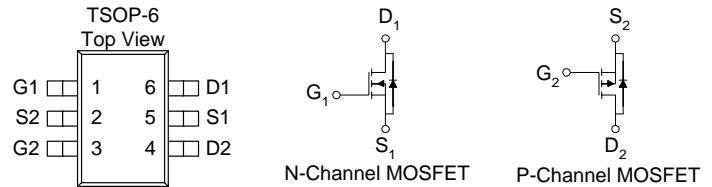


### N & P-Channel 32-V (D-S) MOSFET

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)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
30	0.063 @ $V_{GS} = 10V$	3.7
	0.090 @ $V_{GS} = 4.5V$	3.1
-30	0.112 @ $V_{GS} = -10V$	-2.7
	0.172 @ $V_{GS} = -4.5V$	-2.2

- 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



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_A = 25^\circ C$	3.7	-2.7	A
	$T_A = 70^\circ C$	2.9	-2.1	
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	8	-8	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	1.05	-1.05	A
Power Dissipation <sup>a</sup>	$T_A = 25^\circ C$	1.15		W
	$T_A = 70^\circ C$	0.7		
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ C$

THERMAL RESISTANCE RATINGS							
Parameter	Symbol	N-Channel		P-Channel		Unit	
		Typ	Max	Typ	Max		
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	93	110	93	110	$^\circ C/W$
	Steady State		130	150	130	150	

Notes

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

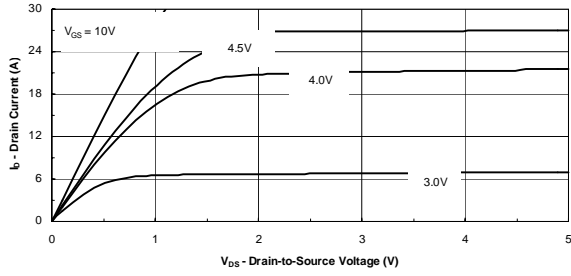
SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Conditions	Limits				Unit
			Ch	Min	Typ	Max	
<b>Static</b>							
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 uA	N	1	1.6	2.5	V
		V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 uA	P	-1	-1.6	-2.5	
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V	N		4.5nA	100	uA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = -20 V	P		-4.5nA	-100	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V	N		12nA	1	uA
		V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V	P		-12nA	-1	
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C	N			10	uA
		V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C	P			-10	
On-State Drain Current <sup>A</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	N	5			A
		V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -10 V	P	-5			
Drain-Source On-Resistance <sup>A</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.7 A	N		0.057	0.063	Ω
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = 3.1 A	P		0.100	0.112	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 2.7 A	N		0.075	0.090	
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.2 A	P		0.148	0.172	
Forward Transconductance <sup>A</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 3.7 A	N		10		S
		V <sub>DS</sub> = -5 V, I <sub>D</sub> = 3.1 A	P		5		
Diode Forward Voltage <sup>A</sup>	V <sub>SD</sub>	I <sub>S</sub> = 1.05 A, V <sub>GS</sub> = 0 V	N		0.80		S
		I <sub>S</sub> = -1.05 A, V <sub>GS</sub> = 0 V	P		-0.83		
<b>Dynamic<sup>B</sup></b>							
Total Gate Charge	Q <sub>g</sub>	N-Channel V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.7A P-Channel V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.1A	N		2.2	5	nC
Gate-Source Charge	Q <sub>gs</sub>		P		3.8	8	
			N		0.5	1	
Gate-Drain Charge	Q <sub>gd</sub>		P		0.6	2	
			N		0.8	2	
Input Capacitance	C <sub>iss</sub>		N		184	400	
		P		378	800		
Output Capacitance	C <sub>oss</sub>	N		62	200	pF	
		P		126	300		
Reverse Transfer Capacitance	C <sub>rss</sub>	N		30	200		
		P		52	300		
Turn-On Delay Time	t <sub>d(on)</sub>	N-Chaneel V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A , R <sub>GEN</sub> =15Ω, P-Channel V <sub>DD</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A R <sub>GEN</sub> =15Ω	N		5	10	nS
Rise Time	t <sub>r</sub>		P		5	10	
			N		12	30	
Turn-Off Delay Time	t <sub>d(off)</sub>		P		15	30	
			N		13	30	
Fall-Time	t <sub>f</sub>		P		20	40	
			N		7	20	
			P		20	40	

