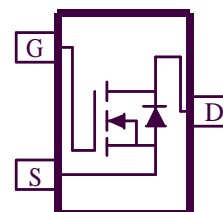
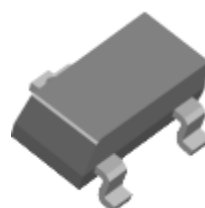


### N-Channel 20-V (D-S) MOSFET

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)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.047 @ $V_{GS} = 4.5V$	4.3
	0.055 @ $V_{GS} = 2.5V$	4.0
	0.087 @ $V_{GS} = 1.8V$	3.2



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Ratings	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A=25^\circ C$	4.3
		$T_A=70^\circ C$	3.6
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	10	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	1.6	A
Power Dissipation <sup>a</sup>	$P_D$	$T_A=25^\circ C$	1.3
		$T_A=70^\circ C$	0.9
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>	$R_{THJA}$	100	$^\circ C/W$	
		Steady-State		

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 uA	0.4			
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 8 V			1	uA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V			0.1	uA
		V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C			1	
On-State Drain Current <sup>A</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 4.5 V	5			A
Drain-Source On-Resistance <sup>A</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 1 A			0.047	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 1 A			0.055	
		V <sub>GS</sub> = 1.8 V, I <sub>D</sub> = 1 A			0.087	
Forward Transconductance <sup>A</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 1 A		16		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 1 A, V <sub>GS</sub> = 0 V		0.6		V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 1 A		6		nC
Gate-Source Charge	Q <sub>gs</sub>			1		
Gate-Drain Charge	Q <sub>gd</sub>			2		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 6 Ω, R <sub>G</sub> = 6 Ω, V <sub>GEN</sub> = 4.5 V		8		ns
Rise Time	t <sub>r</sub>			16		
Turn-Off Delay Time	t <sub>d(off)</sub>			30		
Fall-Time	t <sub>f</sub>			14		

