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FDP3651U

N-Channel PowerTrench® MOSFET

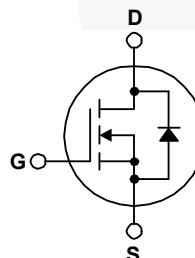
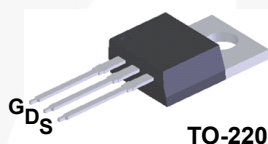
100 V, 80 A, 18 mΩ

Features

- $R_{DS(on)} = 15\text{ m}\Omega$ (Typ.) @ $V_{GS} = 10\text{ V}$, $I_D = 80\text{ A}$
- 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



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ 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	$^\circ\text{C}$
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, Max.	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.59	$^\circ\text{C}/\text{W}$

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	Unit
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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	μA
		$T_C = 150^\circ\text{C}$	-	-	250	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	$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 50\text{V}$ $I_D = 80\text{A}$	-	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. Repetitive Rating : Pulse width limited by maximum junction temperature
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 $T_C = 25^\circ\text{C}$ unless otherwise noted

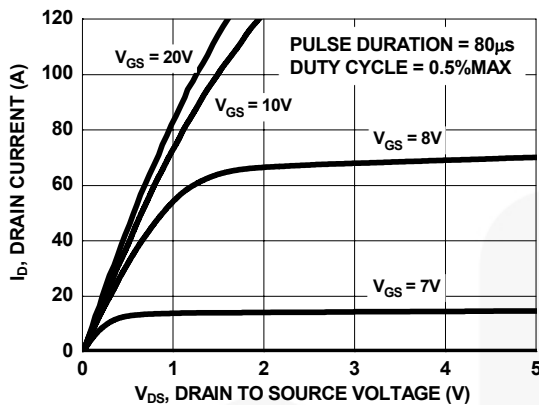


Figure 1. On Region Characteristics

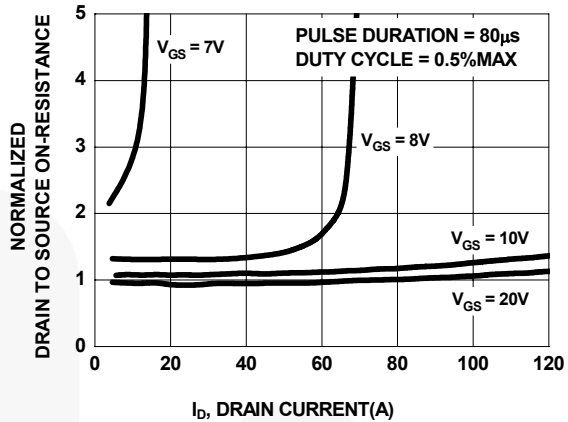


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

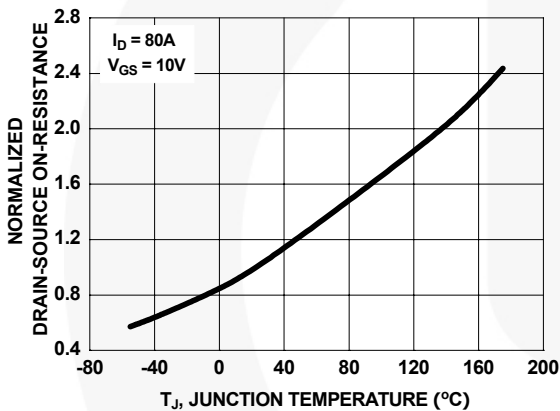


Figure 3. Normalized On Resistance vs Junction Temperature

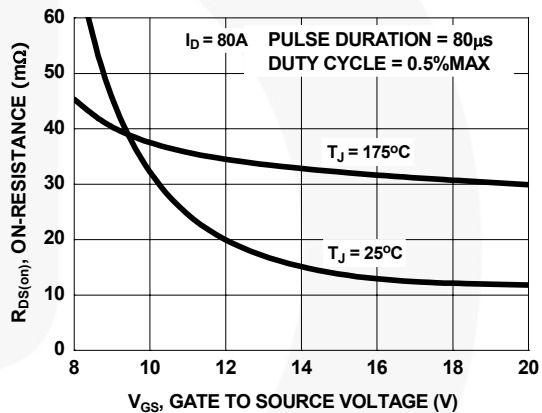


Figure 4. On-Resistance vs Gate to Source Voltage

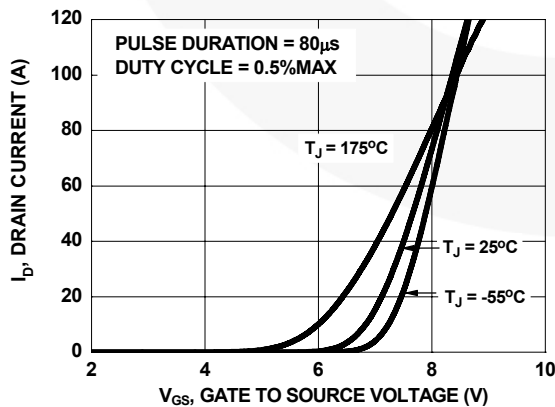


Figure 5. Transfer Characteristics

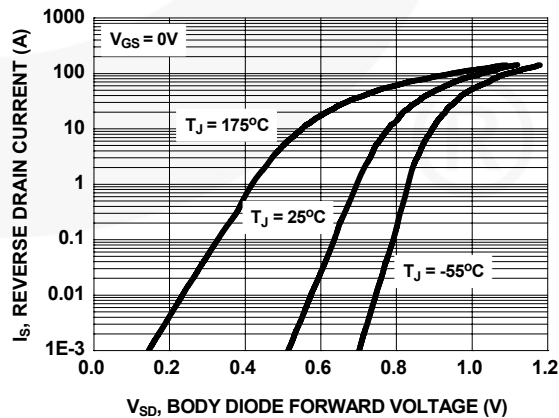


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

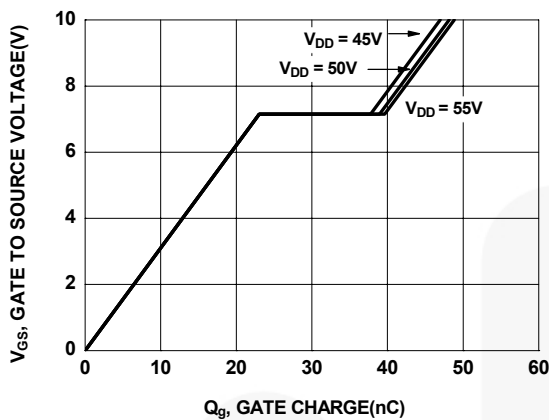


Figure 7. Gate Charge Characteristics

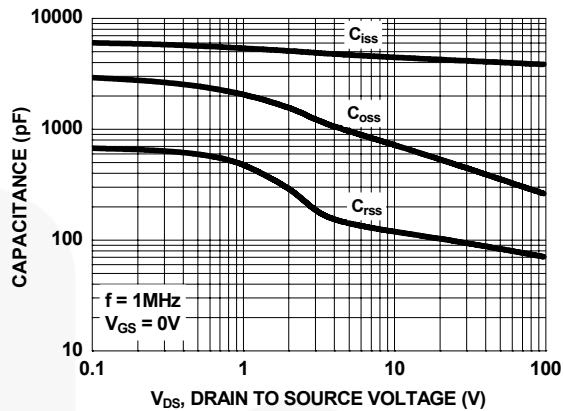


Figure 8. Capacitance vs Drain to Source Voltage

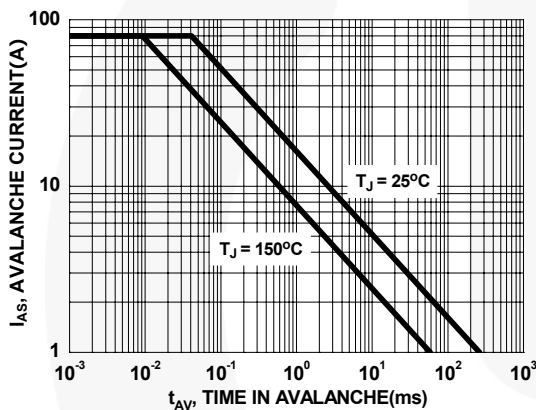


Figure 9. Unclamped Inductive Switching Capability

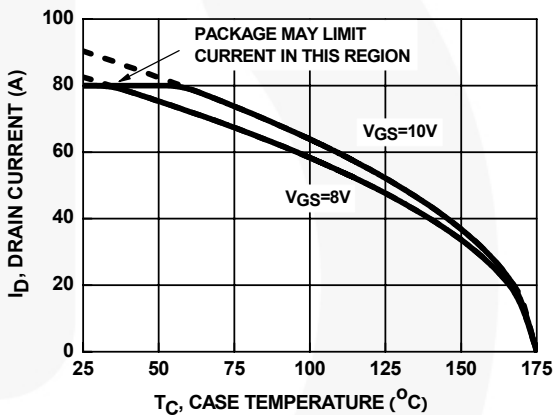


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

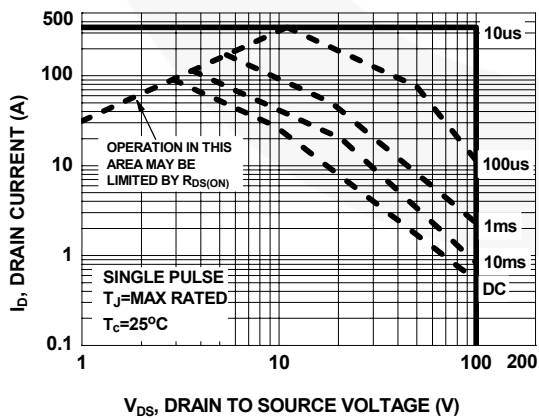


Figure 11. Forward Bias Safe Operating Area

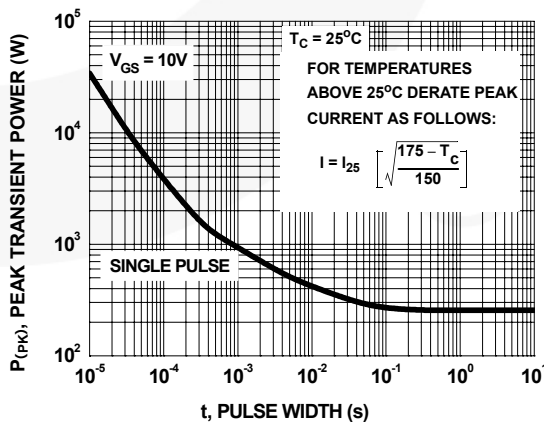
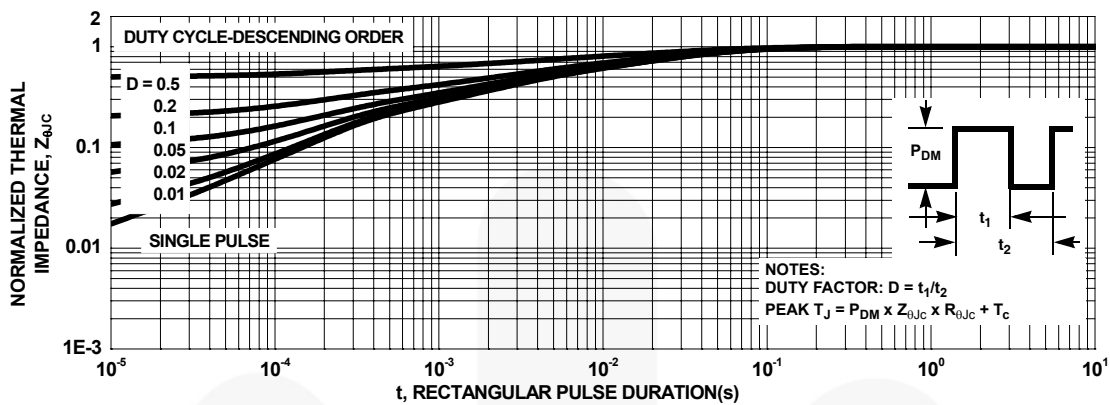


