# 160V NPN SMALL-SIGNAL TRANSISTOR IN SOT323

## Features

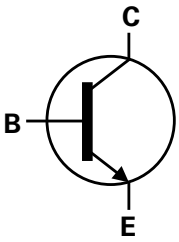
- Ultra-Small Surface-Mount Package
- Complementary PNP Type: MMST5401Q
- Ideal for Low Power Amplification and Switching
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The MMST5551Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  **https://www.diodes.com/quality/product-definitions/**

## Mechanical Data

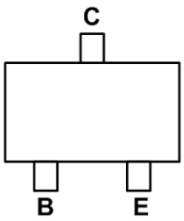
- Package: SOT323
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.006 grams (Approximate)

SOT323

Top View




Device Symbol



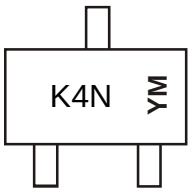

Top View
Pinout

## Ordering Information (Note 4)

| Orderable Part Number | Package | Marking | Reel Size (inches) | Tape Width (mm) | Packing | |
|---|---|---|---|---|---|---|
| | | | | | Qty. | Carrier |
| MMST5551Q-7-F | SOT323 | K4N | 7 | 8 | 3,000 | Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




K4N = Product Type Marking Code
YM = Date Code Marking
Y or Y = Year (ex: M = 2025)
M or M = Month (ex: 9 = September)

Date Code Key

| Year | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | M | N | P | R | S | T | U | V | W | X | Y | Z |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 180 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 160 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 6.0 | V |
| Continuous Collector Current | $I_C$ | 200 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 5) | $P_D$ | 200 | mW |
| Thermal Resistance, Junction to Ambient | (Note 5) | $R_{\theta JA}$ | 625 | °C/W |
| Thermal Resistance, Junction to Case | (Note 5) | $R_{\theta JC}$ | 159 | °C/W |
| Thermal Resistance, Junction to Lead | (Note 6) | $R_{\theta JL}$ | 291 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 7)

| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | 400 | V | C |
| Electrostatic Discharge – Charged Device Model | ESD CDM | 1,000 | V | IV |

Notes:
5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Thermal resistance from junction to solder-point at the end of the collector lead.
7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 8) | | | | | |
| Collector-Base Breakdown Voltage | $V_{CBO}$ | 180 | — | V | $I_C$ = 100µA, $I_E$ = 0 |
| Collector-Emitter Breakdown Voltage | $V_{CEO}$ | 160 | — | V | $I_C$ = 1.0mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | $V_{EBO}$ | 6 | — | V | $I_E$ = 10µA, $I_C$ = 0 |
| Collector Cutoff Current | $I_{CBO}$ | — | 50 | nA<br>µA | $V_{CB}$ = 120V, $I_E$ = 0<br>$V_{CB}$ = 120V, $I_E$ = 0, $T_A$ = +100°C |
| Emitter Cutoff Current | $I_{EBO}$ | — | 50 | nA | $V_{EB}$ = 4.0V, $I_C$ = 0 |
| **ON CHARACTERISTICS** (Note 8) | | | | | |
| DC Current Gain | $h_{FE}$ | 80<br>80<br>30 | —<br>250<br>— | — | $I_C$ = 1.0mA, $V_{CE}$ = 5.0V<br>$I_C$ = 10mA, $V_{CE}$ = 5.0V<br>$I_C$ = 50mA, $V_{CE}$ = 5.0V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | 0.15<br>0.20 | V | $I_C$ = 10mA, $I_B$ = 1.0mA<br>$I_C$ = 50mA, $I_B$ = 5.0mA |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | 1.0 | V | $I_C$ = 10mA, $I_B$ = 1.0mA<br>$I_C$ = 50mA, $I_B$ = 5.0mA |
| **SMALL-SIGNAL CHARACTERISTICS** | | | | | |
| Output Capacitance | $C_{obo}$ | — | 6.0 | pF | $V_{CB}$ = 10V, f = 1.0MHz, $I_E$ = 0 |
| Small-Signal Current Gain | $h_{fe}$ | 50 | 250 | — | $V_{CE}$ = 10V, $I_C$ = 1.0mA, f = 1.0kHz |
| Current Gain-Bandwidth Product | $f_T$ | 100 | 300 | MHz | $V_{CE}$ = 10V, $I_C$ = 10mA, f = 100MHz |
| Noise Figure | NF | — | 8.0 | dB | $V_{CE}$ = 5.0V, $I_C$ = 200µA, $R_S$ =1.0Ω, f = 1.0kHz |

