

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



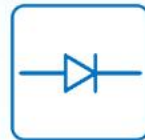
TVS



MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

▶ Domestic	Part Number	FDN352AP
▶ Overseas	Part Number	FDN352AP-EV
▶ Equivalent	Part Number	FDN352AP

EV is the abbreviation of name EVVO

## P-Channel 30 V (D-S) MOSFET

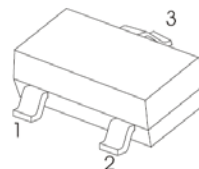
### General Description

These devices are well suited for low voltage and battery powered applications where low in-line power loss is needed in a very small outline surface mount package.

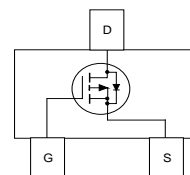
### Features

- -1.3 A, -30V  $R_{DS(ON)} = 180 \text{ m}\Omega$  @  $V_{GS} = -10\text{V}$   
 -1.1 A, -30V  $R_{DS(ON)} = 300 \text{ m}\Omega$  @  $V_{GS} = -4.5\text{V}$
- High performance trench technology for extremely low  $R_{DS(ON)}$ .
- High power version of industry Standard SOT-23 package. Identical pin-out to SOT-23 with 30% higher power handling capability.

SOT - 23



1. GATE
2. SOURCE
3. DRAIN



### Applications

- Notebook computer power management

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

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain-Source Voltage	-30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 25$	V
$I_D$	Drain Current – Continuous (Note 1a)	-1.3	A
	– Pulsed	-10	
$P_D$	Power Dissipation for Single Operation (Note 1a)	0.5	W
	(Note 1b)	0.46	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$
<b>Thermal Characteristics</b>			
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	75	

**P-Channel 30 V (D-S) MOSFET**
**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
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		−17		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
I <sub>GSS</sub>	Gate–Body Leakage	V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V			±100	nA
On Characteristics (Note 2)						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = −250 μA	−0.8	−2.0	−2.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I <sub>D</sub> = −250 μA, Referenced to 25°C		4		mV/°C
R <sub>DS(on)</sub>	Static Drain–Source On–Resistance	V <sub>GS</sub> = −10 V, I <sub>D</sub> = −1.3 A V <sub>GS</sub> = −4.5 V, I <sub>D</sub> = −1.1 A		150 250	180 300	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = −5 V, I <sub>D</sub> = −0.9 A		2.0		S
Dynamic Characteristics						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = −15 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		150		pF
C <sub>oss</sub>	Output Capacitance			40		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			20		pF
Switching Characteristics (Note 2)						
t <sub>d(on)</sub>	Turn–On Delay Time	V <sub>DD</sub> = −10 V, I <sub>D</sub> = −1 A, V <sub>GS</sub> = −10 V, R <sub>GEN</sub> = 6 Ω		4	8	ns
t <sub>r</sub>	Turn–On Rise Time			15	28	ns
t <sub>d(off)</sub>	Turn–Off Delay Time			10	18	ns
t <sub>f</sub>	Turn–Off Fall Time			1	2	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = −10V, I <sub>D</sub> = −0.9 A, V <sub>GS</sub> = −4.5 V		1.4	1.9	nC
Q <sub>gs</sub>	Gate–Source Charge			0.5		nC
Q <sub>gd</sub>	Gate–Drain Charge			0.5		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I <sub>S</sub>	Maximum Continuous Drain–Source Diode Forward Current				−0.42	A
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> = −3.9 A, dI <sub>F</sub> /dt = 100 A/μs		17		ns
Q <sub>rr</sub>	Diode Reverse Recovery Charge			7		nC

**Notes:**

1.  $R_{\theta JA}$  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  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta JA}$  is determined by the user's board design.

(a)  $R_{\theta JA} = 250^\circ\text{C}/\text{W}$  when mounted on a  $0.02\text{ in}^2$  pad of 2oz. copper.

(b)  $R_{\theta JA} = 270^\circ\text{C}/\text{W}$  when mounted on a  $0.001\text{ in}^2$  pad of 2oz. copper.

2. Pulse Test: Pulse Width  $< 300\mu\text{s}$ , Duty Cycle  $< 2.0\%$

## P-Channel 30 V (D-S) MOSFET

### Typical Characteristics

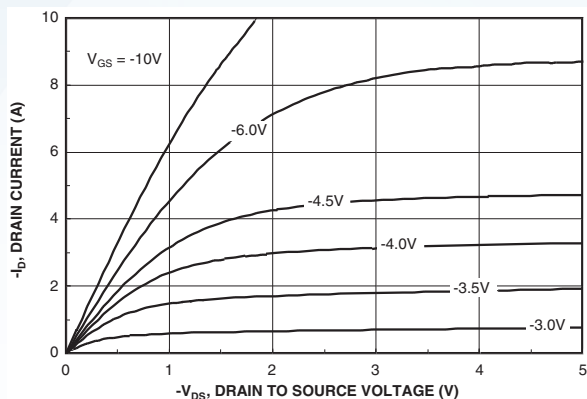


Figure 1. On-Region Characteristics.

