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FCP36N60N / FCPF36N60NT N-Channel SupreMOS[®] MOSFET

600 V, 36 A, 90 m Ω

Features

- $R_{DS(on)}$ = 81 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 18 A
- Ultra Low Gate Charge (Typ. Q_g = 86 nC)
- Low Effective Output Capacitance (Typ. C_{oss(eff.)} = 361 pF)
- 100% Avalanche Tested
- RoHS Compliant

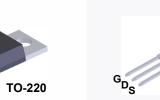
Application

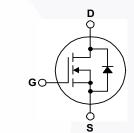
- Solar Inverter
- AC-DC Power Supply

Description

TO-220F

The SupreMOS[®] MOSFET is Fairchild Semiconductor's next generation of high voltage super-junction (SJ) technology employing a deep trench filling process that differentiates it from the conventional SJ MOSFETs. This advanced technology and precise process control provides lowest Rsp on-resistance, superior switching performance and ruggedness. SupreMOS MOSFET is suitable for high frequency switching power converter applications such as PFC, server/telecom power, FPD TV power, ATX power, and industrial power applications.





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

| Symbol | | Parameter | FCP36N60N | FCPF36N60NT | Unit | | |
|-----------------------------------|---|--|-------------|-------------|-------|------|--|
| V _{DSS} | Drain to Source Voltage | | 600 | | V | | |
| V _{GSS} | Gate to Source Voltage | ate to Source Voltage | | ±30 | | V | |
| ID | Drain Current | - Continuous (T _C = 25 ^o C) | | 36 | 36* | ۸ | |
| | | - Continuous (T _C = 100 ^o C) | | 22.7 | 22.7* | A | |
| I _{DM} | Drain Current | - Pulsed | (Note 1) | 108 | 108* | Α | |
| E _{AS} | Single Pulsed Avalanche Energy (Note | | (Note 2) | 1800 | | mJ | |
| I _{AR} | Avalanche Current | | (Note 1) | 12 | | Α | |
| E _{AR} | Repetitive Avalanche Energy | | (Note 1) | 3.12 | | mJ | |
| dv/dt | MOSFET dv/dt | | | 100 | | V/ns | |
| | Peak Diode Recovery dv/ | ecovery dv/dt | | 20 | | | |
| P _D | Power Dissipation | (T _C = 25 ^o C) | | 312 | | W | |
| | | - Derate Above 25°C | | 2.6 | - / F | W/ºC | |
| T _J , T _{STG} | Operating and Storage Temperature Range | | -55 to +150 | | °C | | |
| Τ _L | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds | | | 300 | | °C | |

*Drain current limited by maximum junction temperature.

