FAIRCHILD SEMICONDUCTOR®

February 2002

FDC2612

200V N-Channel PowerTrench® MOSFET

General Description

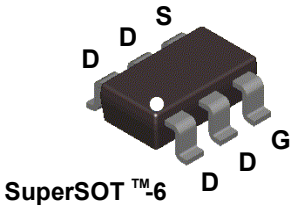
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

Applications

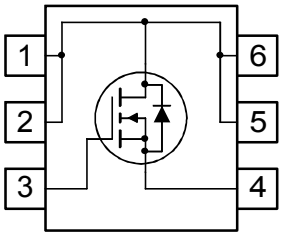
- DC/DC converter

Features

- 1.1 A, 200 V. $R_{DS(ON)}$ = 725 mΩ @ V_{GS} = 10 V
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability
- Fast switching speed
- Low gate charge (8nC typical)



SuperSOT ™-6



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		200	V
V_{GSS}	Gate-Source Voltage		± 20	V
I_D	Drain Current – Continuous	(Note 1a)	1.1	A
	– Pulsed		4	
P_D	Maximum Power Dissipation	(Note 1a)	1.6	W
		(Note 1b)	0.8	
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)	78	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	30	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.262	FDC2612	7''	8mm	3000 units

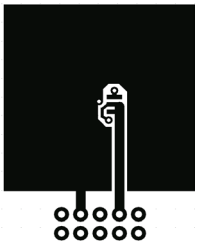
Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	200			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C		246		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 160 V, V_{GS} = 0 V			1	µA
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –20 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	2	4	4.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C		–8.7		mV/°C
$R_{DS(on)}$	Static Drain–Source On Resistance	V_{GS} = 10 V, I_D = 1.1 A V_{GS} = 10 V, I_D = 1.1 A, T_J = 125°C		605 1133	725 1430	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = 10 V, V_{DS} = 10 V	4			A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 1.1 A		4.4		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, f = 1.0 MHz		234		pF
C_{oss}	Output Capacitance			18		pF
C_{rss}	Reverse Transfer Capacitance			8		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 100 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		6	12	ns
t_r	Turn–On Rise Time			6	12	ns
$t_{d(off)}$	Turn–Off Delay Time			17	30	ns
t_f	Turn–Off Fall Time			8	16	ns
Q_g	Total Gate Charge	V_{DS} = 100 V, I_D = 1.1 A, V_{GS} = 10 V		8	11	nC
Q_{gs}	Gate–Source Charge			1.6		nC
Q_{gd}	Gate–Drain Charge			2.2		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				1.3	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.3 A (Note 2)		0.8	1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = 1.1A,		74.5		nS
Q_{rr}	Diode Reverse Recovery Charge	d_{iF}/d_t = 300 A/µs (Note 2)		194		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 $R_{\theta CA}$ is determined by the user's board design.



a) 78°C/W when mounted on a 1in^2 pad of 2 oz copper

b) 156°C/W when mounted on a minimum pad of 2 oz copper

Scale 1 : 1 on letter size paper

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

Typical Characteristics

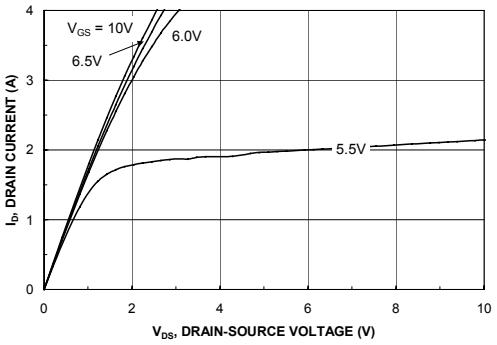


Figure 1. On-Region Characteristics.

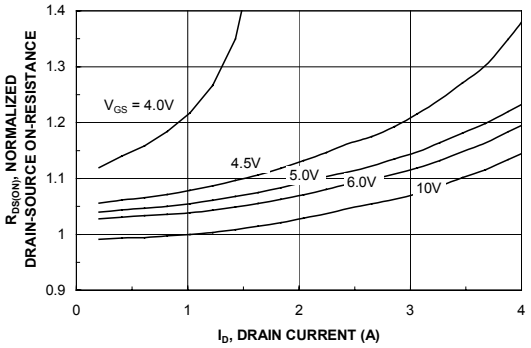


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

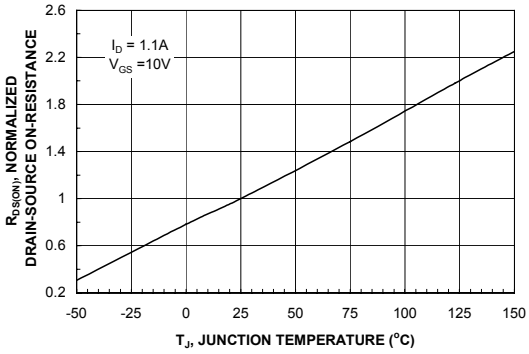


Figure 3. On-Resistance Variation with Temperature.

