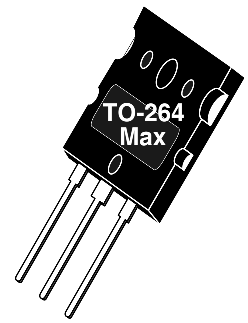
Microsemi®
POWER PRODUCTS GROUP

800V 52A 0.16Ω
APT8014L2FLL APT8014L2FLLG*

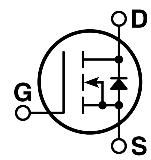
*G Denotes RoHS Compliant, Pb Free Terminal Finish.

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 Microsemi's patented metal gate structure.

- **Lower Input Capacitance**
- **Lower Miller Capacitance**
- **Lower Gate Charge, Qg**
- **Increased Power Dissipation**
- **Easier To Drive**
- **Popular TO-264 MAX Package**
- **FAST RECOVERY BODY DIODE**



MAXIMUM RATINGS All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT8014L2FLL(G)	UNIT
V_{DSS}	Drain-Source Voltage	800	Volts
I_D	Continuous Drain Current @ T_C = 25°C	52	Amps
I_{DM}	Pulsed Drain Current ①	208	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°C	893	Watts
	Linear Derating Factor	7.14	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.	300	
I_{AR}	Avalanche Current ① (Repetitive and Non-Repetitive)	52	Amps
E_{AR}	Repetitive Avalanche Energy ①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ④	3200	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250μA)	800			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ② (V_{GS} = 10V, 26A)			0.160	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 800V, V_{GS} = 0V)			250	μA
	Zero Gate Voltage Drain Current (V_{DS} = 640V, V_{GS} = 0V, T_C = 125°C)			1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 5mA)	3		5	Volts

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

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

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DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ f = 1 MHz		7238		pF
C_{oss}	Output Capacitance			1402		
C_{rss}	Reverse Transfer Capacitance			248		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 400V$ $I_D = 52A$ @ 25°C		285		nC
Q_{gs}	Gate-Source Charge			30		
Q_{gd}	Gate-Drain ("Miller") Charge			170		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 400V$ $I_D = 52A$ @ 25°C $R_G = 0.6\Omega$		20		ns
t_r	Rise Time			19		
$t_{d(off)}$	Turn-off Delay Time			69		
t_f	Fall Time			15		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 533V$, $V_{GS} = 15V$ $I_D = 52A$, $R_G = 3\Omega$		1091		µJ
E_{off}	Turn-off Switching Energy			1135		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 533V$ $V_{GS} = 15V$ $I_D = 52A$, $R_G = 3\Omega$		1662		
E_{off}	Turn-off Switching Energy			1383		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				52	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				208	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V$, $I_S = -52A$)				1.3	Volts
$dv/_{dt}$	Peak Diode Recovery $dv/_{dt}$ ⑤				18	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -52A$, $di/_{dt} = 100A/\mu s$)	$T_j = 25°C$			440	ns
		$T_j = 125°C$			1100	
Q_{rr}	Reverse Recovery Charge ($I_S = -52A$, $di/_{dt} = 100A/\mu s$)	$T_j = 25°C$		2.0		µC
		$T_j = 125°C$		13		
I_{RRM}	Peak Recovery Current ($I_S = -52A$, $di/_{dt} = 100A/\mu s$)	$T_j = 25°C$		15		Amps
		$T_j = 125°C$		30		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.14	°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 $T_j = +25°C$, L = 2.37mH, $R_G = 25\Omega$, Peak $I_L = 52A$

⑤ $dv/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. $I_S \le -I_D 52A$ $di/_{dt} \le 700A/\mu s$ $V_R \le 800V$ $T_J \le 150°C$

⑥ Eon includes diode reverse recovery. See figures 18, 20.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

