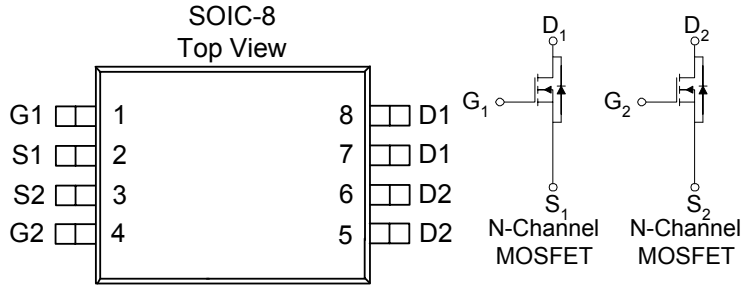


### N-Channel 60-V (D-S) MOSFET

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.

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ m( $\Omega$ )	$I_D$ (A)
60	89 @ $V_{GS} = 10V$	$\pm 4.0$
	104 @ $V_{GS} = 4.5V$	$\pm 3.7$

- 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



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Units
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A = 25^\circ C$	$\pm 4.0$
		$T_A = 70^\circ C$	$\pm 3.3$
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	$\pm 25$	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	2	A
Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ C$	2.1
		$T_A = 70^\circ C$	1.3
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>	$R_{\theta JA}$	$t \leq 10$ sec	62.5
		$t \leq 5$ sec	110

Notes

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

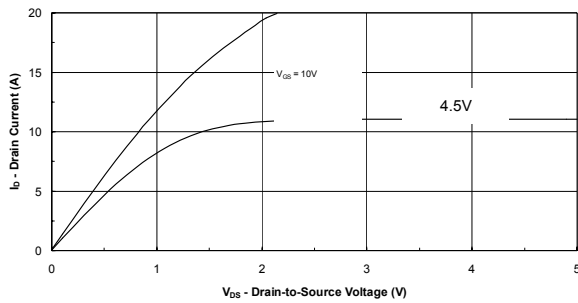
SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1			
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$			1	uA
		$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>A</sup>	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	20			A
Drain-Source On-Resistance <sup>A</sup>	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 4.0 \text{ A}$			89	m $\Omega$
		$V_{GS} = 4.5 \text{ V}, I_D = 3.7 \text{ A}$			104	
Forward Transconductance <sup>A</sup>	$g_s$	$V_{DS} = 15 \text{ V}, I_D = 4.0 \text{ A}$		11		S
Diode Forward Voltage	$V_{SD}$	$I_S = 2.0 \text{ A}, V_{GS} = 0 \text{ V}$		1.1		V
Pulsed Source Current (Body Diode) <sup>A</sup>	$I_{SM}$			5		A
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 30 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = 4.0 \text{ A}$		3.6		nC
Gate-Source Charge	$Q_{gs}$			1.8		
Gate-Drain Charge	$Q_{gd}$			1.3		
<b>Switching</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30 \text{ V}, R_L = 30 \Omega, I_D = 1 \text{ A},$ $V_{GEN} = 10 \text{ V}$		9		nS
Rise Time	$t_r$			10		
Turn-Off Delay Time	$t_{d(off)}$			21		
Fall-Time	$t_f$			8		

## Notes

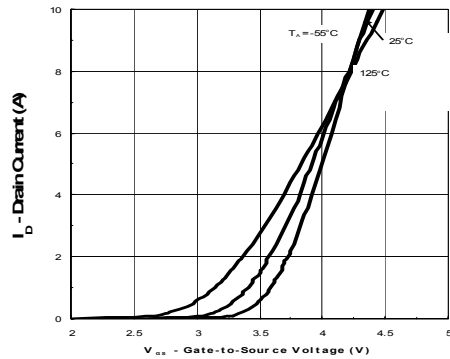
- Pulse test:  $PW \leq 300 \mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

**Analog Power** (APL) reserves the right to make changes without further notice to any products herein. APL makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does APL 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 APL 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. APL does not convey any license under its patent rights nor the rights of others. APL 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 APL product could create a situation where personal injury or death may occur. Should Buyer purchase or use APL products for any such unintended or unauthorized application, Buyer shall indemnify and hold APL 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 APL was negligent regarding the design or manufacture of the part. APL is an Equal Opportunity/Affirmative Action Employer.

