N-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.
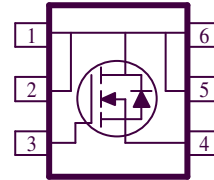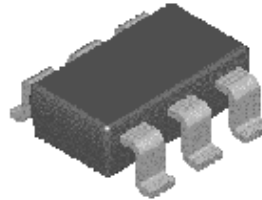
PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.027 @ V_{GS} = 10 V	6.3
	0.035 @ V_{GS} = 4.5V	5.5

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe TSOP-6 saves board space
- Fast switching speed
- High performance trench technology

RoHS COMPLIANT HALOGEN **FREE**

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ^{o}C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current[a]	T_A=25°C	I_D	6.3	A
	T_A=70°C		5.2	
Pulsed Drain Current[b]		I_{DM}	±20	
Continuous Source Current (Diode Conduction)[a]		I_S	1.3	A
Power Dissipation[a]	T_A=25°C	P_D	1.6	W
	T_A=70°C		1.0	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	^{o}C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient[a]	t <= 5 sec	R_{THJA}	78.0	^{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
Switch Off Characteristics						
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°C			10	
Switch On Characteristics						
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 uA	1.0		3.0	V
Drain-Source On-Resistance[A]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 6.3 A			27	mΩ
		V_{GS} = 10 V, I_D = 6.3 A T_J = 55°C			39	
		V_{GS} = 4.5 V, I_D = 5.5 A			35	
Forward Tranconductance[A]	g_{fs}	V_{DS} = 10 V, I_D = 6.3 A		45		S
On-State Drain Current[A]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	20			A
Diode Forward Voltage	V_{SD}	I_S = 1.3 A, V_{GS} = 0 V		0.75		V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 6.3 A R_L = 6 Ω		9		nC
Gate-Source Charge	Q_{gs}			2.9		
Gate-Drain Charge	Q_{gd}			3.2		
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DS} = 15 V, R_L = 6 Ω, I_D = 1 A, V_{GEN} = 10 V		6		ns
Rise Time	t_r			10		
Turn-Off Delay Time	$t_{d(off)}$			18		
Fall-Time	t_f			5		

Notes

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

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

Typical Electrical Characteristics (N-Channel)
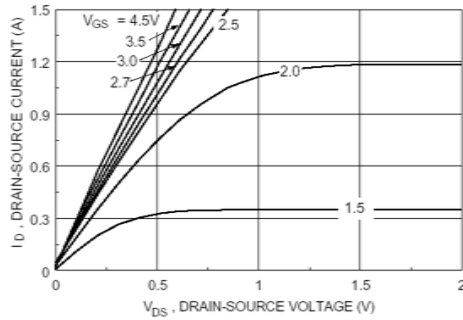

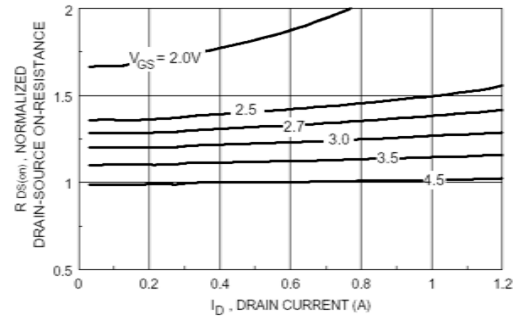**Figure 1. On-Region Characteristics**

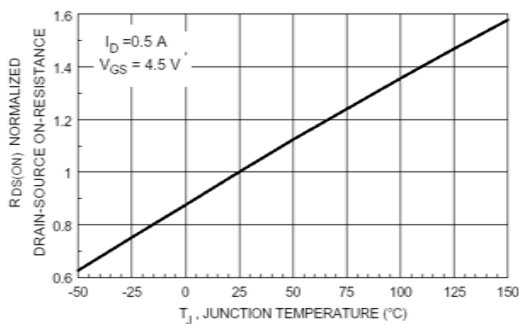**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage**

