

# HiPerFAST™ IGBT

## C2- Class High Speed IGBTs

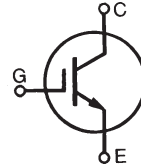
# IXGP 30N60C2

$$V_{CES} = 600 \text{ V}$$

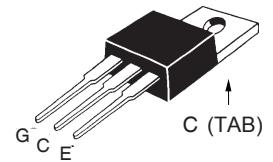
$$I_{C25} = 70 \text{ A}$$

$$V_{CE(sat)} = 2.7 \text{ V}$$

$$t_{fi\text{typ}} = 32 \text{ ns}$$



### TO-220 (IXGP)



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

| Symbol  | Test Conditions   | Maximum Ratings  |                  |
|---|---|------------------|------------------|
| $V_{CES}$   | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$   | 600              | V                |
| $V_{CGR}$   | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$  | 600              | V                |
| $V_{GES}$   | Continuous  | $\pm 20$         | V                |
| $V_{GEM}$   | Transient   | $\pm 30$         | V                |
| $I_{C25}$   | $T_C = 25^\circ\text{C}$ (limited by leads)   | 70               | A                |
| $I_{C110}$  | $T_C = 110^\circ\text{C}$   | 30               | A                |
| $I_{CM}$  | $T_C = 25^\circ\text{C}$ , 1 ms   | 150              | A                |
| <b>SSOA</b><br><b>(RBSOA)</b>   | $V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 10 \Omega$<br>Clamped inductive load @ $\leq 600 \text{ V}$ | $I_{CM} = 60$    | A                |
| $P_C$   | $T_C = 25^\circ\text{C}$  | 190              | W                |
| $T_J$   |   | -55 ... +150     | $^\circ\text{C}$ |
| $T_{JM}$  |   | 150              | $^\circ\text{C}$ |
| $T_{stg}$   |   | -55 ... +150     | $^\circ\text{C}$ |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |   | 300              | $^\circ\text{C}$ |
| $M_d$   | Mounting torque   | 1.13/10Nm/lb.in. |                  |
| <b>Weight</b>   |   | 4                | g                |

### Features

- Very high frequency IGBT
- Square RBSOA
- High current handling capability
- MOS Gate turn-on  
- drive simplicity

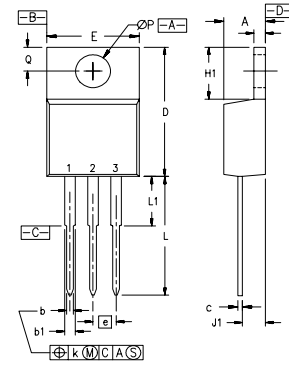
### Applications

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

| Symbol        | Test Conditions                                      | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                          |
|---------------|--|---|------|--------------------------|
|               |  | min.  | typ. | max.                     |
| $V_{GE(th)}$  | $I_C = 250 \mu\text{A}$ , $V_{CE} = V_{GE}$          | 2.5   |      | 5.0 V                    |
| $I_{CES}$     | $V_{CE} = V_{CES}$<br>$V_{GE} = 0 \text{ V}$         |   |      | 50 $\mu\text{A}$<br>1 mA |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$ |   |      | $\pm 100 \text{ nA}$     |
| $V_{CE(sat)}$ | $I_C = 24 \text{ A}$ , $V_{GE} = 15 \text{ V}$       |   |      | 2.7 V                    |

