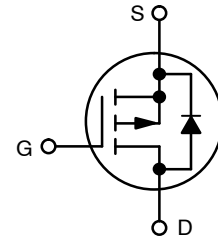
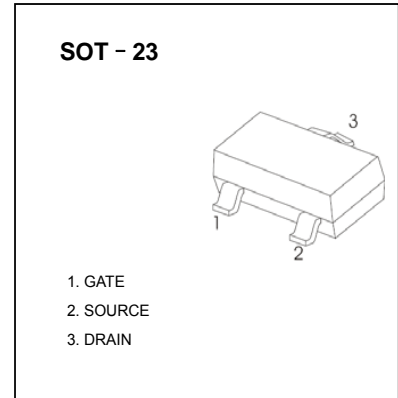


### Features

- $V_{DS} (V) = -30V$
- $R_{DS(ON)} < 75m\ \Omega$  ( $V_{GS} = -10V$ )
- $R_{DS(ON)} < 110m\ \Omega$  ( $V_{GS} = -4.5V$ )

### Applications

- Load Switch
- Optimized for Battery and Load Management Applications in Portable Equipment like Cell Phones, PDA's, Media Players, etc.



### MAXIMUM RATINGS ( $T_J = 25^\circ C$ unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			$V_{DSS}$	-30	V
Gate-to-Source Voltage			$V_{GS}$	$\pm 12$	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ C$	$I_D$	-2.2	A
		$T_A = 85^\circ C$		-1.5	
	$t \leq 5\ s$	$T_A = 25^\circ C$		-3.5	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ C$	$P_D$	0.48	W
	$t \leq 5\ s$			1.25	
Pulsed Drain Current	$t_p = 10\ \mu s$		$I_{DM}$	-15.0	A
Operating Junction and Storage Temperature			$T_J,$ $T_{stg}$	-55 to 150	$^\circ C$
Source Current (Body Diode)			$I_S$	-1.0	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			$T_L$	260	$^\circ C$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	260	$^\circ C/W$
Junction-to-Ambient - $t \leq 10\ s$ (Note 1)	$R_{\theta JA}$	100	

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)

**MOSFET ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250\ \mu\text{A}$ , Reference to $25^\circ\text{C}$		24		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = -24\text{ V}, T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{ V}, V_{DS} = -24\text{ V}, T_J = 85^\circ\text{C}$			-1.0 -5.0	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 0.1$	$\mu\text{A}$

**ON CHARACTERISTICS** (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-0.7	-1.15	-1.4	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.5		mV/ $^\circ\text{C}$
Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -2.2\text{ A}$		50	75	m $\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -1.8\text{ A}$		60	110	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5.0\text{ V}, I_D = -2.2\text{ A}$		7.0		S

**CHARGES, CAPACITANCES AND GATE RESISTANCE**

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz},$ $V_{DS} = -15\text{ V}$		720		pF
Output Capacitance	$C_{oss}$			95		
Reverse Transfer Capacitance	$C_{rss}$			65		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -10\text{ V}, V_{DS} = -15\text{ V},$ $I_D = -3.5\text{ A}$		15.6		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.7		
Gate-to-Source Charge	$Q_{GS}$			1.6		
Gate-to-Drain Charge	$Q_{GD}$			2.6		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V},$ $I_D = -3.5\text{ A}$		7.4		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.7		
Gate-to-Source Charge	$Q_{GS}$			1.6		
Gate-to-Drain Charge	$Q_{GD}$			2.6		
Gate Resistance	$R_G$			6.1		$\Omega$

**SWITCHING CHARACTERISTICS,  $V_{GS} = 4.5\text{ V}$**  (Note 4)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -10\text{ V}, V_{DS} = -15\text{ V},$ $I_D = -3.5\text{ A}, R_G = 6\ \Omega$		8.0		ns
Rise Time	$t_r$			11		
Turn-Off Delay Time	$t_{d(off)}$			32		
Fall Time	$t_f$			14		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V},$ $I_D = -3.5\text{ A}, R_G = 6\ \Omega$		9.0		ns
Rise Time	$t_r$			16		
Turn-Off Delay Time	$t_{d(off)}$			25		
Fall Time	$t_f$			22		

**DRAIN-SOURCE DIODE CHARACTERISTICS**

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -1.0\text{ A}, T_J = 25^\circ\text{C}$		-0.8	-1.2	V
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, I_S = -1.0\text{ A},$ $di_{SD}/dt = 100\text{ A}/\mu\text{s}$		14		ns
Charge Time	$t_a$			10		
Discharge Time	$t_b$			4.0		
Reverse Recovery Charge	$Q_{RR}$			8.0		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

- Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)
- Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$
- Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

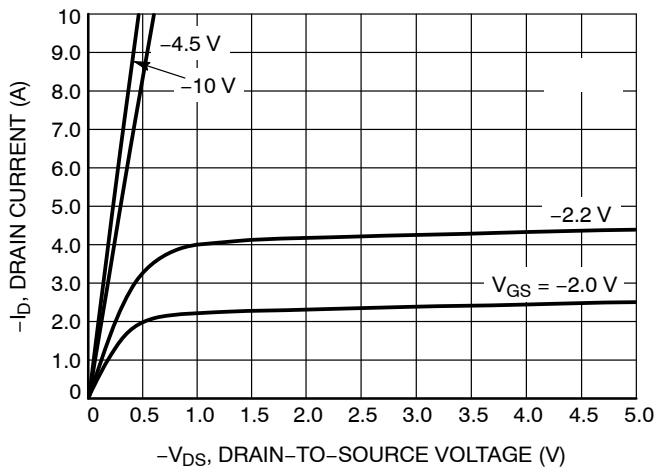


Figure 1. On-Region Characteristics

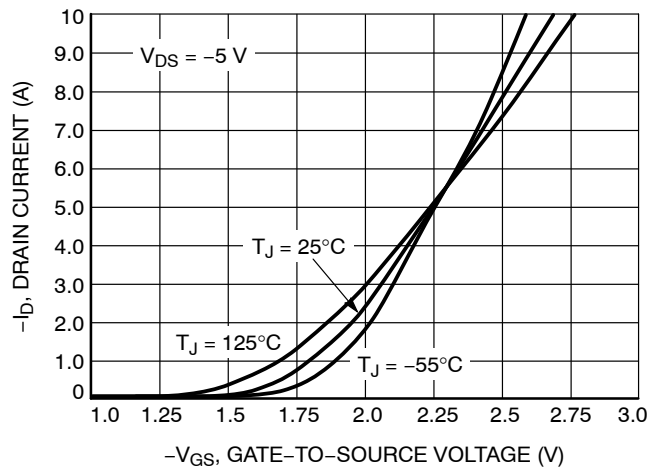


Figure 2. Transfer Characteristics

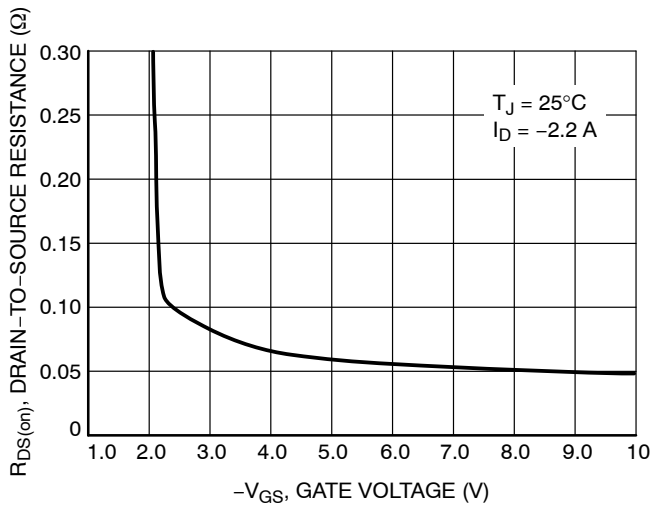


Figure 3. On-Resistance vs. Gate-to-Source Voltage