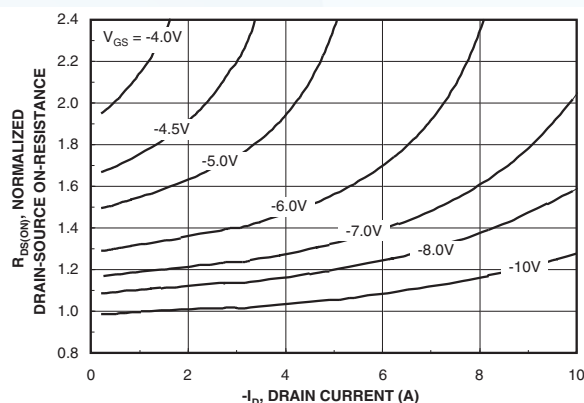


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

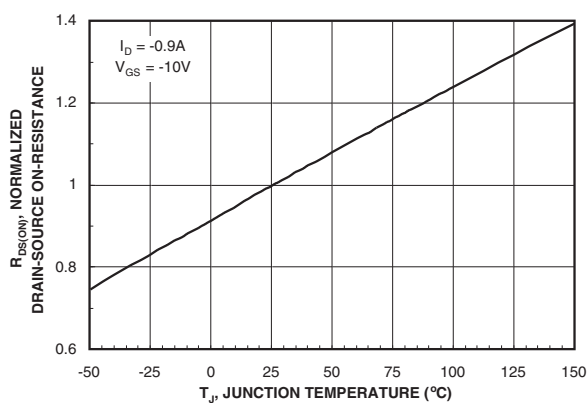


Figure 3. On-Resistance Variation with Temperature.

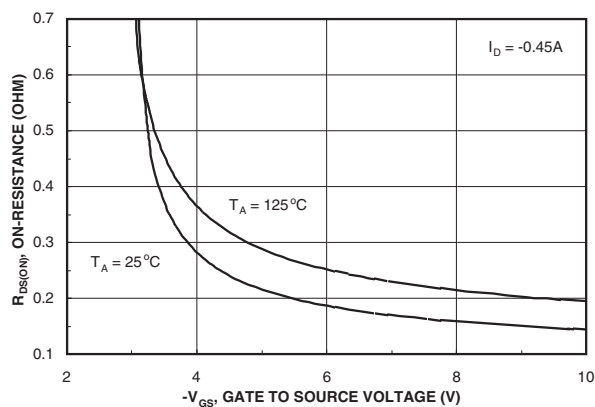


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

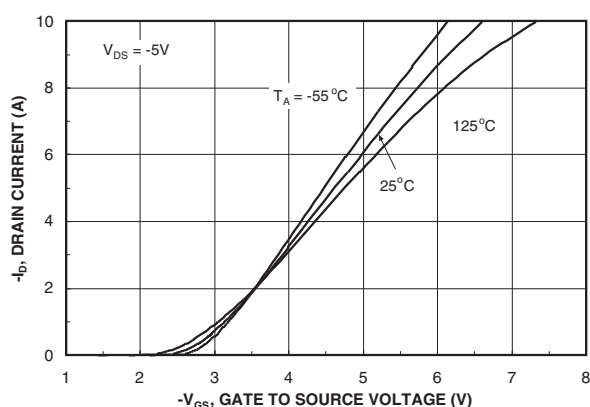


Figure 5. Transfer Characteristics.

