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November 2013



FQB5N50C

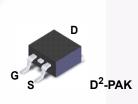
N-Channel QFET[®] MOSFET 500 V, 5 A, 1.4 Ω

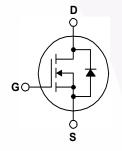
Features

- + 5 A, 500 V, $R_{DS(on)}$ = 1.4 Ω (Max.) @ V_{GS} = 10 V, I_D = 2.5 A
- Low Gate Charge (Typ. 18 nC)
- Low Crss (Typ. 15 pF)
- 100% Avalanche Tested
- RoHS Compliant

Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.





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

| Symbol | Parameter | | FQB5N50CTM | Unit |
|-----------------------------------|--|----------|-------------|------|
| V _{DSS} | Drain-Source Voltage | | 500 | V |
| | Drain Current - Continuous ($T_c = 25^{\circ}C$) | | 5 | A |
| ID | - Continuous (T _C = 100°C) | | 2.9 | А |
| I _{DM} | Drain Current - Pulsed | (Note 1) | 20 | A |
| V _{GSS} | Gate-Source Voltage | | ± 30 | V |
| E _{AS} | Single Pulsed Avalanche Energy (Note 2) | | 300 | mJ |
| I _{AR} | Avalanche Current | (Note 1) | 5 | A |
| E _{AR} | Repetitive Avalanche Energy (No | | 7.3 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | | 4.5 | V/ns |
| D | Power Dissipation (T _C = 25°C) | | 73 | W |
| PD | - Derate above 25°C | | 0.58 | W/°C |
| T _J , T _{STG} | Operating and Storage Temperature Range | | -55 to +150 | °C |
| TL | Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds | | 300 | °C |
| ۱L | | | 500 | |

