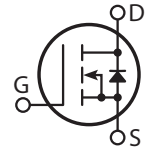
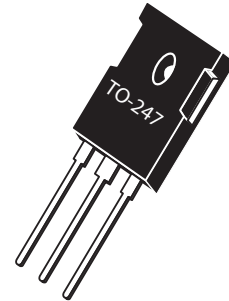


Super Junction MOSFET

- Ultra low $R_{DS(ON)}$
- Low Miller Capacitance
- Ultra Low Gate Charge, Q_g
- Avalanche Energy Rated
- TO-247 Package



MAXIMUM RATINGS

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

| Symbol | Parameter | APT11N80BC3G | UNIT |
|----------------|--|--------------|---------------------|
| V_{DSS} | Drain-Source Voltage | 800 | Volts |
| I_D | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ | 11 | Amps |
| I_{DM} | Pulsed Drain Current ^① | 33 | |
| V_{GS} | Gate-Source Voltage Continuous | ± 20 | Volts |
| V_{GSM} | Gate-Source Voltage Transient | ± 30 | |
| P_D | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | 156 | Watts |
| | Linear Derating Factor | 1.25 | W/ $^\circ\text{C}$ |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_L | Lead Temperature: 0.063" from Case for 10 Sec. | 260 | |
| dv/dt | Drain-Source Voltage slope ($V_{DS} = 640\text{V}$, $I_D = 11\text{A}$, $T_J = 125^\circ\text{C}$) | 50 | V/ns |
| I_{AR} | Repetitive Avalanche Current ^⑦ | 11 | Amps |
| E_{AR} | Repetitive Avalanche Energy ^⑦ | 0.2 | mJ |
| E_{AS} | Single Pulse Avalanche Energy ^④ | 470 | |

STATIC ELECTRICAL CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|---|-----|------|-----------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage ($V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$) | 800 | | | Volts |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ^② ($V_{GS} = 10\text{V}$, $I_D = 7.1\text{A}$) | | 0.39 | 0.45 | Ohms |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}$, $V_{GS} = 0\text{V}$) | | 0.5 | 20 | μA |
| | Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}$, $V_{GS} = 0\text{V}$, $T_J = 150^\circ\text{C}$) | | | 200 | |
| 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 ($V_{DS} = V_{GS}$, $I_D = 680\mu\text{A}$) | 2.1 | 3 | 3.9 | Volts |

DYNAMIC CHARACTERISTICS

APT11N80BC3G

| Symbol | Characteristic | Test Conditions | MIN | TYP | MAX | UNIT |
|--------------|---------------------------------------|--|-----|------|-----|---------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1 \text{ MHz}$ | | 1585 | | pF |
| C_{oss} | Output Capacitance | | | 770 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 18 | | |
| Q_g | Total Gate Charge ^④ | $V_{GS} = 10V$ $V_{DD} = 400V$ $I_D = 11A @ 25^\circ C$ | | 60 | | nC |
| Q_{gs} | Gate-Source Charge | | | 8 | | |
| Q_{gd} | Gate-Drain ("Miller") Charge | | | 30 | | |
| $t_{d(on)}$ | Turn-on Delay Time | RESISTIVE SWITCHING $V_{GS} = 10V$ $V_{DD} = 400V$ $I_D = 11A @ 25^\circ C$ $R_G = 7.5\Omega$ | | 25 | | ns |
| t_r | Rise Time | | | 15 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | | 70 | 80 | |
| t_f | Fall Time | | | 7 | 10 | |
| E_{on} | Turn-on Switching Energy ^⑥ | INDUCTIVE SWITCHING @ 25°C $V_{DD} = 533V, V_{GS} = 15V$ $I_D = 11A, R_G = 5\Omega$ | | 165 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 50 | | |
| E_{on} | Turn-on Switching Energy ^⑥ | INDUCTIVE SWITCHING @ 125°C $V_{DD} = 533V, V_{GS} = 15V$ $I_D = 11A, R_G = 5\Omega$ | | 305 | | |
| E_{off} | Turn-off Switching Energy | | | 65 | | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol | Characteristic / Test Conditions | MIN | TYP | MAX | UNIT |
|----------|--|-----|-----|-----|---------|
| I_S | Continuous Source Current (Body Diode) | | | 11 | Amps |
| I_{SM} | Pulsed Source Current ^① (Body Diode) | | | 33 | |
| V_{SD} | Diode Forward Voltage ^② ($V_{GS} = 0V, I_S = -11A$) | | 1 | 1.2 | Volts |
| t_{rr} | Reverse Recovery Time ($I_S = 11A, di_S/dt = -100A/\mu s, V_R = 640V$) | | 550 | | ns |
| Q_{rr} | Reverse Recovery Charge ($I_S = 11A, di_S/dt = -100A/\mu s, V_R = 640V$) | | 10 | | μC |
| dv/dt | Peak Diode Recovery dv/dt ^③ | | | 6 | V/ns |

THERMAL CHARACTERISTICS

| Symbol | Characteristic | MIN | TYP | MAX | UNIT |
|-----------------|---------------------|-----|-----|------|--------------|
| $R_{\theta JC}$ | Junction to Case | | | 0.80 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction to Ambient | | | 62 | |

① Repetitive avalanche causes additional power losses that can be calculated as $P_{AV} = E_{AR} * f$

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

③ See MIL-STD-750 Method 3471

④ Starting $T_J = +25^\circ C$, $L = 194mH$, $R_G = 25\Omega$, Peak $I_L = 2.2A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 11A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

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

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

APT Reserves the right to change, without notice, the specifications and information contained herein.

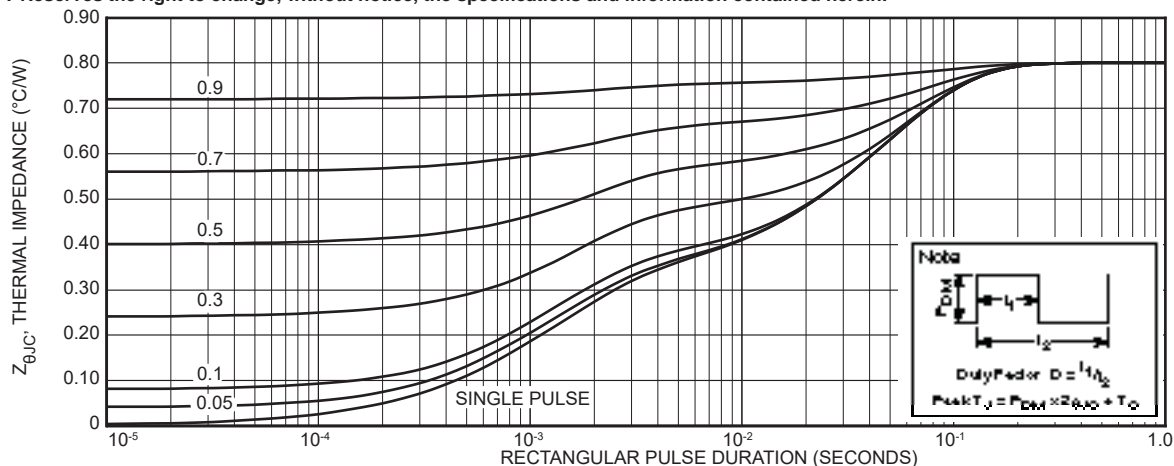


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT11N80BC3G

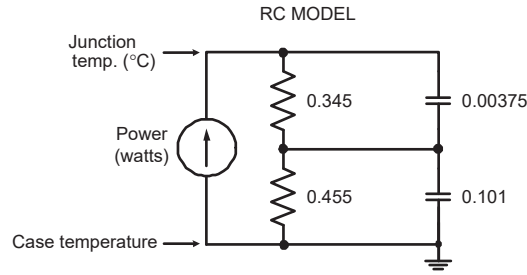


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

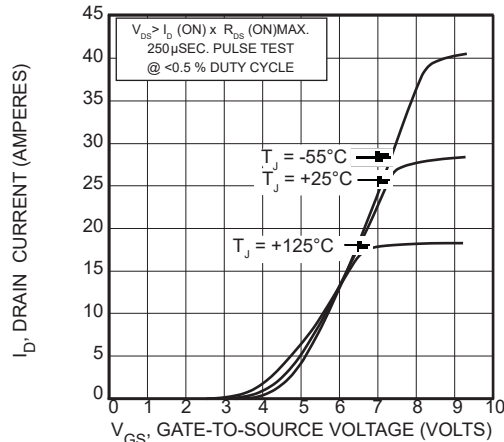


FIGURE 4, TRANSFER CHARACTERISTICS

