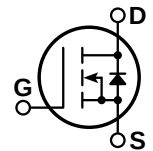
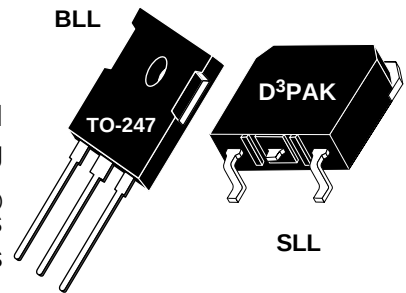


POWER MOS 7® FREDFET

Power MOS 7® is a new generation of low loss, high voltage, N-Channel enhancement mode power MOSFETs. Both conduction and switching losses are addressed with Power MOS 7® by significantly lowering $R_{DS(on)}$ and Q_g . Power MOS 7® combines lower conduction and switching losses along with exceptionally fast switching speeds inherent with APT's patented metal gate structure.

- Lower Input Capacitance
- Lower Miller Capacitance
- Lower Gate Charge, Q_g
- Increased Power Dissipation
- Easier To Drive
- TO-247 or Surface Mount D³PAK Package
- **FAST RECOVERY BODY DIODE**



MAXIMUM RATINGS

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

Symbol	Parameter	APT5018	UNIT
V_{DSS}	Drain-Source Voltage	500	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	27	Amps
I_{DM}	Pulsed Drain Current ^①	108	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	300	Watts
	Linear Derating Factor	2.4	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.	300	
I_{AR}	Avalanche Current ^① (Repetitive and Non-Repetitive)	27	Amps
E_{AR}	Repetitive Avalanche Energy ^①	30	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	1210	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu A$)	500			Volts
$I_{D(on)}$	On State Drain Current ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	27			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 13.5A$)			0.180	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 500V, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 400V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			1000	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1mA$)	3		5	Volts



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

APT Website - <http://www.advancedpower.com>

DYNAMIC CHARACTERISTICS

APT5018BFLL-SFLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		2596		pF
C_{oss}	Output Capacitance			546		
C_{rss}	Reverse Transfer Capacitance			38		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 250V$ $I_D = 27A @ 25^\circ C$		58		nC
Q_{gs}	Gate-Source Charge			15		
Q_{gd}	Gate-Drain ("Miller") Charge			31		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 250V$ $I_D = 27A @ 25^\circ C$ $R_G = 0.6\Omega$		9		ns
t_r	Rise Time			4		
$t_{d(off)}$	Turn-off Delay Time			18		
t_f	Fall Time			2		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 333V, V_{GS} = 15V$ $I_D = 27A, R_G = 5\Omega$		216		μJ
E_{off}	Turn-off Switching Energy			134		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 333V, V_{GS} = 15V$ $I_D = 27A, R_G = 5\Omega$		337		
E_{off}	Turn-off Switching Energy			162		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			27	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			108	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D 27A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -I_D 27A, di/dt = 100A/\mu s$)	$T_J = 25^\circ C$		250	ns
		$T_J = 125^\circ C$		450	
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D 27A, di/dt = 100A/\mu s$)	$T_J = 25^\circ C$	1.76		μC
		$T_J = 125^\circ C$	4.23		
I_{RRM}	Peak Recovery Current ($I_S = -I_D 27A, di/dt = 100A/\mu s$)	$T_J = 25^\circ C$	12		Amps
		$T_J = 125^\circ C$	17		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.42	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	

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 $T_J = +25^\circ C$, $L = 3.32mH$, $R_G = 25\Omega$, Peak $I_L = 27A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 27A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

