

**P - Channel Logic Level MOSFET**

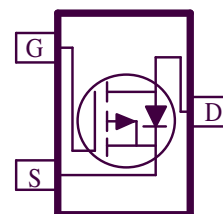
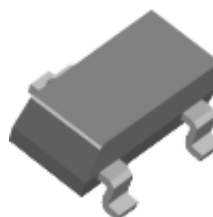
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $r_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA 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)
-30	0.30 @ $V_{GS} = -10$ V	-1.0
	0.50 @ $V_{GS} = -4.5$ V	-0.9



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ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	$V_{DS}$	-30	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A=25^\circ\text{C}$	$\pm 0.9$	A
		$T_A=70^\circ\text{C}$	$\pm 0.75$	
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	$\pm 10$		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	0.4	A	
Power Dissipation <sup>a</sup>	$P_D$	$T_A=25^\circ\text{C}$	0.5	W
		$T_A=70^\circ\text{C}$	0.42	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Maximum	Units	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{THJA}$	t $\leq$ 5 sec	250	$^\circ\text{C}/\text{W}$
		Steady-State	285	

Notes

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

SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Switch Off Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			-10	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
<b>Switch On Characteristics</b>						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.80	-1.7	-2.6	V
On-State Drain Current <sup>A</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-2			A
Drain-Source On-Resistance <sup>A</sup>	$r_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -1.0\text{ A}$		0.25	0.30	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -0.9\text{ A}, T_J = 55^\circ\text{C}$		0.53	0.66	
		$V_{GS} = -4.5\text{ V}, I_D = -0.9\text{ A}$		0.45	0.50	
Forward Transconductance <sup>A</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}, I_D = -1.1\text{ A}$		2		S
Diode Forward Voltage	$V_{SD}$	$I_S = -0.4\text{ A}, V_{GS} = 0\text{ V}$		-0.70	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -5\text{ V},$ $I_D = -0.9\text{ A}$		2.0	3.0	nC
Gate-Source Charge	$Q_{gs}$			0.5		
Gate-Drain Charge	$Q_{gd}$			1.1		
<b>Switching</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = -10\text{ V}, I_D = -0.9\text{ A},$ $R_G = 50\text{ }\Omega, V_{GEN} = -10\text{ V}$		8	16	ns
Rise Time	$t_r$			16	32	
Turn-Off Delay Time	$t_{d(off)}$			36	93	
Fall-Time	$t_f$			33	94	

## Notes

- Pulse test:  $PW \leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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## Typical Electrical Characteristics