| Symbol   | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |    |
|--|--|---|------|------|----|
|  |  | min.  | typ. | max. |    |
| $g_{fs}$   | $I_C = 24\text{ A}; V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$   | 18  | 28   | S    |    |
| $C_{ies}$<br>$C_{oes}$<br>$C_{res}$  | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$  |   | 1430 | pF   |    |
|  |  |   | 110  | pF   |    |
|  |  |   | 40   | pF   |    |
| $Q_g$<br>$Q_{ge}$<br>$Q_{gc}$  | $I_C = 24\text{ A}, V_{GE} = 15\text{ V}, V_{CE} = 300\text{ V}$   |   | 70   | nC   |    |
|  |  |   | 10   | nC   |    |
|  |  |   | 23   | nC   |    |
| $t_{d(on)}$<br>$t_{ri}$<br>$t_{d(off)}$<br>$t_{fi}$<br>$E_{off}$             | <b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b><br>$I_C = 24\text{ A}, V_{GE} = 15\text{ V}$<br>$V_{CE} = 400\text{ V}, R_G = 5\ \Omega$  |   | 13   | ns   |    |
|  |  |   | 15   | ns   |    |
|  |  |   | 70   | 140  | ns |
|  |  |   | 60   | ns   |    |
|  |  |   | 0.19 | 0.30 | mJ |
| $t_{d(on)}$<br>$t_{ri}$<br>$E_{on}$<br>$t_{d(off)}$<br>$t_{fi}$<br>$E_{off}$ | <b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b><br>$I_C = 24\text{ A}, V_{GE} = 15\text{ V}$<br>$V_{CE} = 400\text{ V}, R_G = 5\ \Omega$ |   | 13   | ns   |    |
|  |  |   | 17   | ns   |    |
|  |  |   | 0.22 | mJ   |    |
|  |  |   | 120  | ns   |    |
|  |  |   | 130  | ns   |    |
|  |  |   | 0.59 | mJ   |    |
| $R_{thJC}$<br>$R_{thCH}$   |  |   | 0.65 | KW   |    |
|  |  | 0.25  |      | KW   |    |

