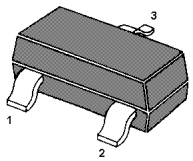
# PNP Silicon Epitaxial Planar Transistor

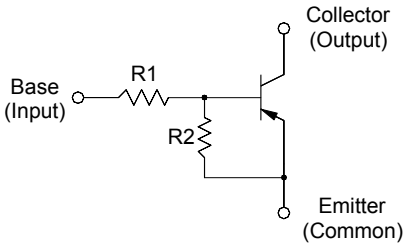
for switching and interface circuit and
drive circuit applications




1.Base 2.Emitter 3.Collector
SOT-23 Plastic Package

## Resistor Values

| Type | R1 (K) | R2 (K) |
|---|---|---|
| MMUN2111 | 10 | 10 |
| MMUN2112 | 22 | 22 |
| MMUN2113 | 47 | 47 |
| MMUN2114 | 10 | 47 |
| MMUN2115 | 10 | ∞ |
| MMUN2116 | 4.7 | ∞ |
| MMUN2130 | 1 | 1 |
| MMUN2131 | 2.2 | 2.2 |
| MMUN2132 | 4.7 | 4.7 |
| MMUN2133 | 4.7 | 47 |
| MMUN2134 | 22 | 47 |




## Absolute Maximum Ratings ($T_a$ = 25 °C)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector Base Voltage | $-V_{CBO}$ | 50 | V |
| Collector Emitter Voltage | $-V_{CEO}$ | 50 | V |
| Collector Current | $-I_C$ | 100 | mA |
| Total Power Dissipation | $P_{tot}$ | 200 | mW |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature Range | $T_S$ | - 55 to + 150 | °C |

## Characteristics at $T_a$ = 25 °C

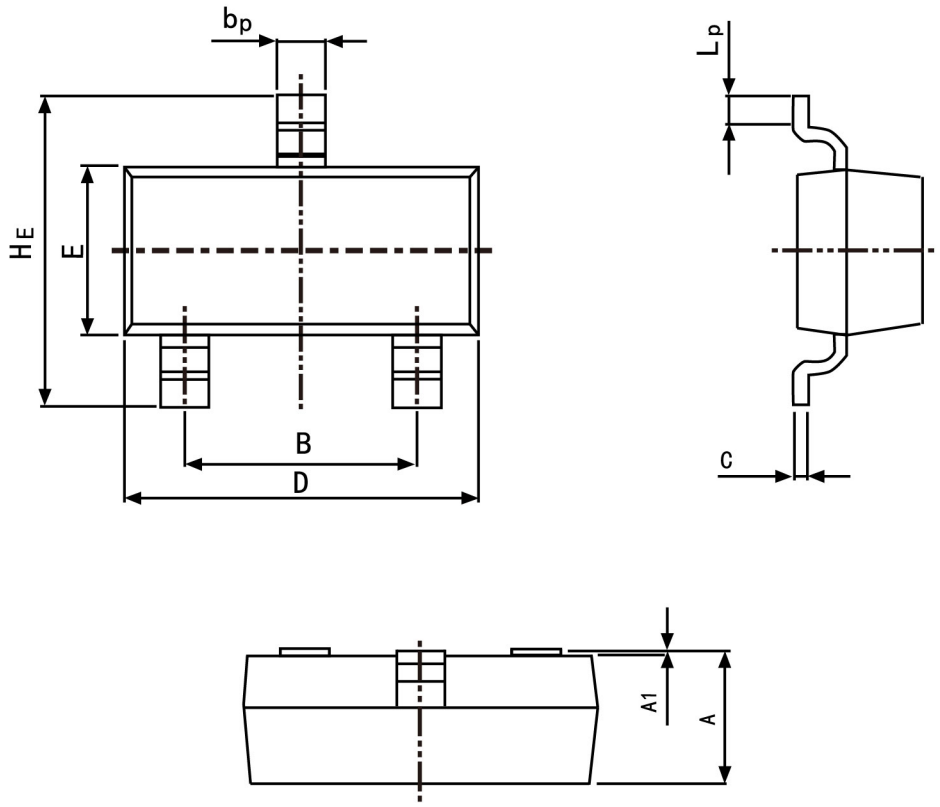
| Parameter | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| DC Current Gain | | | | | |
| at $-V_{CE}$ = 10 V, $-I_C$ = 5 mA | MMUN2111 | $h_{FE}$ | 35 | - | - |
| | MMUN2112 | $h_{FE}$ | 60 | - | - |
| | MMUN2113 | $h_{FE}$ | 80 | - | - |
| | MMUN2114 | $h_{FE}$ | 80 | - | - |
| | MMUN2115 | $h_{FE}$ | 160 | - | - |
| | MMUN2116 | $h_{FE}$ | 160 | - | - |
| | MMUN2130 | $h_{FE}$ | 3 | - | - |
| | MMUN2131 | $h_{FE}$ | 8 | - | - |
| | MMUN2132 | $h_{FE}$ | 15 | - | - |
| | MMUN2133 | $h_{FE}$ | 80 | - | - |
| | MMUN2134 | $h_{FE}$ | 80 | - | - |
| Collector Base Cutoff Current<br>at $-V_{CB}$ = 50 V | | $-I_{CBO}$ | - | 100 | nA |
| Collector Emitter Cutoff Current<br>at $-V_{CE}$ = 50 V | | $-I_{CEO}$ | - | 500 | nA |
| Emitter Base Cutoff Current | | | | | |
| at $-V_{EB}$ = 6 V | MMUN2111 | $-I_{EBO}$ | - | 0.5 | mA |
| | MMUN2112 | $-I_{EBO}$ | - | 0.2 | mA |
| | MMUN2113 | $-I_{EBO}$ | - | 0.1 | mA |
| | MMUN2114 | $-I_{EBO}$ | - | 0.2 | mA |
| | MMUN2115 | $-I_{EBO}$ | - | 0.9 | mA |
| | MMUN2116 | $-I_{EBO}$ | - | 1.9 | mA |
| | MMUN2130 | $-I_{EBO}$ | - | 4.3 | mA |
| | MMUN2131 | $-I_{EBO}$ | - | 2.3 | mA |
| | MMUN2132 | $-I_{EBO}$ | - | 1.5 | mA |
| | MMUN2133 | $-I_{EBO}$ | - | 0.18 | mA |
| | MMUN2134 | $-I_{EBO}$ | - | 0.13 | mA |
| Collector Base Breakdown Voltage<br>at $-I_C$ = 10 μA | | $-V_{(BR)CBO}$ | 50 | - | V |
| Collector Emitter Breakdown Voltage<br>at $-I_C$ = 2 mA | | $-V_{(BR)CEO}$ | 50 | - | V |
| Collector Emitter Saturation Voltage | | | | | |
| at $-I_C$ = 10 mA, $-I_B$ = 0.3 mA | | $-V_{CEsat}$ | - | 0.25 | V |
| at $-I_C$ = 10 mA, $-I_B$ = 5 mA | MMUN2130 | $-V_{CEsat}$ | - | 0.25 | V |
| | MMUN2131 | $-V_{CEsat}$ | - | 0.25 | V |
| at $-I_C$ = 10 mA, $-I_B$ = 1 mA | MMUN2115 | $-V_{CEsat}$ | - | 0.25 | V |
| | MMUN2116 | $-V_{CEsat}$ | - | 0.25 | V |
| | MMUN2132 | $-V_{CEsat}$ | - | 0.25 | V |
| | MMUN2133 | $-V_{CEsat}$ | - | 0.25 | V |
| | MMUN2134 | $-V_{CEsat}$ | - | 0.25 | V |