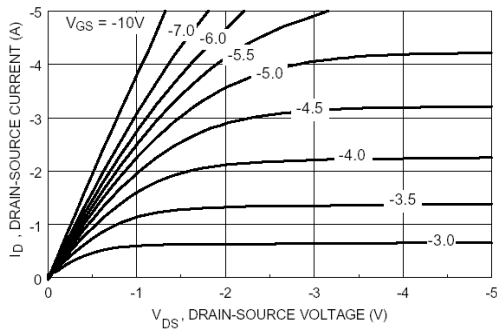


Figure 1. On-Region Characteristics

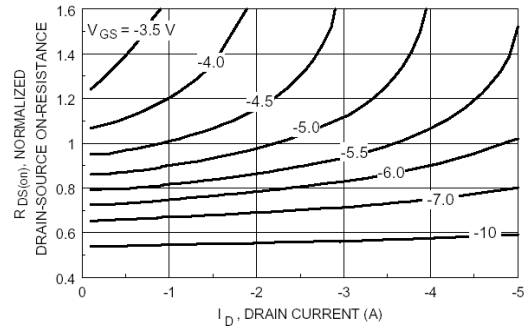


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

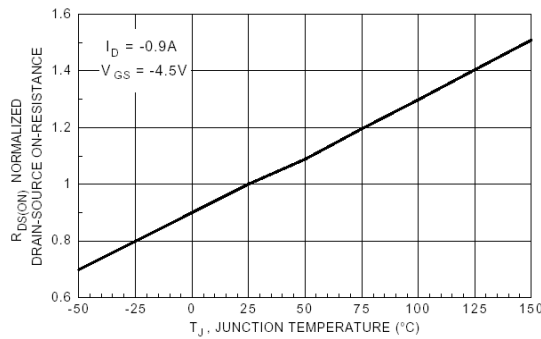


Figure 3. On-Resistance Variation with Temperature

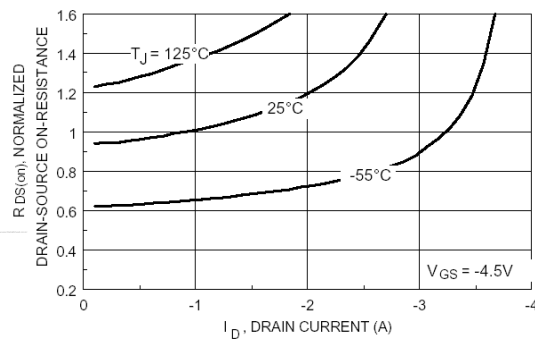


Figure 4. On-Resistance Variation with Gate to Source Voltage

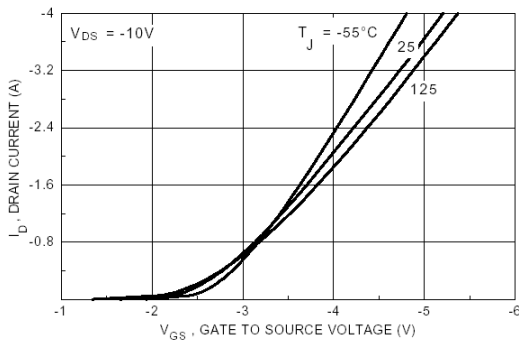


Figure 5. Transfer Characteristics

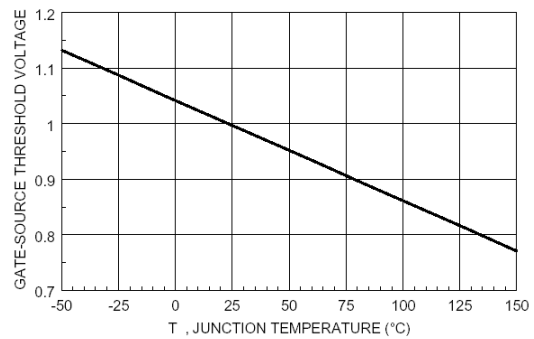


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

