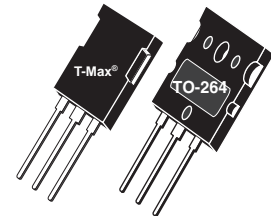


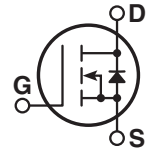


Super Junction MOSFET

APT97N65B2C6



APT97N65LC6



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

Unless stated otherwise, Microsemi discrete MOSFETs contain a single MOSFET die. This device is made with two parallel MOSFET die. It is intended for switch-mode operation. It is not suitable for linear mode operation.


MAXIMUM RATINGS

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

Symbol	Parameter	APT97N65B2_LC6	UNIT
V_{DSS}	Drain-Source Voltage	650	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$ ¹ (assuming $R_{ds(on)}$ max = 0.041Ω)	97	Amps
	Continuous Drain Current @ $T_C = 100^\circ\text{C}$	62	
I_{DM}	Pulsed Drain Current ²	291	
V_{GS}	Gate-Source Voltage Continuous	±20	Volts
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	862	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	
I_{AR}	Avalanche Current ²	13.4	Amps
E_{AR}	Repetitive Avalanche Energy ³ ($I_d = 13.4\text{A}$, $V_{dd} = 50\text{V}$)	2.96	
E_{AS}	Single Pulse Avalanche Energy ($I_d = 13.4\text{A}$, $V_{dd} = 50\text{V}$)	1954	mJ

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{(DSS)}$	Drain-Source Breakdown Voltage ($V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$)	650			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ⁴ ($V_{GS} = 10\text{V}$, $I_D = 48.5\text{A}$)		0.037	0.041	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$)			25	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$, $T_C = 150^\circ\text{C}$)			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 ($V_{DS} = V_{GS}$, $I_D = 2.96\text{mA}$)	2.5	3	3.5	Volts

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

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

DYNAMIC CHARACTERISTICS

APT97N65B2_LC6

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		7650		pF
C_{oss}	Output Capacitance			5045		
C_{rss}	Reverse Transfer Capacitance			550		
Q_g	Total Gate Charge ^⑤	$V_{GS} = 10V$ $V_{DD} = 325V$ $I_D = 97A @ 25^\circ C$		300		nC
Q_{gs}	Gate-Source Charge			50		
Q_{gd}	Gate-Drain ("Miller") Charge			160		
$t_{d(on)}$	Turn-on Delay Time	INDUCTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 433V$ $I_D = 97A @ 25^\circ C$ $R_G = 2.2\Omega$		25		ns
t_r	Rise Time			60		
$t_{d(off)}$	Turn-off Delay Time			275		
t_f	Fall Time			130		
E_{on}	Turn-on Switching Energy ^⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 433V, V_{GS} = 15V$ $I_D = 97A, R_G = 2.2\Omega$		2860		μJ
E_{off}	Turn-off Switching Energy			3500		
E_{on}	Turn-on Switching Energy ^⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 433V, V_{GS} = 15V$ $I_D = 97A, R_G = 2.2\Omega$		4030		
E_{off}	Turn-off Switching Energy			3695		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			97	Amps
I_{SM}	Pulsed Source Current ^② (Body Diode)			291	
V_{SD}	Diode Forward Voltage ^④ ($V_{GS} = 0V, I_S = -48.5A$)		0.9	1.2	Volts
dv/dt	Peak Diode Recovery dv/dt ^⑦			50	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -97A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		790	ns
Q_{rr}	Reverse Recovery Charge ($I_S = -97A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		19	μC
I_{RRM}	Peak Recovery Current ($I_S = -97A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		43	Amps

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.145	°C/W
$R_{\theta JA}$	Junction to Ambient			40	

1 Continuous current limited by package lead temperature.

2 Repetitive Rating: Pulse width limited by maximum junction temperature

3 Repetitive avalanche causes additional power losses that can be calculated as

$P_{AV} = E_{AR} \cdot f$. Pulse width tp limited by Tj max.