## Characteristics at $T_a$ = 25 °C

| Parameter | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Output Voltage (on) | | | | | |
| at $-V_{CC}$ = 5 V, $-V_B$ = 2.5 V, $R_L$ = 1 KΩ | MMUN2111 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2112 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2114 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2115 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2116 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2130 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2131 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2132 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2133 | $-V_{OL}$ | - | 0.2 | V |
| | MMUN2134 | $-V_{OL}$ | - | 0.2 | V |
| at $-V_{CC}$ = 5 V, $-V_B$ = 3.5 V, $R_L$ = 1 KΩ | MMUN2113 | $-V_{OL}$ | - | 0.2 | V |
| Output Voltage (off) | | | | | |
| at $-V_{CC}$ = 5 V, $-V_B$ = 0.5 V, $R_L$ = 1 KΩ | MMUN2130 | $-V_{OH}$ | 4.9 | - | V |
| at $-V_{CC}$ = 5 V, $-V_B$ = 0.05 V, $R_L$ = 1 KΩ | MMUN2115 | $-V_{OH}$ | 4.9 | - | V |
| at $-V_{CC}$ = 5 V, $-V_B$ = 0.25 V, $R_L$ = 1 KΩ | MMUN2116 | $-V_{OH}$ | 4.9 | - | V |
| | MMUN2131 | $-V_{OH}$ | 4.9 | - | V |
| | MMUN2132 | $-V_{OH}$ | 4.9 | - | V |
| Input Resistor | MMUN2111 | R1 | 7 | 13 | KΩ |
| | MMUN2112 | R1 | 15.4 | 28.6 | KΩ |
| | MMUN2113 | R1 | 32.9 | 61.1 | KΩ |
| | MMUN2114 | R1 | 7 | 13 | KΩ |
| | MMUN2115 | R1 | 7 | 13 | KΩ |
| | MMUN2116 | R1 | 3.3 | 6.1 | KΩ |
| | MMUN2130 | R1 | 0.7 | 1.3 | KΩ |
| | MMUN2131 | R1 | 1.5 | 2.9 | KΩ |
| | MMUN2132 | R1 | 3.3 | 6.1 | KΩ |
| | MMUN2133 | R1 | 3.3 | 6.1 | KΩ |
| | MMUN2134 | R1 | 15.4 | 28.6 | KΩ |
| Resistor Ratio | MMUN2111/MMUN2112/MMUN2113 | R1/R2 | 0.8 | 1.2 | - |
| | MMUN2114 | R1/R2 | 0.17 | 0.25 | - |
| | MMUN2115/MMUN2116 | R1/R2 | - | - | - |
| | MMUN2130/MMUN2131/MMUN2132 | R1/R2 | 0.8 | 1.2 | - |
| | MMUN2133 | R1/R2 | 0.055 | 0.185 | - |

## PACKAGE OUTLINE

**Plastic surface mounted package; 3 leads** **SOT-23**




| Symbol | Dimension in Millimeters | |
|---|---|---|
| | Min | Max |
| A | 0.95 | 1.40 |
| B | 1.78 | 2.04 |
| bp | 0.35 | 0.50 |
| C | 0.08 | 0.19 |
| D | 2.70 | 3.10 |
| E | 1.20 | 1.65 |
| HE | 2.20 | 3.00 |
| A1 | 0.100 | 0.013 |
| Lp | 0.20 | 0.50 |