Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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Microsemi
POWER PRODUCTS GROUP

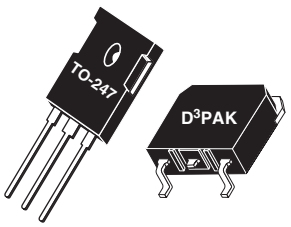
# APT30N60BC6
# APT30N60SC6

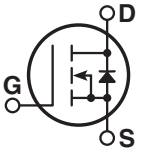
**600V 30A .125Ω**

COOLMOS
Power Semiconductors

## Super Junction MOSFET

- Ultra Low $R_{DS(ON)}$
- Low Miller Capacitance
- Ultra Low Gate Charge, $Q_g$
- Avalanche Energy Rated
- Extreme $dv/dt$ Rated




### MAXIMUM RATINGS

All Ratings per die: $T_C$ = 25°C unless otherwise specified.

| Symbol | Parameter | APT30N60B_SC6 | UNIT |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 600 | Volts |
| $I_D$ | Continuous Drain Current @ $T_C$ = 25°C | 30 | Amps |
| | Continuous Drain Current @ $T_C$ = 100°C | 19 | |
| $I_{DM}$ | Pulsed Drain Current [1] | 89 | |
| $V_{GS}$ | Total Power Dissipation @ $T_C$ = 25°C | ±20 | Volts |
| $P_D$ | Gate-Source Voltage Continuous | 219 | Watts |
| $T_J$,$T_{STG}$ | 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 ($V_{DS}$ = 480V, $I_D$ = 30A, $T_J$ = 125°C) | 15 | V/ns |
| $I_{AR}$ | Avalanche Current [2] | 5.2 | Amps |
| $E_{AR}$ | Repetitive Avalanche Energy [2] ( Id = 5.2A, Vdd = 50V ) | 0.96 | mJ |
| $E_{AS}$ | Single Pulse Avalanche Energy ( Id = 5.2A, Vdd = 50V ) | 636 | |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $BV_{(DSS)}$ | Drain-Source Breakdown Voltage ($V_{GS}$ = 0V, $I_D$ = 250µA) | 600 | | | Volts |
| $R_{DS(on)}$ | Drain-Source On-State Resistance [3] ($V_{GS}$ = 10V, $I_D$ = 14.5A) | | 0.11 | 0.125 | Ohms |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{DS}$ = 600V, $V_{GS}$ = 0V) | | | 25 | µA |
| | Zero Gate Voltage Drain Current ($V_{DS}$ = 600V, $V_{GS}$ = 0V, $T_C$ = 150°C) | | | 100 | |
| $I_{GSS}$ | Gate-Source Leakage Current ($V_{GS}$ = ±20V, $V_{DS}$ = 0V) | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 960µA) | 2.5 | 3 | 3.5 | Volts |

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

**"COOLMOS™ comprise a new family of transistors developed by Infineon Technologies AG. "COOLMOS" is a trademark of Infineon Technologies AG."**

## DYNAMIC CHARACTERISTICS



| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V<br>$V_{DS}$ = 25V<br>f = 1 MHz | | 2267 | | pF |
| $C_{oss}$ | Output Capacitance | | | 1990 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 203 | | |
| $Q_g$ | Total Gate Charge [4] | $V_{GS}$ = 10V<br>$V_{DD}$ = 300V<br>$I_D$ = 30A @ 25°C | | 88 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 12 | | |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | | | 46 | | |
| $t_{d(on)}$ | Turn-on Delay Time | **INDUCTIVE SWITCHING**<br>$V_{GS}$ = 15V<br>$V_{DD}$ = 400V<br>$I_D$ = 30A @ 25°C<br>$R_G$ = 4.3Ω | | 9 | | ns |
| $t_r$ | Rise Time | | | 17 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 74 | | |
| $t_f$ | Fall Time | | | 48 | | |
| $E_{on}$ | Turn-on Switching Energy [5] | **INDUCTIVE SWITCHING @ 25°C**<br>$V_{DD}$ = 400V, $V_{GS}$ = 15V<br>$I_D$ = 30A, $R_G$ = 4.3Ω | | 409 | | µJ |
| $E_{off}$ | Turn-off Switching Energy | | | 224 | | |
| $E_{on}$ | Turn-on Switching Energy [5] | **INDUCTIVE SWITCHING @ 125°C**<br>$V_{DD}$ = 400V, $V_{GS}$ = 15V<br>$I_D$ = 30A, $R_G$ = 4.3Ω | | 649 | | |
| $E_{off}$ | Turn-off Switching Energy | | | 282 | | |