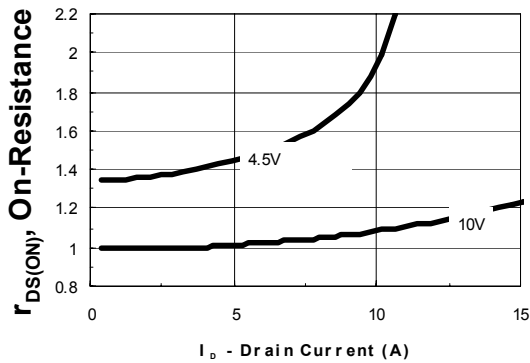
## Typical Electrical Characteristics



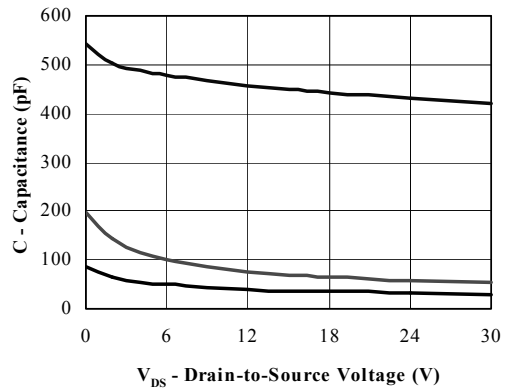
Output Characteristics



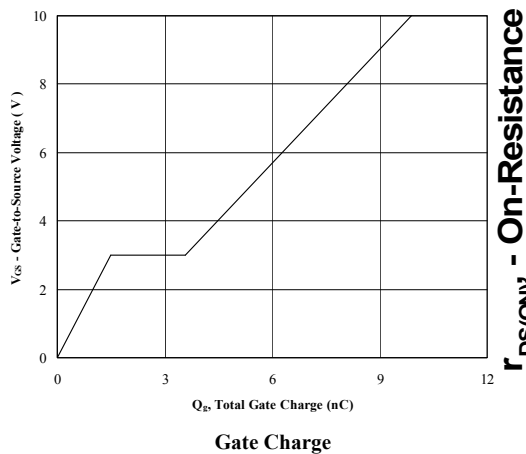
Transfer Characteristics



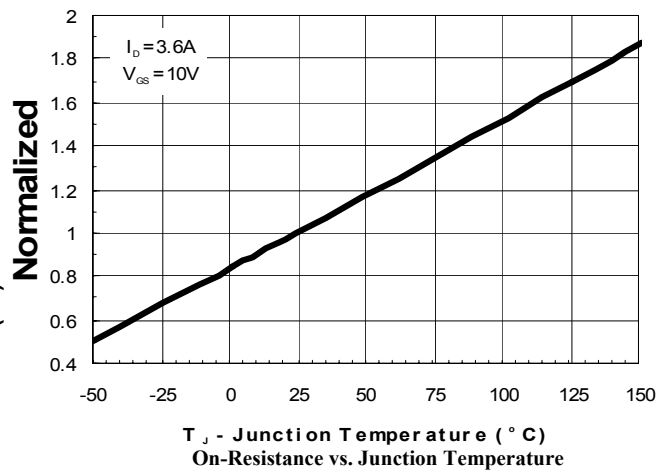
On-Resistance vs. Drain Current



Capacitance

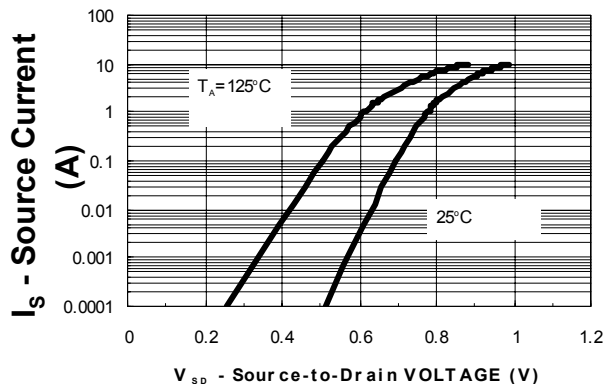


Gate Charge

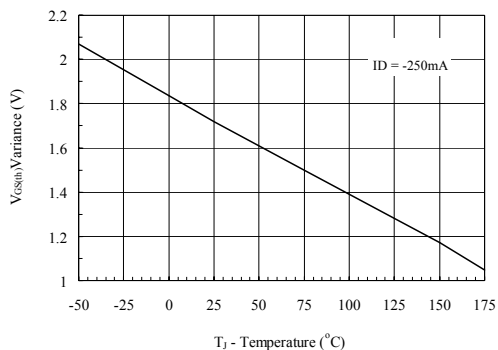


On-Resistance vs. Junction Temperature