Figure 3. On-Resistance Variation with Temperature
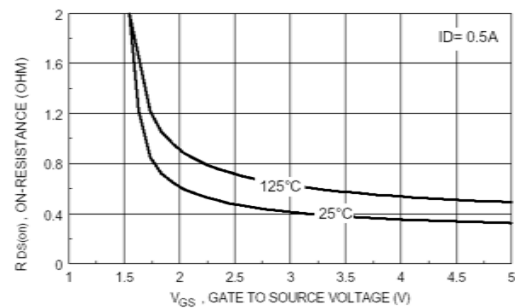

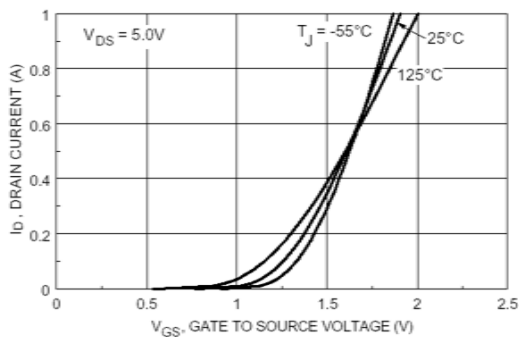**Figure 4. On-Resistance Variation with Gate to Source Voltage**

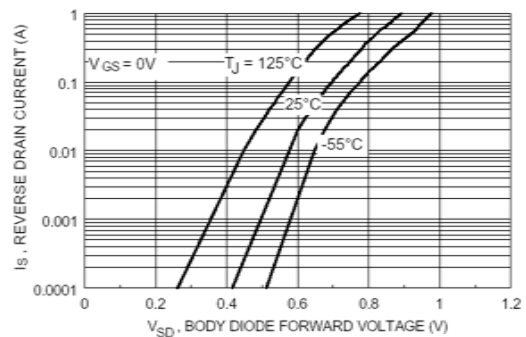**Figure 5. Transfer Characteristics**

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

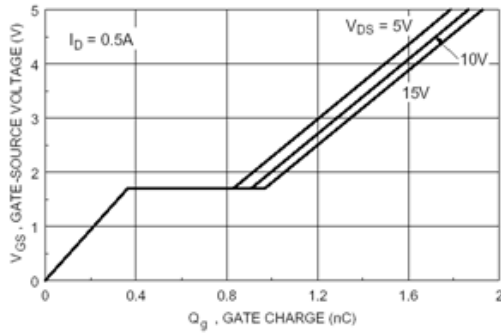# Typical Electrical Characteristics (N-Channel)

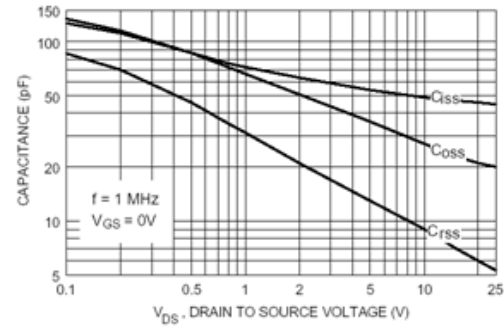
Figure 7. Gate Charge Characteristics.
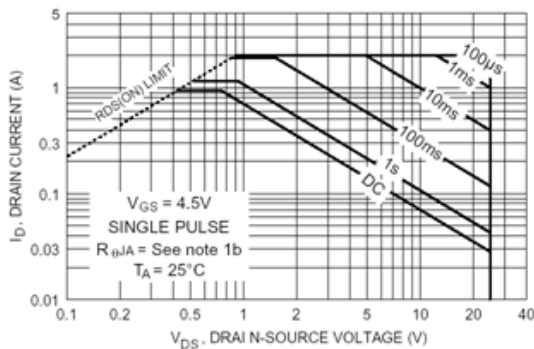

