Microsemi
POWER PRODUCTS GROUP

900V   36A
APT36N90BC3G*
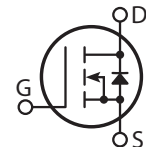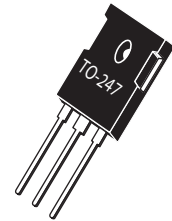
*G Denotes RoHS Compliant, Pb Free Terminal Finish.

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**

TO-247

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°C unless otherwise specified.

Symbol	Parameter	APT36N90BC3G	UNIT
V_{DSS}	Drain-Source Voltage	900	Volts
I_D	Continuous Drain Current @ T_C = 25°C	36	Amps
	Continuous Drain Current @ T_C = 100°C	23	
I_{DM}	Pulsed Drain Current [1]	96	
V_{GS}	Gate-Source Voltage Continuous	±20	Volts
P_D	Total Power Dissipation @ T_C = 25°C	390	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	
dv/dt	Drain-Source Voltage slope (V_{DS} = 400V, I_D = 36A, T_J = 125°C)	50	V/ns
I_{AR}	Avalanche Current [2]	8.8	Amps
E_{AR}	Repetitive Avalanche Energy [2] (Id = 8.8A, Vdd = 50V)	2.9	mJ
E_{AS}	Single Pulse Avalanche Energy (Id = 8.8A, Vdd = 50V)	1940	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{(DSS)}$	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250µA)	900			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance [3] (V_{GS} = 10V, I_D = 18A)		0.10	0.12	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 900V, V_{GS} = 0V)	-	-	100	µA
	Zero Gate Voltage Drain Current (V_{DS} = 900V, V_{GS} = 0V, T_C = 150°C)	-	50	-	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±20V, V_{DS} = 0V)	-	-	100	nA
$V_{GS(th)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 2.9mA)	2.5	3	3.5	Volts

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

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Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V		7463		
C_{oss}	Output Capacitance	V_{DS} = 25V		6827		pF
C_{rss}	Reverse Transfer Capacitance	f = 1 MHz		167		
Q_g	Total Gate Charge [4]	V_{GS} = 10V		252		
Q_{gs}	Gate-Source Charge	V_{DD} = 450V		38		nC
Q_{gd}	Gate-Drain ("Miller") Charge	I_D = 36A @ 25°C		112		
$t_{d(on)}$	Turn-on Delay Time	**INDUCTIVE SWITCHING**		70		
t_r	Rise Time	V_{GS} = 15V		20		
$t_{d(off)}$	Turn-off Delay Time	V_{DD} = 600V		400		ns
t_f	Fall Time	I_D = 36A @ 25°C R_G = 4.3Ω		25		
E_{on}	Turn-on Switching Energy [5]	**INDUCTIVE SWITCHING @ 25°C** V_{DD} = 600V, V_{GS} = 15V		1500		
E_{off}	Turn-off Switching Energy	I_D = 36A, R_G = 4.3Ω		750		μJ
E_{on}	Turn-on Switching Energy [5]	**INDUCTIVE SWITCHING @ 125°C** V_{DD} = 600V, V_{GS} = 15V		2130		
E_{off}	Turn-off Switching Energy	I_D = 36A, R_G = 4.3Ω		867		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			36		Amps
I_{SM}	Pulsed Source Current [1] (Body Diode)			96		
V_{SD}	Diode Forward Voltage [3] (V_{GS} = 0V, I_S = 18A)			0.8	1.2	Volts
dv/dt	Peak Diode Recovery dv/dt [6]				10	V/ns
t_{rr}	Reverse Recovery Time (I_S = -36A, di/dt = 100A/μs)	T_j = 25°C		930		ns
		T_j = 125°C		1230		
Q_{rr}	Reverse Recovery Charge (I_S = -36A, di/dt = 100A/μs)	T_j = 25°C		35		μC
		T_j = 125°C		44		
I_{RRM}	Peak Recovery Current (I_S = -36A, di/dt = 100A/μs)	T_j = 25°C		70		Amps
		T_j = 125°C		68		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{θJC}$	Junction to Case			0.3	°C/W
$R_{θJA}$	Junction to Ambient			31	

1 Repetitive Rating: Pulse width limited by maximum junction temperature

2 Repetitive avalanche causes additional power losses that can be calculated as $P_{AV} = E_{AR}*f$. Pulse width tp limited by Tj max.

