



FDP6676/FDB6676

30V N-Channel Logic Level PowerTrench® MOSFET

General Description

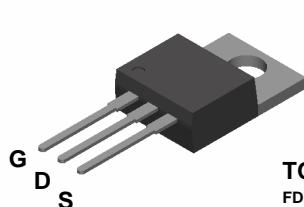
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for "low side" synchronous rectifier operation, providing an extremely low $R_{DS(ON)}$.

Applications

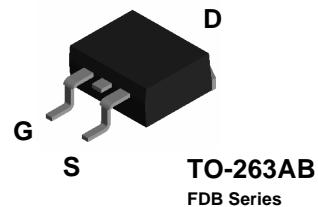
- Synchronous rectifier
- DC/DC converter

Features

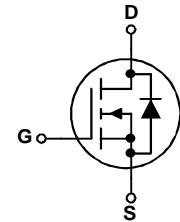
- 42 A, 30 V. $R_{DS(ON)} = 6.0 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$
 $R_{DS(ON)} = 7.5 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$
- Critical DC electrical parameters specified at elevated temperature
- High performance trench technology for extremely low $R_{DS(ON)}$
- 175°C maximum junction temperature rating



TO-220
FDP Series



TO-263AB
FDB Series



Absolute Maximum Ratings

$T_A=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 16	V
I_D	Drain Current – Continuous (Note 1)	84	A
	– Pulsed (Note 1)	240	
P_D	Total Power Dissipation @ $T_c = 25^\circ\text{C}$	93	W
	Derate above 25°C	0.48	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-65 to +175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.6	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ\text{C}/\text{W}$

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDP6676	FDP6676	Tube	n/a	45
FDB6676	FDB6676	13"	24mm	800 units

Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 1)						
W_{DSS}	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 15 \text{ V}$, $I_D = 20 \text{ A}$			370	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				20	A
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		24		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 \text{ V}$, $V_{GS} = 0 \text{ V}$			1	μA
I_{GSSF}	Gate-Body Leakage, Forward	$V_{GS} = 16 \text{ V}$, $V_{DS} = 0 \text{ V}$			100	nA
I_{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = -16 \text{ V}$, $V_{DS} = 0 \text{ V}$			-100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	1	1.5	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		-4.5		$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}$, $I_D = 42 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 39 \text{ A}$ $V_{GS}=10\text{V}$, $I_D = 42 \text{ A}$, $T_J=125^\circ\text{C}$		4.3 4.9 7.0	6 7.5 11	$\text{m}\Omega$
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10 \text{ V}$, $V_{DS} = 5 \text{ V}$	60			A
g_F	Forward Transconductance	$V_{DS} = 5 \text{ V}$, $I_D = 42 \text{ A}$		141		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$		5324		pF
C_{oss}	Output Capacitance			841		pF
C_{rss}	Reverse Transfer Capacitance			384		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 1 \text{ A}$, $R_{GEN} = 6 \Omega$		15	27	ns
t_r	Turn-On Rise Time			10	20	ns
$t_{d(off)}$	Turn-Off Delay Time			93	149	ns
t_f	Turn-Off Fall Time			37	59	ns
Q_g	Total Gate Charge	$V_{DS} = 15 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 42 \text{ A}$		43	60	nC
Q_{gs}	Gate-Source Charge			13		nC
Q_{gd}	Gate-Drain Charge			11		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_s	Maximum Continuous Drain-Source Diode Forward Current				84	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_s = 42 \text{ A}$		0.9	1.3	V

Notes:

1. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%
2. TO-220 package is supplied in tube / rail @ 45 pieces per rail.
3. Calculated continuous current based on maximum allowable junction temperature. Actual maximum continuous current limited by package constraints to 75A

Typical Characteristics

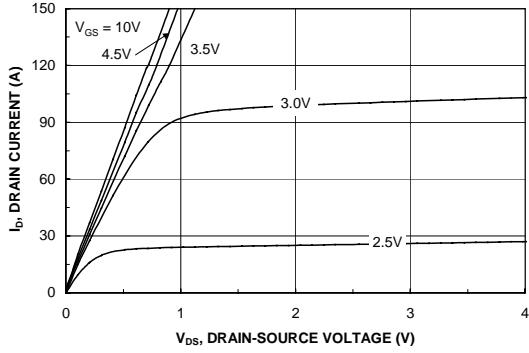


Figure 1. On-Region Characteristics.