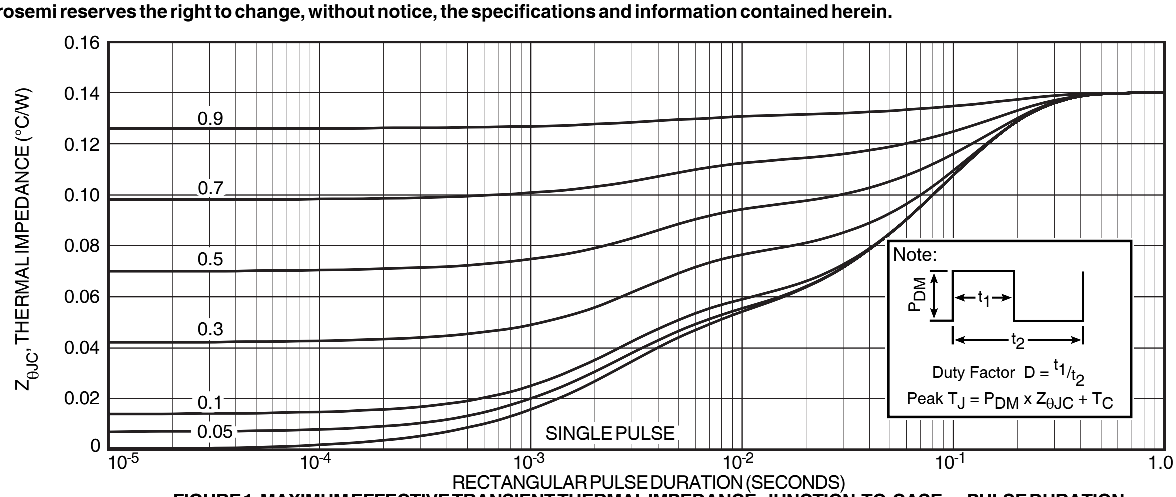

FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

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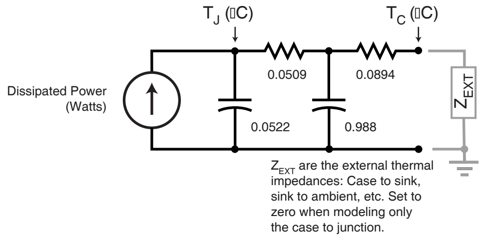

FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

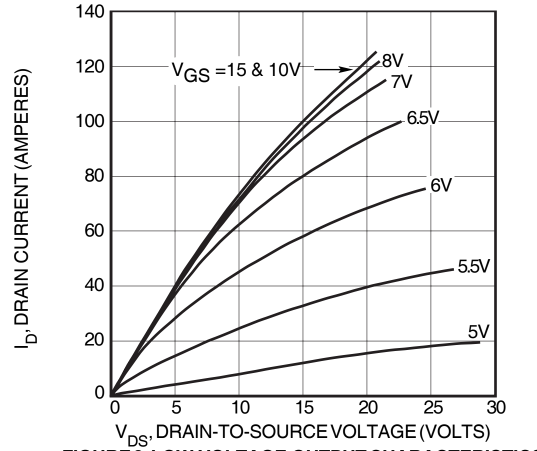

FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

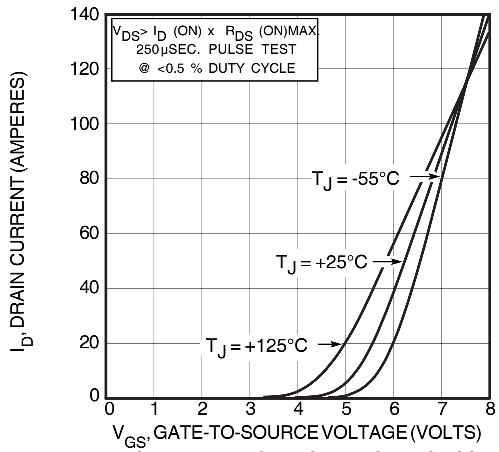

FIGURE 4, TRANSFER CHARACTERISTICS

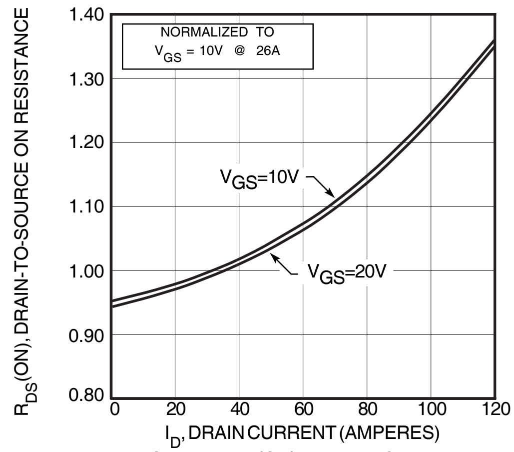

FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

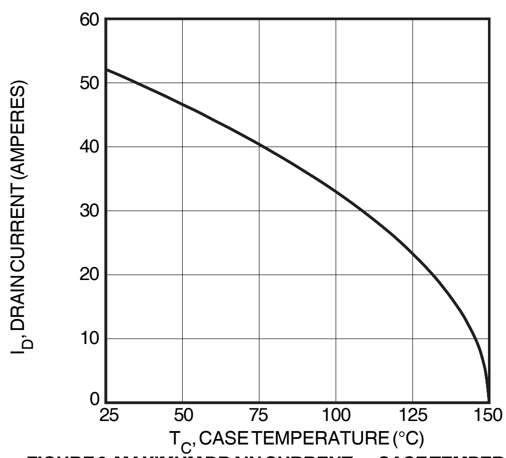

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

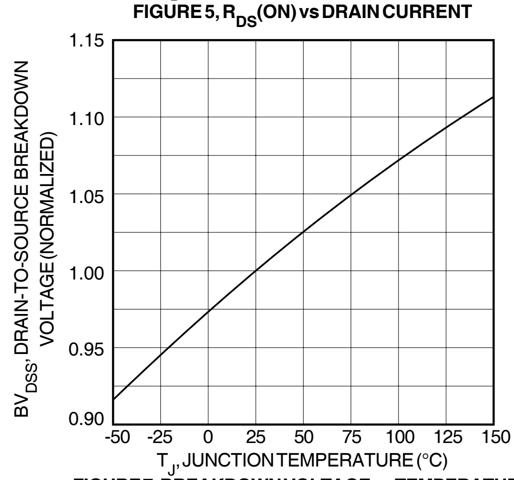

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

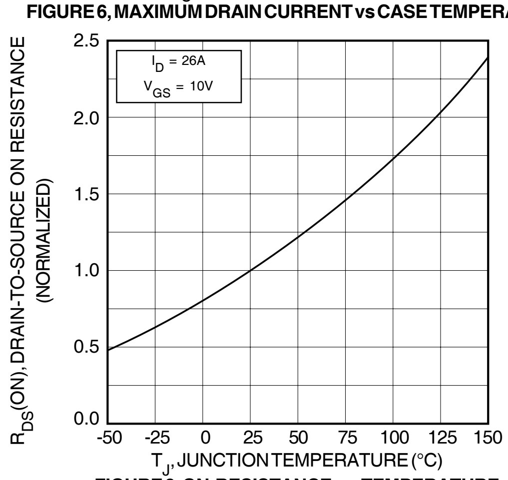

FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

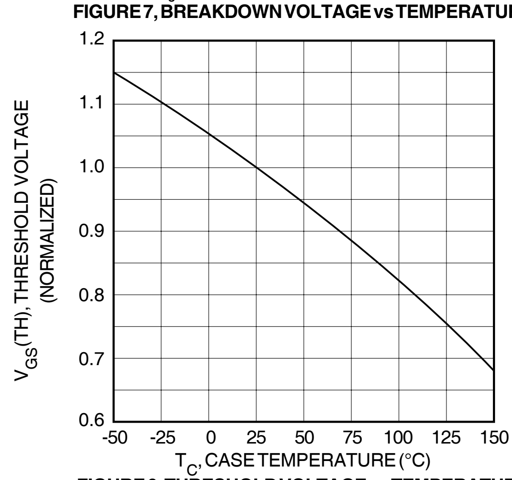

FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

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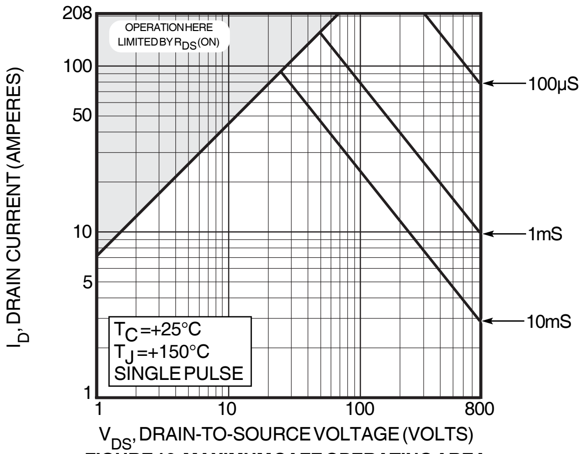

