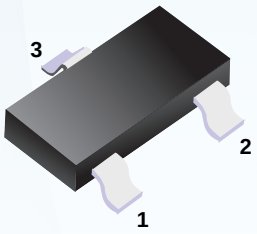
EVVOSEMI®
THINK CHANGE DO

ESD TVS MOS LDO Diode Sensor DC-DC

Product Specification

Domestic Part Number	FDN304P
Overseas Part Number	FDN304P-EV
Equivalent Part Number	FDN304P

P-Channel MOSFET

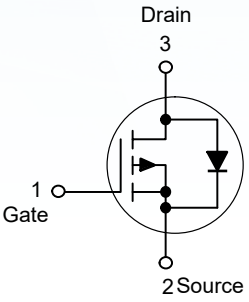


1. Gate
2. Source
3. Drain

Features

- –2.4 A, –20 V. $R_{DS(ON)}$ = 0.052 Ω @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 0.070 Ω @ V_{GS} = –2.5 V
  $R_{DS(ON)}$ = 0.100 Ω @ V_{GS} = –1.8 V
- Fast switching speed
- High performance trench technology for extremely low $R_{DS(ON)}$
- SuperSOT™ -3 provides low $R_{DS(ON)}$ and 30% higher power handling capability than SOT23 in the same footprint

Simplified outline(SOT-23)



Applications

- Battery management
- Load switch
- Battery protection

Absolute Maximum Ratings Ta = 25℃

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		–20	V
V_{GSS}	Gate-Source Voltage		±8	V
I_D	Drain Current – Continuous	(Note 1a)	–2.4	A
	– Pulsed		–10	
P_D	Maximum Power Dissipation	(Note 1a)	0.5	W
		(Note 1b)	0.46	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	250	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	75	°C/W

■ Electrical Characteristics Ta = 25℃

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = –250 μA	–20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250 μA,Referenced to 25°C		–13		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –16 V, V_{GS} = 0 V			–1	μA
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 8 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –8 V V_{DS} = 0 V			–100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 μA	–0.4	–0.8	–1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = –250 μA,Referenced to 25°C		3		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –4.5 V, I_D = –2.4 A V_{GS} = –2.5 V, I_D = –2.0 A V_{GS} = –1.8V, I_D = –1.8 A		0.036 0.047 0.065	0.052 0.070 0.100	Ω
$I_{D(on)}$	On–State Drain Current	V_{GS} = –4.5 V, V_{DS} = –5 V	–10			A
g_{FS}	Forward Transconductance	V_{DS} = –5 V, I_D = –1.25 A		12		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –10 V, V_{GS} = 0 V, f = 1.0 MHz		1312		pF
C_{oss}	Output Capacitance			240		pF
C_{rss}	Reverse Transfer Capacitance			106		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = –10 V, I_D = –1 A, V_{GS} = –4.5 V, R_{GEN} = 6 Ω		15	27	ns
t_r	Turn–On Rise Time			15	27	ns
$t_{d(off)}$	Turn–Off Delay Time			40	64	ns
t_f	Turn–Off Fall Time			25	40	ns
Q_g	Total Gate Charge	V_{DS} = –10 V, I_D = –2.4 A, V_{GS} = –4.5 V		12	20	nC
Q_{gs}	Gate–Source Charge			2		nC
Q_{gd}	Gate–Drain Charge			2		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–0.42	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = –0.42 (Note 2)		–0.6	–1.2	V

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 $R_{\theta CA}$ is determined by the user's board design.

a) 250°C/W when mounted on a 0.02 in² pad of 2 oz. copper.

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

Scale 1 : 1 on letter size paper

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

Typical Characteristics

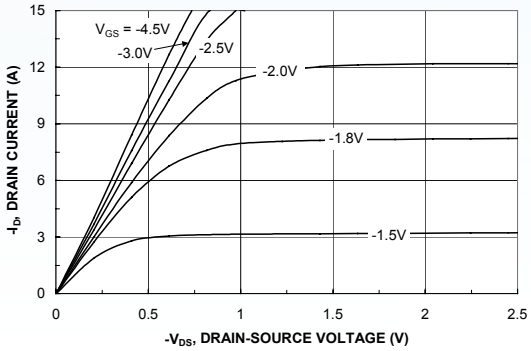


Figure 1. On-Region Characteristics.

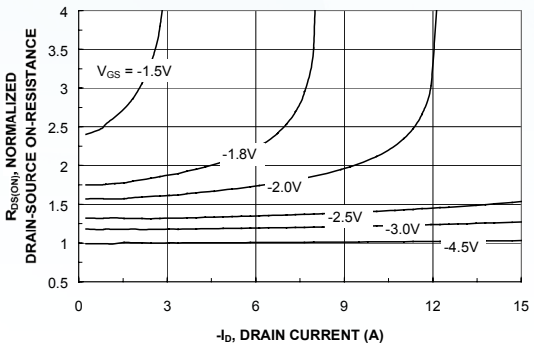


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

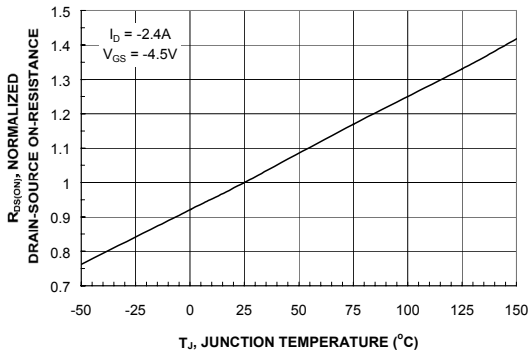


Figure 3. On-Resistance Variation with Temperature.

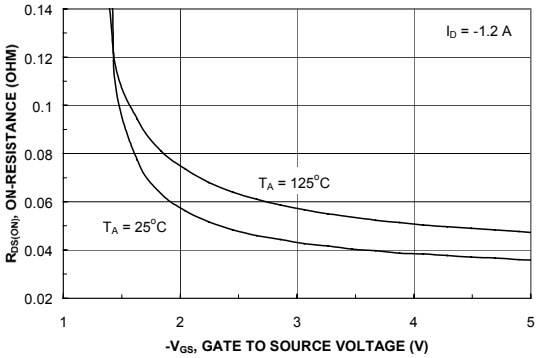


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

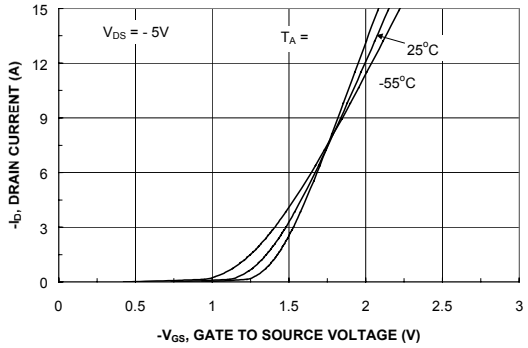


Figure 5. Transfer Characteristics.

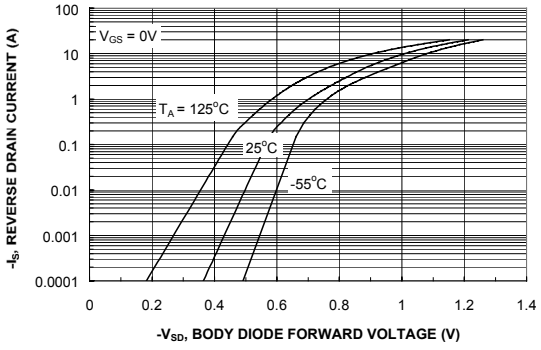


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

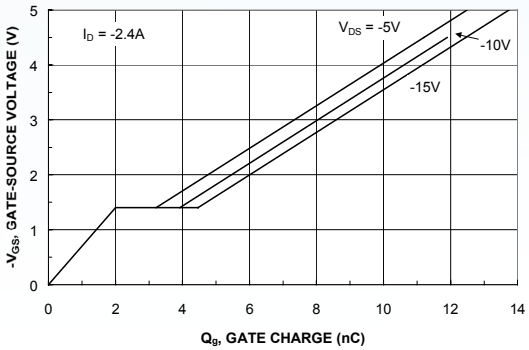


Figure 7. Gate Charge Characteristics.

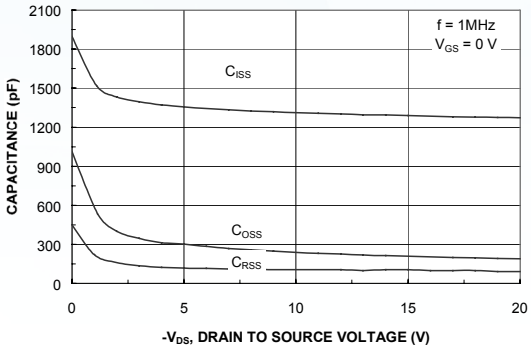


Figure 8. Capacitance Characteristics.

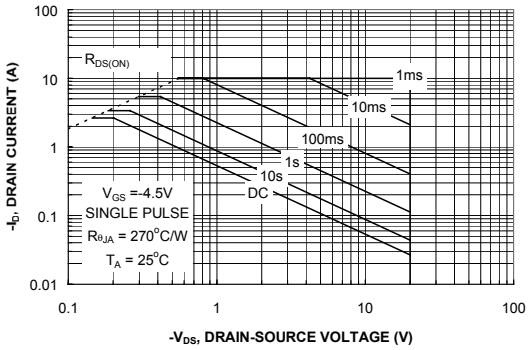


Figure 9. Maximum Safe Operating Area.

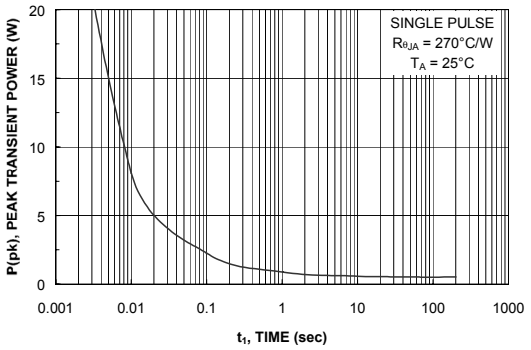


Figure 10. Single Pulse Maximum Power Dissipation.

