

### F7805A-VB Datasheet

# N-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY     |                                  |                                 |                       |  |  |  |
|---------------------|----------------------------------|---------------------------------|-----------------------|--|--|--|
| V <sub>DS</sub> (V) | $R_{DS(on)}$ ( $\Omega$ )        | I <sub>D</sub> (A) <sup>a</sup> | Q <sub>g</sub> (Typ.) |  |  |  |
| 30                  | 0.008 at V <sub>GS</sub> = 10 V  | 13                              | 6.1 nC                |  |  |  |
|                     | 0.011 at V <sub>GS</sub> = 4.5 V | 11                              | 0.1110                |  |  |  |

**SO-8** 

#### **FEATURES**

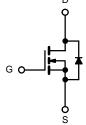
- · Halogen-free
- Trench Power MOSFET



- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested

#### **APPLICATIONS**

- Notebook CPU Core
  - High-Side Switch



3.7

2.0<sup>b, c</sup>

20

21

4.1

2.5

1.3<sup>b, c</sup>

- 55 to 150

2.2<sup>b, c</sup>

N-Channel MOSFET

Unit V

Α

mJ

W

°C

| Top View  |  |                   |                   |
|---|--|-------------------|-------------------|
|   |  |                   | N-C               |
| ABSOLUTE MAXIMUM RATINGS                            | <b>S</b> T <sub>A</sub> = 25 °C, unles | s otherwise noted |                   |
| Parameter   |  | Symbol            | Limit             |
| Drain-Source Voltage                                |  | V <sub>DS</sub>   | 30                |
| Gate-Source Voltage                                 |  | $V_{GS}$          | ± 20              |
|   | T <sub>C</sub> = 25 °C                 |                   | 13                |
| Continuous Drain Current (T <sub>.1</sub> = 150 °C) | T <sub>C</sub> = 70 °C                 | I_                | 10                |
| Continuous Diain Current (1) = 130 C)               | T <sub>A</sub> = 25 °C                 | ID                | 9 <sup>b, c</sup> |
|   | T <sub>A</sub> = 70 °C                 |                   | 7 <sup>b, c</sup> |
| Pulsed Drain Current                                |  | I <sub>DM</sub>   | 45                |

T<sub>C</sub> = 25 °C

T<sub>A</sub> = 25 °C

L = 0.1 mH

T<sub>C</sub> = 25 °C

T<sub>C</sub> = 70 °C

T<sub>A</sub> = 25 °C

T<sub>A</sub> = 70 °C

 $I_S$ 

I<sub>AS</sub>

E<sub>AS</sub>

 $P_{\mathsf{D}}$ 

T<sub>J</sub>, T<sub>stg</sub>

| THERMAL RESISTANCE RATINGS                  |              |                    |         |         |        |  |  |
|---|--------------|--------------------|---------|---------|--------|--|--|
| Parameter                                   |              | Symbol             | Typical | Maximum | Unit   |  |  |
| Maximum Junction-to-Ambient <sup>b, d</sup> | t ≤ 10 s     | $R_{thJA}$         | 39      | 55      | °C/W   |  |  |
| Maximum Junction-to-Foot (Drain)            | Steady State | R <sub>th,IF</sub> | 25      | 29      | - C/VV |  |  |

#### Notes:

- a. Base on  $T_C$  = 25 °C.
- b. Surface Mounted on 1" x 1" FR4 board.

Continuous Source-Drain Diode Current

Single Pulse Avalanche Current

Maximum Power Dissipation

Avalanche Energy

- c. t = 10 s.
- d. Maximum under Steady State conditions is 85 °C/W.

