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FAIRCHILD SEMICONDUCTOR®

October 2013

FDP3651U

N-Channel PowerTrench® MOSFET

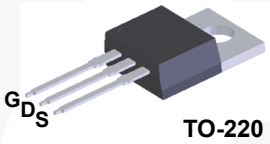
100 V, 80 A, 18 mΩ

Features

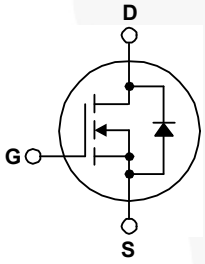
- $R_{DS(on)}$ = 15 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 80 A
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- Low Miller Charge
- UIS Capability (Single Pulse and Repetitive Pulse)

Applications

- Consumer Appliances
- Synchronous Rectification
- Battery Protection Circuit
- Motor drives and Uninterruptible Power Supplies
- Micro Solar Inverter



TO-220



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		FDP3651U	Unit
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current - Continuous		80	A
	- Pulsed	(Note 1)	320	
P_D	Power Dissipation		255	W
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	266	mJ
T_J, T_{STG}	Operating and Storage Temperature		-55 to 175	°C
T_L	Maximum lead temperature soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance , Junction to Ambient, Max.	62	°C/W
$R_{\theta JC}$	Thermal Resistance , Junction to Case, Max.	0.59	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDP3651U	FDP3651U	Tube	N/A	50 units

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Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 80V, V_{GS} = 0V, T_C=150°C	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250μA	3.5	4.5	5.5	V
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 10V , I_D = 80A	-	15	18	mΩ
		V_{GS} = 10V , I_D = 40A	-	13	15	
		V_{GS}=10V, I_D=40A,T_J=175°C	-	32	37	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V,V_{GS} = 0V, f=1MHz	-	4152	5522	pF
C_{oss}	Output Capacitance		-	485	728	pF
C_{rss}	Reverse Transfer Capacitance		-	89	118	pF
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0V to 10V, V_{DD} = 50V, I_D = 80A	-	49	69	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 2V, V_{DD} = 50V, I_D = 80A	-	7	9.8	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 50V, I_D = 80A	-	23	-	nC
Q_{gd}	Gate to Drain Charge	V_{DD} = 50V, I_D = 80A	-	16	-	nC
Resistive Switching Characteristics						
$t_{(on)}$	Turn-On Time	V_{DD} = 50V, I_D = 80A, V_{GS} = 10V, R_{GS} = 5.0Ω	-	-	64	ns
$t_{d(on)}$	Turn-On Delay Time		-	15	27	ns
t_r	Rise Time		-	16	29	ns
$t_{d(off)}$	Turn-Off Delay Time		-	32	52	ns
t_f	Fall Time		-	14	26	ns
$t_{(off)}$	Turn-Off Time		-	-	78	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	I_{SD} = 80A	-	0.99	1.25	V
		I_{SD} = 40A	-	0.88	1.0	V
t_{rr}	Reverse Recovery Time	I_s = 40 A, di/dt = 100A/μs	-	70	105	ns
Q_{rr}	Reverse Recovery Charge		-	202	303	nC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L=0.13mH, I_{AS} = 64A, V_{DD}=50V, R_G=25 Ω , Starting T_J=25°C