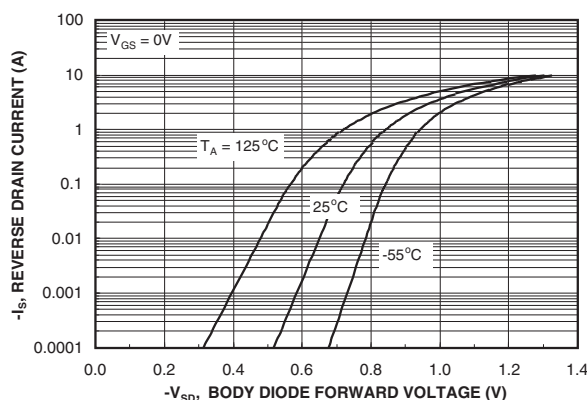
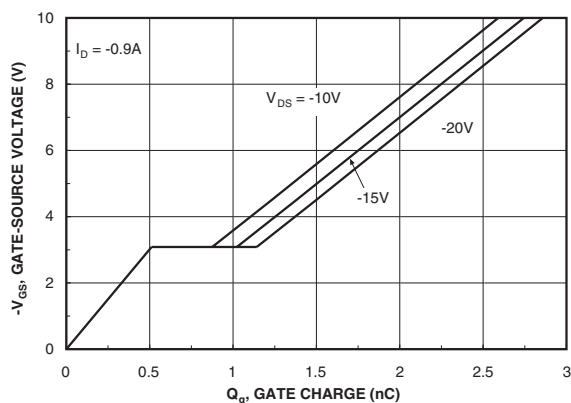
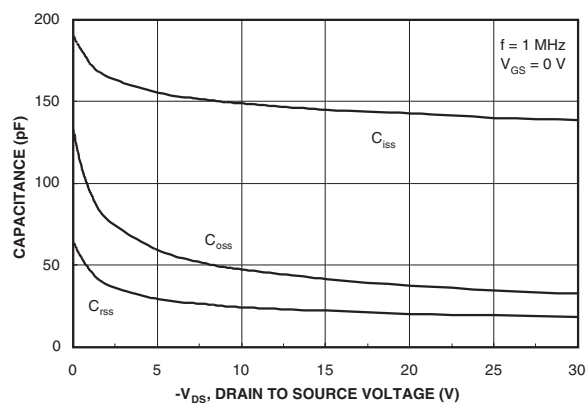
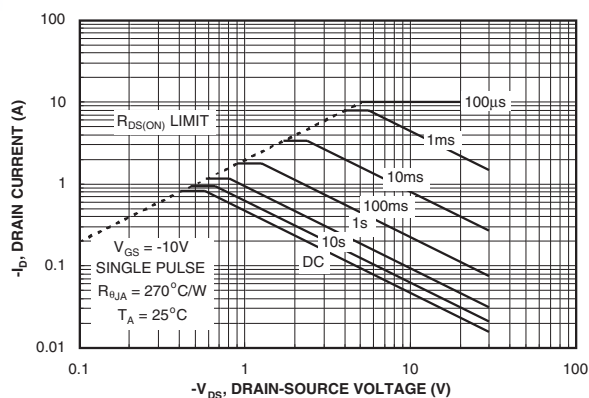
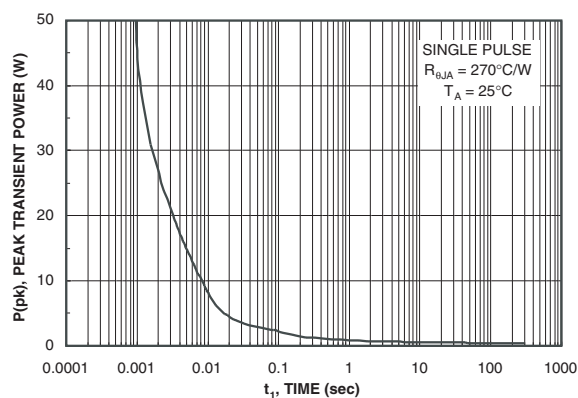
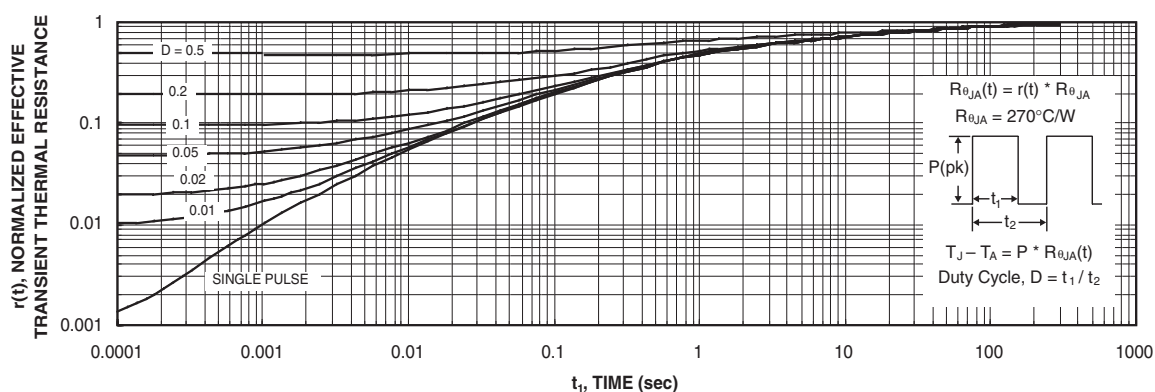


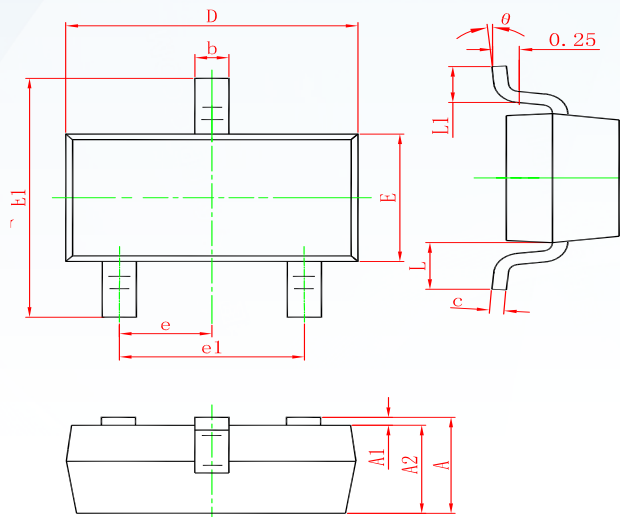
Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

**P-Channel 30 V (D-S) MOSFET**
**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 1c.  
 Transient thermal response will change depending on the circuit board design.

P-Channel 30 V (D-S) MOSFET

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
FDN352AP	SOT-23	3000	Tape and reel



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