Notes

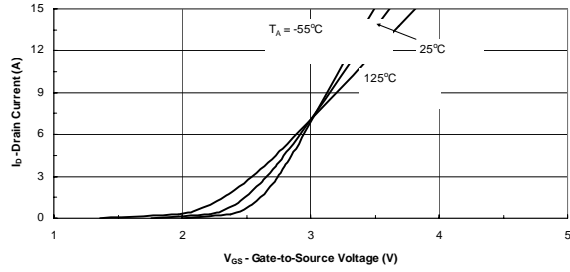
- a. Pulse test: PW <= 300us duty cycle <= 2%.
- b. Guaranteed by design, not subject to production testing.

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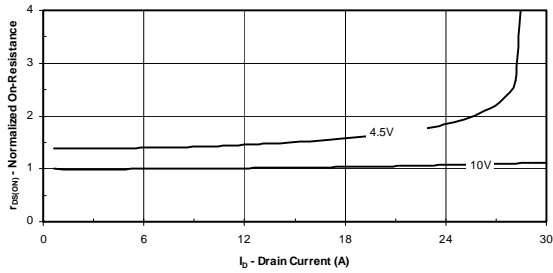
## Typical Electrical Characteristics (N-Channel)



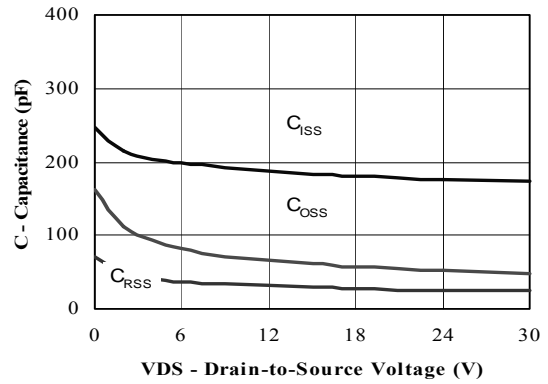
Output Characteristics



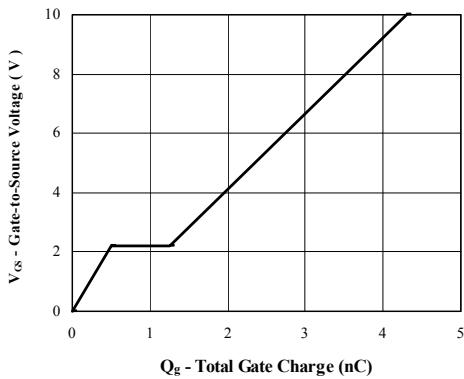