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

4 See MIL-STD-750 Method 3471

5 Eon includes diode reverse recovery.

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

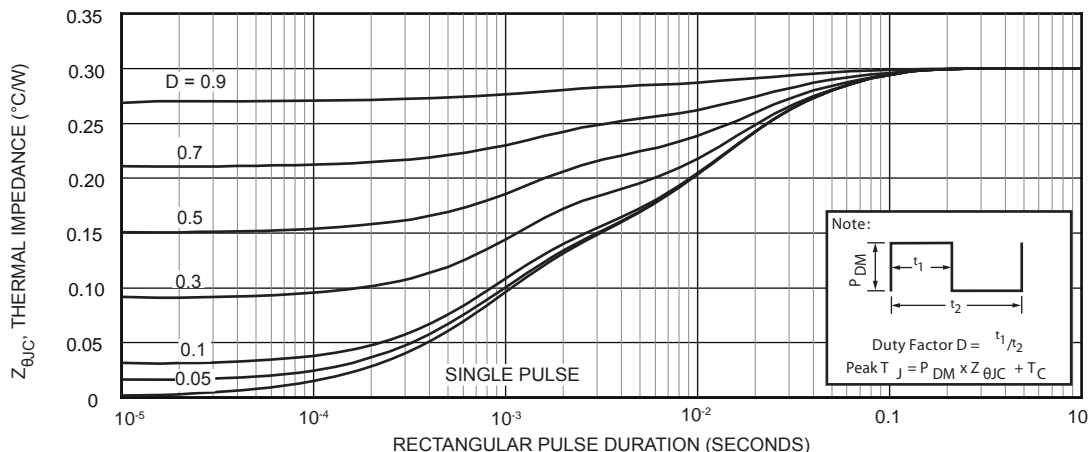**Microsemi reserves the right to change, without notice, the specifications and information contained herein.**

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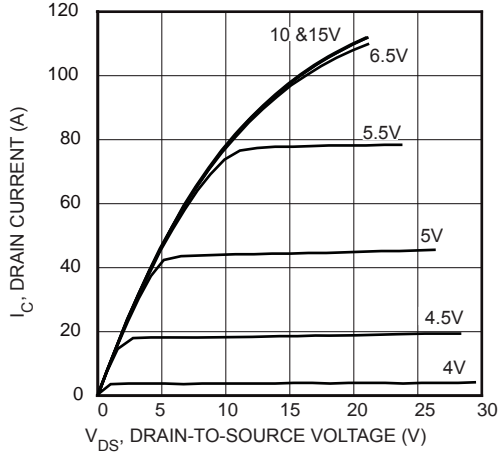
Typical Performance Curves

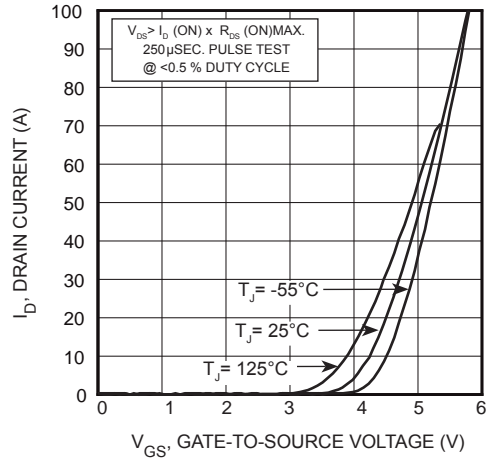FIGURE 2, Low Voltage Output Characteristics

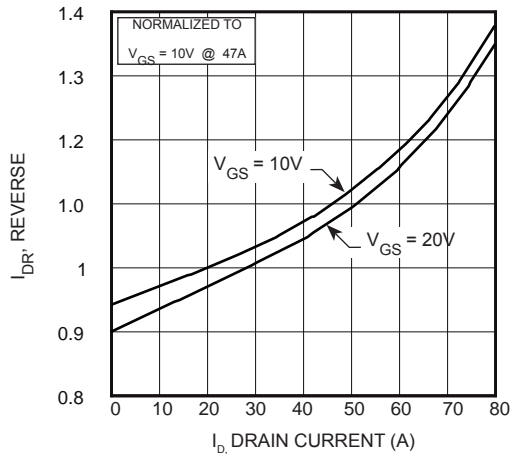FIGURE 3, Transfer Characteristics
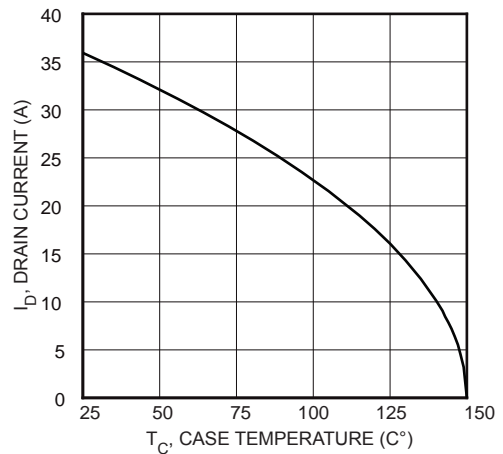

