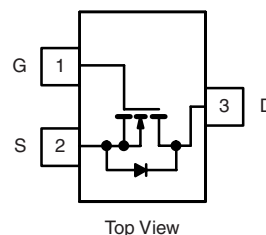
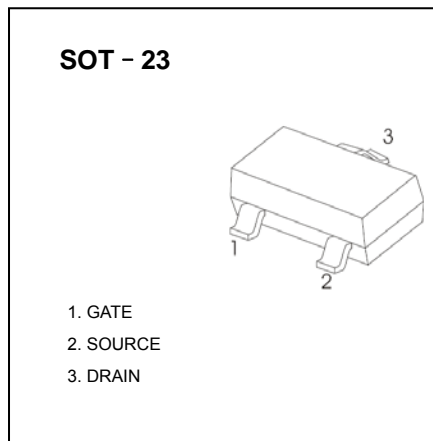


## FEATURES

- $V_{DS} (V) = 20V$
- $I_D = 6 A (V_{GS} = 10V)$
- $R_{DS(ON)} < 28m\Omega (V_{GS} = 4.5V)$
- $R_{DS(ON)} < 42m\Omega (V_{GS} = 2.5V)$
- $R_{DS(ON)} < 50m\Omega (V_{GS} = 1.8V)$

## APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications



## ABSOLUTE MAXIMUM RATINGS $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	
Continuous Drain Current ( $T_J = 150\text{ }^\circ\text{C}$ )	$I_D$	$T_C = 25\text{ }^\circ\text{C}$	6 <sup>a</sup>
		$T_C = 70\text{ }^\circ\text{C}$	5.1
		$T_A = 25\text{ }^\circ\text{C}$	5 <sup>b, c</sup>
		$T_A = 70\text{ }^\circ\text{C}$	4 <sup>b, c</sup>
Pulsed Drain Current	$I_{DM}$	20	A
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	1.75
		$T_A = 25\text{ }^\circ\text{C}$	1.04 <sup>b, c</sup>
Maximum Power Dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	2.1
		$T_C = 70\text{ }^\circ\text{C}$	1.3
		$T_A = 25\text{ }^\circ\text{C}$	1.25 <sup>b, c</sup>
		$T_A = 70\text{ }^\circ\text{C}$	0.8 <sup>b, c</sup>
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)		260	

## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, d</sup>	$R_{thJA}$	80	100	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	40	60	

Notes:

- Package limited
- Surface Mounted on 1" x 1" FR4 board.
- $t = 5\text{ s}$ .
- Maximum under steady state conditions is 125  $^\circ\text{C/W}$ .
- Based on  $T_C = 25\text{ }^\circ\text{C}$ .

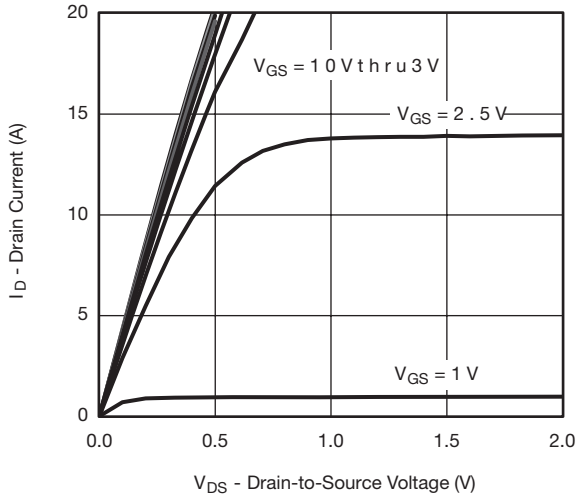
**SPECIFICATIONS**  $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		25		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		1.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		28		m $\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 4.7\text{ A}$		42		
		$V_{GS} = 1.8\text{ V}, I_D = 4.3\text{ A}$		50		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 5.0\text{ A}$		24		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		865		pF
Output Capacitance	$C_{oss}$			105		
Reverse Transfer Capacitance	$C_{rss}$			55		
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 5\text{ V}, I_D = 5.0\text{ A}$		12	18	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		8.8	14	
Gate-Source Charge	$Q_{gs}$			1.1		
Gate-Drain Charge	$Q_{gd}$		0.7			
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	0.5	2.4	4.8	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8	16	ns
Rise Time	$t_r$			17	26	
Turn-Off Delay Time	$t_{d(off)}$			31	47	
Fall Time	$t_f$			8	16	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 5\text{ V}, R_g = 1\text{ }\Omega$		5	10	
Rise Time	$t_r$			13	20	
Turn-Off Delay Time	$t_{d(off)}$			21	32	
Fall Time	$t_f$			6	12	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			1.75	A
Pulse Diode Forward Current	$I_{SM}$				20	
Body Diode Voltage	$V_{SD}$	$I_S = 4\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		12	20	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			5	10	nC
Reverse Recovery Fall Time	$t_a$			7		ns
Reverse Recovery Rise Time	$t_b$			5		

