

FAIRCHILD
SEMICONDUCTOR®

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FDP3651U

N-Channel PowerTrench® MOSFET

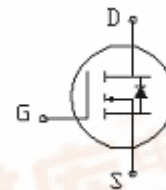
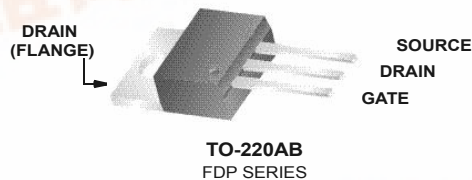
100V, 80A, 15mΩ

Features

- $r_{DS(on)} = 13 \text{ m}\Omega$ (Typ.), $V_{GS} = 10\text{V}$, $I_D = 40\text{A}$
- $Q_{g(TOT)} = 49 \text{ nc}$ (Typ.), $V_{GS} = 10 \text{ V}$
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse/Repetitive Pulse)

Applications

- DC/DC converters and Off-Line UPS
- Distributed Power Architectures and VRMs
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous	80	A
	-Pulsed (Note 1)	220	
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	$^\circ\text{C}$
T_L	Maximum lead temperature soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.59	$^\circ\text{C/W}$

Package Marking and Ordering Information

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



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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}$ $V_{GS} = 0\text{V}$ $T_C = 150^\circ\text{C}$	-	-	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = -250\mu\text{A}$	3.5	4.5	5.5	V
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 10\text{V}$, $I_D = 80\text{A}$	-	15	18	m Ω
		$V_{GS} = 10\text{V}$, $I_D = 40\text{A}$	-	13	15	
		$V_{GS} = 10\text{V}$, $I_D = 40\text{A}$, $T_J = 175^\circ\text{C}$	-	32	37	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	4152	5522	pF
C_{oss}	Output Capacitance		-	485	728	pF
C_{rss}	Reverse Transfer Capacitance		-	89	118	pF
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{V}$ to 10V	-	49	69	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V}$ to 2V	-	7	9.8	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 50\text{V}$ $I_D = 80\text{A}$	-	23	-	nC
Q_{gd}	Gate to Drain Charge		-	16	-	nC

Resistive Switching Characteristics

$t_{(on)}$	Turn-On Time	$V_{DD} = 50\text{V}$, $I_D = 80\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 5.0\Omega$	-	-	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	$I_{SD} = 80\text{A}$	-	0.99	1.25	V
		$I_{SD} = 40\text{A}$	-	0.88	1.0	V
t_{rr}	Reverse Recovery Time	$I_S = 40\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$	-	70	105	ns
Q_{rr}	Reverse Recovery Charge		-	202	303	nC

Notes:

1. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%
2. $L = 0.13\text{mH}$, $I_{AS} = 64\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