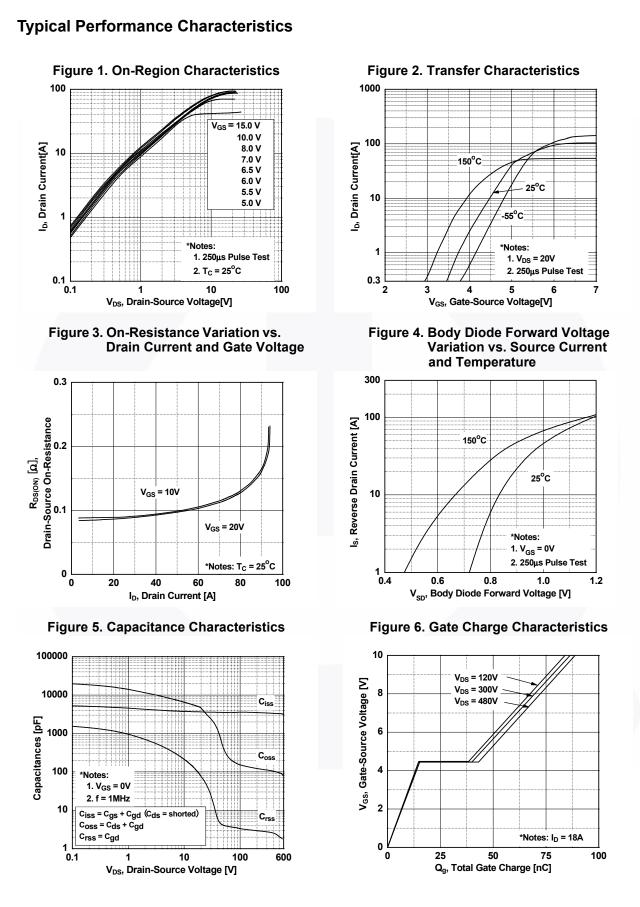
Thermal Characteristics

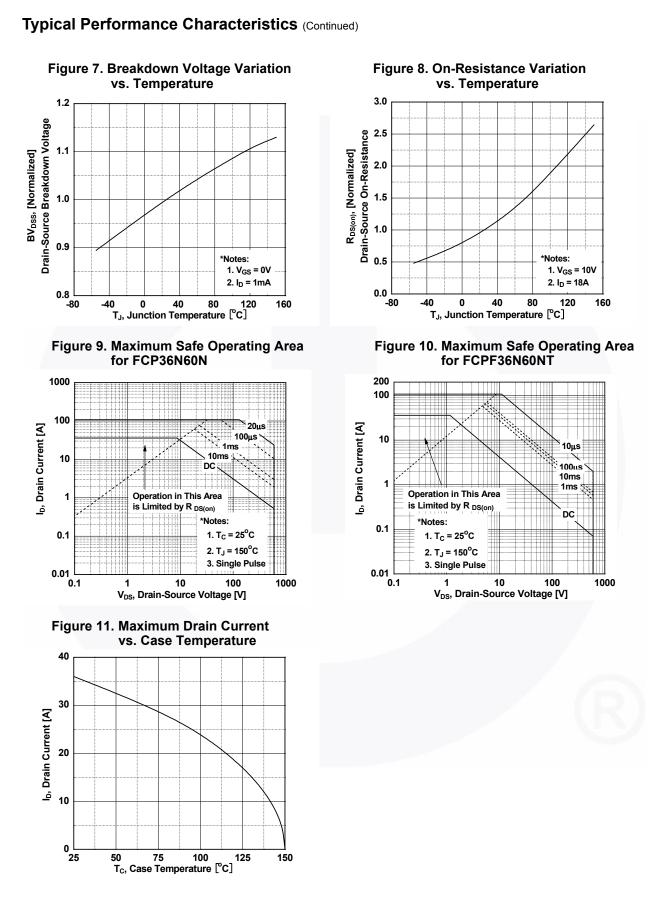
| Symbol | Parameter | FCP36N60N | FCPF36N60NT | Unit |
|-----------------|---|-----------|-------------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.4 | 3.5 | |
| $R_{\theta CS}$ | Thermal Resistance, Case to Heat Sink, Typ. | 0.5 | 0.5 | °C/W |
| R_{\thetaJA} | Thermal Resistance, Junction to Ambient, Max. | 62.5 | 62.5 | |

