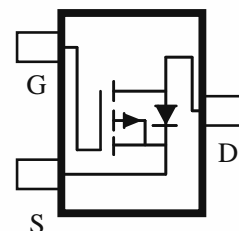
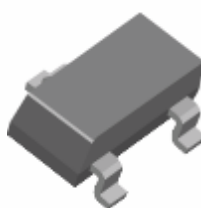


## P-Channel 20-V (D-S) MOSFET

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $r_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SOT-23 saves board space
- Fast switching speed
- High performance trench technology

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (OHM)	$I_D$ (A)
-20	0.130 @ $V_{GS} = -4.5V$	-2.6
	0.190 @ $V_{GS} = -2.5V$	-2.1



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Maximum	Units
Drain-Source Voltage		$V_{DS}$	-20	V
Gate-Source Voltage		$V_{GS}$	$\pm 8$	
Continuous Drain Current <sup>a</sup>	$T_A=25^\circ C$	$I_D$	-2.6	A
	$T_A=70^\circ C$		-1.5	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	-10	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	$\pm 1.6$	A
Power Dissipation <sup>a</sup>	$T_A=25^\circ C$	$P_D$	1.25	W
	$T_A=70^\circ C$		0.8	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 150	$^\circ C$

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>a</sup>	t $\leq$ 5 sec	$R_{THJA}$	100	$^\circ C/W$
	Steady-State		166	

### Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-0.4		-1	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = +/-8 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V			-1	μA
		V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C			-10	
On-State Drain Current <sup>A</sup>	I	V <sub>GS</sub> = -5 V, V <sub>DS</sub> = -4.5 V	-3			A
Drain-Source On-Resistance <sup>A</sup>	r <sub>DS(on)</sub> D(on)	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.6 A			0.130	Ω
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -2.1 A			0.190	
Forward Transconductance <sup>A</sup>	g	V <sub>GS</sub> = -5 V, I <sub>D</sub> = -2.8 A		3		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = -1.6 A, V <sub>GS</sub> = 0 V		-0.70		V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.6 A		12.2		nC
Gate-Source Charge	Q <sub>gs</sub>			1.1		
Gate-Drain Charge	Q <sub>gd</sub>			1.5		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -5 V, R <sub>L</sub> = 5 OHM, V <sub>GEN</sub> = -4.5 V, R <sub>G</sub> = 6 OHM		6.5		ns
Rise Time	t <sub>r</sub>			20		
Turn-Off Delay Time	t <sub>d(off)</sub>			31		
Fall-Time	t <sub>f</sub>			21		

Notes

- a. Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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### Typical Electrical Characteristics

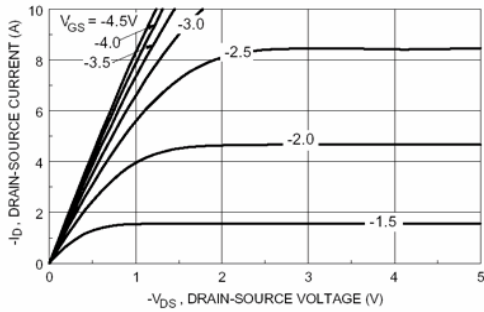


Figure 1. On-Region Characteristics.

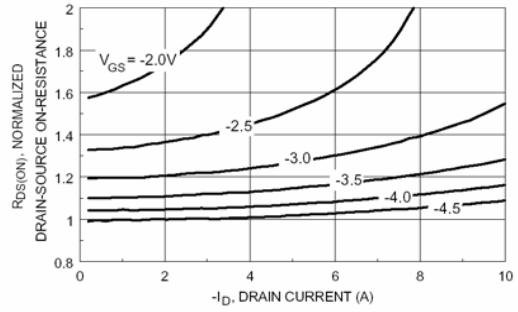


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

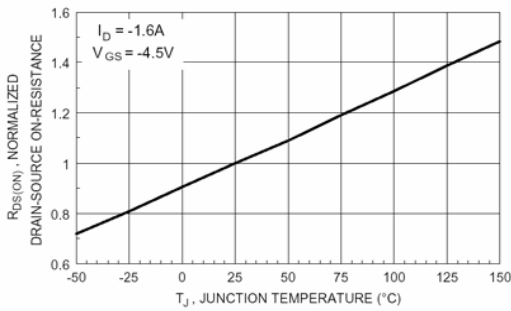


Figure 3. On-Resistance Variation with Temperature.

