# 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 DPAK saves board space
- Fast switching speed
- High performance trench technology
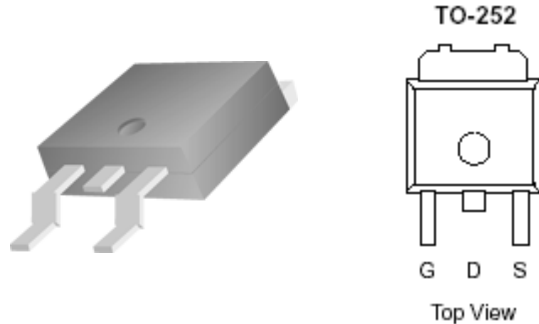
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ m(Ω)	I_D (A)
30	59 @ V_{GS} = 10V	24
	88 @ V_{GS} = 4.5V	20

TO-252

G   D   S

Top View

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ^{o}C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current[a]	T_C=25°C	I_D	24	A
Pulsed Drain Current[b]		I_{DM}	75	
Continuous Source Current (Diode Conduction)[a]		I_S	30	A
Power Dissipation[a]	T_C=25°C	P_D	50	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	^{o}C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient[a]	$R_{\theta JA}$	50	^{o}C/W
Maximum Junction-to-Case	$R_{\theta JC}$	3.0	^{o}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	Min	Typ	Max	Unit
Static						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ uA	1		2.3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = 20$ V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 24$ V, $V_{GS} = 0$ V			1	uA
		$V_{DS} = 24$ V, $V_{GS} = 0$ V, $T_J = 55^oC$			25	
On-State Drain Current[A]	$I_{D(on)}$	$V_{DS} = 5$ V, $V_{GS} = 10$ V	34			A
Drain-Source On-Resistance[A]	$r_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 12$ A			59	mΩ
		$V_{GS} = 4.5$ V, $I_D = 10$ A			88	
Forward Tranconductance[A]	g_{fs}	$V_{DS} = 15$ V, $I_D = 12$ A		22		S
Diode Forward Voltage	V_{SD}	$I_S = 24$ A, $V_{GS} = 0$ V		1.1		V
Dynamic[b]						
Total Gate Charge	Q_g	$V_{DS} = 15$ V, $V_{GS} = 4.5$ V, $I_D = 10$ A		2.2		nC
Gate-Source Charge	Q_{gs}			0.5		
Gate-Drain Charge	Q_{gd}			0.8		
Input Capacitance	C_{iss}	$V_{DS} = 15$ V, $V_{GS} = 0$ V, f = 1MHz		720		pF
Output Capacitance	C_{oss}			165		
Reverse Transfer Capacitance	C_{rss}			60		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 25$ V, $R_L = 25$ Ω, $I_D = 24$ A, $V_{GEN} = 10$ V		16		nS
Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			23		
Fall-Time	t_f			3		

Notes

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

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

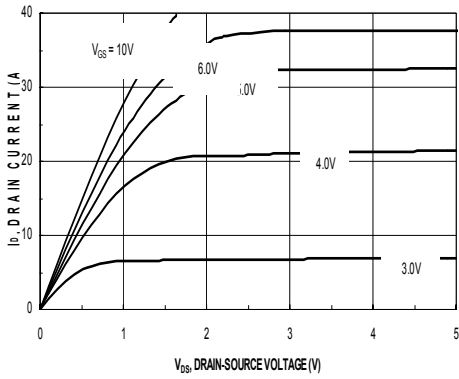# Typical Electrical Characteristics (N-Channel)

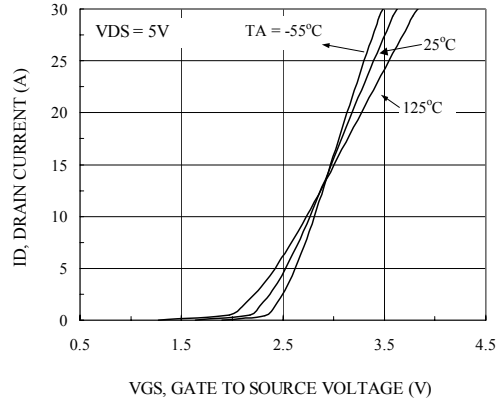**Figure 1. On-Region Characteristics**

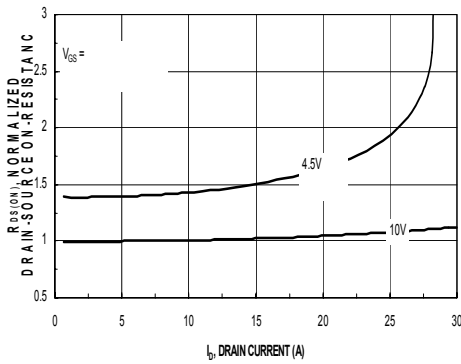**Figure 2. Body Diode Forward Voltage Variation with Source Current and Temperature**
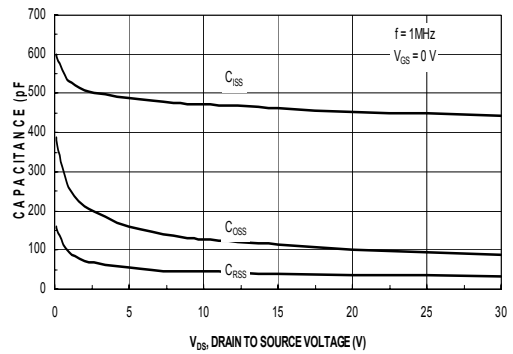

