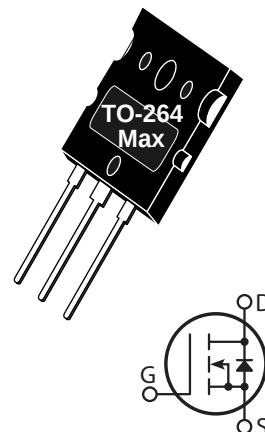


Super Junction MOSFET

- Ultra Low $R_{DS(on)}$
- Low Miller Capacitance
- Ultra Low Gate Charge, Q_g
- Avalanche Energy Rated
- Extreme dv/dt Rated
- Dual die (parallel)
- Popular T-MAX Package



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	APT94N60L2C3G	UNIT
V_{DSS}	Drain-Source Voltage	600	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	94	Amps
I_{DM}	Pulsed Drain Current ^①	282	
V_{GS}	Gate-Source Voltage Continuous	± 20	Volts
V_{GSM}	Gate-Source Voltage Transient	± 30	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	833	Watts
	Linear Derating Factor	6.67	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	
dv/dt	Drain-Source Voltage slope ($V_{DS} = 480\text{V}$, $I_D = 94\text{A}$, $T_J = 125^\circ\text{C}$)	50	V/ns
I_{AR}	Repetitive Avalanche Current ^③	20	Amps
E_{AR}	Repetitive Avalanche Energy ^③	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 ($V_{GS} = 0\text{V}$, $I_D = 500\mu\text{A}$)	600			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10\text{V}$, $I_D = 60\text{A}$)		0.03	0.035	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$)		1.0	50	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$, $T_C = 150^\circ\text{C}$)			500	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$)			± 200	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 5.4\text{mA}$)	2.10	3	3.9	Volts



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

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

DYNAMIC CHARACTERISTICS

APT94N60L2C3G

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		13600		pF
C_{oss}	Output Capacitance			4400		
C_{rss}	Reverse Transfer Capacitance			290		
Q_g	Total Gate Charge ⁽⁵⁾	$V_{GS} = 10V$ $V_{DD} = 300V$ $I_D = 94A @ 25^\circ C$		505	640	nC
Q_{gs}	Gate-Source Charge			48		
Q_{gd}	Gate-Drain ("Miller") Charge			240		
$t_{d(on)}$	Turn-on Delay Time	INDUCTIVE SWITCHING $V_{GS} = 13V$ $V_{DD} = 380V$ $I_D = 94A @ 125^\circ C$ $R_G = 0.9\Omega$		18		ns
t_r	Rise Time			27		
$t_{d(off)}$	Turn-off Delay Time			110	165	
t_f	Fall Time			8	12	
E_{on}	Turn-on Switching Energy ⁽⁶⁾	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 94A, R_G = 5\Omega$		2040		μJ
E_{off}	Turn-off Switching Energy			3515		
E_{on}	Turn-on Switching Energy ⁽⁶⁾	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 94A, R_G = 5\Omega$		2920		
E_{off}	Turn-off Switching Energy			3970		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			94	Amps
I_{SM}	Pulsed Source Current ⁽²⁾ (Body Diode)			282	
V_{SD}	Diode Forward Voltage ⁽⁴⁾ ($V_{GS} = 0V, I_S = -94A$)		1	1.2	Volts
dv/dt	Peak Diode Recovery dv/dt ⁽⁷⁾			6	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -94A, di/dt = 100A/\mu s$)		861		ns
Q_{rr}	Reverse Recovery Charge ($I_S = -94A, di/dt = 100A/\mu s$)		46		μC

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.15	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			62	

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.