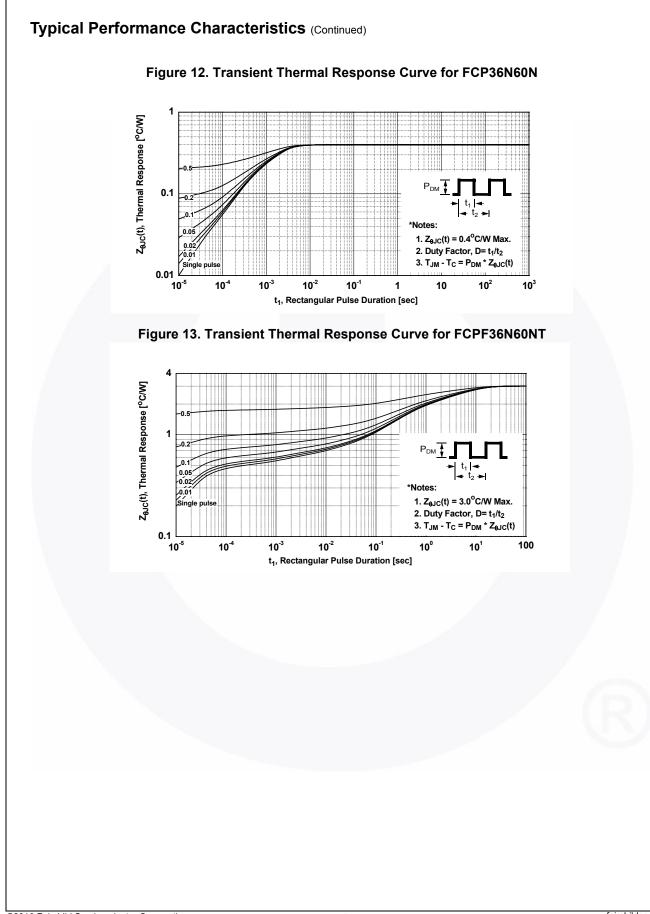
December 2013

| FCP36N60N T FCPF36N60NT haracteristics T _C = 25° Parameter | TO-220 TO-220F C unless oth | Tube Tube nerwise noted. Test Condition | N/A N/A | Min. | N/A N/A | 50 | units units |
|--|--|---|---|--|--|--|----------------|
| haracteristics T _C = 25 ^o Parameter istics | | nerwise noted. | | Min | 1 | | units |
| Parameter | C unless oth | | S | Min | - | | |
| istics | | Test Condition | S | Min | - | | |
| | | | | IVIIII. | Тур. | Max. | Unit |
| | | | | | | | |
| ain to Source Breakdown Voltag | je l _c | $I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}, T_C = 25^{\circ}\text{C}$ | | 600 | - | - | V |
| eakdown Voltage Temperature pefficient | | $I_D = 1$ mA, Referenced to 25°C | | - | 0.7 | - | V/ºC |
| ro Gate Voltage Drain Current | | V _{DS} = 480 V, V _{GS} = 0 V | | - | - | 10 | μA |
| Gate to Body Leakage Current | | $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, T_C = 125^{\circ}\text{C}$ $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ | | - | - | 100 ±100 | nA |
| | | | | - | | | |
| stics | | | | | | | |
| ate Threshold Voltage | Voltage $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$ | | | 2.0 | - | 4.0 | V |
| atic Drain to Source On Resista | nce V | ′ _{GS} = 10 V, I _D = 18 A | | - | 81 | 90 | mΩ |
| orward Transconductance | V | ′ _{DS} = 20 V, I _D = 18 A | | - | 41 | - | S |
| racteristics | | | | | | | |
| put Capacitance | | | | - | 3595 | 4785 | pF |
| utput Capacitance | | | - | 149 | 200 | pF | |
| everse Transfer Capacitance | | V _{DS} = 380 V, V _{GS} = 0V, f = 1 MHz | | - | 4 | 6 | pF |
| utput Capacitance | V | | | | 80 | - | pF |
| fective Output Capacitance | V | $V_{\rm DS}$ = 0 V to 380 V, $V_{\rm GS}$ | = 0 V | - | 361 | - | pF |
| tal Gate Charge at 10V | V _{DS} = 380 V, I _D = 18 A, V _{GS} = 10 V | | - | 86 | 112 | nC | |
| | | | - | 15.4 | - | nC | |
| | | | | - | | - | nC |
| | f | = 1 MHz | | • | 1 | - | Ω |
| | | | | | 23 | 56 | ns |
| , | v | V_{DD} = 380 V, I _D = 18 A, V_{GS} = 10 V, R _G = 4.7 Ω | | | - | | ns |
| | | | | - | | - | ns |
| - | | | (Note 4) | - | | | ns |
| | I | | (1111-1) | | | | |
| | irce Diode F | forward Current | | - | - | 18 | А |
| | | | | - | - | | A |
| | | | | - | - | | V |
| verse Recovery Time | | $V_{GS} = 0 \text{ V}, \text{ I}_{SD} = 18 \text{ A},$ | | - | 574 | - | ns |
| | | $V_{GS} = 0 V, I_{SD} = 18 A,$ $dI_F/dt = 100 A/\mu s$ | | | | | |
| | ro Gate Voltage Drain Current ate to Body Leakage Current stics ate Threshold Voltage atic Drain to Source On Resistan orward Transconductance racteristics out Capacitance output Capacitance exerse Transfer Capacitance toput Capacitance exerse Transfer Capacitance tal Gate Charge at 10V ate to Source Gate Charge ate to Drain "Miller" Charge uivalent Series Resistance aracteristics rn-On Delay Time rn-Off Delay Time rn-Off Fall Time Diode Characteristics eximum Continuous Drain to Source | vro Gate Voltage Drain Current V vate to Body Leakage Current V stics v ate Threshold Voltage V ate to Praceitance V ate to Source Gate Charge V ate to Drain "Miller" Charge V uivalent Series Resistance f aracteristics rm-On Delay Time rm-On Rise Time V mo-Off Delay Time V mo-Off Fall Time V Diode Characteristics V ximum Continuous Drain to Source Diode Forward V | vro Gate Voltage Drain Current $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, V_{SS} = 480 \text{ V}, V_{DS} = 0 \text{ V}$ ate to Body Leakage Current $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ sticsverse Threshold Voltage $V_{GS} = V_{DS}, I_D = 250 \mu \text{ A}$ ate Threshold Voltage $V_{GS} = 10 \text{ V}, I_D = 18 \text{ A}$ anward Transconductance $V_{DS} = 20 \text{ V}, I_D = 18 \text{ A}$ aracteristicsverse Transfer Capacitanceut Capacitance $V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ everse Transfer Capacitance $V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ tal Gate Charge at 10V $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ tate to Source Gate Charge $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ uivalent Series Resistancef = 1 \text{ MHz}aracteristics $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ uivalent Series Resistancef = 1 \text{ MHz}aracteristics $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ uivalent Series Resistancef = 1 \text{ MHz}aracteristics $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}, R_G = 4.7 \Omega$ m-On Delay Time $V_{OS} = 10 \text{ V}, R_G = 4.7 \Omega$ m-Off Fall Time $V_{OS} = 10 \text{ V}, R_G = 4.7 \Omega$ Diode Characteristics $V_{ST} = 10 \text{ V}$ ximum Continuous Drain to Source Diode Forward Currentximum Pulsed Drain to Source Diode Forward Current | Pro Gate Voltage Drain Current $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}$ ate to Body Leakage Current $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, T_C = 125^{\circ}\text{C}$ stics $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ ate Threshold Voltage $V_{GS} = U_{DS}, I_D = 250 \mu\text{A}$ atic Drain to Source On Resistance $V_{GS} = 10 \text{ V}, I_D = 18 \text{ A}$ and Capacitance $V_{DS} = 20 \text{ V}, I_D = 18 \text{ A}$ aracteristics $V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, I_D = 18 \text{ A}$ ate to Apacitance $V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, I_T = 1 \text{ MHz}$ ate to Source Capacitance $V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}, I_T = 18 \text{ A}, V_{GS} = 0 \text{ V}$ ate to Source Gate Charge $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 0 \text{ V}$ ate to Source Gate Charge $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ ate to Drain "Miller" Charge $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ ate to Drain "Miller" Charge $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ aracteristics $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}$ m-On Delay Time $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}, R_G = 4.7 \Omega$ m-Off Delay Time $V_{DD} = 380 \text{ V}, I_D = 18 \text{ A}, V_{GS} = 10 \text{ V}, R_G = 4.7 \Omega$ m-Off Fall Time $V_{DS} = 10 \text{ V}, R_G = 4.7 \Omega$ m-Off Fall Time $V_{NOT} = 10 \text{ V}, R_G = 4.7 \Omega$ m-Off belay Time $V_{NOT} = 10 \text{ V}, R_S = 10 $ | $\frac{V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}}{V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, T_{C} = 125^{\circ}\text{C}} - \frac{1}{V_{DS} = 480 \text{ V}, V_{DS} = 0 \text{ V}}{V_{DS} = 480 \text{ V}, V_{DS} = 0 \text{ V}} - \frac{1}{V_{CS} = 10 \text{ V}, V_{DS} = 0 \text{ V}} - \frac{1}{V_{CS} = 10 \text{ V}, V_{DS} = 0 \text{ V}} - \frac{1}{V_{CS} = 10 \text{ V}, V_{DS} = 10 \text{ V}} - \frac{1}{V_{CS} = 10 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{DS} = 20 \text{ V}, I_{D} = 100 \text{ V}, V_{GS} = 0 \text{ V}} - \frac{1}{V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}} - \frac{1}{V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}} - \frac{1}{V_{DS} = 10 \text{ V}} - \frac{1}{V_{DS} = 380 \text{ V}, I_{D} = 18 \text{ A}} - \frac{1}{V_{CS} = 10 \text{ V}} - \frac{1}{V_{CS} =$ | vo Gate Voltage Drain Current $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}$ $V_{DS} = 480 \text{ V}, V_{GS} = 0 \text{ V}, T_C = 125^{\circ}C$ $ -$ ate to Body Leakage Current $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ $ -$ ate to Body Leakage Current $V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$ $ -$ stics $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$ 2.0 $-$ ate Threshold Voltage $V_{GS} = 10 \text{ V}, I_D = 18 \text{ A}$ $ 81$ ate Transconductance $V_{DS} = 20 \text{ V}, I_D = 18 \text{ A}$ $ 41$ accteristics $V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}, I_D = 18 \text{ A}$ $ 149$ acteristics $F = 1 \text{ MHz}$ $ 4$ but Capacitance $V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}, I_D = 18 \text{ A}$ $ 4$ ate to Capacitance $V_{DS} = 380 \text{ V}, V_{GS} = 0 \text{ V}, I_D = 18 \text{ A}$ $ 4$ ate to Source Gate Charge $V_{DS} = 380 \text{ V}, I_D = 18 \text{ A}, I_D = 10 \text{ I}, I_D = 18 \text{ A}, I_D = 10 \text{ I}, I_D = 18 \text{ A}, I_D = 10 \text{ I}, I_D = 18 \text{ A}, I_D = 10 \text{ I}, I_D = 18 \text{ A}, I_D = 10 \text{ I}, I_D $ | |

