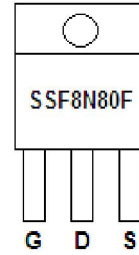


### Main Product Characteristics

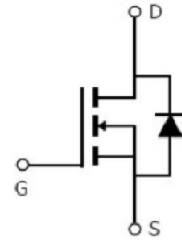
|              |                     |
|--------------|---------------------|
| $V_{DSS}$    | 800V                |
| $R_{DS(on)}$ | 1.3 $\Omega$ (typ.) |
| $I_D$        | 8A                  |



TO220F



Marking and Pin Assignment



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature
- Lead free product



### Description

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

### Absolute Max Rating

| Symbol                   | Parameter  | Max.        | Units |
|--------------------------|--|-------------|-------|
| $I_D @ TC = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$ ①       | 8           | A     |
| $I_D @ TC = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ ①       | 5.1         |       |
| $I_{DM}$                 | Pulsed Drain Current②                            | 32          |       |
| $P_D @ TC = 25^\circ C$  | Power Dissipation③                               | 59          | W     |
|                          | Linear Derating Factor                           | 0.48        | W/°C  |
| $V_{DS}$                 | Drain-Source Voltage                             | 800         | V     |
| $V_{GS}$                 | Gate-to-Source Voltage                           | $\pm 30$    | V     |
| $E_{AS}$                 | Single Pulse Avalanche Energy @ L=25mH           | 760         | mJ    |
| $I_{AS}$                 | Avalanche Current @ L=25mH                       | 7.8         | A     |
| $T_J$ $T_{STG}$          | Operating Junction and Storage Temperature Range | -55 to +150 | °C    |

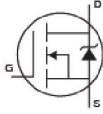
### Thermal Resistance

| Symbol          | Characteristics                                   | Typ. | Max. | Units         |
|-----------------|---|------|------|---------------|
| $R_{\theta JC}$ | Junction-to-case <sup>③</sup>                     | —    | 2.1  | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Junction-to-ambient ( $t \leq 10s$ ) <sup>④</sup> | —    | 62.5 | $^{\circ}C/W$ |

### Electrical Characteristics @ $T_A=25^{\circ}C$ unless otherwise specified

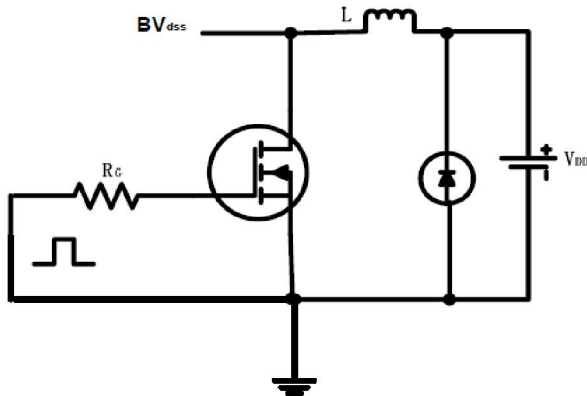
| Symbol        | Parameter                            | Min. | Typ. | Max. | Units    | Conditions   |
|---------------|--------------------------------------|------|------|------|----------|--|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage    | 800  | —    | —    | V        | $V_{GS} = 0V, I_D = 250\mu A$  |
| $R_{DS(on)}$  | Static Drain-to-Source on-resistance | —    | 1.3  | 1.55 | $\Omega$ | $V_{GS}=10V, I_D = 3.5A$   |
|               |                                      | —    | 3.07 | —    |          | $T_J = 125^{\circ}C$   |
| $V_{GS(th)}$  | Gate threshold voltage               | 2    | —    | 4    | V        | $V_{DS} = V_{GS}, I_D = 250\mu A$  |
|               |                                      | —    | 1.93 | —    |          | $T_J = 125^{\circ}C$   |
| $I_{DSS}$     | Drain-to-Source leakage current      | —    | —    | 1    | $\mu A$  | $V_{DS} = 800V, V_{GS} = 0V$   |
|               |                                      | —    | —    | 50   |          | $T_J = 125^{\circ}C$   |
| $I_{GSS}$     | Gate-to-Source forward leakage       | —    | —    | 100  | nA       | $V_{GS} = 30V$   |
|               |                                      | —    | —    | -100 |          | $V_{GS} = -30V$  |
| $Q_g$         | Total gate charge                    | —    | 24   | —    | nC       | $I_D = 8A,$<br>$V_{DS} = 400V,$<br>$V_{GS} = 10V$                          |
| $Q_{gs}$      | Gate-to-Source charge                | —    | 7.2  | —    |          |  |
| $Q_{gd}$      | Gate-to-Drain("Miller") charge       | —    | 9.7  | —    |          |  |
| $t_{d(on)}$   | Turn-on delay time                   | —    | 20   | —    | ns       | $V_{GS}=10V, V_{DS}=400V,$<br>$R_L=50\Omega, R_{GEN}=25\Omega$<br>$I_D=8A$ |
| $t_r$         | Rise time                            | —    | 37   | —    |          |  |
| $t_{d(off)}$  | Turn-Off delay time                  | —    | 59   | —    |          |  |
| $t_f$         | Fall time                            | —    | 36   | —    |          |  |
| $C_{iss}$     | Input capacitance                    | —    | 1106 | —    | pF       | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1MHz$                              |
| $C_{oss}$     | Output capacitance                   | —    | 121  | —    |          |  |
| $C_{rss}$     | Reverse transfer capacitance         | —    | 5.2  | —    |          |  |

