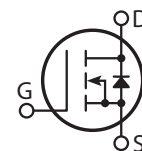
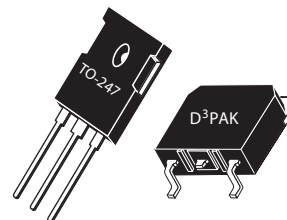


Super Junction MOSFET



- 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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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

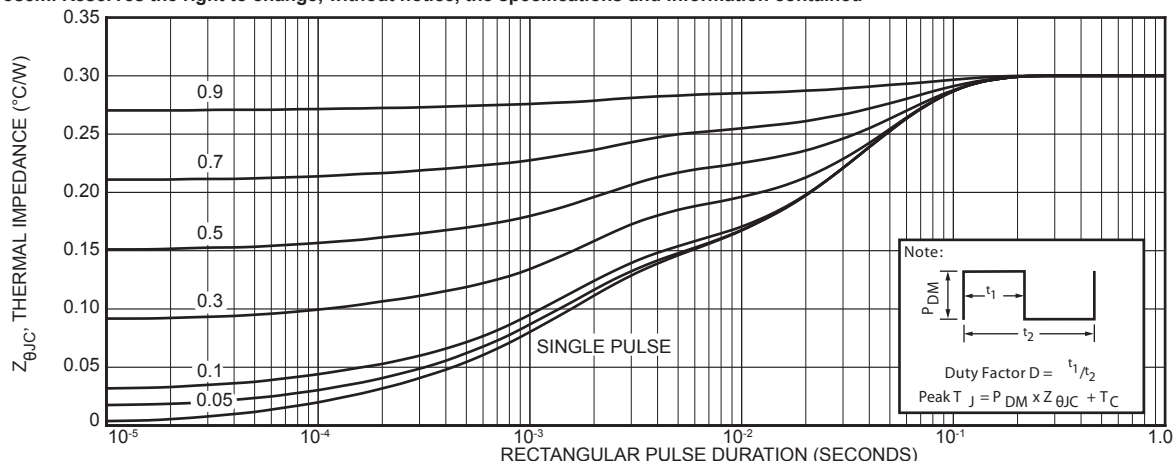


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT47N60BC3_SC3(G)