## Typical Electrical Characteristics

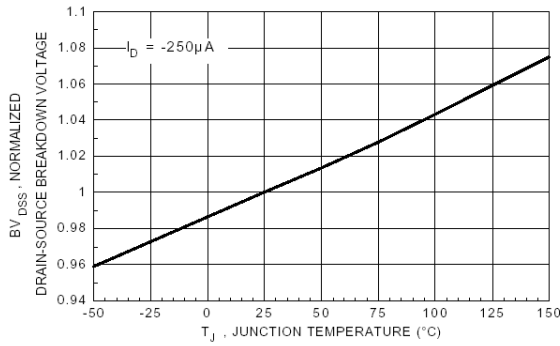


Figure 7. Breakdown Voltage With Temperature

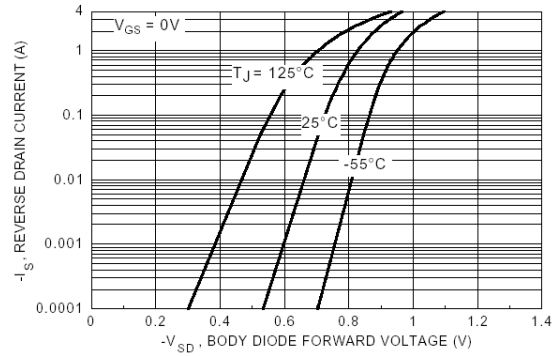


Figure 8. Body Diode Forward Voltage With Source Current & Temperature

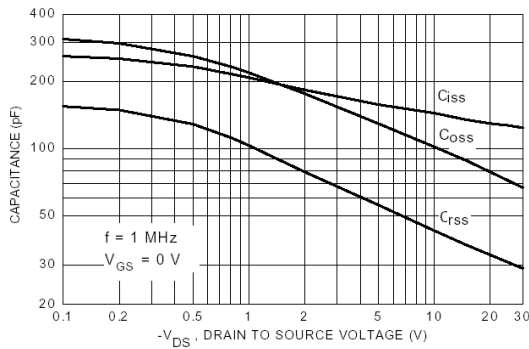


Figure 9. Capacitance Characteristic

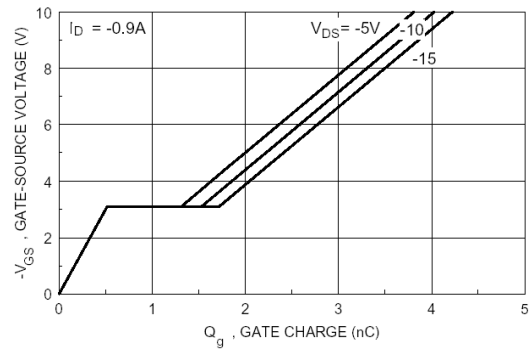


Figure 10. Gate Charge Characteristic

### Normalized Thermal Transient Impedance, Junction to Ambient

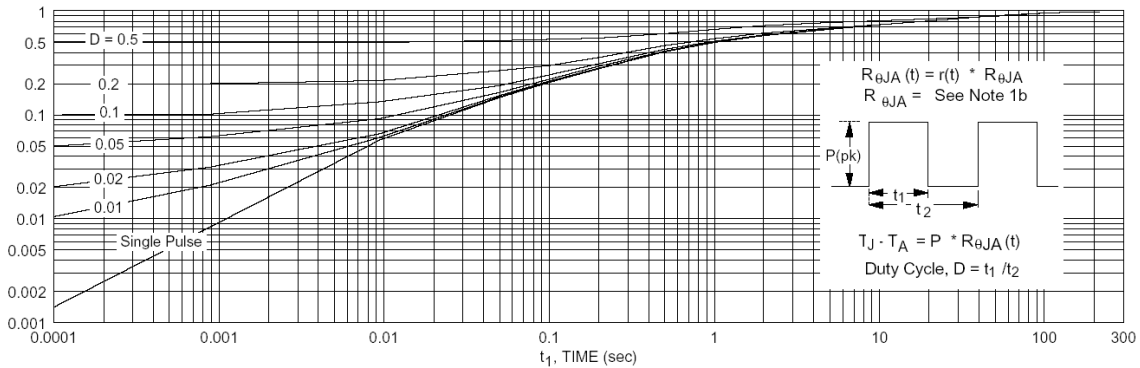


Figure 11. Transient Thermal Response Curve