## TO-220 Outline

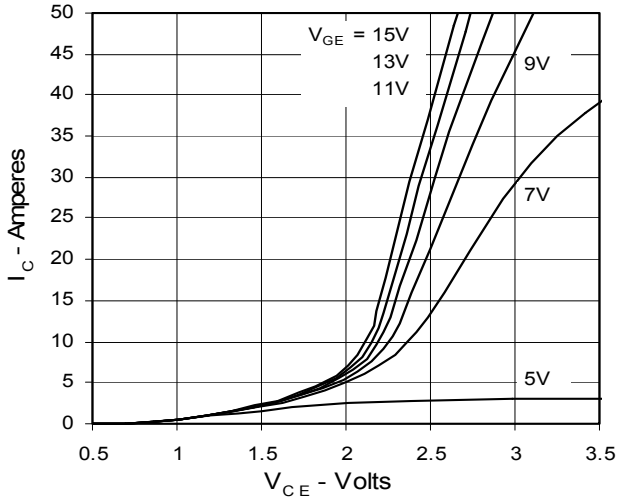
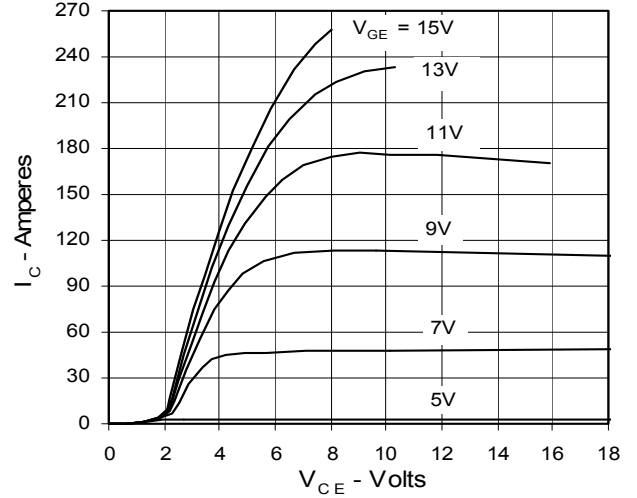
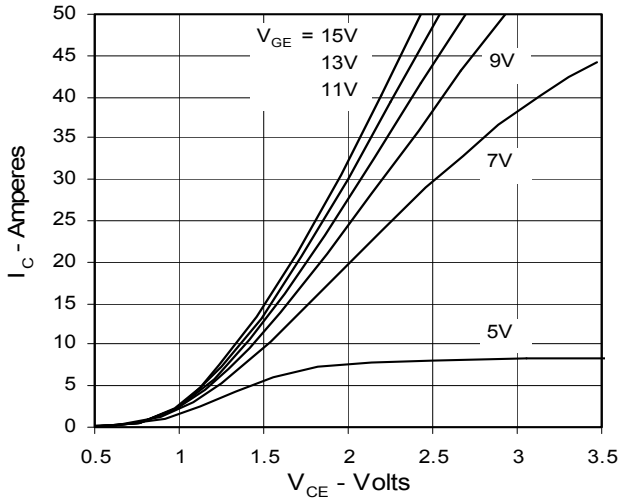
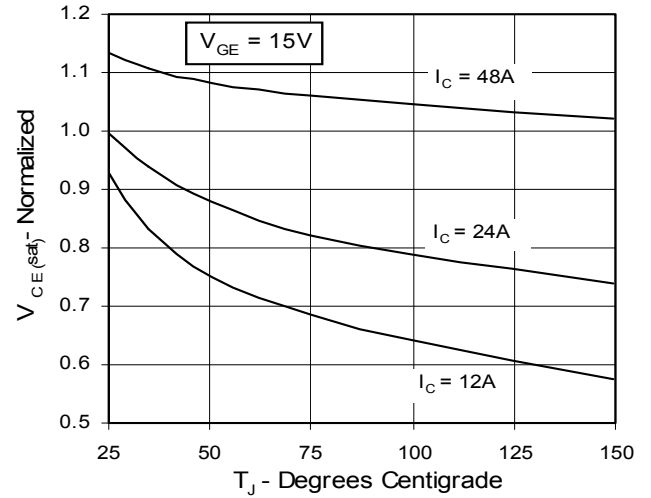
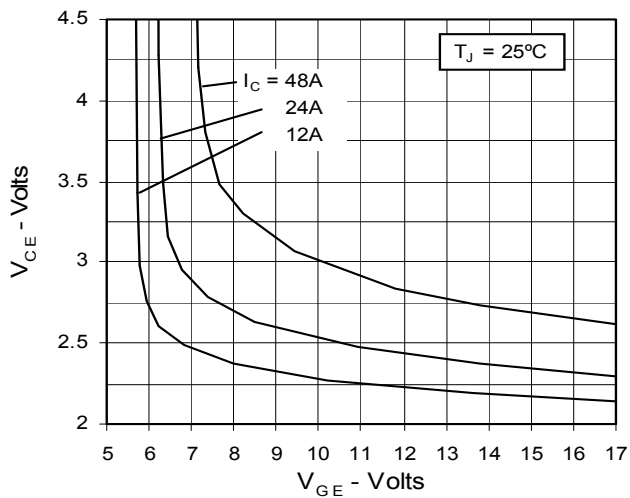
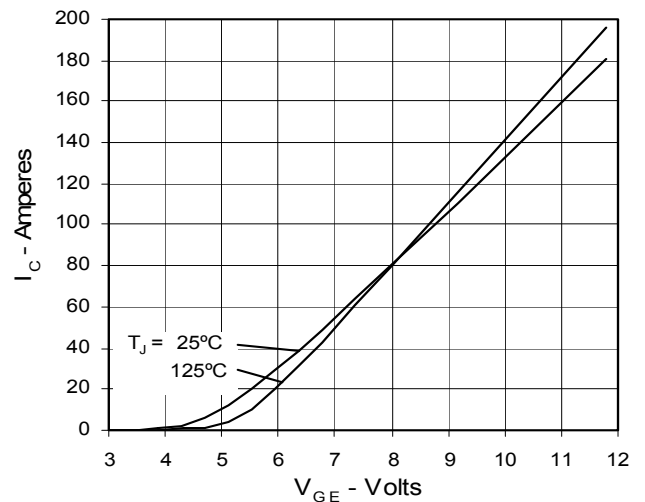


