FAIRCHILD SEMICONDUCTOR®

August 2012

FDD1600N10ALZD

N-Channel PowerTrench® Boost-FET

100V, 6.8A, 160mΩ

Features

- $R_{DS(on)}$ = 124mΩ (Typ.)@ V_{GS} = 10V, I_D = 3.5A
- $R_{DS(on)}$ = 175mΩ (Typ.)@ V_{GS} = 5.0V, I_D = 2.1A
- Low Gate Charge (Typ.2.78nC)
- Low C_{rss} (Typ. 2.04pF)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability
- RoHS Compliant

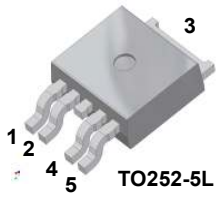
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance Power Trench process that has been expecially tailored to minimize the on-state resistance and yet maintain superior switching performance.

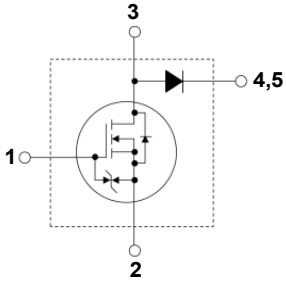
The NP diode is hyperfast rectifier with low forward voltage drop and excellent switching performance for boost block.

Application

- LED Monitor Backlight
- LED TV Backlight



1. Gate
2. Source
3. Drain / Anode
4. Cathode
5. Cathode



Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DSS}	Drain to Source Voltage			100	V
V_{GSS}	Gate to Source Voltage			±20	V
I_D	Drain Current	- Continuous (T_C = 25°C)		6.8	A
		- Continuous (T_C = 100°C)		4.3	
I_{DM}	Drain Current	- Pulsed	(Note 1)	27.2	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	TBD	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	6.0	V/ns
I_F	Diode Continuous Forward Current (T_C = TBD°C)			TBD	A
I_{FM}	Diode Maximum Forward Current			TBD	A
P_D	Power Dissipation	(T_C = 25°C)		14.9	W
		- Derate above 25°C		0.12	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case for MOSFET	-	8.4	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diode	-	TBD	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	87	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
1500N10ALZD	FDD1500N10ALZD	TO252-5L	13”	12mm	2500

Electrical Characteristics of the MOSFET $T_C = 25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_C = 25°C	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.1	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 80V, T_C = 125°C	-	-	500	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	1.4	2.1	2.8	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 3.5A	-	124	160	mΩ
		V_{GS} = 5V, I_D = 2.1A	-	175	375	
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 6.8A	-	34	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50V, V_{GS} = 0V f = 1MHz	-	169	225	pF
C_{oss}	Output Capacitance		-	43	55	pF
C_{rss}	Reverse Transfer Capacitance		-	2.04	-	pF
$C_{oss(er)}$	Energy Related Output Capacitance	V_{DS} = 50V, I_D = 6.8A		85	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 50V I_D = 6.8A V_{GS} = 10V (Note 4)	-	2.78	3.61	nC
$Q_{g(tot)}$	Total Gate Charge at 5V			1.5	1.95	nC
Q_{gs}	Gate to Source Gate Charge		-	0.72	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	0.56	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1MHZ, Drain shorted to Source	-	2.1	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, I_D = 6.8A V_{GS} = 10V, R_{GEN} = 4.7Ω (Note 4)	-	7	24	ns
t_r	Turn-On Rise Time		-	2	14	ns
$t_{d(off)}$	Turn-Off Delay Time		-	13	36	ns
t_f	Turn-Off Fall Time		-	2	14	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	6.8	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	27.2	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 6.8A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 6.8A, V_{DS} = 50V dI_F/dt = 100A/μs	-	37	-	ns
Q_{rr}	Reverse Recovery Charge		-	42	-	nC