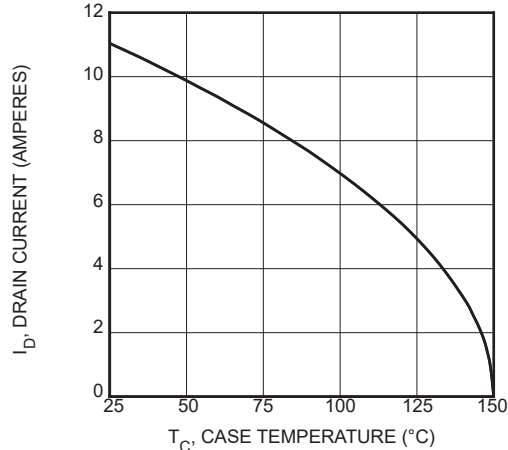


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

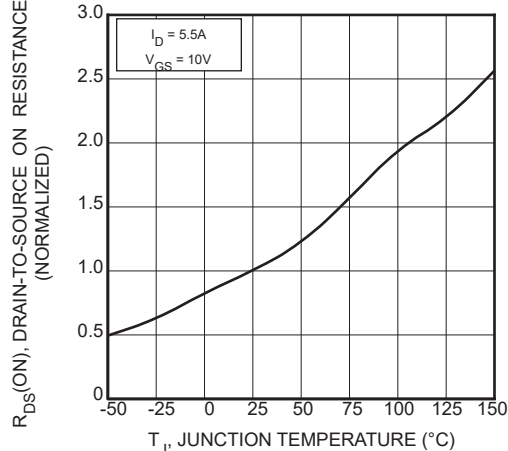


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

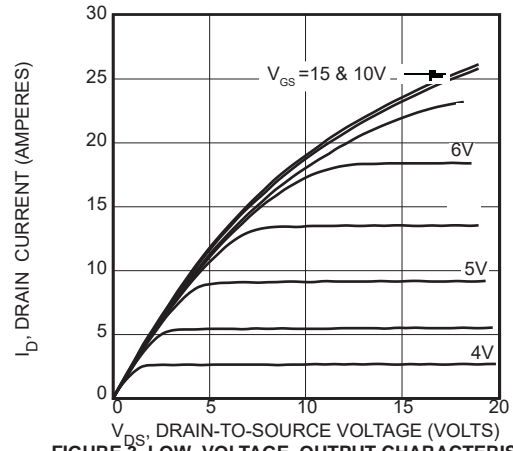


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

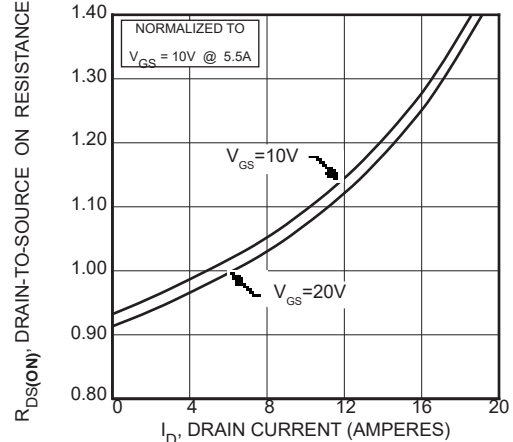


FIGURE 5, $R_{DS, \text{ (ON)}}$ vs DRAIN CURRENT

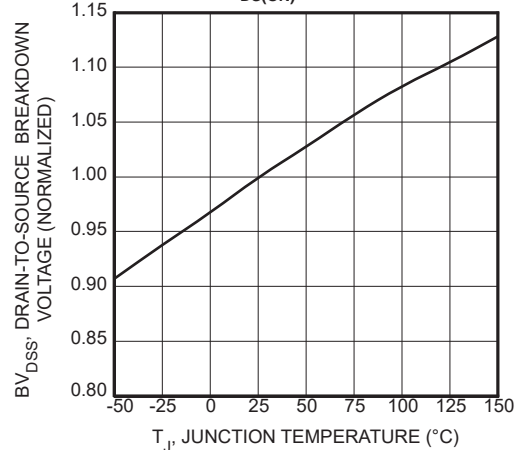


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

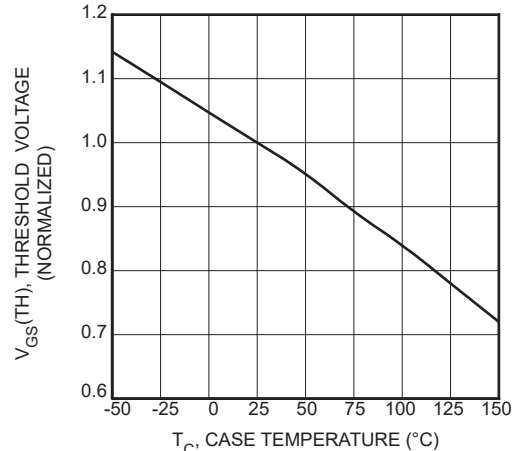


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

