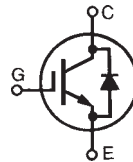


High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

IXBH 10N170
IXBT 10N170

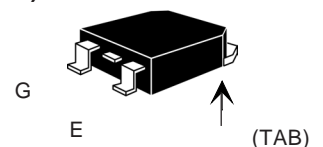
$V_{CES} = 1700 \text{ V}$
 $I_{C25} = 20 \text{ A}$
 $V_{CE(sat)} = 3.8 \text{ V}$

Preliminary Data Sheet

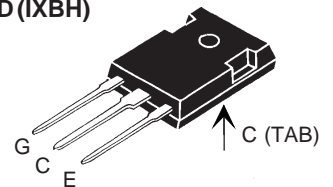


| Symbol | Test Conditions | Maximum Ratings |
|---------------------|--|---------------------------------------|
| V_{CES} | $T_J = 25^\circ\text{C}$ to 150°C | 1700 V |
| V_{CGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$ | 1700 V |
| V_{GES} | Continuous | ± 20 V |
| V_{GEM} | Transient | ± 30 V |
| I_{C25} | $T_C = 25^\circ\text{C}$ | 20 A |
| I_{C90} | $T_C = 90^\circ\text{C}$ | 10 A |
| I_{CM} | $T_C = 25^\circ\text{C}$, 1 ms | 40 A |
| SSOA (RBSOA) | $V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 33 \Omega$ Clamped inductive load | $I_{CM} = 20$ A $V_{CES} = 1350$ V |
| P_C | $T_C = 25^\circ\text{C}$ | 140 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 1.6 mm (0.062 in.) from case for 10 s | 300 $^\circ\text{C}$ |
| | Maximum Tab temperature for soldering SMD devices for 10 s | 260 $^\circ\text{C}$ |
| M_d | Mounting torque (M3) (TO-247) | 1.13/10Nm/lb.in. |
| Weight | TO-247 AD | 6 g |
| | TO-268 | 4 g |

TO-268 (IXBT)



TO-247 AD (IXBH)



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

Features

- High Blocking Voltage
- JEDEC TO-268 surface and JEDEC TO-247 AD
- Low conduction losses
- High current handling capability
- MOS Gate turn-on - drive simplicity
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

- AC motor speed control
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- Capacitor discharge circuits

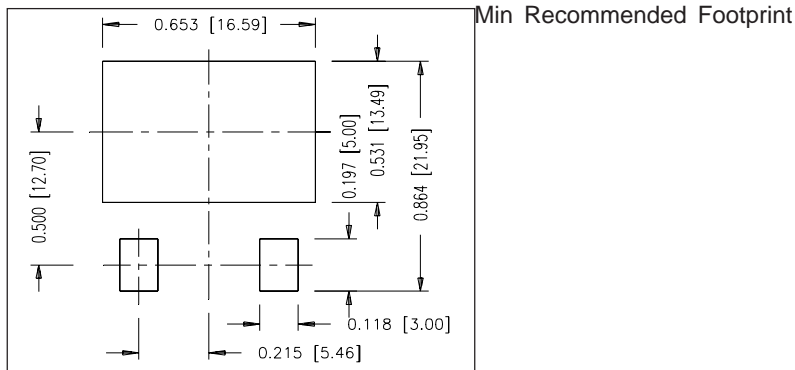
Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