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

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

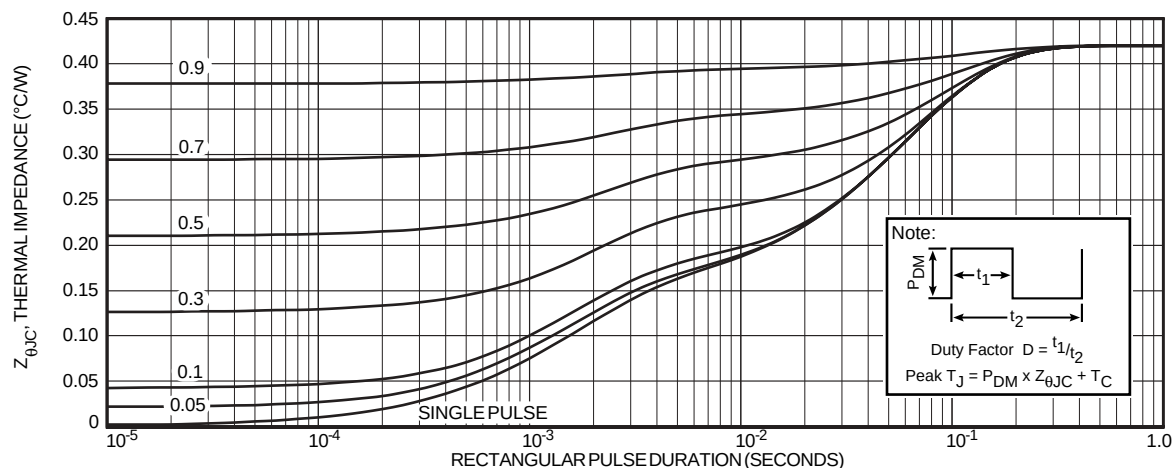


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

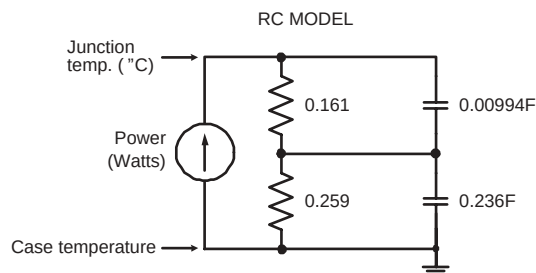


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

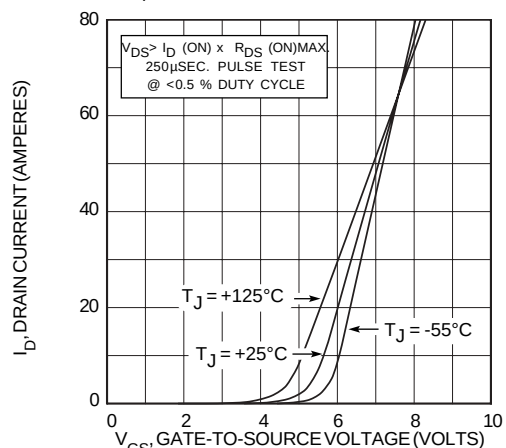


FIGURE 4, TRANSFER CHARACTERISTICS

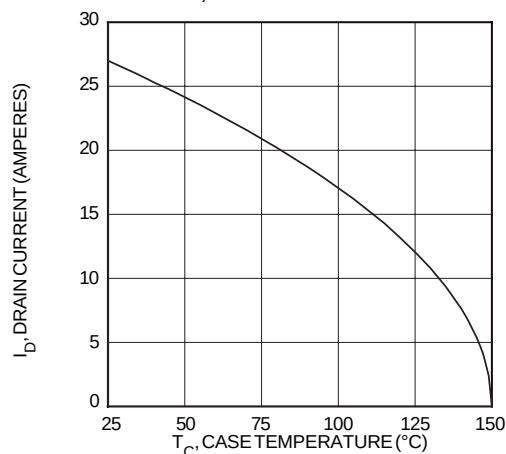


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

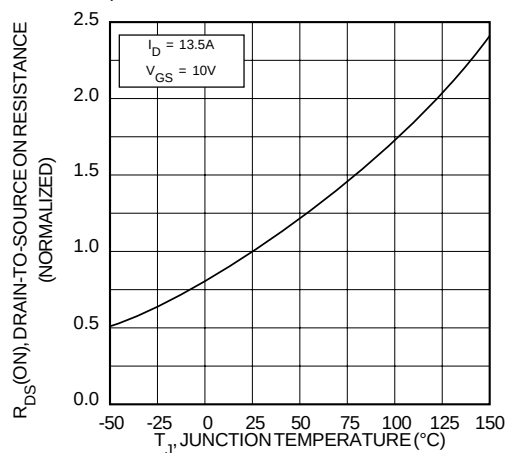


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

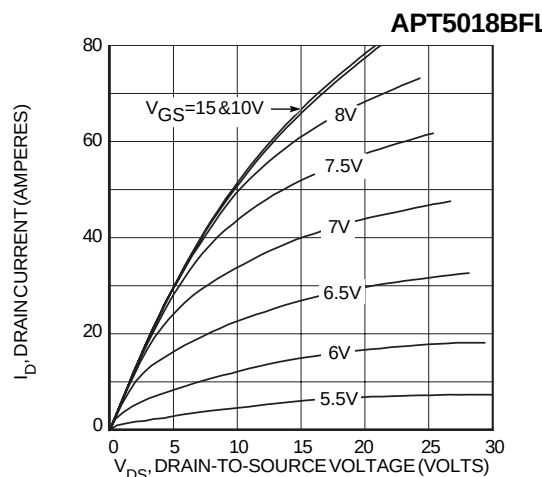


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

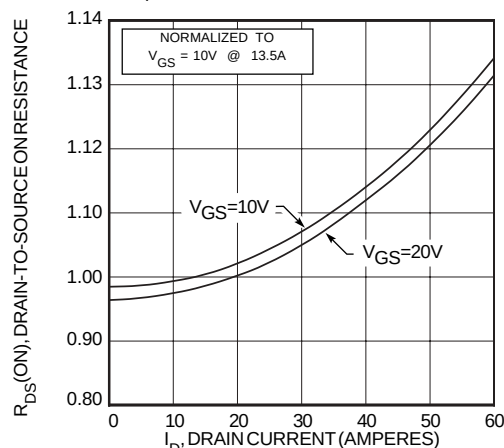


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

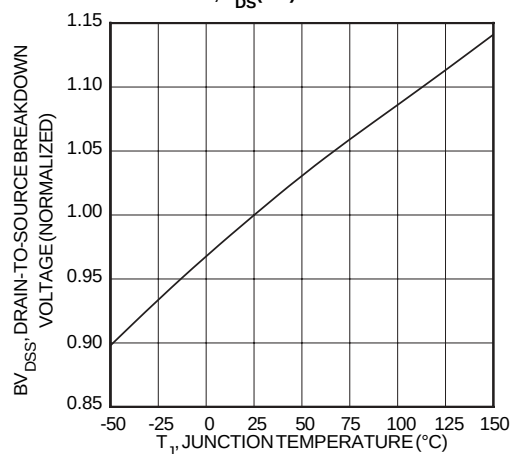


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

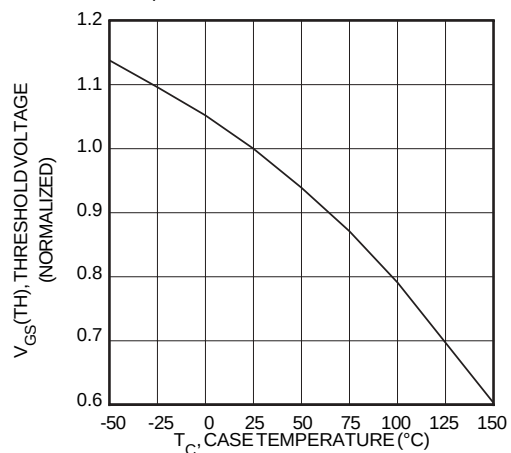


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