### Source-Drain Ratings and Characteristics

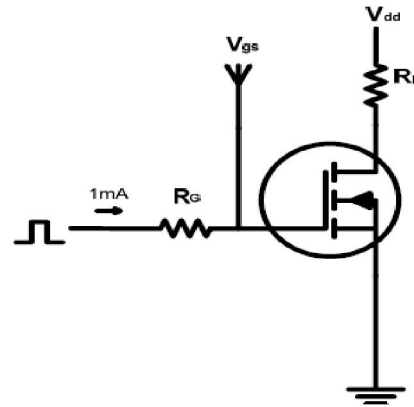
| Symbol   | Parameter                                 | Min. | Typ. | Max. | Units | Conditions   |
|----------|---|------|------|------|-------|--|
| $I_S$    | Continuous Source Current<br>(Body Diode) | —    | —    | 8    | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current<br>(Body Diode)     | —    | —    | 32   | A     |  |
| $V_{SD}$ | Diode Forward Voltage                     | —    | 0.74 | 1.4  | V     | $I_S=7A, V_{GS}=0V$  |
| $t_{rr}$ | Reverse Recovery Time                     | —    | 968  | —    | ns    | $T_J = 25^{\circ}C, I_F = 8A, di/dt = 100A/\mu s$  |
| $Q_{rr}$ | Reverse Recovery Charge                   | —    | 5456 | —    | nC    |  |

## Test Circuits and Waveforms

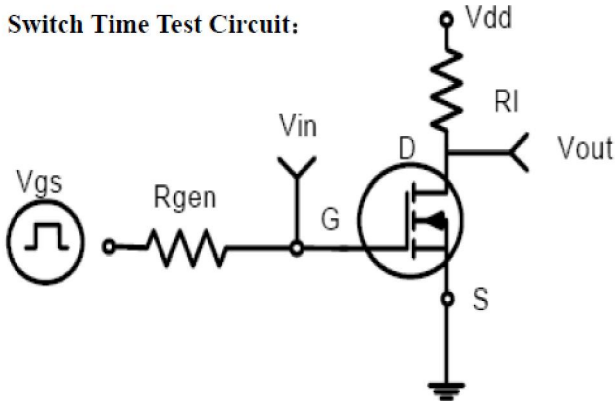
EAS test circuits:



