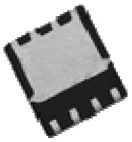
P-Channel 20-V (D-S) MOSFET

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.

PRODUCT SUMMARY

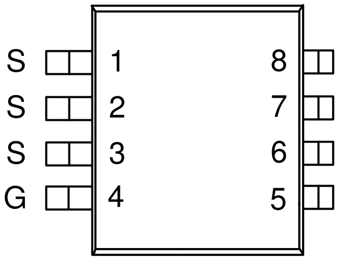
V_{DS} (V)	$r_{DS(on)}$ m(Ω)	I_D (A)
-20	14 @ V_{GS} = -4.5V	-13
	19 @ V_{GS} = -2.5V	-12

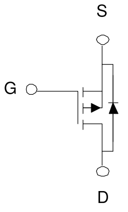


- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe DFN3x3-8PP saves board space
- Fast switching speed
- High performance trench technology

Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

DFN3x3-8PP
Top View





P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current[a]	T_A=25°C	I_D	-13	A
	T_A=70°C		-11	
Pulsed Drain Current[b]		I_{DM}	±50	
Continuous Source Current (Diode Conduction)[a]		I_S	-2.1	A
Power Dissipation[a]	T_A=25°C	P_D	3.5	W
	T_A=70°C		2.0	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient[a]	t <= 10 sec	$R_{\theta JA}$	35	°C/W
	Steady State		81	°C/W

Notes

a. Surface Mounted on 1” x 1” FR4 Board.

b. Pulse width limited by maximum junction temperature

SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Static						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = -250 uA	-1			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -16 V, V_{GS} = 0 V			-1	uA
		V_{DS} = -16 V, V_{GS} = 0 V, T_J = 55°C			-5	
On-State Drain Current[A]	$I_{D(on)}$	V_{DS} = -5 V, V_{GS} = -10 V	-50			A
Drain-Source On-Resistance[A]	$r_{DS(on)}$	V_{GS} = -4.5 V, I_D = -11.5 A			14	mΩ
		V_{GS} = -2.5 V, I_D = -9.3 A			19	
Forward Tranconductance[A]	g_{fs}	V_{DS} = -15 V, I_D = -11.5 A		29		S
Diode Forward Voltage	V_{SD}	I_S = 2.5 A, V_{GS} = 0 V		-0.8		V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = -15 V, V_{GS} = -4.5 V, I_D = -11.5 A		25		nC
Gate-Source Charge	Q_{gs}			11		
Gate-Drain Charge	Q_{gd}			17		
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V, f=1MHz		2300		pF
Output Capacitance	C_{oss}			600		
Reverse Transfer Capacitance	C_{rss}			300		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -15 V, R_L = 6 Ω , I_D = -1 A, V_{GEN} = -10 V		15		nS
Rise Time	t_r			13		
Turn-Off Delay Time	$t_{d(off)}$			100		
Fall-Time	t_f			54		

Notes

a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

Typical Electrical Characteristics (P-Channel)

