

FDP7042L / FDB7042L

N-Channel Logic Level PowerTrench® MOSFET

General Description

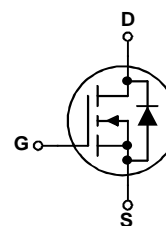
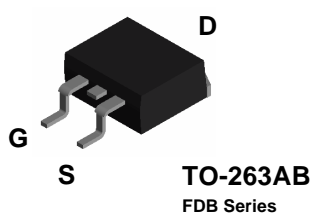
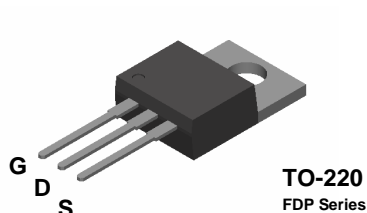
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for "low side" synchronous rectifier operation, providing an extremely low $R_{DS(ON)}$.

Applications

- Synchronous rectifier
- DC/DC converter

Features

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



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	± 12	V
I_D	Drain Current – Continuous (Note 1)	50	A
	– Pulsed (Note 1)	150	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	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 $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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		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	$V_{GS} = 12\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = -12\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.8	1.2	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-4.1		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 4.5\text{ V}, I_D = 25\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 25\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 25\text{ A}, T_J = 125^\circ\text{C}$		6.2 5.5 9.6	9 7.5 16	m Ω
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}$	60			A
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 25\text{ A}$		117		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		2418		pF
C_{oss}	Output Capacitance			549		pF
C_{riss}	Reverse Transfer Capacitance			243		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 15\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 4.5\text{ V}, R_{GEN} = 6\ \Omega$		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	$V_{DS} = 15\text{ V}, I_D = 50\text{ A},$ $V_{GS} = 4.5\text{ V}$		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	$V_{GS} = 0\text{ V}, I_S = 25\text{ A}$ (Note 2)		0.8	1.3	V

Notes:

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

Typical Characteristics

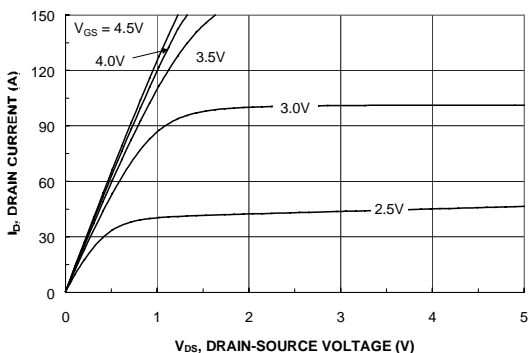


Figure 1. On-Region Characteristics.

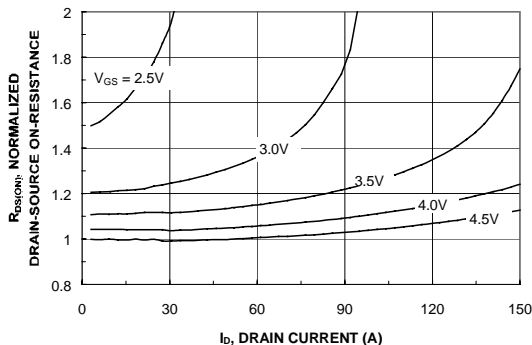


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

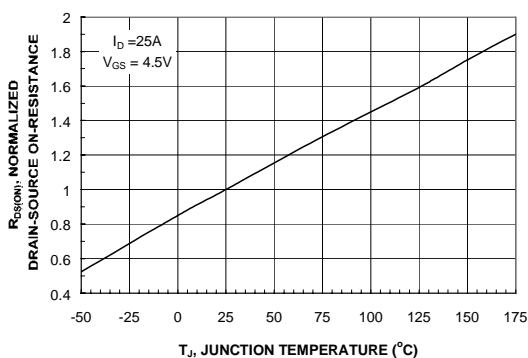


Figure 3. On-Resistance Variation with Temperature.

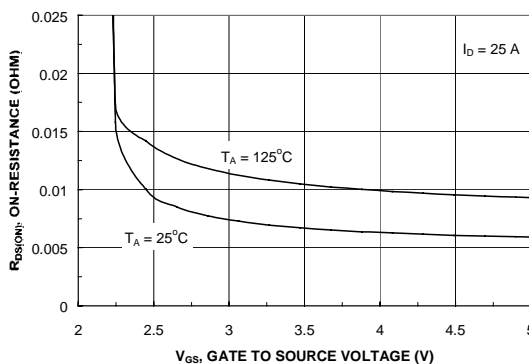


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

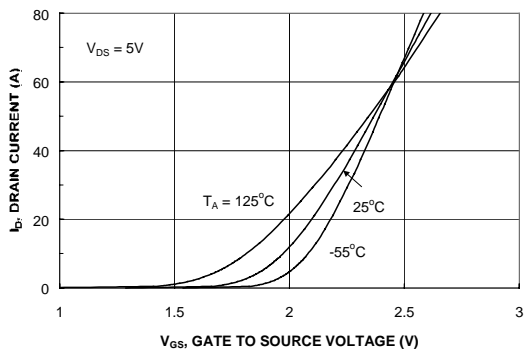


Figure 5. Transfer Characteristics.

