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March 2015

FDD3510H

Dual N & P-Channel PowerTrench® MOSFET

N-Channel: 80V, 13.9A, $80m\Omega$ P-Channel: -80V, -9.4A, $190m\Omega$

Features

Q1: N-Channel

■ Max $r_{DS(on)} = 80 \text{m}\Omega$ at $V_{GS} = 10 \text{V}$, $I_D = 4.3 \text{A}$

■ Max $r_{DS(on)}$ = 88m Ω at V_{GS} = 6V, I_D = 4.1A

Q2: P-Channel

■ Max $r_{DS(on)}$ = 190m Ω at V_{GS} = -10V, I_D = -2.8A

■ Max $r_{DS(on)}$ = 224m Ω at V_{GS} = -4.5V, I_{D} = -2.6A

■ 100% UIL Tested

■ RoHS Compliant



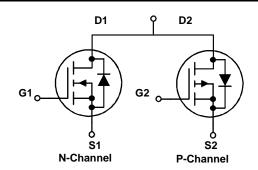
General Description

These dual N and P- Channel enha ncement mode Pow er MOSFETs ar e produ ced u sing Fa irchild Semiconductor 's advanced PowerT rench® process that has been especially tailored to minimize on -state r esistance and yet maint ain superior switching performance.

Applications

- Inverter
- H-Bridge





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Q1	Q2	Units
V _{DS}	Drain to Source Voltage		80	-80	V
V_{GS}	Gate to Source Voltage		±20	±20	V
	Drain Current - Continuous	T _C = 25°C	13.9	-9.4	
I_D	- Continuous	T _A = 25°C	4.3	-2.8	Α
	- Pulsed		20	-10	
	Power Dissipation for Single Operation	T _C = 25°C (Note 1)	35	32	
P_{D}		$T_A = 25^{\circ}C$ (Note 1a)	3	.1	W
		$T_A = 25^{\circ}C$ (Note 1b)	1.3		
E _{AS}	Single Pulse Avalanche Energy	(Note 3)	37	54	mJ
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to	+150	°C

Thermal Characteristics

$R_{ heta JC}$	Thermal Resistance, Junction to Case, Single Operation for Q1	(Note 1)	3.5	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Single Operation for Q2	(Note 1)	3.9	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD3510H	FDD3510H	TO-252-4L	13"	16mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Type	Min	Тур	Max	Units
Off Chara	cteristics						
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0V$ $I_D = -250 \mu A, V_{GS} = 0V$	Q1 Q2	80 -80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C I_D = -250μA, referenced to 25°C	Q1 Q2		84 -67	mV	/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 64V, V_{GS} = 0V$ $V_{DS} = -64V, V_{GS} = 0V$	Q1 Q2			1 -1	μА
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±20V, V _{DS} = 0V	Q1 Q2			±100 ±100	nA nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$ $V_{GS} = V_{DS}, I_D = -250 \mu A$	Q1 Q2	2.0 -1.0	2.6 -1.6	4.0 -3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C I_D = -250μA, referenced to 25°C	Q1 Q2		-6.7 4.6	mV/	°C
F	Static Drain to Source On Resistance	$V_{GS} = 10V, I_D = 4.3A$ $V_{GS} = 6.0V, I_D = 4.1A$ $V_{GS} = 10V, I_D = 4.3A, T_J = 125^{\circ}C$	Q1		64 70 121	80 88 152	mΩ
r _{DS(on)}	Static Drain to Source On Resistance	V_{GS} = -10V, I_D = -2.8A V_{GS} = -4.5V, I_D = -2.6A V_{GS} = -10V, I_D = -2.8A, T_J = 125°C	Q2		153 184 259	190 224 322	1115.2
g _{FS}	Forward Transconductance	$V_{DD} = 10V, I_D = 4.3A$ $V_{DD} = -5V, I_D = -2.8A$	Q1 Q2		15 6.8		S