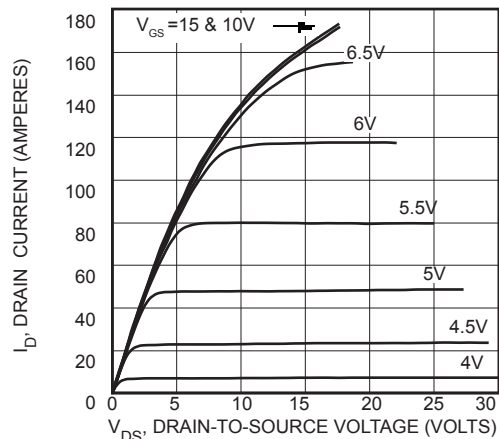


FIGURE 2, LOW VOLTAGE OUTPUT CHARACTERISTICS

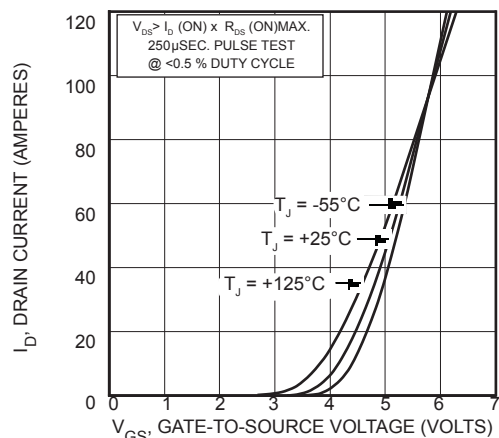


FIGURE 3, TRANSFER CHARACTERISTICS

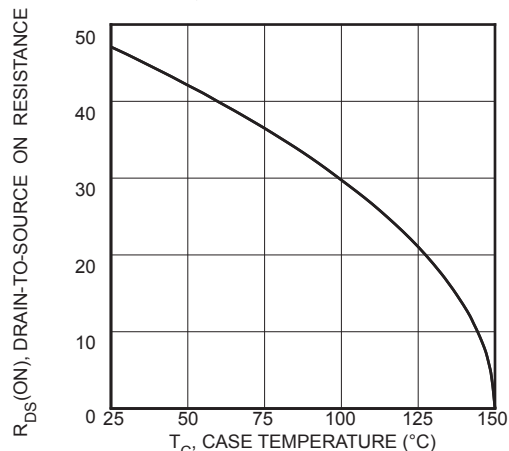


FIGURE 5, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

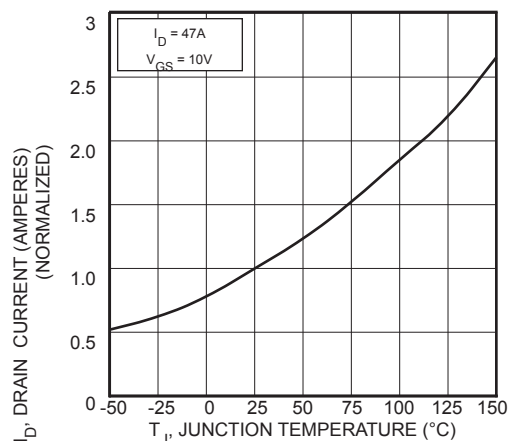


FIGURE 7, ON-RESISTANCE vs. TEMPERATURE

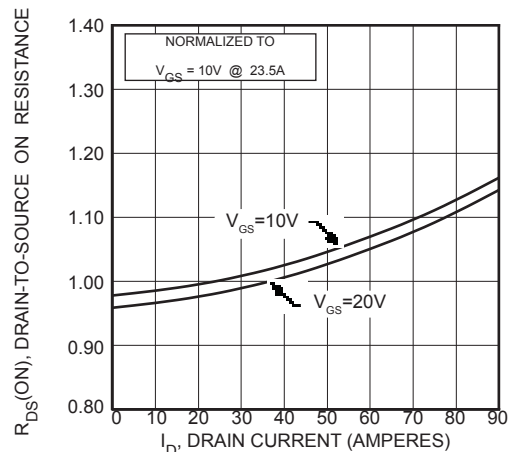


FIGURE 4, $R_{DS(ON)}$ vs DRAIN CURRENT

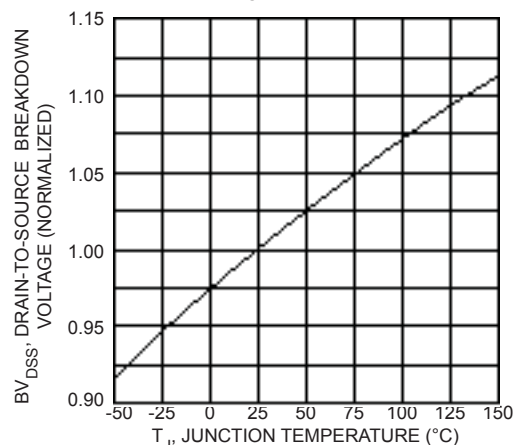


