FDP7045L/FDB7045L

N-Channel Logic Level PowerTrench® MOSFET

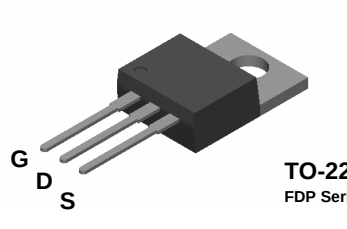
General Description

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.

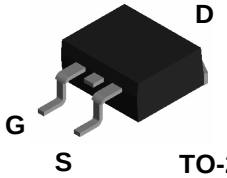
These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications resulting in DC/DC power supply designs with higher overall efficiency.

Features

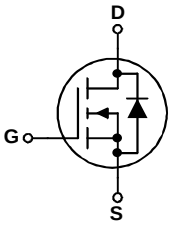
- 100 A, 30 V $R_{DS(ON)}$ = 4.5 mΩ @ V_{GS} = 10 V
  $R_{DS(ON)}$ = 6.0 mΩ @ V_{GS} = 4.5 V
- Critical DC electrical parameters specified at elevated temperature
- High performance trench technology for extremely low $R_{DS(ON)}$
- 175°C maximum junction temperature rating



TO-220
FDP Series



TO-263AB
FDB Series



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1)	100	A
		75	
	– Pulsed (Note 1)	300	
P_D	Total Power Dissipation @ T_C = 25°C	107	W
	Derate above 25°C	0.7	W/°C
T_J, T_{STG}	Operating and Storage Junction Temperature Range	–55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.4	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDB7045L	FDB7045L	13''	24mm	800 units
FDP7045L	FDP7045L	Tube	n/a	45

Electrical Characteristics

T_A = 25°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 V, I_D = 75 A			330	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				75	A
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		25		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate–Body Leakage	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	1.8	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		–6		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = 10 V, I_D = 50 A V_{GS} = 4.5 V, I_D = 40 A V_{GS}= 10 V, I_D = 50 A, T_J=125°C		3.5 4.0 5.5	4.5 6.0 7.0	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = 10 V, V_{DS} = 10 V	50			A
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D = 50 A		165		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1.0 MHz		4357		pF
C_{oss}	Output Capacitance			1092		pF
C_{rss}	Reverse Transfer Capacitance			399		pF
R_G	Gate Resistance	V_{GS} = 15 mV, f = 1.0 MHz		1.4		Ω
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 15V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		16	29	ns
t_r	Turn–On Rise Time			13	24	ns
$t_{d(off)}$	Turn–Off Delay Time			74	119	ns
t_f	Turn–Off Fall Time			41	66	ns
Q_g	Total Gate Charge	V_{DS} = 15 V, I_D = 50 A, V_{GS} = 5 V		41	58	nC
Q_{gs}	Gate–Source Charge			12		nC
Q_{gd}	Gate–Drain Charge			14		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				75	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 50 A (Note 1)		0.91	1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = 50 A, d_{iF}/d_t = 100 A/μs		48		nS
Q_{rr}	Diode Reverse Recovery Charge			42		nC

Notes:

1. Calculated continuous current based on maximum allowable junction temperature. Actual maximum continuous current limited by package constraints to 75A.
2. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

Typical Characteristics

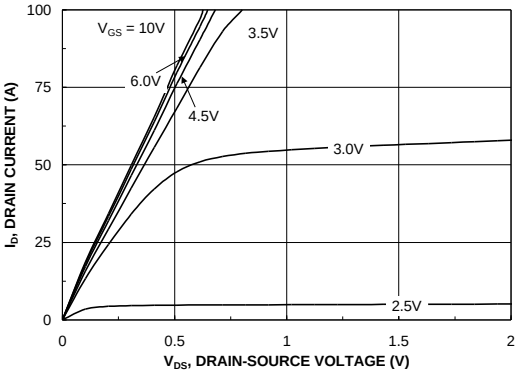


Figure 1. On-Region Characteristics.

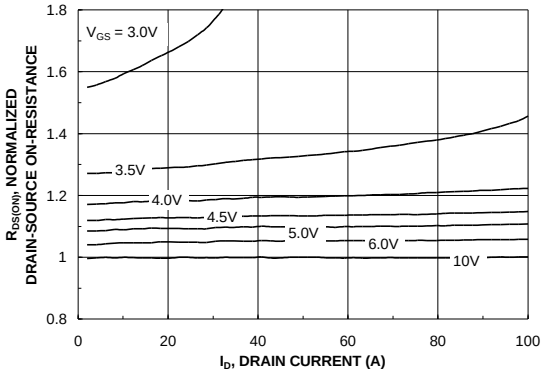


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

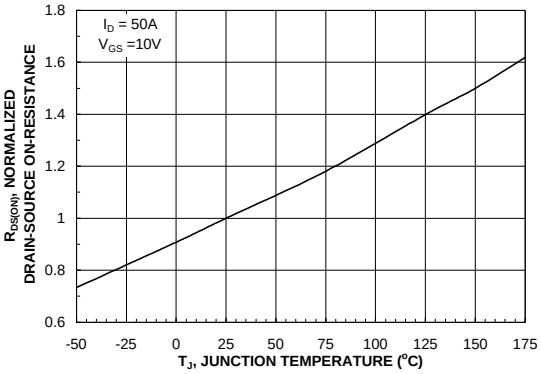


Figure 3. On-Resistance Variation with Temperature.

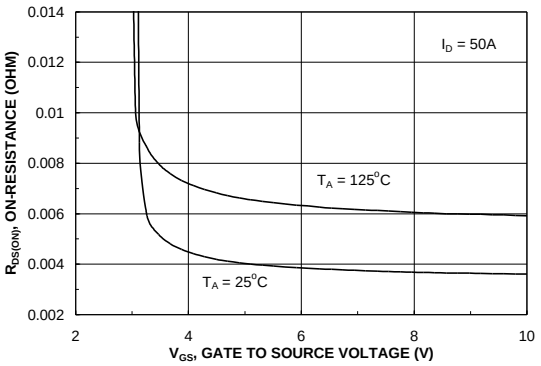


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

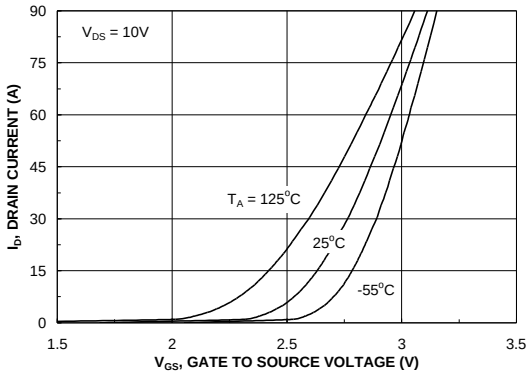


Figure 5. Transfer Characteristics.

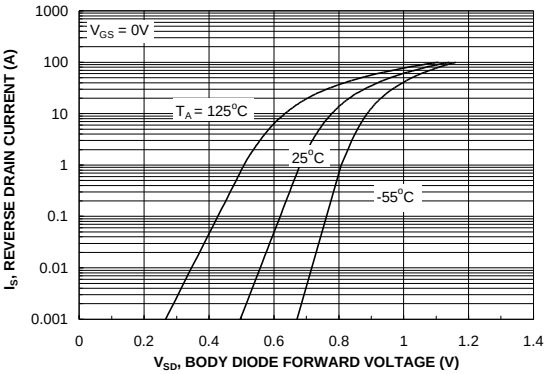


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.