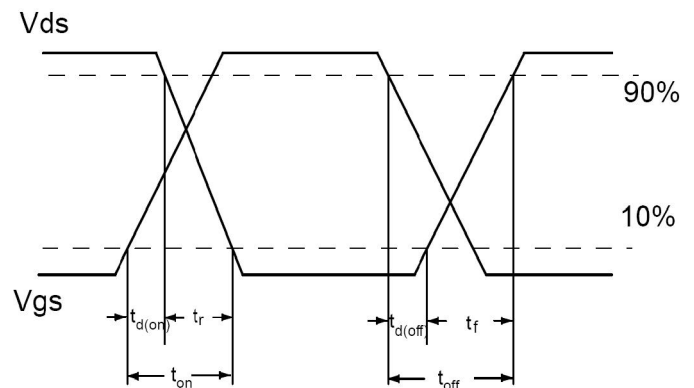
Gate charge test circuit:



Switch Time Test Circuit:



Waveforms:



### Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of  $R_{\theta JA}$  is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ C$

## Typical Electrical and Thermal Characteristics

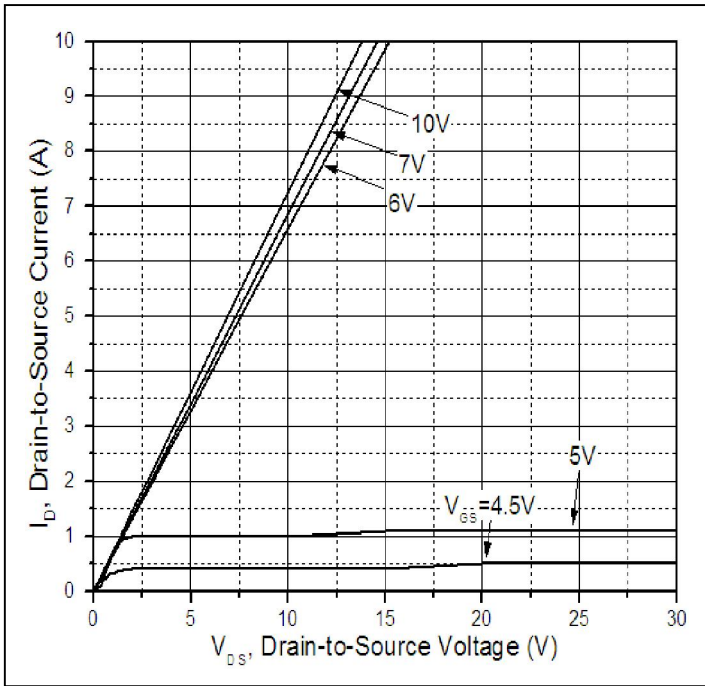


Figure 1: Typical Output Characteristics

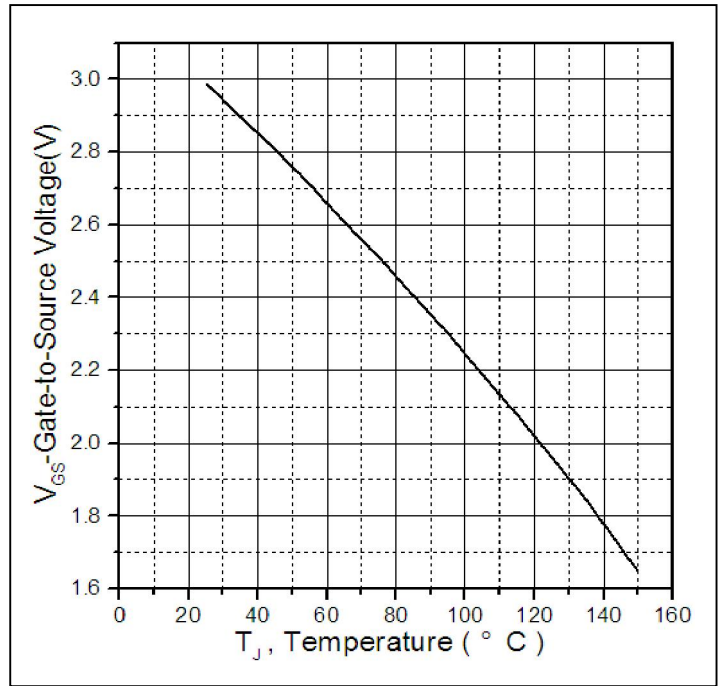


Figure 2: Gate to source cut-off voltage

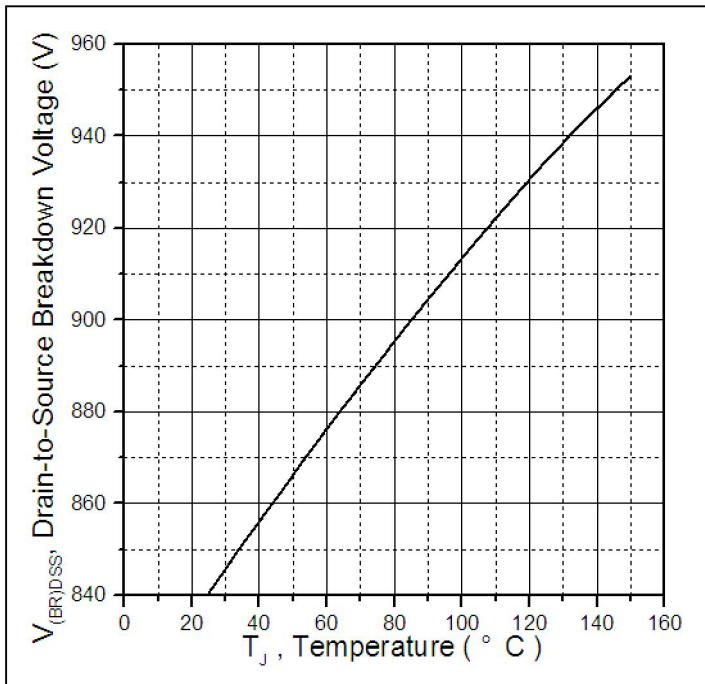