Operating Junction and Storage Temperature Range

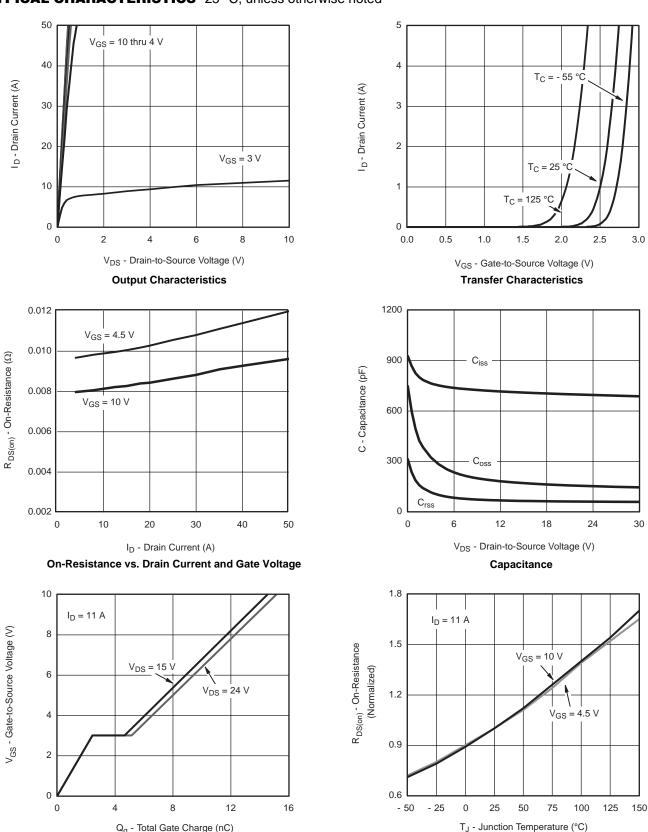


| <b>SPECIFICATIONS</b> $T_J = 25  ^{\circ}\text{C}$ Parameter | Symbol                  | Test Conditions   | Min.                       | Typ.  | Max.  | Unit  |  |
|--|-------------------------|---|----------------------------|-------|-------|-------|--|
| Static   |                         |   |                            | .,,,, |       |       |  |
| Drain-Source Breakdown Voltage                               | V <sub>DS</sub>         | $V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$                       | 30                         |       |       | V     |  |
| V <sub>DS</sub> Temperature Coefficient                      | $\Delta V_{DS}/T_{J}$   |   |                            | 26    |       | mV/°C |  |
| V <sub>GS(th)</sub> Temperature Coefficient                  | $\Delta V_{GS(th)}/T_J$ | I <sub>D</sub> = 250 μA   |                            | - 6   |       |       |  |
| Gate-Source Threshold Voltage                                | V <sub>GS(th)</sub>     | $V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$                            | 1.0                        |       | 3.0   | V     |  |
| Gate-Source Leakage  | I <sub>GSS</sub>        | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$                     |                            |       | ± 100 | nA    |  |
|  |                         | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                         | ) V, V <sub>GS</sub> = 0 V |       | 1     | μА    |  |
| Zero Gate Voltage Drain Current                              | I <sub>DSS</sub>        | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C |                            |       | 10    |       |  |
| On-State Drain Current <sup>a</sup>                          | I <sub>D(on)</sub>      | $V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$                       | 20                         |       |       | Α     |  |
|  |                         | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A                         |                            | 0.008 |       | Ω     |  |
| Drain-Source On-State Resistance <sup>a</sup>                | R <sub>DS(on)</sub>     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 9 A                         |                            | 0.011 |       |       |  |
| Forward Transconductance <sup>a</sup>                        | 9 <sub>fs</sub>         | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A                         |                            | 50    |       | S     |  |
| Dynamic <sup>b</sup>   |                         |   |                            | L     |       | ı     |  |
| Input Capacitance  | C <sub>iss</sub>        |   |                            | 800   |       | pF    |  |
| Output Capacitance   | C <sub>oss</sub>        | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$      |                            | 165   |       |       |  |
| Reverse Transfer Capacitance                                 | C <sub>rss</sub>        |   |                            | 73    |       |       |  |
| Total Cata Charma  | Qg                      | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A |                            | 15    | 23    | nC    |  |
| Total Gate Charge  |                         |   |                            | 6.8   | 10.2  |       |  |
| Gate-Source Charge   | Q <sub>gs</sub>         | $V_{DS} = 15 \text{ V}, V_{GS} = 5 \text{ V}, I_{D} = 10 \text{ A}$   |                            | 2.5   |       |       |  |
| Gate-Drain Charge  | $Q_{gd}$                |   |                            | 2.3   |       |       |  |
| Gate Resistance  | $R_g$                   | f = 1 MHz   | 0.36                       | 1.8   | 3.6   | Ω     |  |
| Turn-On Delay Time   | t <sub>d(on)</sub>      |   |                            | 16    | 23    |       |  |
| Rise Time  | t <sub>r</sub>          | $V_{DD}$ = 15 V, $R_L$ = 1.4 $\Omega$                                 |                            | 12    | 16    |       |  |
| Turn-Off Delay Time  | t <sub>d(off)</sub>     | $I_D \cong 9 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$      |                            | 16    | 22    |       |  |
| Fall Time  | t <sub>f</sub>          |   |                            | 10    | 18    | ]     |  |
| Turn-On Delay Time   | t <sub>d(on)</sub>      |   |                            | 8     | 16    | ns    |  |
| Rise Time  | t <sub>r</sub>          | $V_{DD}$ = 15 V, $R_L$ = 1.4 $\Omega$                                 |                            | 10    | 20    |       |  |
| Turn-Off Delay Time  | t <sub>d(off)</sub>     | $I_D \cong 9 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$       |                            | 16    | 22    |       |  |
| Fall Time  | t <sub>f</sub>          |   |                            | 8     | 15    |       |  |
| Drain-Source Body Diode Characterist                         | ics                     |   |                            |       |       |       |  |
| Continuous Source-Drain Diode Current                        | I <sub>S</sub>          | T <sub>C</sub> = 25 °C  |                            |       | 10    |       |  |
| Pulse Diode Forward Current <sup>a</sup>                     | I <sub>SM</sub>         |   |                            |       | 50    | A     |  |
| Body Diode Voltage   | $V_{SD}$                | I <sub>S</sub> = 9 A  |                            | 0.8   | 1.2   | V     |  |
| Body Diode Reverse Recovery Time                             | t <sub>rr</sub>         |   |                            | 15    | 30    | ns    |  |
| Body Diode Reverse Recovery Charge                           | Q <sub>rr</sub>         | I <sub>F</sub> = 9 A, dI/dt = 100 A/μs, T <sub>.I</sub> = 25 °C       |                            | 6     | 12    | nC    |  |
| Reverse Recovery Fall Time                                   | t <sub>a</sub>          | i <sub>F</sub> = θ A, αί/αι = 100 A/μs, 1 <sub>J</sub> = 25 °C        |                            | 8     |       | ns    |  |
| Reverse Recovery Rise Time                                   | t <sub>b</sub>          |   |                            | 7     |       |       |  |

- a. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 %. b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.





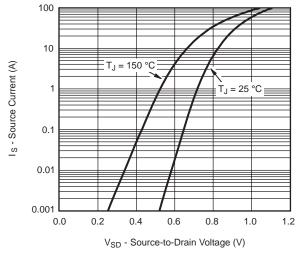
服务热线:400-655-8788

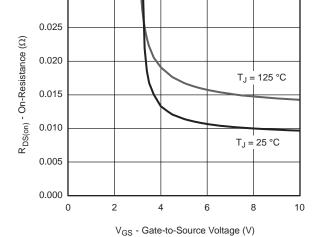
Q<sub>q</sub> - Total Gate Charge (nC)

**Gate Charge** 

On-Resistance vs. Junction Temperature

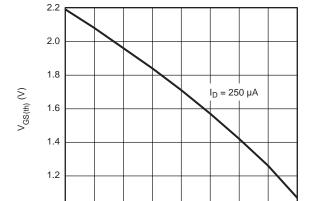






0.030

#### Source-Drain Diode Forward Voltage



1.0

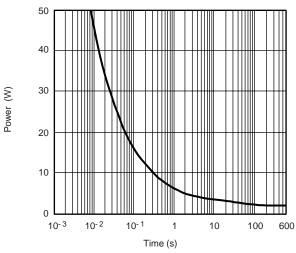
- 50

- 25

0

25

On-Resistance vs. Gate-to-Source Voltage



#### T<sub>J</sub> - Temperature (°C) **Threshold Voltage**

50

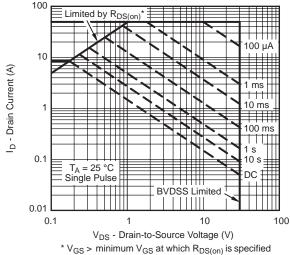
75

100

125

150

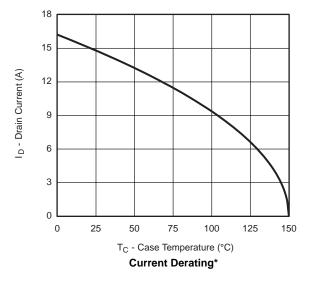
Single Pulse Power, Junction-to-Ambient



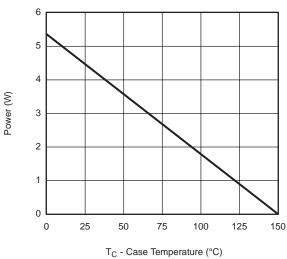
\*  $V_{GS} > \mbox{minimum } V_{GS}$  at which  $R_{DS(on)}$  is specified