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

5 See MIL-STD-750 Method 3471

6 Eon includes diode reverse recovery.

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

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

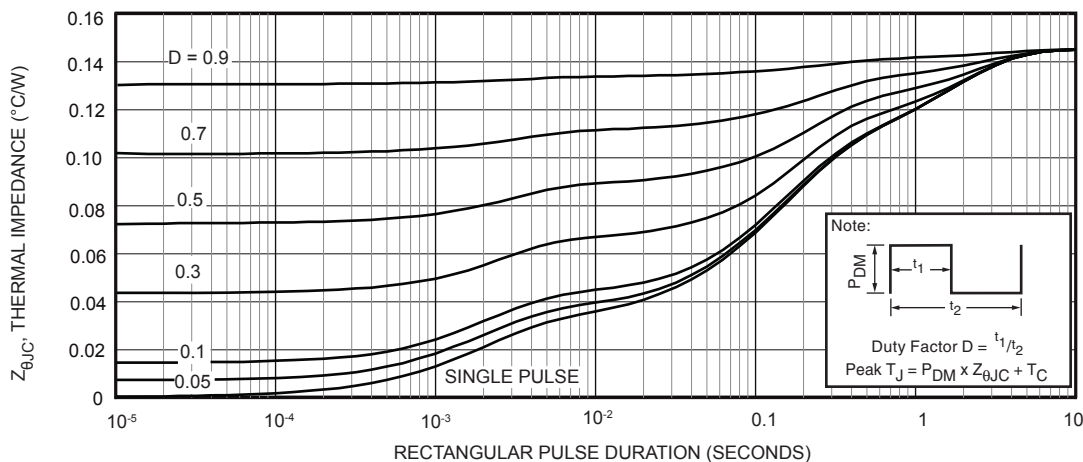


Figure 1, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

Typical Performance Curves

APT97N65B2_LC6

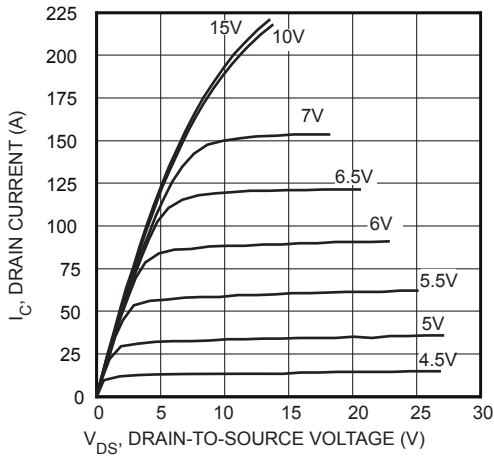


FIGURE 2, Low Voltage Output Characteristics

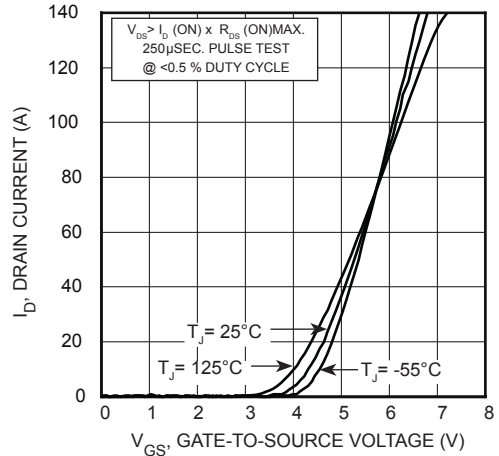