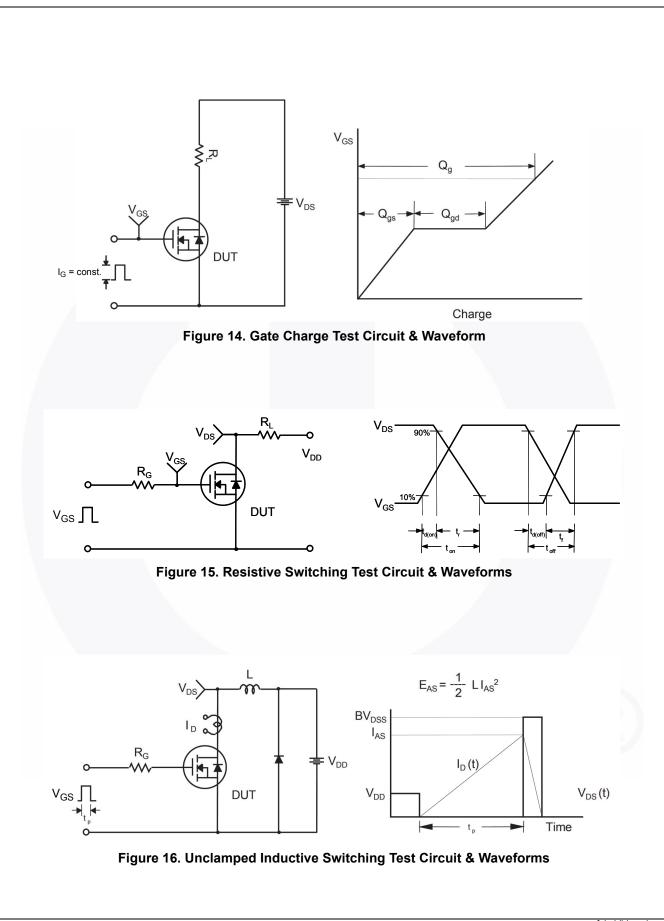
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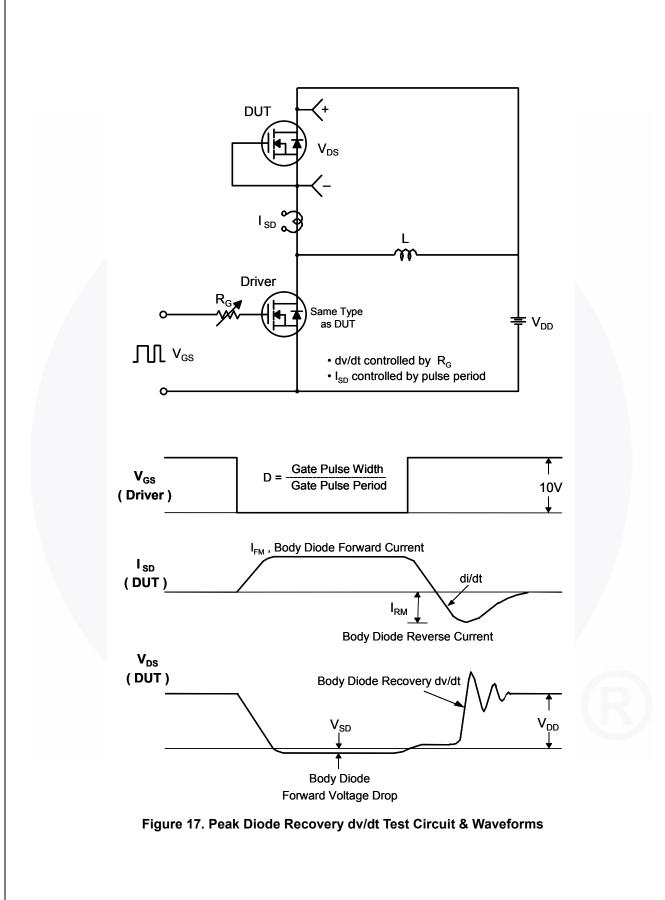