Transfer Characteristics



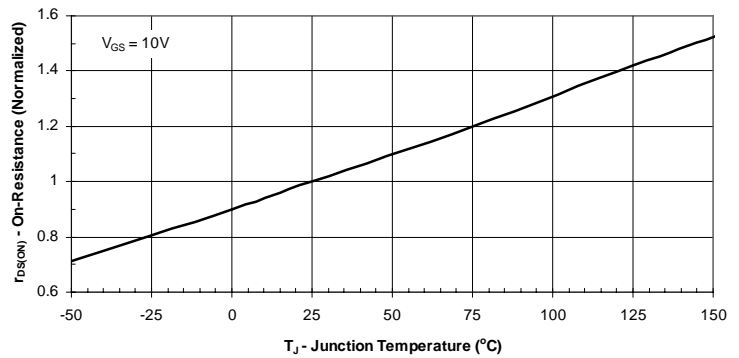
On-Resistance vs. Drain Current



Capacitance

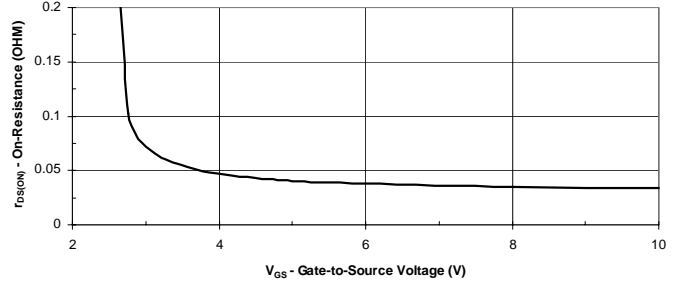
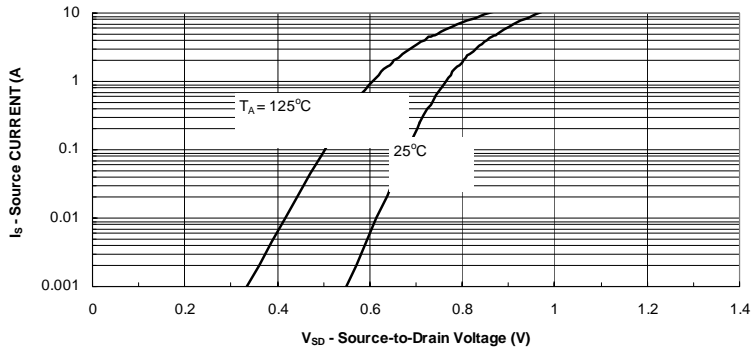


Gate Charge



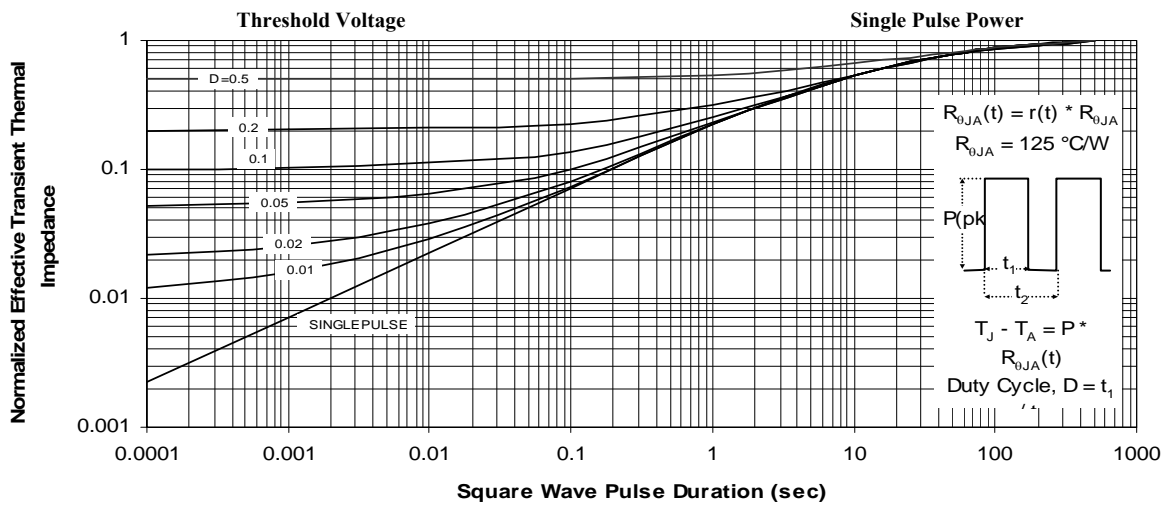
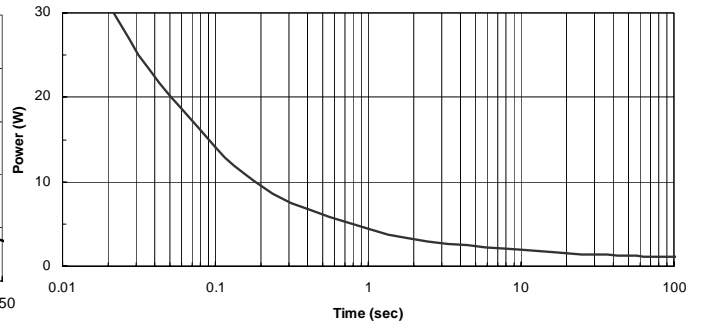
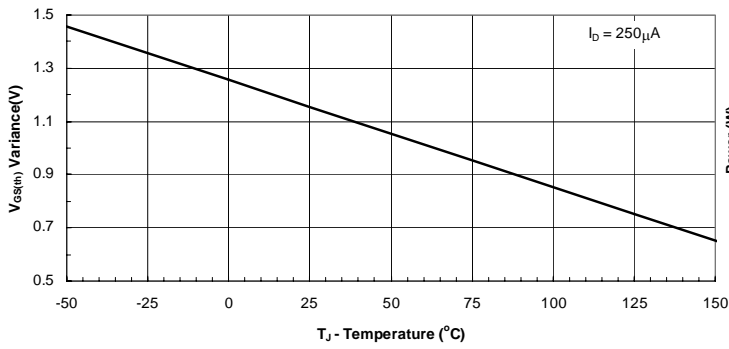
On-Resistance vs. Junction Temperature