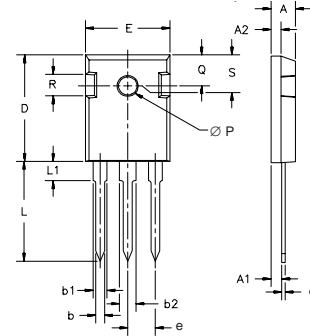
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|---------------|---|---|--------|---------------------------------------|
| | | min. | typ. | max. |
| BV_{CES} | $I_C = 250 \mu\text{A}$, $V_{GE} = 0 \text{ V}$ Temperature Coefficient | 1700 | 0.10 | V %/K |
| $V_{GE(th)}$ | $I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$ Temperature Coefficient | 3.0 | - 0.24 | V %/K |
| I_{CES} | $V_{CE} = 0.8 V_{CES}$, $T_J = 25^\circ\text{C}$ $V_{GE} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$ | | | 10 μA 100 μA |
| I_{GES} | $V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = I_{C90}$, $V_{GE} = 15 \text{ V}$ $T_J = 125^\circ\text{C}$ | 3.4 | 4.1 | 3.8 V V |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|--|------|----------|
| | | $(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$ | | |
| | | min. | typ. | max. |
| g_{fs} | $I_C = I_{C90}, V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$ | 4.0 | 6.5 | S |
| C_{ies} | $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$ | | 700 | pF |
| C_{oes} | | | 40 | pF |
| C_{res} | | | 12 | pF |
| Q_g | $I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$ | | 30 | nC |
| Q_{ge} | | | 6 | nC |
| Q_{gc} | | | 10 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}, V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 56\ \Omega$ | | 35 | ns |
| t_{ri} | | | 28 | ns |
| $t_{d(off)}$ | | | 500 | ns |
| t_{fi} | | | 1000 | ns |
| E_{off} | | | 6 | mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}, V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 56\ \Omega$ | | 35 | ns |
| t_{ri} | | | 28 | ns |
| E_{on} | | | 0.7 | mJ |
| $t_{d(off)}$ | | | 600 | ns |
| t_{fi} | | | 1200 | ns |
| E_{off} | | 8 | mJ | |
| R_{thJC} | | | | 0.89 K/W |
| R_{thCK} | (TO-247) | 0.25 | | K/W |

| Symbol | Test Conditions | Characteristic Values | | |
|----------|---|--|------|-------|
| | | $(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$ | | |
| | | min. | typ. | max. |
| V_F | $I_F = I_{C90}, V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ | | | 3.0 V |
| I_{RM} | $I_F = I_{C90}, V_{GE} = 0\text{ V}, -di_F/dt = 50\text{ A/us}$ $V_R = 100\text{ V}$ | | 10 | A |
| t_{rr} | | | 360 | ns |

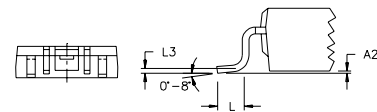
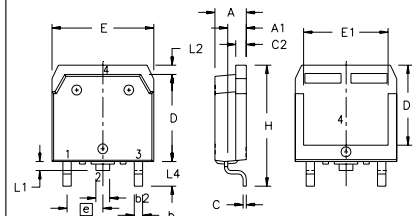


TO-247 AD Outline



| 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 |

TO-268 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 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 6,306,728B1 6,259,123B1 6,306,728B1
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343