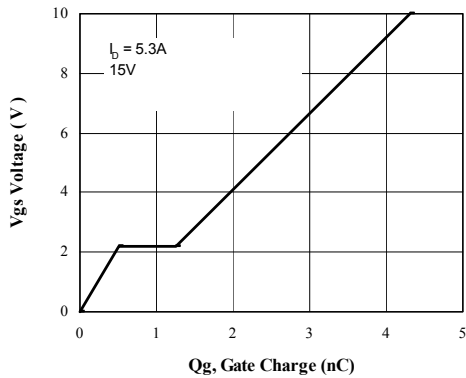**Figure 3. On Resistance Vs Vgs Voltage**

Figure 4. Capacitance Characteristics
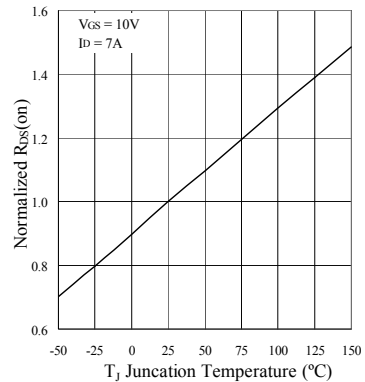

Figure 5. Gate Charge Characteristics

Figure 6. On-Resistance Variation with Temperature

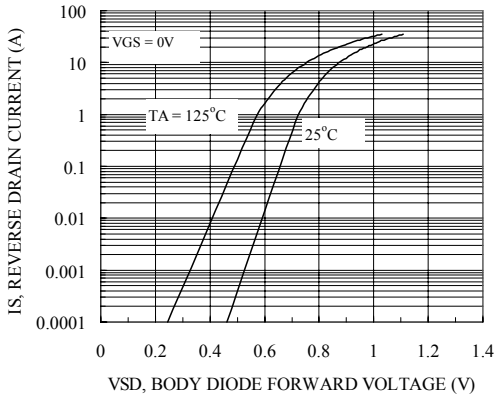# Typical Electrical Characteristics (N-Channel)

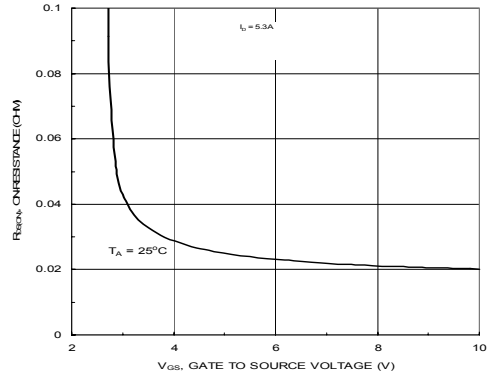**Figure 7. Transfer Characteristics**

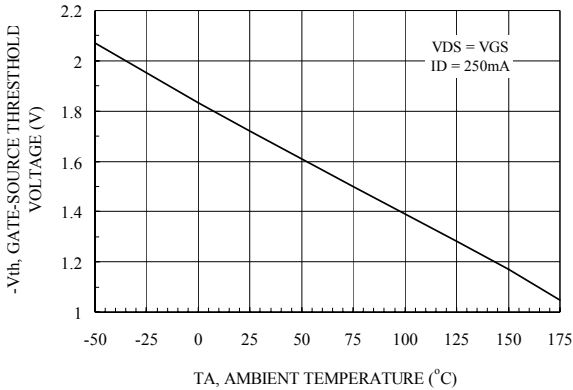**Figure 8. On-Resistance with Gate to Source Voltage**

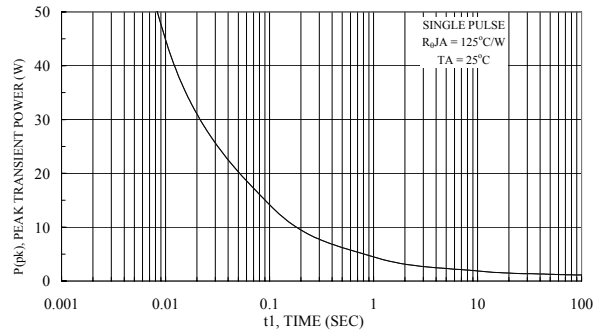**Figure 9. Vth Gate to Source Voltage Vs Temperature**

