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FDB047N10 N-Channel PowerTrench[®] MOSFET 100 V, 164 A, 4.7 m Ω

Features

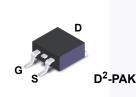
- $R_{DS(on)}$ = 3.9 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 75 A
- · Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{\text{DS}(\text{on})}$
- High Power and Current Handling Capability
- RoHS Compliant

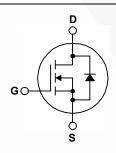
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench[®] process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted.

| Symbol | | Parameter | | FDB047N10 | Unit |
|-----------------------------------|--|-------------------------|----------|-------------|------|
| V _{DSS} | Drain to Source Voltage | | | 100 | V |
| V _{GSS} | Gate to Source Voltage | | | ±20 | V |
| ID | Drain Current - | mited) | 164* | A | |
| | - | mited) | 116* | A | |
| | - | Limited) | 120 | Α | |
| I _{DM} | Drain Current | - Pulsed | (Note 1) | 656* | Α |
| E _{AS} | Single Pulsed Avalanche E | nergy | (Note 2) | 1153 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (No | | (Note 3) | 6.0 | V/ns |
| P _D | Dower Dissinction | (T _C = 25°C) | | 375 | W |
| | Power Dissipation | - Derate Above 25°C | | 2.5 | W/ºC |
| T _J , T _{STG} | Operating and Storage Temperature Range | | | -55 to +175 | °C |
| ΤL | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds | | Seconds | 300 | °C |

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

Thermal Characteristics

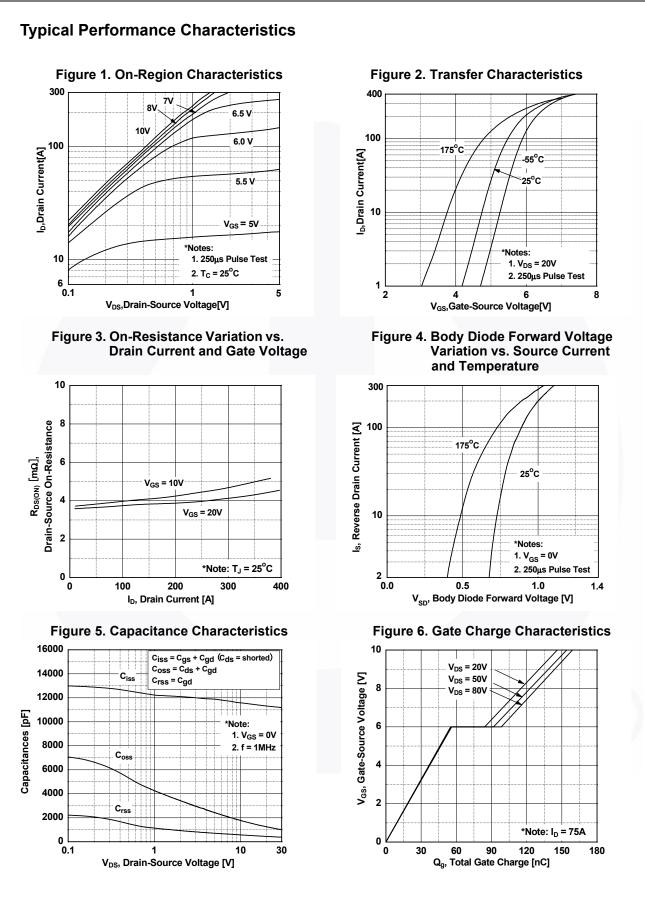
| Symbol | Parameter | FDB047N10 | Unit |
|-----------------------|--|-----------|------|
| $R_{	extsf{	heta}JC}$ | Thermal Resistance, Junction to Case, Max. | 0.4 | |
| D | Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max. | 62.5 | °C/W |
| $R_{	extsf{	heta}JA}$ | Thermal Resistance, Junction to Ambient (1 in ² Pad of 2-oz Copper), Max. | 40 | |