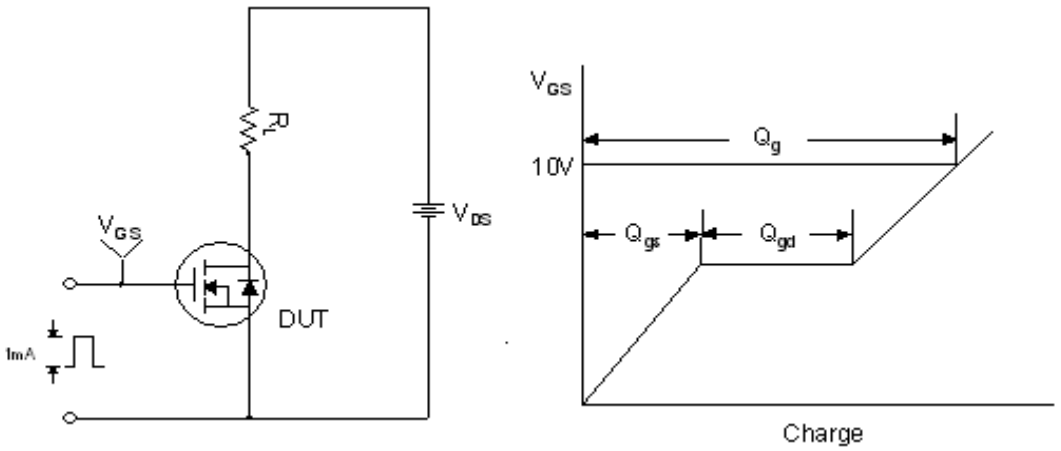
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, I_{AS} = TBDA, R_G = 25Ω, Starting T_J = 25°C
3. $I_{SD} \le$ 6.8A, di/dt ≤ 200A/μs, $V_{DD} \le BV_{DSS}$, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

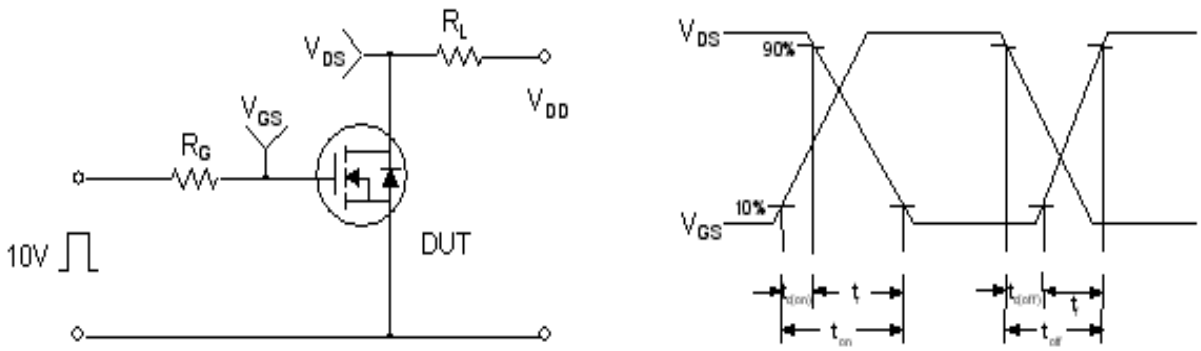
Electrical Characteristics of DIODE $T_C = 25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_R	DC Blocking Voltage	I_R = 250uA		120	-	-	V
I_R	Reverse Current	V_R = 96V		-	-	1	mA
I_R	Reverse Current	V_R = 120V		-	-	10	mA
I_R	Reverse Current	V_R = 160V		-	-	10	mA
V_{FM}	Diode Forward Voltage	I_F = 5A	$T_C = 25^oC$	-	-	2.5	V
			$T_C = 125^oC$	-	TBD	-	
t_{rr}	Diode Reverse Recovery Time	I_F = 5A dI/dt = 200A/μs	$T_C = 25^oC$	-	TBD	TBD	ns
			$T_C = 125^oC$	-	TBD	-	
I_{rr}	Diode Peak Reverse Recovery Current		$T_C = 25^oC$	-	TBD	TBD	A
			$T_C = 125^oC$	-	TBD	-	
Q_{rr}	Diode Reverse Recovery Charge		$T_C = 25^oC$	-	TBD	TBD	nC
			$T_C = 125^oC$	-	TBD	-	

