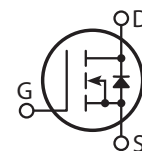
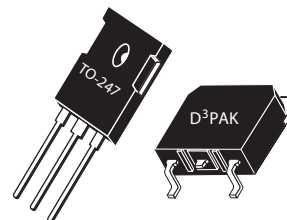



Super Junction MOSFET



- Ultra Low $R_{DS(ON)}$
- Low Miller Capacitance
- Ultra Low Gate Charge, Q_g
- Avalanche Energy Rated
- Extreme dv/dt Rated
- Popular TO-247 or Surface Mount D³ package.
- RoHS Compliant 

MAXIMUM RATINGS

All Ratings: $T_C = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | APT47N60BC3_SC3(G) | UNIT |
|----------------|--|--------------------|-------|
| V_{DSS} | Drain-Source Voltage | 600 | Volts |
| I_D | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ | 47 | Amps |
| I_{DM} | Pulsed Drain Current ^① | 141 | |
| V_{GS} | Gate-Source Voltage Continuous | ±20 | Volts |
| V_{GSM} | Gate-Source Voltage Transient | ±30 | |
| P_D | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | 417 | Watts |
| | Linear Derating Factor | 3.33 | W/°C |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to 150 | °C |
| T_L | Lead Temperature: 0.063" from Case for 10 Sec. | 260 | |
| dv/dt | Drain-Source Voltage slope ($V_{DS} = 480\text{V}$, $I_D = 47\text{A}$, $T_J = 125^\circ\text{C}$) | 50 | V/ns |
| I_{AR} | Repetitive Avalanche Current ^⑦ | 20 | Amps |
| E_{AR} | Repetitive Avalanche Energy ^⑦ | 1 | mJ |
| E_{AS} | Single Pulse Avalanche Energy ^④ | 1800 | |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|---|------|------|------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage ($V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$) | 600 | | | Volts |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ^② ($V_{GS} = 10\text{V}$, $I_D = 30\text{A}$) | | 0.06 | 0.07 | Ohms |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$) | | 0.5 | 25 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 150^\circ\text{C}$) | | | 250 | |
| I_{GSS} | Gate-Source Leakage Current ($V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$) | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 2.7\text{mA}$) | 2.10 | 3 | 3.9 | Volts |

 CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

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Microsemi Website - <http://www.microsemi.com>

DYNAMIC CHARACTERISTICS

APT47N60BC3_SC3(G)

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|---------------------------------------|---|-----|------|-----|---------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$ | | 7015 | | pF |
| C_{oss} | Output Capacitance | | | 2565 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 210 | | |
| Q_g | Total Gate Charge ^③ | $V_{GS} = 10V$ $V_{DD} = 300V$ $I_D = 47A @ 25^\circ C$ | | 260 | | nC |
| Q_{gs} | Gate-Source Charge | | | 29 | | |
| Q_{gd} | Gate-Drain ("Miller") Charge | | | 110 | | |
| $t_{d(on)}$ | Turn-on Delay Time | RESISTIVE SWITCHING $V_{GS} = 13V$ $V_{DD} = 380V$ $I_D = 47A @ 125^\circ C$ $R_G = 1.8\Omega$ | | 18 | | ns |
| t_r | Rise Time | | | 27 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 110 | | |
| t_f | Fall Time | | | 8 | | |
| E_{on} | Turn-on Switching Energy ^⑥ | INDUCTIVE SWITCHING @ 25°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 47A, R_G = 5\Omega$ | | 670 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 980 | | |
| E_{on} | Turn-on Switching Energy ^⑥ | INDUCTIVE SWITCHING @ 125°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 47A, R_G = 5\Omega$ | | 1100 | | |
| E_{off} | Turn-off Switching Energy | | | 1200 | | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|----------|--|-----|-----|-----|---------|
| I_S | Continuous Source Current (Body Diode) | | | 47 | Amps |
| I_{SM} | Pulsed Source Current ^① (Body Diode) | | | 141 | |
| V_{SD} | Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -47A$) | | | 1.2 | Volts |
| t_{rr} | Reverse Recovery Time ($I_S = -47A, di_S/dt = 100A/\mu s, V_R = 350V$) | | 580 | | ns |
| Q_{rr} | Reverse Recovery Charge ($I_S = -47A, di_S/dt = 100A/\mu s, V_R = 350V$) | | 23 | | μC |
| dv/dt | Peak Diode Recovery dv/dt ^⑤ | | | 6 | V/ns |

THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|-----------------|---------------------|-----|-----|------|--------------|
| $R_{\theta JC}$ | Junction to Case | | | 0.30 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction to Ambient | | | 62 | |

① Repetitive Rating: Pulse width limited by maximum junction temperature

② Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting $T_J = +25^\circ C, L = 36.0mH, R_G = 25\Omega$, Peak $I_L = 10A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_{D47A}$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

⑥ E_{on} includes diode reverse recovery. See figures 18, 20.

⑦ Repetitive avalanche causes additional power losses that can be calculated as $P_{AV} = E_{AR} * f$

Microsemi Reserves the right to change, without notice, the specifications and information contained

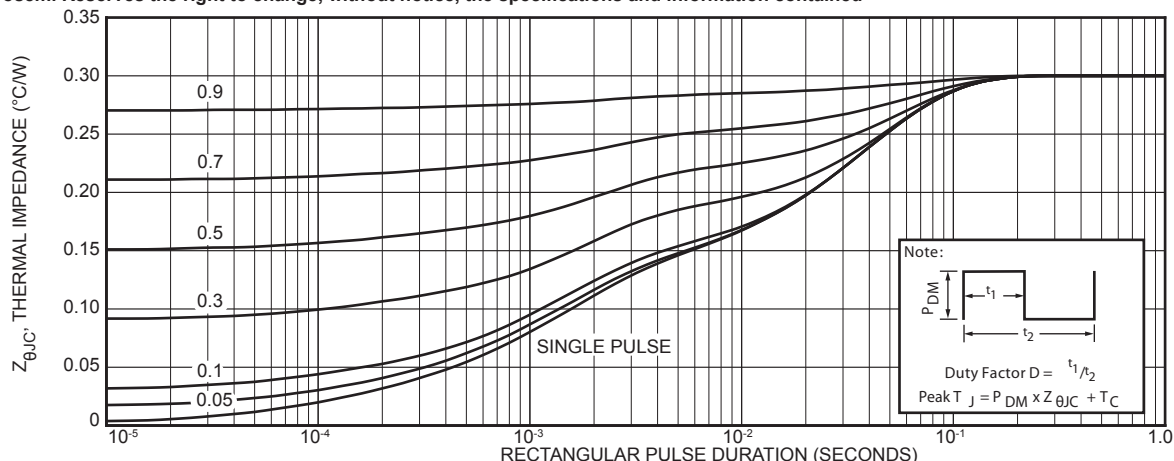


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT47N60BC3_SC3(G)