Dynamic Characteristics

C _{iss}	Input Capacitance	Q1 V _{DS} = 40V, V _{GS} = 0V, f = 1MHZ	Q1 Q2	600 660	800 880	pF
C _{oss}	Output Capacitance	Q2	Q1 Q2	56 50	75 70	pF
C _{rss}	Reverse Transfer Capacitance	$V_{DS} = -40V, V_{GS} = 0V, f = 1MHZ$	Q1 Q2	27 25	41 40	pF
R _g	Gate Resistance	f = 1MHz	Q1 Q2	1.7 7.2		Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	Q1	Q1 Q2	7 6	13 11	ns
t _r	Rise Time	$V_{DD} = 40V, I_D = 4.3A, V_{GS} = 10V, R_{GEN} = 6\Omega$	Q1 Q2	2 3	10 10	ns
t _{d(off)}	Turn-Off Delay Time	Q2 V _{DD} = -40V, I _D = -2.8A,	Q1 Q2	16 25	29 40	ns
t _f	Fall Time	$V_{GS} = -10V$, $R_{GEN} = 6\Omega$	Q1 Q2	2 5	10 10	ns
Q _{g(TOT)}	Total Gate Charge	Q1	Q1 Q2	13 14	18 20	nC
Q _{gs}	Gate to Source Charge	$V_{GS} = 10V, V_{DD} = 40V, I_D = 4.3A$ $Q2$	Q1 Q2	2.3 1.9		nC
Q_{gd}	Gate to Drain "Miller" Charge	$V_{GS} = -10V, V_{DD} = -40V, I_{D} = -2.8A$	Q1 Q2	3.2 2.9		nC

Units

Electrical Characteristics $T_J = 25^{\circ}C$ unless otherwise noted

Parameter

Drain-S	ource Diode Characteristics						
V _{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0V, I_S = 2.6A$ (N $V_{GS} = 0V, I_S = -2.6A$ (N	Note 2) Note 2)	Q1 Q2	0.8 -0.8	1.2 -1.2	٧
t _{rr}	Reverse Recovery Time	Q1 I _F = 4.3A, di/dt = 100A/s		Q1 Q2	29 30	46 48	ns
Q _{rr}	Reverse Recovery Charge	Q2 $I_F = -2.8A$, di/dt = 100A/s		Q1 Q2	28 30	45 48	nC

Test Conditions

Type

Min

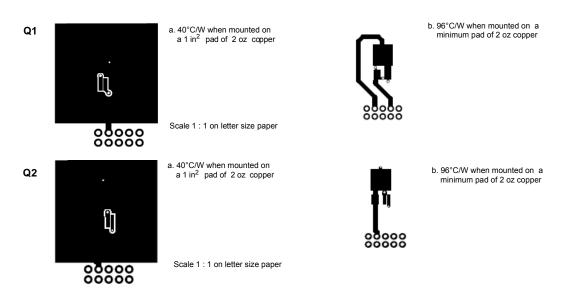
Тур

Max

Notes

Symbol

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



- 2. Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0%.
- 3. Starting $T_J = 25^{\circ}C$, N-ch: L = 3mH, $I_{AS} = 5A$, $V_{DD} = 80V$, $V_{GS} = 10V$; P-ch: L = 3mH, $I_{AS} = -6A$, $V_{DD} = -80V$, $V_{GS} = -10V$.

Typical Characteristics (Q1 N-Channel) T_J = 25°C unless otherwise noted

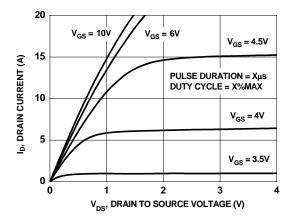


Figure 1. On Region Characteristics

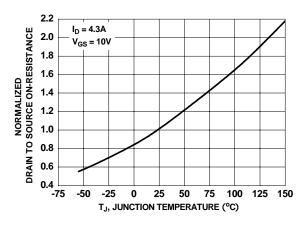


Figure 3. Normalized On Resistance vs Junction Temperature

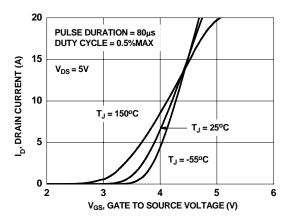


Figure 5. Transfer Characteristics

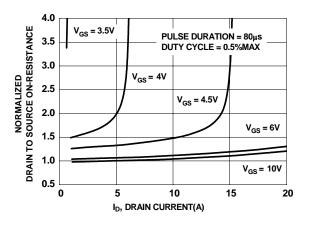


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

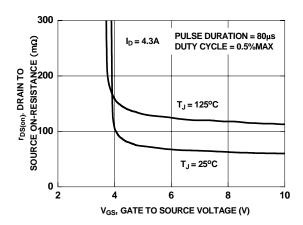


Figure 4. On-Resistance vs Gate to Source Voltage

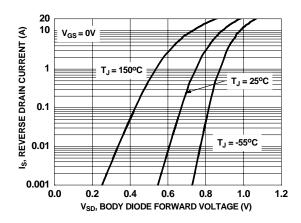


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics (Q1 N-Channel) T_J = 25°C unless otherwise noted