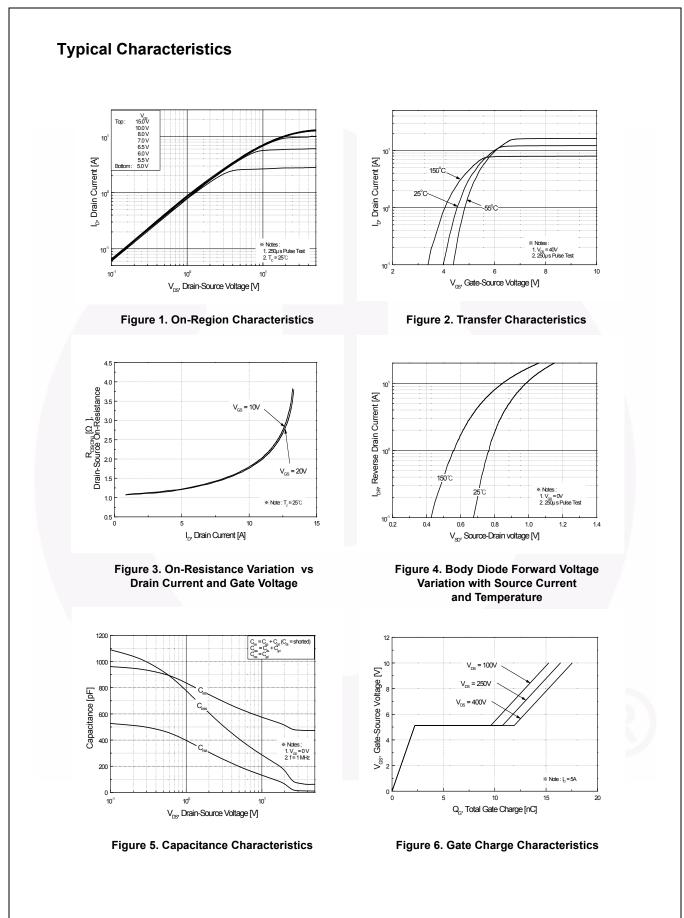
Thermal Characteristics

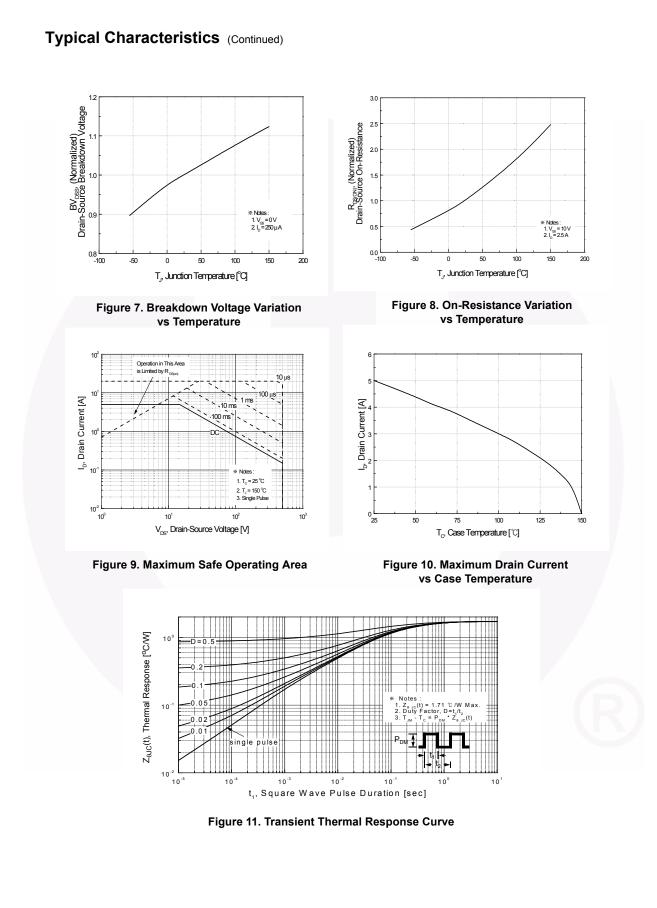
| Symbol | Parameter | FQB5N50CTM | Unit |
|-----------------|---|------------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Max. 1.71 | | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient, Max. | 62.5 | C/W |

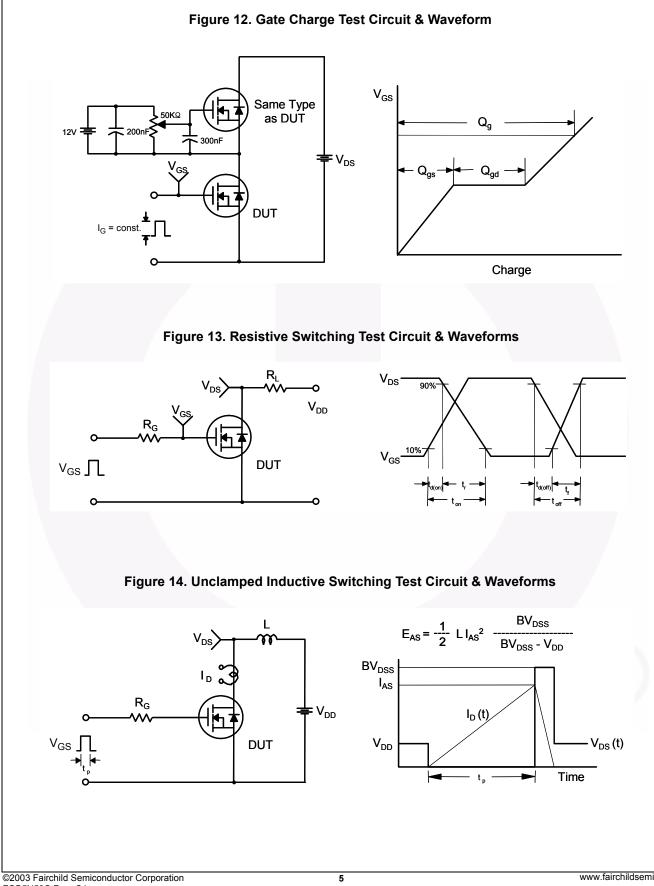
1

| Device MarkingDeviceFQB5N50CFQB5N50CTM | | PackageReel SizeD2-PAK330 mm | | Tape Width 24 mm | | Quantity 800 units | | |
|---|---------------------------------|--|--|---------------------|-----|-----------------------|------------------|----------|
| | | | | | | | | lectri |
| Symbol | | Parameter | | Conditions | Min | Тур | Max | Unit |
| Off Cha | aracteristic | `e | | | | | | |
| BV _{DSS} | | ce Breakdown Voltage | V _{GS} = 0 V, I _D = 250 μA | | 500 | | | V |
| ∆BV _{DSS} | | Voltage Temperature | $I_D = 250 \ \mu\text{A}$, Referenced to 25°C | | | | | |
| ΔT_{J} | Coefficient | volage temperature | | | | 0.5 | | V/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | | V_{DS} = 500 V, V_{G} | | | | 1 | μA |
| 000 | | | V _{DS} = 400 V, T _C = 125°C | | | 1 | 10 | μA |
| GSSF | | Leakage Current, Forward | V_{GS} = 30 V, V_{DS} | | | | 100 | nA |
| GSSR | Gate-Body | Leakage Current, Reverse | V_{GS} = -30 V, V_{DS} | _S = 0 V | | | -100 | nA |
| On Cha | racteristic | s | | | | | | |
| V _{GS(th)} | Gate Thres | hold Voltage | $V_{DS} = V_{GS}, I_D =$ | 250 μA | 2.0 | | 4.0 | V |
| R _{DS(on)} | Static Drain On-Resista | | V _{GS} = 10 V, I _D = | 2.5A | | 1.14 | 1.4 | Ω |
| JFS | | ansconductance | V _{DS} = 40 V, I _D = | 2.5A | | 5.2 | | S |
| Dynam C _{iss} C _{oss} C _{rss} | ic Charact | citance | V _{DS} = 25 V, V _{GS} f = 1.0 MHz | = 0 V, | | 480 80 15 | 625 105 20 | pF pF |
| | | | | | | 15 | 20 | рг |
| Switch | ing Charac | | | | 1 | | I | |
| d(on) | Turn-On De | | V _{DD} = 250 V, I _D | = 5A, | | 12 | 35 | ns |
| r | Turn-On Ris | | R _G = 25 Ω | | | 46 | 100 | ns |
| d(off) | Turn-Off De | • | - | (Note 4) | | 50 | 110 | ns |
| f | Turn-Off Fa | | | | | 48 | 105 | ns |
| כ ^ק | Total Gate (| | $V_{DS} = 400 V, I_{D}$ | = 5A, | | 18 | 24 | nC |
| ב _{gs} ב | Gate-Sourc | | V _{GS} = 10 V | (Note 4) | | 2.2 9.7 | | nC nC |
| 2 _{gd} | Gate-Drain | Charge | | (Note 4) | | 9.7 | | nc |
| Drain-S | ource Dio | de Characteristics a | nd Maximum I | Ratings | | | | |
| S | | Im Continuous Drain-Source Diode Forward Current | | | | 5 | Α | |
| SM | | Pulsed Drain-Source Diode F | | | | | 20 | A |
| / _{SD} | | e Diode Forward Voltage | V _{GS} = 0 V, I _S = 5 A | | | | 1.4 | V |
| rr | | covery Time | $V_{GS} = 0 V, I_{S} = 5$ | | | 263 | | ns |
| ג _{יי} | Reverse Re | covery Charge | dI _F / dt = 100 A/µ | us | | 1.9 | | μC |
| DTES: | | n limited by maximum junction tempe | | | | | | |

