



November 2004

FDJ1027P

P-Channel 1.8V Specified PowerTrench[®] MOSFET

General Description

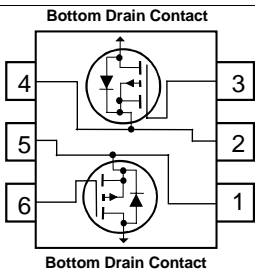
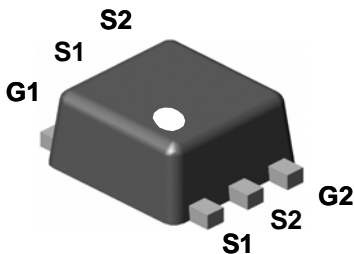
This dual P-Channel 1.8V specified MOSFET uses Fairchild's advanced low voltage PowerTrench process. Packaged in FLMP SC75, the $R_{DS(ON)}$ and thermal properties of the device are optimized for battery power management applications.

Applications

- Battery management/Charger Application
- Load switch

Features

- -2.8 A, -20 V $R_{DS(ON)} = 160\text{ m}\Omega$ @ $V_{GS} = -4.5\text{ V}$
 $R_{DS(ON)} = 230\text{ m}\Omega$ @ $V_{GS} = -2.5\text{ V}$
 $R_{DS(ON)} = 390\text{ m}\Omega$ @ $V_{GS} = -1.8\text{ V}$
- Low gate charge, High Power and Current handling capability
- High performance trench technology for extremely low $R_{DS(ON)}$
- FLMP SC75 package: Enhanced thermal performance in industry-standard package size



MOSFET Maximum Ratings

$T_A = 25^\circ\text{C}$ 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 1a)	-2.8	A
	– Pulsed	-12	
P_D	Power Dissipation for Single Operation (Note 1a)	1.5	
	(Note 1b)	0.9	
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	80	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	5	

Package Marking and Ordering Information

.G	FDJ1027P	7"	8mm	3000 units
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Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C		-13		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
I_{GSS}	Gate–Body Leakage	$V_{GS} = \pm 8\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.4	-0.8	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C		3		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -4.5\text{ V}, I_D = -2.8\text{ A}$ $V_{GS} = -2.5\text{ V}, I_D = -2.2\text{ A}$ $V_{GS} = -1.8\text{ V}, I_D = -1.7\text{ A}$ $V_{GS} = -4.5\text{ V}, I_D = -2.8\text{ A}, T_J = 125^\circ\text{C}$		108 163 283 150	160 230 390 238	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -2.8\text{ A}$		5		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		290		pF
C_{oss}	Output Capacitance			55		pF
C_{rss}	Reverse Transfer Capacitance			29		pF
R_g	Gate Resistance	$V_{GS} = 15\text{ mV}, f = 1.0\text{ MHz}$		18		m Ω

Switching Characteristics (Note 2)

$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -10\text{ V}, I_D = -1\text{ A},$ $V_{GS} = -4.5\text{ V}, R_{GEN} = 6\text{ }\Omega$		8	16	ns
t_r	Turn–On Rise Time			13	23	ns
$t_{d(off)}$	Turn–Off Delay Time			13	23	ns
t_f	Turn–Off Fall Time			18	32	ns
Q_g	Total Gate Charge	$V_{DS} = -10\text{ V}, I_D = -2.8\text{ A},$ $V_{GS} = -4.5\text{ V}$		3	4	nC
Q_{gs}	Gate–Source Charge			0.65		nC
Q_{gd}	Gate–Drain Charge			0.75		nC

Drain–Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain–Source Diode Forward Current			-1.25		A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -1.25\text{ A}$ (Note 2)		-0.8	-1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = -2.8\text{ A},$ $dI_F/dt = 100\text{ A}/\mu\text{s}$		14		ns
Q_{rr}	Diode Reverse Recovery Charge			4		nC

Electrical Characteristics

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

NOTES:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



- a) 80°C/W when mounted on a 1 in^2 pad of 2 oz copper (Single Operation).

