

# FDP2570/FDB2570

## 150V N-Channel PowerTrench® MOSFET

### General Description

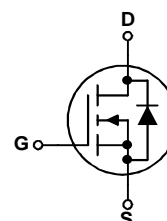
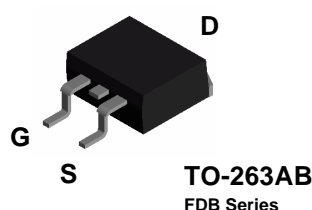
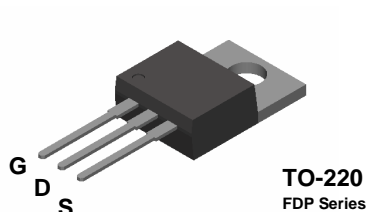
This N-Channel MOSFET has been designed specifically for switching on the primary side in the isolated DC/DC converter application. Any application requiring a 150V MOSFETs with low on-resistance and fast switching will benefit.

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

- 22 A, 150 V.  $R_{DS(ON)} = 80 \text{ m}\Omega$  @  $V_{GS} = 10 \text{ V}$   
 $R_{DS(ON)} = 90 \text{ m}\Omega$  @  $V_{GS} = 6 \text{ V}$
- Low gate charge (40nC typical)
- Fast switching speed
- 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	150	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous (Note 1)	22	A
	– Pulsed (Note 1)	50	A
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	93	W
	Derate above $25^\circ\text{C}$	0.63	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	1.6	°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
FDB2570	FDB2570	13"	24mm	800 units
FDP2570	FDP2570	Tube	n/a	45 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**Drain-Source Avalanche Ratings (Note 1)**

$W_{DSS}$	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 75\text{ V}$ , $I_D = 11\text{ A}$			375	mJ
$I_{AR}$	Maximum Drain-Source Avalanche Current				11	A

**Off Characteristics**

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	150			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		154		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{ V}$ , $V_{GS} = 0\text{ V}$			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

**On Characteristics (Note 2)**

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2	2.6	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$		-7		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 11\text{ A}$ $V_{GS} = 6.0\text{ V}$ , $I_D = 10\text{ A}$ $V_{GS} = 10\text{ V}$ , $I_D = 11\text{ A}$ , $T_J = 125^\circ\text{C}$		61 63 127	80 90 175	m $\Omega$
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 10\text{ V}$	25			A
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}$ , $I_D = 11\text{ A}$		39		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$		1911		pF
$C_{oss}$	Output Capacitance			106		pF
$C_{rss}$	Reverse Transfer Capacitance			33		pF

**Switching Characteristics (Note 2)**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}$ , $I_D = 1\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		12	22	ns
$t_r$	Turn-On Rise Time			5	10	ns
$t_{d(off)}$	Turn-Off Delay Time			33	53	ns
$t_f$	Turn-Off Fall Time			23	37	ns
$Q_g$	Total Gate Charge	$V_{DS} = 75\text{ V}$ , $I_D = 11\text{ A}$ , $V_{GS} = 10\text{ V}$		40	56	nC
$Q_{gs}$	Gate-Source Charge			7		nC
$Q_{gd}$	Gate-Drain Charge			12		nC

**Drain-Source Diode Characteristics and Maximum Ratings**

$I_S$	Maximum Continuous Drain-Source Diode Forward Current				22	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 11\text{ A}$ (Note 2)		0.83	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%

## Typical Characteristics

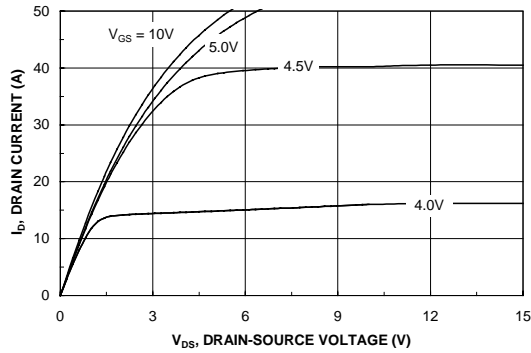


Figure 1. On-Region Characteristics.

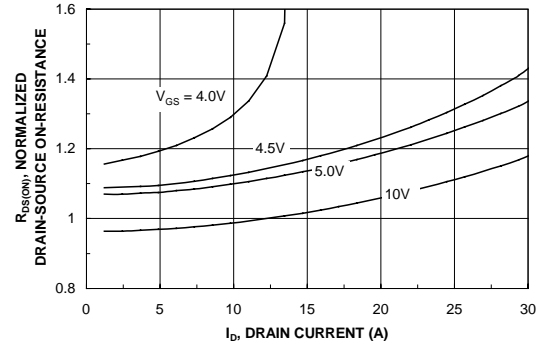


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

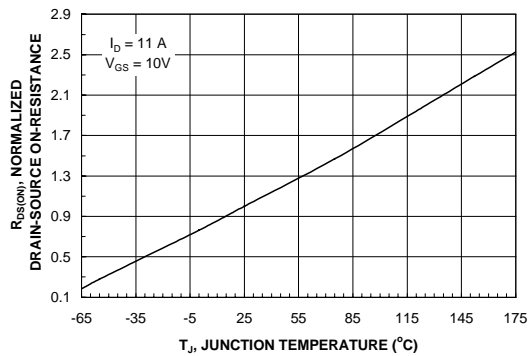


Figure 3. On-Resistance Variation with Temperature.

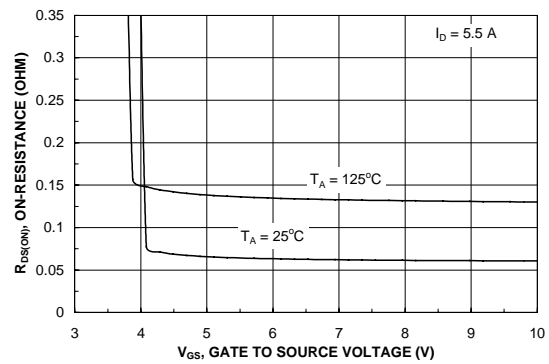


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

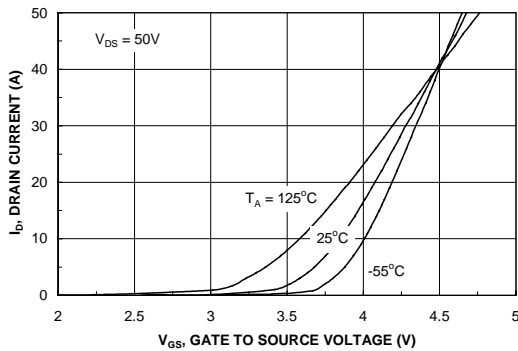


Figure 5. Transfer Characteristics.

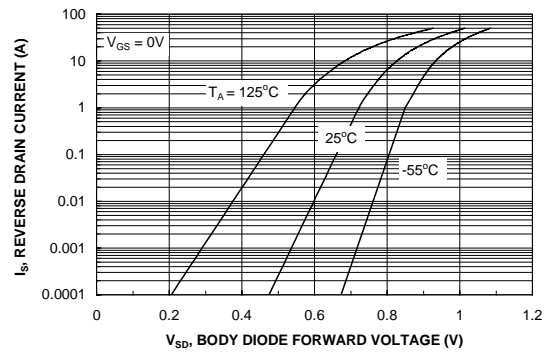


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.