![Microsemi Power Products Group logo] ![Power MOS 8 Cooler! logo]
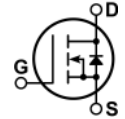
N-Channel MOSFET

Power MOS 8 ™ is a high speed, high voltage N-channel switch-mode power MOSFET. A proprietary planar strip design yields excellent reliability and manufacturability. Low switching loss is achieved with low input capacitance and ultra low C_{rss} "Miller" capacitance. The intrinsic gate resistance and capacitance of the poly-silicon gate structure help control slew rates during switching, resulting in low EMI and reliable paralleling, even when switching at very high frequency. Reliability in flyback, boost, forward, and other circuits is enhanced by the high avalanche energy capability.

IS OTO P ®

"UL Recognized" file # E145592

APT32M80J

Single die MOSFET

FEATURES

- **Fast switching with low EMI/RFI**
- **Low $R_{DS(on)}$**
- **Ultra low C_{rss} for improved noise immunity**
- **Low gate charge**
- **Avalanche energy rated**
- **RoHS compliant**

TYPICAL APPLICATIONS

- **PFC and other boost converter**
- **Buck converter**
- **Two switch forward (asymmetrical bridge)**
- **Single switch forward**
- **Flyback**
- **Inverters**

Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
I_D	Continuous Drain Current @ T_C = 25°C	33	A
	Continuous Drain Current @ T_C = 100°C	20	
I_{DM}	Pulsed Drain Current [①]	173	
V_{GS}	Gate-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy [②]	1979	mJ
I_{AR}	Avalanche Current, Repetitive or Non-Repetitive	24	A

Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
P_D	Total Power Dissipation @ T_C = 25°C			543	W
$R_{θJC}$	Junction to Case Thermal Resistance			0.23	°C/W
$R_{θCS}$	Case to Sink Thermal Resistance, Flat, Greased Surface		0.15		
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55		150	°C
$V_{Isolation}$	RMS Voltage (50-60hHz Sinusoidal Wavefomr from Terminals to Mounting Base for 1 Min.)	2500			V
W_T	Package Weight		1.03		oz
			29.2		g
Torque	Terminals and Mounting Screws.			10	in·lbf
				1.1	N·m

Static Characteristics $T_J = 25°C$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{BR(DSS)}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V$, $I_D = 250\mu A$	800			V
$\Delta V_{BR(DSS)}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, $I_D = 250\mu A$		1.41		V/°C
$R_{DS(on)}$	Drain-Source On Resistance③	$V_{GS} = 10V$, $I_D = 24A$		0.16	0.19	Ω
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 2.5mA$	3	4	5	V
$\Delta V_{GS(th)}/\Delta T_J$	Threshold Voltage Temperature Coefficient			-10		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 800V$ $T_J = 25°C$			100	μA
		$V_{GS} = 0V$ $T_J = 125°C$			500	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm30V$			±100	nA

Dynamic Characteristics $T_J = 25°C$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
g_{fs}	Forward Transconductance	$V_{DS} = 50V$, $I_D = 24A$		43		S
C_{iss}	Input Capacitance	$V_{GS} = 0V$, $V_{DS} = 25V$ f = 1MHz		9326		pF
C_{rss}	Reverse Transfer Capacitance			159		
C_{oss}	Output Capacitance			927		
$C_{o(cr)}$ ④	Effective Output Capacitance, Charge Related	$V_{GS} = 0V$, $V_{DS} = 0V$ to 533V		438		
$C_{o(er)}$ ⑤	Effective Output Capacitance, Energy Related			217		
Q_g	Total Gate Charge	$V_{GS} = 0$ to 10V, $I_D = 24A$, $V_{DS} = 400V$		303		nC
Q_{gs}	Gate-Source Charge			51		
Q_{gd}	Gate-Drain Charge			155		
$t_{d(on)}$	Turn-On Delay Time	**Resistive Switching** $V_{DD} = 533V$, $I_D = 24A$ $R_G = 2.2\Omega$⑥, $V_{GG} = 15V$		53		ns
t_r	Current Rise Time			76		
$t_{d(off)}$	Turn-Off Delay Time			231		
t_f	Current Fall Time			67		

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source Current (Body Diode)	MOSFET symbol showing the integral reverse p-n junction diode (body diode)			32	A
I_{SM}	Pulsed Source Current (Body Diode)①				173	
V_{SD}	Diode Forward Voltage	$I_{SD} = 24A$, $T_J = 25°C$, $V_{GS} = 0V$			1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 24A$, $V_{DD} = 100V$ ③		1000		ns
Q_{rr}	Reverse Recovery Charge	$di_{SD}/dt = 100A/\mu s$, $T_J = 25°C$		20		μC
dv/dt	Peak Recovery dv/dt	$I_{SD} \le 24A$, $di/dt \le 1000A/\mu s$, $V_{DD} = 100V$, $T_J = 125°C$			10	V/ns

① Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.

② Starting at $T_J = 25°C$, L = 6.9mH, $R_G = 25\Omega$, $I_{AS} = 24A$.

③ Pulse test: Pulse Width < 380μs, duty cycle < 2%.

④ $C_{o(cr)}$ is defined as a fixed capacitance with the same stored charge as C_{OSS} with $V_{DS} = 67\%$ of $V_{(BR)DSS}$.

⑤ $C_{o(er)}$ is defined as a fixed capacitance with the same stored energy as C_{OSS} with $V_{DS} = 67\%$ of $V_{(BR)DSS}$. To calculate $C_{o(er)}$ for any value of V_{DS} less than $V_{(BR)DSS}$, use this equation: $C_{o(er)} = -8.27E\text{-}7/V_{DS}^2 + 1.01E\text{-}7/V_{DS} + 1.43E\text{-}10$.

⑥ R_G is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)

Microsemi reserves the right to change, without notice, the specifications and information contained herein.
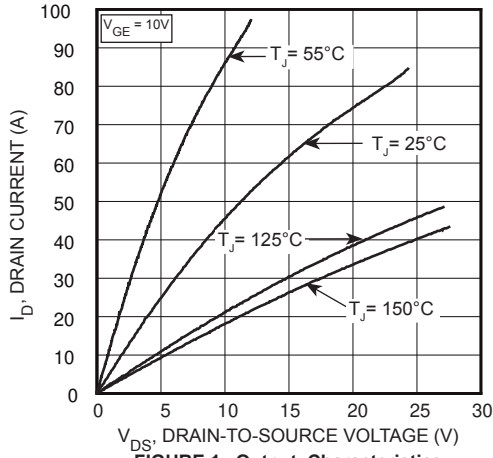
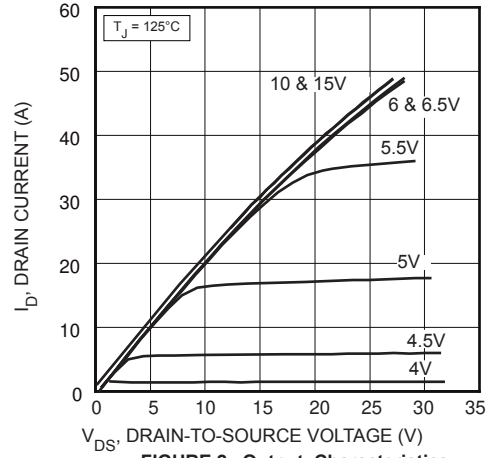**FIGURE 1, Output Characteristics**
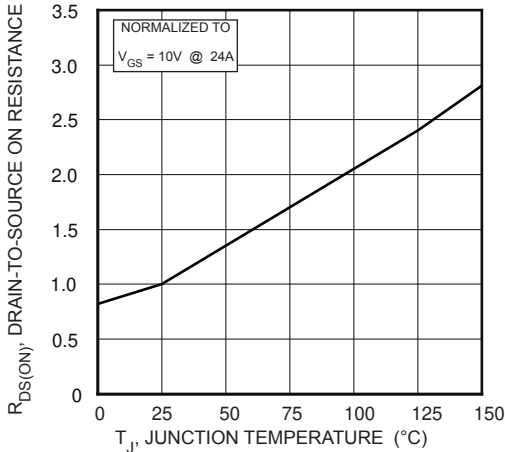

FIGURE 2, Output Characteristics

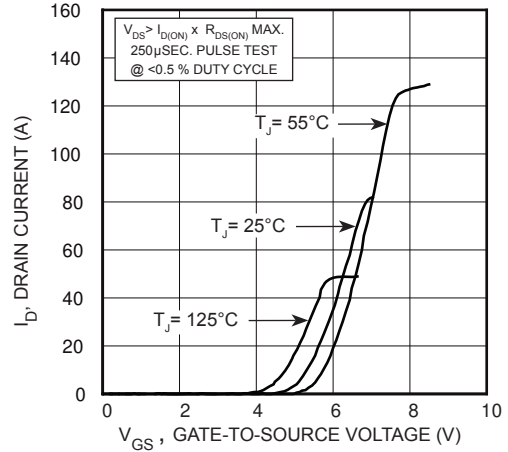**FIGURE 3, R$_{DS(ON)}$ vs Junction Temperature**
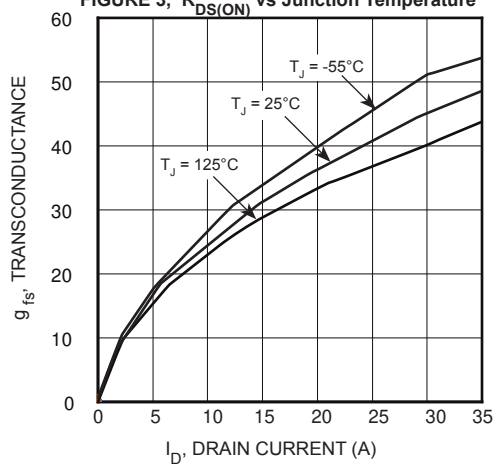

FIGURE 4, Transfer Characteristics

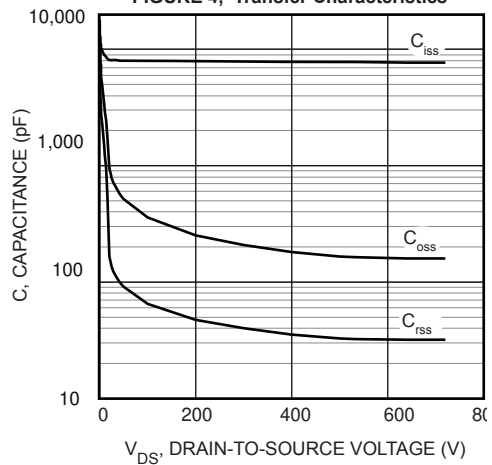**FIGURE 5, Gain vs Drain Current**
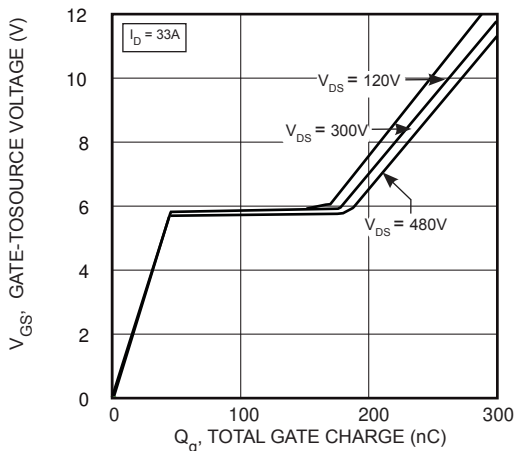

FIGURE 6, CAPACITANCE VS DRAIN-TO-SOURCE VOLTAGE
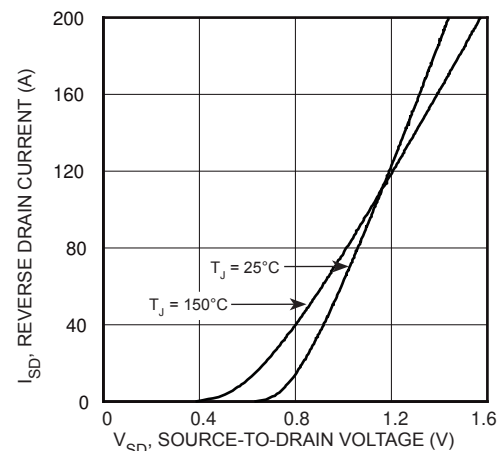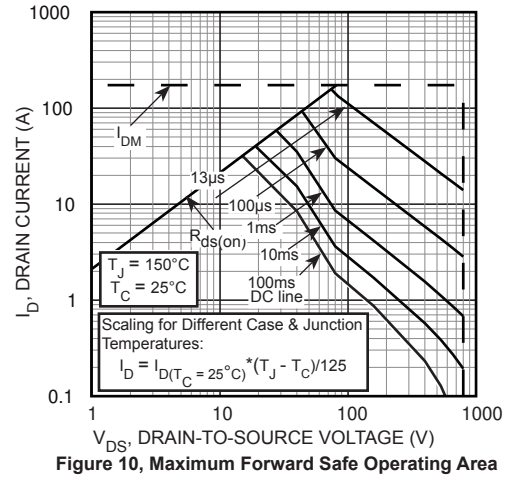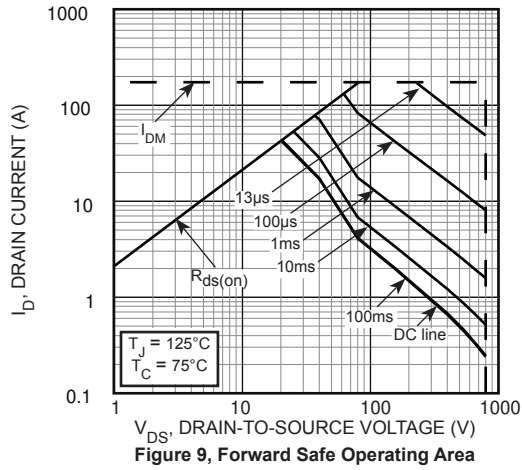

FIGURE 7, Gate Charge vs Gate-to-Source Voltage

FIGURE 8, Reverse Drain Current vs Source-to-Drain Voltage

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Figure 9, Forward Safe Operating Area

Figure 10, Maximum Forward Safe Operating Area

$$I_D = I_{D(T_C = 25°C)} * (T_J - T_C)/125$$

t_1 = Pulse Duration

Duty Factor D = t_1/t_2

Peak T$_J$ = P$_{DM}$ x Z$_{\theta JC}$ + T$_C$

Figure 11. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

SOT-227 (ISOTOP®) Package Outline

* Emitter terminals are shorted internally. Current handling capability is equal for either Source terminal.

Dimensions in Millimeters (Inches)