Fig. 1. Output Characteristics
@ 25 Deg. C

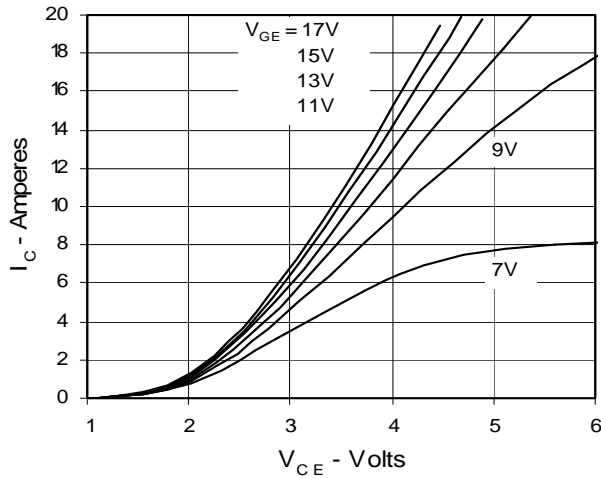


Fig. 2. Extended Output Characteristics
@ 25 deg. C

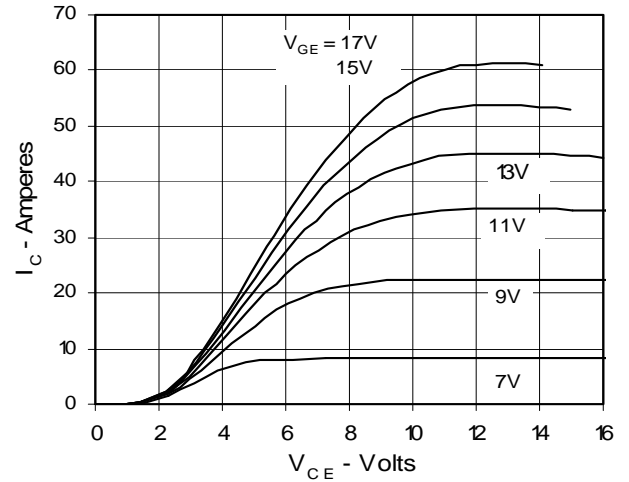


Fig. 3. Output Characteristics
@ 125 Deg. C

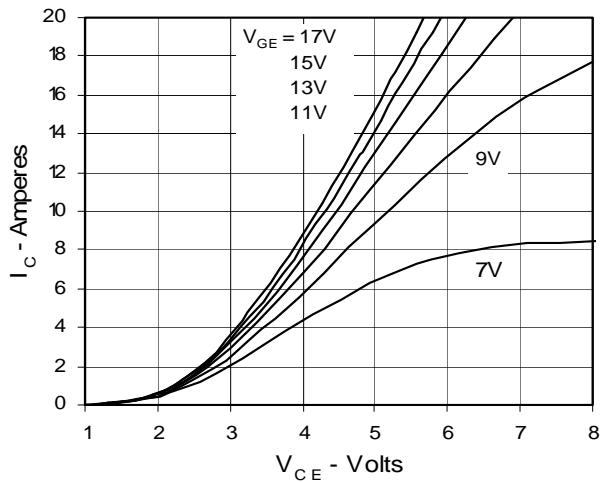


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

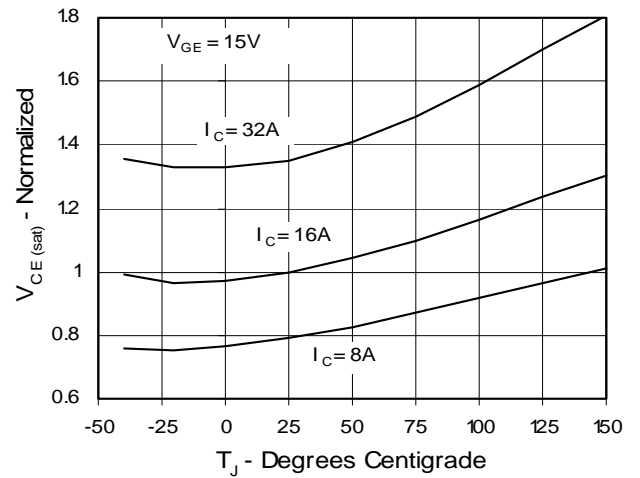


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter voltage

