

# NPN Silicon Transistor

## FJPF5021

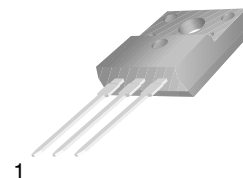
### High Voltage and High Reliability

- High Speed Switching:  $t_F = 0.1 \mu s$  (Typ.)
- Wide SOA
- This is a Pb-Free Device

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ C$ , unless otherwise noted)

| Symbol    | Parameter                                    | Value     | Unit       |
|-----------|--|-----------|------------|
| $V_{CBO}$ | Collector-Base Voltage                       | 800       | V          |
| $V_{CEO}$ | Collector-Emitter Voltage                    | 500       | V          |
| $V_{EBO}$ | Emitter-Base Voltage                         | 7         | V          |
| $I_C$     | Collector Current (DC)                       | 5         | A          |
| $I_{CP}$  | Collector Current (Pulse)                    | 10        | A          |
| $I_B$     | Base Current                                 | 2         | A          |
| $P_C$     | Collector Dissipation ( $T_C = 25^\circ C$ ) | 40        | W          |
| $T_J$     | Junction Temperature                         | 150       | $^\circ C$ |
| $T_{STG}$ | Storage Temperature                          | -55 ~ 150 | $^\circ C$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



1. Base
2. Collector
3. Emitter

TO-220 Fullpack, 3-Lead / TO-220F-3SG  
CASE 221AT

### MARKING DIAGRAM

|        |
|--------|
| J5021- |
| O      |
| AYWWZZ |

J5021- = Specific Device Code  
O =  $h_{FE}$  Grade  
A = Assembly Site  
YWW = Date Code (Year & Week)  
ZZ = Assembly Lot Code

### ORDERING INFORMATION

| Device      | Package                    | Shipping             |
|-------------|----------------------------|----------------------|
| FJPF5021OTU | TO-220 Fullpack,<br>3-Lead | 1000 Units /<br>Tube |

# FJPF5021

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol         | Parameter                            | Test Condition  | Min | Typ | Max | Unit          |
|----------------|--------------------------------------|---|-----|-----|-----|---------------|
| $BV_{CBO}$     | Collector-Base Breakdown Voltage     | $I_C = 1\text{ mA}, I_E = 0$  | 800 | –   | –   | V             |
| $BV_{CEO}$     | Collector-Emitter Breakdown Voltage  | $I_C = 5\text{ mA}, I_B = 0$  | 500 | –   | –   | V             |
| $BV_{EBO}$     | Emitter-Base Breakdown Voltage       | $I_E = 1\text{ mA}, I_C = 0$  | 7   | –   | –   | V             |
| $V_{CEX(sus)}$ | Collector-Emitter Sustaining Voltage | $I_C = 2.5\text{ A}, I_{B1} = -I_{B2} = 1\text{ A}$<br>$L = 1\text{ mH}$ , Clamped                                | 500 | –   | –   | V             |
| $I_{CBO}$      | Collector Cut-off Current            | $V_{CB} = 500\text{ V}, I_E = 0$  | –   | –   | 10  | $\mu\text{A}$ |
| $I_{EBO}$      | Emitter Cut-off Current              | $V_{EB} = 5\text{ V}, I_C = 0$  | –   | –   | 10  | $\mu\text{A}$ |
| $h_{FE1}$      | DC Current Gain                      | $V_{CE} = 5\text{ V}, I_C = 0.6\text{ A}$   | 15  | –   | 50  |               |
| $h_{FE2}$      |                                      | $V_{CE} = 5\text{ V}, I_C = 3\text{ A}$   | 8   | –   | –   |               |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage | $I_C = 3\text{ A}, I_B = 0.6\text{ A}$  | –   | –   | 1   | V             |
| $V_{BE(sat)}$  | Base-Emitter Saturation Voltage      | $I_C = 3\text{ A}, I_B = 0.6\text{ A}$  | –   | –   | 1.5 | V             |
| $C_{ob}$       | Output Capacitance                   | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$   | –   | 80  | –   | pF            |
| $f_T$          | Current Gain Bandwidth Product       | $V_{CE} = 10\text{ V}, I_C = 0.6\text{ A}$  | –   | 15  | –   | MHz           |
| $t_{ON}$       | Turn On Time                         | $V_{CC} = 200\text{ V}$<br>$I_C = 5\text{ A}, I_{B1} = -2.5\text{ A}, I_{B2} = 4\text{ A},$<br>$R_L = 50\ \Omega$ | –   | –   | 0.5 | $\mu\text{s}$ |
| $t_{STG}$      | Storage Time                         |   | –   | –   | 3   | $\mu\text{s}$ |
| $t_F$          | Fall Time                            |   | –   | 0.1 | 0.3 | $\mu\text{s}$ |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## $h_{FE}$ CLASSIFICATION

| Classification | R       | O       | Y       |
|----------------|---------|---------|---------|
| $h_{FE1}$      | 15 ~ 30 | 20 ~ 40 | 30 ~ 50 |