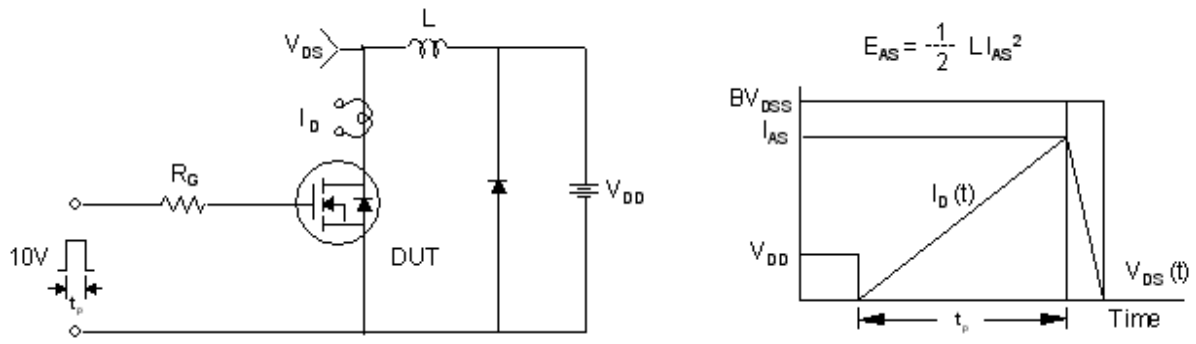
Gate Charge Test Circuit & Waveform



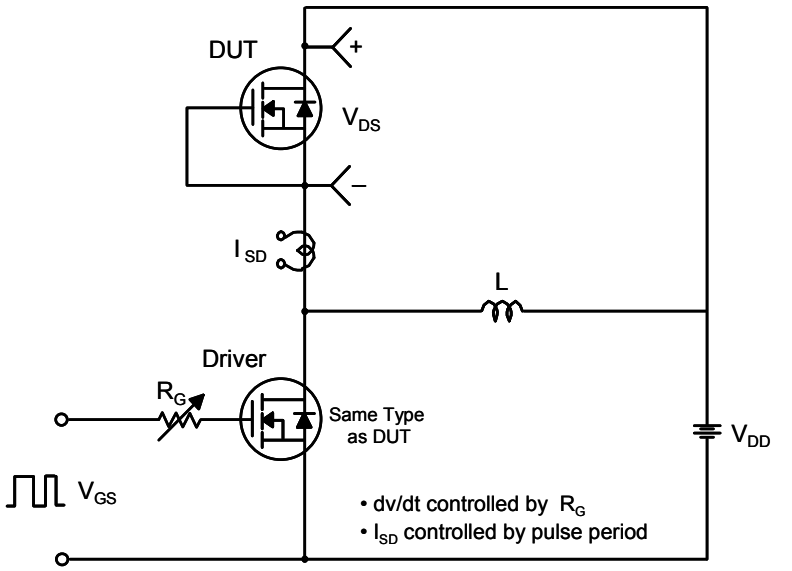
Resistive Switching Test Circuit & Waveforms

