



## FDP025N06

### N-Channel PowerTrench® MOSFET

60V, 265A, 2.5mΩ

#### Features

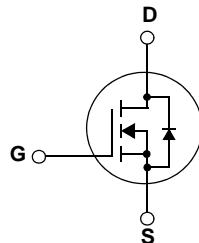
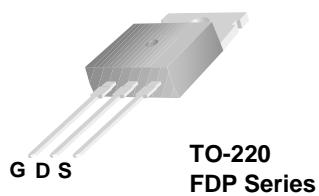
- $R_{DS(on)} = 1.9\text{m}\Omega$  (Typ.) @  $V_{GS} = 10\text{V}$ ,  $I_D = 75\text{A}$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low  $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

#### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

#### Application

- DC to DC convertors / Synchronous Rectification



#### MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter		Ratings	Units
$V_{DSS}$	Drain to Source Voltage		60	V
$V_{GSS}$	Gate to Source Voltage		$\pm 20$	V
$I_D$	Drain Current		265*	A
	- Continuous ( $T_C = 25^\circ\text{C}$ , Silicon Limited)		190*	A
	- Continuous ( $T_C = 100^\circ\text{C}$ , Silicon Limited)		120	A
$I_{DM}$	Drain Current	- Pulsed	(Note 1)	A
$E_{AS}$	Single Pulsed Avalanche Energy		(Note 2)	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$		(Note 3)	V/ns
$P_D$	Power Dissipation		395	W
	( $T_C = 25^\circ\text{C}$ )		2.6	$\text{W}/^\circ\text{C}$
$T_J$ , $T_{STG}$		Operating and Storage Temperature Range		-55 to +175 $^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	$^\circ\text{C}$

\*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

#### Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.38	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case to Sink Typ.	0.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

## Package Marking and Ordering Information $T_C = 25^\circ\text{C}$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP025N06	FDP025N06	TO-220	-	-	50

## Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
--------	-----------	-----------------	------	------	------	-------

### Off Characteristics

$\text{BV}_{\text{DSS}}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}, T_C = 25^\circ\text{C}$	60	-	-	V
$\Delta \text{BV}_{\text{DSS}} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}, \text{Referenced to } 25^\circ\text{C}$	-	0.04	-	$^\circ\text{C}$
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}, T_C = 150^\circ\text{C}$	-	-	500	
$I_{\text{GSS}}$	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2.5	3.5	4.5	V
$R_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 75\text{A}$	-	1.9	2.5	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 75\text{A}$ (Note 4)	-	200	-	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	11190	14885	pF
$C_{oss}$	Output Capacitance		-	1610	2140	pF
$C_{rss}$	Reverse Transfer Capacitance		-	750	1125	pF
$Q_{g(\text{tot})}$	Total Gate Charge at 10V		-	174	226	nC
$Q_{gs}$	Gate to Source Gate Charge	$V_{DS} = 48\text{V}, I_D = 75\text{A}$ $V_{GS} = 10\text{V}$	-	54	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge	(Note 4, 5)	-	50	-	nC

### Switching Characteristics

$t_{d(\text{on})}$	Turn-On Delay Time	$V_{DD} = 30\text{V}, I_D = 75\text{A}$ $V_{GS} = 10\text{V}, R_{\text{GEN}} = 25\Omega$	-	134	278	ns
$t_r$	Turn-On Rise Time		-	324	658	ns
$t_{d(\text{off})}$	Turn-Off Delay Time		-	348	706	ns
$t_f$	Turn-Off Fall Time		(Note 4, 5)	-	250	510

### Drain-Source Diode Characteristics

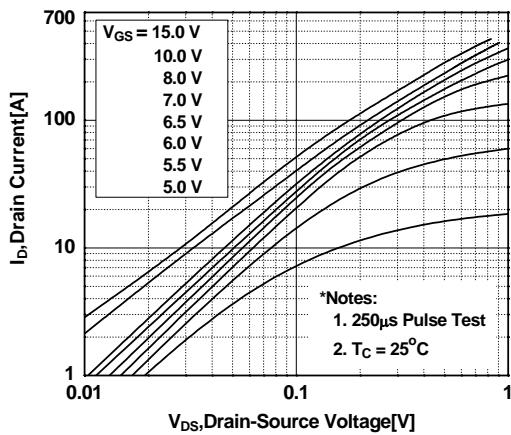
$I_S$	Maximum Continuous Drain to Source Diode Forward Current	-	-	265	A	
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	1060	A	
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_{SD} = 75\text{A}$	-	-	1.3	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{V}, I_{SD} = 75\text{A}$	-	69	-	ns
$Q_{rr}$	Reverse Recovery Charge	$dI_F/dt = 100\text{A}/\mu\text{s}$	(Note 4)	-	152	nC