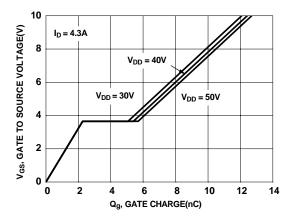


Figure 7. Gate Charge Characteristics

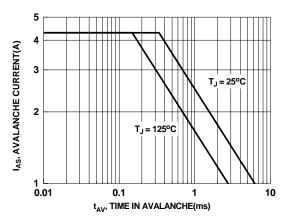


Figure 9. Unclamped Inductive Switching Capability

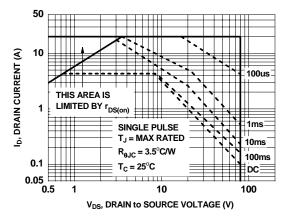


Figure 11. Forward Bias Safe Operating Area

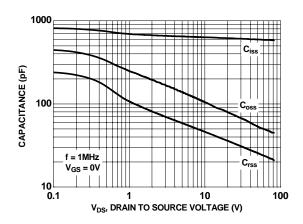


Figure 8. Capacitance vs Drain to Source Voltage

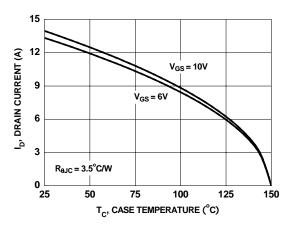


Figure 10. Maximum Continuous Drain Current vs Case Temperature

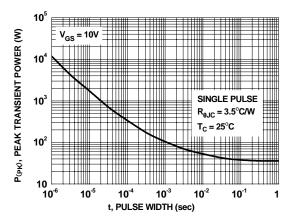


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics (Q1 N-Channel) T_J = 25°C unless otherwise noted

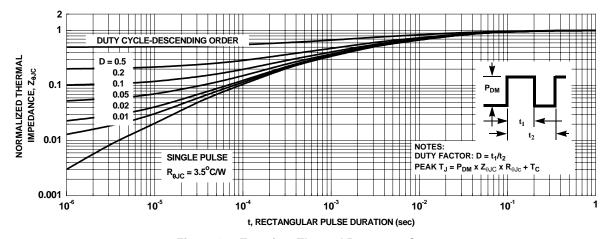


Figure 13. Transient Thermal Response Curve

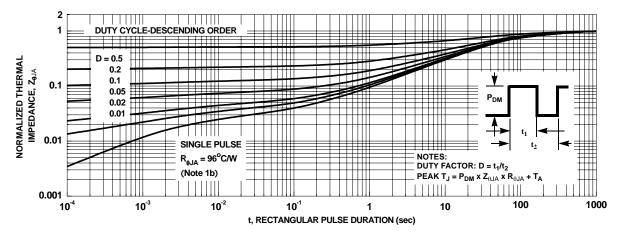


Figure 14. Transient Thermal Response Curve

Typical Characteristics (Q2 P-Channel) T_J = 25°C unless otherwise noted

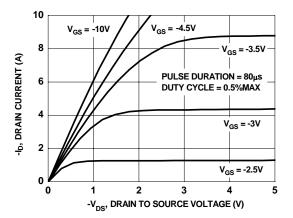


Figure 15. On- Region Characteristics

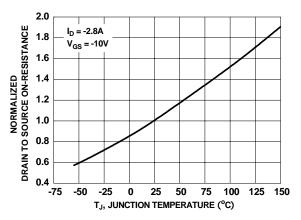


Figure 17. Normalized On-Resistance vs Junction Temperature

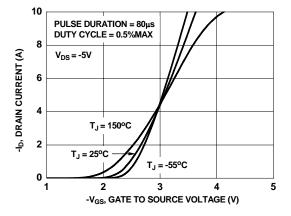


Figure 19. Transfer Characteristics

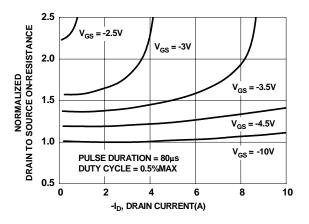


Figure 16. Normalized on-Resistance vs Drain Current and Gate Voltage

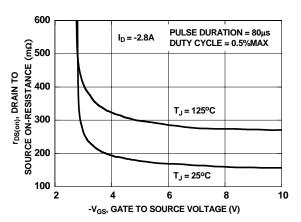


Figure 18. On-Resistance vs Gate to Source Voltage

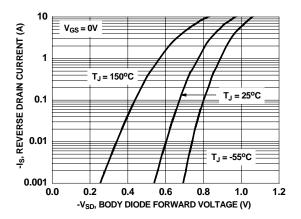


Figure 20. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics (Q2 P-Channel)T_I = 25°C unless otherwise noted