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

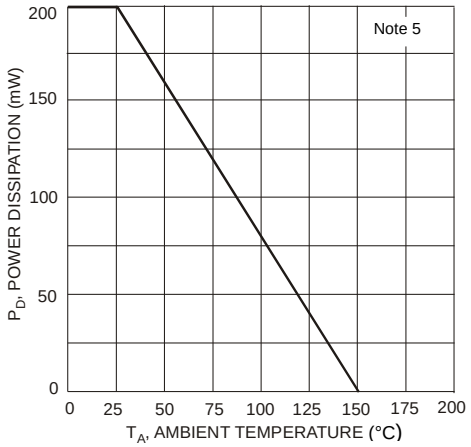



Fig. 1, Max Power Dissipation vs. Ambient Temperature

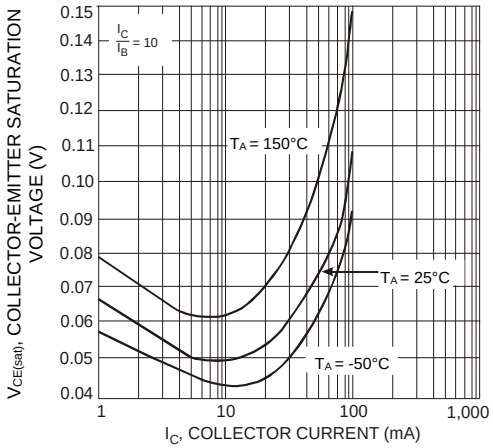



Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

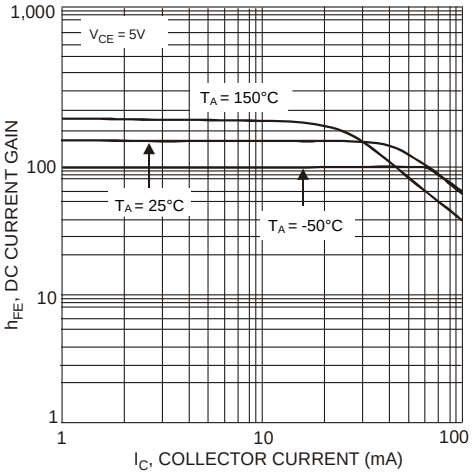



Fig. 3, DC Current Gain vs. Collector Current

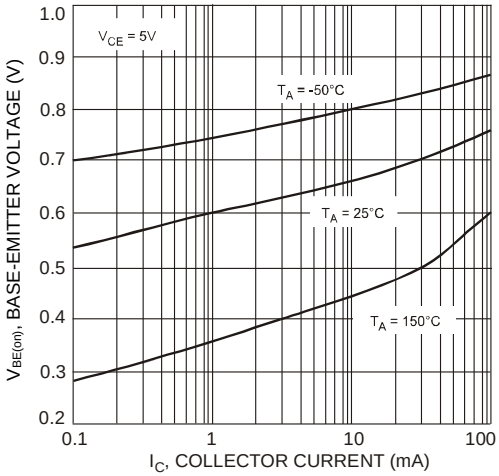



Fig. 4, Base Emitter Voltage vs. Collector Current

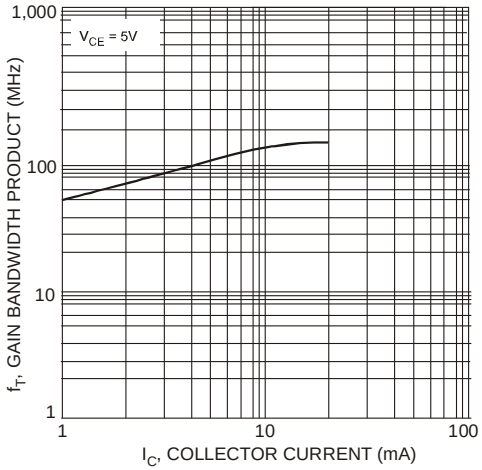
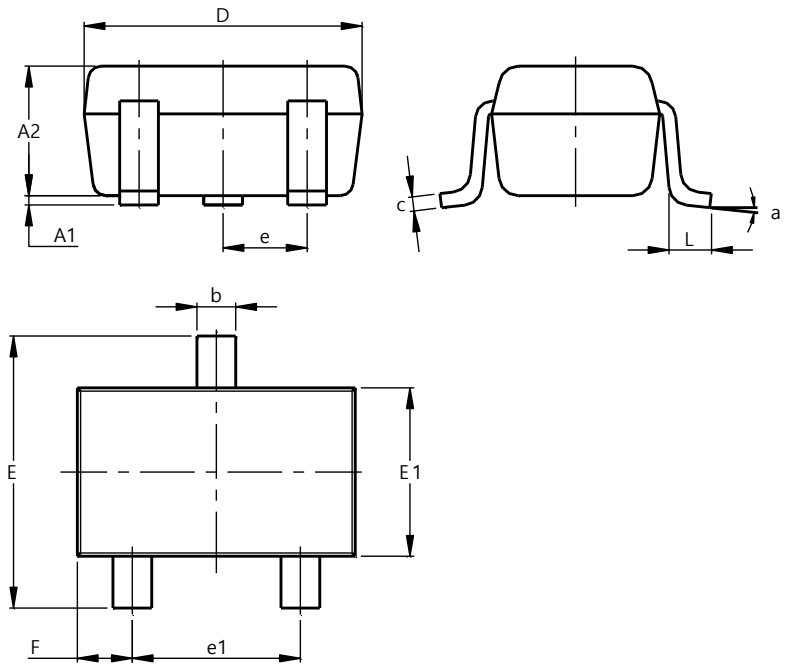



Fig. 5, Gain Bandwidth Product vs. Collector Current

## Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT323**

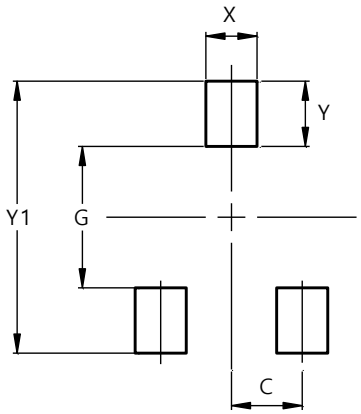



| SOT323 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.90 | 1.00 | 0.95 |
| **b** | 0.25 | 0.40 | 0.30 |
| **c** | 0.10 | 0.18 | 0.11 |
| **D** | 1.80 | 2.20 | 2.15 |
| **E** | 2.00 | 2.20 | 2.10 |
| **E1** | 1.15 | 1.35 | 1.30 |
| **e** | 0.650 BSC | | |
| **e1** | 1.20 | 1.40 | 1.30 |
| **F** | 0.375 | 0.475 | 0.425 |
| **L** | 0.25 | 0.40 | 0.30 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

**SOT323**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.650 |
| **G** | 1.300 |
| **X** | 0.470 |
| **Y** | 0.600 |
| **Y1** | 2.500 |

Note: For high-voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.

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