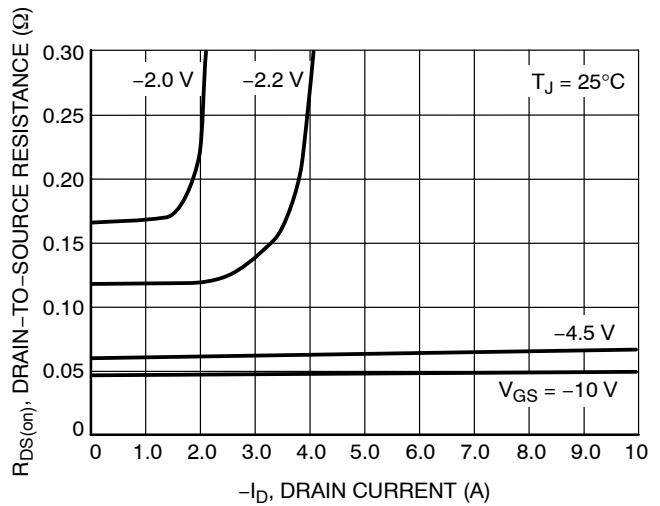


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

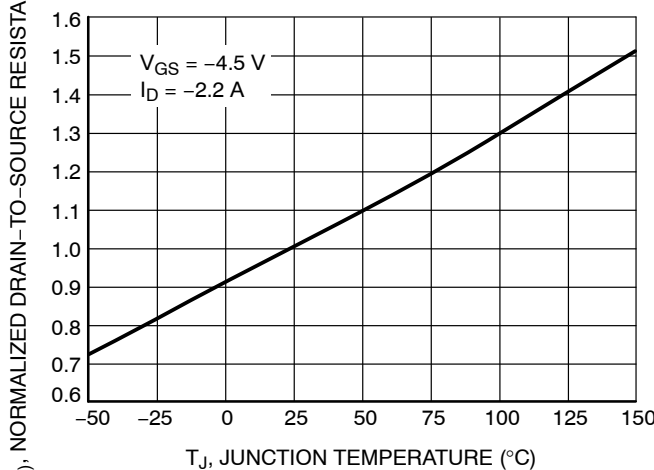


Figure 5. On-Resistance Variation with Temperature

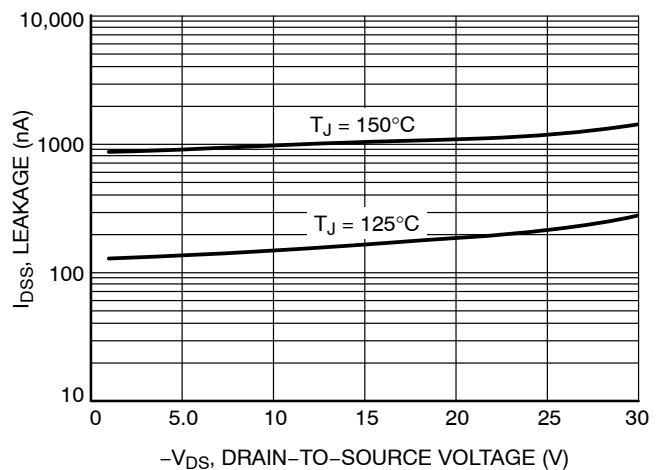


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

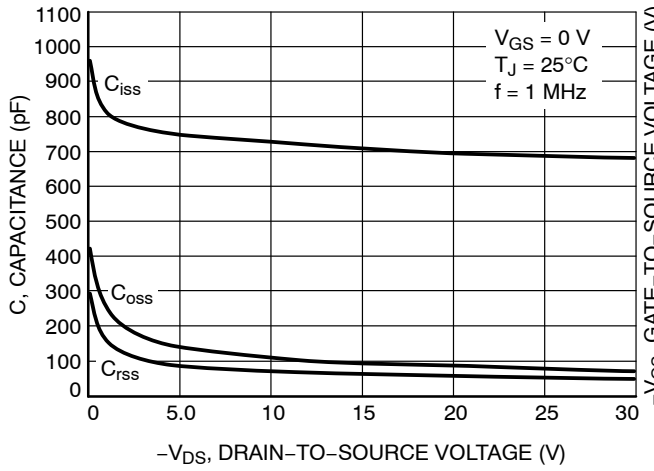


Figure 7. Capacitance Variation

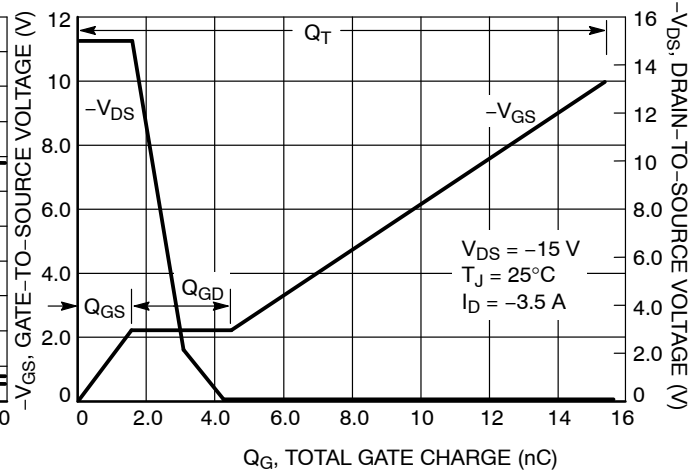