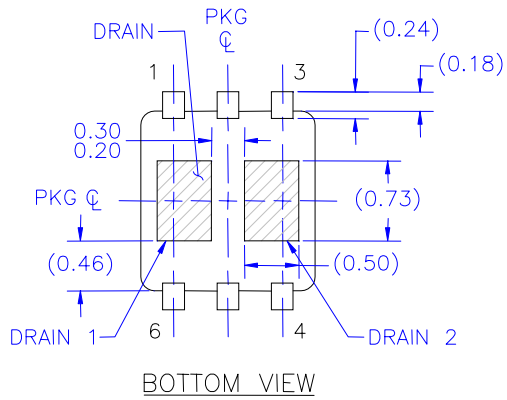


- b) 140°C/W when mounted on a minimum pad of 2 oz copper (Single Operation).

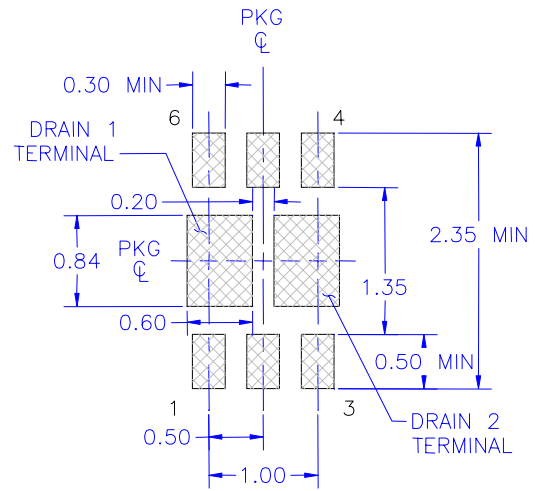
Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width $< 300\mu\text{s}$, Duty Cycle $< 2.0\%$

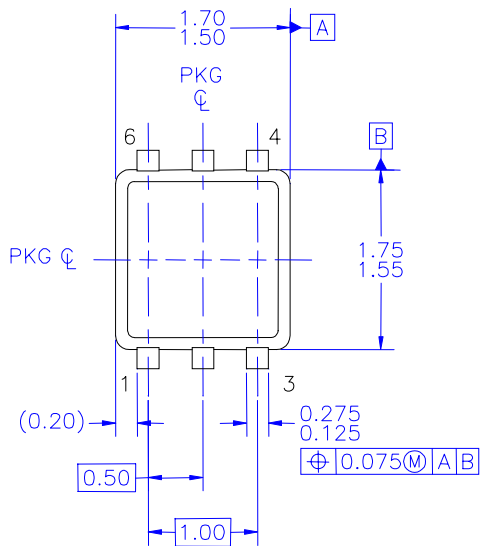
Dimensional Outline and Pad Layout



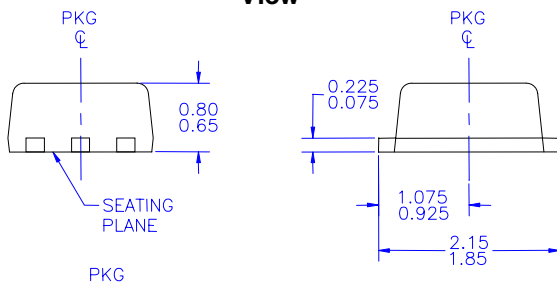
BOTTOM VIEW



LAND PATTERN RECOMMENDATION



Top View



Typical Characteristics

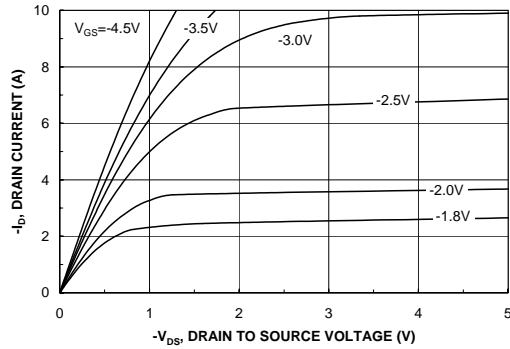


Figure 1. On-Region Characteristics.

