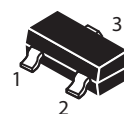
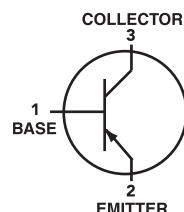


## PNP General Purpose Transistors

 **Lead(Pb)-Free**


**SOT-23**

### MAXIMUM RATINGS

| Rating                       | Symbol    | Value | Unit             |
|------------------------------|-----------|-------|------------------|
| Collector-Emitter Voltage    | $V_{CEO}$ | -25   | Vdc              |
| Collector-Base Voltage       | $V_{CBO}$ | -40   | Vdc              |
| Emitter-Base Voltage         | $V_{EBO}$ | -5    | Vdc              |
| Collector Current-Continuous | $I_C$     | -500  | mA <sub>dc</sub> |

### THERMAL CHARACTERISTICS

| Characteristics                                                                 | Symbol          | Max         | Unit  |
|---------------------------------------------------------------------------------|-----------------|-------------|-------|
| Total Device Dissipation FR-5 Board (1)<br>TA=25°C<br>Derate above 25°C         | $P_D$           | 225         | mW    |
|                                                                                 |                 | 1.8         | mW/°C |
| Thermal Resistance, Junction to Ambient                                         | $R_{\theta JA}$ | 556         | °C/W  |
| Total Device Dissipation<br>Alumina Substrate, (2) TA=25°C<br>Derate above 25°C | $P_D$           | 300         | mW    |
|                                                                                 |                 | 2.4         | mW/°C |
| Thermal Resistance, Junction to Ambient                                         | $R_{\theta JA}$ | 417         | °C/W  |
| Junction and Storage, Temperature                                               | $T_J, T_{stg}$  | -55 to +150 | °C    |

### DEVICE MARKING

S9012LT1=2T1

### ELECTRICAL CHARACTERISTICS

| Characteristics | Symbol | Min | Max | Unit |
|-----------------|--------|-----|-----|------|
|-----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                               |               |      |      |                    |
|-------------------------------------------------------------------------------|---------------|------|------|--------------------|
| Collector-Emitter Breakdown Voltage ( $I_C = -0.1 \text{ mA}_{dc}, I_E = 0$ ) | $V_{(BR)CEO}$ | -25  | -    | Vdc                |
| Collector-Base Breakdown Voltage ( $I_C = -100 \mu\text{A}_{dc}, I_E = 0$ )   | $V_{(BR)CBO}$ | -40  | -    | Vdc                |
| Emitter-Base Breakdown Voltage ( $I_E = -100 \mu\text{A}_{dc}, I_C = 0$ )     | $V_{(BR)EBO}$ | -5.0 | -    | Vdc                |
| Collector Cutoff Current ( $V_{CE} = -20 \text{ V}_{dc}, I_E = 0$ )           | $I_{CEO}$     | -    | -0.1 | $\mu\text{A}_{dc}$ |
| Collector Cutoff Current ( $V_{CB} = -40 \text{ V}_{dc}, I_E = 0$ )           | $I_{CBO}$     | -    | -0.1 | $\mu\text{A}_{dc}$ |
| Emitter Cutoff Current ( $V_{EB} = -5.0 \text{ V}_{dc}, I_C = 0$ )            | $I_{EBO}$     | -    | -0.1 | $\mu\text{A}_{dc}$ |

1.FR-5=1.0 x 0.75 x 0.062 in

2.Alumina=0.4 x 0.3 x 0.024 in. 99.5% alumina

# S9012LT1



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

| Characteristics | Symbol | Min | Max | Unit |
|-----------------|--------|-----|-----|------|
|-----------------|--------|-----|-----|------|