FIGURE 4, R$_{DS}$(ON) vs Drain Current

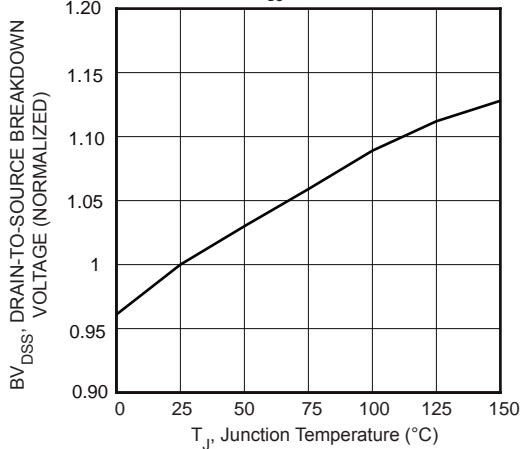FIGURE 5, Maximum Drain Current vs Case Temperature
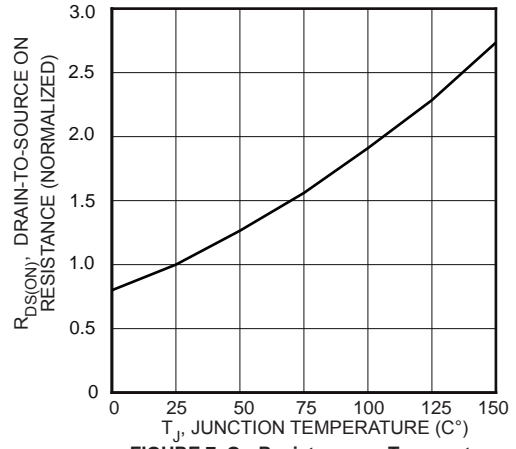

FIGURE 6, Breakdown Voltage vs Temperature
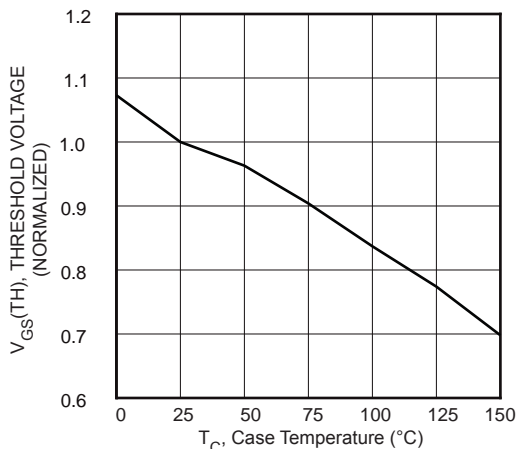