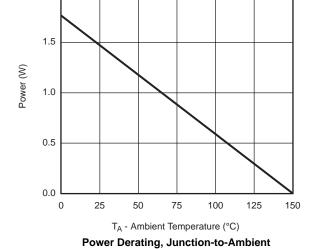
Safe Operating Area, Junction-to-Ambient





2.0

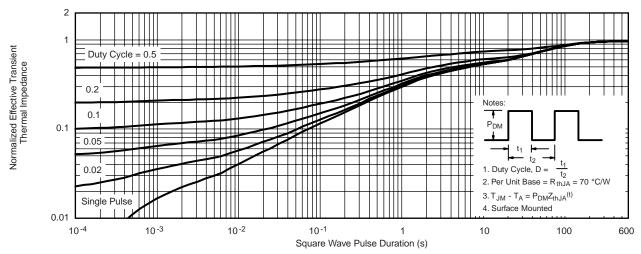




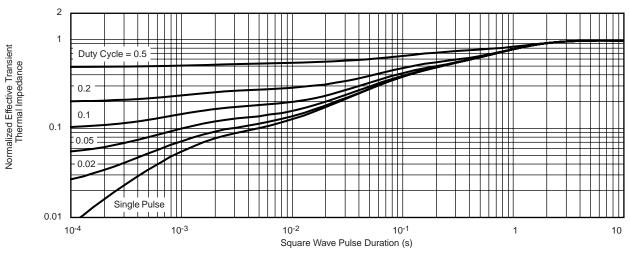
Power Derating, Junction-to-Foot

\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





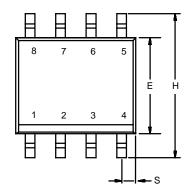
Normalized Thermal Transient Impedance, Junction-to-Ambient

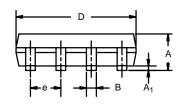


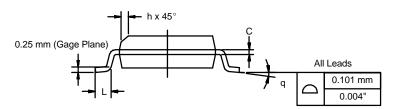
Normalized Thermal Transient Impedance, Junction-to-Foot



## SOIC (NARROW): 8-LEAD







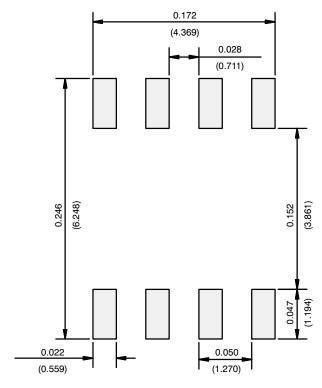
|                              | MILLIMETERS |      | INC       | HES   |  |
|------------------------------|-------------|------|-----------|-------|--|
| DIM                          | Min         | Max  | Min       | Max   |  |
| Α                            | 1.35        | 1.75 | 0.053     | 0.069 |  |
| A <sub>1</sub>               | 0.10        | 0.20 | 0.004     | 0.008 |  |
| В                            | 0.35        | 0.51 | 0.014     | 0.020 |  |
| С                            | 0.19        | 0.25 | 0.0075    | 0.010 |  |
| D                            | 4.80        | 5.00 | 0.189     | 0.196 |  |
| Е                            | 3.80        | 4.00 | 0.150     | 0.157 |  |
| е                            | 1.27 BSC    |      | 0.050 BSC |       |  |
| Н                            | 5.80        | 6.20 | 0.228     | 0.244 |  |
| h                            | 0.25        | 0.50 | 0.010     | 0.020 |  |
| L                            | 0.50        | 0.93 | 0.020     | 0.037 |  |
| q                            | 0°          | 8°   | 0°        | 8°    |  |
| S                            | 0.44        | 0.64 | 0.018     | 0.026 |  |
| FCN: C-06527-Rev   11-Sen-06 |             |      |           |       |  |

ECN: C-06527-Rev. I, 11-Sep-06

DWG: 5498



#### **RECOMMENDED MINIMUM PADS FOR SO-8**



Recommended Minimum Pads Dimensions in Inches/(mm)



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