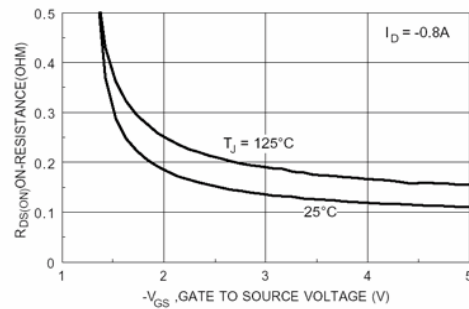


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

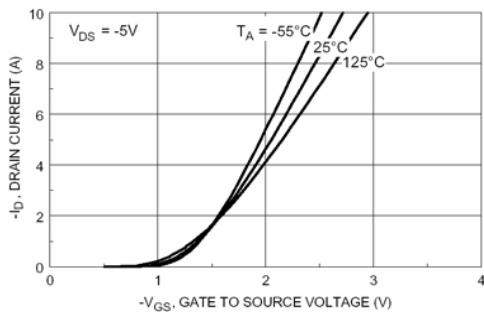


Figure 5. Transfer Characteristics.

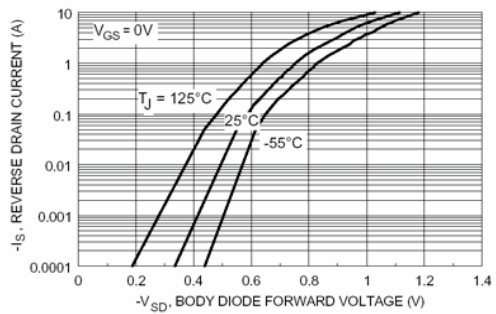


Figure 6 . Body Diode Forward Voltage Variation with Source Current and Temperature.

### Typical Electrical Characteristics

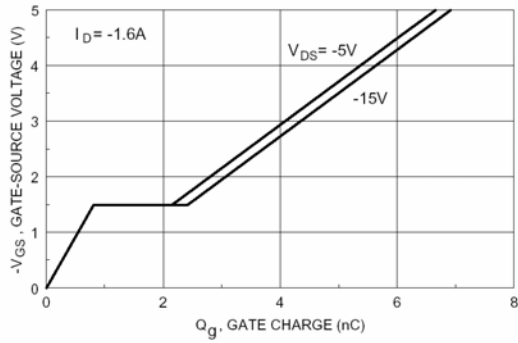


Figure 7. Gate Charge Characteristics.

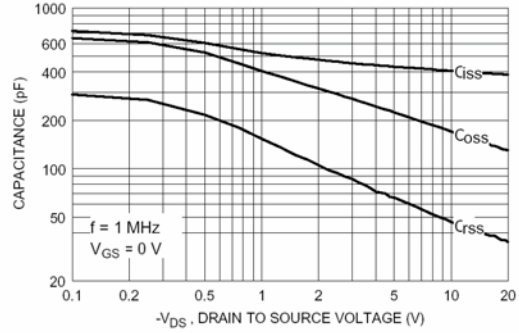


Figure 8. Capacitance Characteristics.

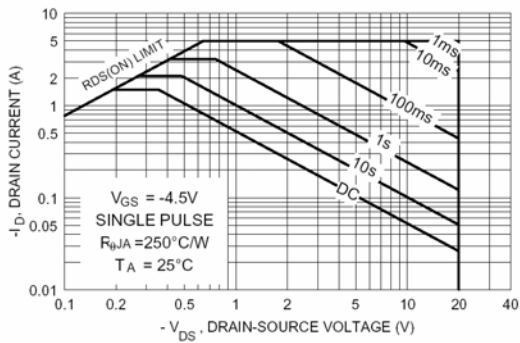


Figure 9. Maximum Safe Operating Area.

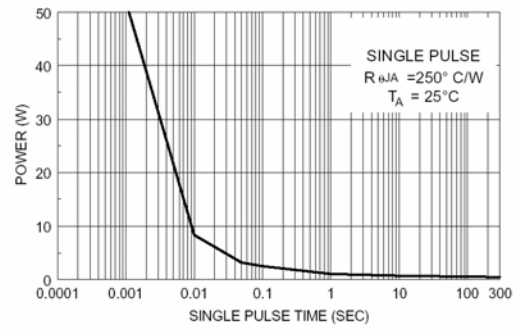


Figure 10. Single Pulse Maximum Power Dissipation.