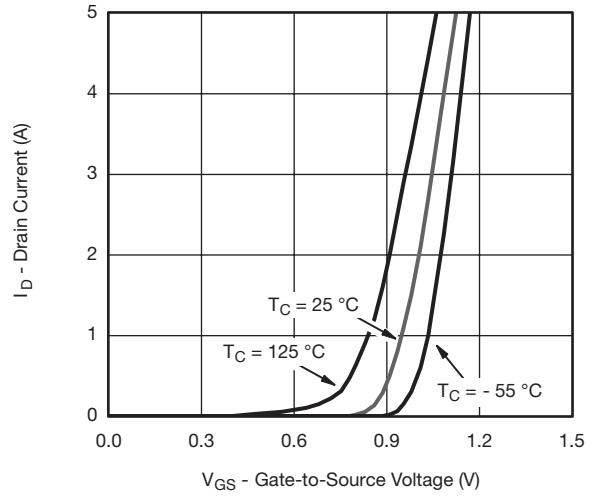
Notes:

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$   
b. Guaranteed by design, not subject to production testing.

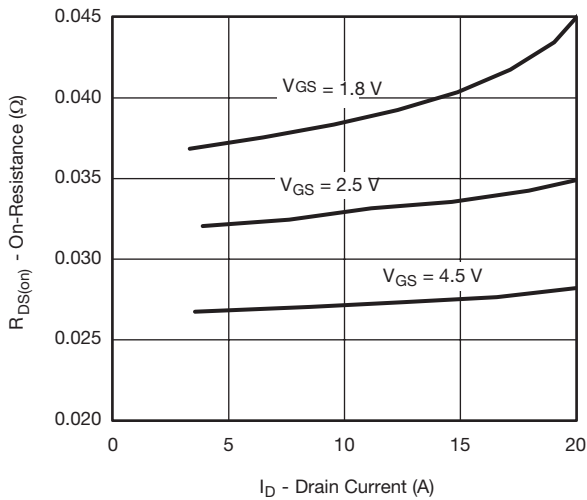
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



