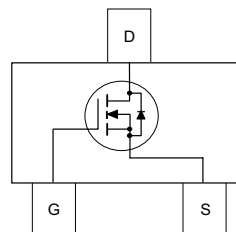
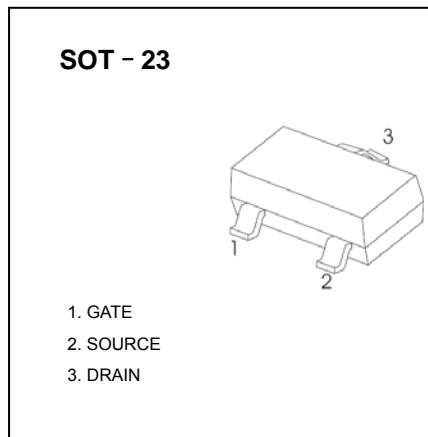


**General Description**

These devices are particularly suited for low voltage applications in notebook computers, portable phones, PCMCIA cards, and other battery powered circuits where fast switching, and low in-line power loss are needed in a very small outline surface mount package. <sup>®</sup>

**Features**

- $V_{DS} (V) = 30V$
- $R_{DS(ON)} < 110m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 160m\Omega$  ( $V_{GS} = 4.5V$ )



**Absolute Maximum Ratings**  $T_A=25^{\circ}C$  unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain-Source Voltage	30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous (Note 1a)	1.4	A
	– Pulsed	10	
$P_D$	Power Dissipation for Single Operation (Note 1a) (Note 1b)	0.5	W
		0.46	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^{\circ}C$
<b>Thermal Characteristics</b>			
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	75	

**Electrical Characteristics**

T<sub>A</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain–Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		26		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C			10	μA
I <sub>GSS</sub>	Gate–Body Leakage	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±100	nA
<b>On Characteristics (Note 2)</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	2.1	3	V
R <sub>DS(on)</sub>	Static Drain–Source On–Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1.4 A V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 1.2 A		92 120	110 160	mΩ
I <sub>D(on)</sub>	On–State Drain Current	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 5 V	3.5			A
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 1.4 A		4		S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		145	193	pF
C <sub>oss</sub>	Output Capacitance			35	47	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			15	23	pF
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = 15 mV, f = 1.0 MHz		1.6		Ω
<b>Switching Characteristics (Note 2)</b>						
t <sub>d(on)</sub>	Turn–On Delay Time	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω		3	6	ns
t <sub>r</sub>	Turn–On Rise Time			8	16	ns
t <sub>d(off)</sub>	Turn–Off Delay Time			16	29	ns
t <sub>f</sub>	Turn–Off Fall Time			2	4	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 1.4 A, V <sub>GS</sub> = 4.5 V		1.3	1.8	nC
Q <sub>gs</sub>	Gate–Source Charge			0.5		nC
Q <sub>gd</sub>	Gate–Drain Charge			0.5		nC
<b>Drain–Source Diode Characteristics</b>						
V <sub>SD</sub>	Drain–Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 0.42 A (Note 2)		0.8	1.2	V
t <sub>rr</sub>	Diode Reverse Recovery Time	I <sub>F</sub> = 1.4 A, d <sub>I</sub> /d <sub>t</sub> = 100 A/μs		11	22	nS
Q <sub>rr</sub>	Diode Reverse Recovery Charge			4		nC

**Notes:**

- R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



a) 250°C/W when mounted on a 0.02 in<sup>2</sup> pad of 2 oz. copper.

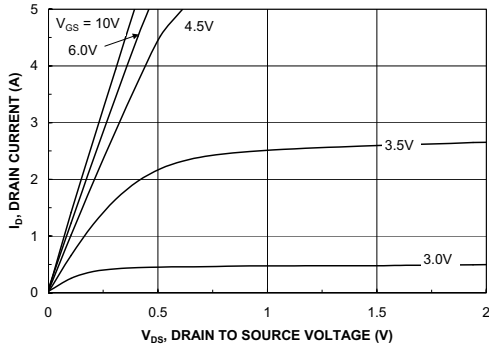


b) 270°C/W when mounted on a minimum pad.