### Typical Electrical Characteristics (N-Channel)



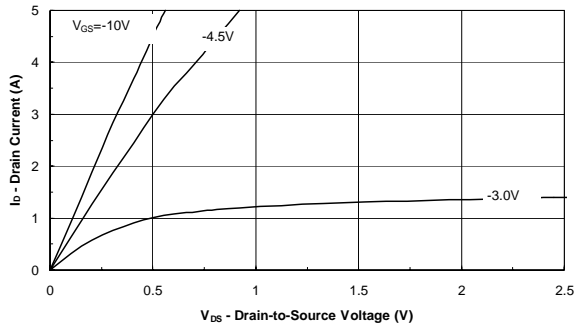
Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to Source Voltage

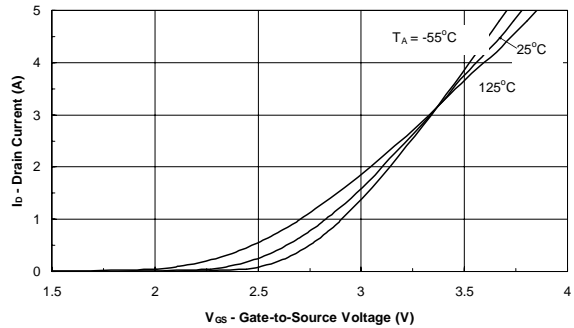


Normalized Thermal Transient Impedance, Junction-to-Ambient

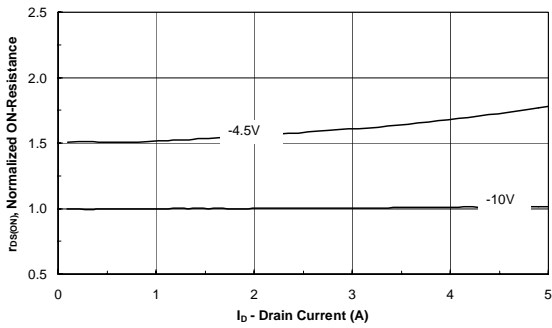
## Typical Electrical Characteristics (P-Channel)