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

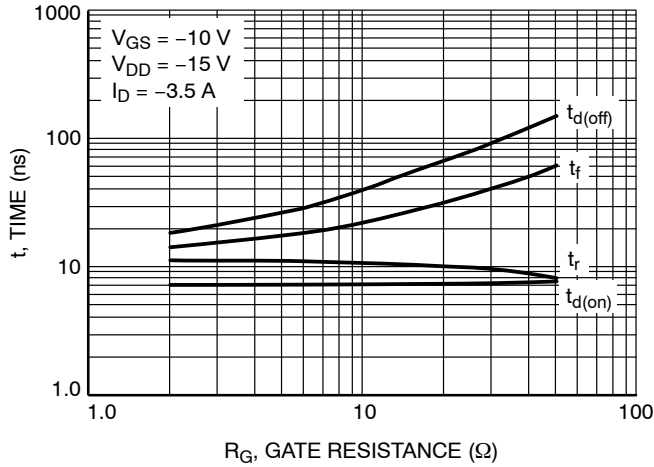


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

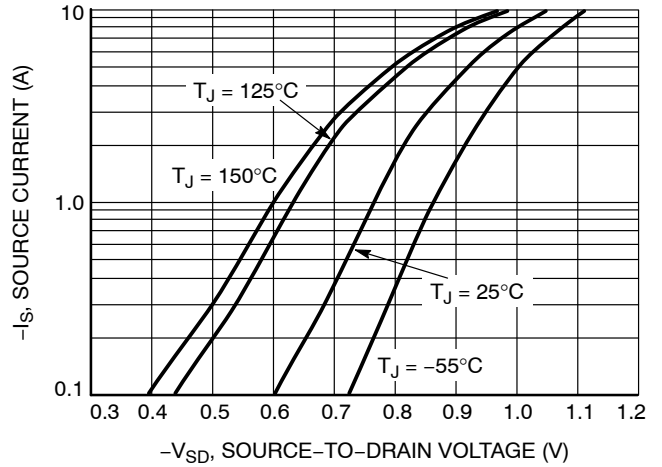


Figure 10. Diode Forward Voltage vs. Current

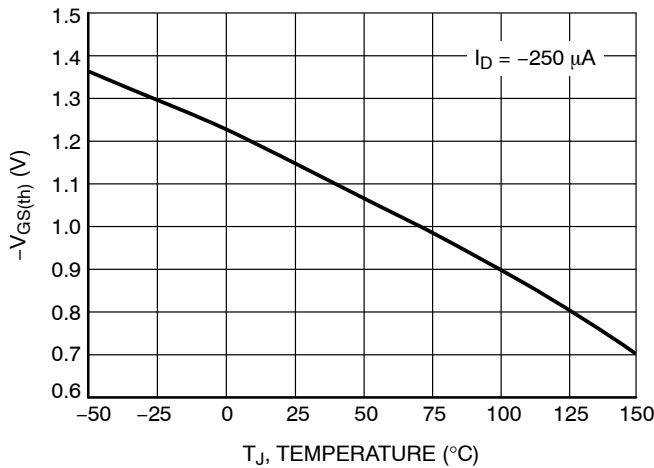


Figure 11. Threshold Voltage

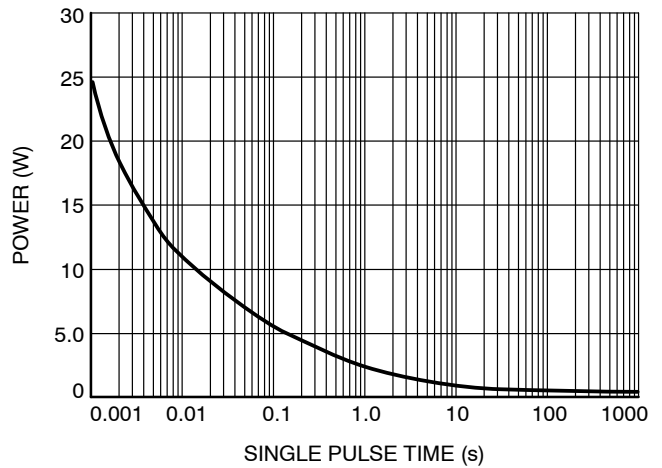


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS

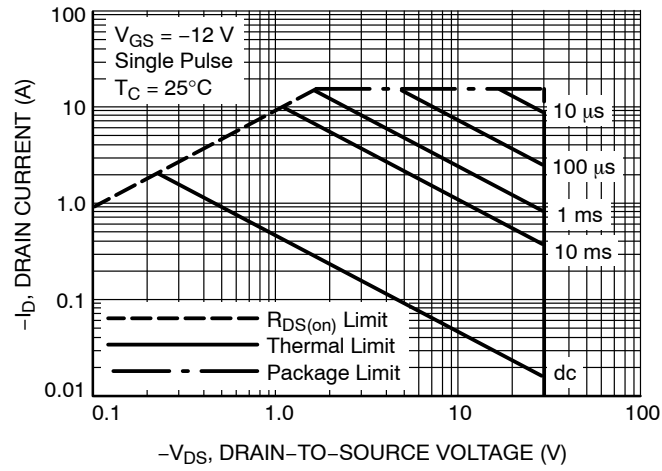