FIGURE 3, Transfer Characteristics

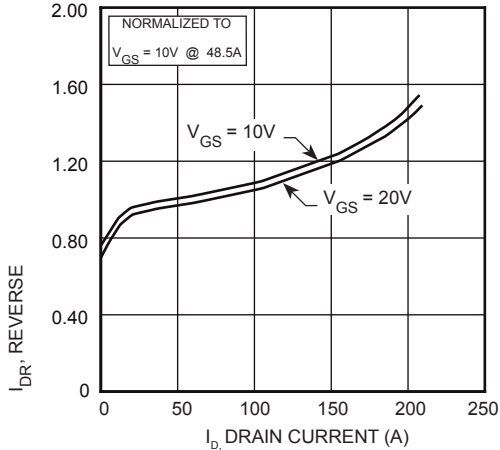


FIGURE 4, $R_{DS(ON)}$ vs Drain Current

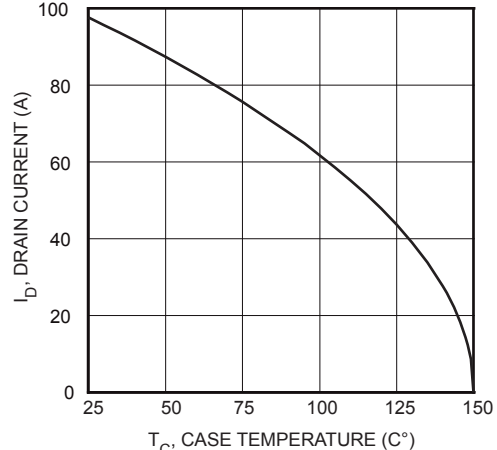


FIGURE 5, Maximum Drain Current vs Case Temperature

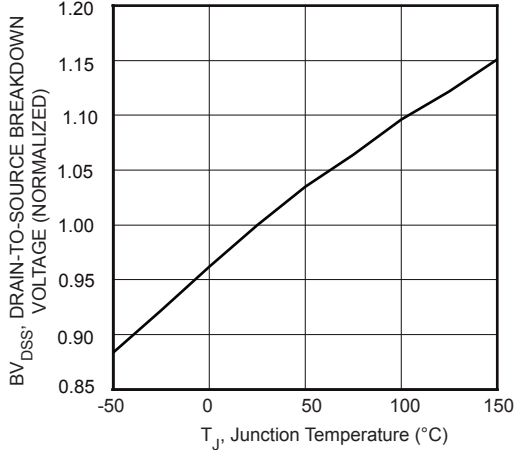


FIGURE 6, Breakdown Voltage vs Temperature

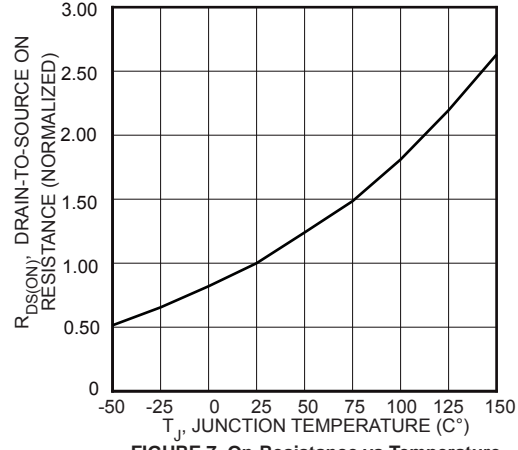


FIGURE 7, On-Resistance vs Temperature

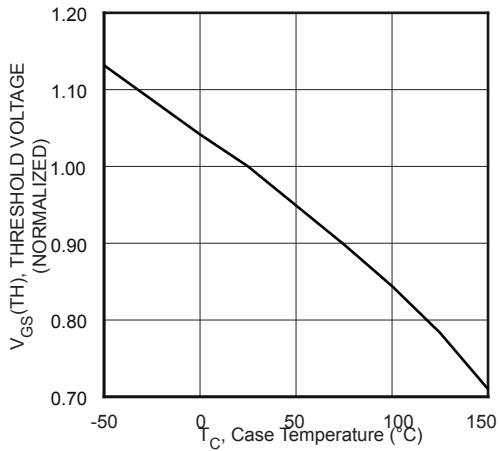


FIGURE 8, Threshold Voltage vs Temperature

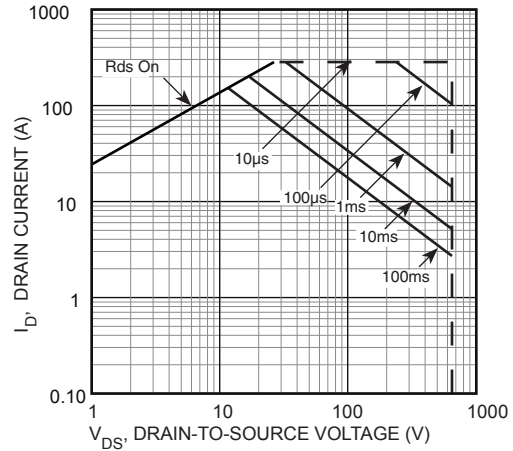