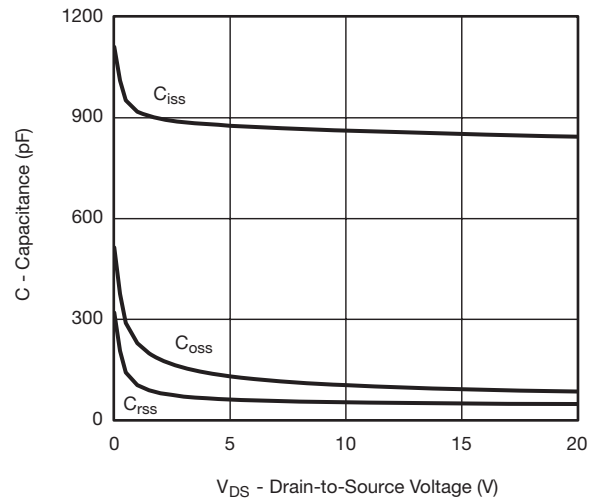
Output Characteristics



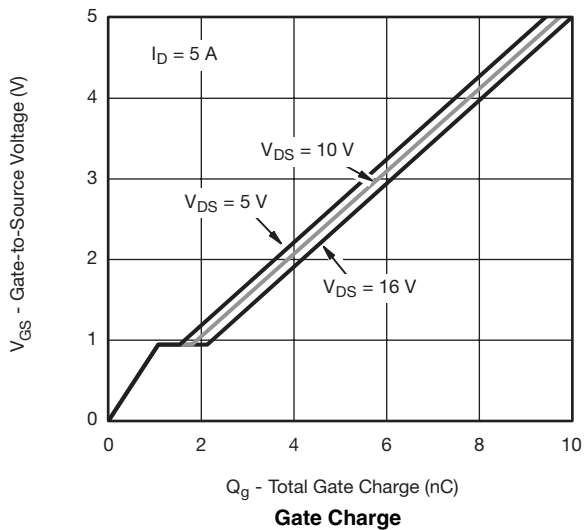
Transfer Characteristics



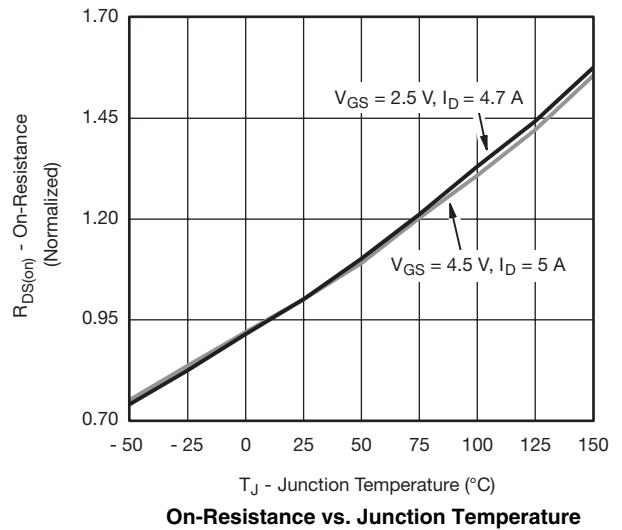
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