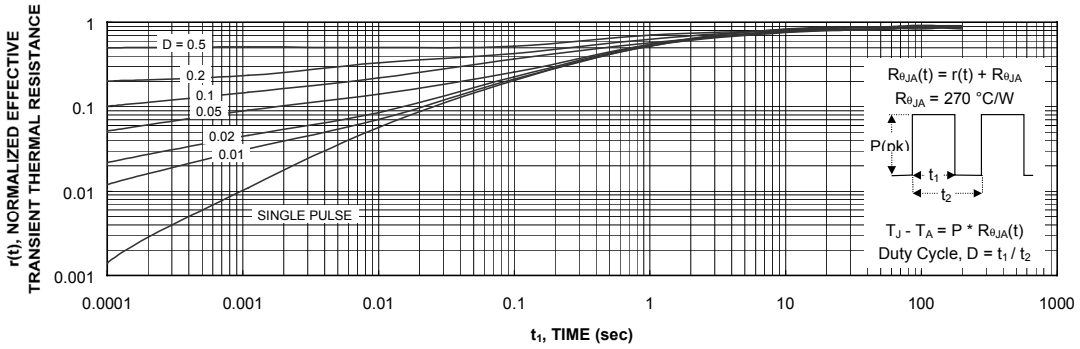
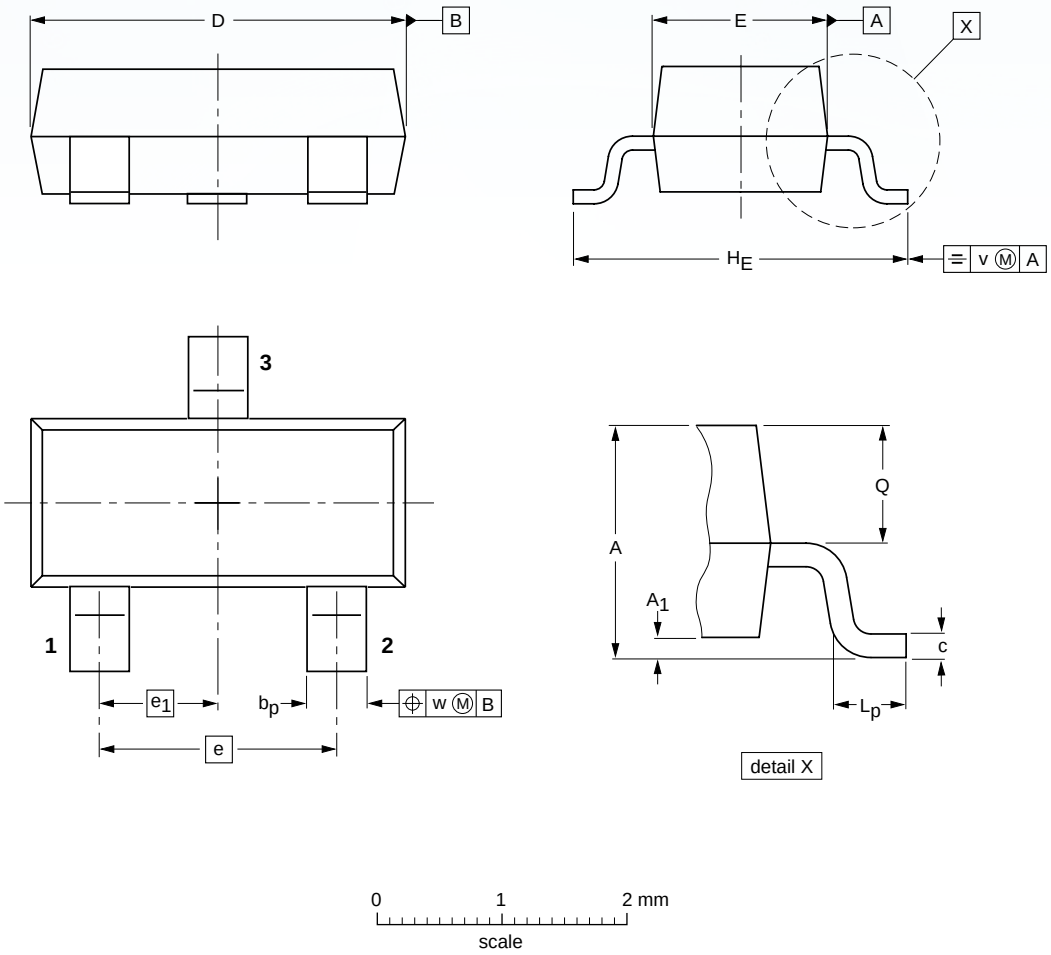


Figure 11. Transient Thermal Response Curve.

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

■ SOT-23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

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