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

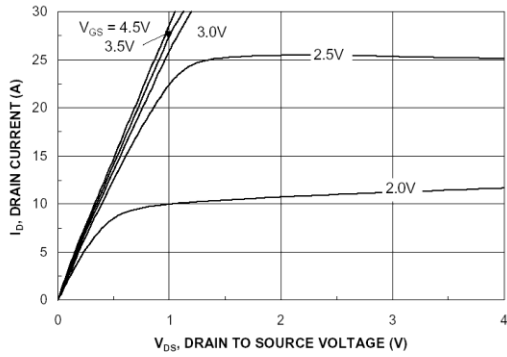


Figure 1. On-Region Characteristics

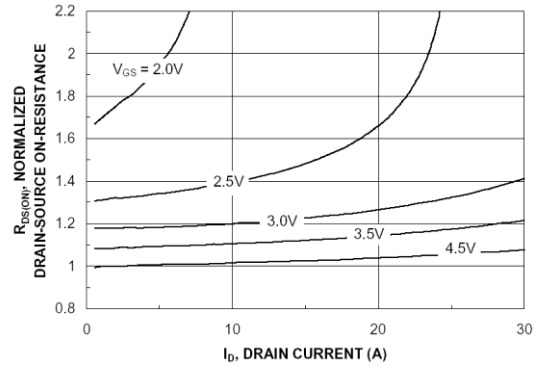


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

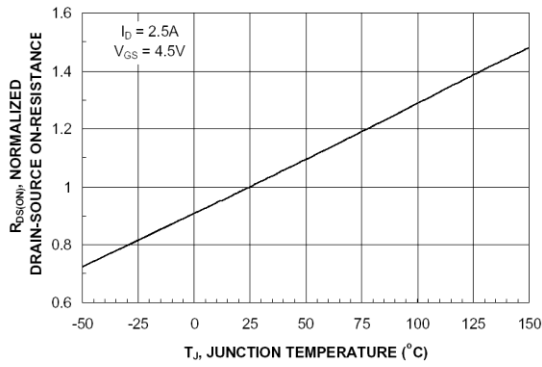


Figure 3. On-Resistance Variation with Temperature

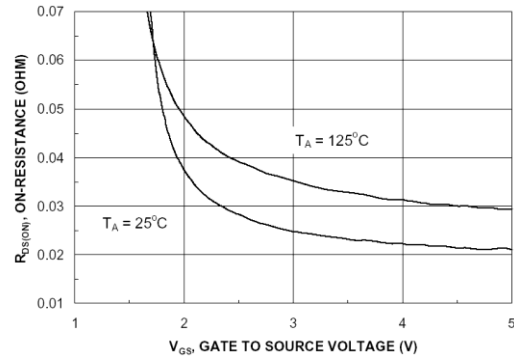


Figure 4. On-Resistance Variation with Gate to Source Voltage

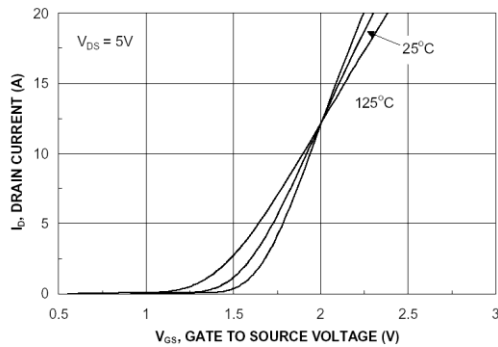


Figure 5. Transfer Characteristics

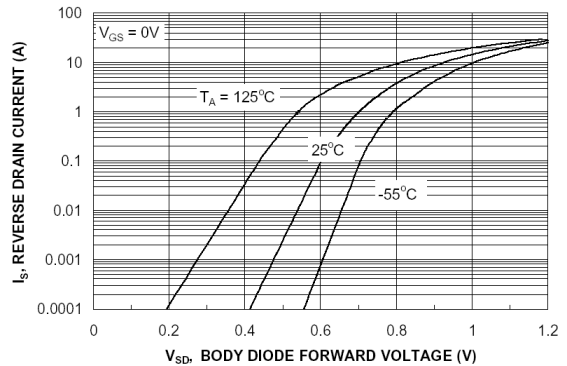


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