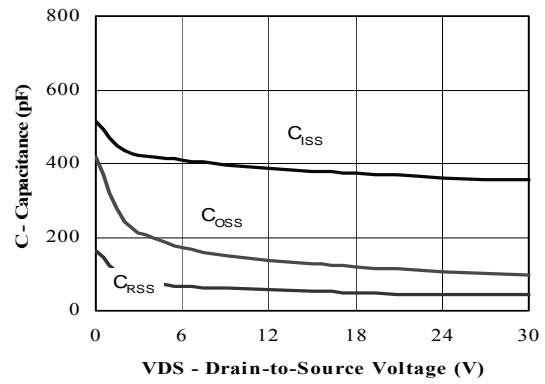
Output Characteristics



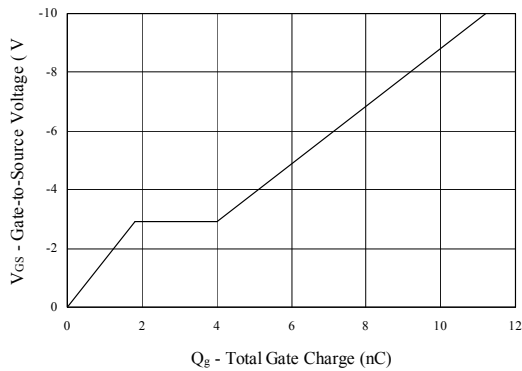
Transfer Characteristics



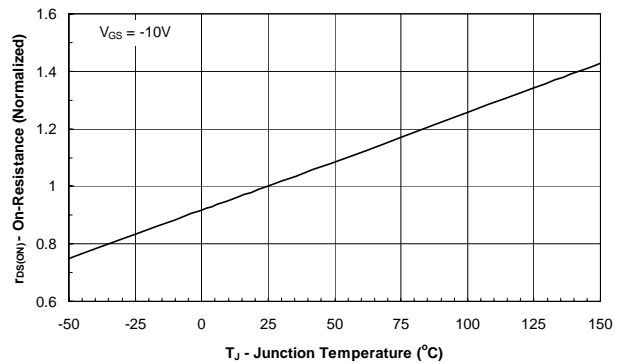
On-Resistance vs. Drain Current



Capacitance

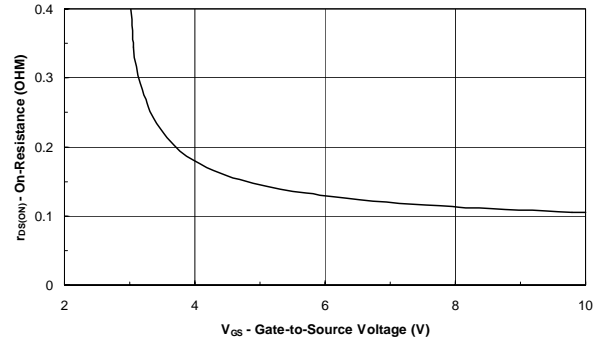
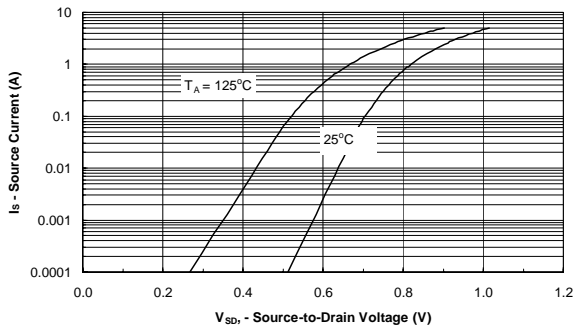