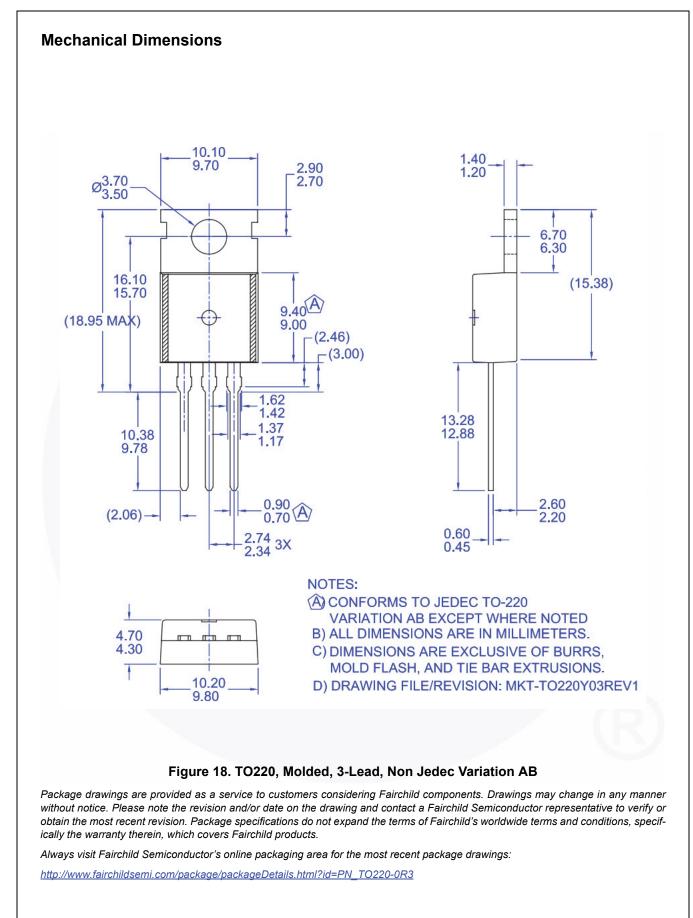


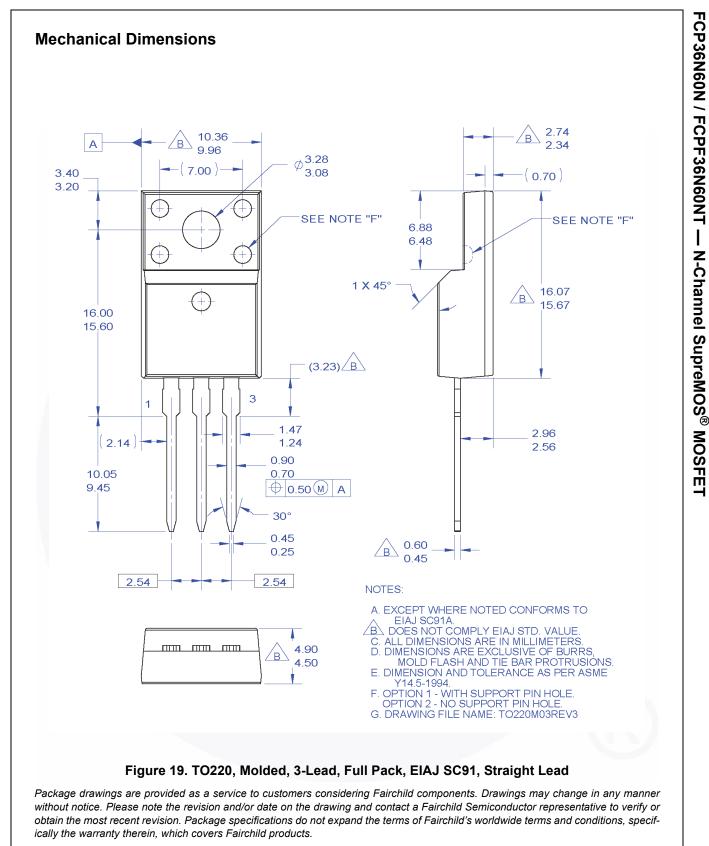


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|--------------------------|-----------------------|---|--|--|
| Advance Information | Formative / In Design | Datasheet contains the design specifications for product development. Specifications may change in any manner without notice. | | |
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