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | | | 26 | | Amps |
| $I_{SM}$ | Pulsed Source Current [1] (Body Diode) | | | 65 | | |
| $V_{SD}$ | Diode Forward Voltage [3] ($V_{GS}$ = 0V, $I_S$ = -30A) | | | | 1.30 | Volts |
| $^{dv}/_{dt}$ | Peak Diode Recovery $^{dv}/_{dt}$ [6] | | | 15 | | V/ns |
| $t_{rr}$ | Reverse Recovery Time ($I_S$ = -30A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 661 | | ns |
| | | $T_j$ = 125°C | | 813 | | |
| $Q_{rr}$ | Reverse Recovery Charge ($I_S$ = -30A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 15 | | µC |
| | | $T_j$ = 125°C | | 18 | | |
| $I_{RRM}$ | Peak Recovery Current ($I_S$ = -30A, $^{di}/_{dt}$ = 100A/µs) | $T_j$ = 25°C | | 46 | | Amps |
| | | $T_j$ = 125°C | | 48 | | |

## THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction to Case | | | 0.52 | °C/W |
| $R_{\theta JA}$ | Junction to Ambient | | | 31 | |

1 Repetitive Rating: Pulse width limited by maximum junction temperature

2 Repetitive avalanche causes additional power losses that can be calculated as ***$P_{AV} = E_{AR}*f$ . Pulse width tp limited by Tj max.***

