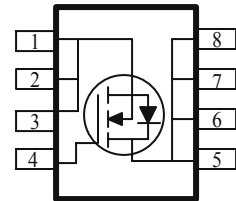
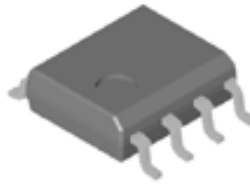


## N-Channel 30-V (D-S) MOSFET

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 SOIC-8 saves board space
- Fast switching speed
- High performance trench technology



PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ m( $\Omega$ )	$I_D$ (A)
30	13.5 @ $V_{GS} = 10V$	13
	20 @ $V_{GS} = 4.5V$	11

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Units
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_A = 25^\circ C$	$I_D$	$\pm 13$	A
	$T_A = 70^\circ C$		$\pm 11$	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	$\pm 50$	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	2.3	A
Power Dissipation <sup>a</sup>	$T_A = 25^\circ C$	$P_D$	3.1	W
	$T_A = 70^\circ C$		2.2	
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-Case <sup>a</sup>	$t \leq 5$ sec	$R_{\theta JC}$	25	$^\circ C/W$
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 5$ sec	$R_{\theta JA}$	50	$^\circ C/W$

#### 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	1			V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C			25	
On-State Drain Current <sup>A</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	20			A
Drain-Source On-Resistance <sup>A</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A			13.5	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 8 A			20	
Forward Transconductance <sup>A</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A		40		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 2.3 A, V <sub>GS</sub> = 0 V		0.7		V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A		12.5		nC
Gate-Source Charge	Q <sub>gs</sub>			2.6		
Gate-Drain Charge	Q <sub>gd</sub>			4.6		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		1191		pF
Output Capacitance	C <sub>oss</sub>			412		
Reverse Transfer Capacitance	C <sub>rss</sub>			160		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 25 V, R <sub>L</sub> = 25 Ω, I <sub>D</sub> = 1 A, V <sub>GEN</sub> = 10 V		20		nS
Rise Time	t <sub>r</sub>			9		
Turn-Off Delay Time	t <sub>d(off)</sub>			70		
Fall-Time	t <sub>f</sub>			20		

## Notes

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

**FREESCALE** reserves the right to make changes without further notice to any products herein. Freescale makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in Freescale data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Freescale does not convey any license under its patent rights nor the rights of others. Freescale products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale was negligent regarding the design or manufacture of the part. Freescale is an Equal Opportunity/Affirmative Action Employer.