FIGURE 10, MAXIMUM SAFE OPERATING AREA

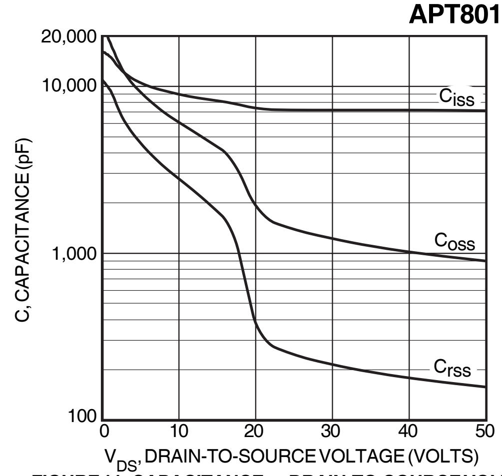

FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

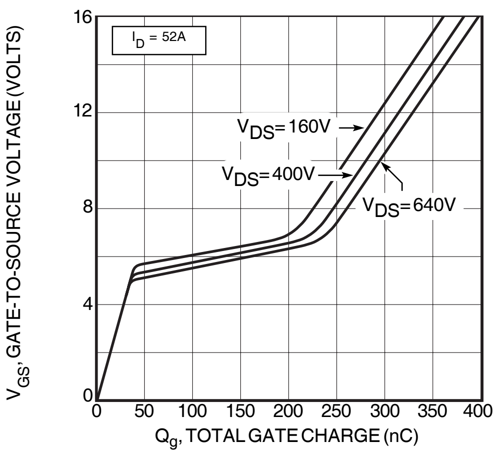

FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

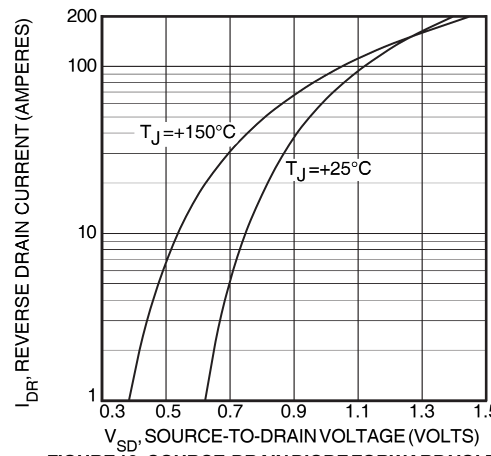

FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

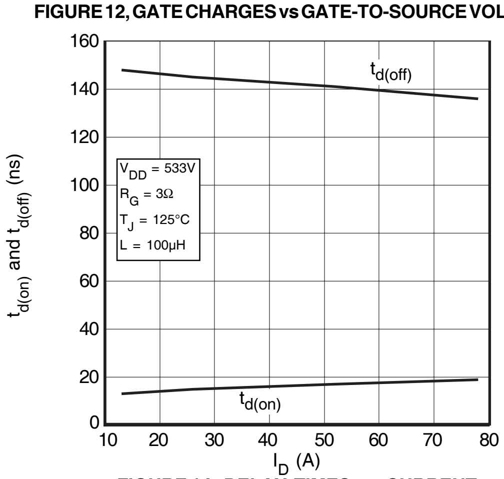

FIGURE 14, DELAY TIMES vs CURRENT

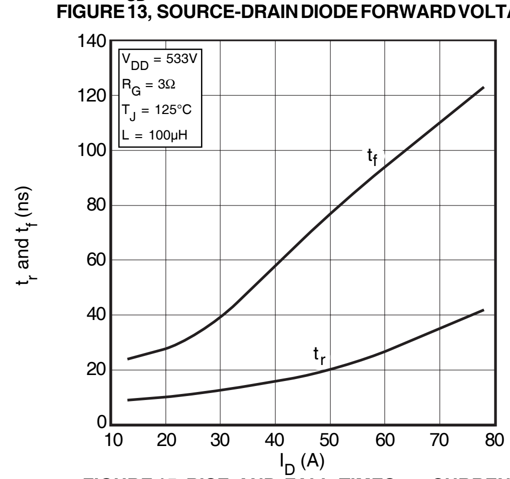

FIGURE 15, RISE AND FALL TIMES vs CURRENT

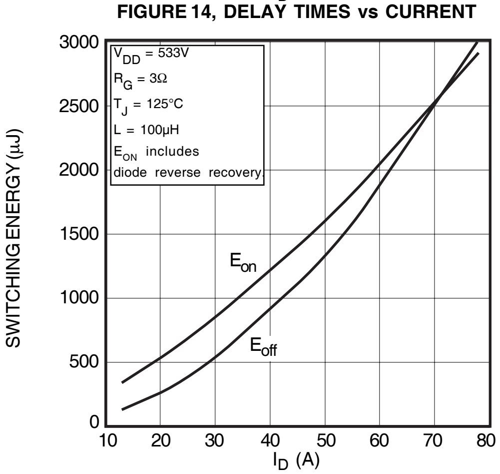

FIGURE 16, SWITCHING ENERGY vs CURRENT

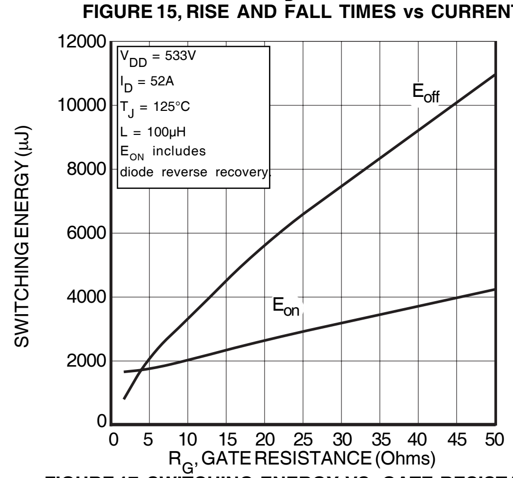

FIGURE 17, SWITCHING ENERGY VS. GATE RESISTANCE