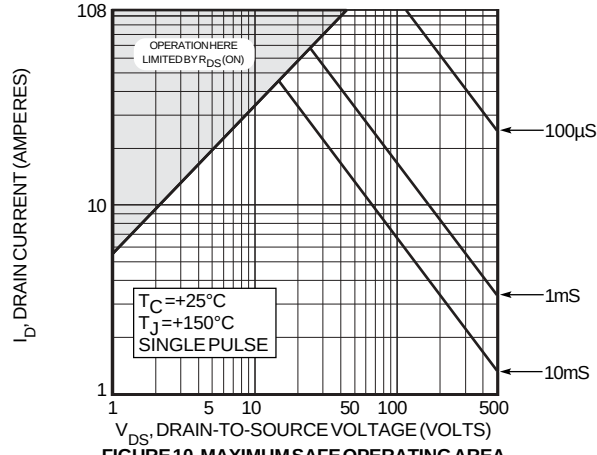


FIGURE 10, MAXIMUM SAFE OPERATING AREA

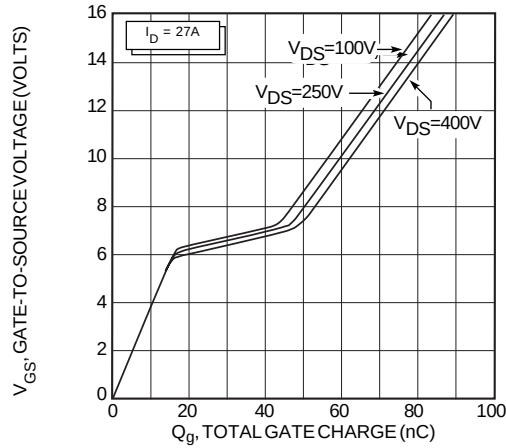


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

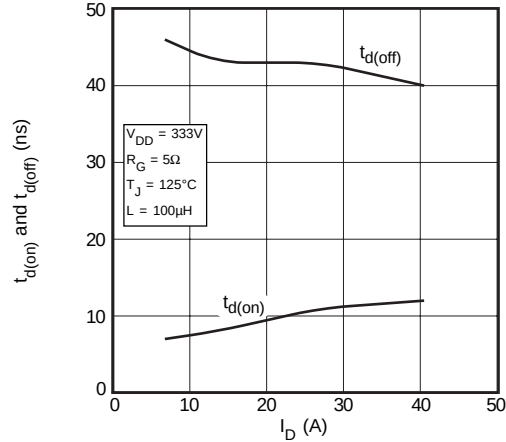


FIGURE 14, DELAY TIMES vs CURRENT

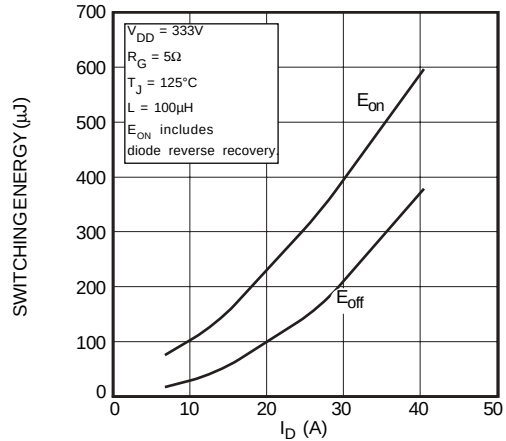


FIGURE 16, SWITCHING ENERGY vs CURRENT

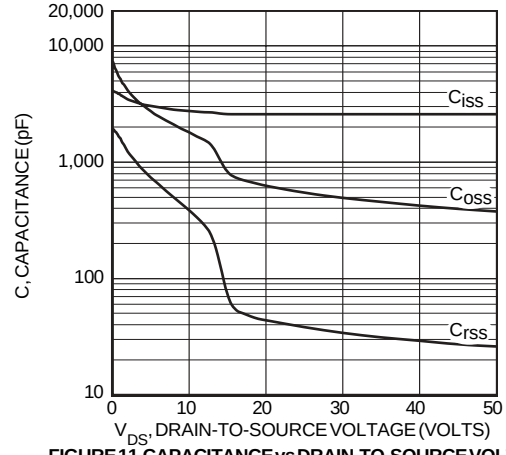


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

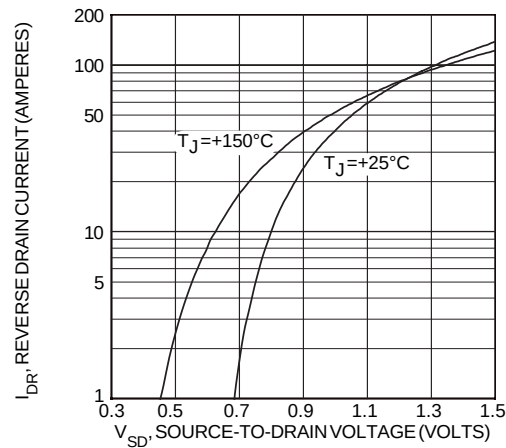


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

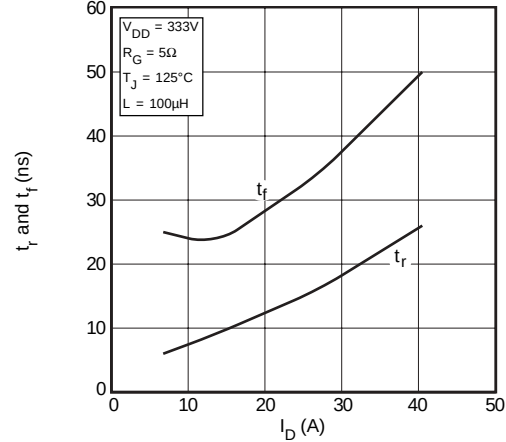


FIGURE 15, RISE AND FALL TIMES vs CURRENT

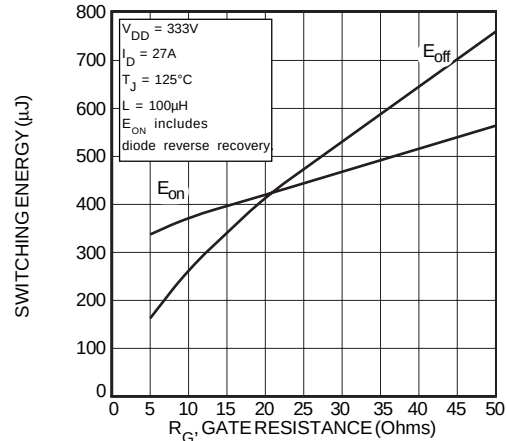


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

$V_{GS} = 27.0\text{ V}$
 $V_{DS} = 10.0\text{ V}$
 $V_{GS} = 0\text{ V}$
 $I_{DS} = 161.7\text{ }\mu\text{A/Vs}$
 $T_J = 125\text{ }^\circ\text{C}$

90%
 $t_{d(off)}$
 90%
 t_f
 10%
 0%

Gate Voltage
 Drain Voltage
 Drain Current

Switching Energy

Ch1 10.0V %