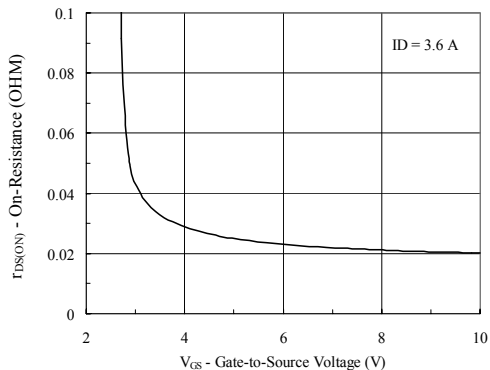
## Typical Electrical Characteristics



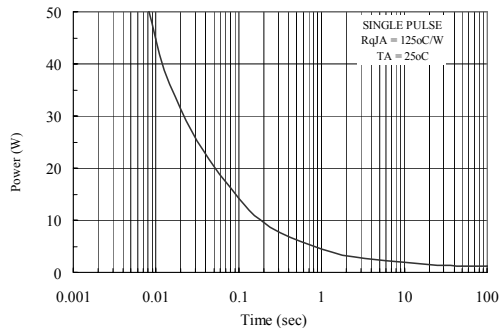
Source-Drain Diode Forward Voltage



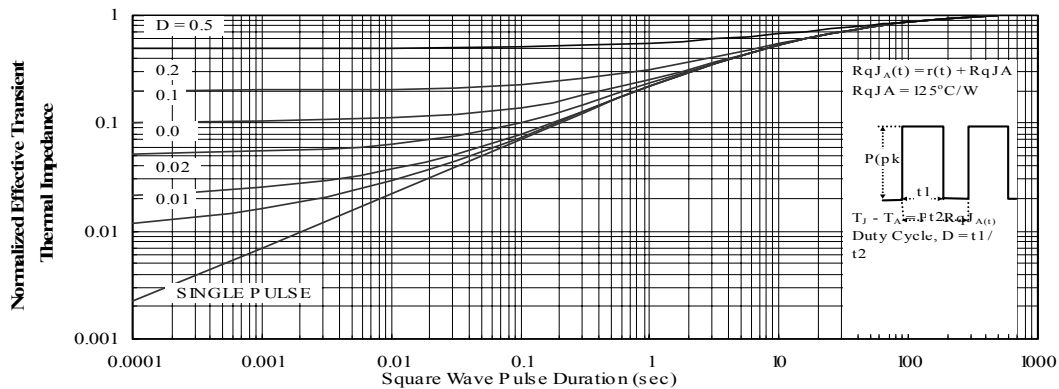
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



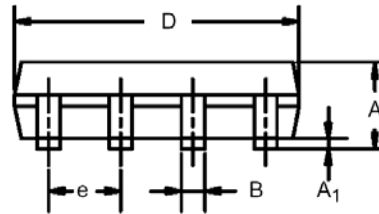
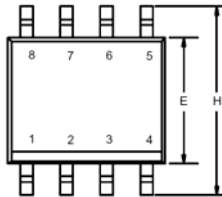
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

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°

