

## TO-92 Plastic-Encapsulate Transistors

### S9014 TRANSISTOR (NPN)

#### FEATURES

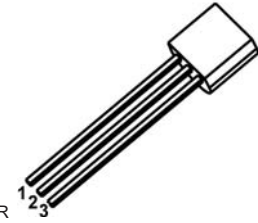
- High Total Power Dissipation. ( $P_C=0.45W$ )
- High  $h_{FE}$  and Good Linearity
- Complementary to S9015

#### TO-92

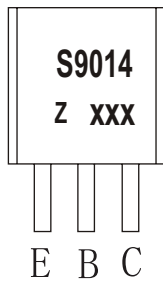
1. EMITTER

2. BASE

3. COLLECTOR



#### MARKING



S9014=Device code

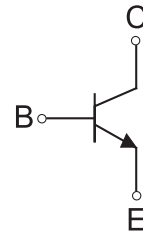
Z=Rank of  $h_{FE}$

XXX=Code

GXX=Green molding compound device

CXX=Normal molding compound device

#### Equivalent Circuit



#### ORDERING INFORMATION

| Part Number | Package | Packing Method | Pack Quantity |
|-------------|---------|----------------|---------------|
| S9014       | TO-92   | Bulk           | 1000pcs/Bag   |
| S9014-TA    | TO-92   | Tape           | 2000pcs/Box   |

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

| Symbol          | Parameter                                        | Value    | Unit            |
|-----------------|--------------------------------------------------|----------|-----------------|
| $V_{CBO}$       | Collector-Base Voltage                           | 50       | V               |
| $V_{CEO}$       | Collector-Emitter Voltage                        | 45       | V               |
| $V_{EBO}$       | Emitter-Base Voltage                             | 5        | V               |
| $I_C$           | Collector Current -Continuous                    | 0.1      | A               |
| $P_D$           | Collector Power Dissipation                      | 450      | mW              |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient      | 277.7    | $^{\circ}C / W$ |
| $T_J, T_{stg}$  | Operation Junction and Storage Temperature Range | -55~+150 | $^{\circ}C$     |

## ELECTRICAL CHARACTERISTICS

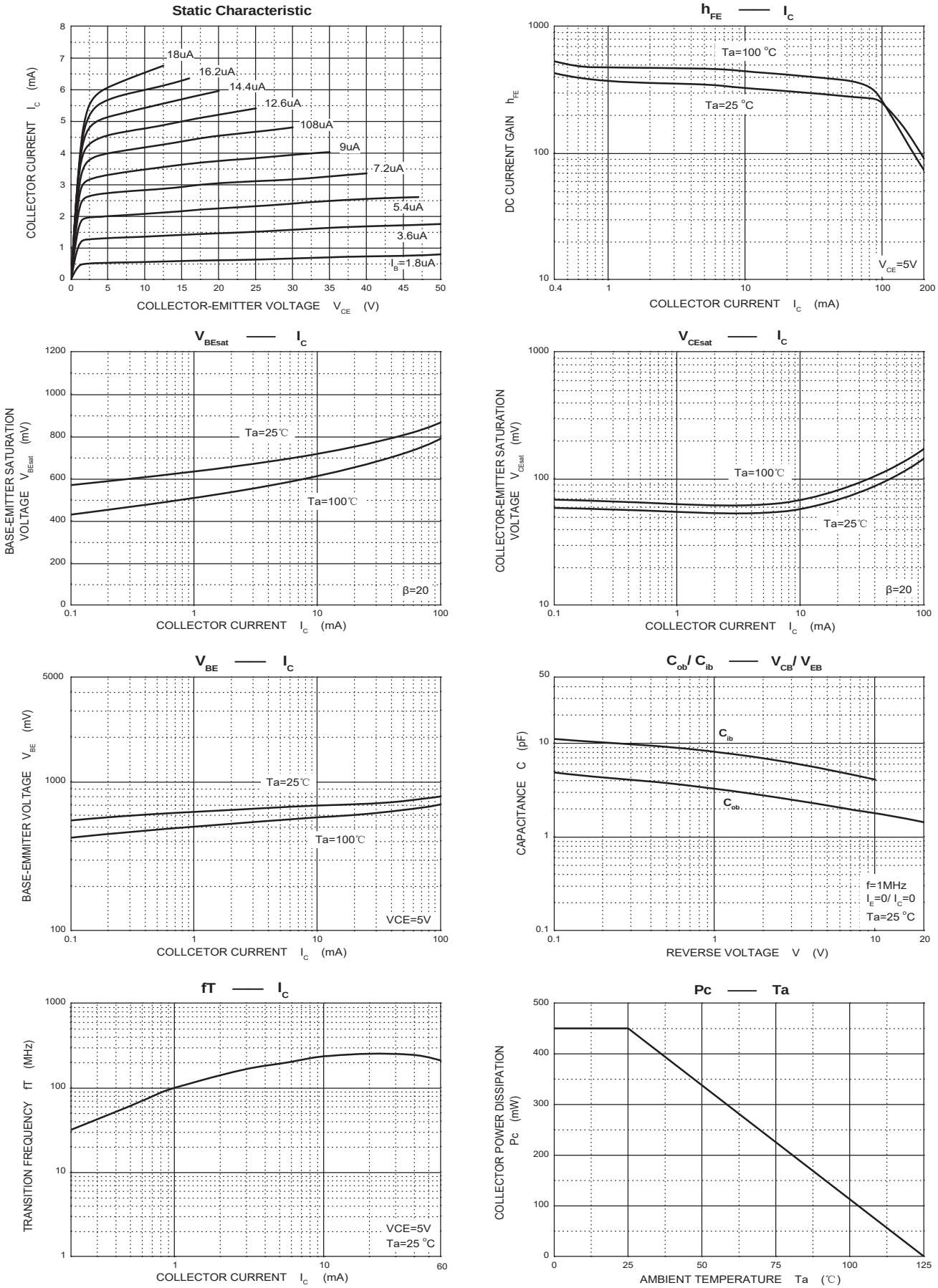
$T_a=25^{\circ}\text{C}$  unless otherwise specified

