

FDB6021P

20V P-Channel 1.8V Specified PowerTrench® MOSFET

General Description

This P-Channel power MOSFET uses Fairchild's low voltage PowerTrench process. It has been optimized for power management applications.

Applications

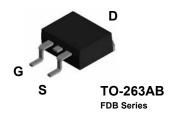
- · Battery management
- Load switch
- Voltage regulator

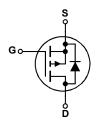
Features

• -28 A, -20 V.
$$R_{DS(ON)} = 30 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$$

 $R_{DS(ON)} = 40 \text{ m}\Omega @ V_{GS} = 2.5 \text{ V}$
 $R_{DS(ON)} = 65 \text{ m}\Omega @ V_{GS} = 1.8 \text{ V}$

- Critical DC electrical parameters specified at elevated temperature
- High performance trench technology for extremely low $R_{\mbox{\scriptsize DS}(\mbox{\scriptsize ON})}$
- 175°C maximum junction temperature rating





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V _{DSS}	Drain-Source Voltage		-20	V
V _{GSS}	Gate-Source Voltage		± 8	V
I _D	Drain Current - Continuous	(Note 1)	-28	Α
	– Pulsed	(Note 1)	-80	
P _D	Total Power Dissipation @ T _C = 25°C		37	W
	Derate above 25°C		0.25	W°C
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-65 to +175	°C

Thermal Characteristics

R _θ JC	Thermal Resistance, Junction-to-Case	4	°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
FDB6021P	FDB6021P	13"	24mm	800 units

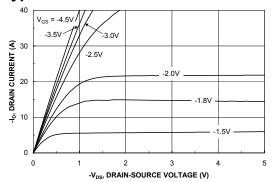
Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics		I	I	ı	I
BV _{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = -250 \mu\text{A}$	-20			V
ΔBV _{DSS} ΔT _{.1}	Breakdown Voltage Temperature Coefficient	I_D = -250 μ A,Referenced to 25°C		-16		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16 \text{ V}, V_{GS} = 0 \text{ V}$			-1	μА
I _{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = 8 \text{ V}, \qquad V_{DS} = 0 \text{ V}$			100	nA
I _{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = -8 \text{ V}$ $V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	-0.4	-0.7	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = -250 μ A,Referenced to 25°C		3		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$		24 31 50 30	30 40 65 42	mΩ
I _{D(on)}	On–State Drain Current	$V_{GS} = -4.5 \text{ V}, V_{DS} = -5 \text{ V}$	-40			Α
g _{FS}	Forward Transconductance	$V_{DS} = -5 \text{ V}, \qquad I_{D} = -14 \text{ A}$		33		S
Dynamic	Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V},$		1890		pF
Coss	Output Capacitance	f = 1.0 MHz		302		pF
C _{rss}	Reverse Transfer Capacitance			124		pF
Switchir	ng Characteristics (Note 2)					
t _{d(on)}	Turn-On Delay Time	$V_{DD} = -10 \text{ V}, \qquad I_{D} = -1 \text{ A},$ $V_{GS} = -4.5 \text{ V}, \qquad R_{GEN} = 6 \Omega$		13	23	ns
t _r	Turn-On Rise Time			10	20	ns
t _{d(off)}	Turn-Off Delay Time			80	128	ns
t _f	Turn-Off Fall Time			50	80	ns
Q _g	Total Gate Charge	$V_{DS} = -10 \text{ V}, \qquad I_{D} = -14 \text{ A},$		20	28	nC
Q _{gs}	Gate-Source Charge	V _{GS} = -4.5 V		4		nC
Q_{gd}	Gate-Drain Charge			7		nC
Drain-S	ource Diode Characteristics	and Maximum Ratings				
Is	Maximum Continuous Drain-Source				-28	Α
V _{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = -14 \text{ A}$		-0.9	-1.3	V

Notes

^{1.} Pulse Test: Pulse Width < 300 μ s, Duty Cycle < 2.0%

^{2.} Calculated continuous current based on maximum allowable junction temperature. Actual maximum continuous current limited by package constraints to 75A

Typical Characteristics



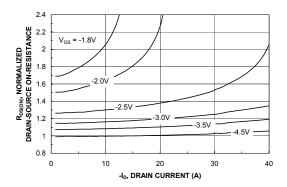
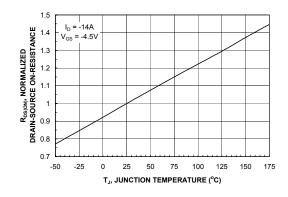


Figure 1. On-Region Characteristics.

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



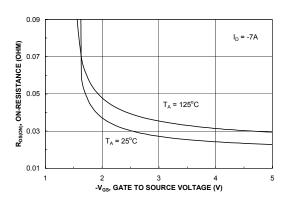
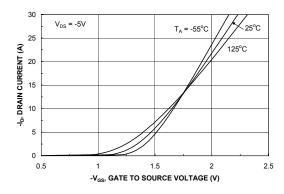


Figure 3. On-Resistance Variation withTemperature.

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



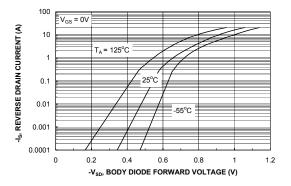
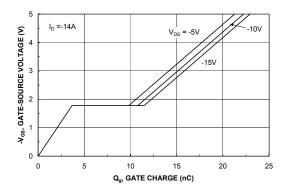


Figure 5. Transfer Characteristics.

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

Typical Characteristics



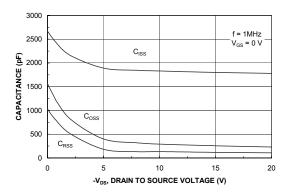


Figure 7. Gate Charge Characteristics.

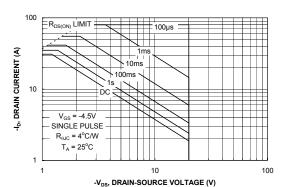


Figure 8. Capacitance Characteristics.

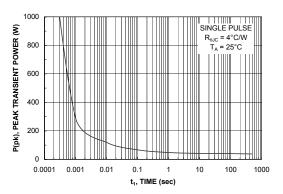


Figure 9. Maximum Safe Operating Area.



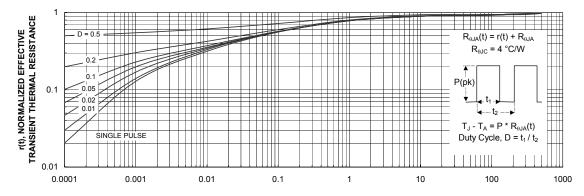


Figure 11. Transient Thermal Response Curve.

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