 Ch2 10.0V %
 Math1 10.0V %
 1.00μs/div
 10.0V/div
 50.0ms
 1 Mar 2003
 14:47:29

Figure 1: Dimensions of the 2-Pin Connector

Left View (Side Profile):

- Top width dimensions: 4.69 (185), 5.31 (209), 1.49 (.059), 2.49 (.098)
- Bottom width dimensions: 0.40 (.016), 0.79 (.031)
- Bottom width dimensions: 2.21 (.087), 2.59 (.102)
- Label: Drain

Right View (Top-down):

- Top width dimensions: 15.49 (.610), 16.26 (.640)
- Left side dimensions: 6.15 (.242) BSC, 20.80 (.819), 21.46 (.845)
- Right side dimensions: 5.38 (.212), 6.20 (.244)
- Internal dimensions: 3.50 (.138), 3.81 (.150)
- Central pin dimensions: 4.50 (.177) Max., 1.91 (.780), 20.32 (.800)
- Bottom dimensions: 1.01 (.040), 1.40 (.055)
- Bottom width dimensions: 5.45 (.215) BSC, 2-Pins
- Right side dimensions: 2.87 (.113), 3.12 (.122), 1.65 (.065), 2.13 (.084)
- Labels: Gate, Drain, Source

Dimensions in Millimeters and (Inches)

Figure 1: Dimensions of the Heat Sink and Leads. The diagram shows three views of the assembly with dimensions in millimeters (mm) and inches (in).