### Normalized Thermal Transient Junction to Ambient

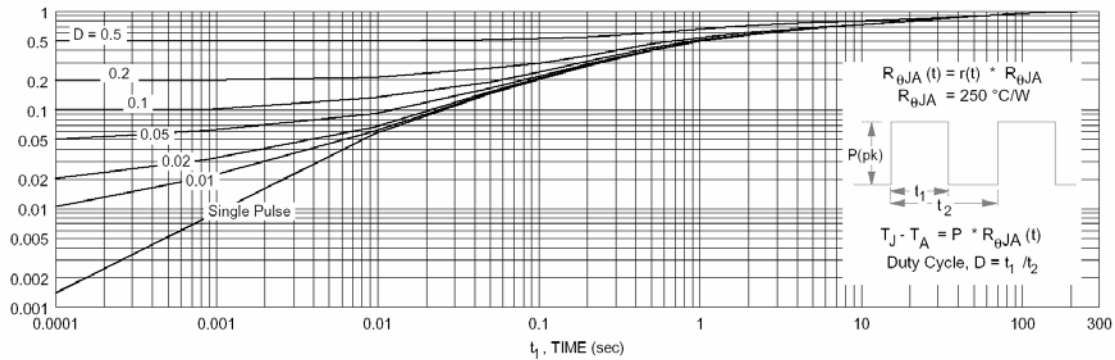
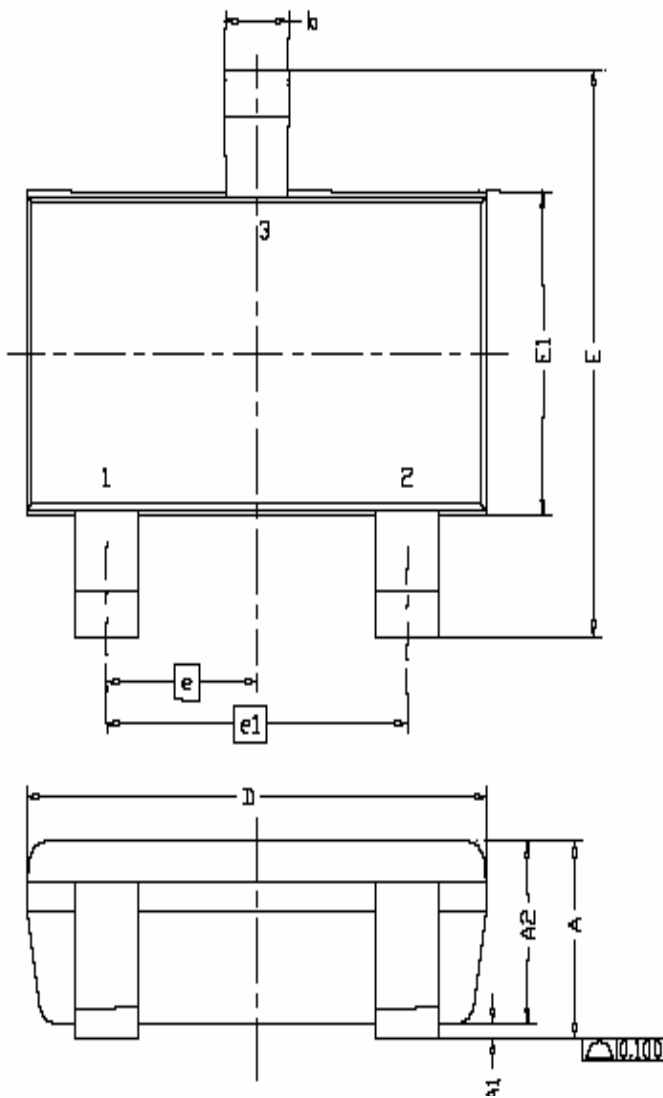
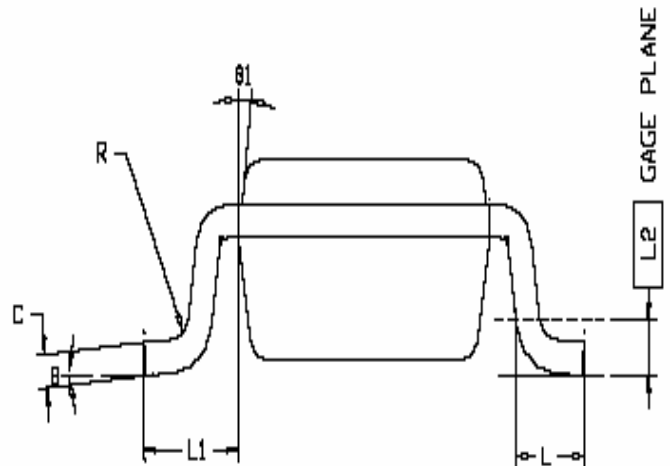


Figure 11. Transient Thermal Response Curve.

# Package Information



DIM.	MILLIMETERS		
	MIN	NOM	MAX
A	0.935	0.95	1.10
A1	0.01	---	0.10
A2	0.85	0.90	0.925
b	0.30	0.40	0.50
c	0.10	0.15	0.25
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	0.40	0.60
L1	0.60REF		
L2	0.25BSC		
R	0.10	---	---
θ	0°	4°	8°
θ1	7°NOM		



# Ordering information

- AM2301P-T1-XX
  - A: Analog Power
  - M: MOSFET
  - 2301: Part number
  - P: P-Channel
  - T1: Tape & reel
  - XX: Blank: Standard  
PF: Leadfree