## TYPICAL CHARACTERISTICS

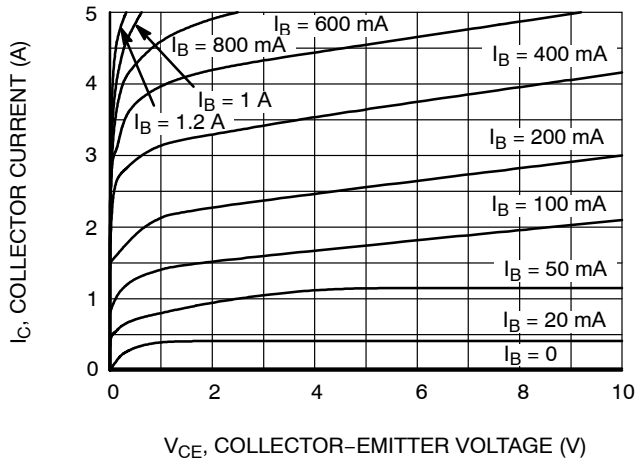


Figure 1. Static Characteristic

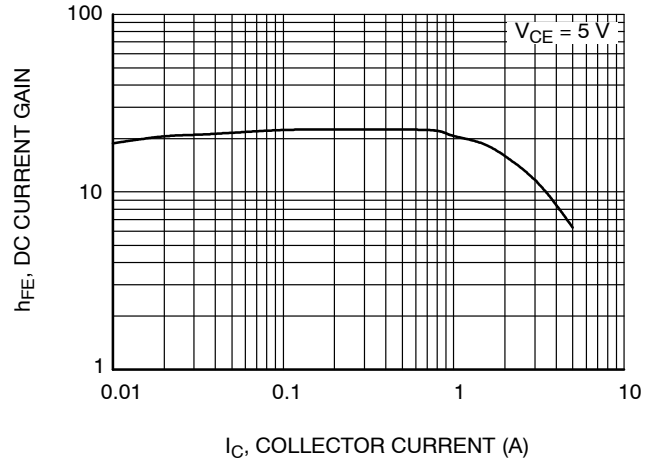


Figure 2. DC Current Gain

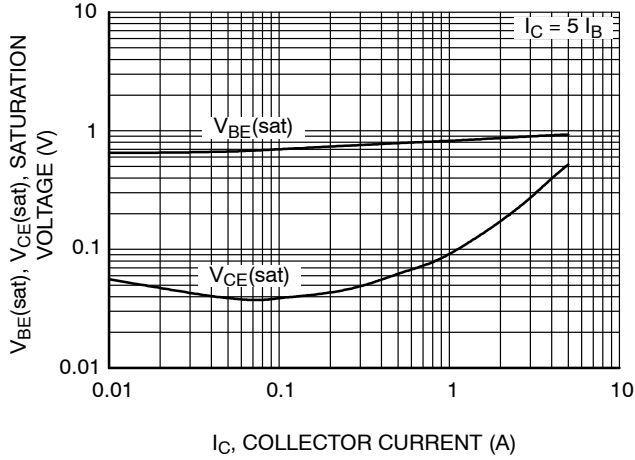
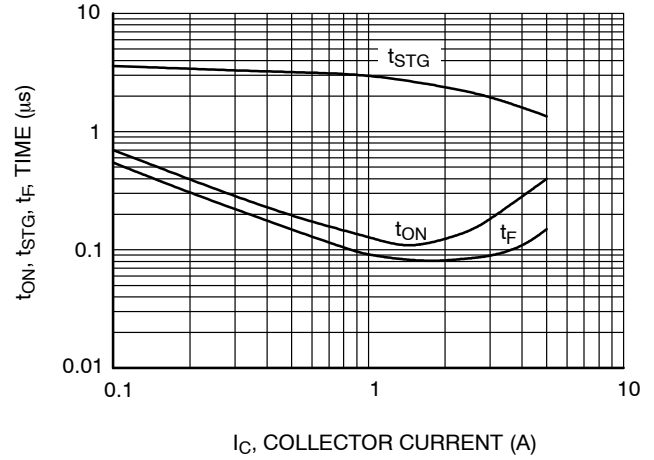
Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