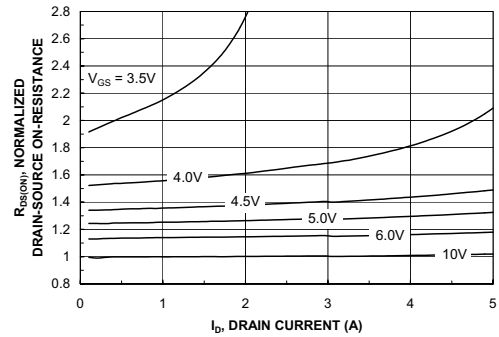
Scale 1 : 1 on letter size paper

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

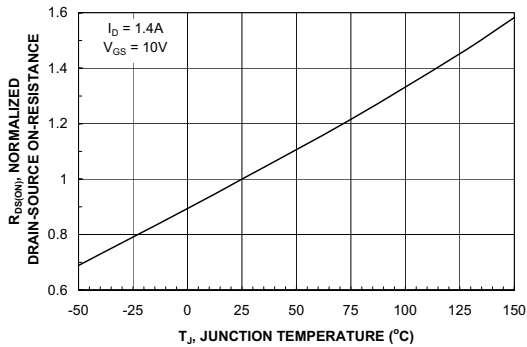
**Typical Characteristics**



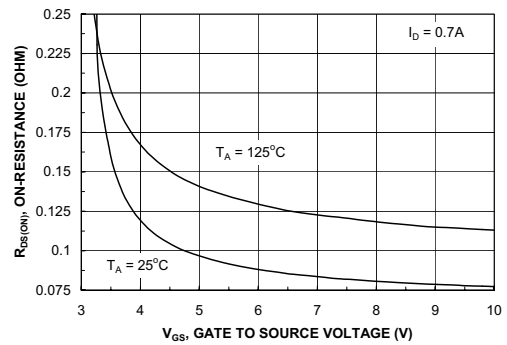
**Figure 1. On-Region Characteristics.**



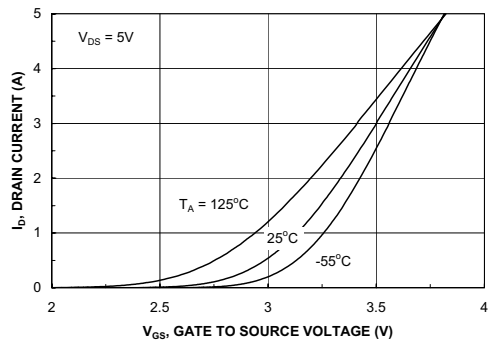
**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**



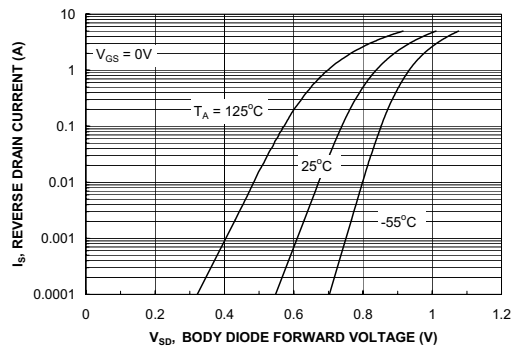
**Figure 3. On-Resistance Variation with Temperature.**