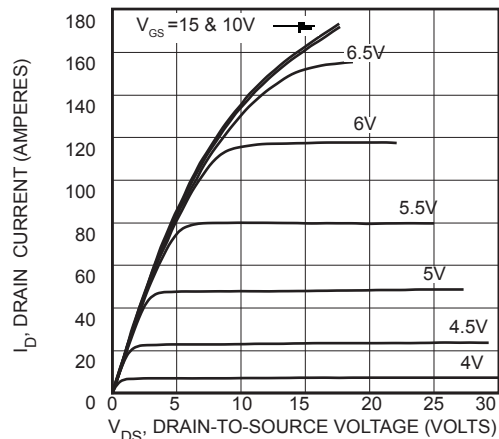


FIGURE 2, LOW VOLTAGE OUTPUT CHARACTERISTICS

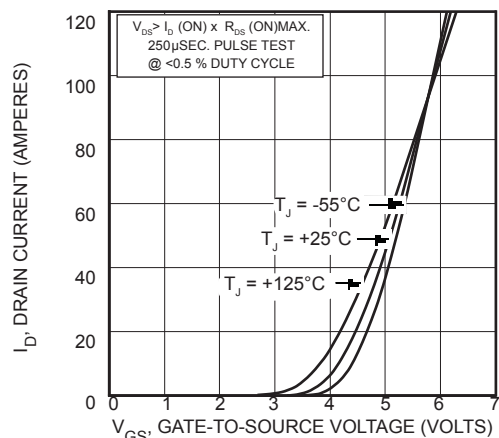


FIGURE 3, TRANSFER CHARACTERISTICS

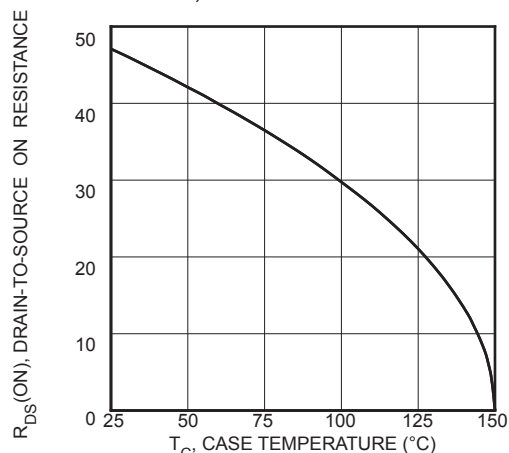


FIGURE 5, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

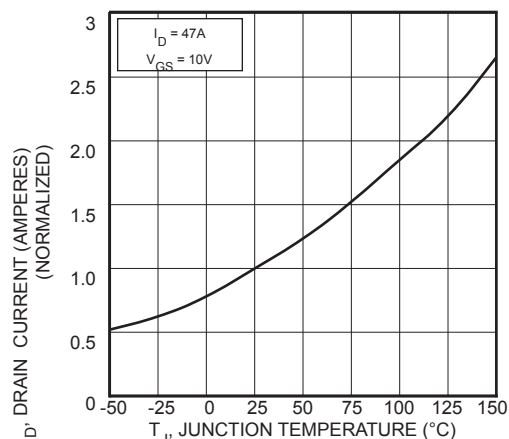


FIGURE 7, ON-RESISTANCE vs. TEMPERATURE

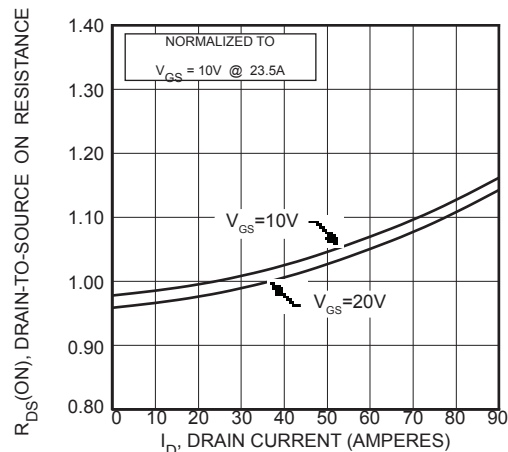


FIGURE 4, $R_{DS(ON)}$ vs DRAIN CURRENT

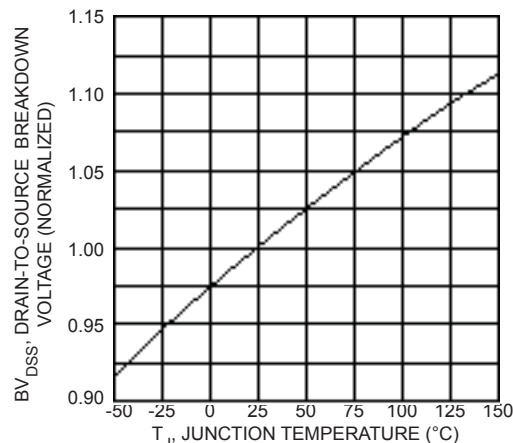