## Typical Electrical Characteristics (N-Channel)

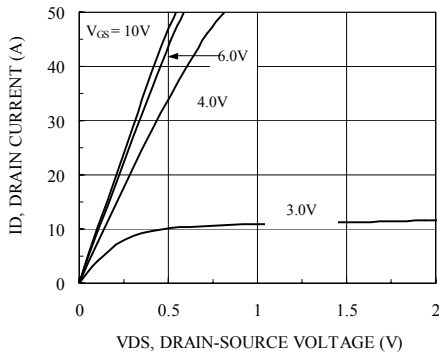


Figure 1. On-Region Characteristics

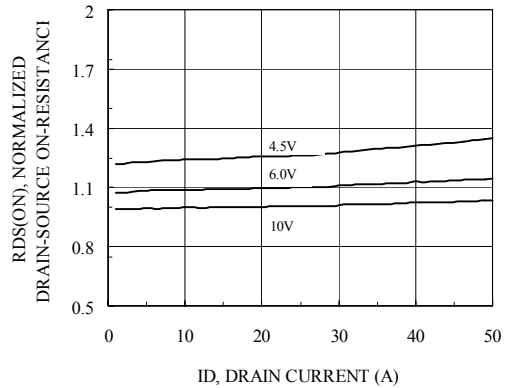


Figure 2. On-Resistance with Drain Current

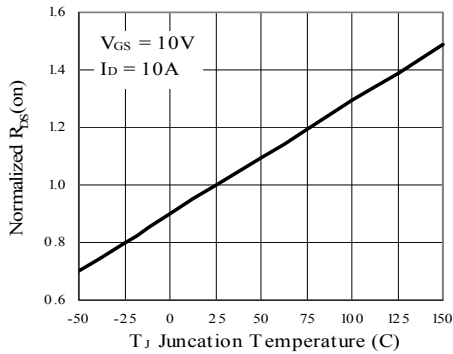


Figure 3. On-Resistance Variation with Temperature

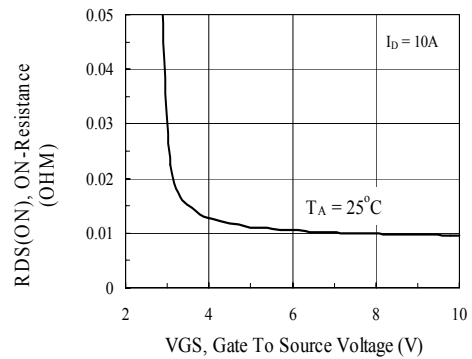


Figure 4. On-Resistance Variation with Gate to Source Voltage

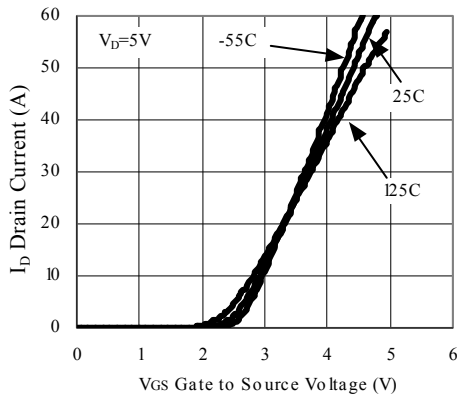


Figure 5. Transfer Characteristics

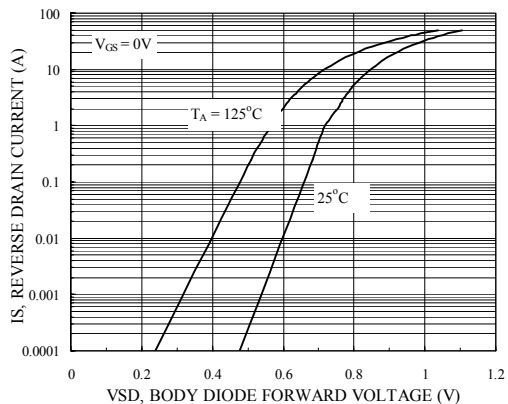


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

## Typical Electrical Characteristics (N-Channel)

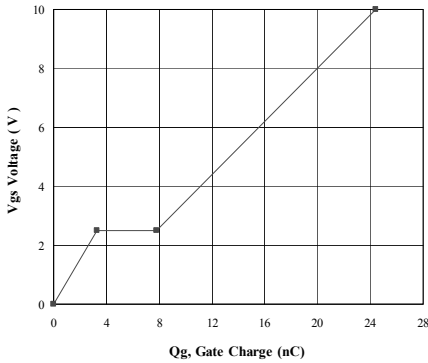


Figure 7. Gate Charge Characteristics

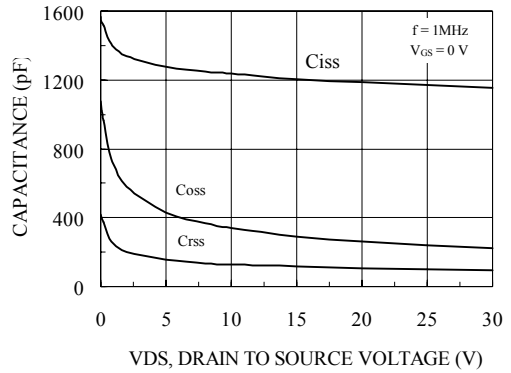


Figure 8. Capacitance Characteristics

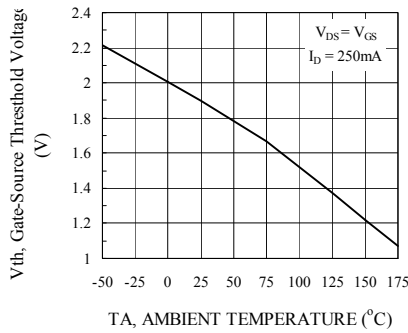


Figure 9. Threshold Vs Ambient Temperature

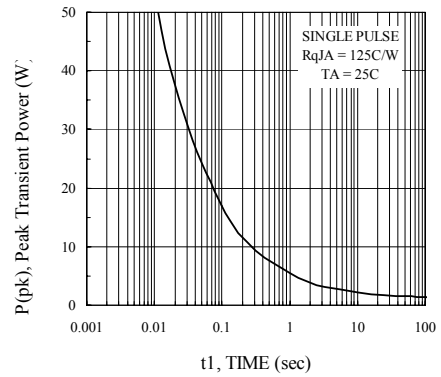


Figure 10. Single Pulse Maximum Power Dissipation

### Normalized Thermal Transient Junction to Ambient

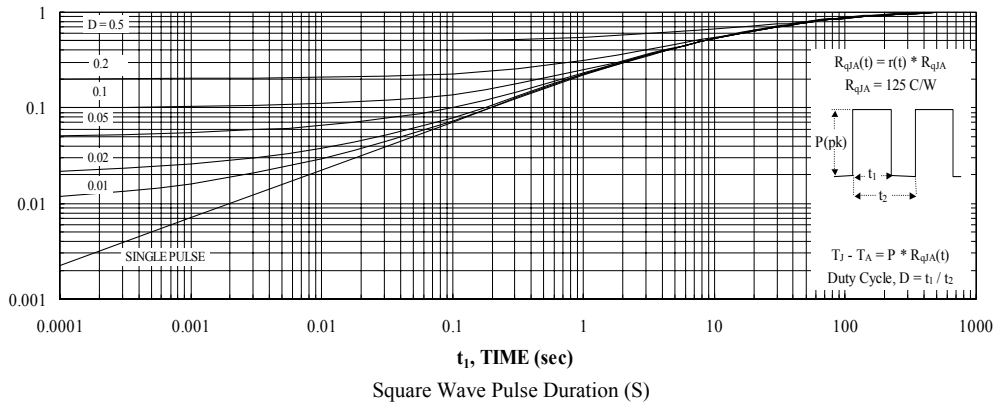
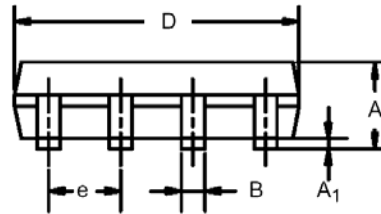
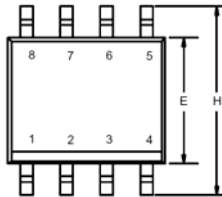


Figure 11. Transient Thermal Response Curve

# Package Information

## SO-8: 8LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°