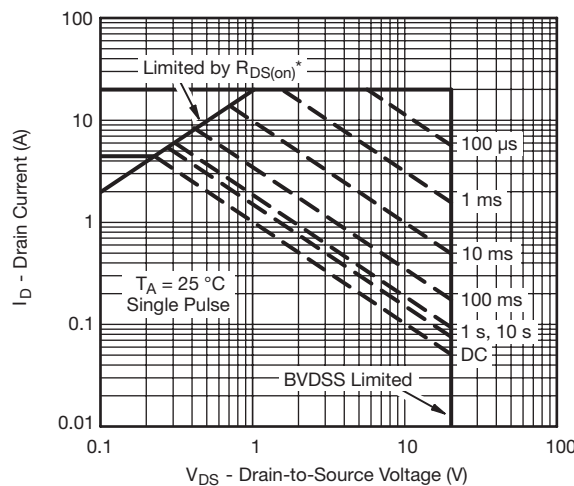
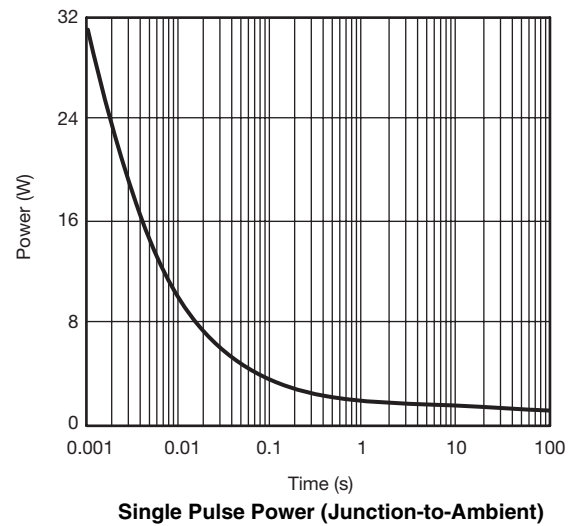
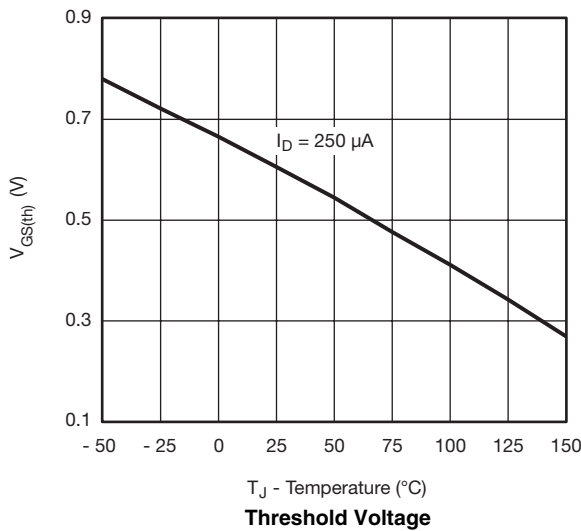
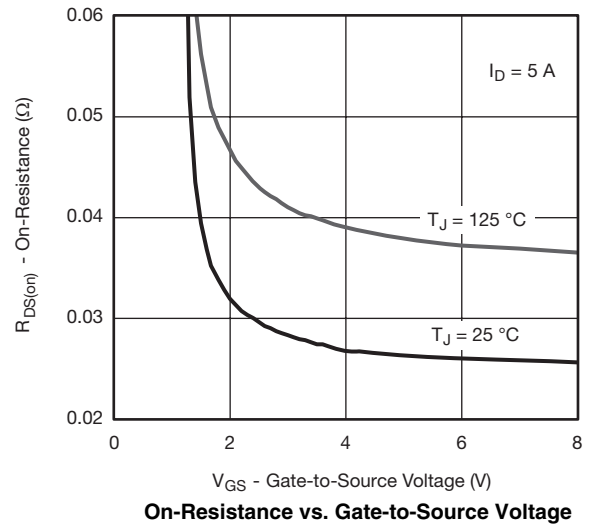
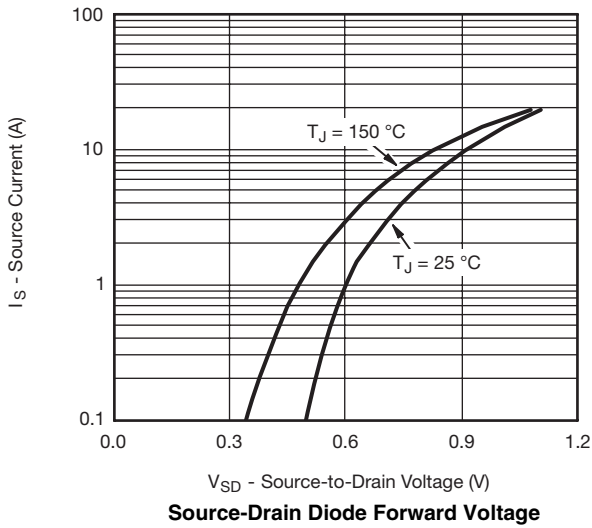


Gate Charge



On-Resistance vs. Junction Temperature

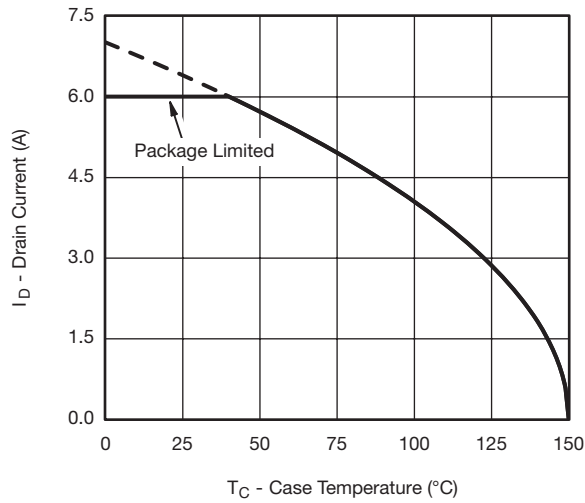
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