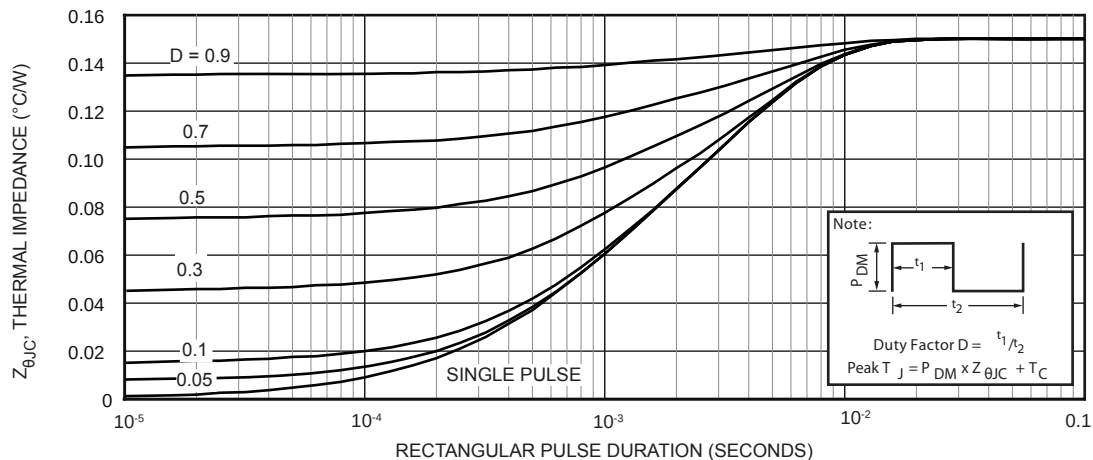
④ Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%

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.