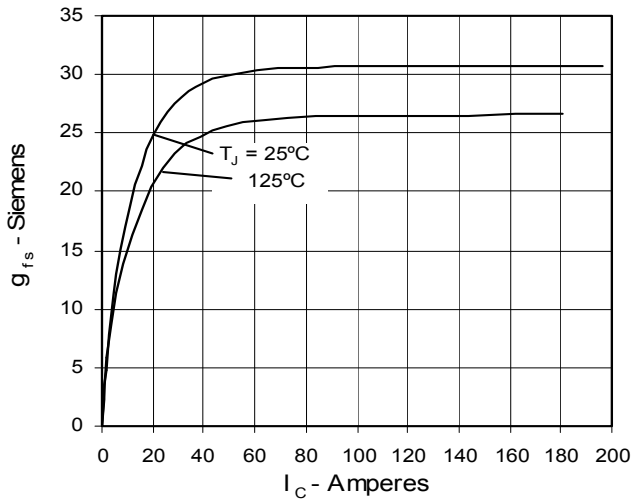
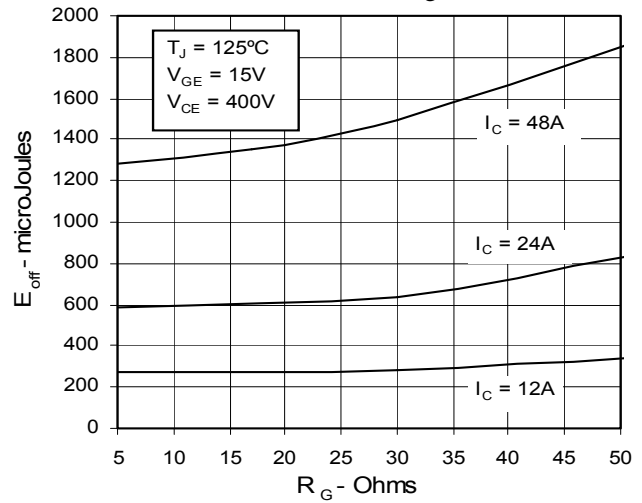
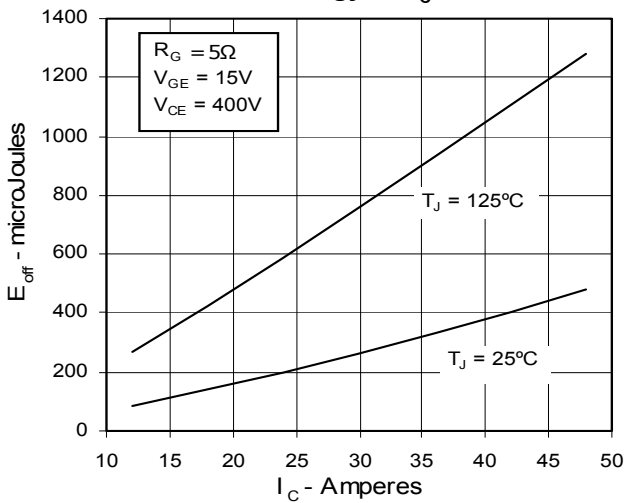
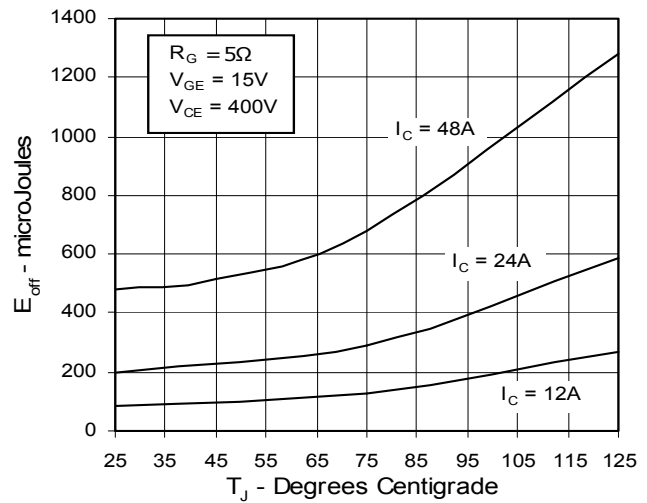