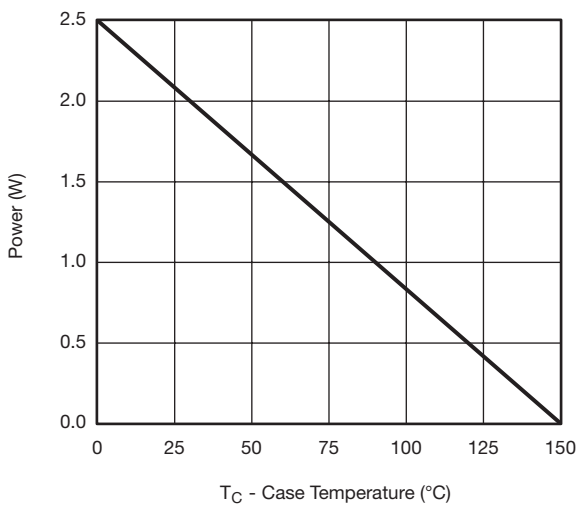
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

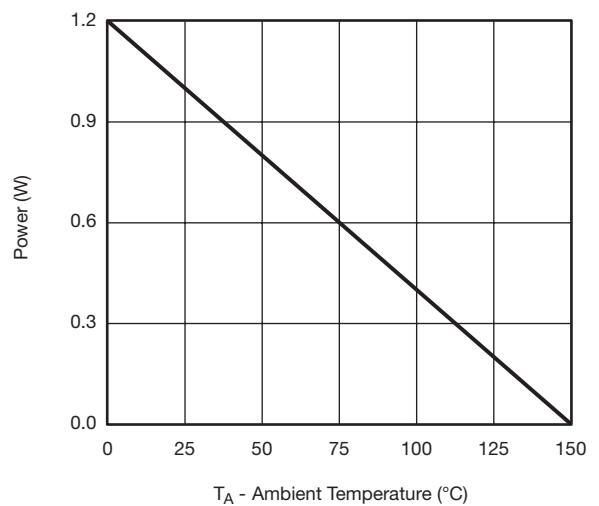
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