Typical Characteristics T_C = 25°C unless otherwise noted

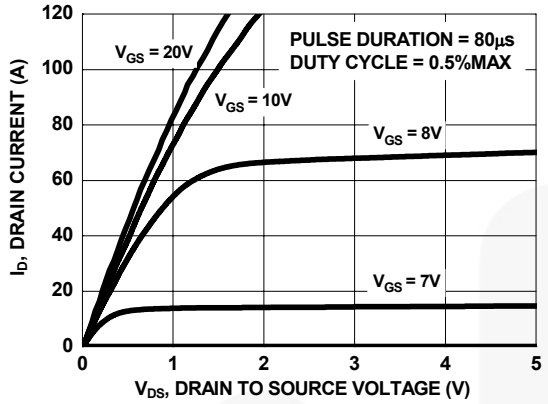


Figure 1. On Region Characteristics

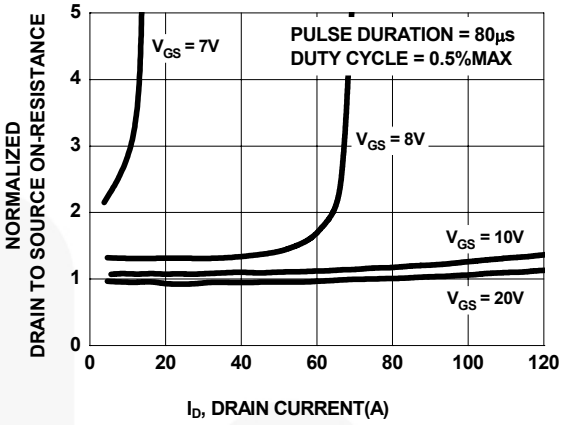


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

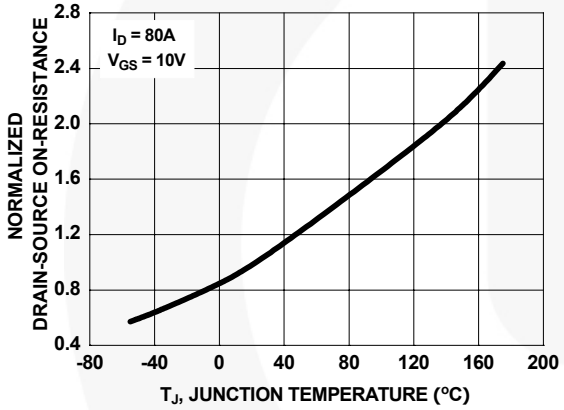


Figure 3. Normalized On Resistance vs Junction Temperature

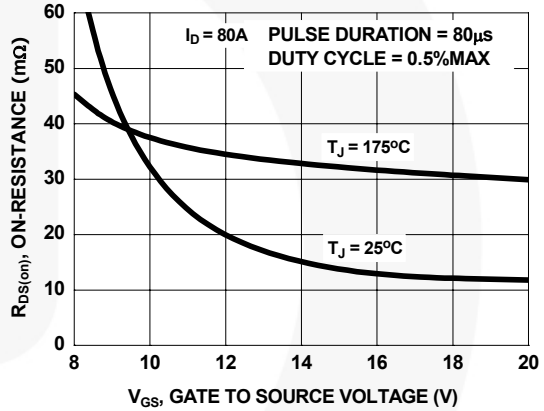


Figure 4. On-Resistance vs Gate to Source Voltage

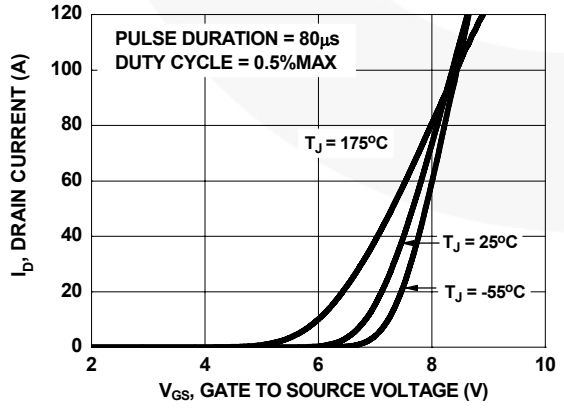


Figure 5. Transfer Characteristics

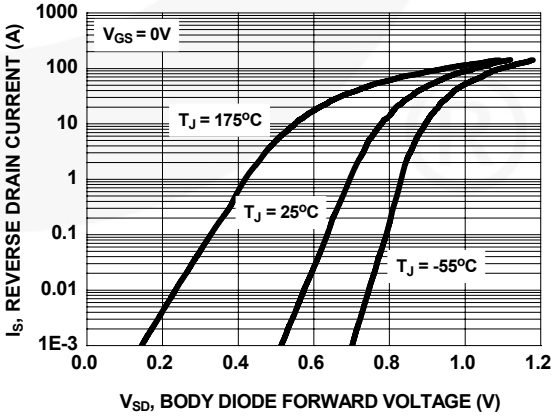


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_C = 25°C unless otherwise noted