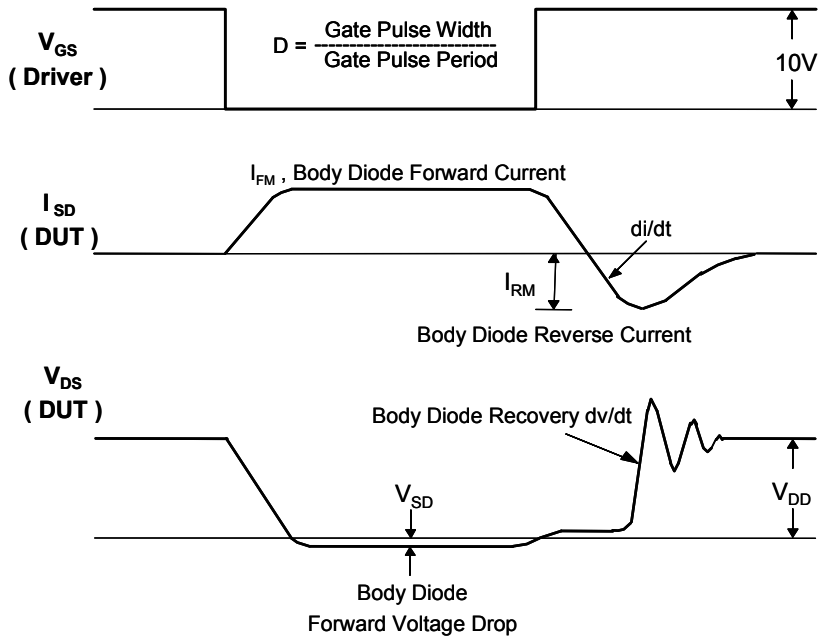


Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

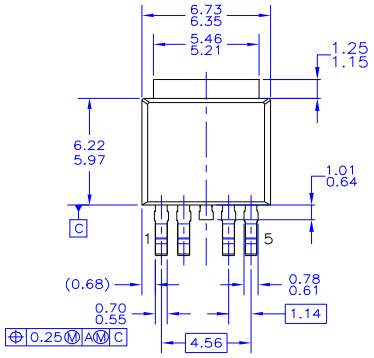


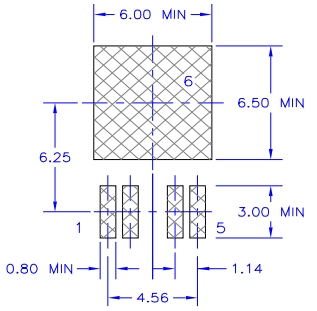


Mechanical Dimensions

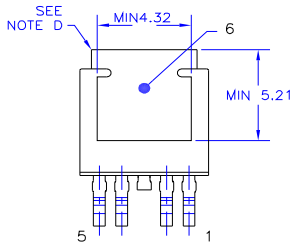
TO252-5L

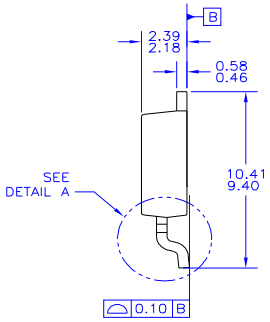
REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
O	RELEASE TO DOCUMENT CONTROL	-	05APR2006	OS JEON





LAND PATTERN RECOMMENDATION





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C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
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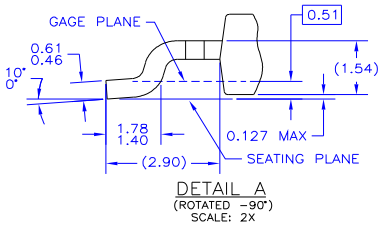

DETAIL A
(ROTATED -90°)
SCALE: 2X

APPROVALS	DATE
DRAWN: S. W LIM	05APR2006
CHECKED: S. W LIM	
APPROVED: M.K JONG	
O.S JEON	

FAIRCHILD SEMICONDUCTOR™ BUCHEON KOREA

TO-252 MOLDED, 5LD
JEDEC TO-252, AD

PROJECTION	SCALE	SIZE	DRAWING NUMBER	REV
	1:1	NA	MKT-	O

FORMERLY: N/A SHEET : 1 OF 1

FILE NAME

Dimensions in Millimeters

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