Figure 3: Drain-to-Source Breakdown Voltage Vs. Case Temperature

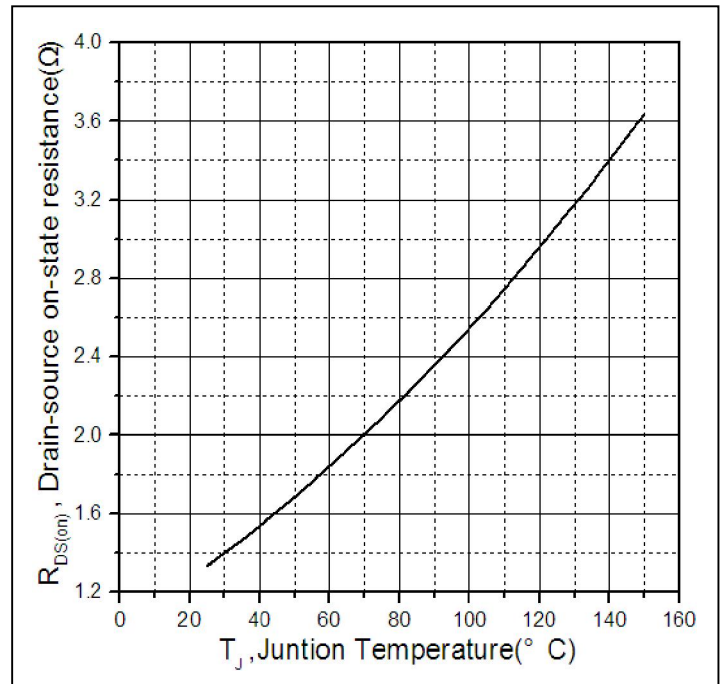


Figure 4: Normalized On-Resistance Vs. Case Temperature

## Typical Electrical and Thermal Characteristics

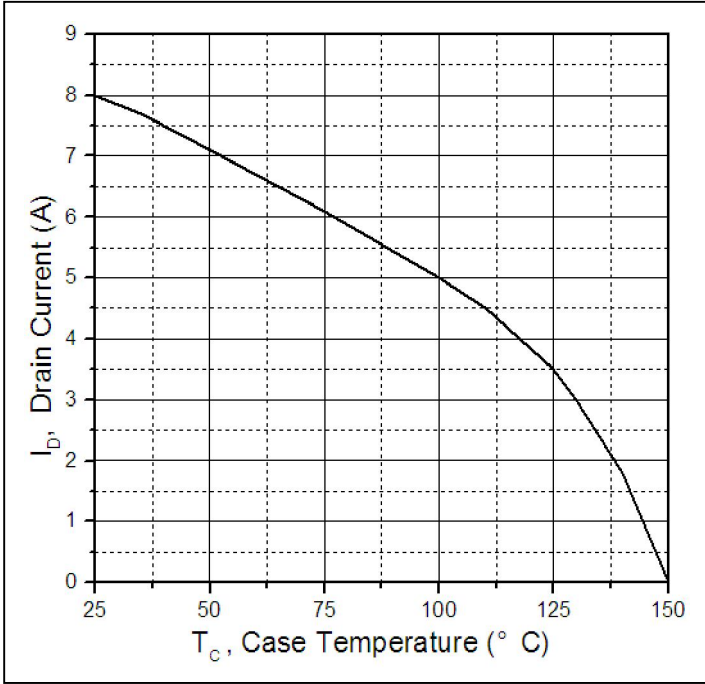