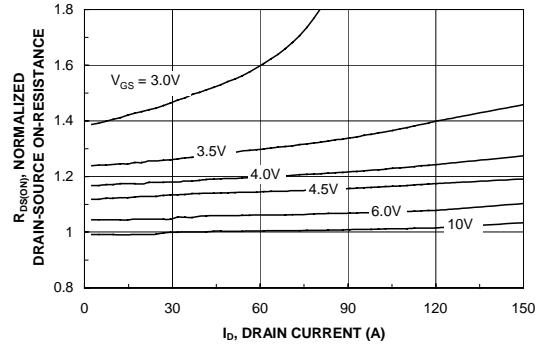


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

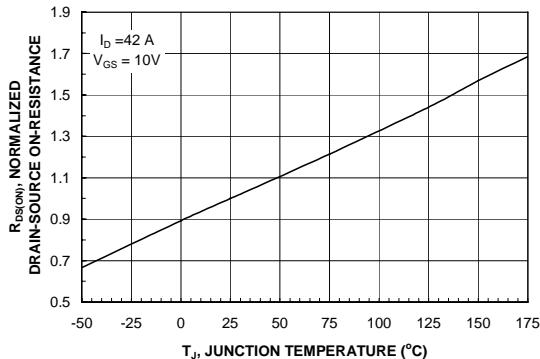


Figure 3. On-Resistance Variation with Temperature.

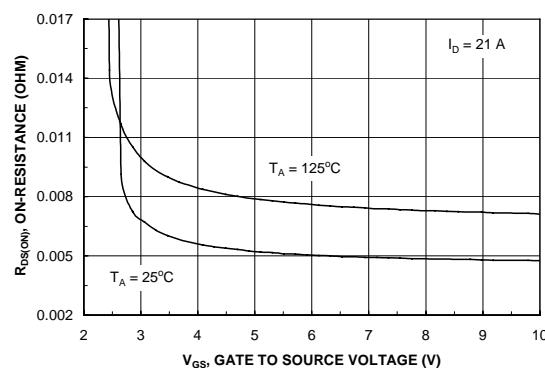


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

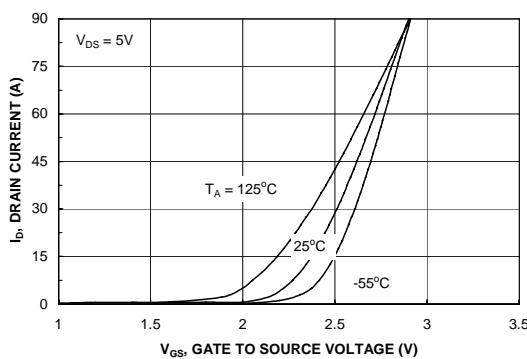


Figure 5. Transfer Characteristics.

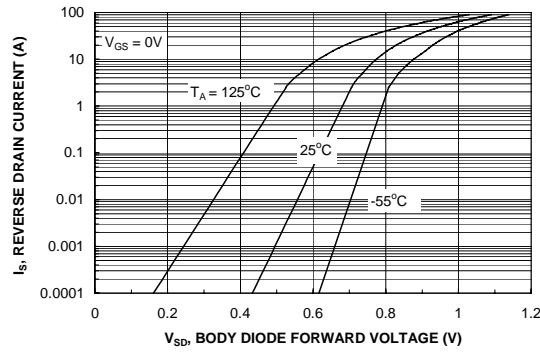


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.