Typical Performance Curves

APT11N80BC3G

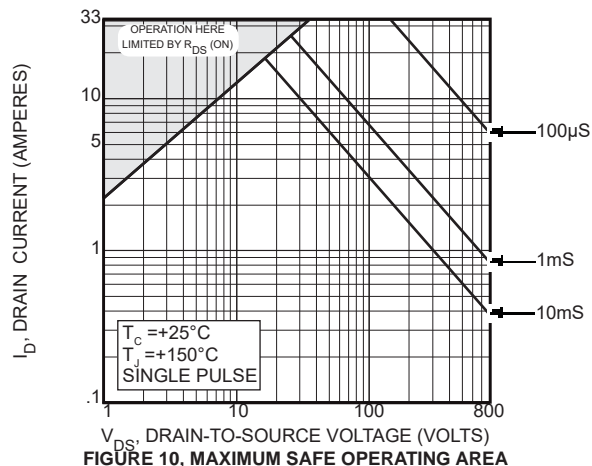


FIGURE 10, MAXIMUM SAFE OPERATING AREA

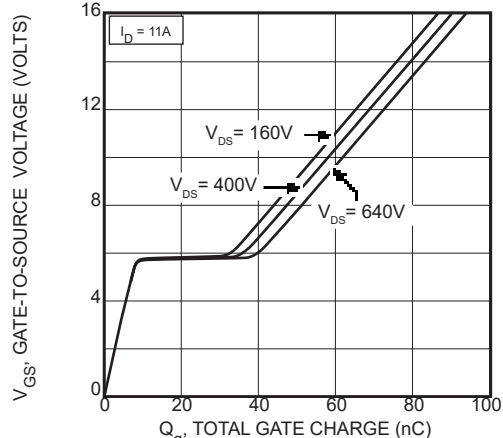


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

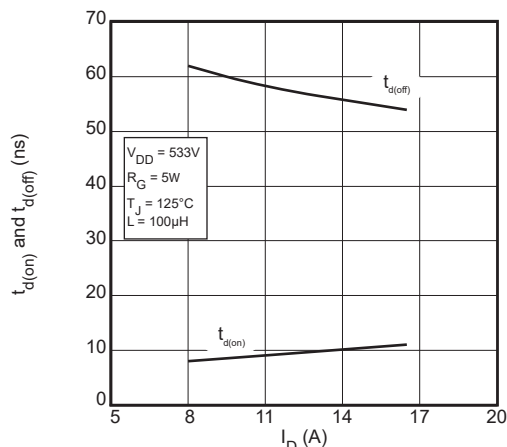


FIGURE 14, DELAY TIMES vs CURRENT

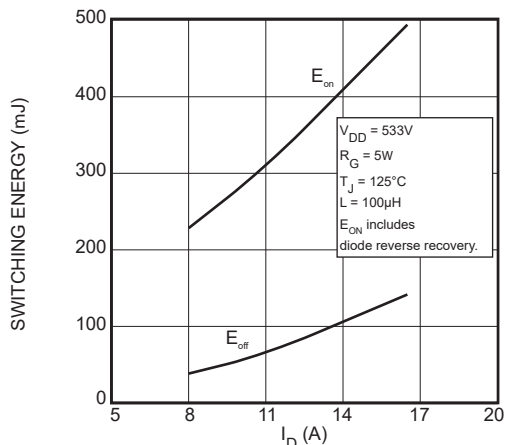


FIGURE 16, SWITCHING ENERGY vs CURRENT

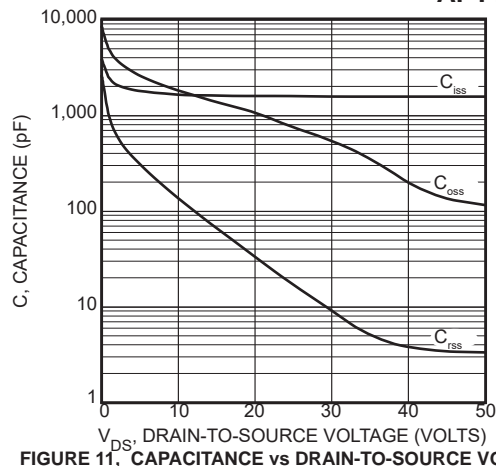


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

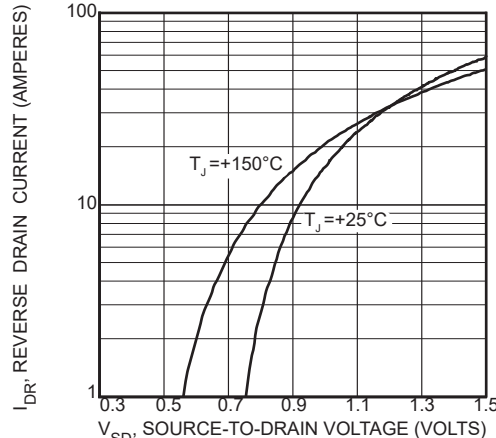


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