Figure 5. Maximum Drain Current Vs. Case Temperature

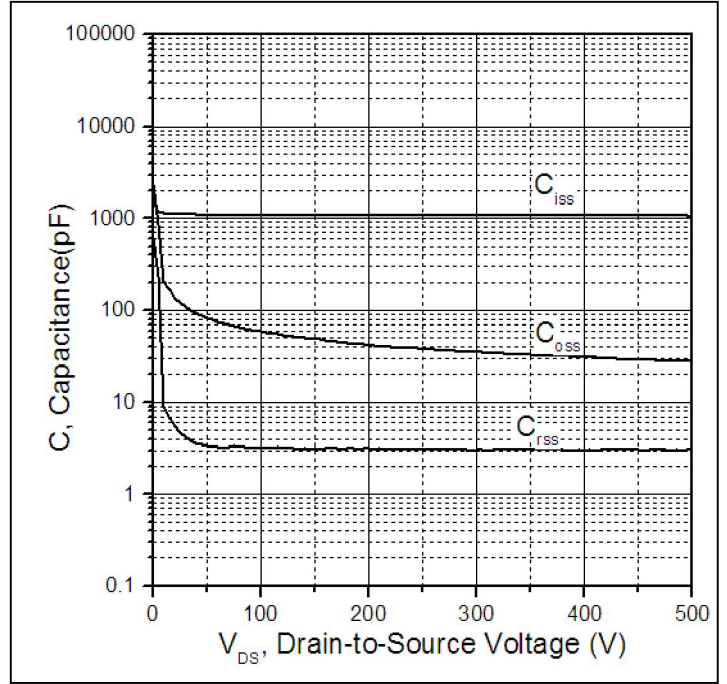


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

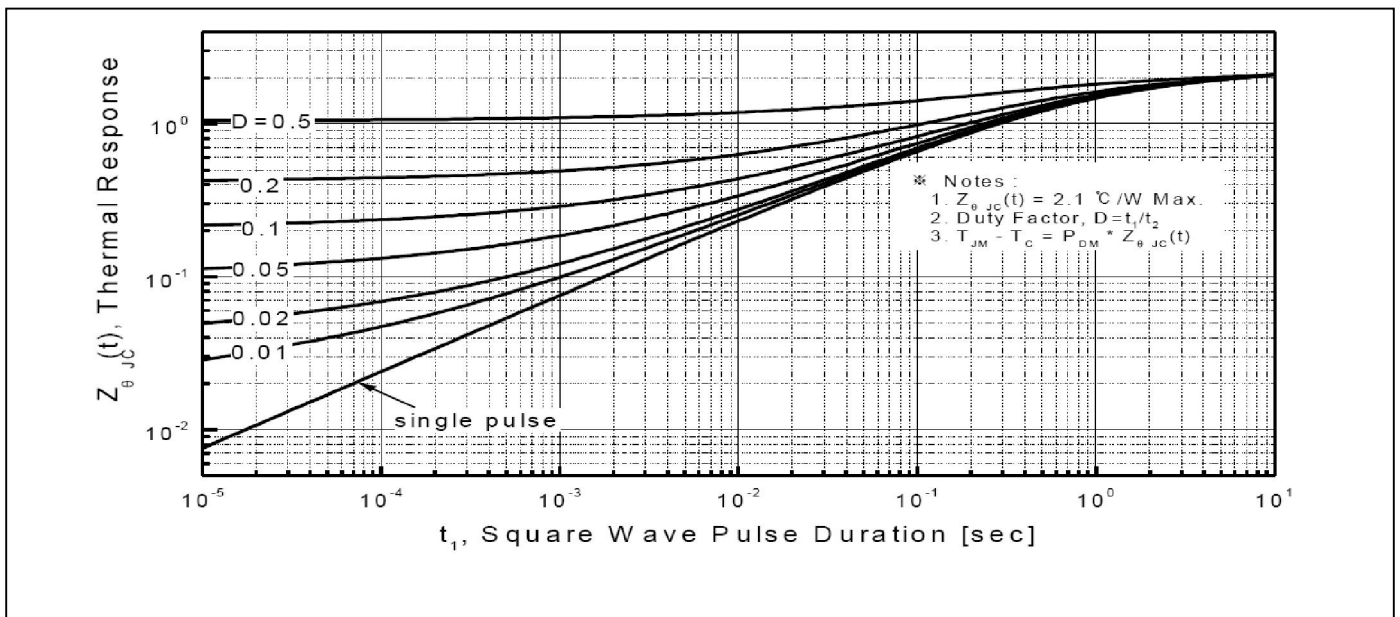
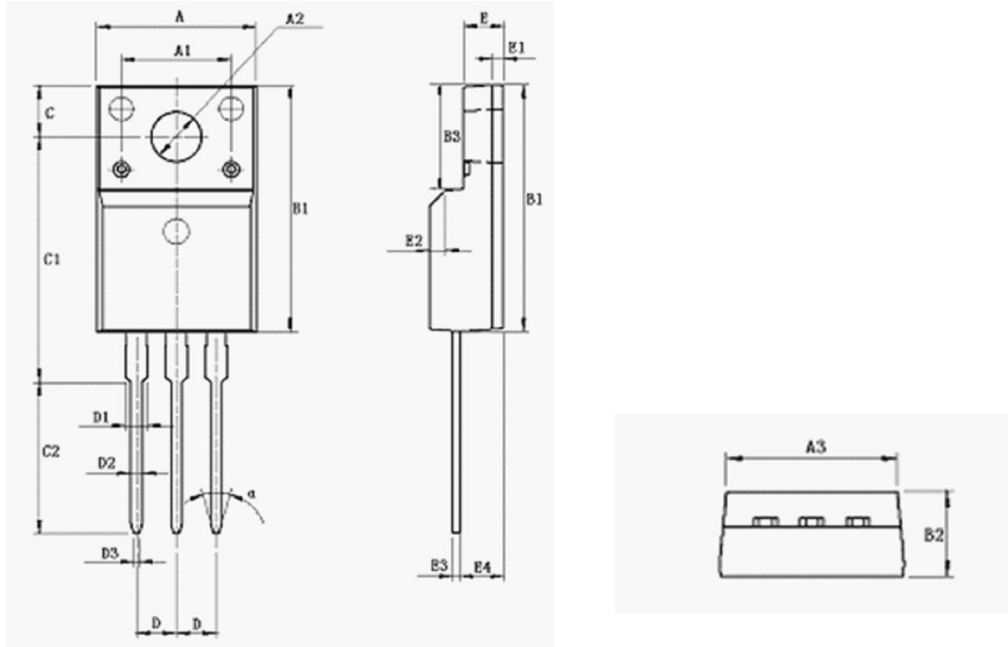


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Mechanical Data

TO220F PACKAGE OUTLINE DIMENSION



| Symbol | Dimension In Millimeters |        |        | Dimension In Inches |       |       |
|--------|--------------------------|--------|--------|---------------------|-------|-------|
|        | Min                      | Nom    | Max    | Min                 | Nom   | Max   |
| A      | 9.960                    | 10.160 | 10.360 | 0.392               | 0.400 | 0.408 |
| A1     |                          | 7.000  |        | 0.276               | 0.000 | 0.000 |
| A2     | 3.080                    | 3.180  | 3.280  | 0.121               | 0.125 | 0.129 |
| A3     | 9.260                    | 9.460  | 9.660  | 0.365               | 0.372 | 0.380 |
| B1     | 15.670                   | 15.870 | 16.070 | 0.617               | 0.625 | 0.633 |
| B2     | 4.500                    | 4.700  | 4.900  | 0.177               | 0.185 | 0.193 |
| B3     | 6.480                    | 6.680  | 6.880  | 0.255               | 0.263 | 0.271 |
| C      | 3.200                    | 3.300  | 3.400  | 0.126               | 0.130 | 0.134 |
| C1     | 15.600                   | 15.800 | 16.000 | 0.614               | 0.622 | 0.630 |
| C2     | 9.550                    | 9.750  | 9.950  | 0.376               | 0.384 | 0.392 |
| D      | 2.54 (TYP)               |        |        | 1.00 (TYP)          |       |       |
| D1     | -                        | -      | 1.470  | -                   | -     | 0.058 |
| D2     | 0.700                    | 0.800  | 0.900  | 0.028               | 0.031 | 0.035 |
| D3     | 0.250                    | 0.350  | 0.450  | 0.010               | 0.014 | 0.018 |
| E      | 2.340                    | 2.540  | 2.740  | 0.092               | 0.100 | 0.108 |
| E1     | 0.700                    |        |        | 0.028               |       |       |
| E2     | 1.0°45°                  |        |        | 1.0°45°             |       |       |
| E3     | 0.450                    | 0.500  | 0.600  | 0.018               | 0.020 | 0.024 |
| E4     | 2.560                    | 2.760  | 2.960  | 0.101               | 0.109 | 0.117 |
| □      | 30°                      |        |        | 30°                 |       |       |



## Ordering and Marking Information

### Device Marking: SSF8N80F

Package (Available)  
TO220F  
Operating Temperature Range  
C : -55 to 150 °C

## Devices per Unit

| Package Type | Units/Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|--------------|------------|-----------------|-----------------|------------------------|------------------|
| TO220F       | 50         | 20              | 1000            | 6                      | 6000             |

## Reliability Test Program

| Test Item                           | Conditions  | Duration                             | Sample Size         |
|-------------------------------------|---|--------------------------------------|---------------------|
| High Temperature Reverse Bias(HTRB) | $T_j=125^{\circ}\text{C}$ to $150^{\circ}\text{C}$ @ 80% of Max $V_{DSS}/V_{CES}/V_R$ | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |
| High Temperature Gate Bias(HTGB)    | $T_j=150^{\circ}\text{C}$ @ 100% of Max $V_{GSS}$                                     | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |