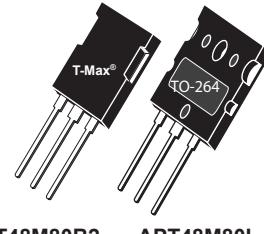


## N-Channel MOSFET

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.



APT48M80B2      APT48M80L



### 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 @ $T_c = 25^\circ\text{C}$	49	A
	Continuous Drain Current @ $T_c = 100^\circ\text{C}$	30	
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	173	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy <sup>②</sup>	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 @ $T_c = 25^\circ\text{C}$	-	-	1135	W
$R_{θJC}$	Junction to Case Thermal Resistance	-	-	0.11	$^\circ\text{C}/\text{W}$
$R_{θCS}$	Case to Sink Thermal Resistance, Flat, Greased Surface	-	0.11	-	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55	-	150	$^\circ\text{C}$
$T_L$	Soldering Temperature for 10 Seconds (1.6mm from case)	-	-	300	
$W_T$	Package Weight	-	0.22	-	oz
		-	6.2	-	g
Torque	Mounting Torque (TO-264 Package), 4-40 or M3 screw	-	-	10	in·lbf
		-	-	1.1	N·m

## Static Characteristics

$T_J = 25^\circ\text{C}$  unless otherwise specified

APT48M80B2\_L

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{BR(DSS)}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu\text{A}$	800			V
$\Delta V_{BR(DSS)}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D = 250\mu\text{A}$		0.87		$^\circ\text{C}$
$R_{DS(on)}$	Drain-Source On Resistance <sup>③</sup>	$V_{GS} = 10V, I_D = 24\text{A}$		0.17	0.19	$\Omega$
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	3	4	5	V
$\Delta V_{GS(th)}/\Delta T_J$	Threshold Voltage Temperature Coefficient			-10		$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 800V, T_J = 25^\circ\text{C}$			100	$\mu\text{A}$
		$V_{GS} = 0V, T_J = 125^\circ\text{C}$			500	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS} = \pm 30V$			$\pm 100$	nA

## Dynamic Characteristics

$T_J = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$g_{fs}$	Forward Transconductance	$V_{DS} = 50V, I_D = 24\text{A}$		43		S
$C_{iss}$	Input Capacitance			9330		$\text{pF}$
$C_{rss}$	Reverse Transfer Capacitance	$V_{GS} = 0V, V_{DS} = 25V$ $f = 1\text{MHz}$		160		
$C_{oss}$	Output Capacitance			930		
$C_{o(cr)}^{\text{(4)}}$	Effective Output Capacitance, Charge Related			440		
$C_{o(er)}^{\text{(5)}}$	Effective Output Capacitance, Energy Related	$V_{GS} = 0V, V_{DS} = 0V$ to 533V		220		$\text{nC}$
$Q_g$	Total Gate Charge			305		
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 0$ to $10V, I_D = 24\text{A}$ , $V_{DS} = 400V$		51		
$Q_{gd}$	Gate-Drain Charge			155		
$t_{d(on)}$	Turn-On Delay Time			55		$\text{ns}$
$t_r$	Current Rise Time			75		
$t_{d(off)}$	Turn-Off Delay Time	$V_{DD} = 400V, I_D = 24\text{A}$ $R_G = 2.2\Omega^{\text{(6)}}$ , $V_{GG} = 15V$		230		
$t_f$	Current Fall Time			70		

## 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)			49	A
$I_{SM}$	Pulsed Source Current (Body Diode) <sup>①</sup>				173	
$V_{SD}$	Diode Forward Voltage	$I_{SD} = 24\text{A}, T_J = 25^\circ\text{C}, V_{GS} = 0V$		0.8	1.0	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 24\text{A}^{\text{(3)}}$		970		$\text{nS}$
$Q_{rr}$	Reverse Recovery Charge	$dI_{SD}/dt = 100\text{A}/\mu\text{s}, T_J = 25^\circ\text{C}$		22		$\mu\text{C}$
$dv/dt$	Peak Recovery $dv/dt$	$I_{SD} \leq 24\text{A}, di/dt \leq 1000\text{A}/\mu\text{s}, V_{DD} = 533V, T_J = 125^\circ\text{C}$			10	V/ns