FIGURE 6, BREAKDOWN VOLTAGE vs TEMPERATURE

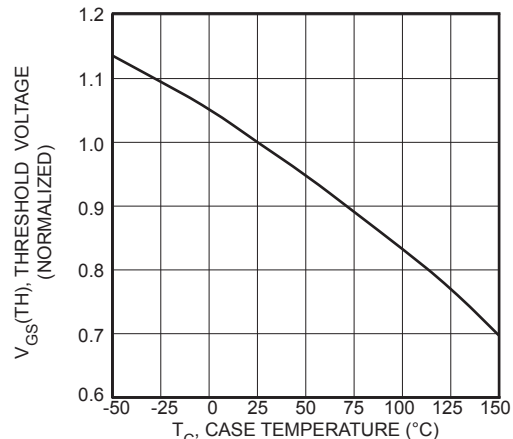


FIGURE 8, THRESHOLD VOLTAGE vs TEMPERATURE

Typical Performance Curves

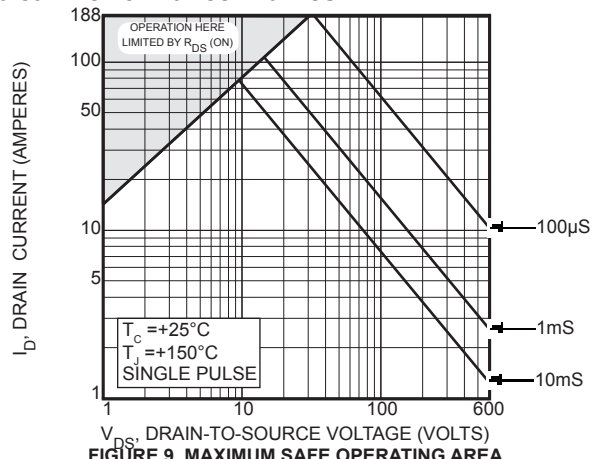


FIGURE 9, MAXIMUM SAFE OPERATING AREA

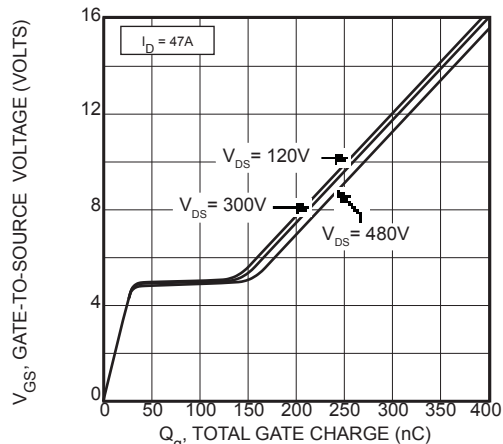


FIGURE 11, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

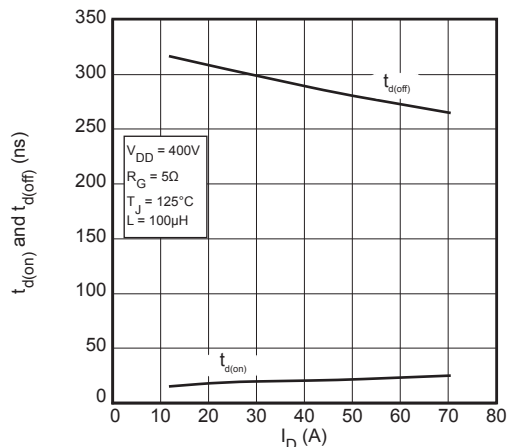


FIGURE 13, DELAY TIMES vs CURRENT

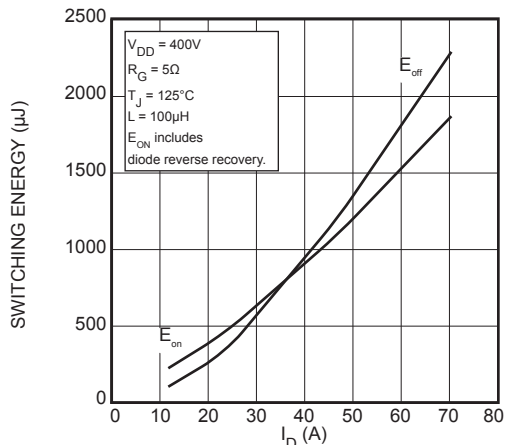