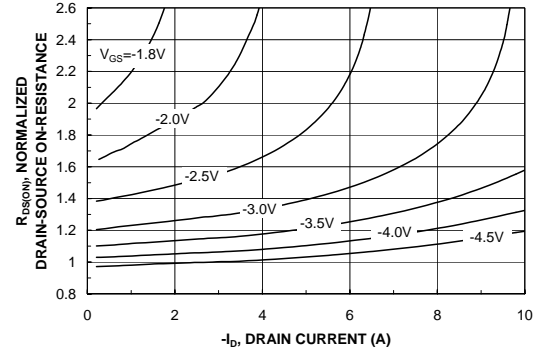


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

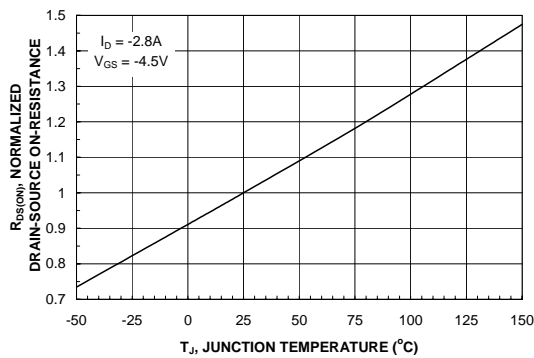


Figure 3. On-Resistance Variation with Temperature.

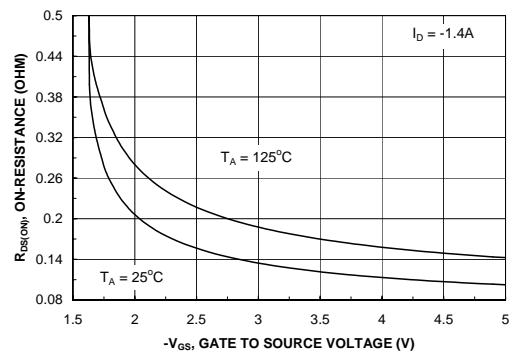


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

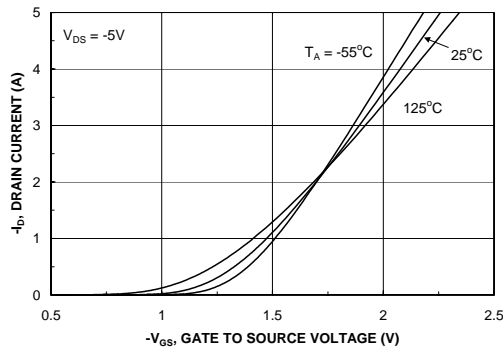


Figure 5. Transfer Characteristics.

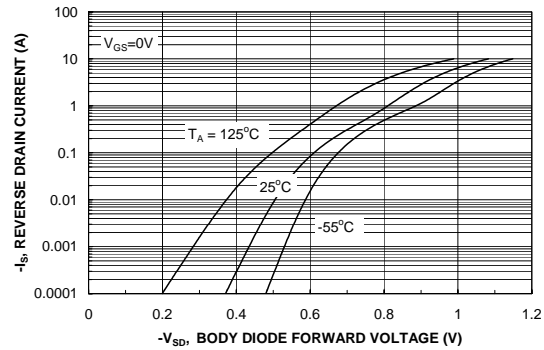


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

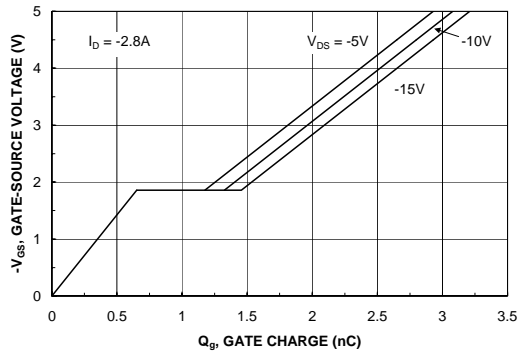


Figure 7. Gate Charge Characteristics.

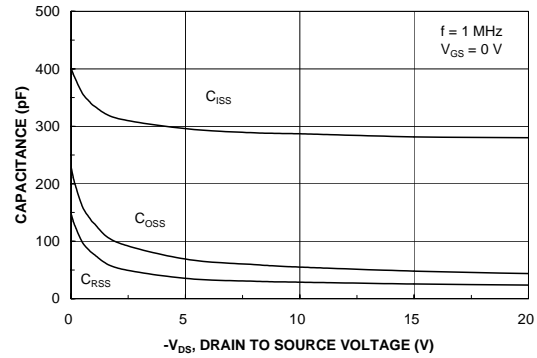


Figure 8. Capacitance Characteristics.

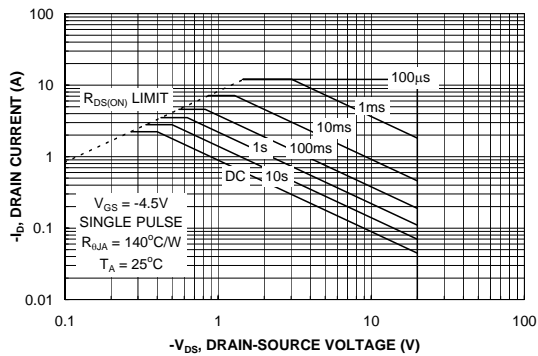


Figure 9. Maximum Safe Operating Area.

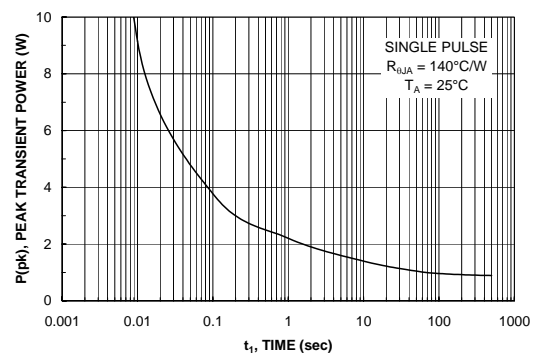


Figure 10. Single Pulse Maximum Power Dissipation.

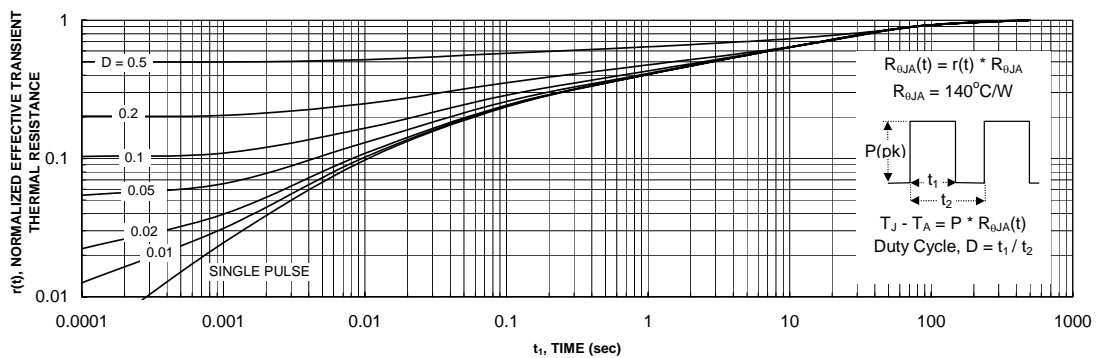


Figure 11. Transient Thermal Response Curve.

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

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FACT Quiet Series™		OPTOLOGIC®	µSerDes™	UltraFET®
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