Typical Performance Curves

APT94N60L2C3G

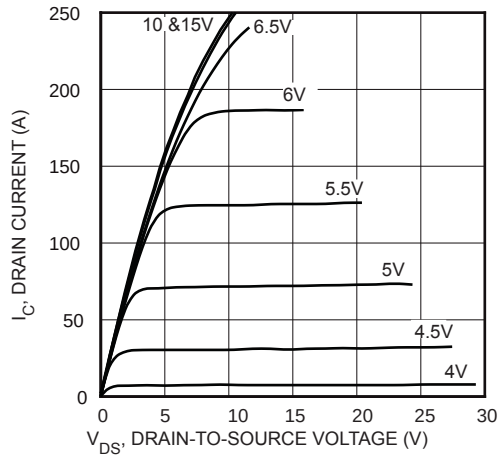


FIGURE 2, Low Voltage Output Characteristics

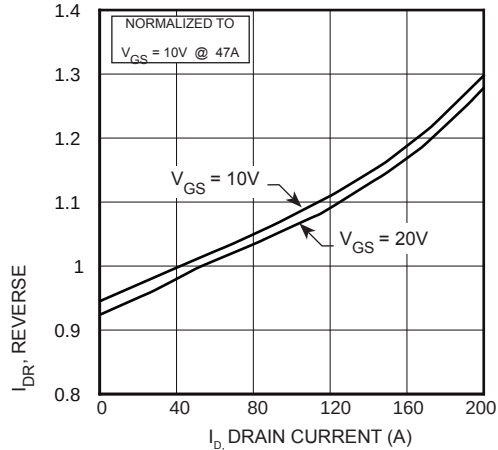


FIGURE 4, $R_{DS(ON)}$ vs Drain Current

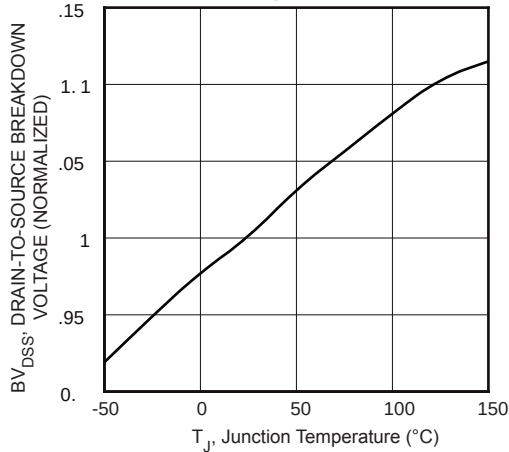


FIGURE 6, Breakdown Voltage vs Temperature

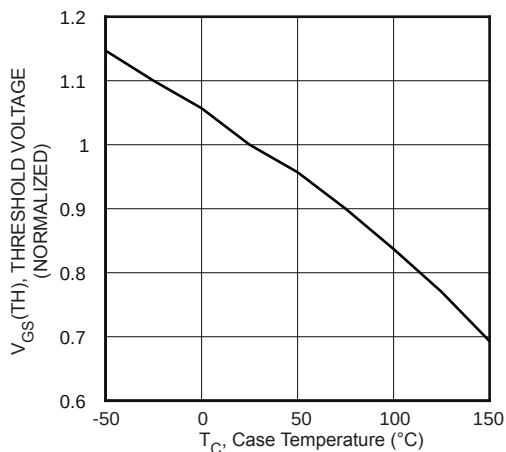


FIGURE 8, Threshold Voltage vs Temperature

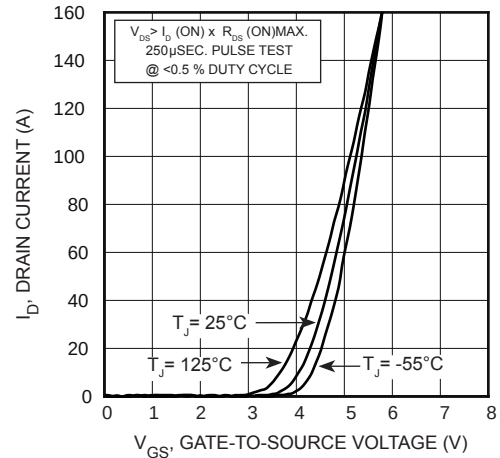


FIGURE 3, Transfer Characteristics

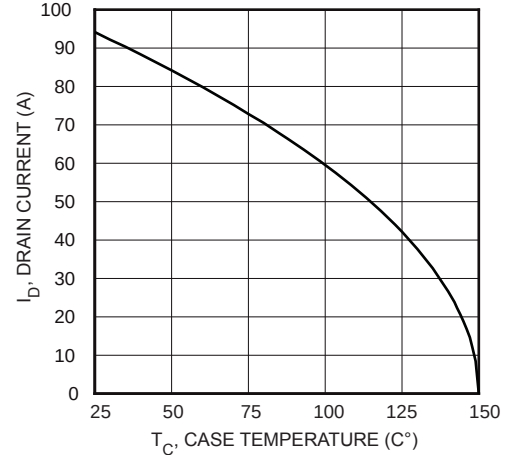


FIGURE 5, Maximum Drain Current vs Case Temperature

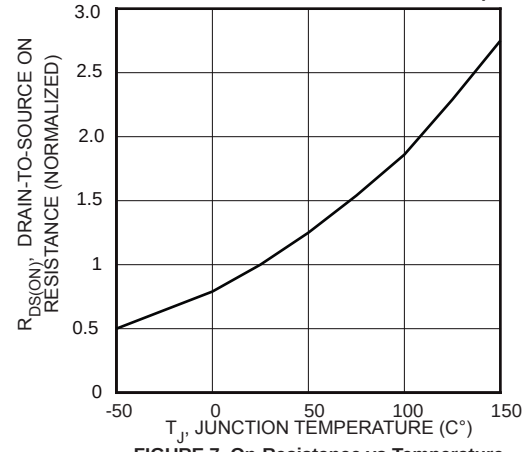


FIGURE 7, On-Resistance vs Temperature

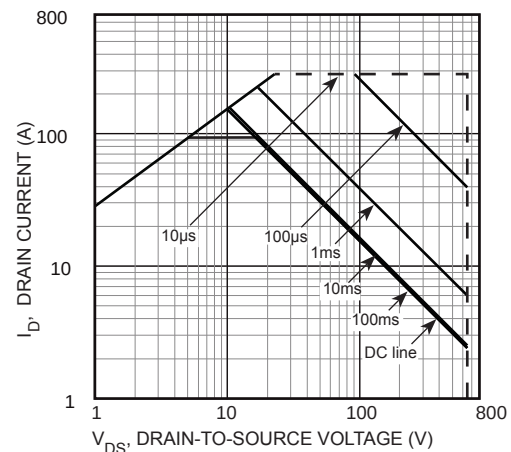


FIGURE 9, Maximum Safe Operating Area

Typical Performance Curves

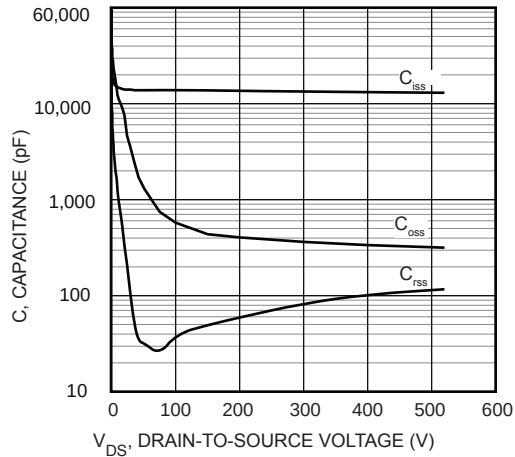


FIGURE 10, Capacitance vs Drain-To-Source Voltage

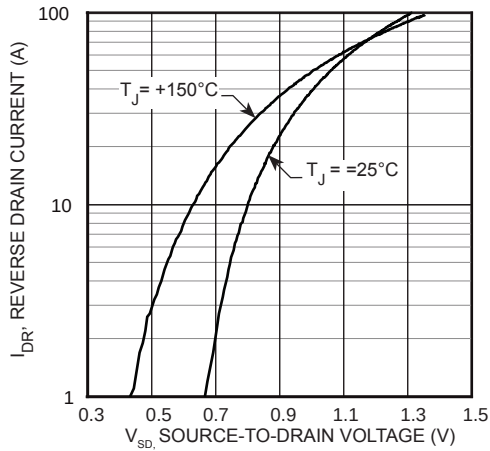


FIGURE 12, Source-Drain Diode Forward Voltage

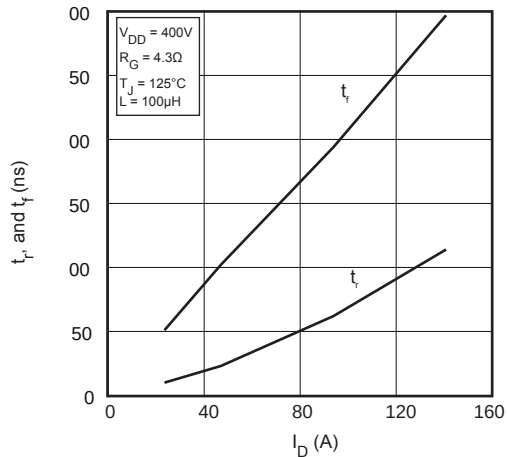


FIGURE 14, Rise and Fall Times vs Current

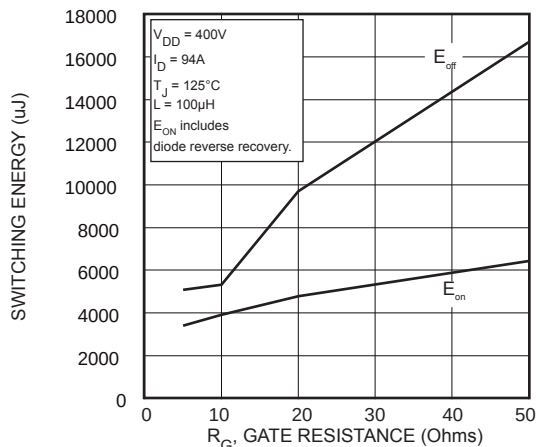


FIGURE 16, Switching Energy vs Gate Resistance

APT94N60L2C3G