FIGURE 15, SWITCHING ENERGY vs CURRENT

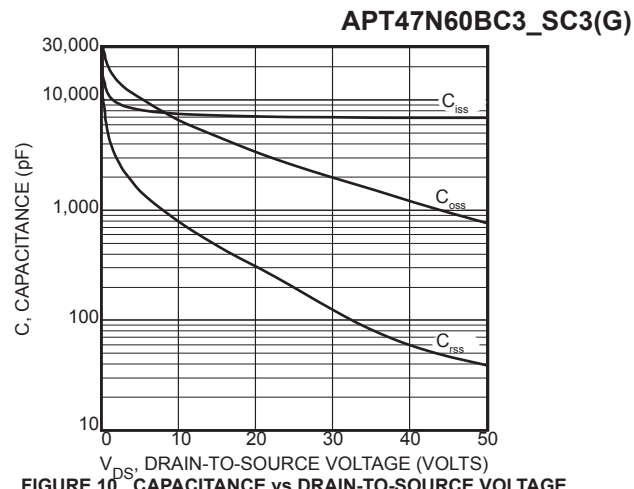


FIGURE 10, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

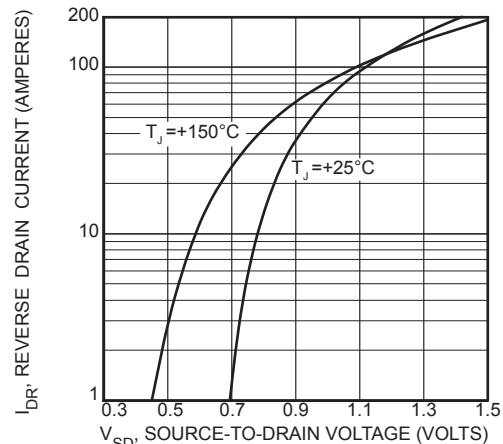


FIGURE 12, SOURCE-DRAIN DIODE FORWARD VOLTAGE

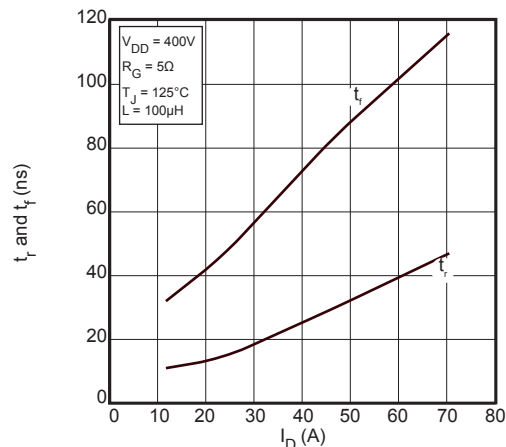


FIGURE 14, RISE AND FALL TIMES vs CURRENT

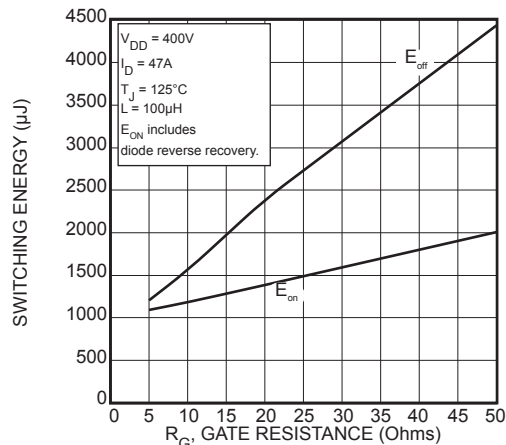


FIGURE 16, SWITCHING ENERGY vs. GATE RESISTANCE

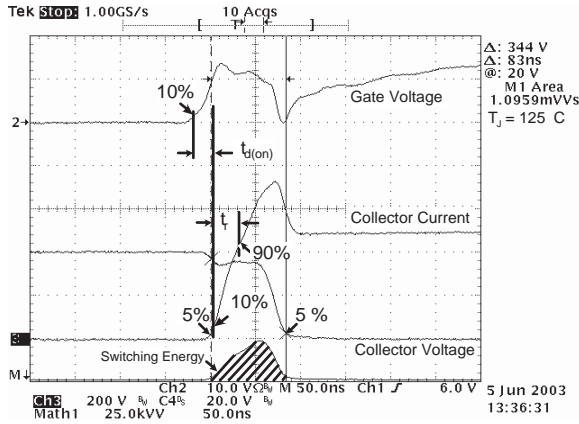