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

4 See MIL-STD-750 Method 3471

5 Eon includes diode reverse recovery.

6 Maximum 125°C diode commutation speed = di/dt 600A/µs



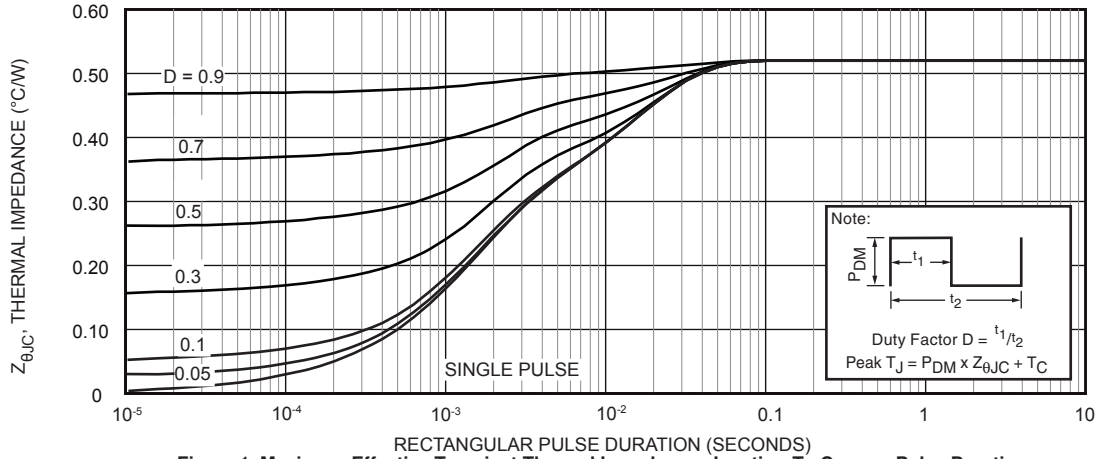



**Figure 1, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration**

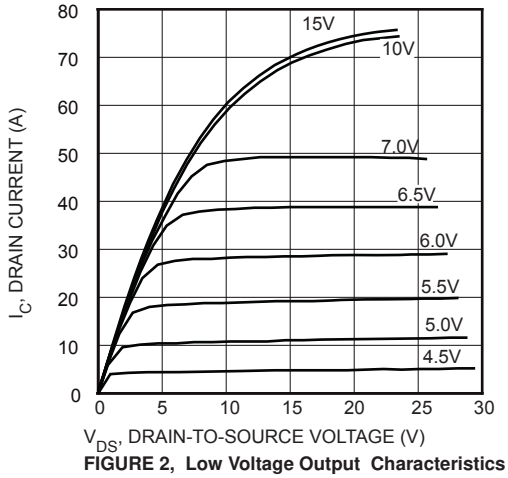



**FIGURE 2, Low Voltage Output Characteristics**

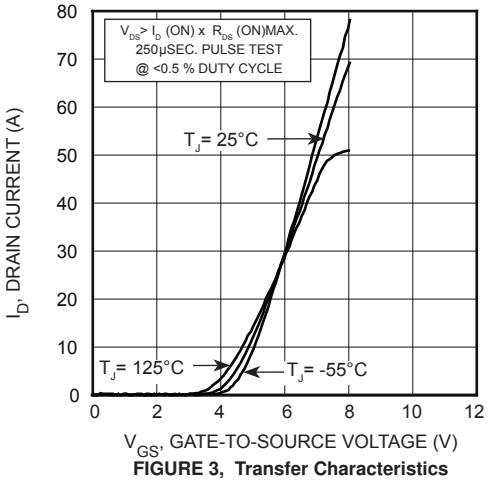



**FIGURE 3, Transfer Characteristics**

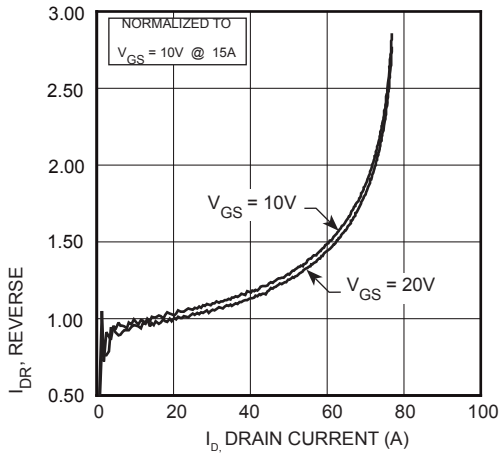