FIGURE 9, Maximum Safe Operating Area

Typical Performance Curves

APT97N65B2_LC6

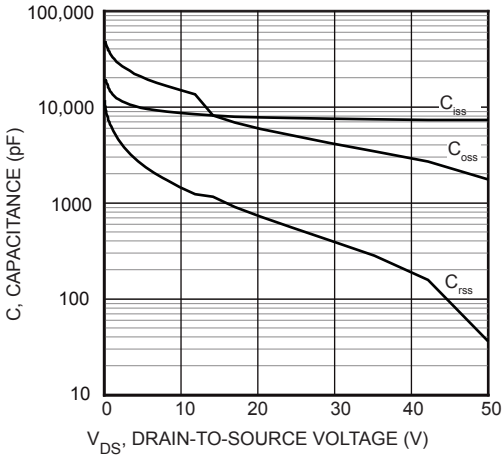


FIGURE 10, Capacitance vs Drain-To-Source Voltage

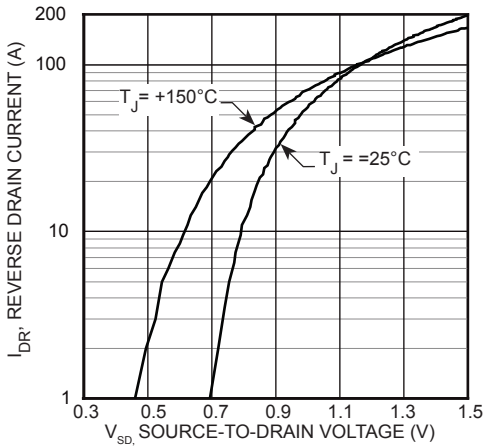


FIGURE 12, Source-Drain Diode Forward Voltage

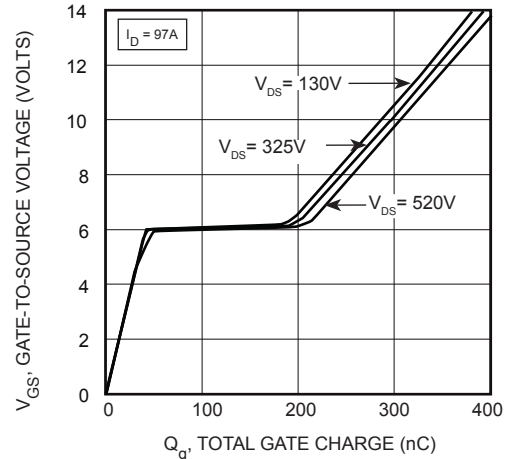


FIGURE 11, Gate Charges vs Gate-To-Source Voltage

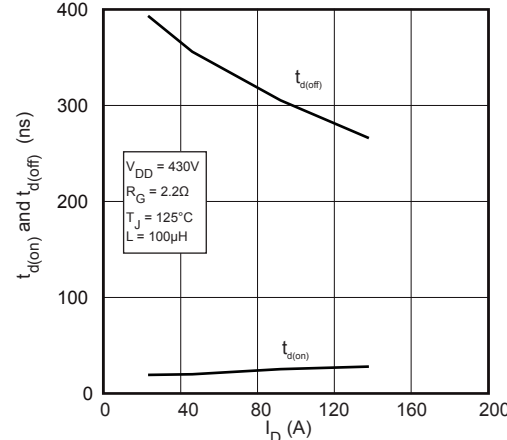


FIGURE 13, Delay Times vs Current

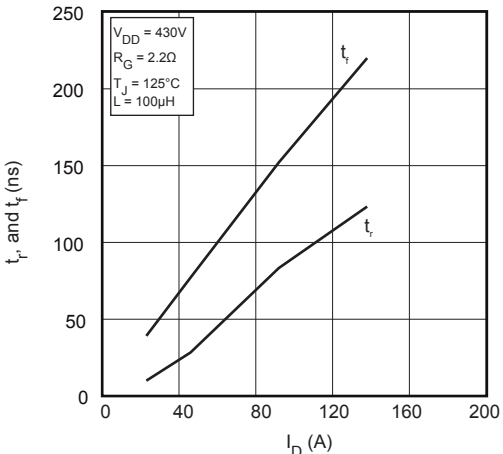


FIGURE 14, Rise and Fall Times vs Current