Figure 17, Turn-on Switching Waveforms and Definitions

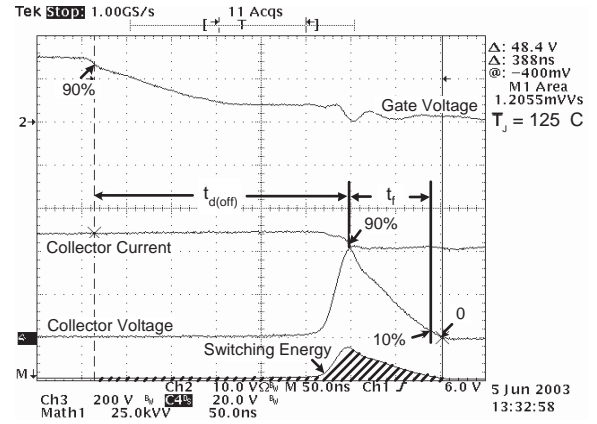


Figure 18, Turn-off Switching Waveforms and Definitions

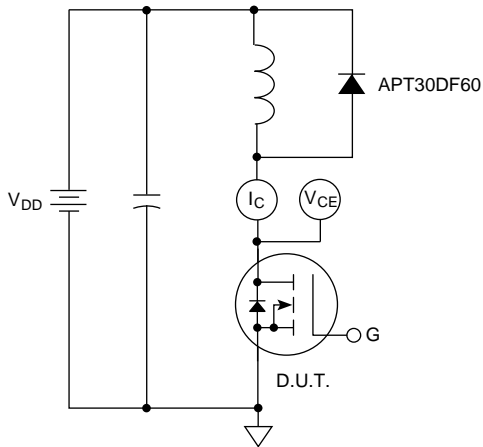
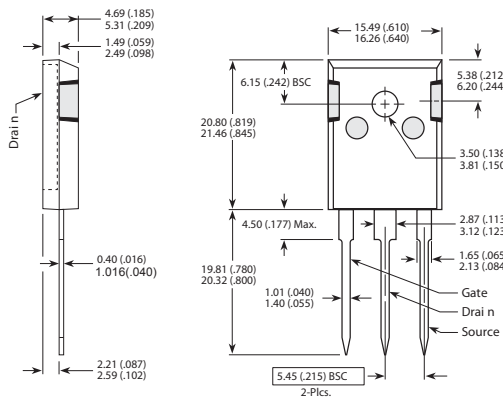


Figure 19, Inductive Switching Test Circuit

TO-247 (B) Package Outline

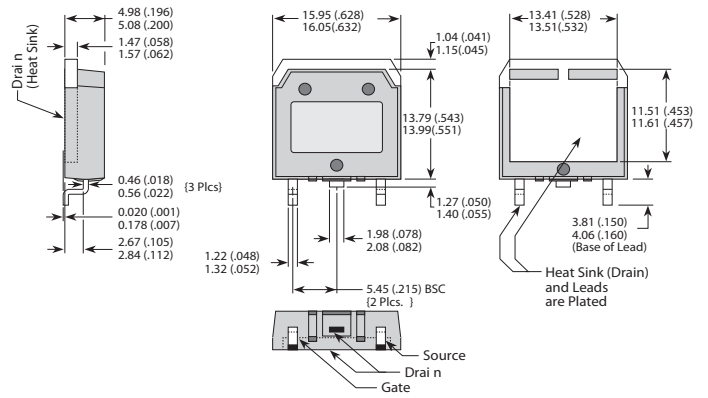
⑥1 SAC: Tin, Silver, Copper



Dimensions in Millimeters (Inches)

D³PAK Package Outline

⑥3 100% Sn Plated



Dimensions in Millimeters (Inches)