

FDZ5047N

30V N-Channel Logic Level PowerTrench® BGA MOSFET

General Description

Combining Fairchild's 30V PowerTrench process with state of the art BGA packaging, the FDZ5047N minimizes both PCB space and $R_{DS(ON)}$. This BGA MOSFET embodies a breakthrough in packaging technology which enables the device to combine excellent thermal transfer characteristics, high current handling capability, ultra-low profile packaging, low gate charge, and low $R_{DS(ON)}$.

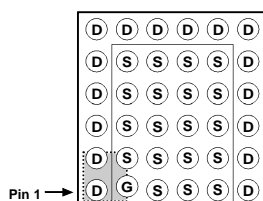
These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications resulting in DC/DC power supply designs with higher overall efficiency.

Applications

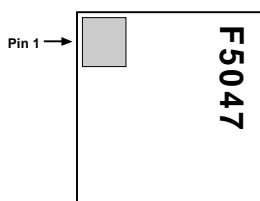
- DC/DC Converters
- Solenoid drive

Features

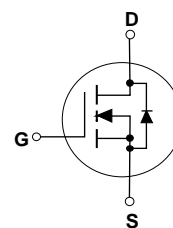
- 22 A, 30 V. $R_{DS(ON)} = 0.0035 \Omega @ V_{GS} = 10 V$
 $R_{DS(ON)} = 0.0050 \Omega @ V_{GS} = 4.5 V$.
- Occupies only 27.5 mm² of PCB area. 1/5 of the area of a TO-220 package.
- Ultra-thin package: less than 0.80 mm height when mounted to PCB.
- Outstanding thermal transfer characteristics.
- Ultra-low gate charge x $R_{DS(ON)}$ product.
- 175°C maximum junction temperature rating.



Bottom



Top



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V _{DSS}	Drain-Source Voltage	30	V
V _{GSS}	Gate-Source Voltage	±20	V
I _D	Drain Current – Continuous (Note 1a)	22	A
	– Pulsed	75	
P _D	Total Power Dissipation @ T _A = 25°C	3.3	W
T _J , T _{STG}	Operating and Storage Junction Temperature Range	-65 to +175	°C

Thermal Characteristics

R _{θJC}	Thermal Resistance, Junction-to-Case (Note 1)	2.5	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient (Note 1a)	45	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
F5047	FDZ5047N	TBD	TBD	TBD

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		22		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSSF}	Gate–Body Forward Leakage	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate–Body Reverse Leakage	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.5	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-5		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 10\text{ V}, I_D = 22\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 18\text{ A}$		3.0 4.2	3.5 5.0	m Ω
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 10\text{ V}$	50			A
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		5400		pF
C_{oss}	Output Capacitance			1170		pF
C_{riss}	Reverse Transfer Capacitance			530		pF
Switching Characteristics (Note 2)						
Q_g	Total Gate Charge	$V_{DS} = 15\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 5\text{ V}$		50	70	nC
Q_{gs}	Gate–Source Charge			16		nC
Q_{gd}	Gate–Drain Charge			16		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current (Note 1a)				3	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 22\text{ A}$ (Note 2)		0.95	1.2	V

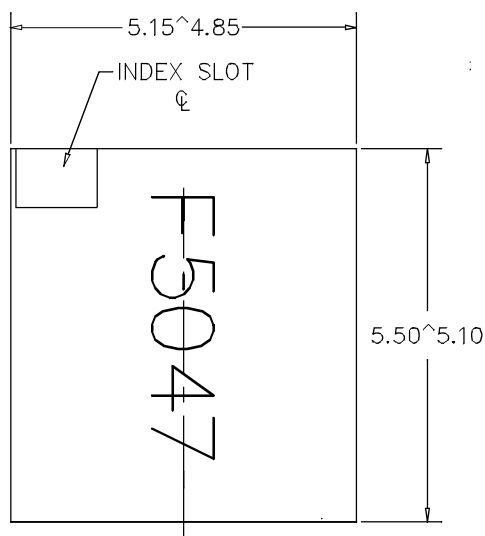
Notes:

1. $R_{\theta JA}$ is a function of the junction-to-case ($R_{\theta JC}$), case-to-ambient ($R_{\theta CA}$) and the PC Board ($R_{\theta BA}$) thermal resistance. For the purpose of determining $R_{\theta JC}$ the case thermal reference is defined as the top surface of the package. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ and $R_{\theta BA}$ are determined by the user's design.

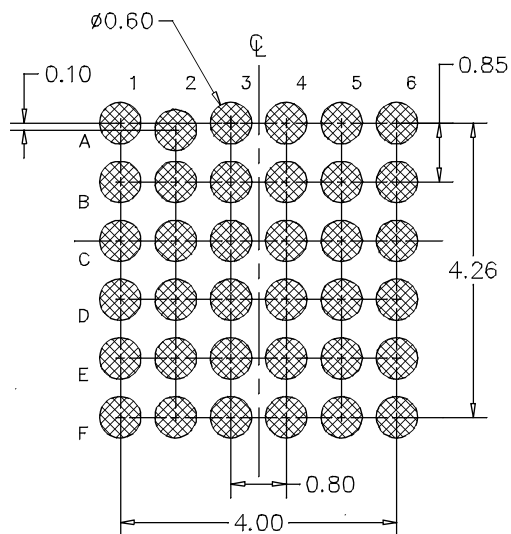
(a). $R_{\theta JA} = 45^\circ\text{C/W}$ (steady-state) when mounted on 1 in² of 2 oz. copper.

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

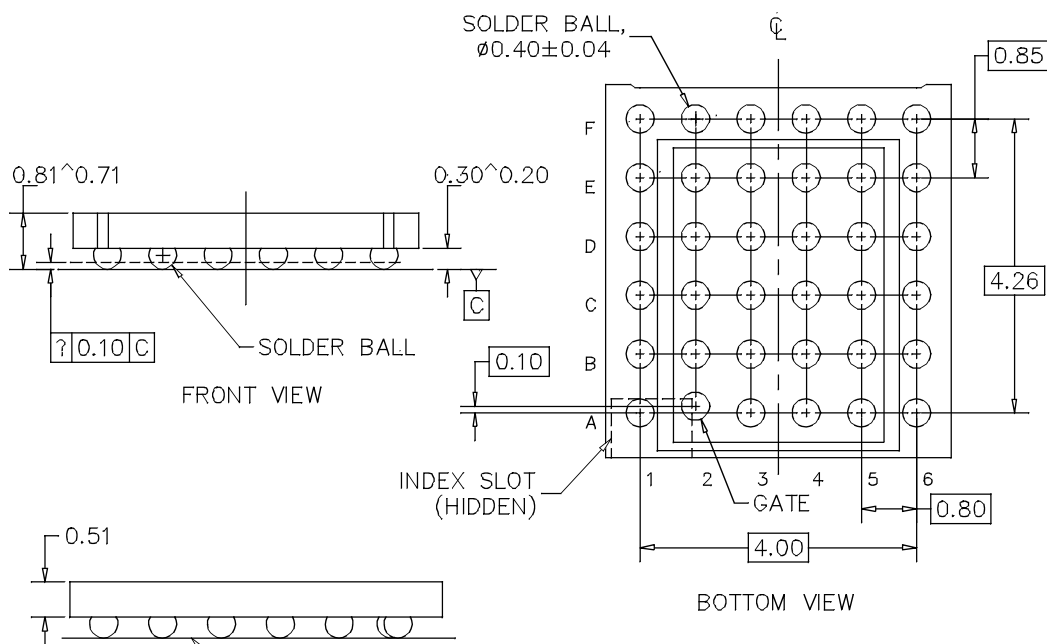
Dimensional Outline and Pad Layout



TOP VIEW



RECOMMENDED LAND PATTERN



NOTES: UNLESS OTHERWISE SPECIFIED

- A) ALL DIMENSIONS ARE IN MILLIMETERS.
- B) NO JEDEC REGISTRATION REFERENCE AS OF JULY 1999.

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