FIGURE 6, BREAKDOWN VOLTAGE vs TEMPERATURE

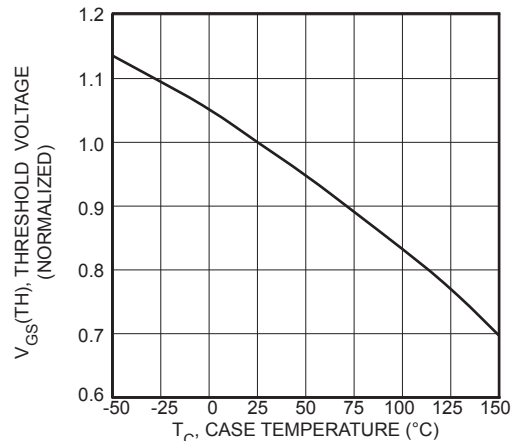


FIGURE 8, THRESHOLD VOLTAGE vs TEMPERATURE

Typical Performance Curves

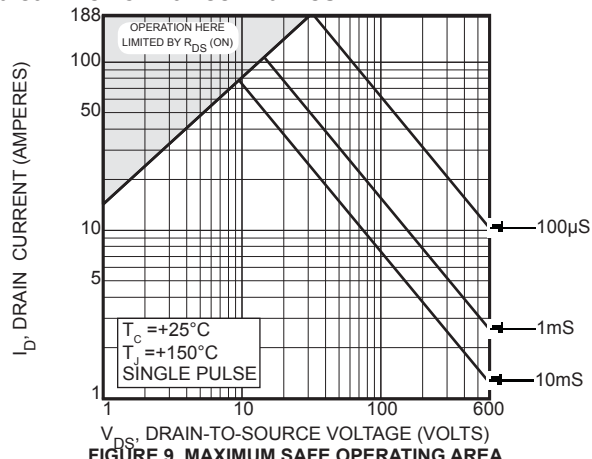


FIGURE 9, MAXIMUM SAFE OPERATING AREA

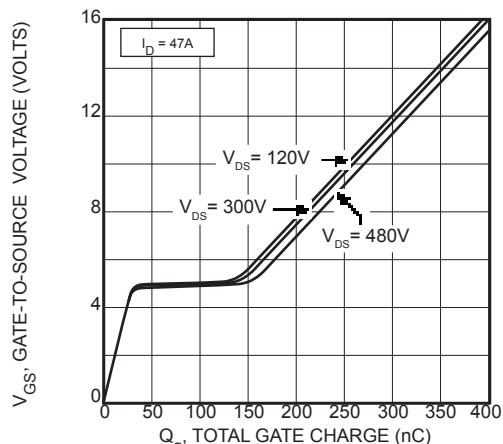


FIGURE 11, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

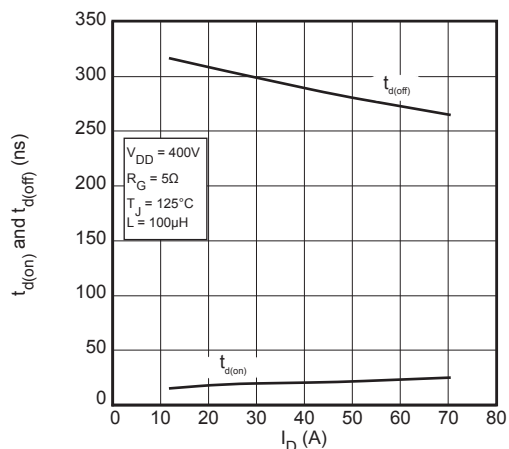


FIGURE 13, DELAY TIMES vs CURRENT

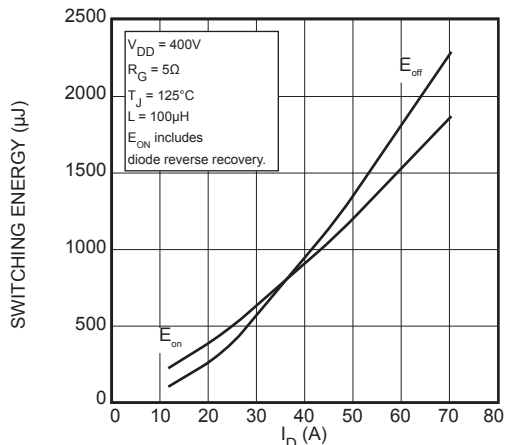