Gate Charge

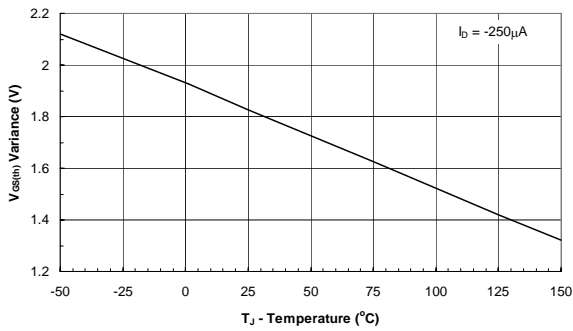


On-Resistance vs. Junction Temperature

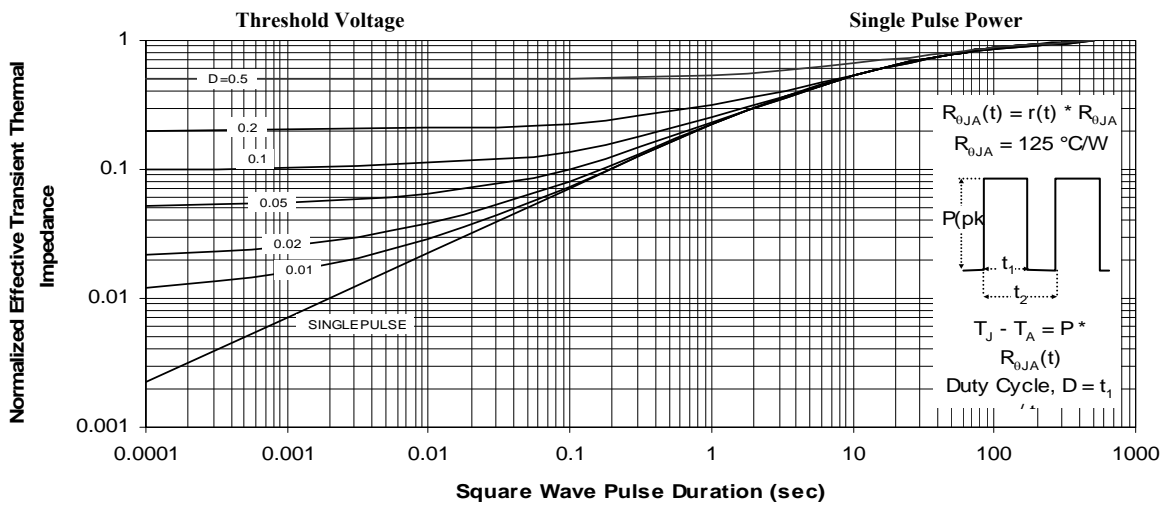
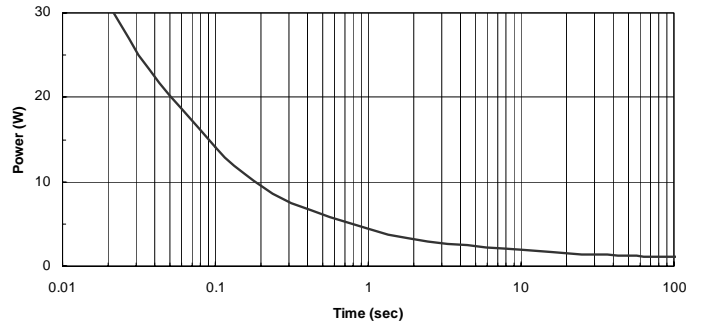
### Typical Electrical Characteristics (P-Channel)



Source-Drain Diode Forward Voltage



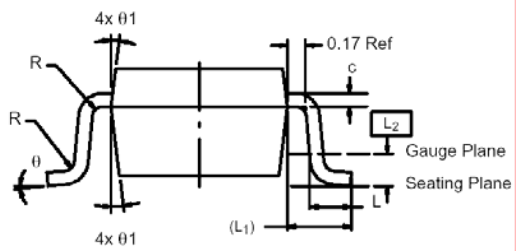
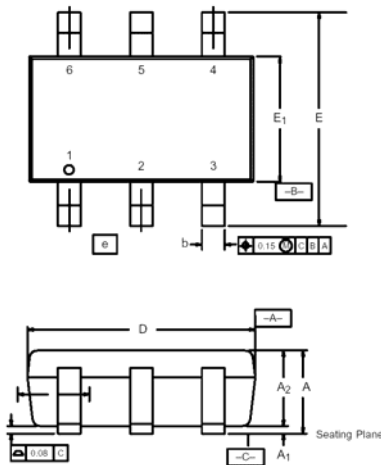
On-Resistance vs. Gate-to Source Voltage



Normalized Thermal Transient Impedance, Junction-to-Ambient

## Package Information

### TSOP-6: 6LEAD



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	–	1.10	0.036	–	0.043
A <sub>1</sub>	0.01	–	0.10	0.0004	–	0.004
A <sub>2</sub>	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 <sub>1</sub>	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 <sub>1</sub>	0.60 Ref			0.024 Ref		
L <sub>2</sub>	0.25 BSC			0.010 BSC		
R	0.10	–	–	0.004	–	–
θ	0°	4°	8°	0°	4°	8°
θ <sub>1</sub>	7° Nom			7° Nom		