FDP7042L / FDB7042L

N-Channel Logic Level PowerTrench® MOSFET

General Description

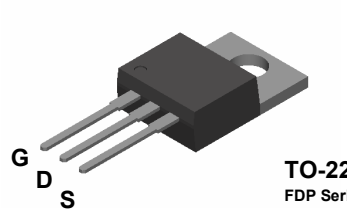
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for "low side" synchronous rectifier operation, providing an extremely low $R_{DS(ON)}$.

Applications

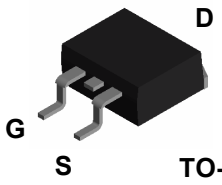
- Synchronous rectifier
- DC/DC converter

Features

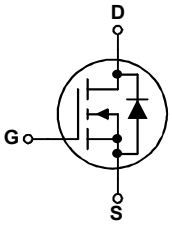
- 50 A, 30 V. $R_{DS(ON)}$ = 9 mΩ @ V_{GS} = 4.5 V
  $R_{DS(ON)}$ = 7.5 mΩ @ V_{GS} = 10 V
- Critical DC electrical parameters specified at elevated temperature
- High performance trench technology for extremely low $R_{DS(ON)}$
- 175°C maximum junction temperature rating



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		± 12	V
I_D	Drain Current – Continuous	(Note 1)	50	A
	– Pulsed	(Note 1)	150	
P_D	Total Power Dissipation @ T_C = 25°C		83	W
	Derate above 25°C		0.48	W°C
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-65 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.8	°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
FDB7042L	FDB7042L	13''	24mm	800 units
FDP7042L	FDP7042L	Tube	n/a	45

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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		24		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} = 12 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –12 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	0.8	1.2	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		–4.1		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = 4.5 V, I_D = 25A V_{GS} = 10 V, I_D = 25A V_{GS}= 4.5 V, I_D =25A, T_J=125°C		6.2 5.5 9.6	9 7.5 16	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = 4.5 V, V_{DS} = 10 V	60			A
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D = 25 A		117		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1.0 MHz		2418		pF
C_{oss}	Output Capacitance			549		pF
C_{rss}	Reverse Transfer Capacitance			243		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 15 V, I_D = 1 A, V_{GS} = 4.5 V, R_{GEN} = 6 Ω		21	34	ns
t_r	Turn–On Rise Time			20	32	ns
$t_{d(off)}$	Turn–Off Delay Time			60	96	ns
t_f	Turn–Off Fall Time			30	48	ns
Q_g	Total Gate Charge	V_{DS} = 15 V, I_D = 50 A, V_{GS} = 4.5 V		32	51	nC
Q_{gs}	Gate–Source Charge			10		nC
Q_{gd}	Gate–Drain Charge			9		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				50	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 25 A (Note 2)		0.8	1.3	V

Notes:

1. Maximum continuous current is limited by the package.
2. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

Typical Characteristics

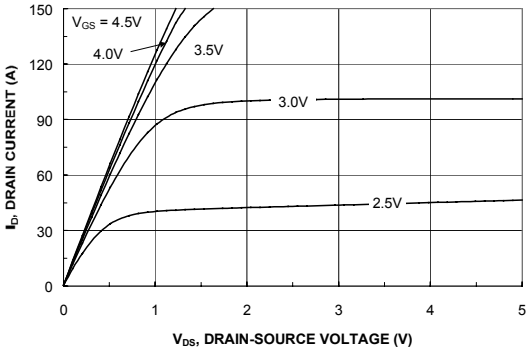


Figure 1. On-Region Characteristics.

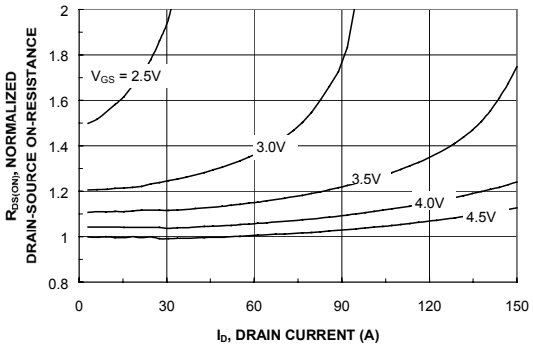


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

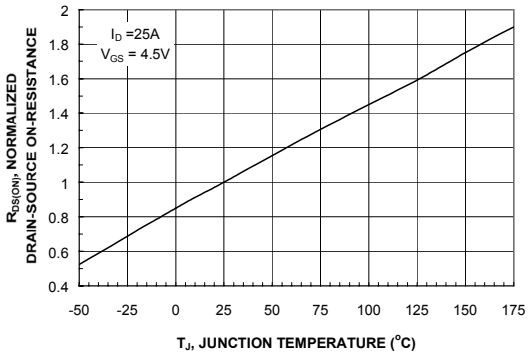


Figure 3. On-Resistance Variation withTemperature.

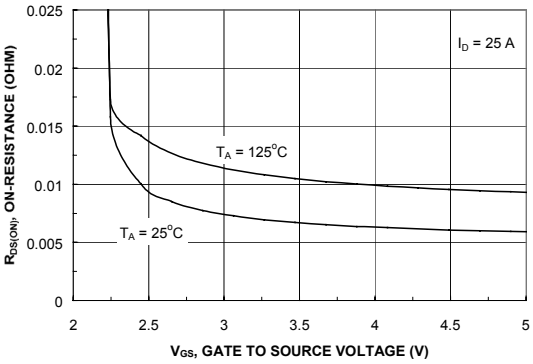


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

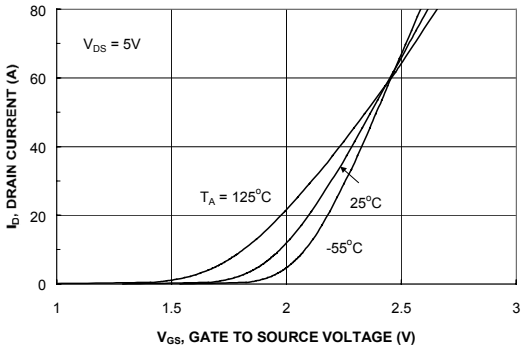


Figure 5. Transfer Characteristics.

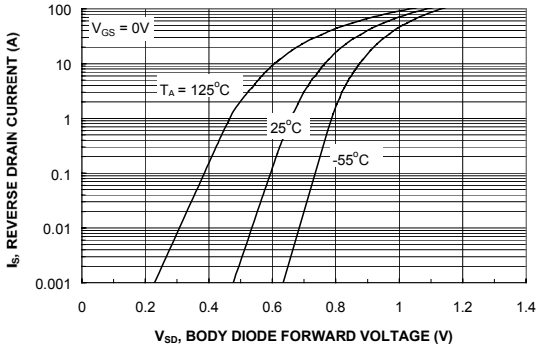


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.