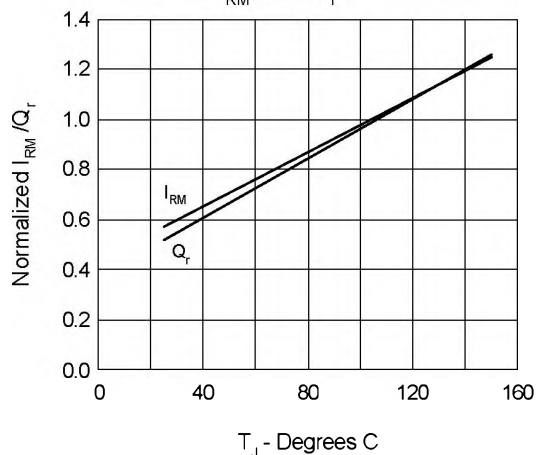

Fig.12 Peak Forward Voltage  $V_{FR}$  and Forward Recovery Time  $t_{FR}$ 

Fig.13 Junction Temperature Dependence of  $I_{RM}$  and  $Q_r$ 


Fig.14 Reverse Recovery Charge

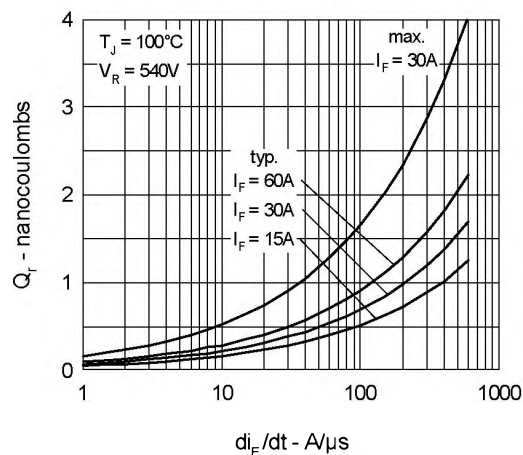


Fig.15 Peak Reverse Recovery Current

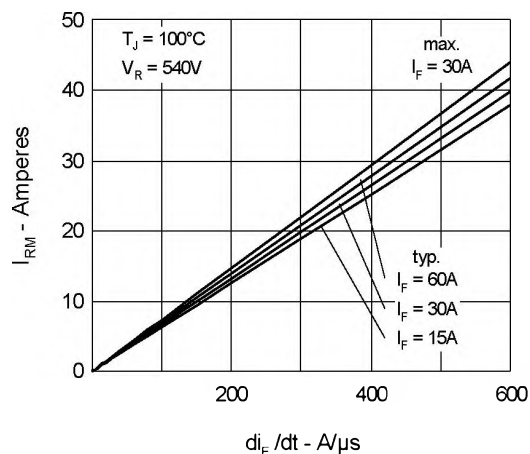


Fig.16 Reverse Recovery Time

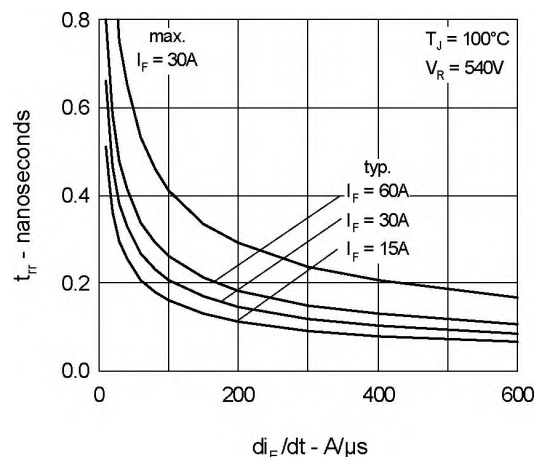
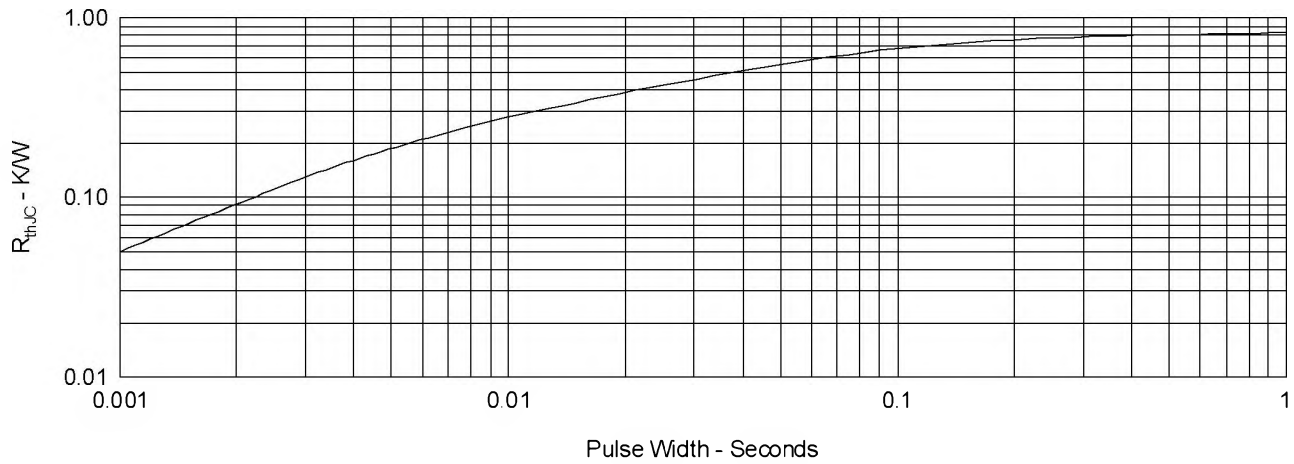


Fig.17 Diode Transient Thermal resistance junction to case



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

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 |
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |