FAIRCHILD SEMICONDUCTOR®

March 2008

FDZ4672

N-Channel PowerTrench® MOSFET BGA
30V, 19A, 4.0mΩ

Features

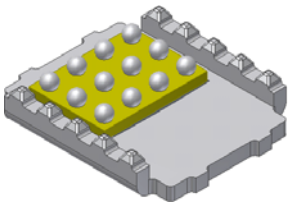
- Max $r_{DS(on)}$ = 4.0mΩ at V_{GS} = 10V, I_D = 19A
- Max $r_{DS(on)}$ = 7.0mΩ at V_{GS} = 4.5V, I_D = 14A
- Ultra-thin package: less than 0.85mm height when mounted to PCB
- Outstanding thermal transfer characteristics
- Ultra-low gate charge x $r_{DS(on)}$ product
- RoHS Compliant

General Description

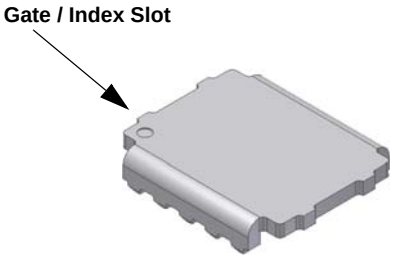
This part is optimized for very high density and high current synchronous buck converters using Fairchild's proprietary PowerTrench® process.This part has been tailored for the high side application, optimized both for low $r_{DS(on)}$, Qg and package parasitics; essential for high efficiency and fast switching. The part is offered in a standard format 3.5x4 footprint to offer both high side and low side in the same footprint. Partner low side FDZ4670 or FDZ4670S (SyncFET ™ version).

Applications

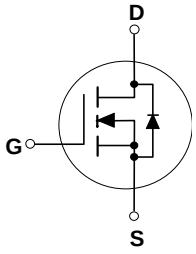
- High Current POL
- DC-DC in server
- Networking
- High current microprocessor



Bottom



FLFBGA 3.5X4.0



MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			30	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current -Continuous	T_A =25°C	(Nota 1a)	19	A
	-Pulsed			83	
P_D	Power Dissipation	T_A = 25°C	(Note 1a)	2.35	W
	Power Dissipation	T_A = 25°C	(Note 1b)	1.2	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.85	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	52	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	104	

Package Marking and Ordering Information

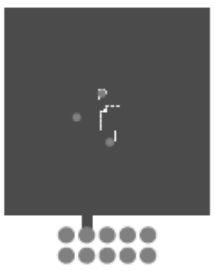
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
4672	FDZ4672	FLFBGA 3.5X4.0	13”	12mm	3000 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		26		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V, V_{DS} = 24V,			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		-4.6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 19A		2.9	4.0	mΩ
		V_{GS} = 4.5V, I_D = 14A		4.5	7.0	
		V_{GS} = 10V, I_D = 19A, T_J = 125°C		4.1	6.0	
g_{FS}	Forward Transconductance	V_{DD} = 10V, I_D = 19A		89		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		1720	2290	pF
C_{oss}	Output Capacitance			840	1120	pF
C_{rss}	Reverse Transfer Capacitance			140	210	pF
R_g	Gate Resistance	f = 1MHz		1.2		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15V, I_D = 19A, V_{GS} = 10V, R_{GEN} = 6Ω		9.4	19	ns
t_r	Rise Time			3.1	10	ns
$t_{d(off)}$	Turn-Off Delay Time			27	43	ns
t_f	Fall Time			16	28	ns
Q_g	Total Gate Charge	V_{GS} = 10V, V_{DD} = 15V, I_D = 19A		28	39	nC
Q_{gs}	Gate to Source Charge			5		nC
Q_{gd}	Gate to Drain “Miller” Charge			5		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 1.8A (Note 2)		0.7	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 19A, di/dt = 100A/μs		36	58	ns
Q_{rr}	Reverse Recovery Charge			19	35	nC

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a.52°C/W when mounted on a 1in^2 pad of 2 oz copper.

b. 104°C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

Typical Characteristics T_J = 25°C unless otherwise noted

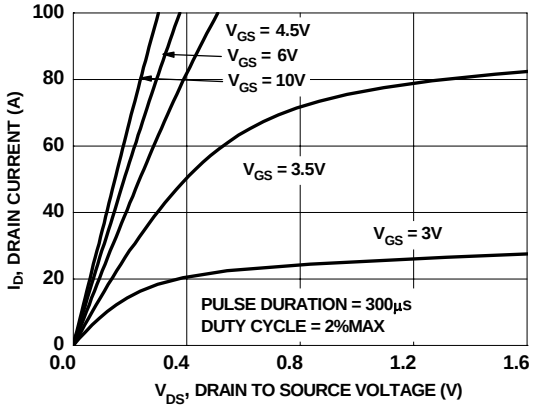


Figure 1. On-Region Characteristics

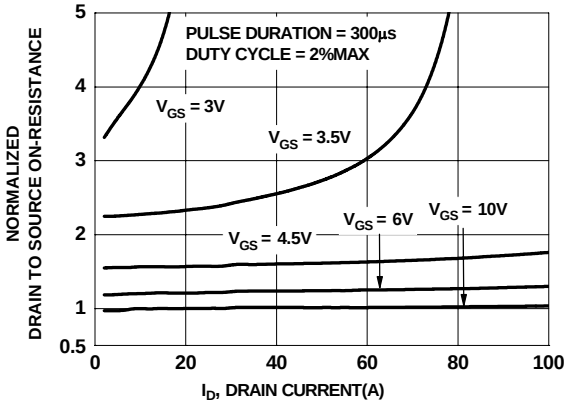


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

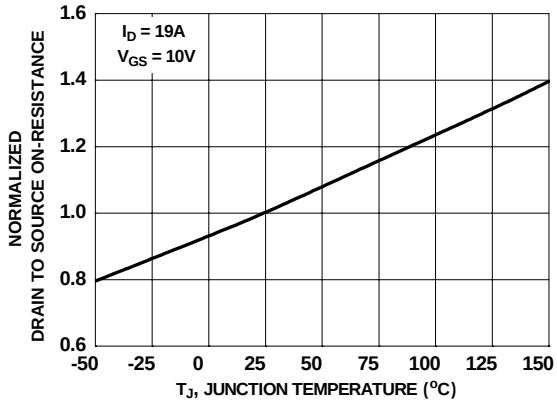


Figure 3. Normalized On-Resistance vs Junction Temperature

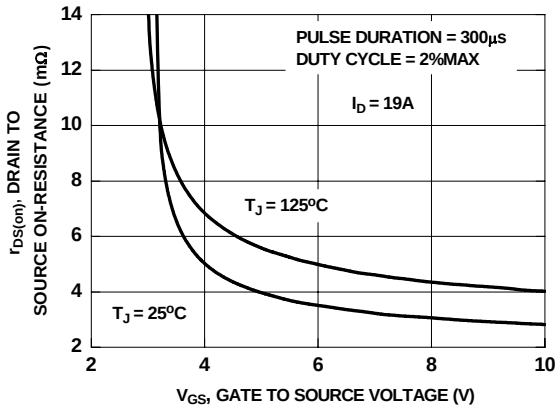


Figure 4. On-Resistance vs Gate to Source Voltage

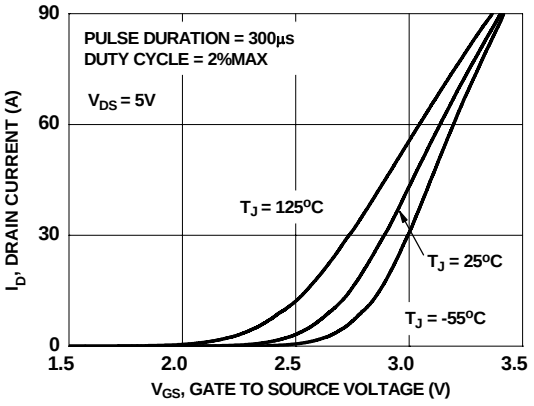


Figure 5. Transfer Characteristics

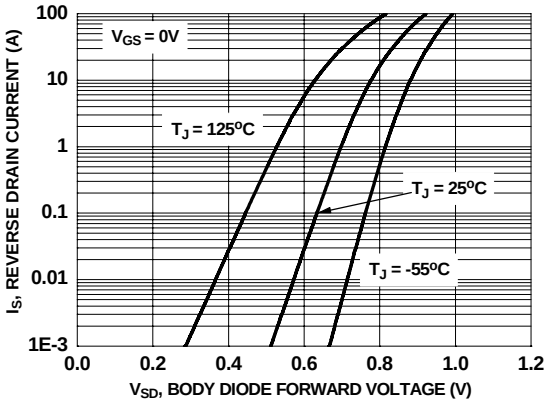


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

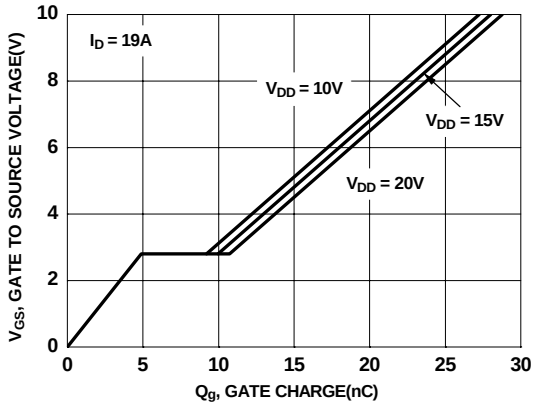


Figure 7. Gate Charge Characteristics

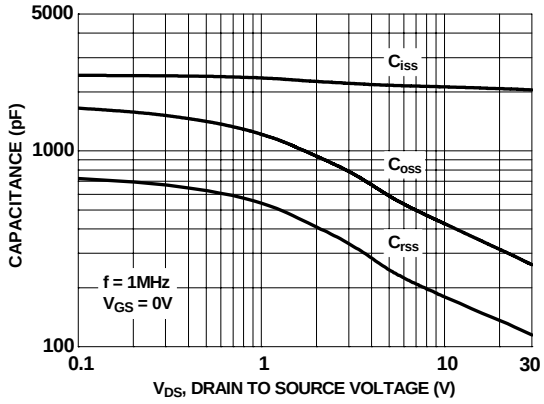


Figure 8. Capacitance vs Drain to Source Voltage

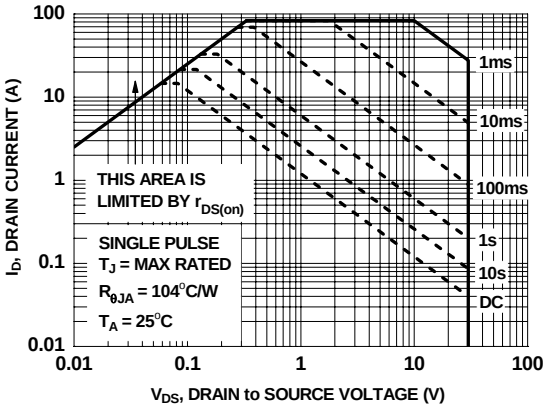


Figure 9. Forward Bias Safe Operating Area

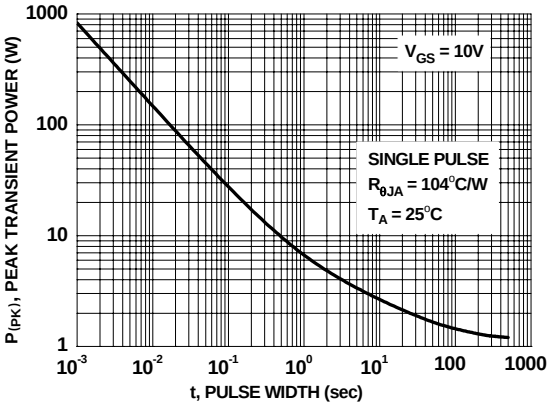


Figure 10. Single Pulse Maximum Power Dissipation

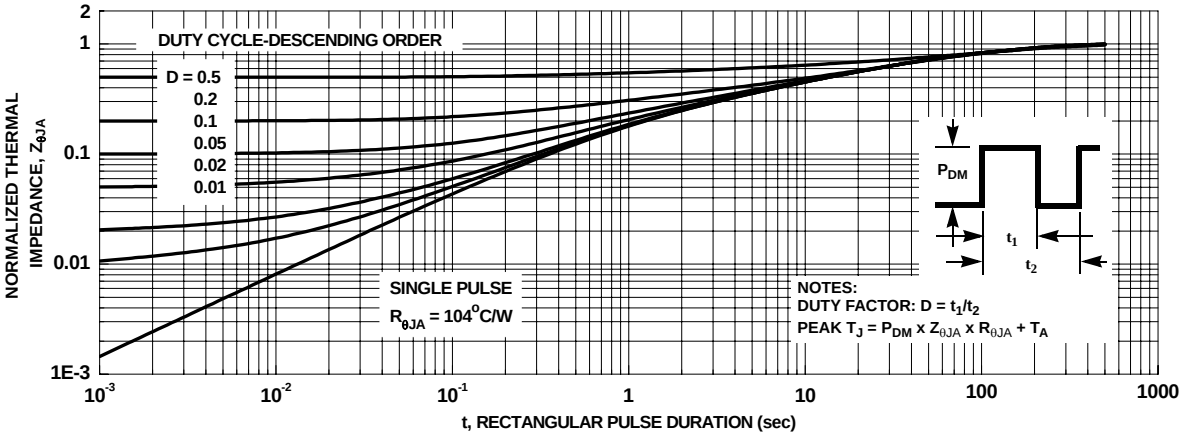
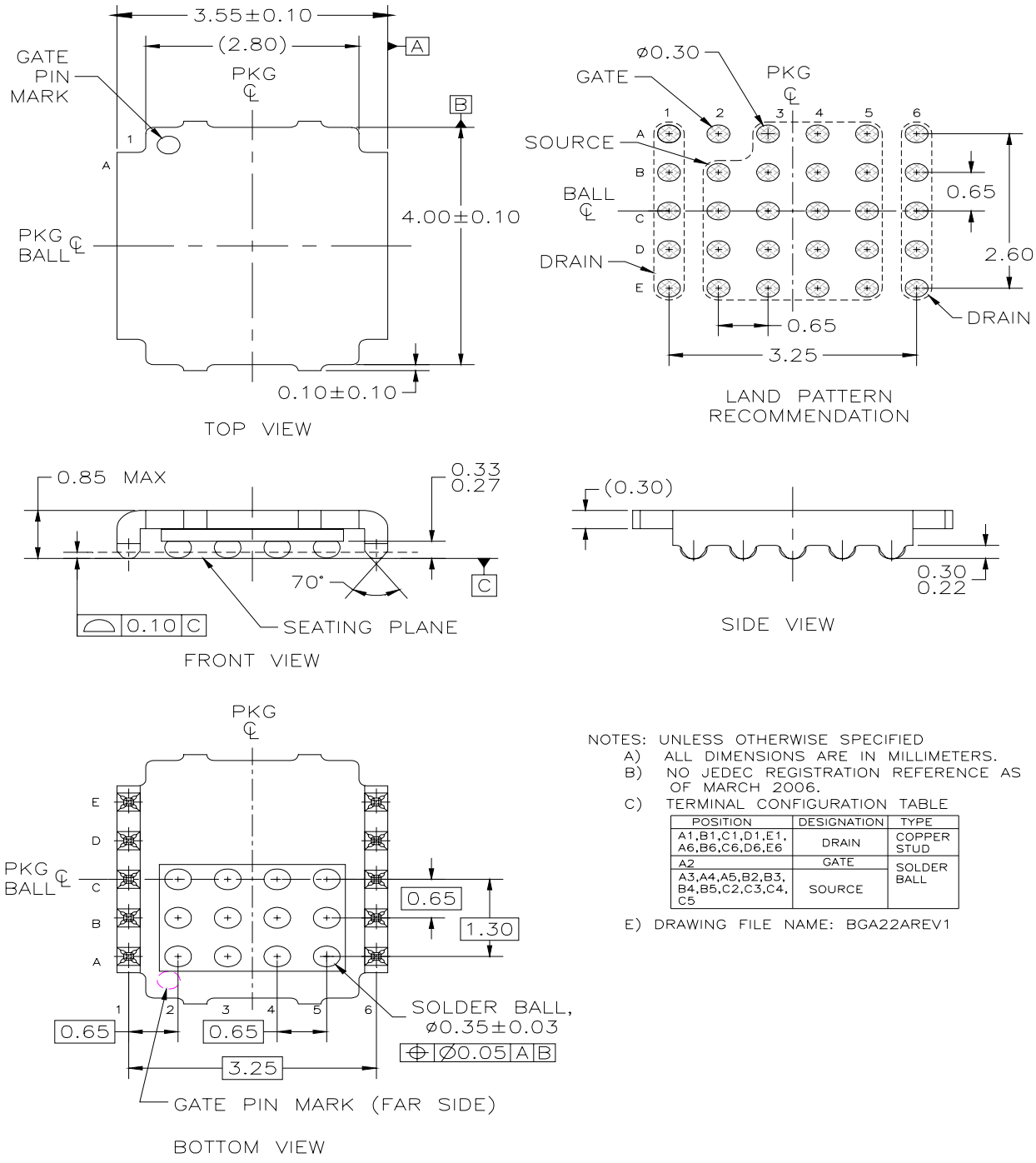


Figure 11. Transient Thermal Response Curve

Dimensional Outline and Pad Layout



NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

B) NO JEDEC REGISTRATION REFERENCE AS OF MARCH 2006.

C) TERMINAL CONFIGURATION TABLE

POSITION	DESIGNATION	TYPE
A1,B1,C1,D1,E1, A6,B6,C6,D6,E6	DRAIN	COPPER STUD
A2	GATE	SOLDER BALL
A3,A4,A5,B2,B3, B4,B5,C2,C3,C4, C5	SOURCE	

E) DRAWING FILE NAME: BGA22AREV1

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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