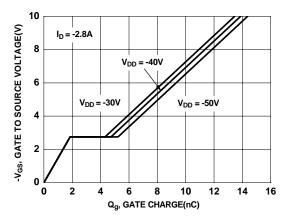


Figure 21. Gate Charge Characteristics

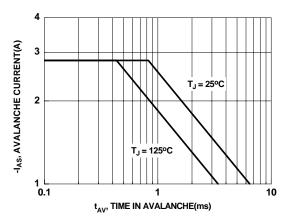


Figure 23. Unclamped Inductive Switching Capability

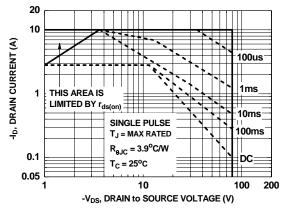


Figure 25. Forward Bias Safe Operating Area

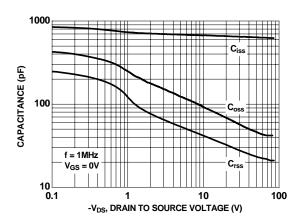


Figure 22. Capacitance vs Drain to Source Voltage

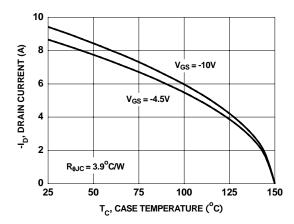


Figure 24. Maximum Continuous Drain Current vs Case Temperature

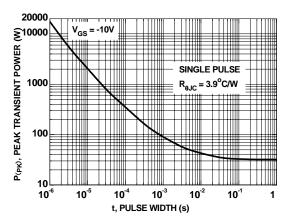


Figure 26. Single Pulse Maximum Power Dissipation

Typical Characteristics (Q2 P-Channel)T_J = 25°C unless otherwise noted

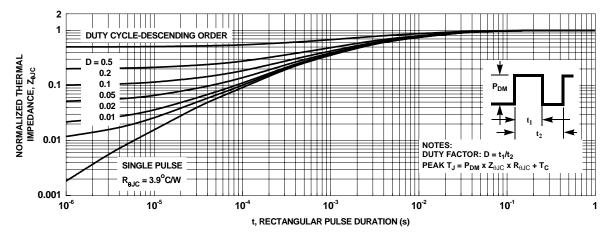


Figure 27. Transient Thermal Response Curve

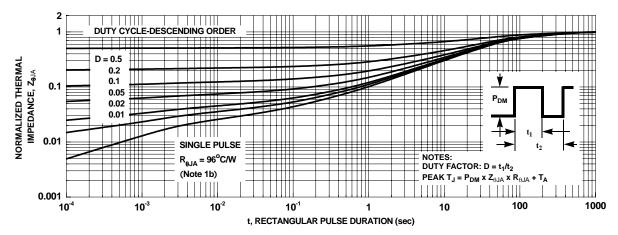
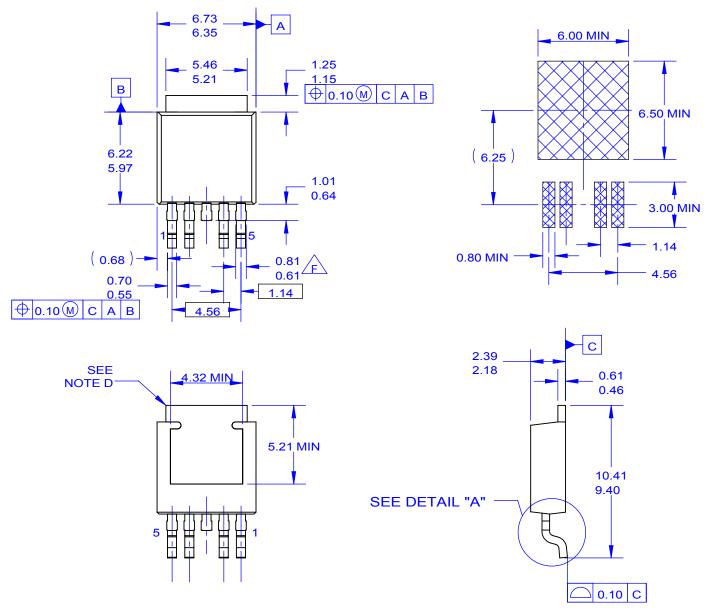
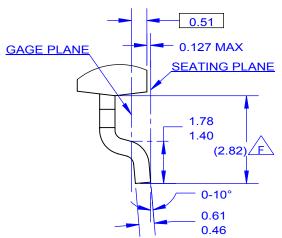


Figure 28. Transient Thermal Response Curve





DETAIL A SCALE 2:1

NOTES: UNLESS OTHERWISE SPECIFED

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- B. ALL DIMENSIONS ARE IN MILLIMETERS.
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- D. HEATSINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
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многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

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