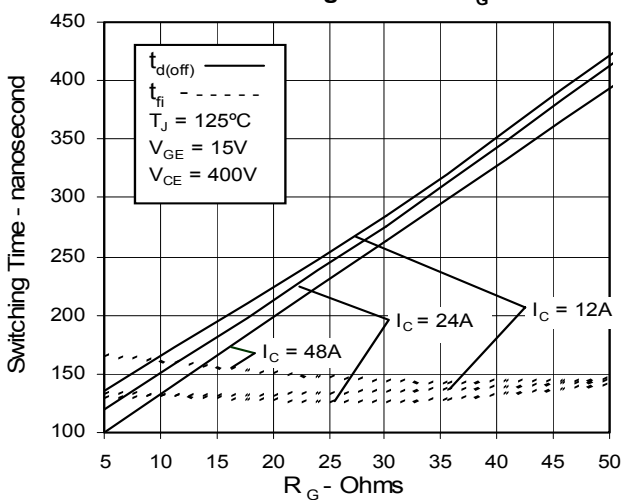
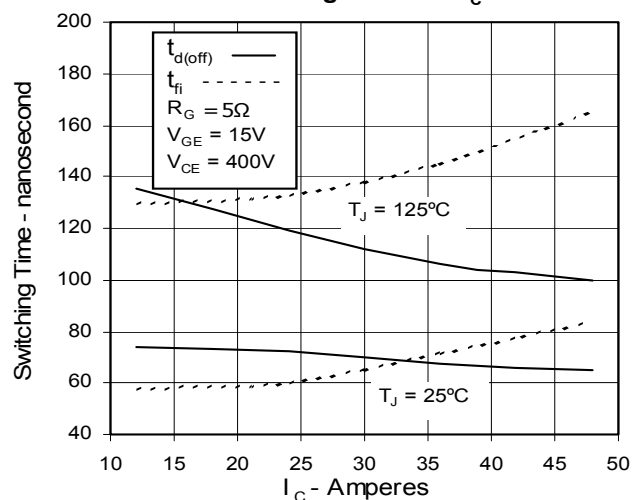
Pins: 1 - Gate      2 - Drain  
3 - Source      4 - Drain

