

# FDP2670/FDB2670

## 200V N-Channel PowerTrench® MOSFET

### General Description

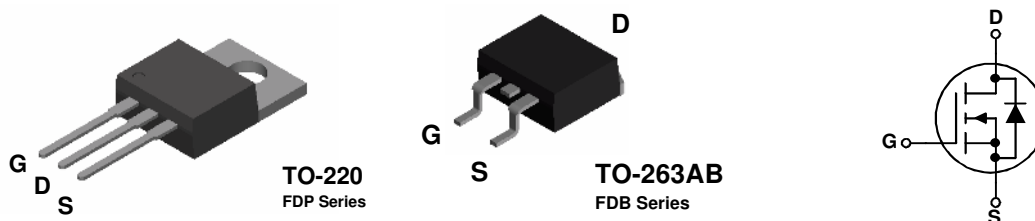
This N-Channel MOSFET has been designed specifically for switching on the primary side in the isolated DC/DC converter application. Any application requiring a 200V MOSFETs with low on-resistance and fast switching will benefit.

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

- 19 A, 200 V.  $R_{DS(ON)} = 130 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$
- Low gate charge (27 nC typical)
- Fast switching speed
- High performance trench technology for extremely low  $R_{DS(ON)}$
- High power and current handling capability



### Absolute Maximum Ratings

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

Symbol	Parameter	Ratings	Units
$V_{DSS}$	Drain-Source Voltage	200	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous (Note 1)	19	A
	– Pulsed (Note 1)	40	A
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	93	W
	Derate above $25^\circ\text{C}$	0.63	W/ $^\circ\text{C}$
dv/dt	Peak Diode Recovery dv/dt (Note 3)	3.2	V/ns
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-65 to +175	$^\circ\text{C}$

### Thermal Characteristics

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

### Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDB2670	FDB2670	13"	24mm	800 units
FDP2670	FDP2670	Tube	n/a	45 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Drain-Source Avalanche Ratings (Note 1)</b>						
$W_{DSS}$	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 100\text{ V}, I_D = 10\text{ A}$			375	mJ
$I_{AR}$	Maximum Drain-Source Avalanche Current				10	A
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		241		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 160\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate-Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
<b>On Characteristics (Note 2)</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	4	4.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		-9		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 10\text{ A}, T_J = 125^\circ\text{C}$		98 205	130 285	m $\Omega$
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 10\text{ V}$	20			A
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$		24		S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V},$		1320		pF
$C_{oss}$	Output Capacitance	$f = 1.0\text{ MHz}$		71		pF
$C_{riss}$	Reverse Transfer Capacitance			24		pF
<b>Switching Characteristics (Note 2)</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{ V}, I_D = 1\text{ A},$		14	25	ns
$t_r$	Turn-On Rise Time	$V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		5	10	ns
$t_{d(off)}$	Turn-Off Delay Time			26	41	ns
$t_f$	Turn-Off Fall Time			23	37	ns
$Q_g$	Total Gate Charge	$V_{DS} = 100\text{ V}, I_D = 10\text{ A},$		27	38	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 10\text{ V}$		7		nC
$Q_{gd}$	Gate-Drain Charge			10		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current				19	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$ (Note 2)		0.8	1.3	V

**Notes:**

1. Calculated continuous current based on maximum allowable junction temperature.
2. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%
3.  $I_{SD} \leq 3\text{ A}$ ,  $di/dt \leq 100\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

## Typical Characteristics

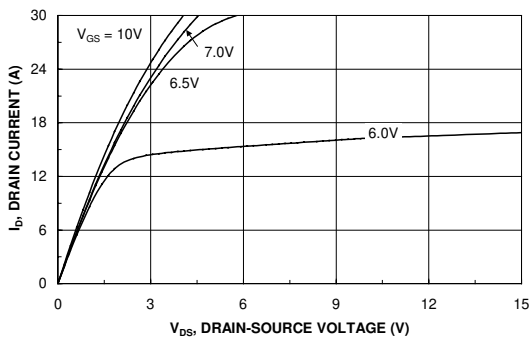


Figure 1. On-Region Characteristics.