FIGURE 15, SWITCHING ENERGY vs CURRENT

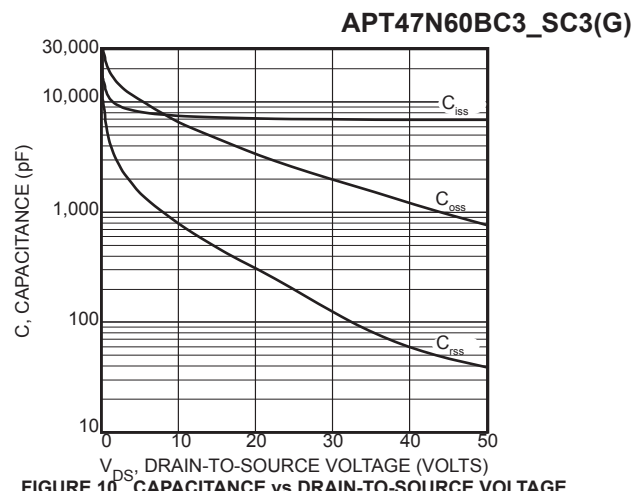


FIGURE 10, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

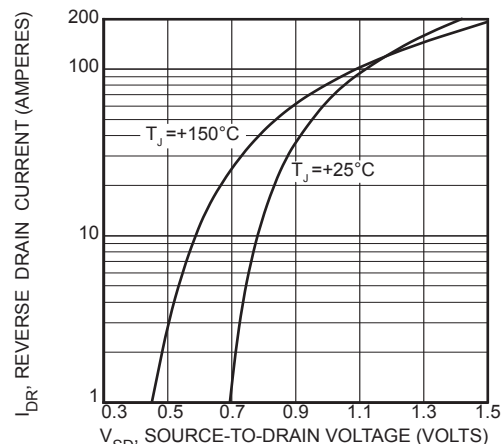


FIGURE 12, SOURCE-DRAIN DIODE FORWARD VOLTAGE

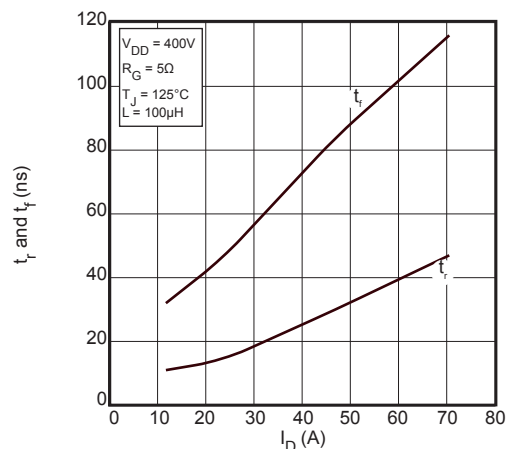


FIGURE 14, RISE AND FALL TIMES vs CURRENT

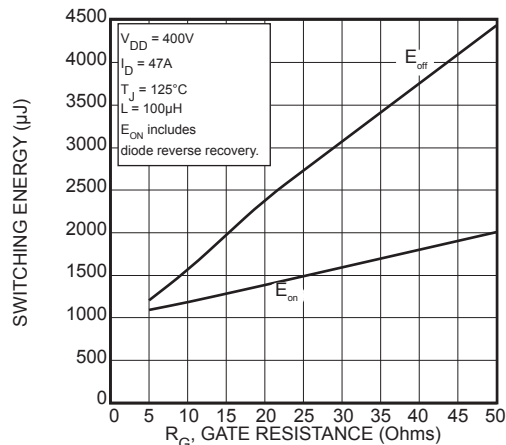


FIGURE 16, SWITCHING ENERGY vs. GATE RESISTANCE

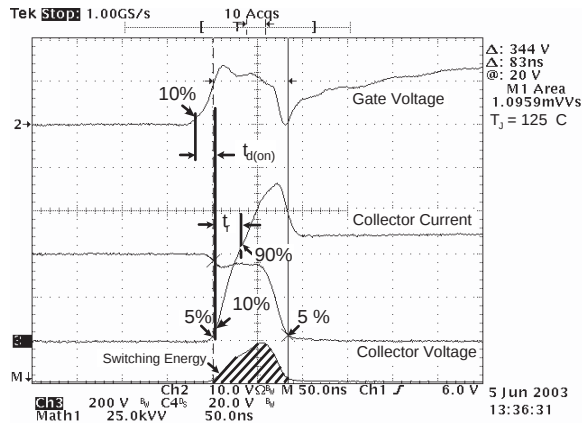