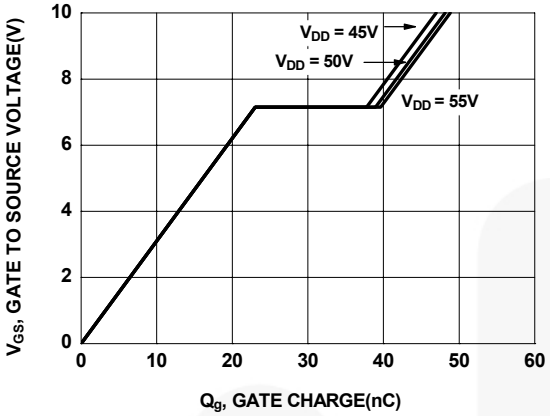


Figure 7. Gate Charge Characteristics

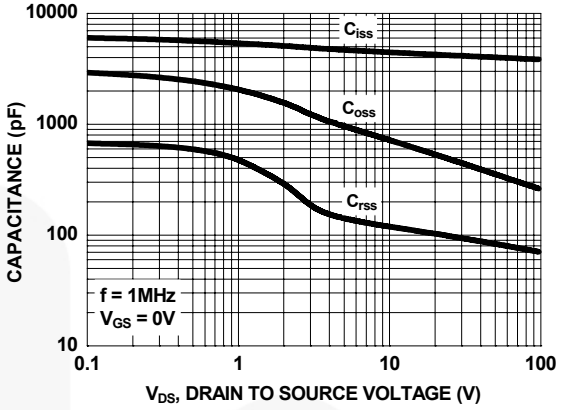


Figure 8. Capacitance vs Drain to Source Voltage

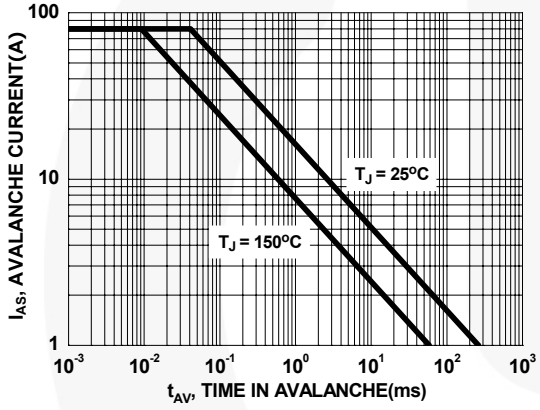


Figure 9. Unclamped Inductive Switching Capability

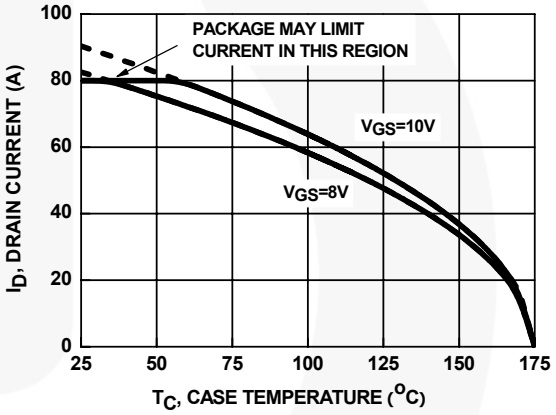


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

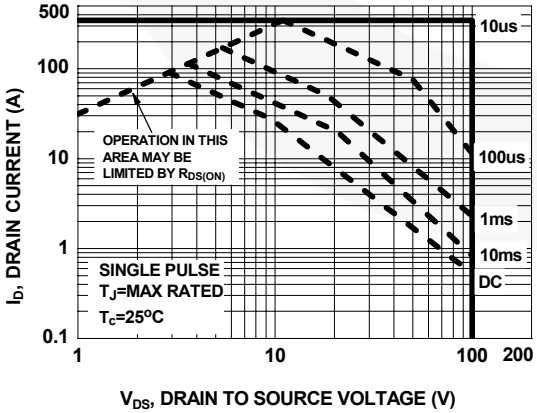


Figure 11. Forward Bias Safe Operating Area

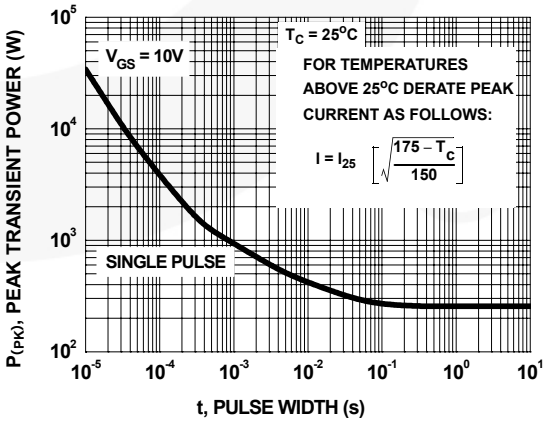


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_C = 25°C unless otherwise noted