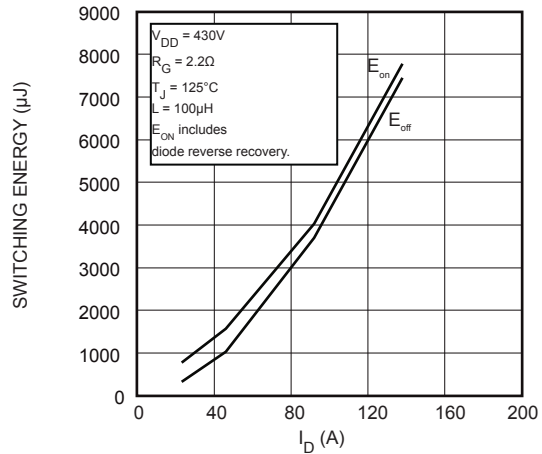


FIGURE 15, Switching Energy vs Current

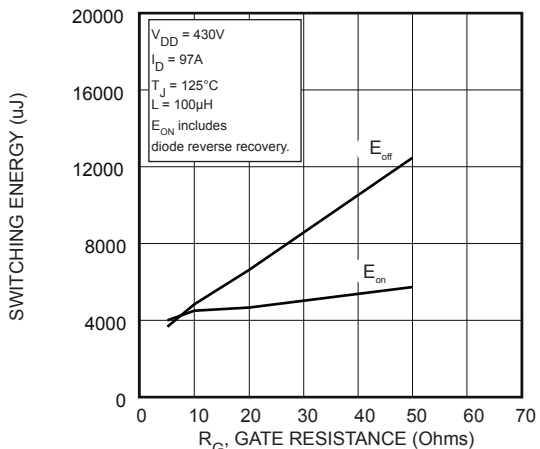


FIGURE 16, Switching Energy vs Gate Resistance

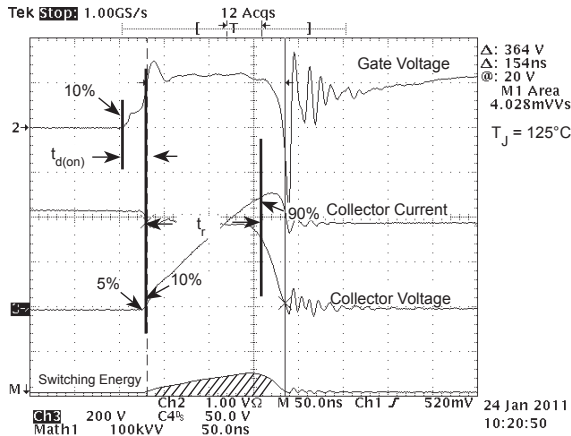


Figure 17, Turn-on Switching Waveforms and Definitions

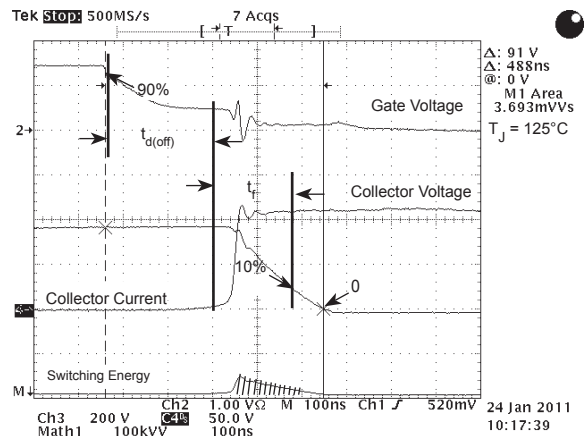


Figure 18, Turn-off Switching Waveforms and Definitions

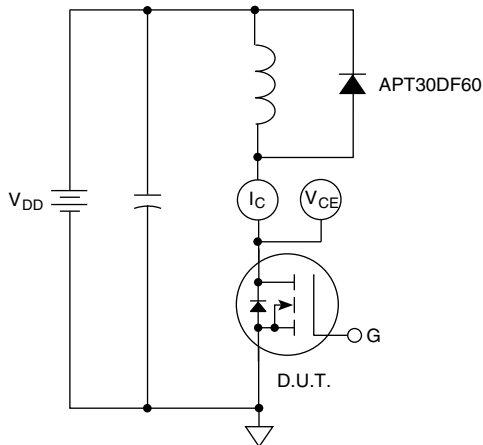


Figure 19, Inductive Switching Test Circuit

T-MAX® (B2) Package Outline

TO-264 (L) Package Outline

e3 100% Sn Plated

