

# FDP3651U

## N-Channel PowerTrench® MOSFET

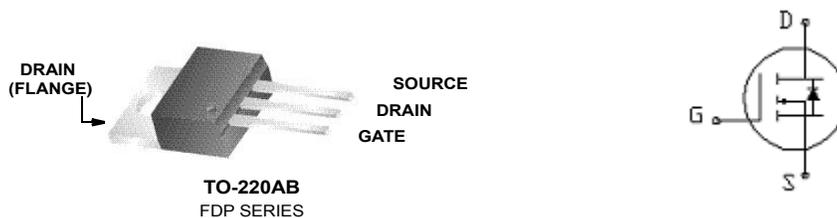
100V, 80A, 15mΩ

### Features

- $r_{DS(on)}=13\text{ m}\Omega(\text{Typ.}), V_{GS} = 10\text{V}, I_D = 40\text{A}$
- $Q_{g(TOT)}=49\text{ nc}(\text{Typ.}), V_{GS} = 10\text{ V}$
- 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
$V_{DSS}$	Drain to Source Voltage	100	V
$V_{GSS}$	Gate to Source Voltage	$\pm 20$	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	$^\circ\text{C}$
$T_L$	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	$V_{DS} = 80\text{V}$ $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$T_C = 150^\circ\text{C}$	-	-	250	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	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 $\Omega$
		$V_{GS} = 10\text{V}, I_D = 40\text{A}$	-	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	$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 50\text{V}$ $I_D = 80\text{A}$	-	49	69	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V to } 2\text{V}$		-	7	9.8	nC
$Q_{gs}$	Gate to Source Gate Charge			-	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 $\mu\text{s}$ , 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