$T_C$  - Case Temperature (°C)  
**Current Derating\***



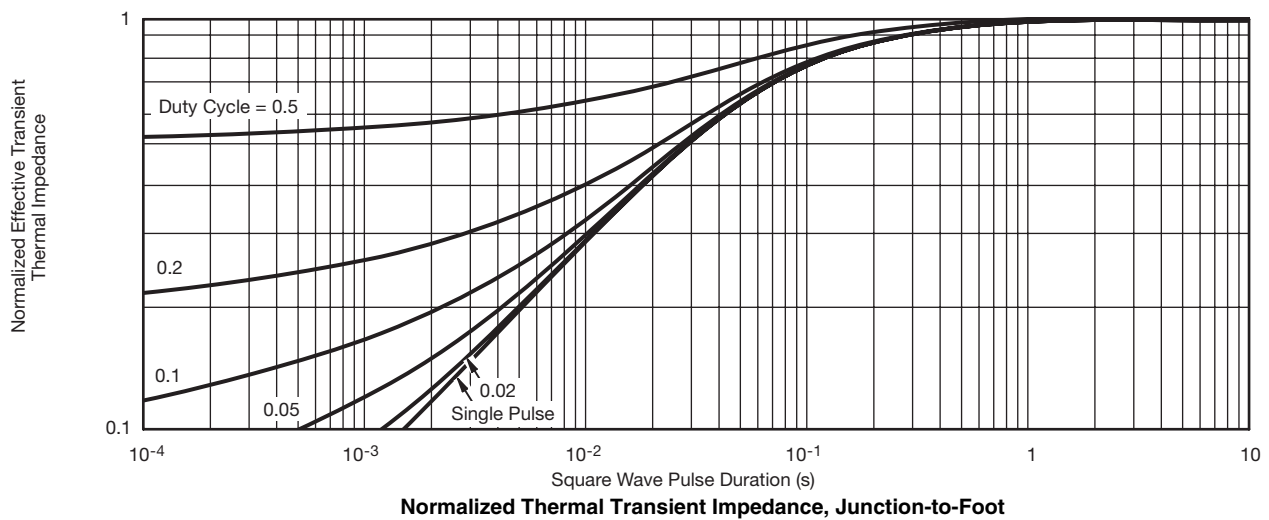
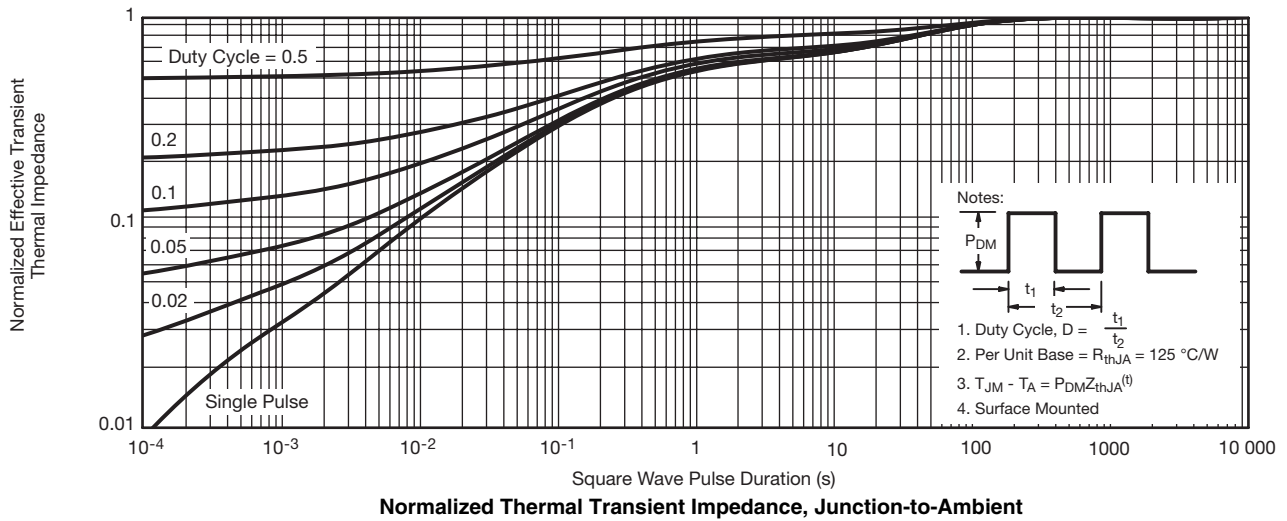
$T_C$  - Case Temperature (°C)  
**Power Derating, Junction-to-Foot**



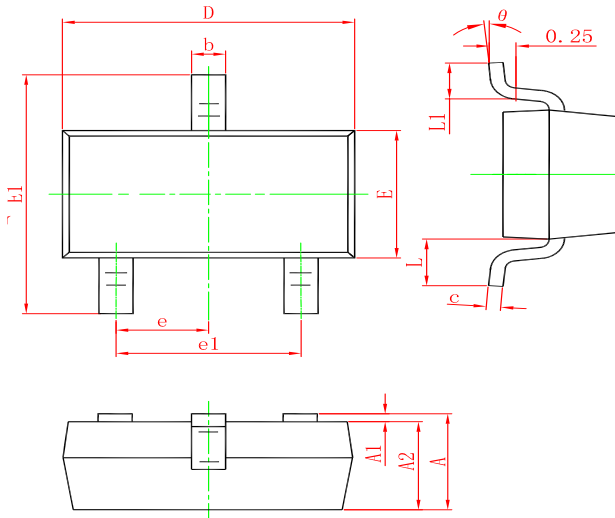
$T_A$  - Ambient Temperature (°C)  
**Power Derating, Junction-to-Ambient**

\* The power dissipation  $P_D$  is based on  $T_{J(max.)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

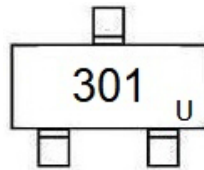


**SOT-23 PACKAGE OUTLINE DIMENSIONS**



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
θ	0°	8°	0°	8°

**Marking**



**Ordering information**

Order code	Package	Baseqty	Deliverymode
UMW FDV301N	SOT-23	3000	Tape and reel