

## TO-220F Plastic-Encapsulate Transistors

### 2SD2137 TRANSISTOR (NPN)

#### FEATURES

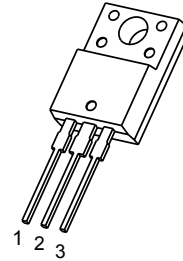
- High Forward Current Transfer Ratio  $h_{FE}$  which Has Satisfactory Linearity
- Low Collector to Emitter Saturation Voltage  $V_{CE(sat)}$
- Allowing Supply with the Radial Taping

#### MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

| Symbol    | Parameter                     | Value   | Unit             |
|-----------|-------------------------------|---------|------------------|
| $V_{CBO}$ | Collector-Base Voltage        | 60      | V                |
| $V_{CEO}$ | Collector-Emitter Voltage     | 60      | V                |
| $V_{EBO}$ | Emitter-Base Voltage          | 6       | V                |
| $I_C$     | Collector Current -Continuous | 3       | A                |
| $P_C$     | Collector Power Dissipation   | 2       | W                |
| $T_J$     | Junction Temperature          | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature           | -55-150 | $^\circ\text{C}$ |

#### TO-220F

1. BASE
2. COLLECTOR
3. EMITTER



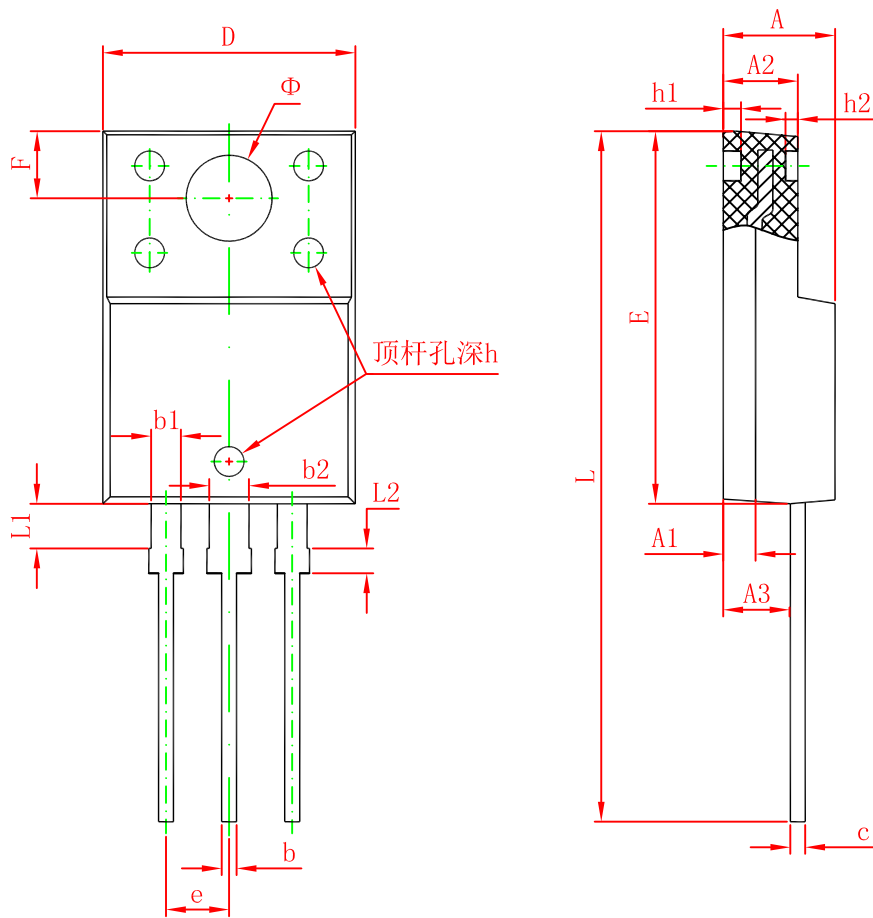
#### ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test conditions                                     | Min  | Typ | Max | Unit          |
|--------------------------------------|---------------|---|--|-----|-----|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C=0.1\text{mA}, I_E=0$                           | 60   |     |     | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C=30\text{mA}, I_B=0$                            | 60   |     |     | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E=0.1\text{mA}, I_C=0$                           | 6  |     |     | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB}=60\text{V}, I_E=0$                          |  |     | 100 | $\mu\text{A}$ |
| Collector cut-off current            | $I_{CEO}$     | $V_{CE}=30\text{V}, I_B=0$                          |  |     | 100 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB}=6\text{V}, I_C=0$                           |  |     | 100 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE(1)}$   | $V_{CE}=4\text{V}, I_C=1\text{A}$                   | 70   |     | 320 |               |
|                                      | $h_{FE(2)}$   | $V_{CE}=4\text{V}, I_C=3\text{A}$                   | 10   |     |     |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C=3\text{A}, I_B=375\text{mA}$                   |  |     | 1.2 | V             |
| Base-emitter voltage                 | $V_{BE}$      | $V_{CE}=4\text{V}, I_C=3\text{A}$                   |  |     | 1.8 | V             |
| Transition frequency                 | $f_T$         | $V_{CE}=5\text{V}, I_C=0.2\text{A}, f=10\text{MHz}$ |  | 30  |     | MHz           |
| Switch time                          | Turn-on time  | $t_{on}$  |  | 0.3 |     | $\mu\text{s}$ |
|                                      | Storage time  | $t_{stg}$   | $V_{CC}=50\text{V}, I_C=1\text{A}, I_{B1}=-I_{B2}=0.1\text{A}$ | 2.5 |     | $\mu\text{s}$ |
|                                      | Fall time     | $t_f$   |  | 0.2 |     | $\mu\text{s}$ |

#### CLASSIFICATION OF $h_{FE(1)}$

| Rank  | Q      | P       | O       |
|-------|--------|---------|---------|
| Range | 70-150 | 120-250 | 160-320 |

# TO-220F Package Outline Dimensions



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.300                     | 4.700  | 0.169                | 0.185 |
| A1     | 1.300 REF.                |        | 0.051 REF.           |       |
| A2     | 2.800                     | 3.200  | 0.110                | 0.126 |
| A3     | 2.500                     | 2.900  | 0.098                | 0.114 |
| b      | 0.500                     | 0.750  | 0.020                | 0.030 |
| b1     | 1.100                     | 1.350  | 0.043                | 0.053 |
| b2     | 1.500                     | 1.750  | 0.059                | 0.069 |
| c      | 0.500                     | 0.750  | 0.020                | 0.030 |
| D      | 9.960                     | 10.360 | 0.392                | 0.408 |
| E      | 14.800                    | 15.200 | 0.583                | 0.598 |
| e      | 2.540 TYP.                |        | 0.100 TYP.           |       |
| F      | 2.700 REF.                |        | 0.106 REF.           |       |
| Φ      | 3.500 REF.                |        | 0.138 REF.           |       |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| h1     | 0.800 REF.                |        | 0.031 REF.           |       |
| h2     | 0.500 REF.                |        | 0.020 REF.           |       |
| L      | 28.000                    | 28.400 | 1.102                | 1.118 |
| L1     | 1.700                     | 1.900  | 0.067                | 0.075 |
| L2     | 0.900                     | 1.100  | 0.035                | 0.043 |