### Typical Electrical Characteristics

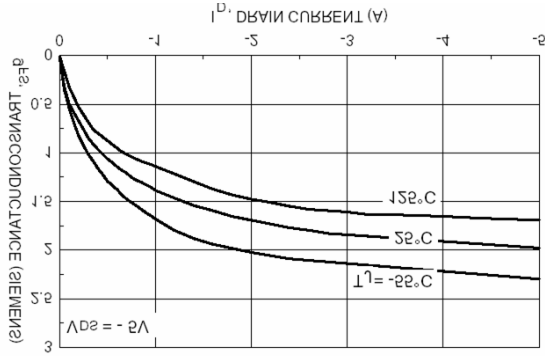


Figure 13. Transconductance Variation With Current & Temperature

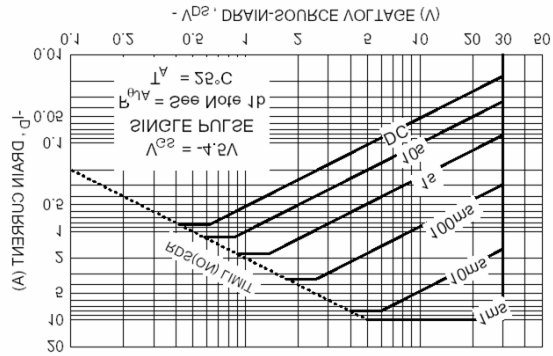


Figure 14. Maximum Safe Operation Area

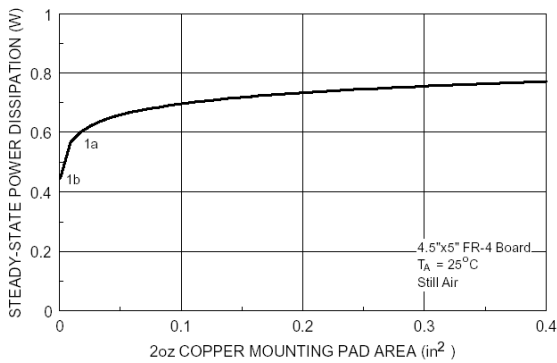


Figure 15. SOT-3 Maximum Steady-State Variation Power Dissipation versus Copper Pad Area

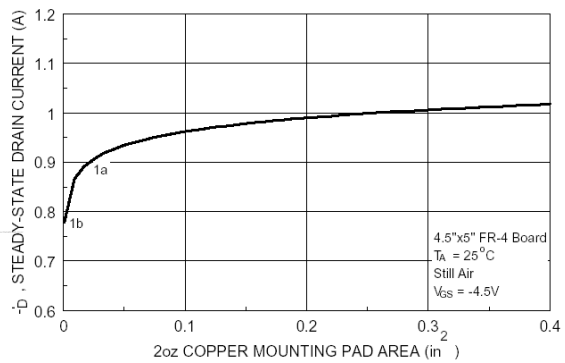
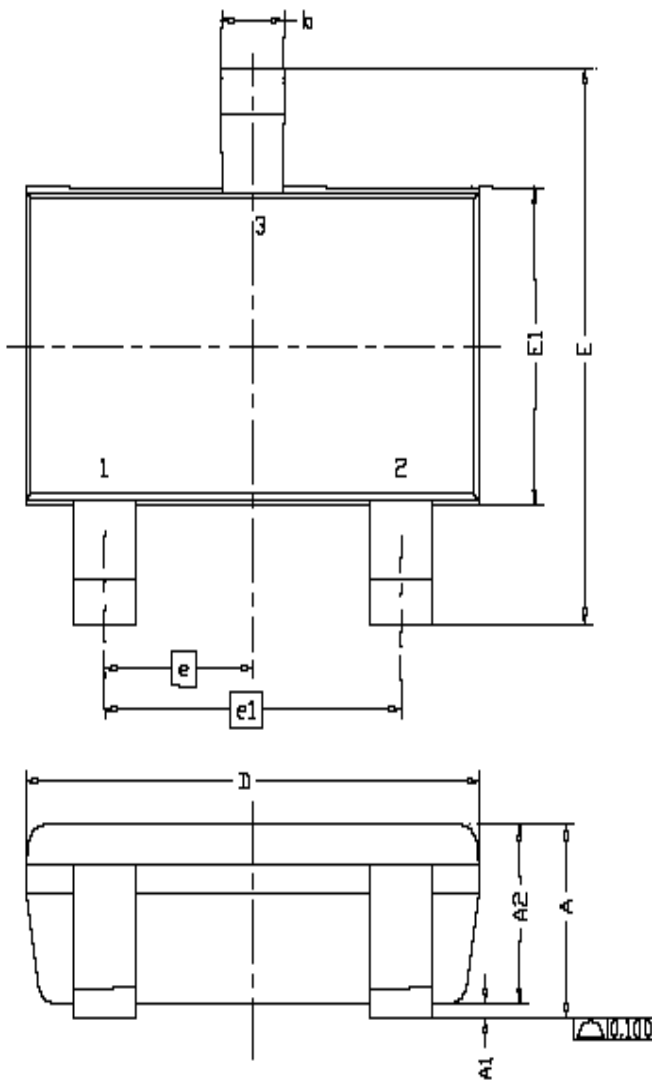


Figure 16. Maximum State-State Drain Current Current Versus Copper Pad Area

# 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		