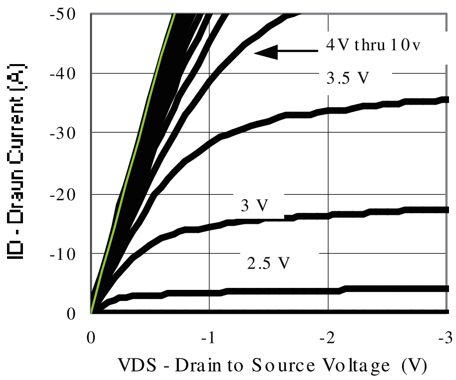


Figure 1. On-Region Characteristics

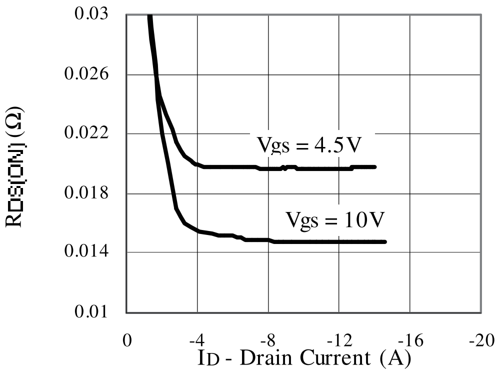


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

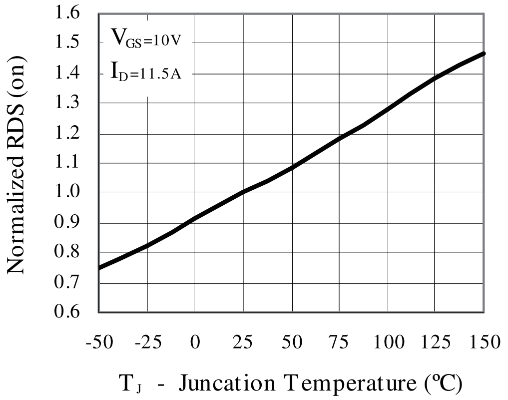


Figure 3. On-Resistance Variation with Temperature

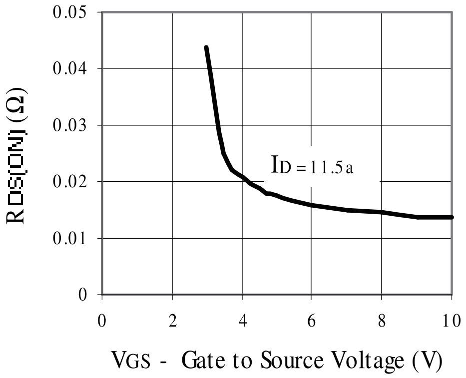


Figure 4. On-Resistance with Gate to Source Voltage

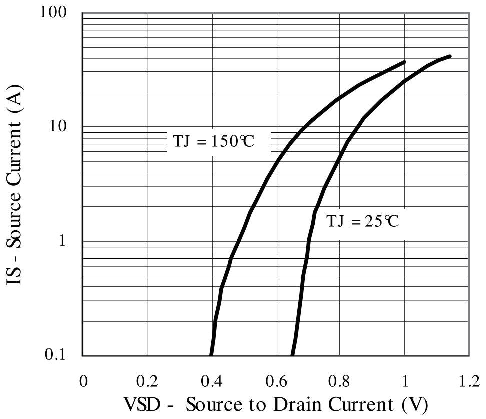


Figure 5. Transfer Characteristics

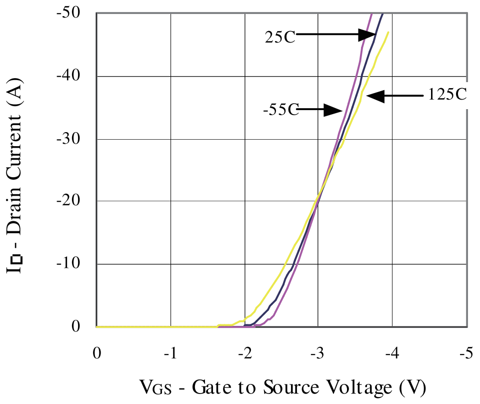


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Electrical Characteristics (P-Channel)