November 2013

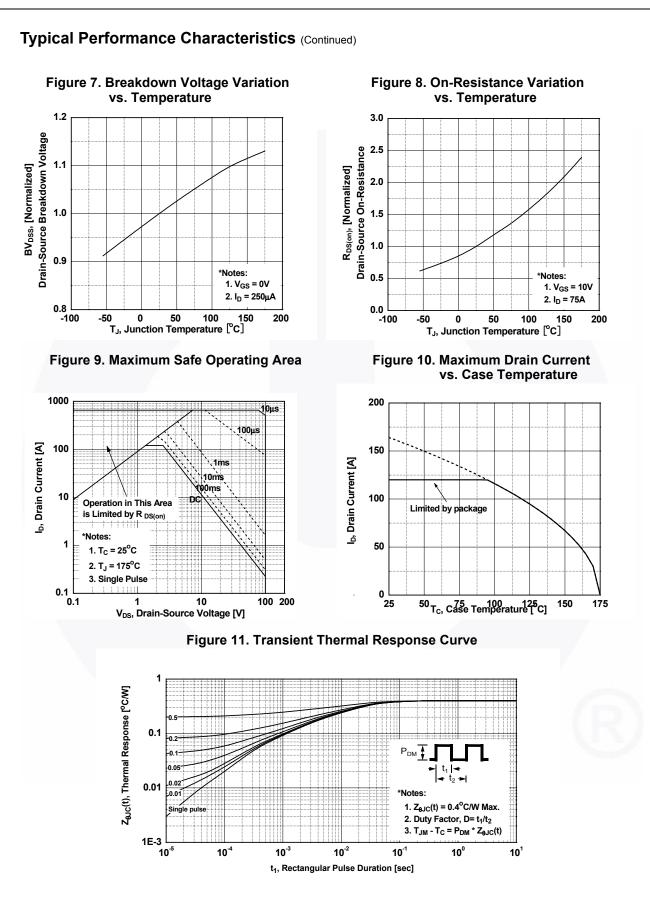
| | Part Number Top Mark | | Packing Method | Reel Size | Тар | e Width | Qua | ntity |
|------------|---|--|--|--|--|---|---|---|
| • | | D ² -PAK | Tape and Reel | 330 mm | | | 800 units | |
| l Chara | | C unless of | herwise noted. | | | | | |
| | Parameter | | | ns | Min. | Тур. | Max. | Unit |
| teristics | | | | | | | | |
| Drain to S | Source Breakdown Voltage | e l | _D = 250 μA, V _{GS} = 0 V, | T _{.I} = 25 ^o C | 100 | - | - | V |
| | U 1 | li | _D = 250 μA, Referenced | - | - | 0.1 | - | V/ºC |
| Zero Gat | e Voltage Drain Current | | | | - | - | 1 | μA |
| 2010 000 | 5 Voltage Drain Guirein | | V_{DS} = 100 V, V_{GS} = 0 V, T_{C} = 150°C | | - | - | 500 | μΛ |
| Gate to E | ody Leakage Current | ٧ | $V_{\rm GS}$ = ±20 V, $V_{\rm DS}$ = 0 V | | - | - | ±100 | nA |
| teristics | | | | | | | | |
| Gate Thr | eshold Voltage | ١ | V _{GS} = V _{DS} , I _D = 250 μA | | 2.5 | 3.5 | 4.5 | V |
| Static Dra | ain to Source On Resistan | | | | - | 3.9 | 4.7 | mΩ |
| Forward | Transconductance | | | | - | 170 | - | S |
| haracte | ristics | | | | | | | |
| Input Cap | pacitance | | | | - | 11500 | 15265 | pF |
| Output C | apacitance | | | _ | - | 1120 | 1500 | pF |
| Reverse | Transfer Capacitance | | = f = 1 MHz | | - | 455 | 680 | pF |
| Characte | eristics | | | · | | | | |
| | | | | | - | 174 | 358 | ns |
| | , | · · · | √ _{DD} = 50 V, I _D = 75 A, | - | - | | | ns |
| | | | | | - | | | ns |
| | , | | | (Note 4) | - | 244 | 499 | ns |
| Total Gate | e Charge at 10V | | / _ <u>90 \/ I</u> _ 75 A | , , | - | 160 | 210 | nC |
| | - | | | | - | 56 | - | nC |
| Gate to D | rain "Miller" Charge | | 63 101 | (Note 4) | - | 36 | - | nC |
| | Charactoristics | I | | 1 | | 1 | | |
| | | rce Diode I | Forward Current | | - | _ | 164* | A |
| | | | | | - | - | | A |
| Drain to S | Source Diode Forward Volt | | $V_{GS} = 0 V, I_{SD} = 75 A$ | | - | - | 1.25 | V |
| | Recovery Time | | $V_{GS} = 0 V, I_{SD} = 75 A,$ $V_{GS} = 0 V, I_{SD} = 75 A,$ | | - | 88 | - | ns |
| Reveiser | Reverse Recovery Charge | | $dI_{\rm F}/dt = 100 A/\mu s$ | | - | 245 | - | nC |
| | teristics Drain to S Breakdov Coefficier Zero Gate Gate to B teristics Gate Thr Static Dra Static Dra Forward Haracter Input Cap Output Ca Output Ca Output Ca Output Ca Output Ca Character Turn-On I Turn-On I Turn-Of I Turn-Of I Turn-Of I Turn-Of I State to S Gate to D Ce Diode | Parameter teristics Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current Gate to Body Leakage Current teristics Gate Threshold Voltage Static Drain to Source On Resistan Forward Transconductance haracteristics Input Capacitance Output Capacitance Qutput Capacitance Characteristics Turn-On Delay Time Turn-On Rise Time Turn-Off Fall Time Total Gate Charge at 10V Gate to Source Gate Charge Gate to Drain "Miller" Charge ce Diode Characteristics Maximum Continuous Drain to Source | Parameter teristics Drain to Source Breakdown Voltage I Breakdown Voltage Temperature Coefficient I Breakdown Voltage Temperature Coefficient I Zero Gate Voltage Drain Current I Gate to Body Leakage Current I teristics I Gate Threshold Voltage I Static Drain to Source On Resistance I Forward Transconductance I haracteristics I Input Capacitance I Output Capacitance I Characteristics I Turn-On Delay Time I Turn-On Rise Time I Turn-Off Fall Time I Total Gate Charge at 10V I Gate to Source Gate Charge I Gate to Drain "Miller" Charge I Maximum Continuous Drain to Source Diode I | teristicsDrain to Source Breakdown VoltageID = 250 μ A, VGS = 0 V,Breakdown Voltage TemperatureID = 250 μ A, ReferencedCoefficientVDS = 100 V, VGS = 0 V,Zero Gate Voltage Drain CurrentVDS = 100 V, VGS = 0 V,Gate to Body Leakage CurrentVGS = ±20 V, VDS = 0 V,Gate Threshold VoltageVGS = ±20 V, VDS = 0 V,Static Drain to Source On ResistanceVGS = 10 V, ID = 75 A,Forward TransconductanceVDS = 10 V, ID = 75 A,Input CapacitanceVDS = 10 V, ID = 75 A,Output CapacitanceVDS = 25 V, VGS = 0 V,f = 1 MHzTurn-On Delay TimeTurn-On Rise TimeVDD = 50 V, ID = 75 A,Turn-Off Delay TimeVDS = 10 V, ID = 75 A,Turn-Off Fall TimeVDS = 10 V, ID = 75 A,Total Gate Charge at 10VVDS = 80 V, ID = 75 A,VGS = 10 VVDS = 80 V, ID = 75 A,VGS = 10 VVGS = 10 VVDS = 10 VVDS = 80 V, ID = 75 A,VGS = 10 VVGS = 10 VVGS = 10 VVGS = 10 VVDS = 80 V, ID = 75 A,VGS = 10 VVGS | ParameterTest ConditionsteristicsDrain to Source Breakdown Voltage $I_D = 250 \ \mu\text{A}, \ V_{GS} = 0 \ V, \ T_J = 25^{\circ}\text{C}$ Breakdown Voltage Temperature Coefficient $I_D = 250 \ \mu\text{A}, \ Referenced to 25^{\circ}\text{C}$ Zero Gate Voltage Drain Current $V_{DS} = 100 \ V, \ V_{GS} = 0 \ V$ Qate to Body Leakage Current $V_{GS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^{\circ}\text{C}$ Gate to Body Leakage Current $V_{GS} = 250 \ \mu\text{A}, \ P_{GS} = 0 \ V, \ T_D = 75 \ A$ Gate Threshold Voltage $V_{GS} = 10 \ V, \ I_D = 75 \ A$ Forward Transconductance $V_{DS} = 10 \ V, \ I_D = 75 \ A$ Porward TransconductanceV_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHzInput CapacitanceQutput CapacitanceV_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ f = 1 \ MHzCharacteristicsTurn-On Delay Time(Note 4)V_{DS} = 80 \ V, \ I_D = 75 \ A, \ V_{GS} = 10 \ V, \ R_G = 25 \ \Omega(Note 4)Total Gate Charge at 10VV_{DS} = 80 \ V, \ I_D = 75 \ A, \ V_{GS} = 10 \ VGate to Drain "Miller" Charge(Note 4) | ParameterTest ConditionsMin.teristicsDrain to Source Breakdown Voltage $I_D = 250 \ \mu$ A, $V_{GS} = 0 \ V, \ T_J = 25^{\circ}C$ 100Breakdown Voltage Temperature Coefficient $I_D = 250 \ \mu$ A, Referenced to $25^{\circ}C$ -Zero Gate Voltage Drain Current $V_{DS} = 100 \ V, \ V_{GS} = 0 \ V, \ T_C = 150^{\circ}C$ -Gate to Body Leakage Current $V_{GS} = 420 \ V, \ V_{DS} = 0 \ V$ -Gate to Body Leakage Current $V_{GS} = 420 \ V, \ V_{DS} = 0 \ V$ -Gate Threshold Voltage $V_{GS} = 100 \ V, \ I_D = 75 \ A$ -Gate Threshold Voltage $V_{GS} = 10 \ V, \ I_D = 75 \ A$ -Forward Transconductance $V_{DS} = 10 \ V, \ I_D = 75 \ A$ -Input Capacitance $V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ -$ -Output Capacitance $V_{DS} = 25 \ V, \ V_{GS} = 0 \ V, \ -$ -Turn-On Delay Time $V_{DS} = 50 \ V, \ I_D = 75 \ A, \ -$ -Turn-Off Belay Time $V_{DS} = 50 \ V, \ I_D = 75 \ A, \ -$ -Turn-Off Fall Time $V_{DS} = 80 \ V, \ I_D = 75 \ A, \ -$ -Turn-Off Fall Time $V_{DS} = 80 \ V, \ I_D = 75 \ A, \ -$ -Gate to Source Gate Charge $V_{DS} = 80 \ V, \ I_D = 75 \ A, \ -$ -Gate to Drain "Miller" Charge $(Note 4)$ -Characteristics $V_{DS} = 10 \ V \ CS = 10 \ V, \ CS = 10 \ V \ CS = 10 \ V, \ CS = 10 $ | $\begin{tabular}{ c c c c c } \hline Parameter & Test Conditions & Min. Typ. \\ \hline teristics \\ \hline \begin{tabular}{ c c c c } \hline Test Conditions & Min. Typ. \\ \hline teristics & & & & & & & & & & & & & & & & & & &$ | $\begin{tabular}{ c c c c } \hline Parameter Test Conditions Min. Typ. Max. \\ \hline teristics \\ \hline \begin{tabular}{ c c c c } \hline Test Source Breakdown Voltage II_b = 250 \mbox{ μ, $V_{GS} = 0 \mbox{ V, $V_{J} = 25^{\circ}C$} & 100 & - & - \\ \hline \begin{tabular}{ c c c c } \hline Drain to Source Breakdown Voltage Temperature II_b = 250 \mbox{ μ, $Referenced to $25^{\circ}C$} & - & 0.1 & - \\ \hline \begin{tabular}{ c c c c } \hline Test Source Breakdown Voltage Temperature II_b = 250 \mbox{ μ, $Referenced to $25^{\circ}C$} & - & 0.1 & - \\ \hline \begin{tabular}{ c c c } \hline Test Source V \begin{tabular}{ c c c } \hline V_{DS} = 100 \begin{tabular}{ c c c } V_{DS} = 0 \begin{tabular}{ c c c } \hline V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 0 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 0 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 0 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 250 \begin{tabular}{ c c } V_{DS} = 250 \begin{tabular}{ c c } V_{DS} = 250 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 100 \begin{tabular}{ c c c } V_{DS} = 100 \begin{tabular}{ c c } V_{DS} = 100 tabu$ |

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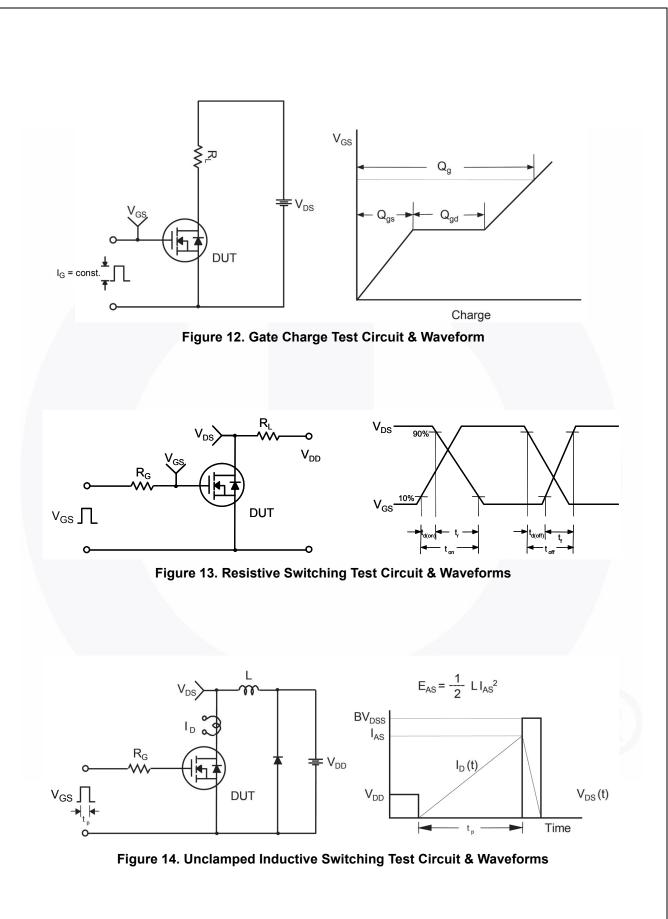
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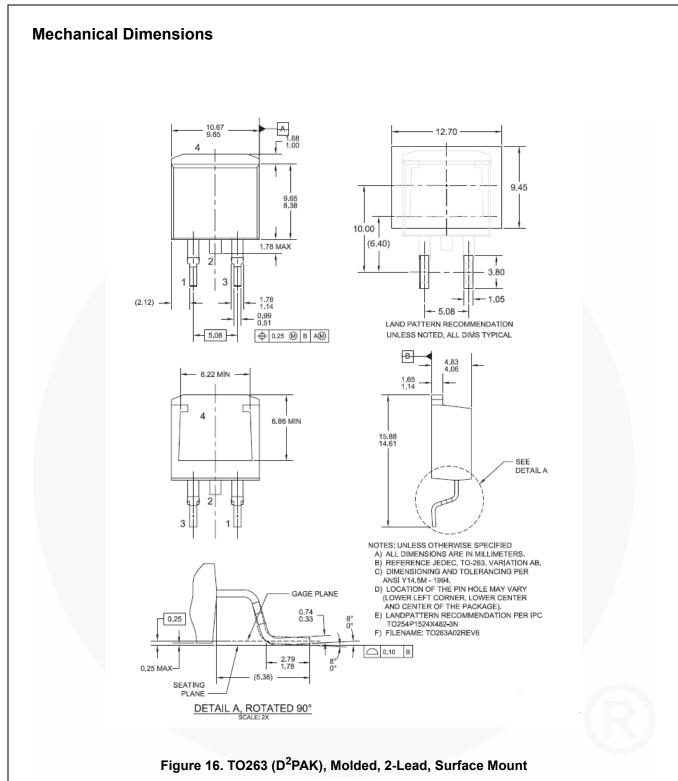


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5

DUT + V_{DS} a ۱_{SD} م L Driver R_G, Same Type as DUT L F ∨_{DD} $\prod V_{GS}$ • dv/dt controlled by R_G • I_{SD} controlled by pulse period Î Gate Pulse Width V_{GS} D = Gate Pulse Period 10V (Driver) I_{FM}, Body Diode Forward Current I _{SD} di/dt (DUT) I_{RM} Body Diode Reverse Current V_{DS} (DUT) Body Diode Recovery dv/dt V_{SD} V_{DD} Body Diode Forward Voltage Drop Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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| | | | XS ''' |
| | | | |

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