**FIGURE 4, $R_{DS}$(ON) vs Drain Current**

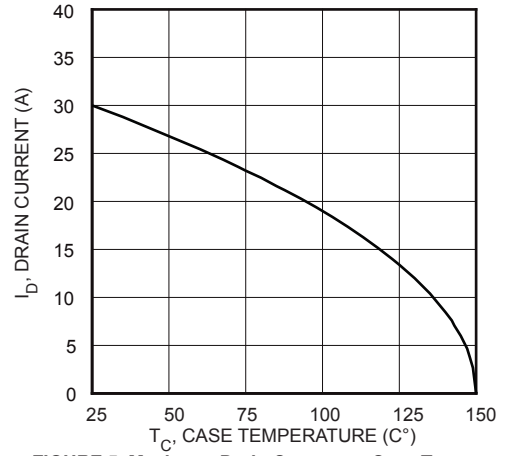



**FIGURE 5, Maximum Drain Current vs Case Temperature**

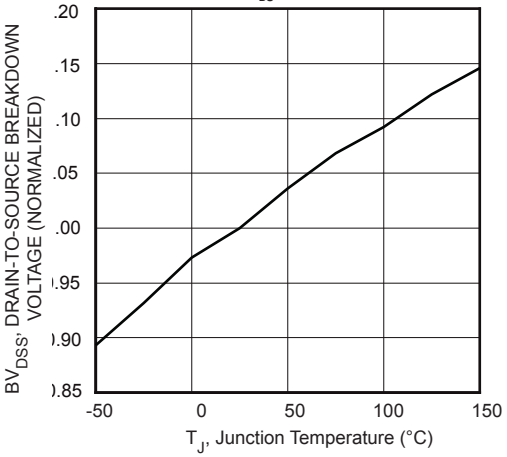



**FIGURE 6, Breakdown Voltage vs Temperature**

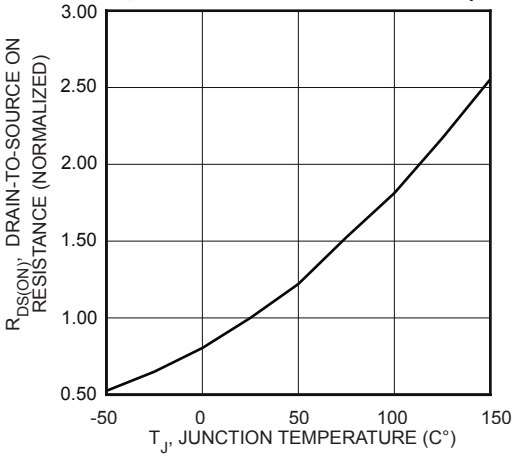



**FIGURE 7, On-Resistance vs Temperature**

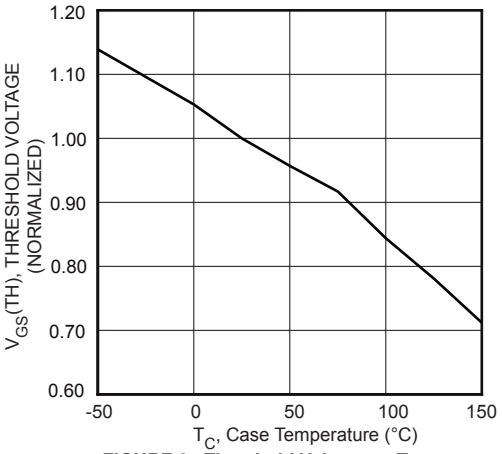



**FIGURE 8, Threshold Voltage vs Temperature**

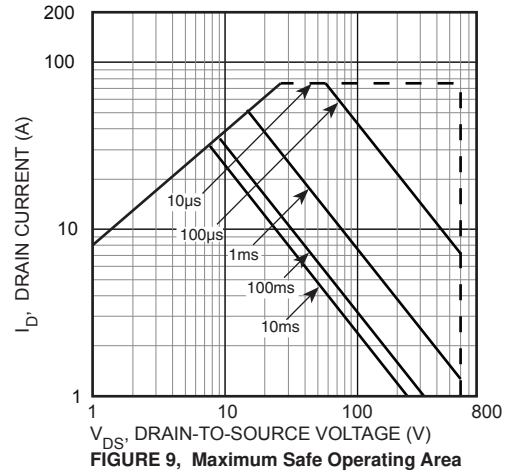



**FIGURE 9, Maximum Safe Operating Area**

## Typical Performance Curves

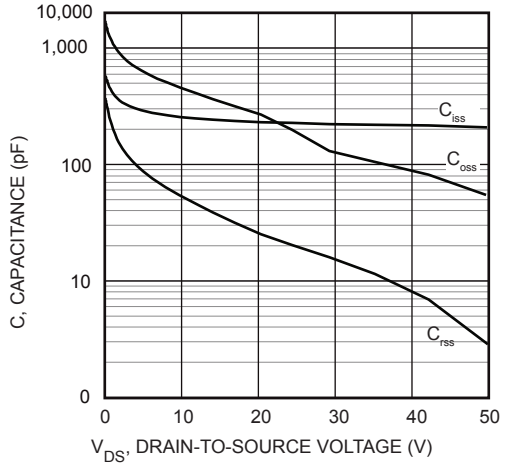



