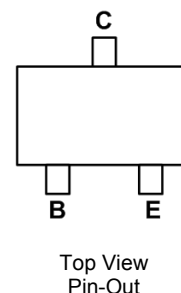
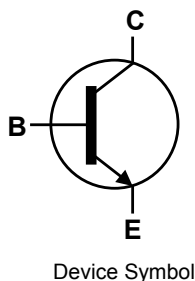
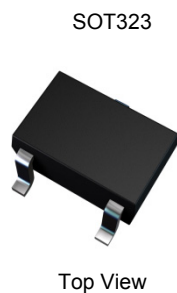


## Features

- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary NPN Type: MMST5401
- Ideal for Low Power Amplification and Switching
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: SOT323
- Case 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 ③
- Weight: 0.006 grams (approximate)

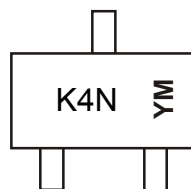


## Ordering Information (Notes 4 & 5)

| Device        | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per reel |
|---------------|------------|---------|--------------------|-----------------|-------------------|
| MMST5551-7-F  | AEC-Q101   | K4N     | 7                  | 8               | 3,000             |
| MMST5551Q-7-F | Automotive | K4N     | 7                  | 8               | 3,000             |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K4N = Product Type Marking Code  
 YM = Date Code Marking  
 Y or Y = Year (ex: A = 2013)  
 M or M = Month (ex: 9 = September)

### Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|------|
| Code | X    | Y    | Z    | A    | B    | C    | D    | E    |

| 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** (@ $T_A = +25^\circ\text{C}$ , 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Power Dissipation (Note 6)                       | $P_D$           | 200         | mW                        |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 625         | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$          |

**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           |

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

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

- Notes:
- 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.
  - Refer to JEDEC specification JESD22-A114 and JESD22-A115.
  - Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

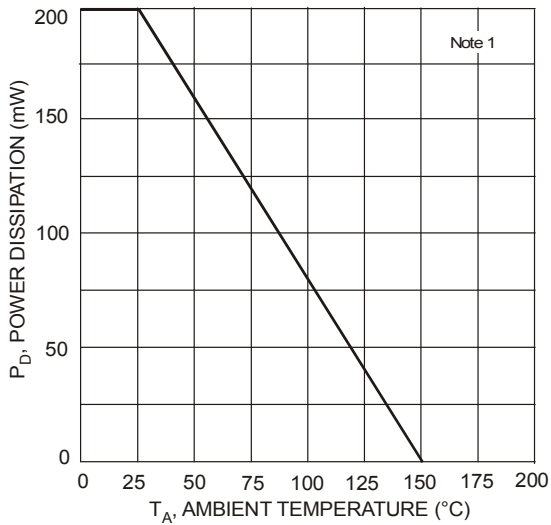


Fig. 1, Max Power Dissipation vs. Ambient Temperature

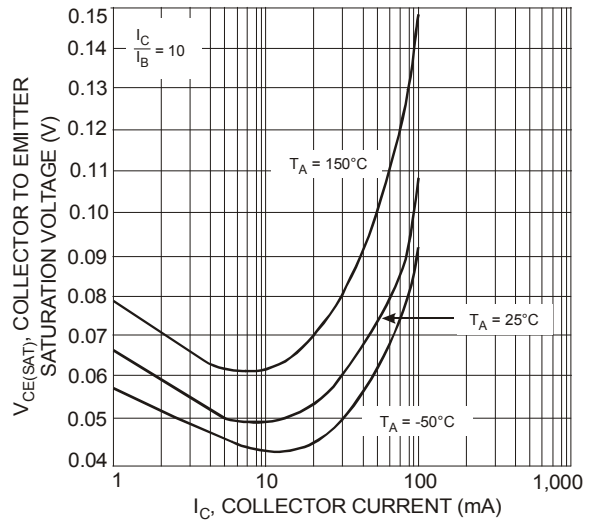


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

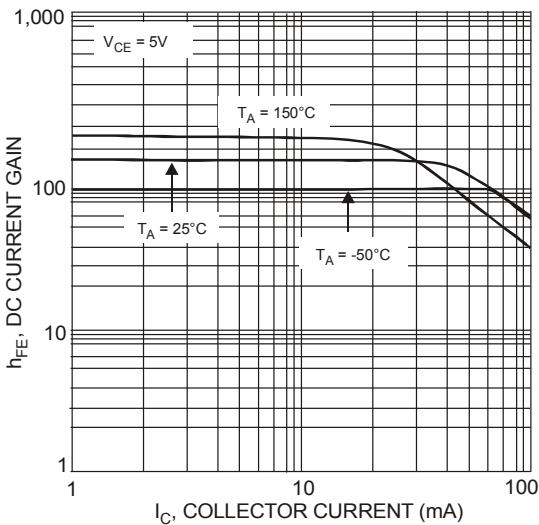


Fig. 3, DC Current Gain vs. Collector Current

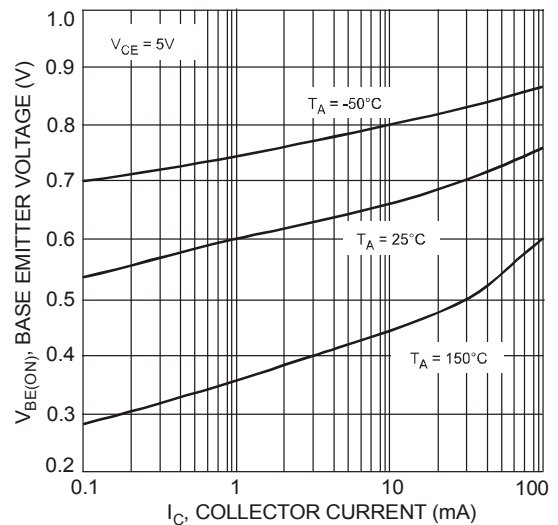


Fig. 4, Base Emitter Voltage vs. Collector Current

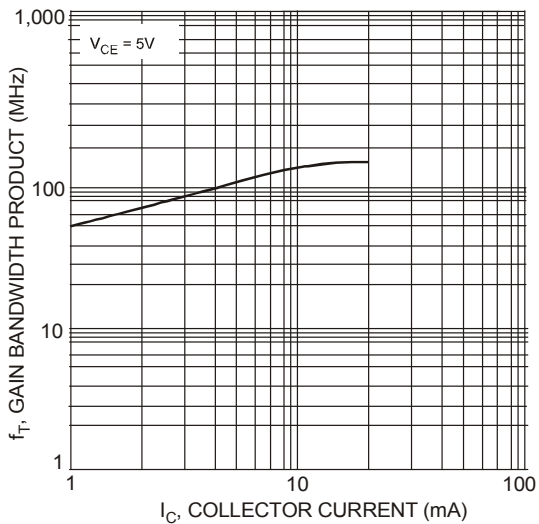
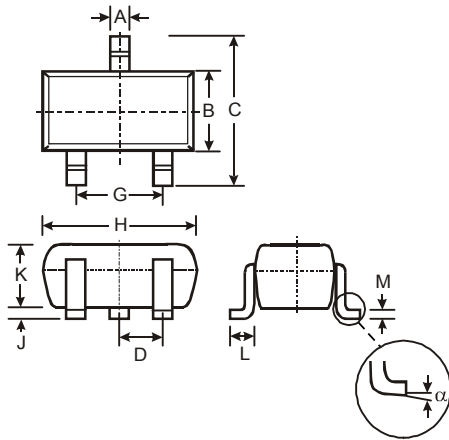


Fig. 5, Gain Bandwidth Product vs. Collector Current

## Package Outline Dimensions

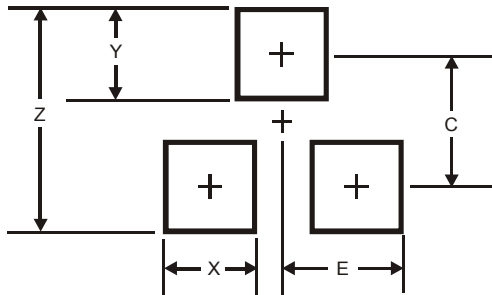
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT323               |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.25 | 0.40 | 0.30 |
| B                    | 1.15 | 1.35 | 1.30 |
| C                    | 2.00 | 2.20 | 2.10 |
| D                    | -    | -    | 0.65 |
| G                    | 1.20 | 1.40 | 1.30 |
| H                    | 1.80 | 2.20 | 2.15 |
| J                    | 0.0  | 0.10 | 0.05 |
| K                    | 0.90 | 1.00 | 1.00 |
| L                    | 0.25 | 0.40 | 0.30 |
| M                    | 0.10 | 0.18 | 0.11 |
| $\alpha$             | 0°   | 8°   | -    |
| All Dimensions in mm |      |      |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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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