Figure 13. Maximum Rated Forward Biased Safe Operating Area

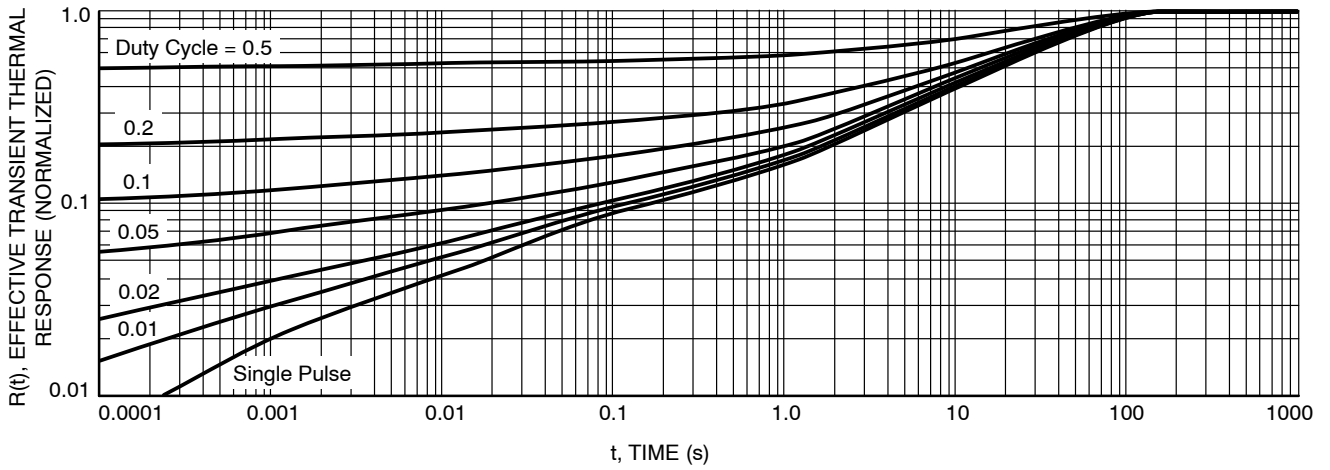
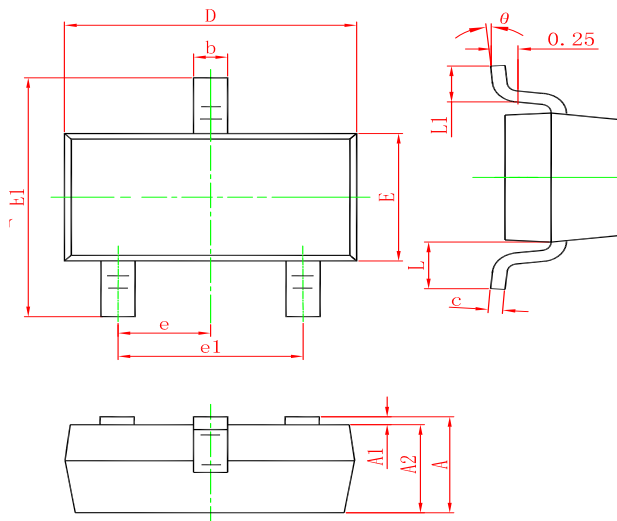


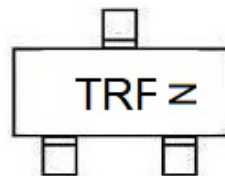
Figure 14. FET Thermal Response

### SOT-23 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
$\theta$	0°	8°	0°	8°

### Marking



### Ordering information

Order code	Package	Baseqty	Deliverymode
NTR4171PT1G	SOT-23	3000	Tape and reel