Left View (Side Profile):

- Drain (heat Sink) height: 4.98 (.196) mm, 5.08 (.200) mm, 1.47 (.058) mm, 1.57 (.062) mm.
- Lead heights (3 Plcs): 0.46 (.018) mm, 0.56 (.022) mm, 0.020 (.001) mm, 0.178 (.007) mm, 2.67 (.105) mm, 2.84 (.112) mm.
- Lead spacing: 1.22 (.048) mm, 1.32 (.052) mm.

Top View:

- Heat Sink width: 15.95 (.628) mm, 16.05 (.632) mm.
- Lead width: 1.04 (.041) mm, 1.15 (.045) mm.
- Lead spacing: 13.79 (.543) mm, 13.99 (.551) mm.
- Lead length: 1.27 (.050) mm, 1.40 (.055) mm.
- Lead spacing (BSC): 5.45 (.215) mm (2 Plcs.).
- Lead spacing: 1.98 (.078) mm, 2.08 (.082) mm.

Right View (Front):

- Heat Sink width: 13.41 (.528) mm, 13.51 (.532) mm.
- Lead width: 11.51 (.453) mm, 11.61 (.457) mm.
- Lead length: 3.81 (.150) mm, 4.06 (.160) mm (Base of Lead).

Note: Heat Sink (Drain) and Leads are Plated.

Legend:

- Source
- Drain
- Gate

Dimensions in Millimeters (Inches)

050-7027 Rev C 3-2003