Figure 12. Single Pulse Maximum Power Dissipation

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



Mechanical Dimensions

TO-220 3L

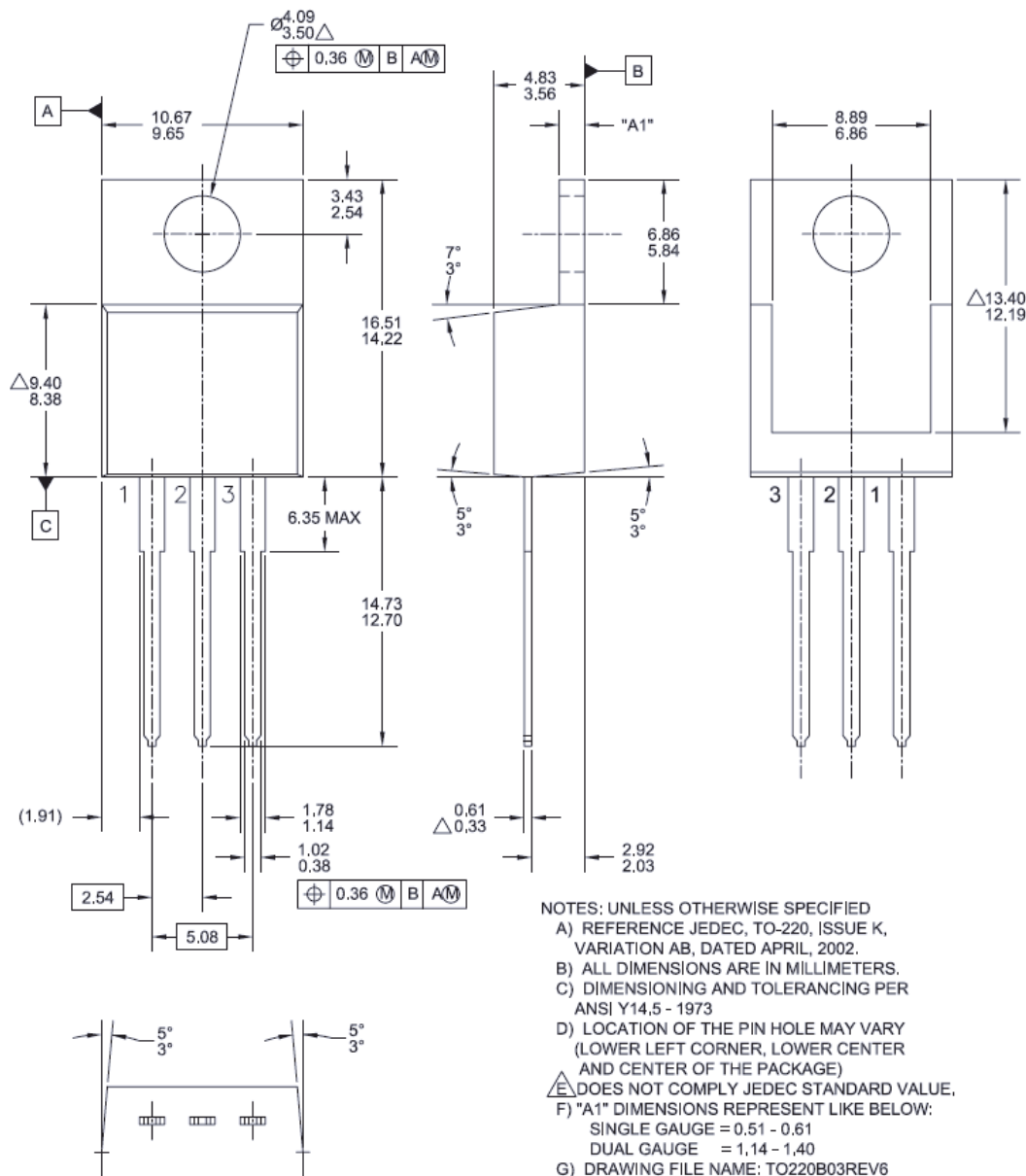


Figure 14. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters



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