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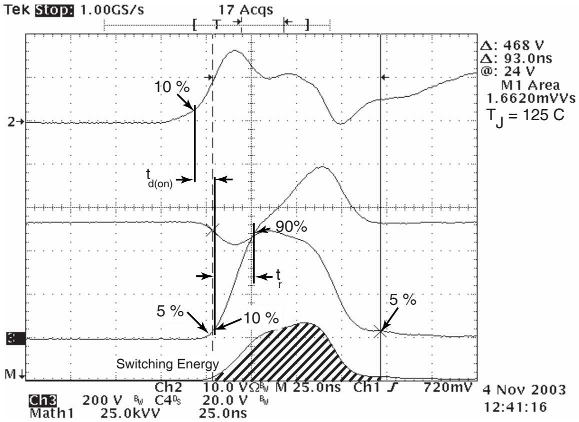


Figure 18, Turn-on Switching Waveforms and Definitions

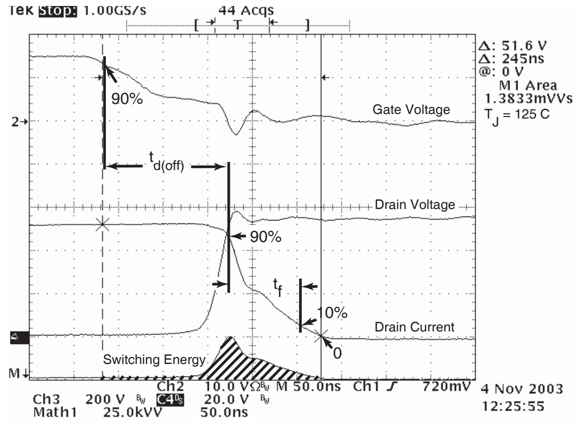


Figure 19, Turn-off Switching Waveforms and Definitions

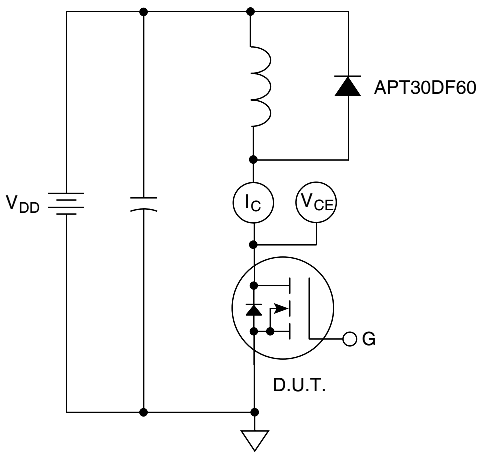
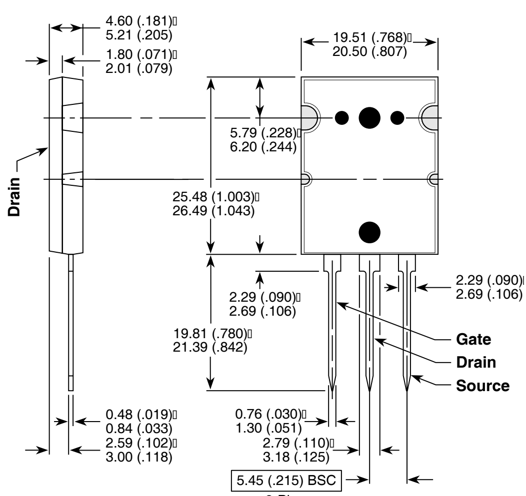


Figure 20, Inductive Switching Test Circuit

TO-264 MAX^{TM}(L2) Package Outline

(e1) SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)

Microsemi's products are covered by one or more of U.S.patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. US and Foreign patents pending. All Rights Reserved.

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