**Notes:**

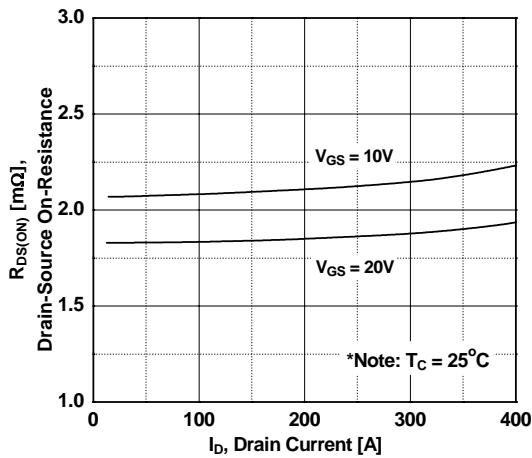
- 1: Repetitive Rating: Pulse width limited by maximum junction temperature
- 2:  $L = 0.9\text{mH}, I_{AS} = 75\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
- 3:  $I_{SD} \leq 75\text{A}, dI/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
- 4: Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- 5: Essentially Independent of Operating Temperature Typical Characteristics

## Typical Performance Characteristics

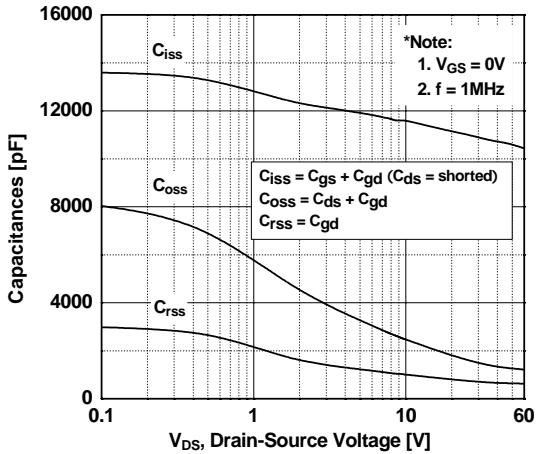
**Figure 1. On-Region Characteristics**



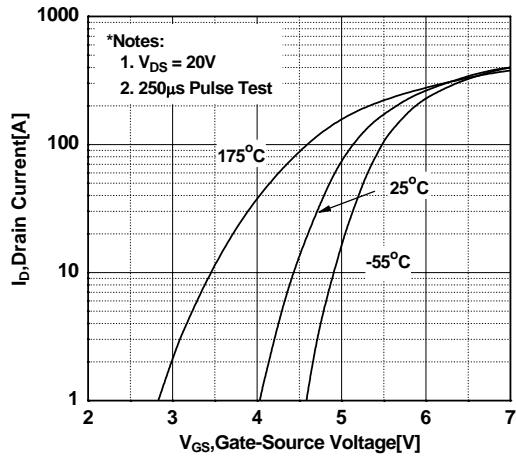
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



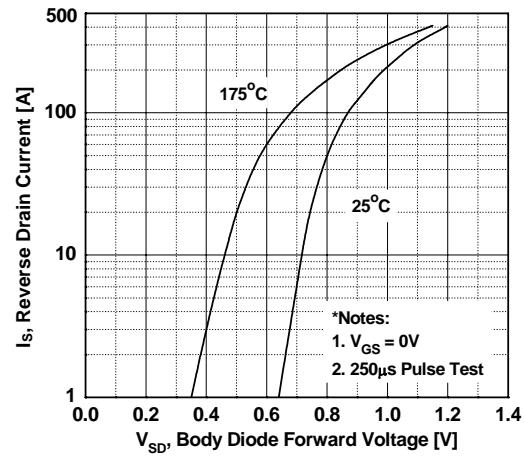
**Figure 5. Capacitance Characteristics**



**Figure 2. Transfer Characteristics**



**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 6. Gate Charge Characteristics**