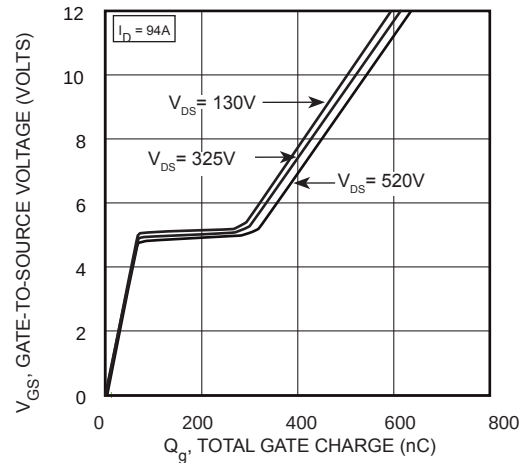


FIGURE 11, Gate Charges vs Gate-To-Source Voltage

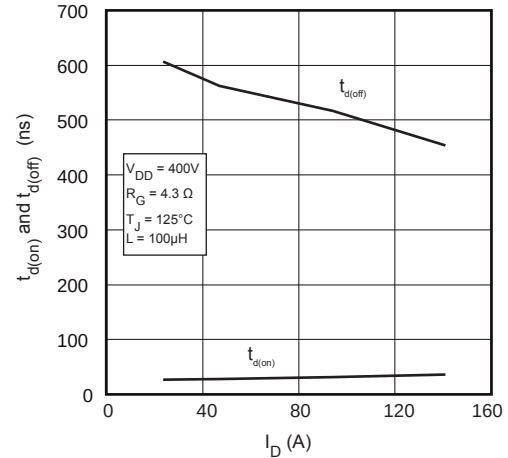


FIGURE 13, Delay Times vs Current

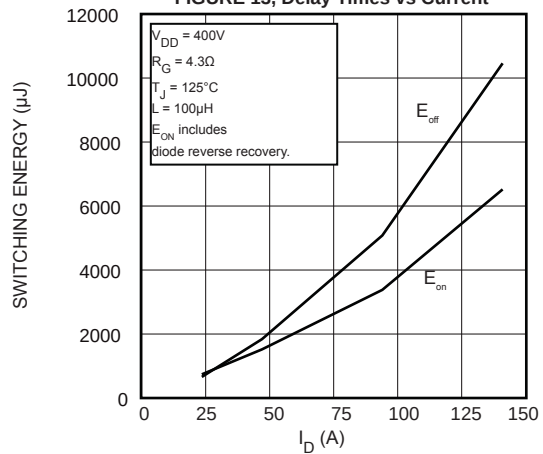


FIGURE 15, Switching Energy vs Current

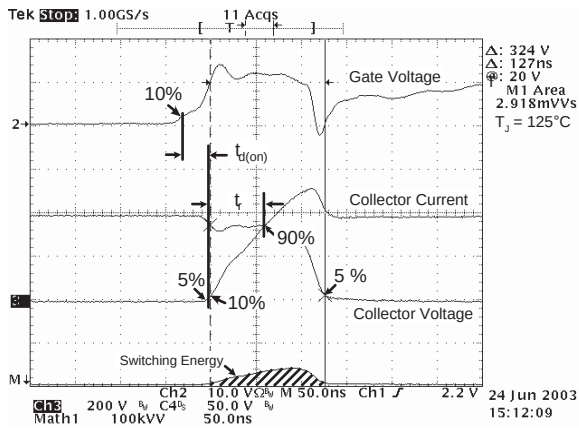


Figure 17, Turn-on Switching Waveforms and Definitions

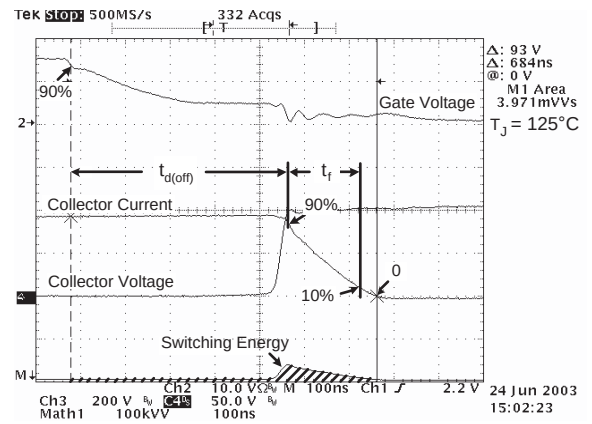


Figure 18, Turn-off Switching Waveforms and Definitions

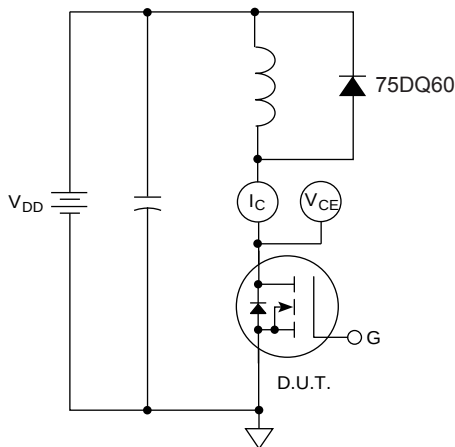


Figure 19, Inductive Switching Test Circuit

TO-264 MAX™(L2) Package Outline

