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June 2015

FDS4465_F085

P-Channel 1.8V Specified PowerTrench® MOSFET

General Description

This P-Channel 1.8V specified MOSFET is a rugged gate version of Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications with a wide range of gate drive voltage (1.8V-8V).

Applications

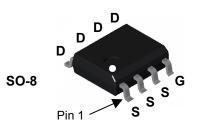
- · Power management
- Load switch
- · Battery protection

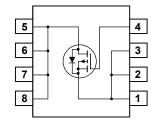
Features

• -13.5 A, -20 V. $R_{DS(ON)}$ = 8.5 m Ω @ V_{GS} = -4.5 V $R_{DS(ON)}$ = 10.5 m Ω @ V_{GS} = -2.5 V $R_{DS(ON)}$ = 14 m Ω @ V_{GS} = -1.8 V

- · Fast switching speed
- High performance trench technology for extremely low $R_{\text{DS(ON)}}$
- High current and power handling capability
- Qualified to AEC Q101
- RoHS Compliant







Absolute Maximum Ratings TA=25°C unless otherwise noted

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)	-13.5	Α
	– Pulsed		-50	
P_D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1	
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)	85	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	(Note 1c)	125	°C/W
R _{θJC}	Thermal Resistance, Junction-to-Case	(Note 1)	25	°C/W

Package Marking and Ordering Information

		J	J			
_	Device Marking	Device	Reel Size	Tape width	Quantity	
_	FDS4465	FDS4465_F085	13"	12mm	2500 units	

	-12	-1 100 -100	V mV/°C μA nA
BVDSSDrain-Source Breakdown Voltage $V_{GS} = 0 \text{ V}$, $I_D = -250 \text{ μA}$ -20 M ΔBVDSS ΔT_J Breakdown Voltage Temperature Coefficient $I_D = -250 \text{ μA}$, Referenced to 25°C I_{DSS} Zero Gate Voltage Drain Current $V_{DS} = -16 \text{ V}$, $V_{GS} = 0 \text{ V}$ I_{GSSF} Gate-Body Leakage, Forward $V_{GS} = 8 \text{ V}$, $V_{DS} = 0 \text{ V}$	-12	100	mV/°C μA nA
	-12	100	mV/°C μA nA
ΔT_J Coefficient $I_D = -250 \mu\text{A}$, Referenced to 25°C I_{DSS} Zero Gate Voltage Drain Current $V_{DS} = -16 \text{V}$, $V_{GS} = 0 \text{V}$ I_{GSSF} Gate–Body Leakage, Forward $V_{GS} = 8 \text{V}$, $V_{DS} = 0 \text{V}$		100	μA nA
I_{GSSF} Gate–Body Leakage, Forward $V_{GS} = 8 \text{ V}$, $V_{DS} = 0 \text{ V}$	-0.6	100	nA
	-0.6		
I_{GSSR} Gate–Body Leakage, Reverse $V_{GS} = -8 \text{ V}$, $V_{DS} = 0 \text{ V}$	-0.6	-100	nA
	-0.6		
On Characteristics (Note 2)	-0.6		
$V_{GS(th)}$ Gate Threshold Voltage $V_{DS} = V_{GS}$, $I_D = -250 \mu\text{A}$ -0.4	0.0	-1.5	V
$\Delta V_{GS(th)}$ Gate Threshold Voltage $I_D = -250 \mu A$, Referenced to 25°C Temperature Coefficient	3		mV/°C
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6.7 8.0 9.8 9.0	8.5 10.5 14 13	mΩ
$I_{D(on)}$ On–State Drain Current $V_{GS} = -4.5 \text{ V}$, $V_{DS} = -5 \text{ V}$ –50			Α
g_{FS} Forward Transconductance $V_{DS} = -5 \text{ V}$, $I_D = -13.5 \text{ A}$	70		S
Dynamic Characteristics	•		•
$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V},$	8237		pF
C _{oss} Output Capacitance f = 1.0 MHz	1497		pF
C _{rss} Reverse Transfer Capacitance	750		pF
Switching Characteristics (Note 2)			
$t_{d(on)}$ Turn–On Delay Time $V_{DD} = -10V$, $I_D = -1$ A,	20	36	ns
t_r Turn–On Rise Time V_{GS} = -4.5 V, R_{GEN} = 6 Ω	24	38	ns
t _{d(off)} Turn–Off Delay Time	300	480	ns
t _f Turn–Off Fall Time	140	224	ns
Q_g Total Gate Charge $V_{DS} = -10 \text{ V}$, $I_D = -13.5 \text{ A}$,	86	120	nC
Q_{gs} Gate–Source Charge $V_{GS} = -4.5 \text{ V}$	20		nC
Q _{gd} Gate–Drain Charge	11		nC
Drain–Source Diode Characteristics and Maximum Ratings			
I _S Maximum Continuous Drain–Source Diode Forward Current		-2.1	Α
V_{SD} Drain-Source Diode Forward $V_{GS} = 0 \text{ V}, I_S = -2.1 \text{ A} \text{(Note 2)}$	-0.6	-1.2	V

Notes

 R_{8JA} 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_{8JC} is guaranteed by design while R_{8CA} is determined by the user's board design.



a) 50 °C/W when mounted on a 1in² pad of 2 oz copper



b) 105 °C/W when mounted on a 04 in² pad of 2 oz copper



c) 125 °C/W when mounted on a minimum pad.

