FAIRCHILD
SEMICONDUCTOR TM

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FDP6670AL/FDB6670AL
N-Channel Logic Level PowerTrench™ MOSFET

General Description

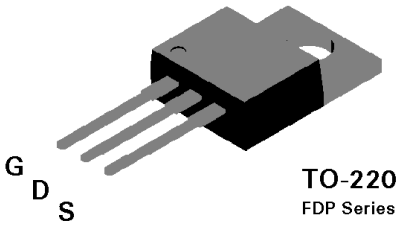
This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(on)}$ specifications.

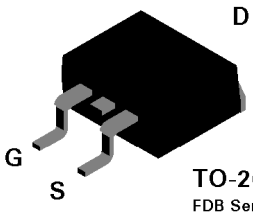
The result is a MOSFET that is easy and safer to drive (even at very high frequencies), and DC/DC power supply designs with higher overall efficiency.

Features

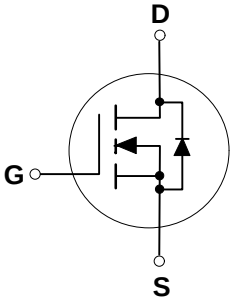
- 80 A, 30 V. $R_{DS(ON)}$ = 0.0065 Ω @ V_{GS}=10 V,
  $R_{DS(ON)}$ = 0.0085 Ω @ V_{GS}= 4.5 V.
- Critical DC electrical parameters specified at elevated temperature.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- High performance trench 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_C = 25°C unless otherwise noted

Symbol	Parameter	FDP6670AL	FDB6670AL	Units
V_{DSS}	Drain-Source Voltage	30		V
V_{GSS}	Gate-Source Voltage	±20		V
I_D	Drain Current - Continuous (Note 1)	80		A
	- Pulsed (Note 1)	240		
P_D	Total Power Dissipation @ T_C = 25°C	75		W
	Derate above 25°C	0.5		W/°C
T_J,T_{STG}	Operating and Storage Temperature Range	-65 to 175		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	275		°C
THERMAL CHARACTERISTICS				
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5		°C/W

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
DRAIN-SOURCE AVALANCHE RATINGS (Note 1)						
W_{DSS}	Single Pulse Drain-Source Avalanche Energy	V_{DD} = 15 V, I_D = 80 A			300	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				80	A
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	30			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	I_D = 250 µA, Referenced to 25 °C		22		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	µA
I_{GSSF}	Gate - Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	V_{GS} = -20 V, V_{DS} = 0 V			-100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	1	1.5	3	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp.Coefficient	I_D = 250 µA, Referenced to 25 °C		-5		mV/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 40 A		0.005	0.0065	Ω
		T_J = 125°C		0.0072	0.0091	
		V_{GS} = 4.5 V, I_D = 37 A		0.0067	0.0085	
$I_{D(on)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 10 V	80			A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 40 A		86		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1.0 MHz		3200		pF
C_{oss}	Output Capacitance			820		pF
C_{rss}	Reverse Transfer Capacitance			400		pF
SWITCHING CHARACTERISTICS (Note 1)						
$t_{D(on)}$	Turn - On Delay Time	V_{DD} = 10 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		15	27	nS
t_r	Turn - On Rise Time			15	27	nS
$t_{D(off)}$	Turn - Off Delay Time			85	105	nS
t_f	Turn - Off Fall Time			42	68	nS
Q_g	Total Gate Charge	V_{DS} = 15 V, I_D = 40 A, V_{GS} = 5 V		35	50	nC
Q_{gs}	Gate-Source Charge			9		nC
Q_{gd}	Gate-Drain Charge			16		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain-Source Diode Forward Current (Note 1)				80	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current (Note 1)				240	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 40 A (Note1)		0.9	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_F = 40 A, dI_F/dt = 100 A/µs		32	55	ns
I_{rr}	Reverse Recovery Current			0.83	5	A

Notes

1. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.