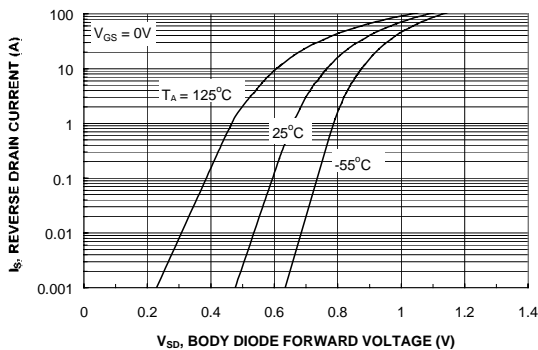


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

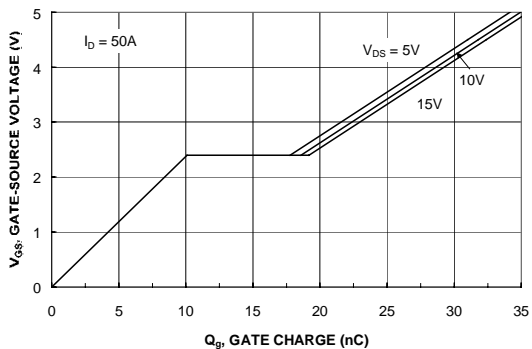


Figure 7. Gate Charge Characteristics.

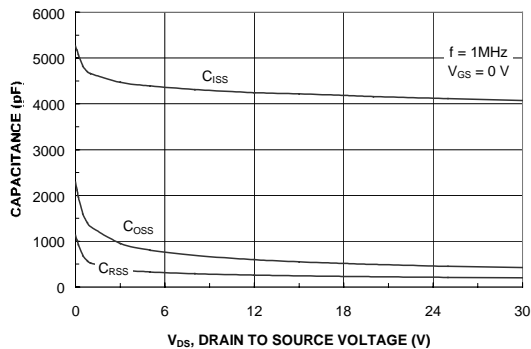


Figure 8. Capacitance Characteristics.

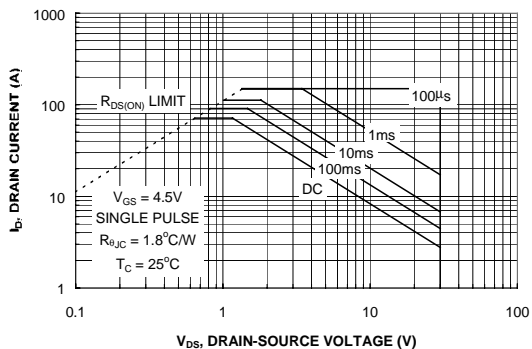


Figure 9. Maximum Safe Operating Area.

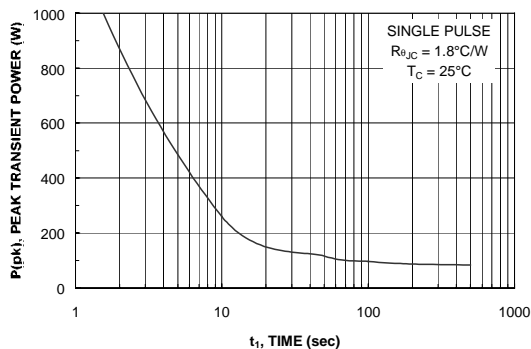


Figure 10. Single Pulse Maximum Power Dissipation.

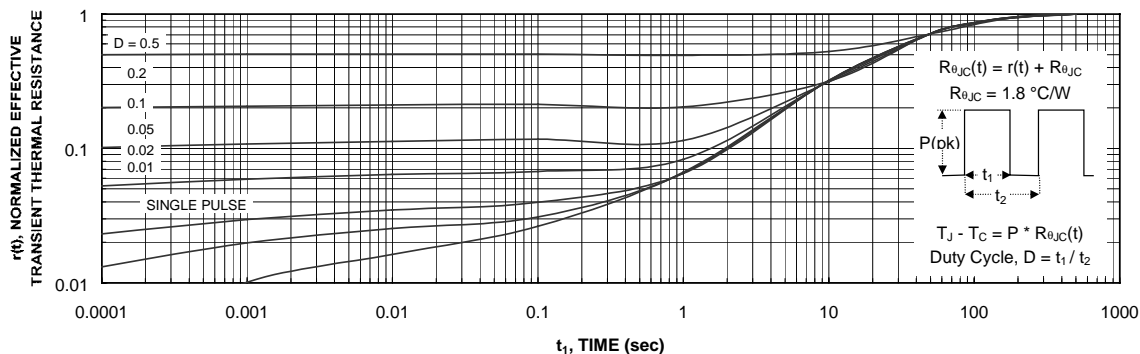


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.
Transient thermal response will change depending on the circuit board design.

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