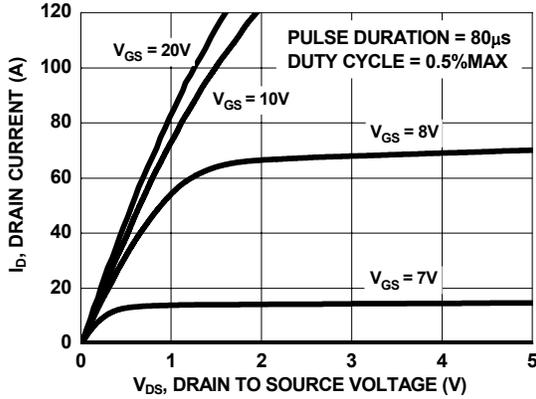


Figure 1. On Region Characteristics

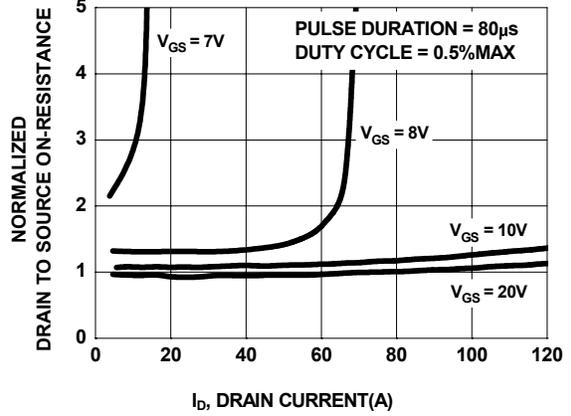


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

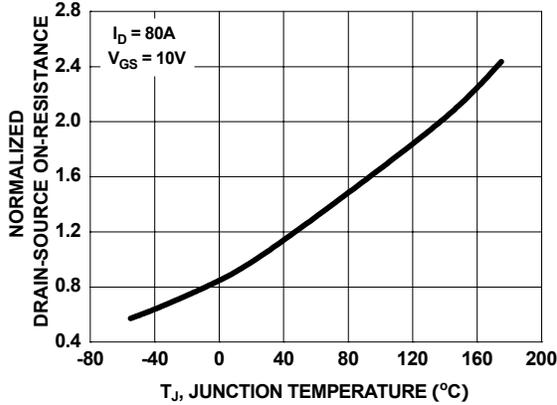


Figure 3. Normalized On Resistance vs Junction Temperature

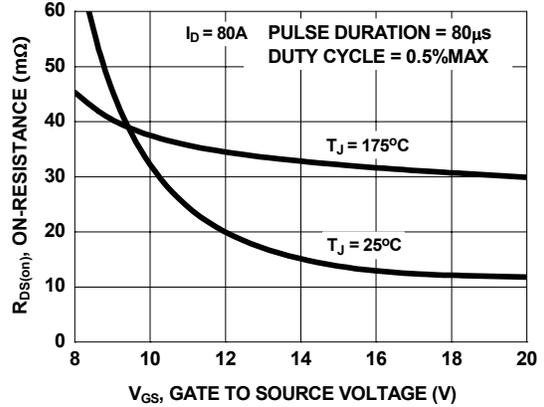


Figure 4. On-Resistance vs Gate to Source Voltage

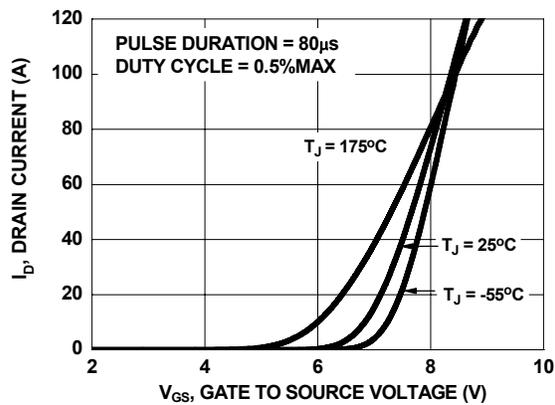


Figure 5. Transfer Characteristics

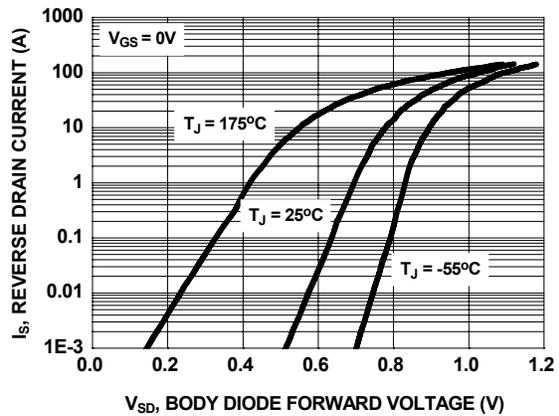


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

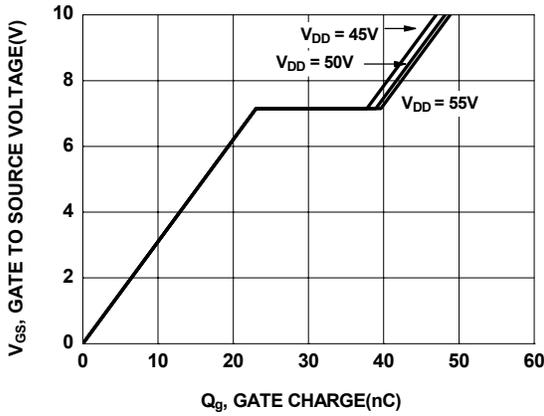


Figure 7. Gate Charge Characteristics

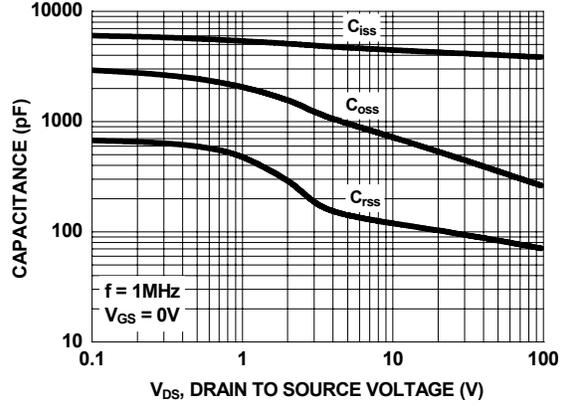