### Typical Electrical Characteristics

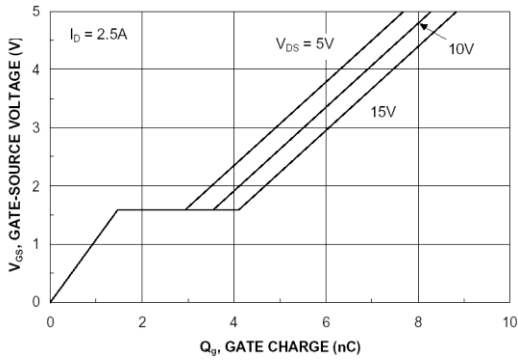


Figure 7. Gate Charge Characteristics

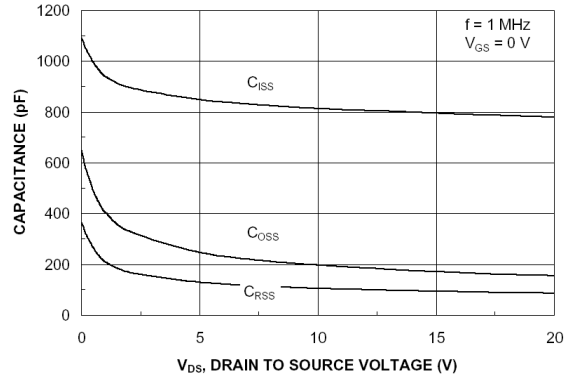


Figure 8. Capacitance Characteristics

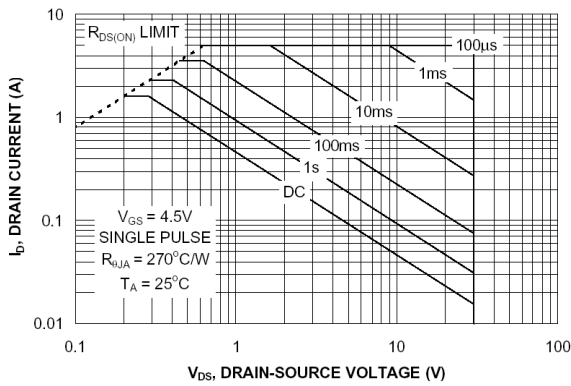


Figure 9. Maximum Safe Operating Area

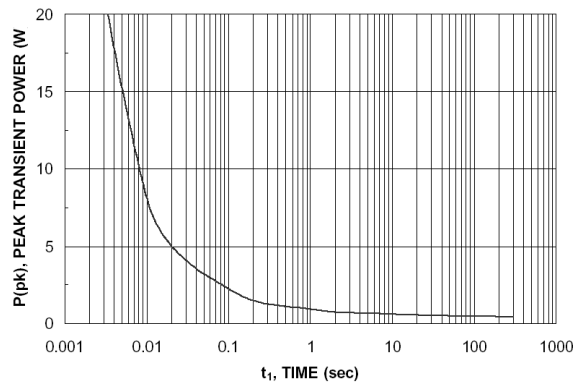


Figure 10. Single Pulse Maximum Power Dissipation

### Normalized Thermal Transient Junction to Ambient

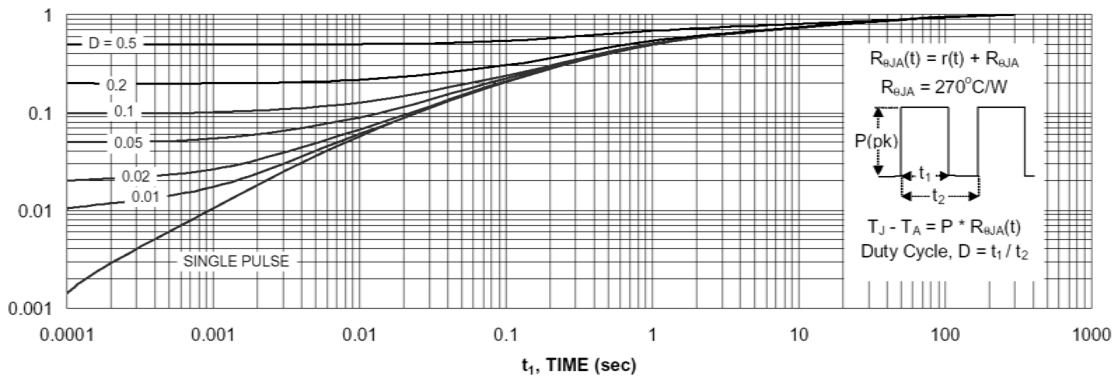
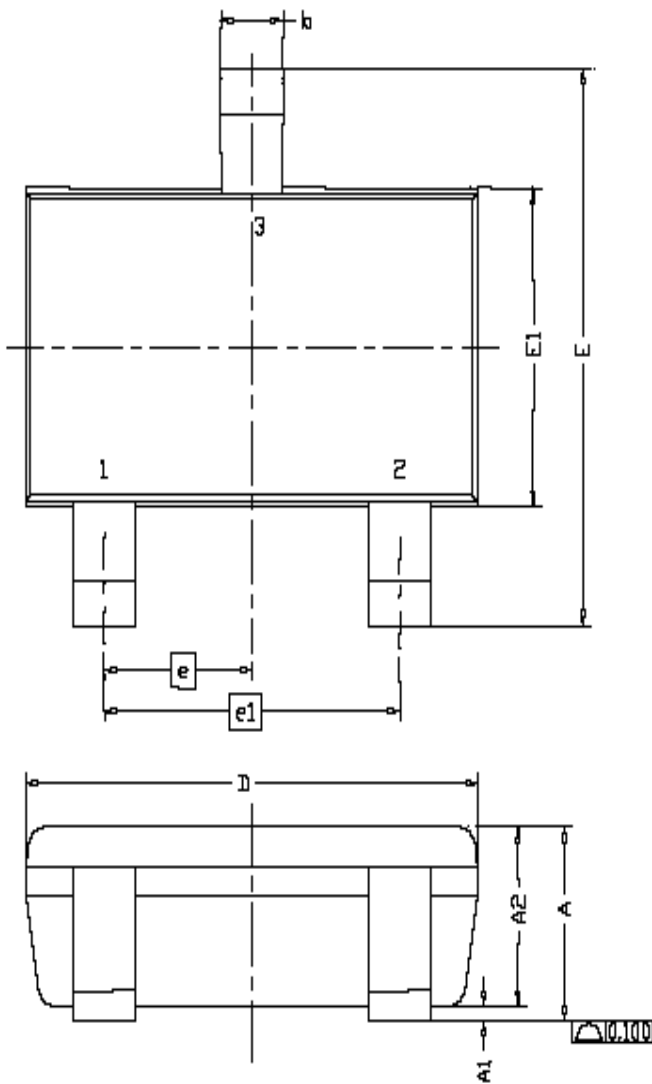


Figure 11. Transient Thermal Response Curve

# 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		