Figure 4. Switching Time

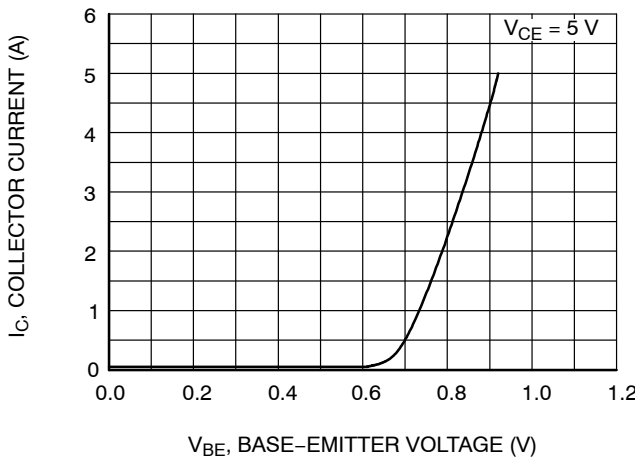


Figure 5. Base-Emitter On Voltage

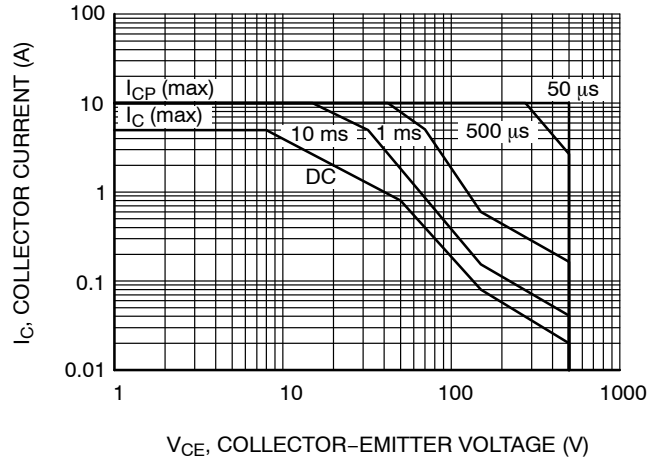


Figure 6. Forward Bias Safe Operating Area

TYPICAL CHARACTERISTICS (continued)

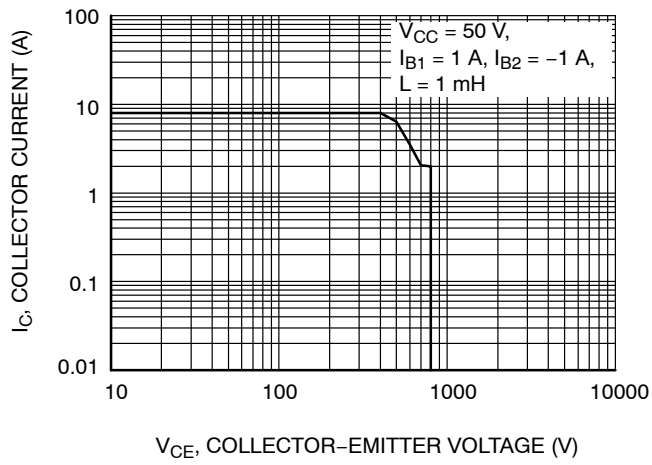


Figure 7. Reverse Bias Safe Operating Area

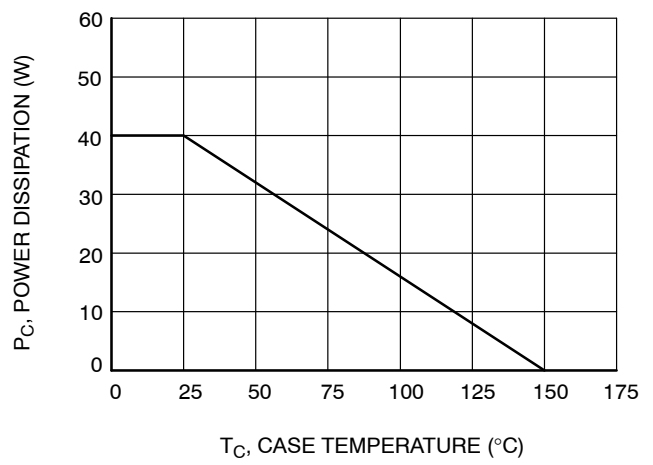
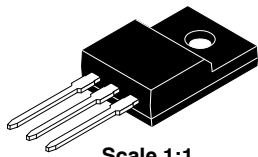