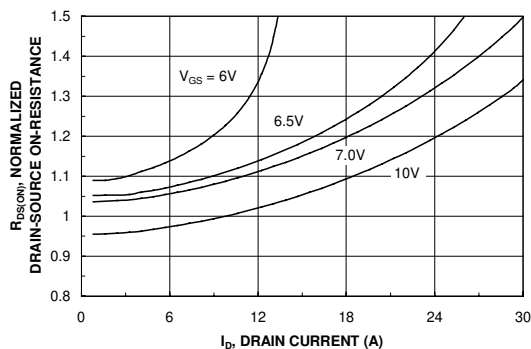


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

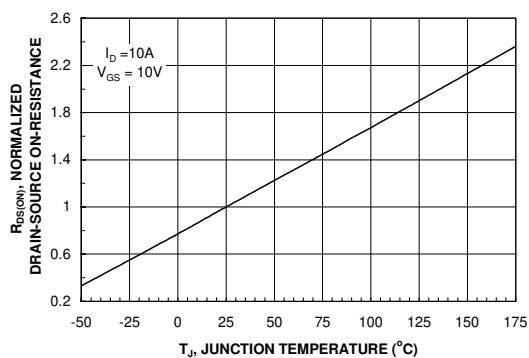


Figure 3. On-Resistance Variation with Temperature.

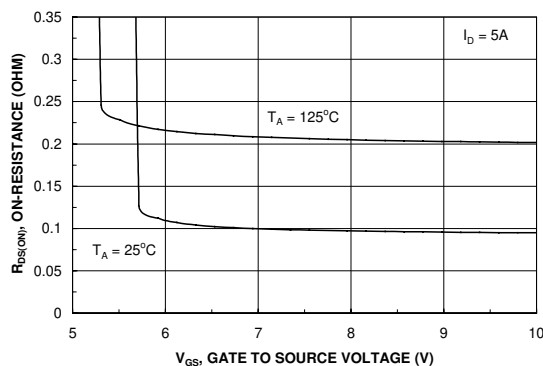


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

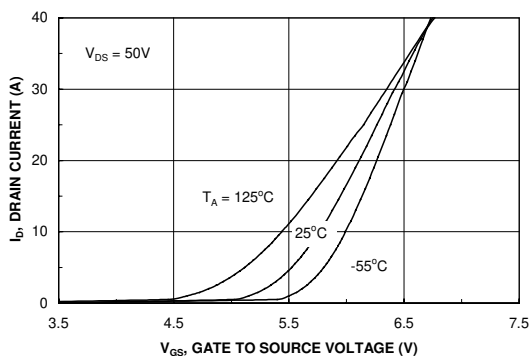


Figure 5. Transfer Characteristics.

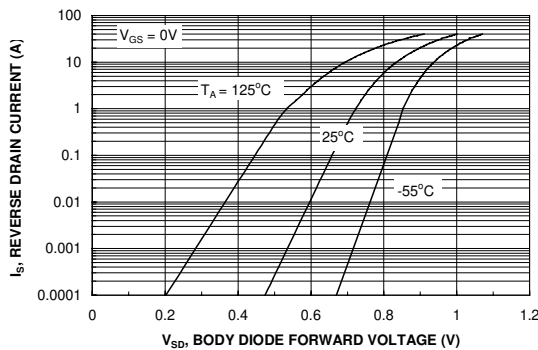


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

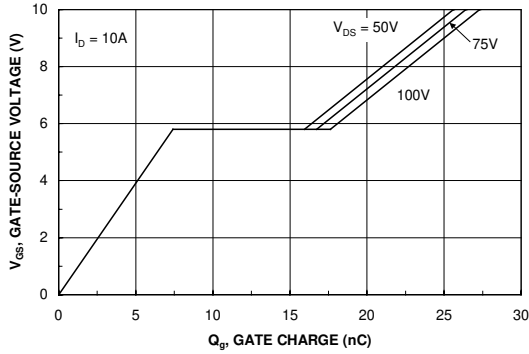


Figure 7. Gate Charge Characteristics.

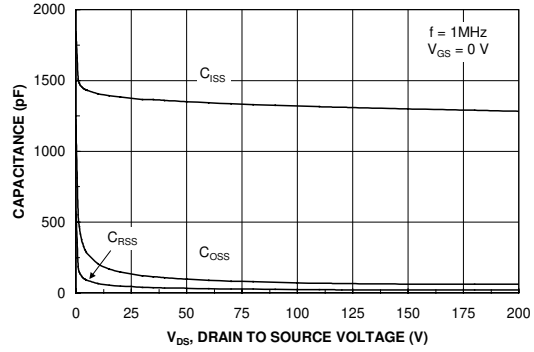


Figure 8. Capacitance Characteristics.

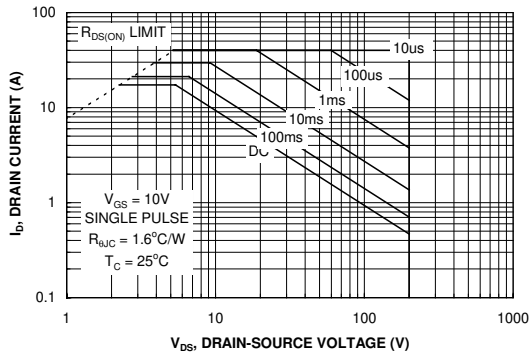


Figure 9. Maximum Safe Operating Area.

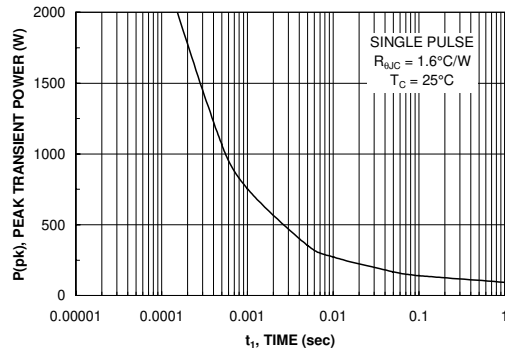


Figure 10. Single Pulse Maximum Power Dissipation.

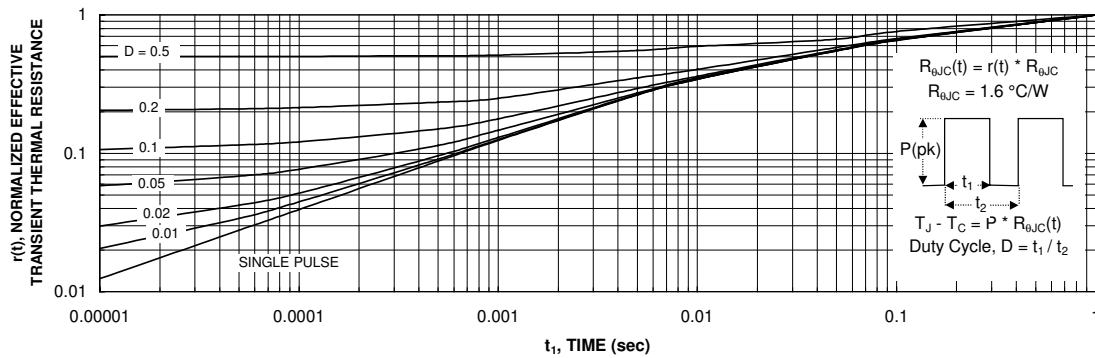


Figure 11. Transient Thermal Response Curve.

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

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