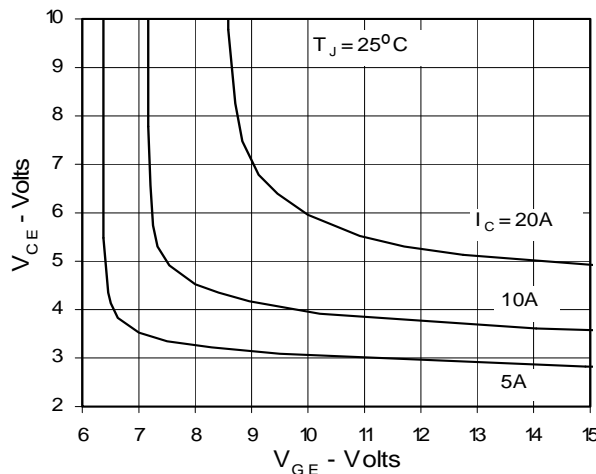


Fig. 6. Input Admittance

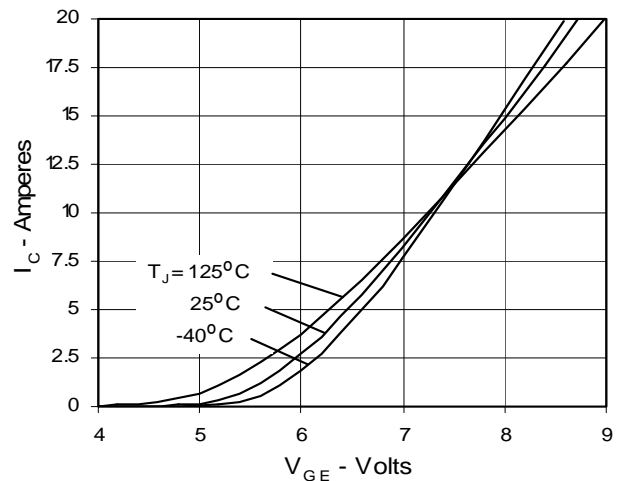


Fig. 7. Transconductance

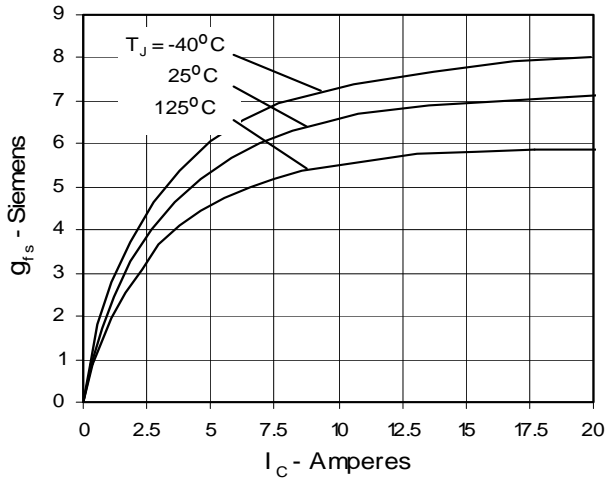


Fig. 8. Forward Voltage Drop of Intrinsic Diode

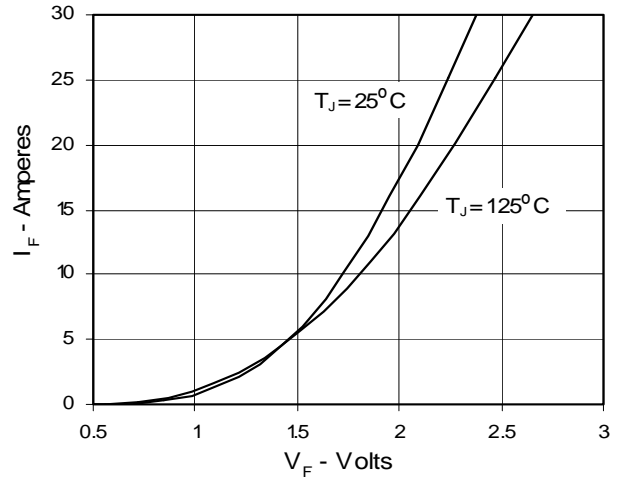


Fig. 9. Dependence of E_{off} on R_G

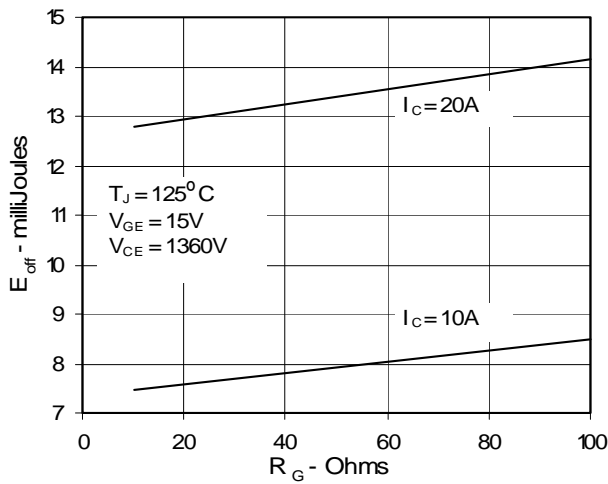


Fig. 10. Dependence of E_{off} on I_C

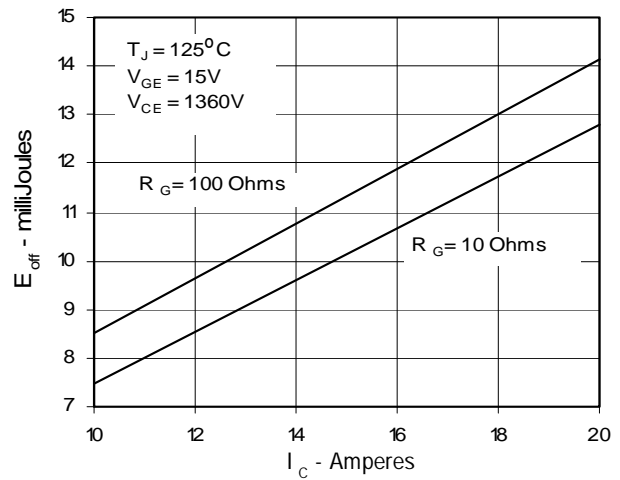


Fig. 11. Dependence of E_{off} on Temperature