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

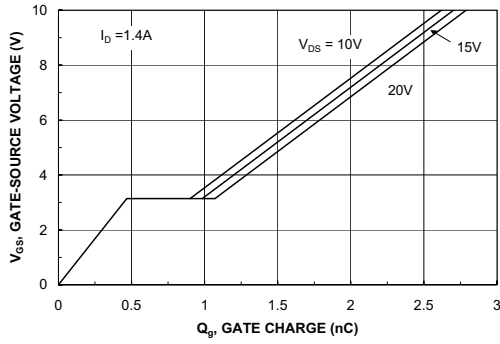


**Figure 5. Transfer Characteristics.**

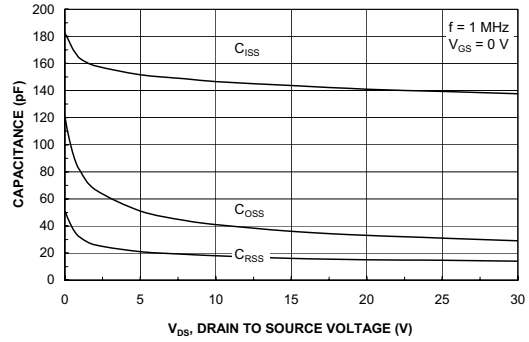


**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.**

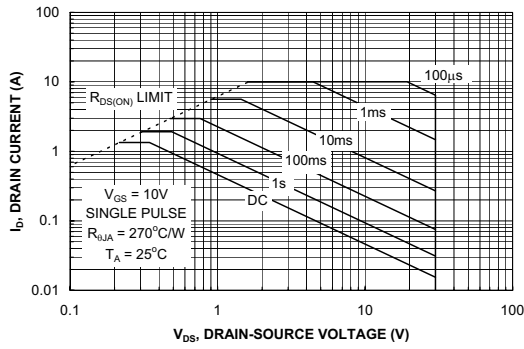
**Typical Characteristics**



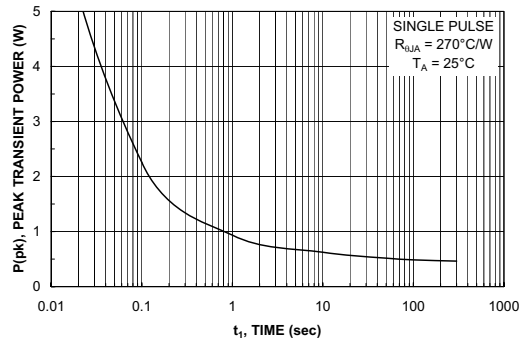
**Figure 7. Gate Charge Characteristics.**



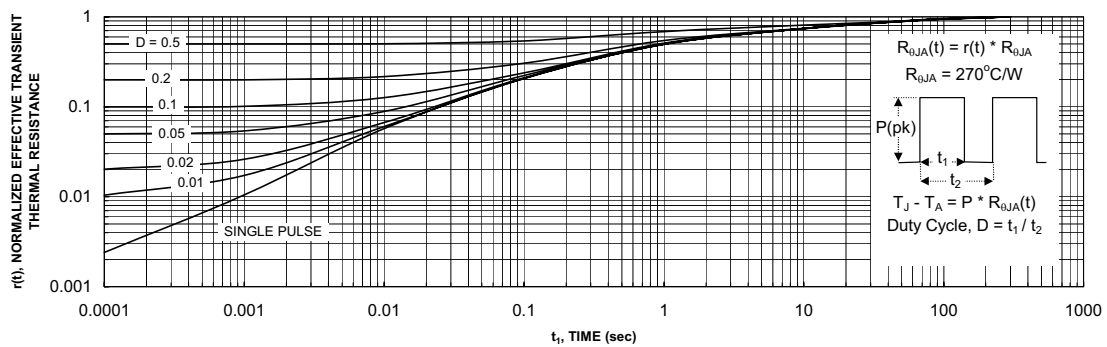
**Figure 8. Capacitance Characteristics.**



**Figure 9. Maximum Safe Operating Area.**



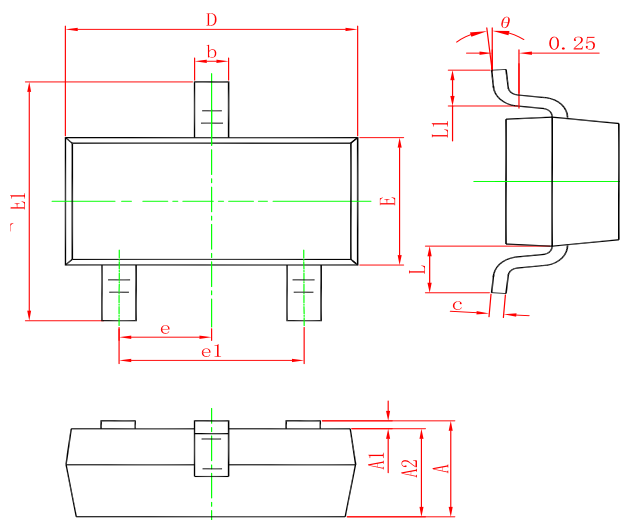
**Figure 10. Single Pulse Maximum Power Dissipation.**



**Figure 11. Transient Thermal Response Curve.**

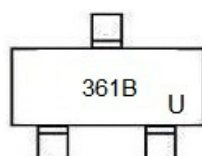
Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

**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
FDN361BN	SOT-23	3000	Tape and reel