FIGURE 7, On-Resistance vs Temperature

FIGURE 8, Threshold Voltage vs Temperature

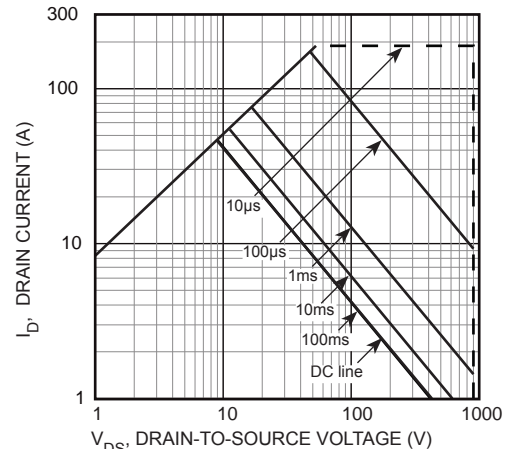FIGURE 9, Maximum Safe Operating Area

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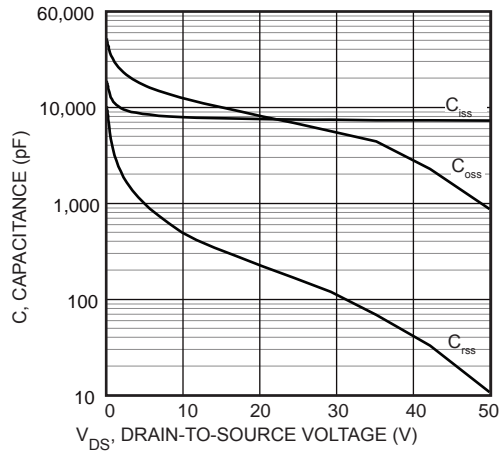
FIGURE 10, Capacitance vs Drain-To-Source Voltage
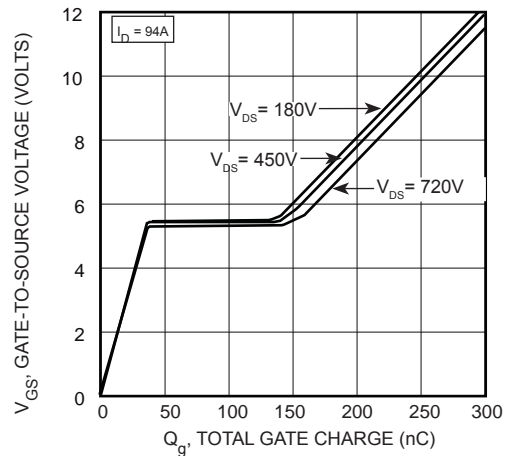
FIGURE 11, Gate Charges vs Gate-To-Source Voltage
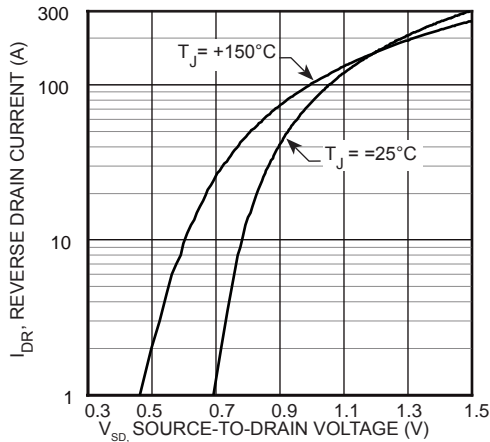
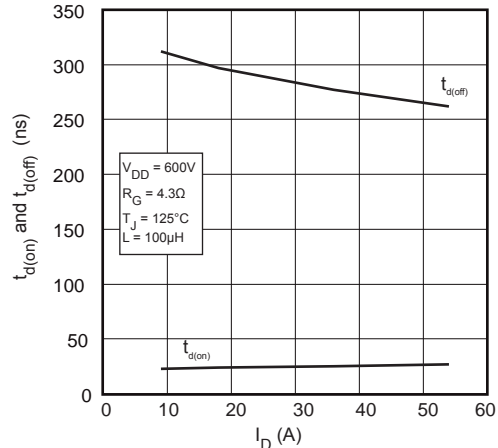FIGURE 12, Source-Drain Diode Forward Voltage
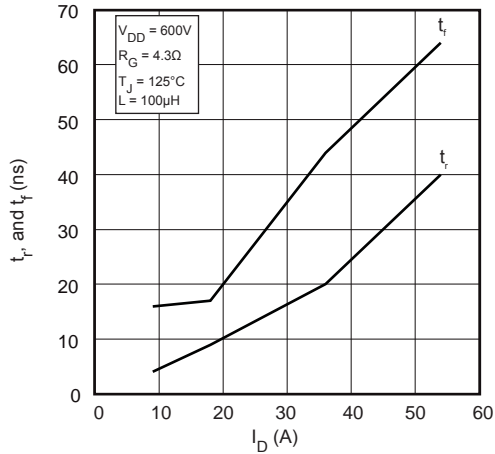

FIGURE 13, Delay Times vs Current

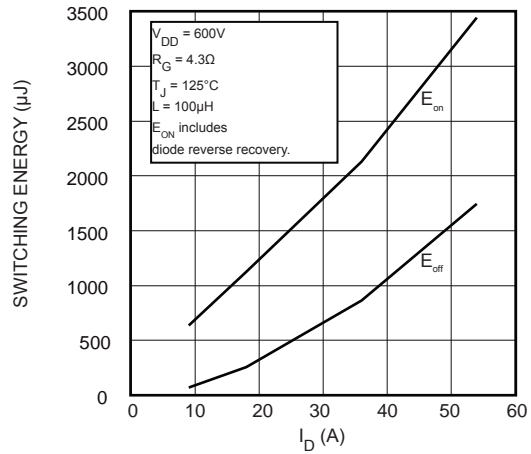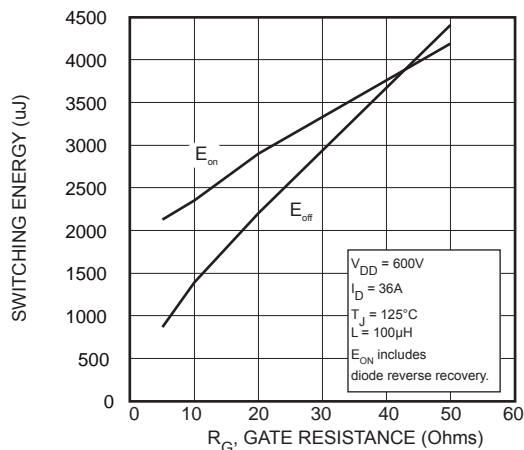FIGURE 14, Rise and Fall Times vs Current

FIGURE 15, Switching Energy vs Current

FIGURE 16, Switching Energy vs Gate Resistance