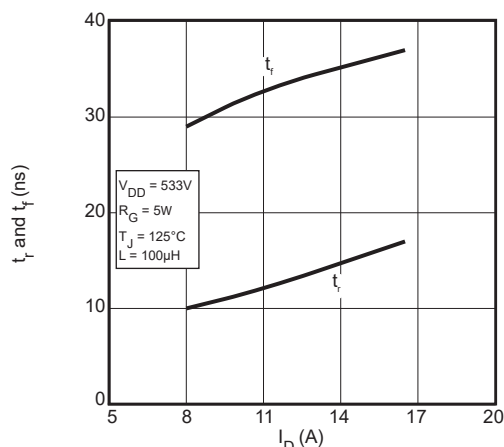


FIGURE 15, RISE AND FALL TIMES vs CURRENT

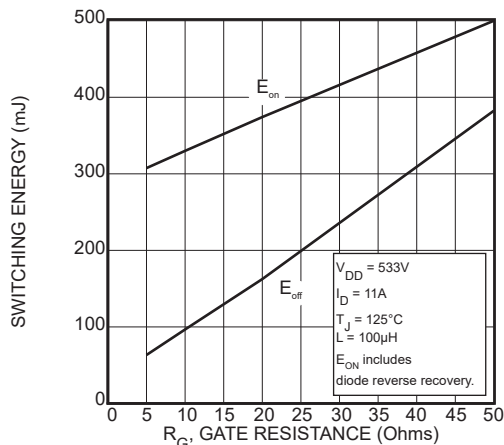


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

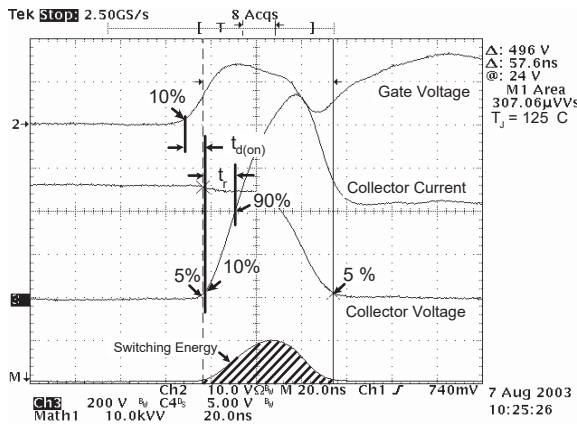


Figure 18, Turn-on Switching Waveforms and Definitions

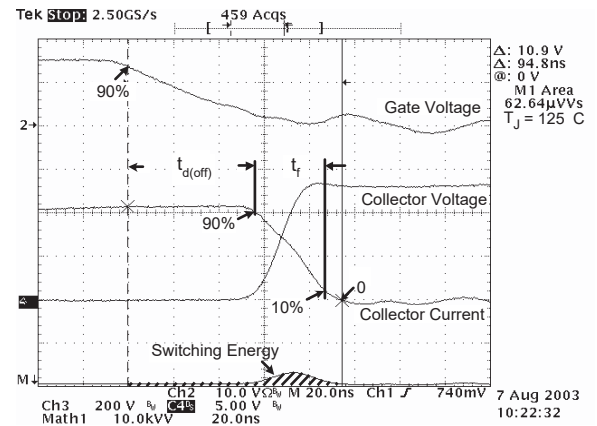


Figure 19, Turn-off Switching Waveforms and Definitions

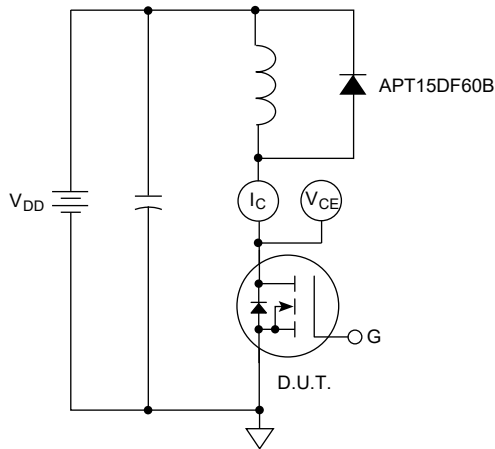
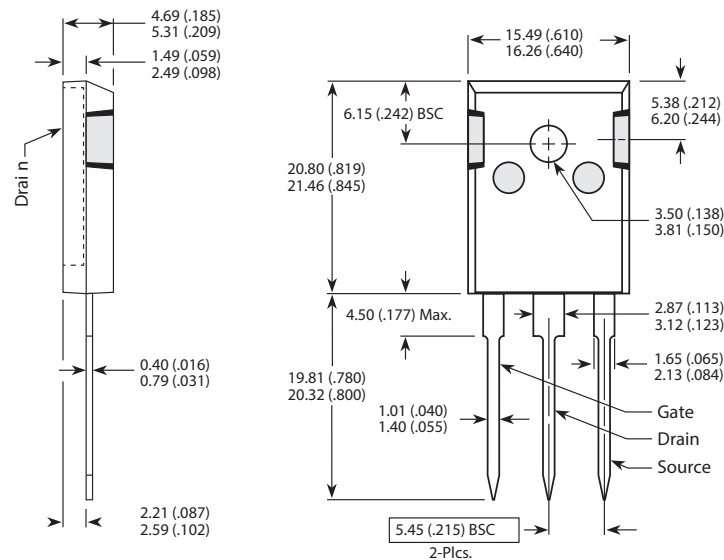


Figure 20, Inductive Switching Test Circuit

TO-247 Package Outline



Dimensions in Millimeters and (Inches)