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

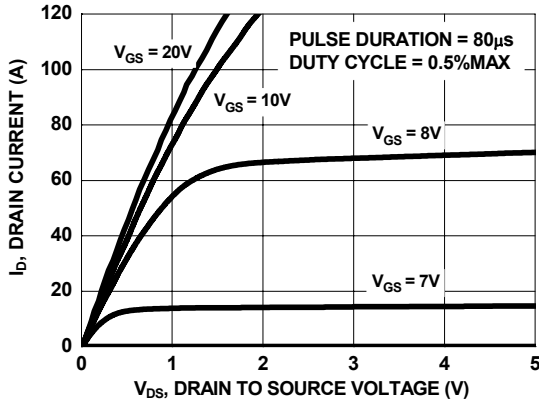


Figure 1. On Region Characteristics

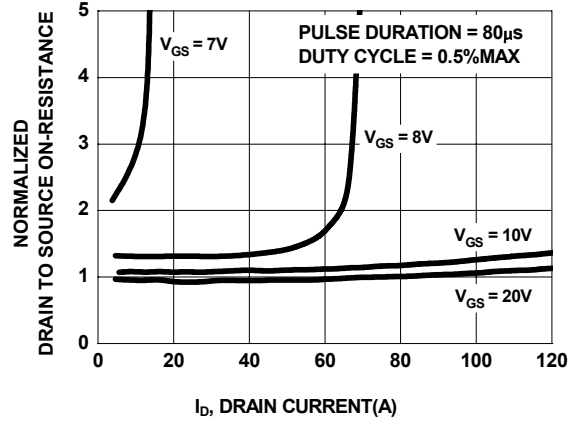


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

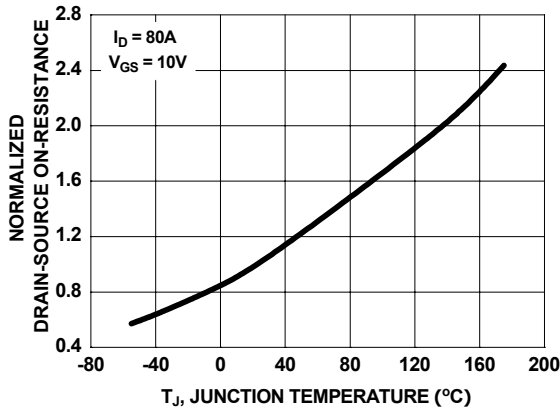


Figure 3. Normalized On Resistance vs Junction Temperature

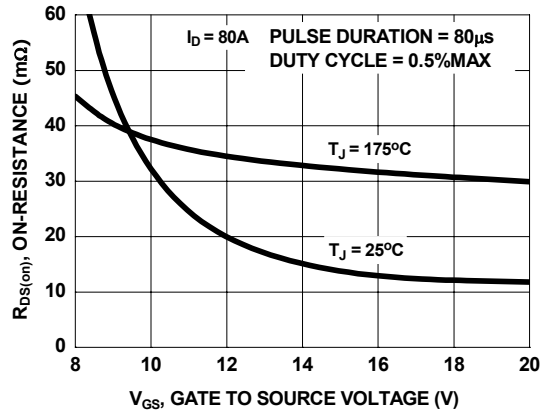


Figure 4. On-Resistance vs Gate to Source Voltage

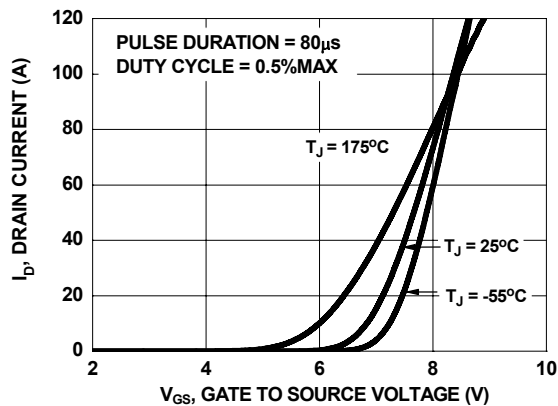


Figure 5. Transfer Characteristics

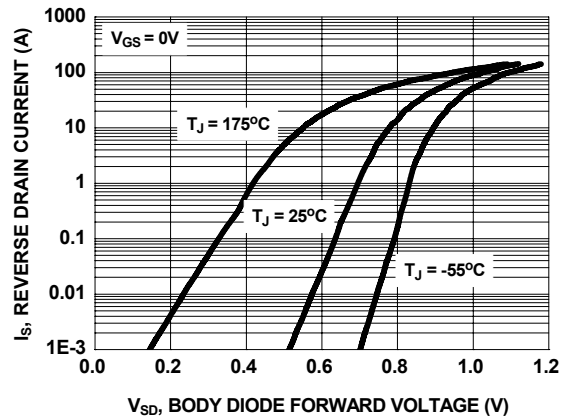


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

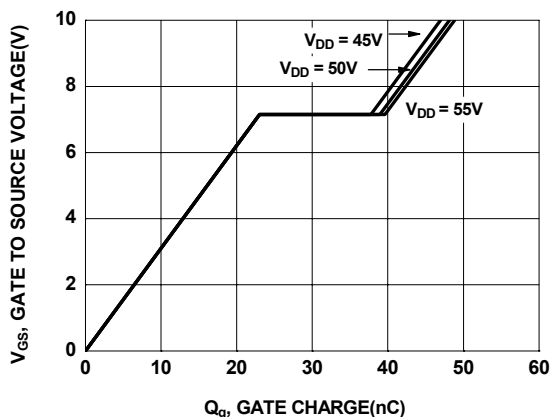


Figure 7. Gate Charge Characteristics