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

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

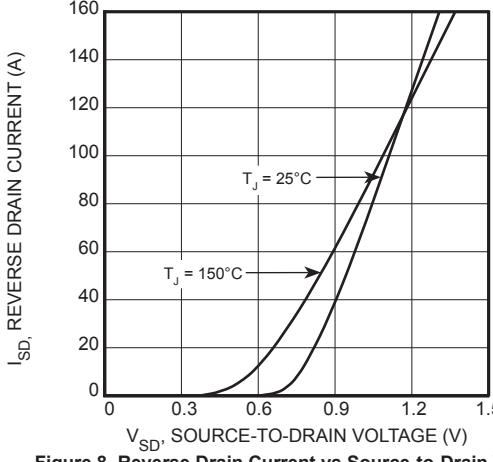
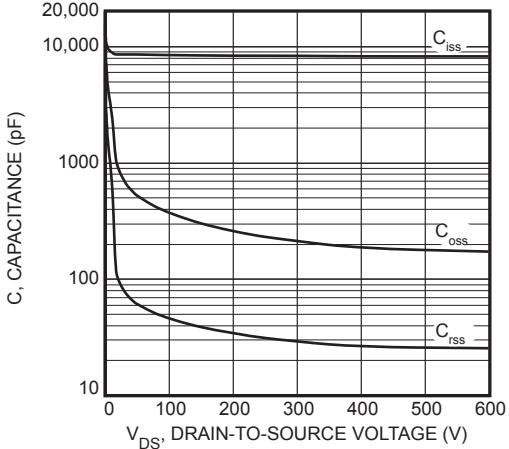
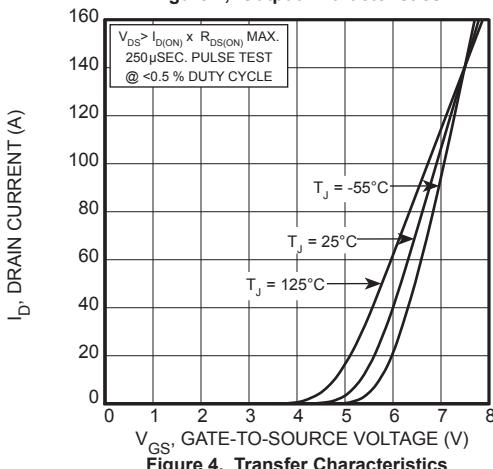