Figure 8. Power Derating

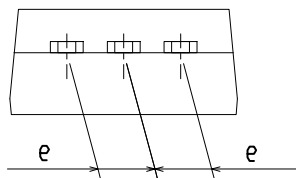
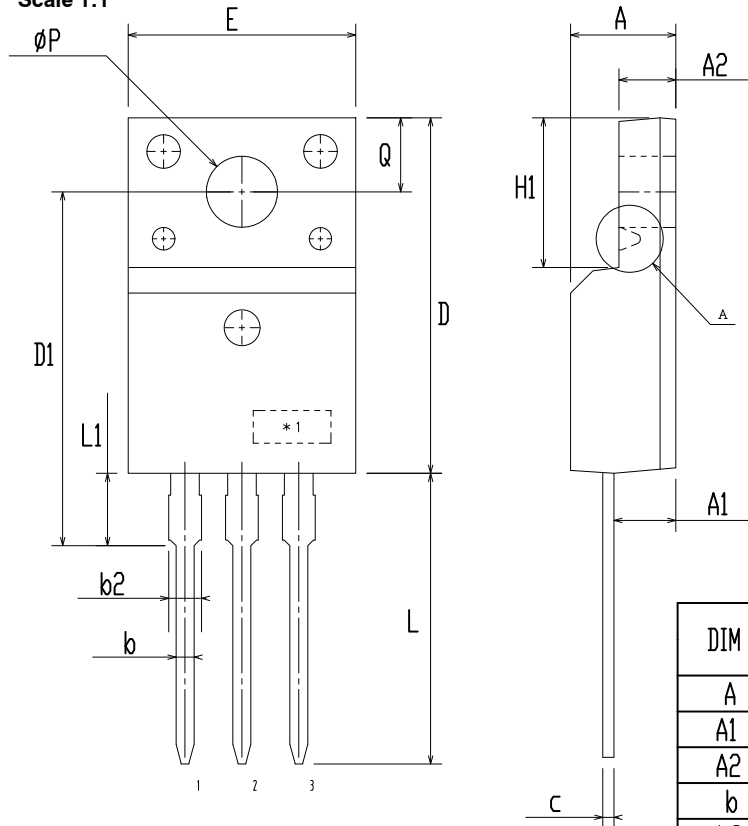
### TO-220 Fullpack, 3-Lead / TO-220F-3SG

CASE 221AT  
ISSUE B

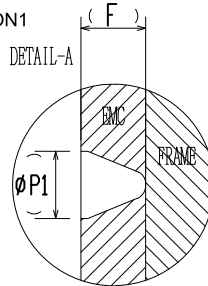
DATE 19 JAN 2021



Scale 1:1



OPTION1



| DIM  | MILLIMETERS |       |       |
|------|-------------|-------|-------|
|      | MIN         | NOM   | MAX   |
| A    | 4.50        | 4.70  | 4.90  |
| A1   | 2.56        | 2.76  | 2.96  |
| A2   | 2.34        | 2.54  | 2.74  |
| b    | 0.70        | 0.80  | 0.90  |
| b2   | ~           | ~     | 1.47  |
| c    | 0.45        | 0.50  | 0.60  |
| D    | 15.67       | 15.87 | 16.07 |
| D1   | 15.60       | 15.80 | 16.00 |
| E    | 9.96        | 10.16 | 10.36 |
| e    | 2.34        | 2.54  | 2.74  |
| F    | ~           | 0.84  | ~     |
| H1   | 6.48        | 6.68  | 6.88  |
| L    | 12.78       | 12.98 | 13.18 |
| L1   | 3.03        | 3.23  | 3.43  |
| Ø P  | 2.98        | 3.18  | 3.38  |
| Ø P1 | ~           | 1.00  | ~     |
| Q    | 3.20        | 3.30  | 3.40  |

#### NOTES:

- DIMENSION AND TOLERANCE AS ASME Y14.5-2009
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCTIONS.
- OPTION 1 - WITH SUPPORT PIN HOLE  
OPTION 2 - NO SUPPORT PIN HOLE

|                  |                                       |   |
|------------------|---------------------------------------|---|
| DOCUMENT NUMBER: | 98AON67439E                           | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | TO-220 FULLPACK, 3-LEAD / TO-220F-3SG | PAGE 1 OF 1   |

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)