Scale 1:1 on letter size paper

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

Typical Characteristics

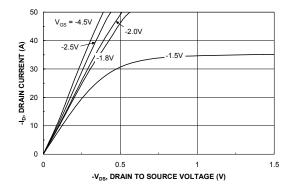


Figure 1. On-Region Characteristics.

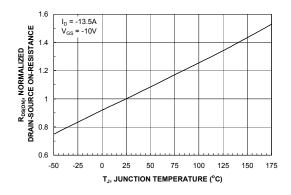


Figure 3. On-Resistance Variation with Temperature.

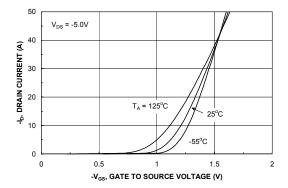


Figure 5. Transfer Characteristics.

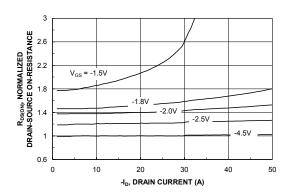


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

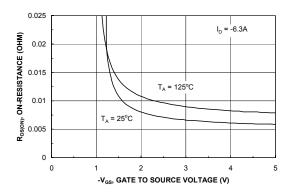


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

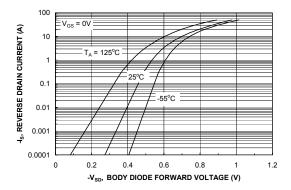
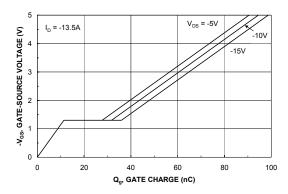


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics



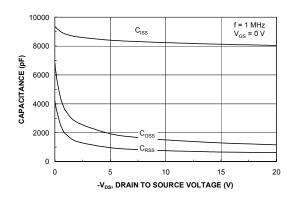
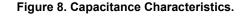
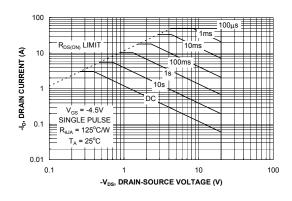


Figure 7. Gate Charge Characteristics.





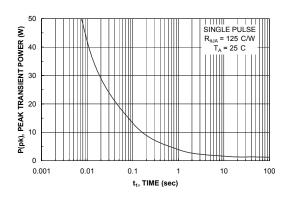


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

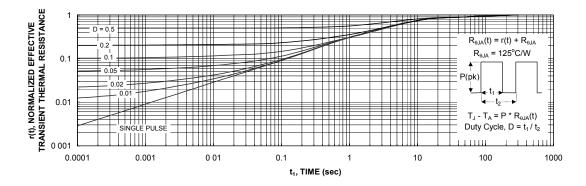
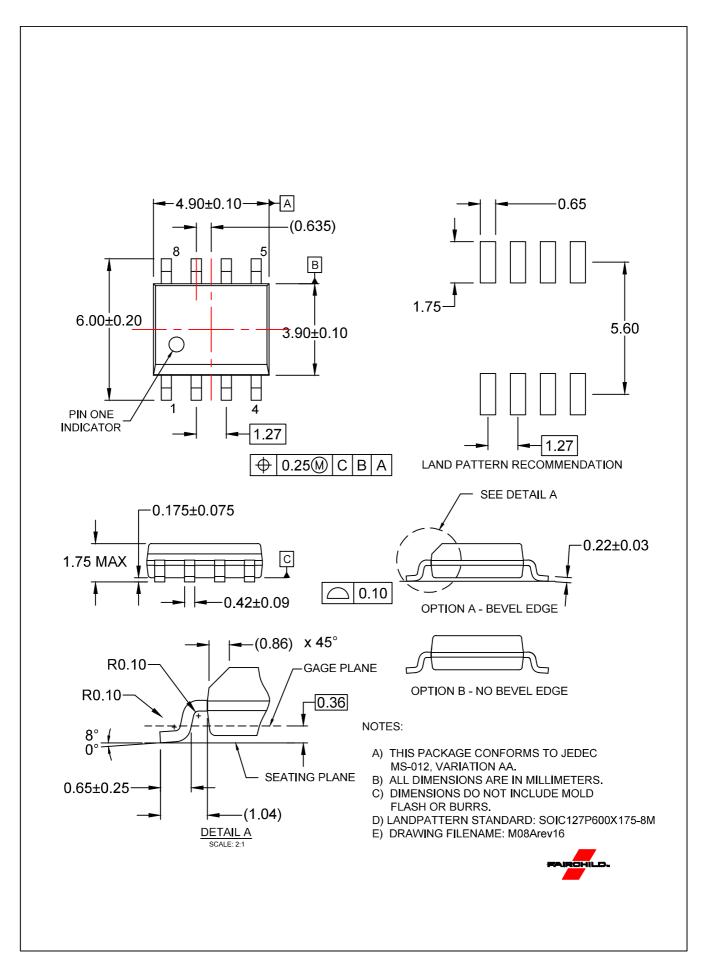


Figure 11. Transient Thermal Response Curve.

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



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