**FIGURE 10, Capacitance vs Drain-To-Source Voltage**

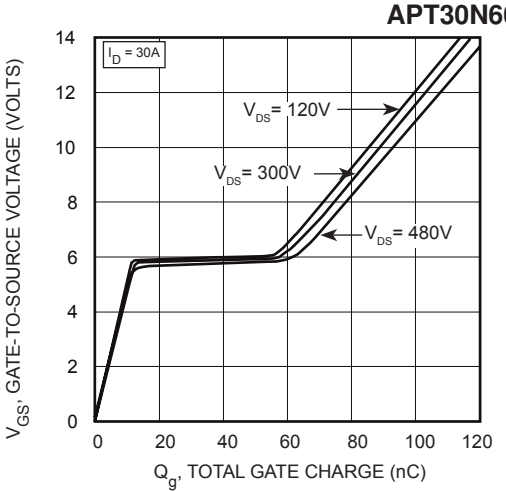



**FIGURE 11, Gate Charges vs Gate-To-Source Voltage**

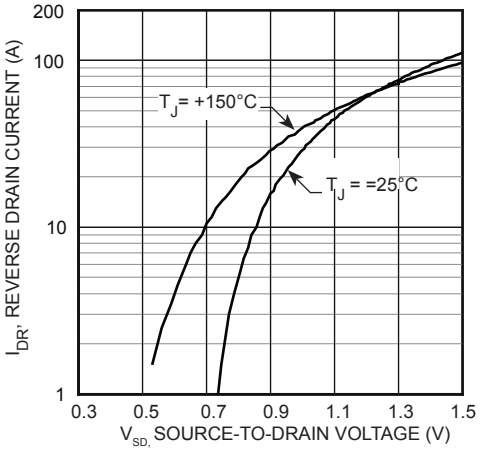



**FIGURE 12, Source-Drain Diode Forward Voltage**

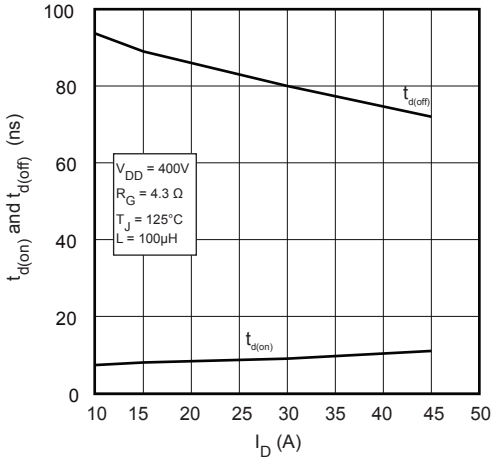



**FIGURE 13, Delay Times vs Current**

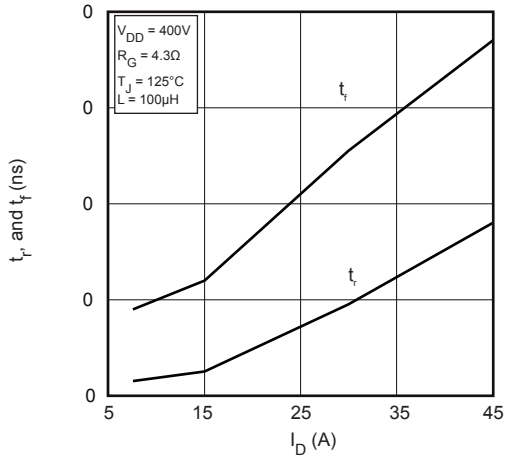



**FIGURE 14 , Rise and Fall Times vs Current**

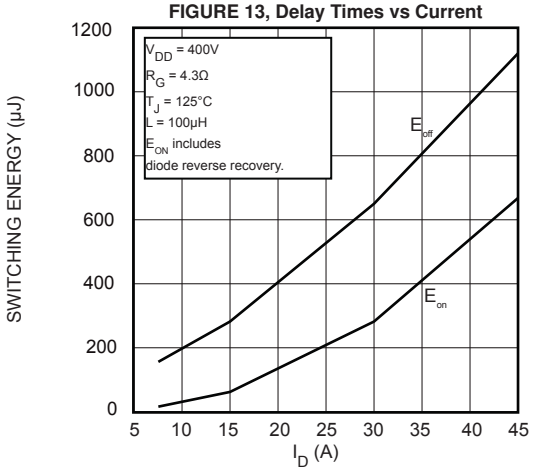



**FIGURE 15, Switching Energy vs Current**

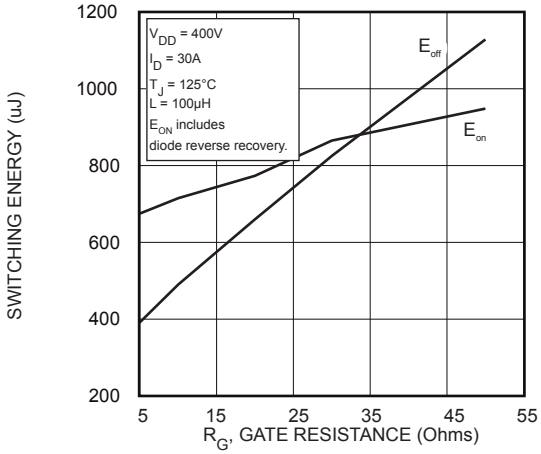



**FIGURE 16, Switching Energy vs Gate Resistance**

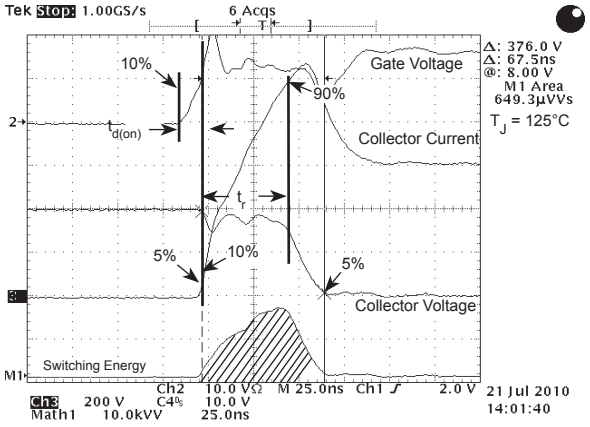



**Figure 17, Turn-on Switching Waveforms and Definitions**

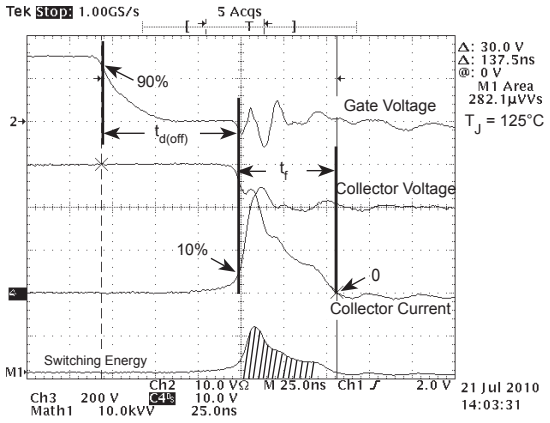



**Figure 18, Turn-off Switching Waveforms and Definitions**

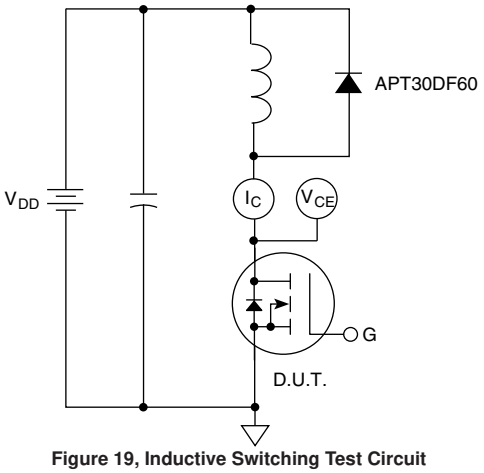
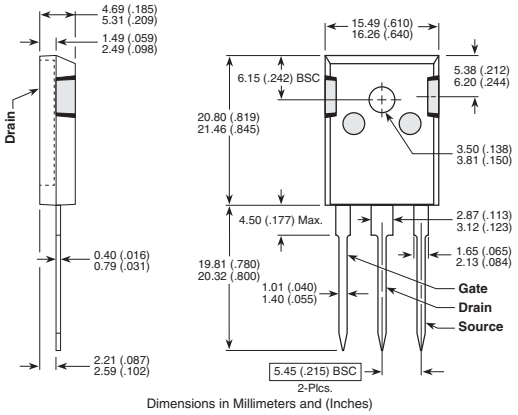



**Figure 19, Inductive Switching Test Circuit**

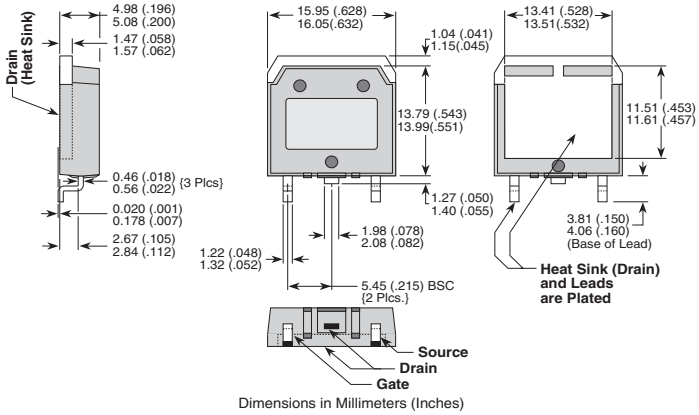
## TO-247 Package Outline




Dimensions in Millimeters and (Inches)

## D³PAK Package Outline

e3 100% Sn




Dimensions in Millimeters (Inches)