| Parameter                            | Symbol        | Test conditions                                            | Min | Typ | Max  | Unit          |
|--------------------------------------|---------------|------------------------------------------------------------|-----|-----|------|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C=100\mu\text{A}$ , $I_E=0$                             | 50  |     |      | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C=1\text{mA}$ , $I_B=0$                                 | 45  |     |      | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E=100\mu\text{A}$ , $I_C=0$                             | 5   |     |      | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB}=50\text{V}$ , $I_E=0$                              |     |     | 0.1  | $\mu\text{A}$ |
| Collector cut-off current            | $I_{CEO}$     | $V_{CE}=35\text{V}$ , $I_B=0$                              |     |     | 1    | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB}=5\text{V}$ , $I_C=0$                               |     |     | 0.1  | $\mu\text{A}$ |
| DC current gain                      | $h_{FE}$      | $V_{CE}=5\text{V}$ , $I_C=1\text{mA}$                      | 60  |     | 1000 |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C=100\text{mA}$ , $I_B=5\text{mA}$                      |     |     | 0.3  | V             |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C=100\text{mA}$ , $I_B=5\text{mA}$                      |     |     | 1    | V             |
| Transition frequency                 | $f_T$         | $V_{CE}=5\text{V}$ , $I_C=10\text{mA}$<br>$f=30\text{MHz}$ | 150 |     |      | MHz           |

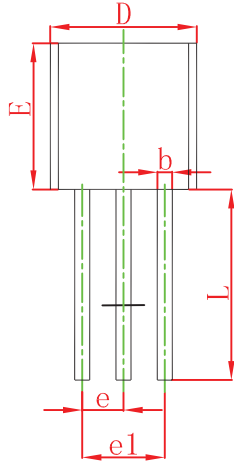
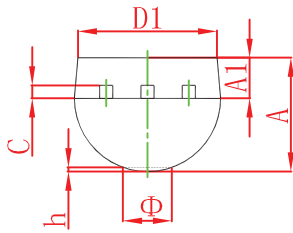
### CLASSIFICATION OF $h_{FE(1)}$

| Rank  | A      | B       | C       | D        |
|-------|--------|---------|---------|----------|
| Range | 60-150 | 100-300 | 200-600 | 400-1000 |

Typical Characteristics

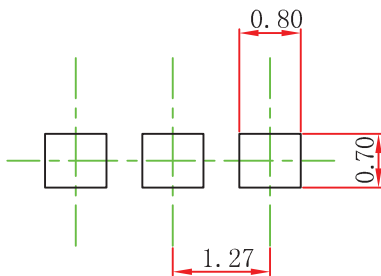


## TO-92 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 3.300                     | 3.700  | 0.130                | 0.146 |
| A1     | 1.100                     | 1.400  | 0.043                | 0.055 |
| b      | 0.380                     | 0.550  | 0.015                | 0.022 |
| c      | 0.360                     | 0.510  | 0.014                | 0.020 |
| D      | 4.300                     | 4.700  | 0.169                | 0.185 |
| D1     | 3.430                     |        | 0.135                |       |
| E      | 4.300                     | 4.700  | 0.169                | 0.185 |
| e      | 1.270 TYP                 |        | 0.050 TYP            |       |
| e1     | 2.440                     | 2.640  | 0.096                | 0.104 |
| L      | 14.100                    | 14.500 | 0.555                | 0.571 |
| K      |                           | 1.600  |                      | 0.063 |
| h      | 0.000                     | 0.380  | 0.000                | 0.015 |