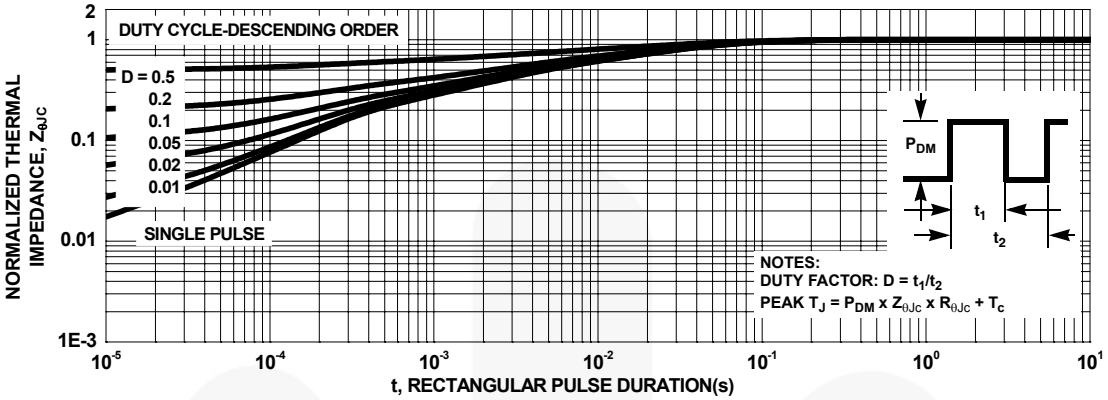


Figure 13. Transient Thermal Response Curve

Mechanical Dimensions

TO-220 3L

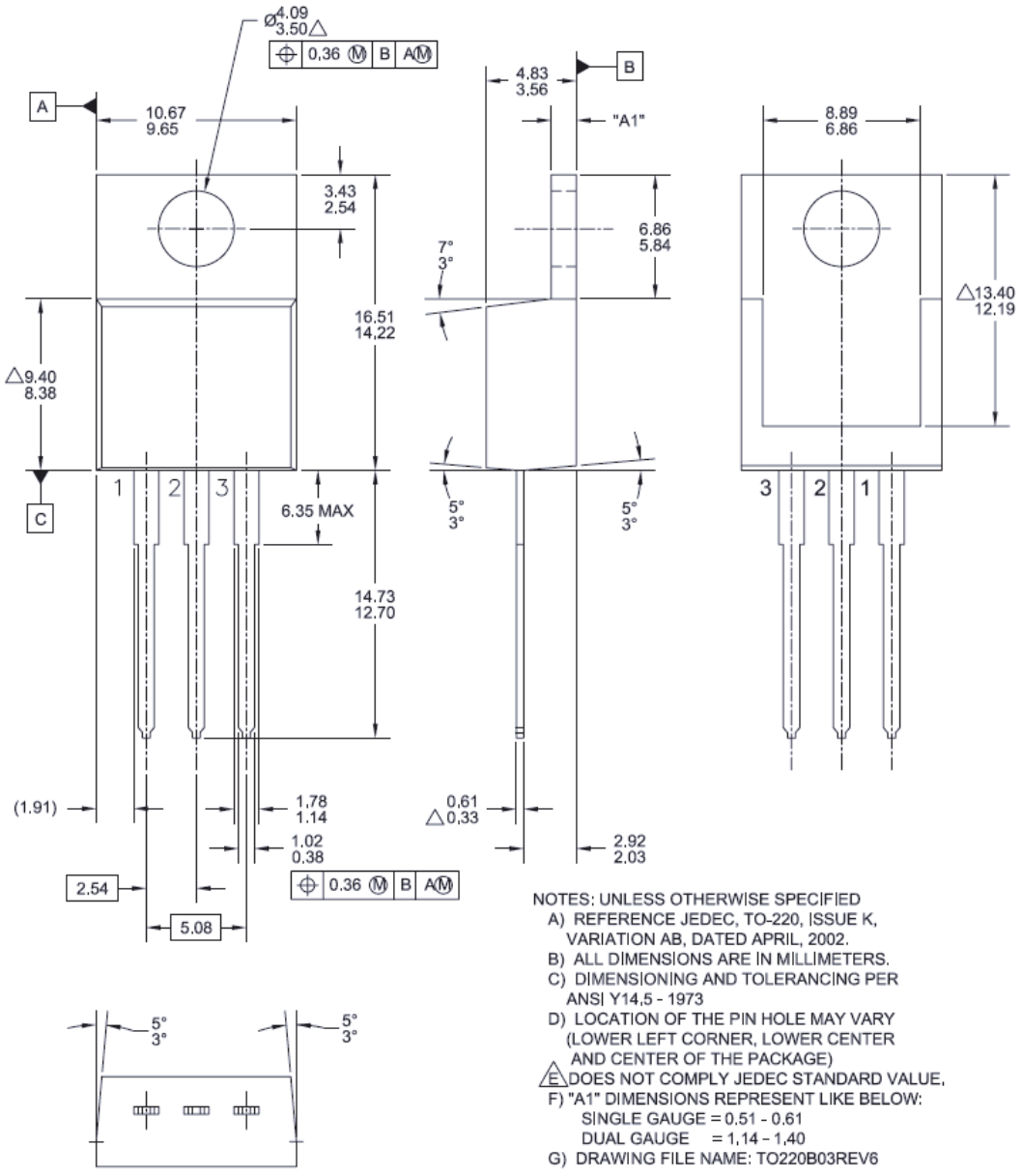


Figure 14. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters

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