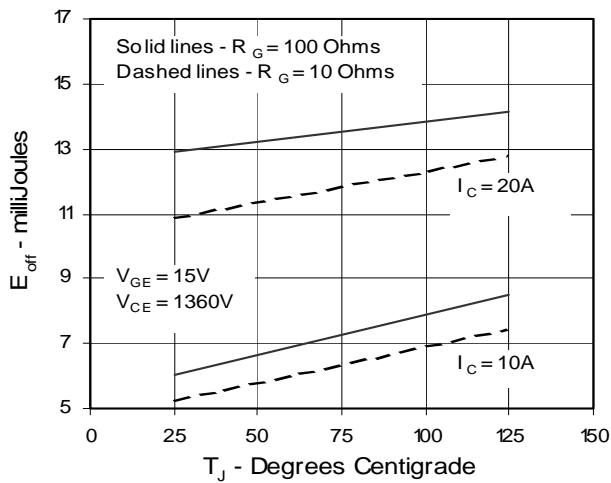
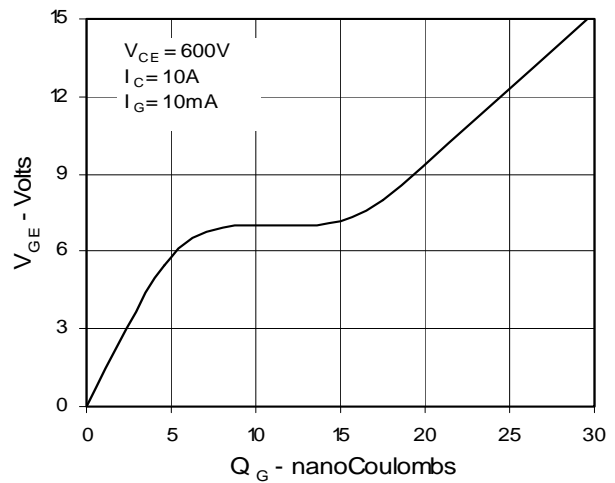


Fig. 12. Gate Charge



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4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343

Fig. 12. Capacitance

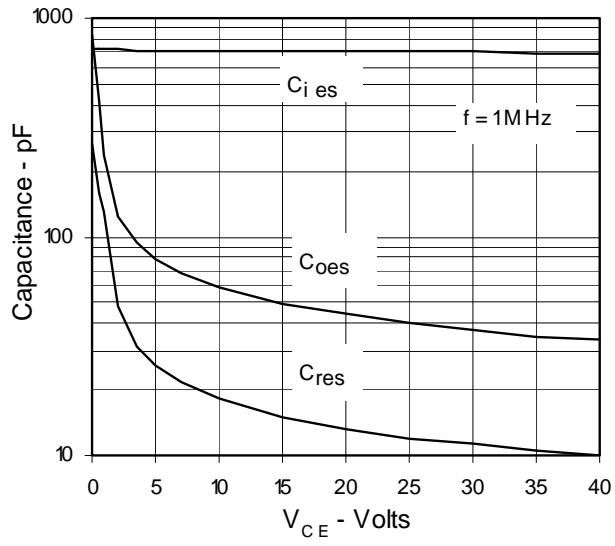
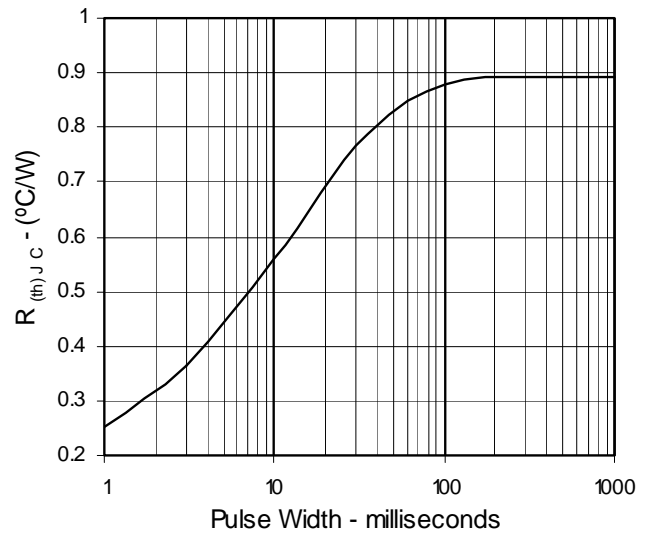


Fig. 13. Maximum Transient Thermal Resistance





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