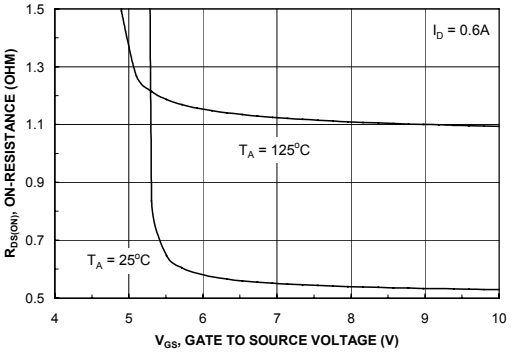


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

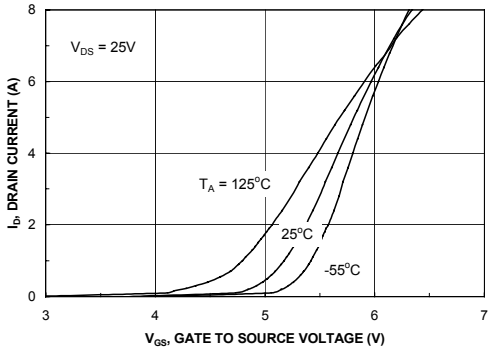


Figure 5. Transfer Characteristics.

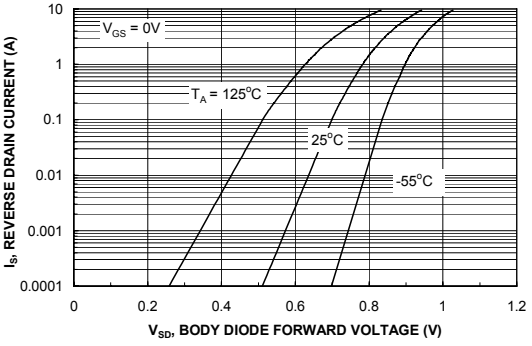


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

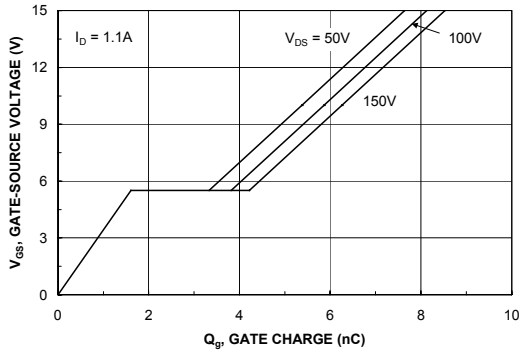


Figure 7. Gate Charge Characteristics.

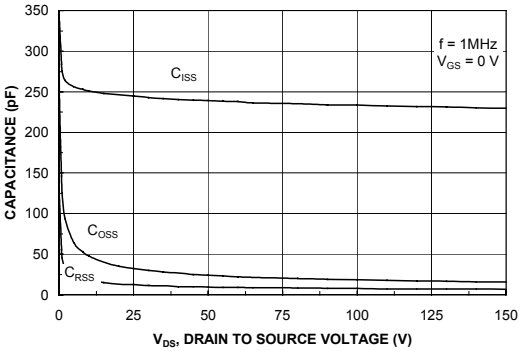
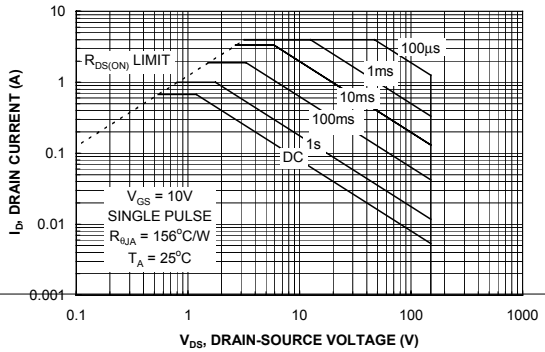
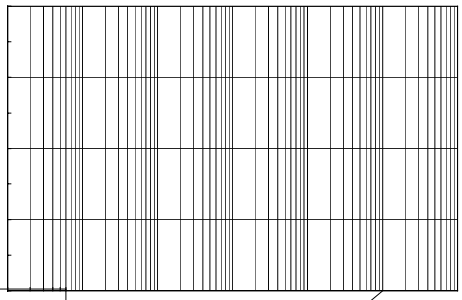


Figure 8. Capacitance Characteristics.





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