Figure 8. Capacitance Characteristics.
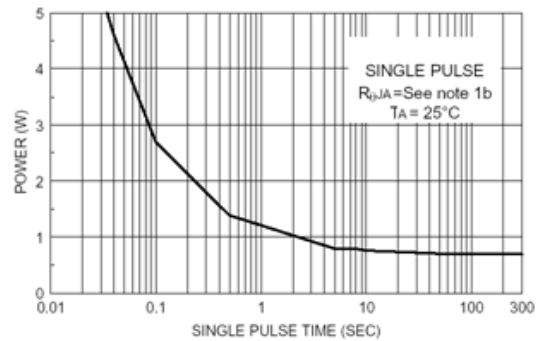

Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

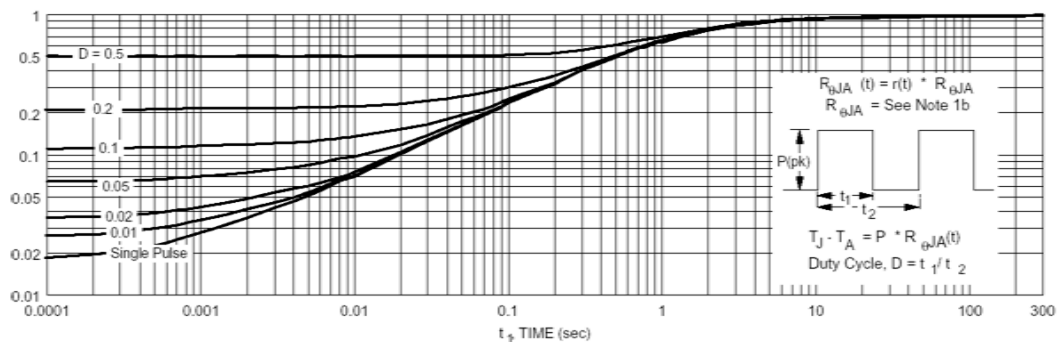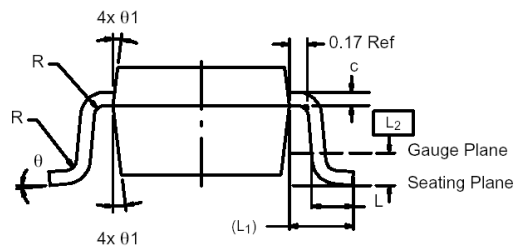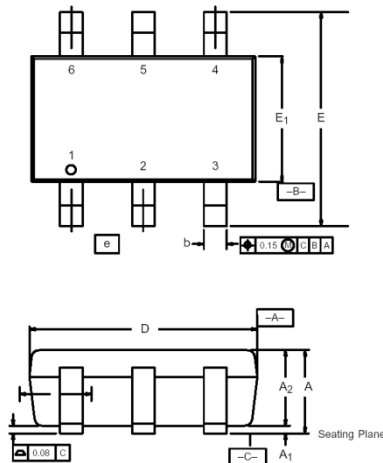**Normalized Thermal Transient Junction to Ambient**

$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$
$$R_{\theta JA} = \text{See Note 1b}$$
$$T_J - T_A = P * R_{\theta JA}(t)$$
$$\text{Duty Cycle, } D = t_1/t_2$$

Figure 11. Transient Thermal Response Curve

Package Information

TSOP-6: 6LEAD

	MILLIMETERS			**INCHES**		
Dim	**Min**	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.91	–	1.10	0.036	–	0.043
A$_1$	0.01	–	0.10	0.0004	–	0.004
A$_2$	0.84	–	1.00	0.033	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E$_1$	1.55	1.65	1.70	0.061	0.065	0.067
e	1.00 BSC			0.0394 BSC		
L	0.35	–	0.50	0.014	–	0.020
L$_1$	0.60 Ref			0.024 Ref		
L$_2$	0.25 BSC			0.010 BSC		
R	0.10	–	–	0.004	–	–
θ	0°	4°	8°	0°	4°	8°
θ$_1$	7° Nom			7° Nom		