Figure 10. Single Pulse Maximum Power Dissipation

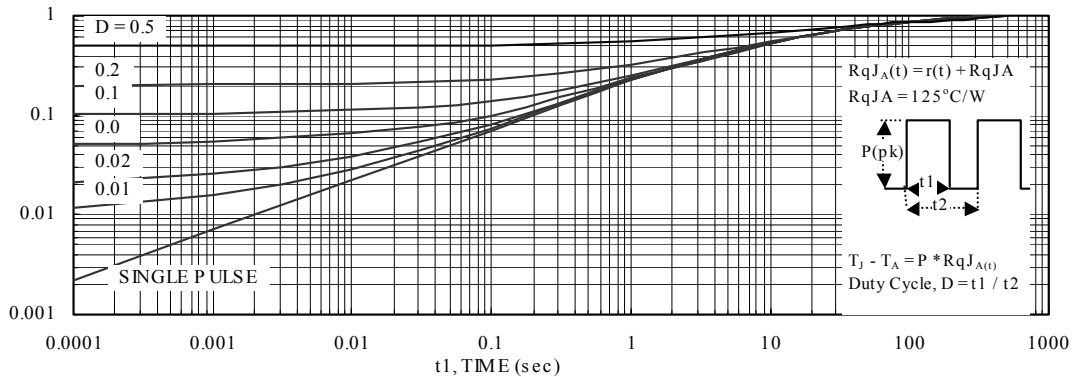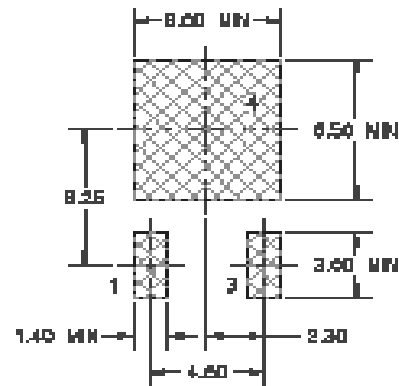## Normalized Thermal Transient Junction to Ambient

$$RqJ_A(t) = r(t) + RqJA$$
$$RqJA = 125^{\circ}C/W$$

$$T_J - T_A = P * RqJ_{A(t)}$$
Duty Cycle, $D = t1 / t2$
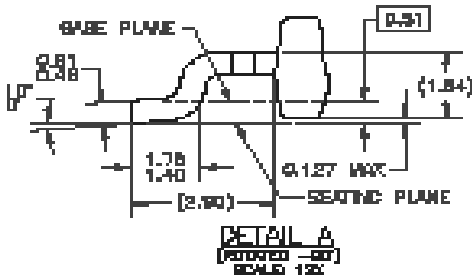
Figure 11. Transient Thermal Response Curve

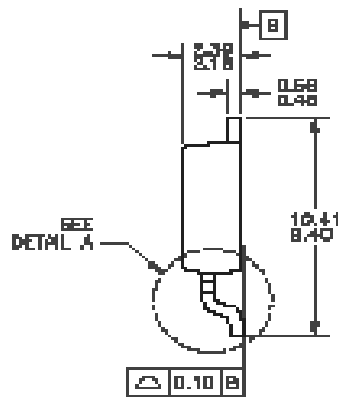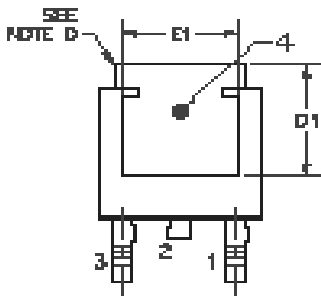©   4

Package Information
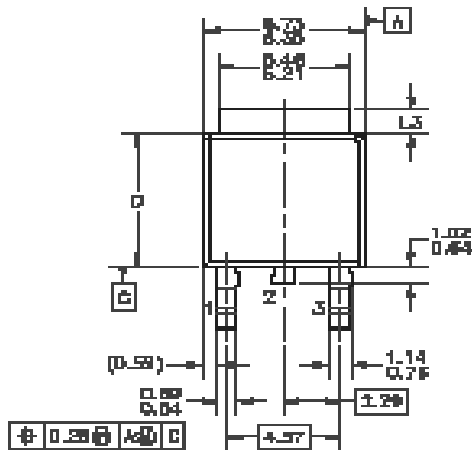
LAND PATTERN RECOMMENDATION

DETAIL A
[ROTATED -90°]
SCALE 15X

NOTES: UNLESS OTHERWISE SPECIFIED
A) ALL DIMENSIONS ARE IN MILLIMETERS.
B) THIS PACKAGE CONFORMS TO JEDEC TO-252,
   ISSUE C, VARIATION AA & AB, DATED NOV. 1989.
C) DIMENSIONING AND TOLERANCING PER
   ASME Y14.5M-1994.
D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED
   CORNERS OR EDGE PROTRUSION.
E) DIMENSIONS L3,D,E1&D1 TABLE:

	OPTION AA	OPTION AB
L3	0.51-1.27	1.02-2.69
D	5.47-5.83	5.33-5.99
E1	4.32 MM	3.51 MM
D1	3.81 MM	4.57 MM