| SYM             | INCHES   |      | MILLIMETERS |       |
|-----------------|----------|------|-------------|-------|
|                 | MIN      | MAX  | MIN         | MAX   |
| A               | .170     | .190 | 4.32        | 4.83  |
| b               | .025     | .040 | 0.64        | 1.02  |
| b1              | .045     | .065 | 1.15        | 1.65  |
| c               | .014     | .022 | 0.35        | 0.56  |
| D               | .580     | .630 | 14.73       | 16.00 |
| E               | .390     | .420 | 9.91        | 10.66 |
| e               | .100 BSC |      | 2.54 BSC    |       |
| F               | .045     | .055 | 1.14        | 1.40  |
| H1              | .230     | .270 | 5.85        | 6.85  |
| J1              | .090     | .110 | 2.29        | 2.79  |
| k               | 0        | .015 | 0           | 0.38  |
| L               | .500     | .550 | 12.70       | 13.97 |
| L1              | .110     | .230 | 2.79        | 5.84  |
| $\varnothing P$ | .139     | .161 | 3.53        | 4.08  |
| Q               | .100     | .125 | 2.54        | 3.18  |

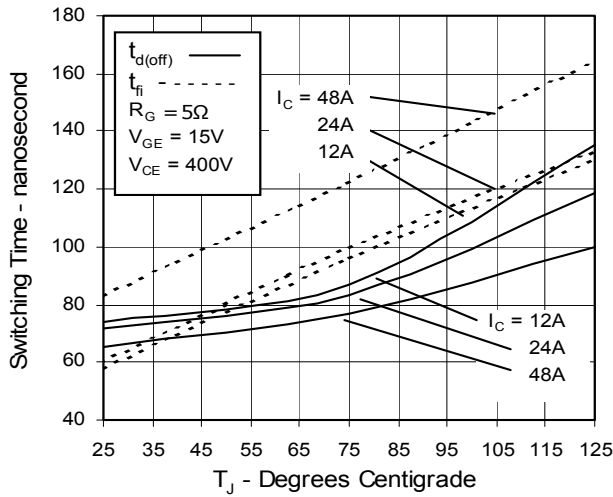
IXYS reserves the right to change limits, test conditions, and dimensions.

|  |           |           |           |           |              |              |              |              |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    |
|  | 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    |
|  | 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 |

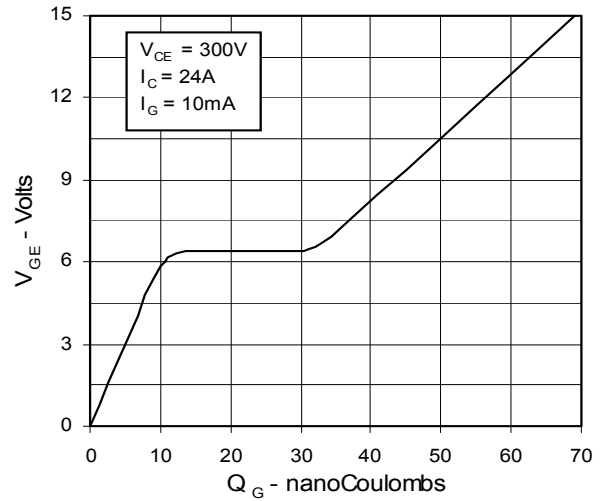
**Fig. 1. Output Characteristics  
@ 25 Deg. C**

**Fig. 2. Extended Output Characteristics  
@ 25 deg. C**

**Fig. 3. Output Characteristics  
@ 125 Deg. C**

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

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

**Fig. 6. Input Admittance**


**Fig. 7. Transconductance**

**Fig. 8. Dependence of Turn-Off Energy on  $R_G$** 

**Fig. 9. Dependence of Turn-Off Energy on  $I_C$** 

**Fig. 10. Dependence of Turn-Off Energy on Temperature**

**Fig. 11. Dependence of Turn-Off Switching Time on  $R_G$** 

**Fig. 12. Dependence of Turn-Off Switching Time on  $I_C$** 


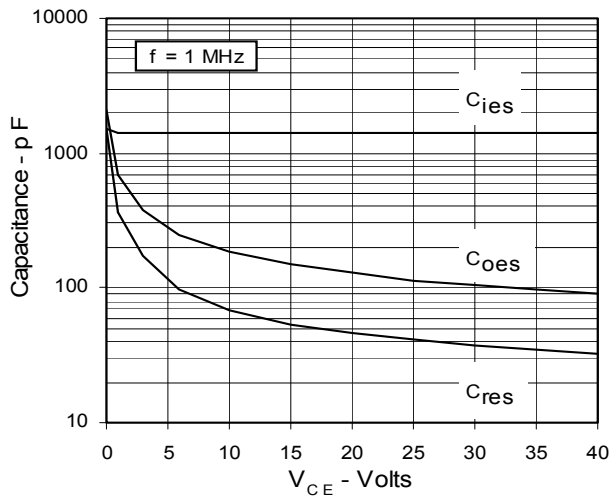
**Fig. 13. Dependence of Turn-Off Switching Time on Temperature**



**Fig. 14. Gate Charge**



**Fig. 15. Capacitance**



**Fig. 16. Maximum Transient Thermal Resistance**