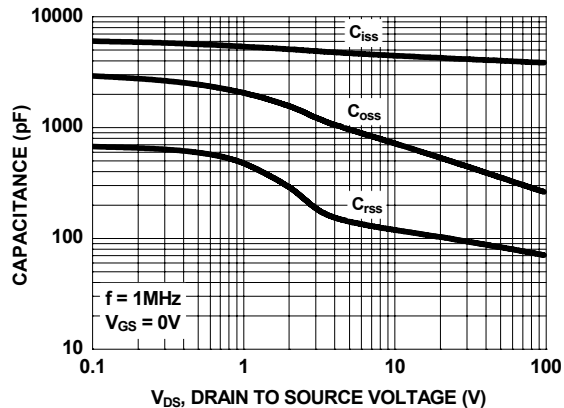


Figure 8. Capacitance vs Drain to Source Voltage

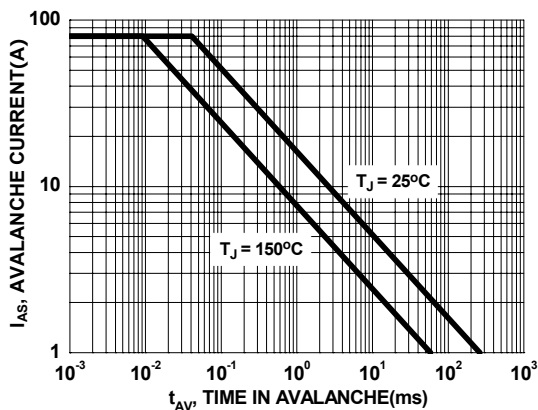


Figure 9. Unclamped Inductive Switching Capability

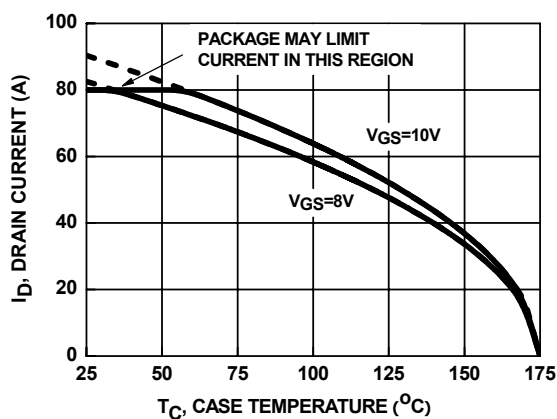


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

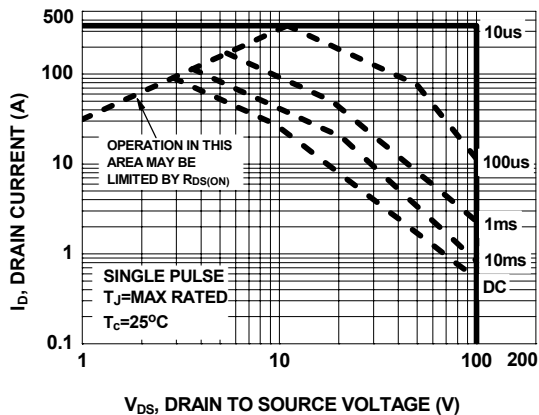


Figure 11. Forward Bias Safe Operating Area

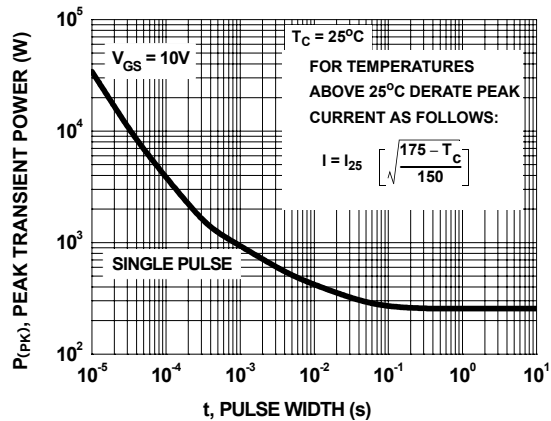


Figure 12. Single Pulse Maximum Power Dissipation

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

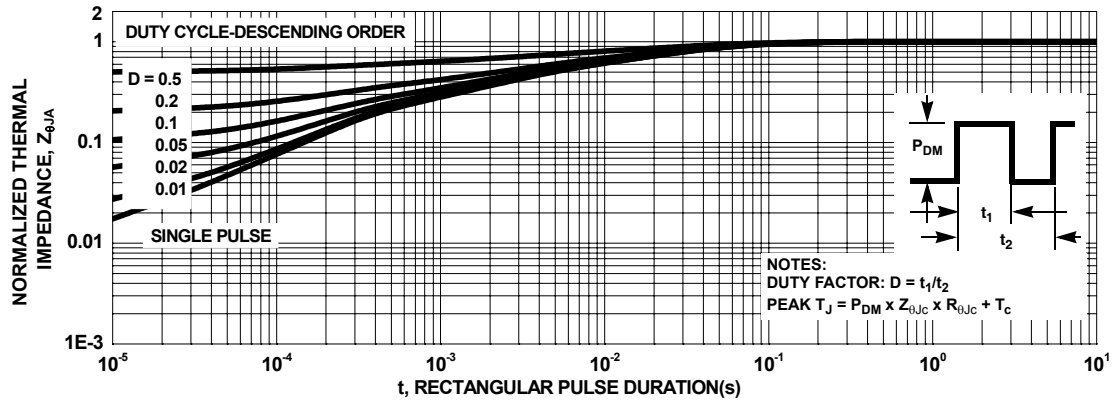


Figure 13. Transient Thermal Response Curve

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