Figure 8. Capacitance vs Drain to Source Voltage

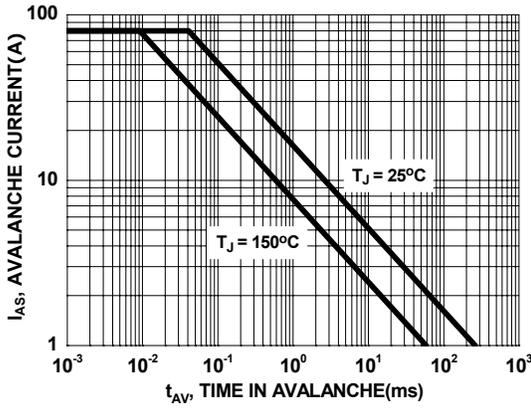


Figure 9. Unclamped Inductive Switching Capability

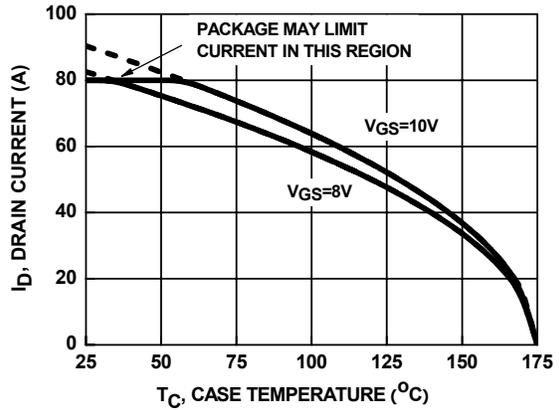


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

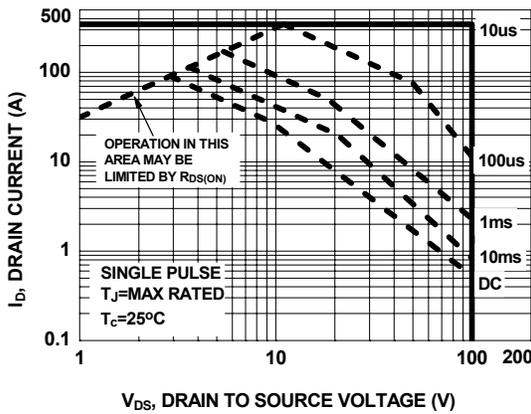


Figure 11. Forward Bias Safe Operating Area

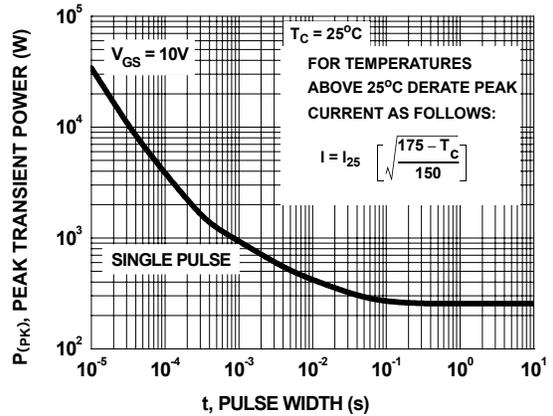
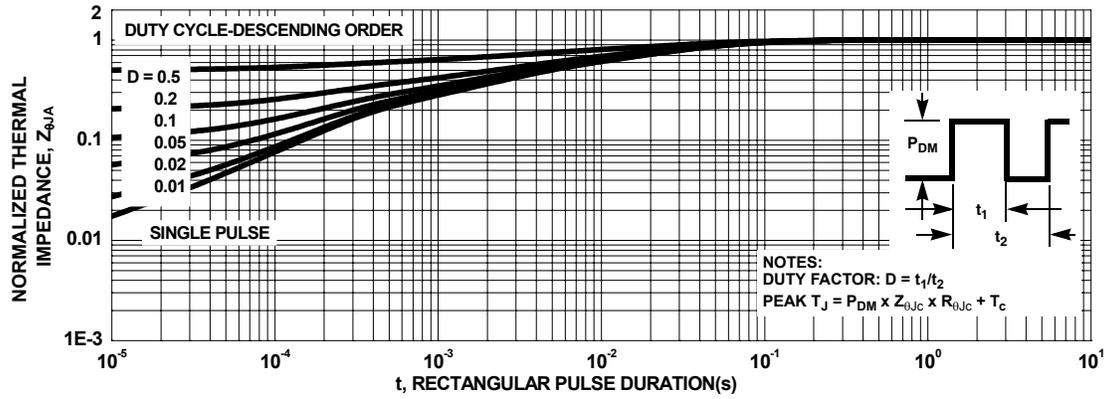


Figure 12. Single Pulse Maximum Power Dissipation

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



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FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
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