### ON CHARACTERISTICS

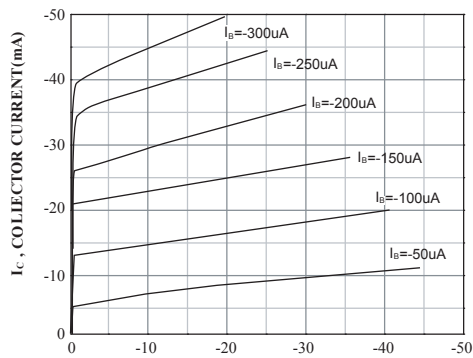
|                                                                                                                                  |                                  |           |          |        |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------|----------|--------|
| DC Current Gain<br>( $I_C=-50\text{ mAdc}$ , $V_{CE}=-1.0\text{ Vdc}$ )<br>( $I_C=-500\text{ mAdc}$ , $V_{CE}=-1.0\text{ Vdc}$ ) | $h_{FE}^{(1)}$<br>$h_{FE}^{(2)}$ | 120<br>40 | 350<br>- | -<br>- |
| Collector-Emitter Saturation Voltage<br>( $I_C=-500\text{ mAdc}$ , $I_B=-50\text{ mAdc}$ )                                       | $V_{CE(sat)}$                    | -         | -0.6     | Vdc    |
| Base-Emitter Saturation Voltage<br>( $I_C=-500\text{ mAdc}$ , $I_B=-50\text{ mAdc}$ )                                            | $V_{BE(sat)}$                    | -         | -1.2     | Vdc    |
| Base-Emitter Voltage<br>( $I_E=-100\text{ mA}$ )                                                                                 | $V_{EBF}$                        | -         | -1.4     | Vdc    |

### SMALL-SIGNAL CHARACTERISTICS

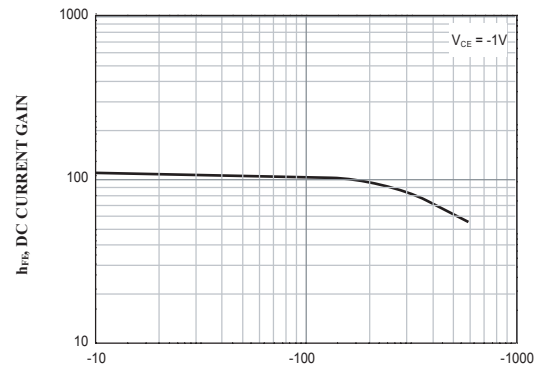
|                                                                                                          |       |     |   |     |
|----------------------------------------------------------------------------------------------------------|-------|-----|---|-----|
| Current-Gain-Bandwidth Product<br>( $I_C=-20\text{ mAdc}$ , $V_{CE}=-6\text{ Vdc}$ , $f=30\text{ MHz}$ ) | $f_T$ | 150 | - | MHz |
|----------------------------------------------------------------------------------------------------------|-------|-----|---|-----|

### CLASSIFICATION OF $h_{FE}$

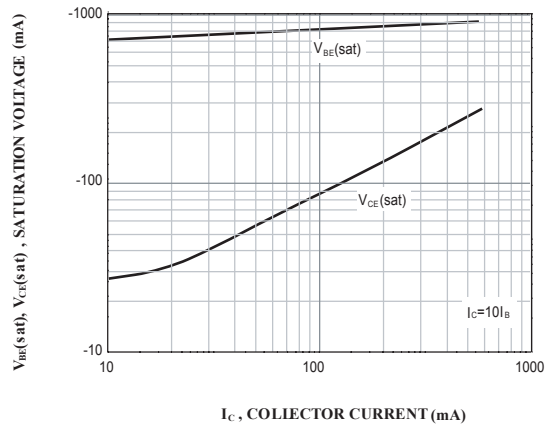
|       |         |         |
|-------|---------|---------|
| Rank  | L       | H       |
| Range | 120-200 | 200-350 |



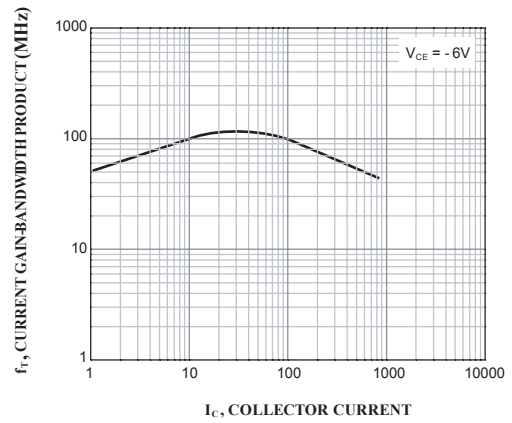
$V_{CE}$ , COLLECTOR-EMITTER VOLTAGE (Volts)  
Figure 1. Static Characteristic



$I_C$ , COLLECTOR CURRENT (mA)  
Figure 2. DC current Gain



$I_C$ , COLLECTOR CURRENT (mA)  
Figure 3. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage



$I_C$ , COLLECTOR CURRENT  
Figure 4. Current Gain Bandwidth Product