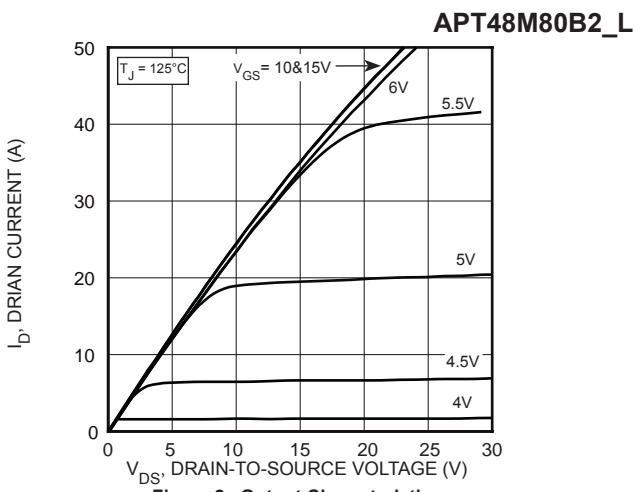
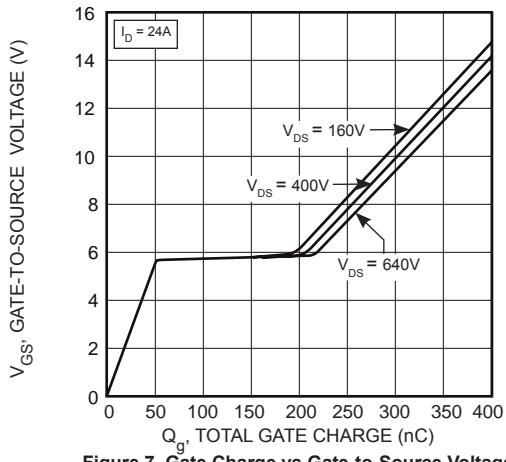
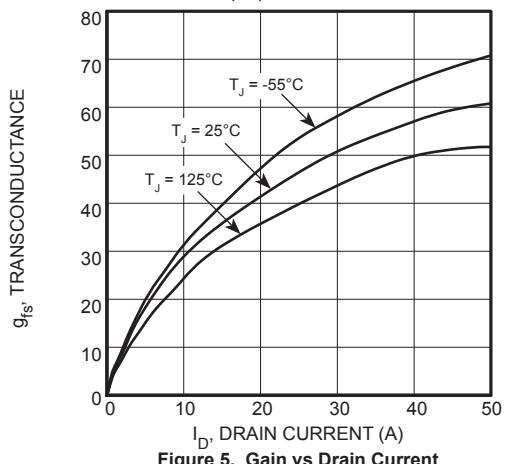
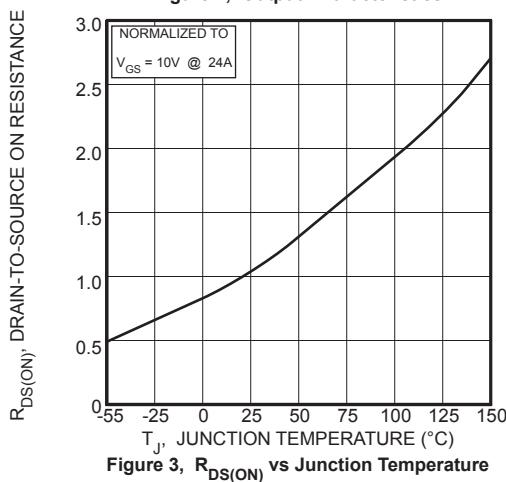
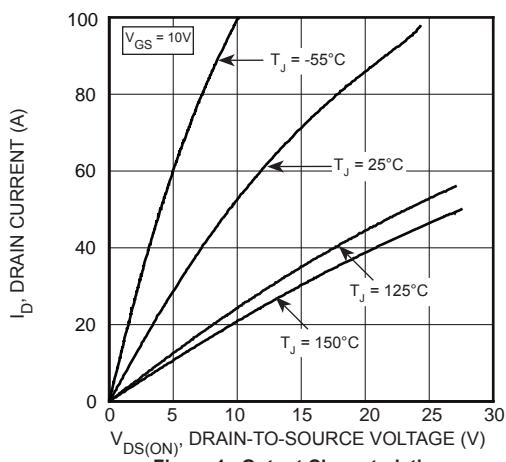
③ Pulse test: Pulse Width < 380 $\mu\text{s}$ , duty cycle < 2%.

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:  $C_{o(er)} = -8.32E-8/V_{DS}^2 + 3.49E-8/V_{DS} + 1.30E-10$ .

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.



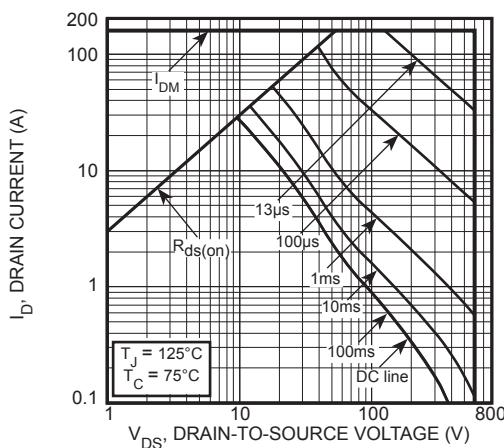


Figure 9, Forward Safe Operating Area

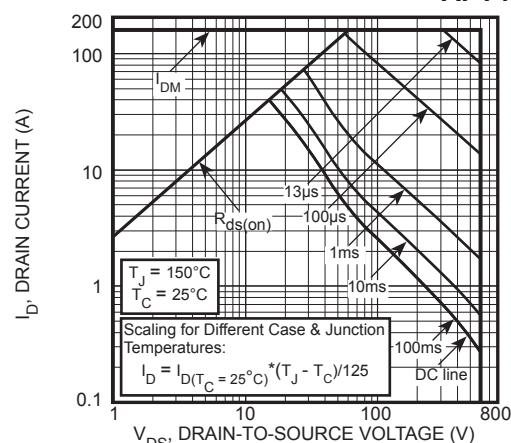


Figure 10, Maximum Forward Safe Operating Area

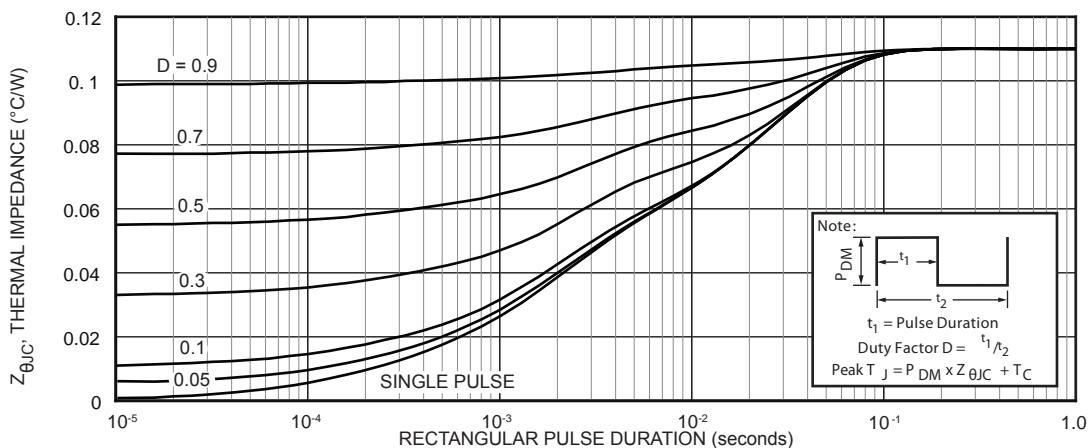
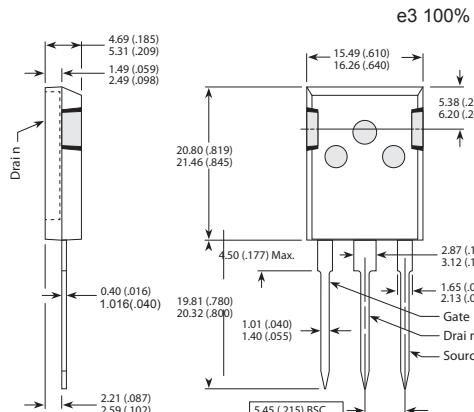
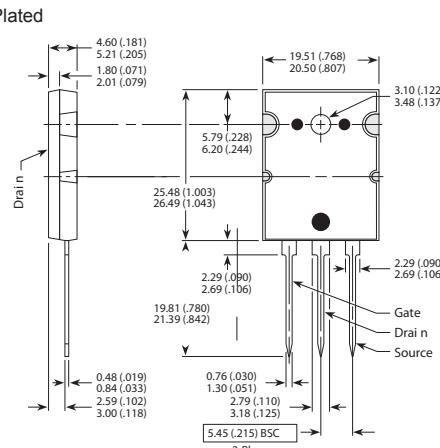


Figure 11. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

**T-MAX® (B2) Package Outline**

These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

**TO-264 (L) Package Outline**

Dimensions in Millimeters and (Inches)

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105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru  
moschip.ru\_4

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