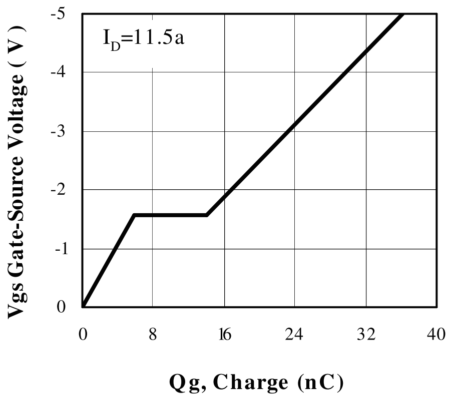


Figure 7. Gate Charge Characteristics

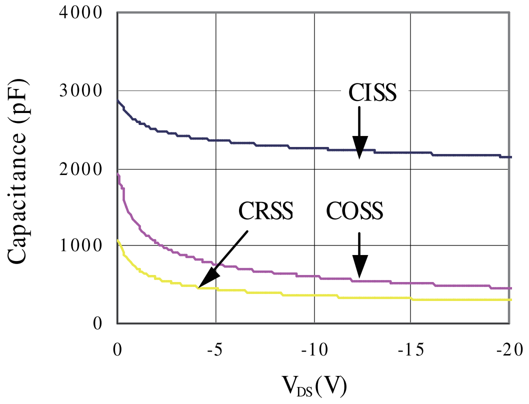


Figure 8. Capacitance Characteristics

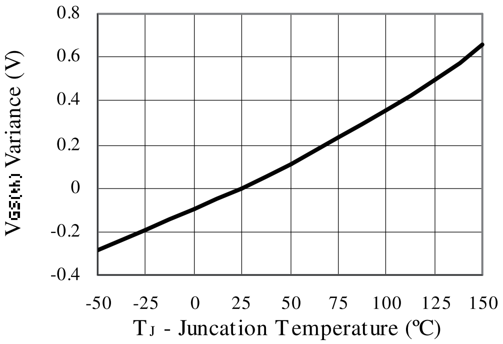


Figure 9. Maximum Safe Operating Area

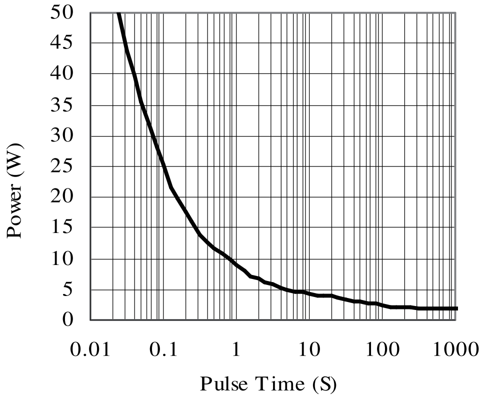
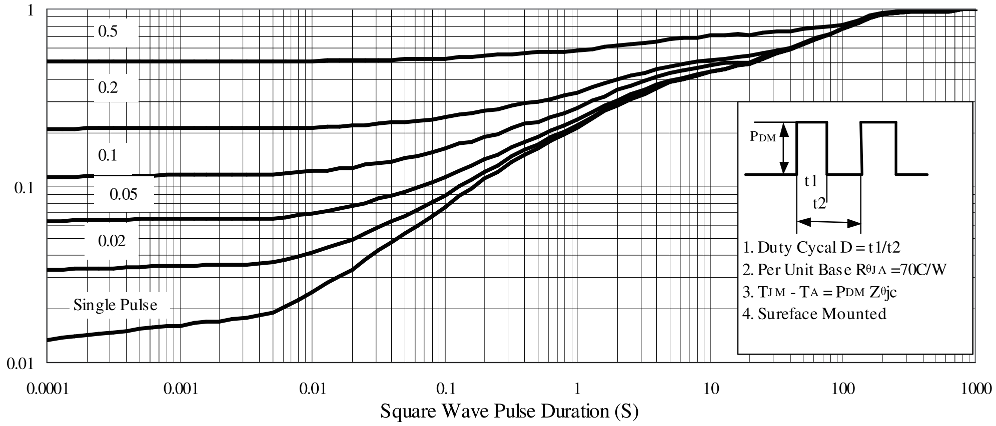


Figure 10. Single Pulse Maximum Power Dissipation

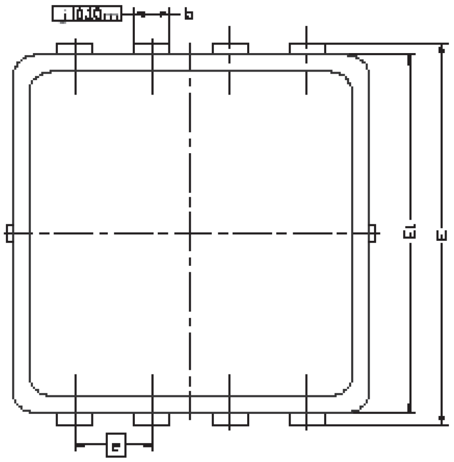
Normalized Thermal Transient Junction to Ambient

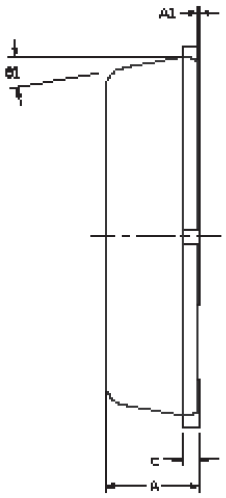


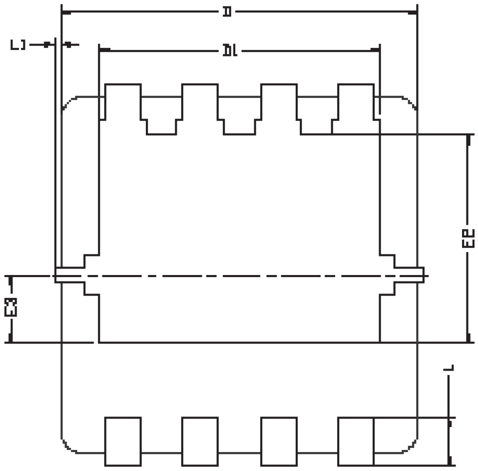
1. Duty Cycal $D = t1/t2$
2. Per Unit Base $R_{\theta JA}$ =70C/W
3. $T_{JM} - T_A = P_{DM} Z_{\theta jc}$
4. Sureface Mounted

Figure 11. Transient Thermal Response Curve

Package Information







DIM.	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.0276	0.0315	0.0354
A1	0.00	---	0.05	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.10	0.152	0.25	0.004	0.006	0.010
D	3.00 BSC			0.118 BSC		
D1	2.35 BSC			0.093 BSC		
E	3.20 BSC			0.126 BSC		
E1	3.00 BSC			0.118 BSC		
E2	1.75 BSC			0.069 BSC		
E3	0.575 BSC			0.023 BSC		
e	0.65 BSC			0.026 BSC		
L	0.30	0.40	0.50	0.0118	0.0157	0.0197
L1	0	---	0.100	0	---	0.004
θ1	0°	10°	12°	0°	10°	12°