Figure 17, Turn-on Switching Waveforms and Definitions

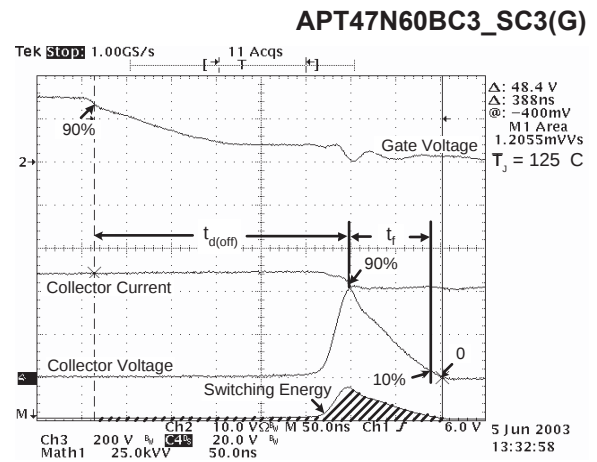


Figure 18, Turn-off Switching Waveforms and Definitions

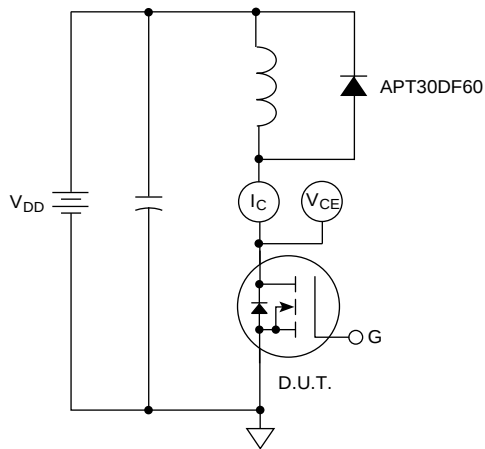
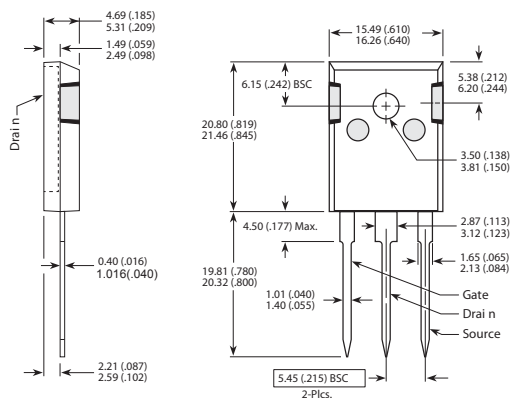


Figure 19, Inductive Switching Test Circuit

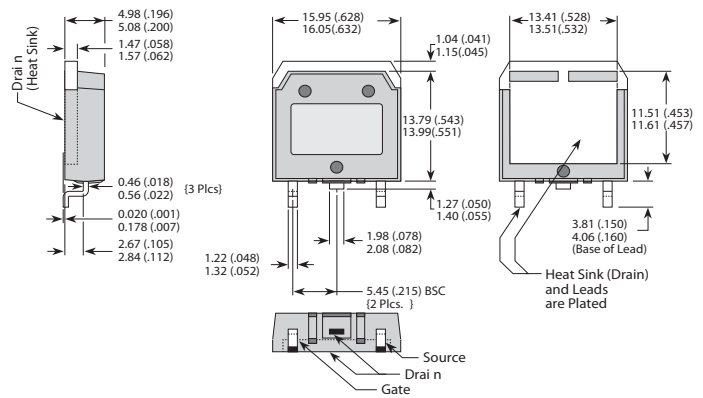
TO-247 (B) Package Outline

⑥1 SAC: Tin, Silver, Copper



D³PAK Package Outline

⑥3 100% Sn Plated



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