## TO-92 Suggested Pad Layout

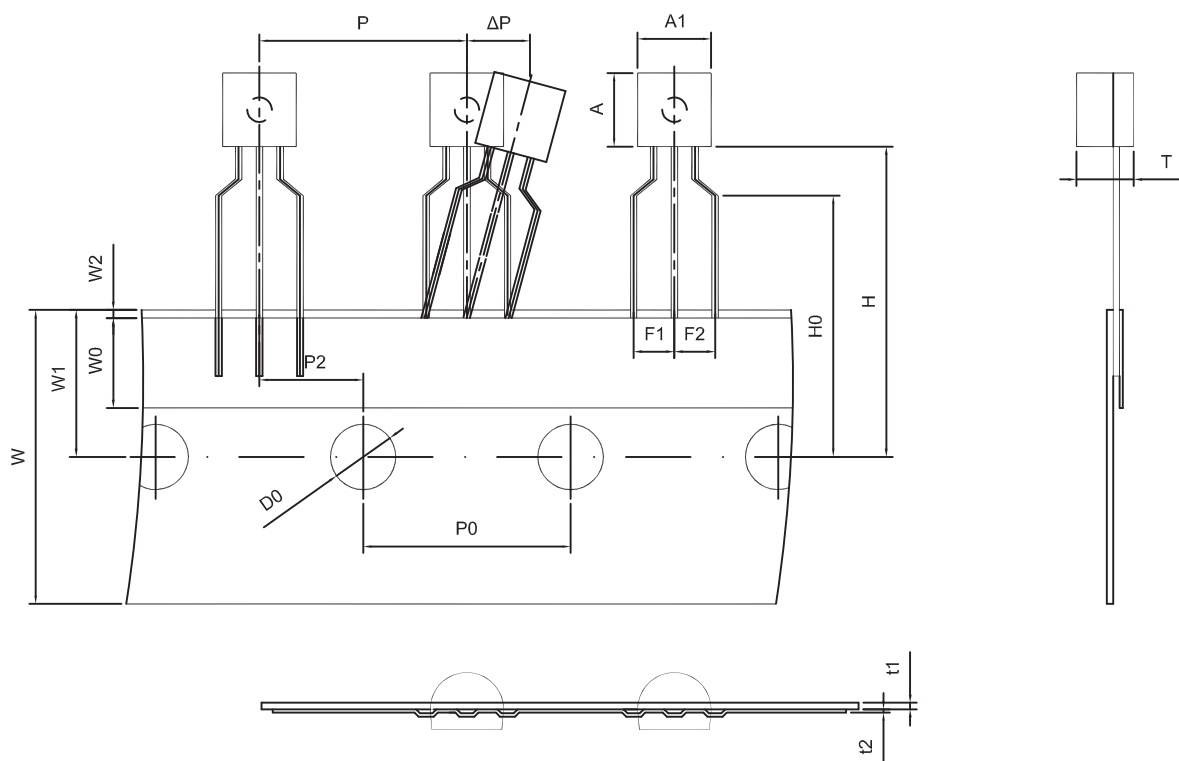


Note:

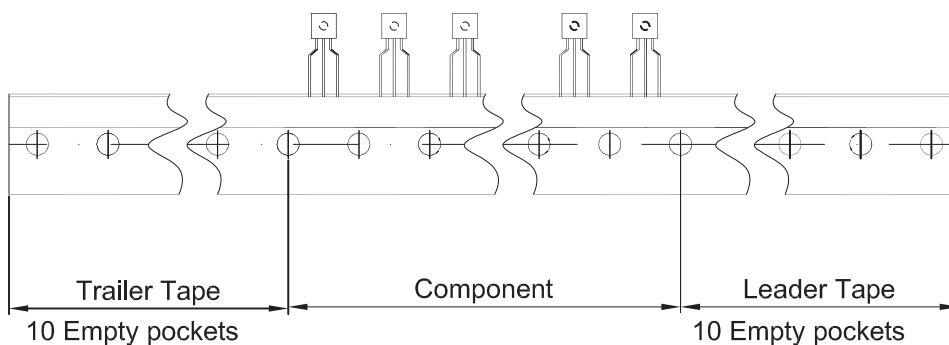
1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

### NOTICE

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| Dimiensions are in millimeter |     |          |      |      |      |     |     |            |
|-------------------------------|-----|----------|------|------|------|-----|-----|------------|
| A1                            | A   | T        | P    | P0   | P2   | F1  | F2  | W          |
| 4.5                           | 4.5 | 3.5      | 12.7 | 12.7 | 6.35 | 2.5 | 2.5 | 18.0       |
| W0                            | W1  | W2       | H    | H0   | D0   | t1  | t2  | $\Delta P$ |
| 6.0                           | 9.0 | 1.0 MAX. | 19.0 | 16.0 | 4.0  | 0.4 | 0.2 | 0          |



| Package | Box      | Box Size(mm) | Carton     | Carton Size(mm) |
|---------|----------|--------------|------------|-----------------|
| TO-92   | 2000 pcs | 333×162×43   | 20,000 pcs | 350×340×250     |