FQB5N50C — N-Channel QFET[®] MOSFET







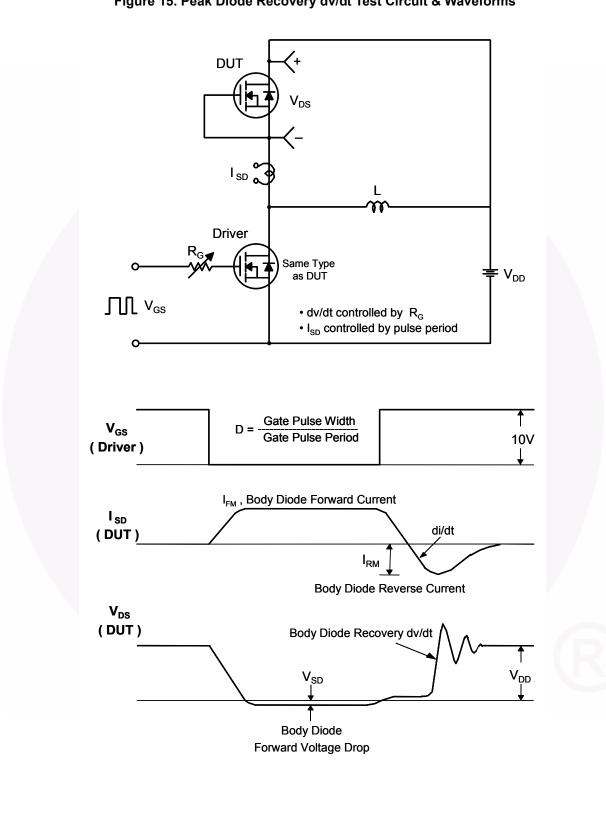


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

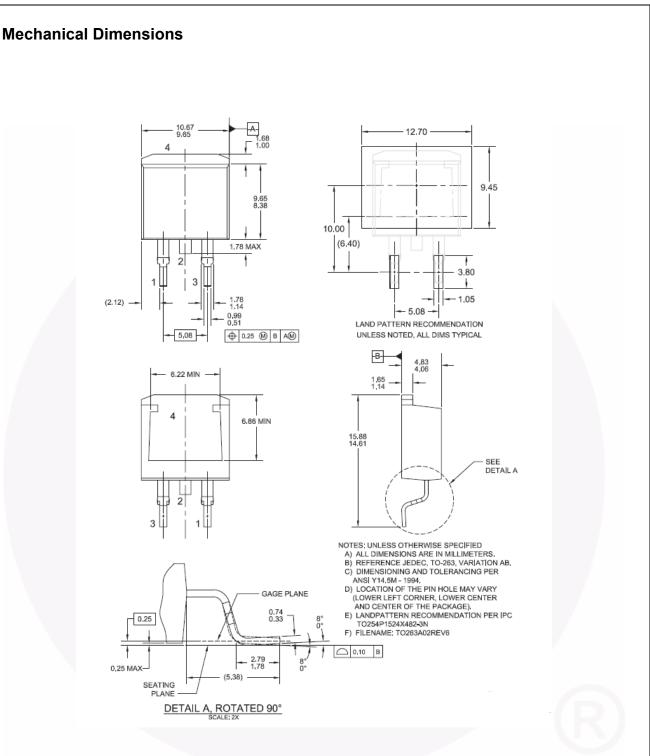


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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FQB5N50C — N-Channel QFET[®] MOSFET



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| DEUXPEED [®] Dual Cool™ | ISOPLANAR™ | dar O | TinyPWM™ |
| EcoSPARK [®] | Marking Small Speakers Sound Lou and Better™ | Saving our world, 1mW/W/kW at a time™ | TinyWire™ |
| Eccorrant EfficentMax™ | MegaBuck™ | SignalWise™ | TranSiC™ |
| ESBC™ | MICROCOUPLER™ | SmartMax™ | TriFault Detect™ |
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