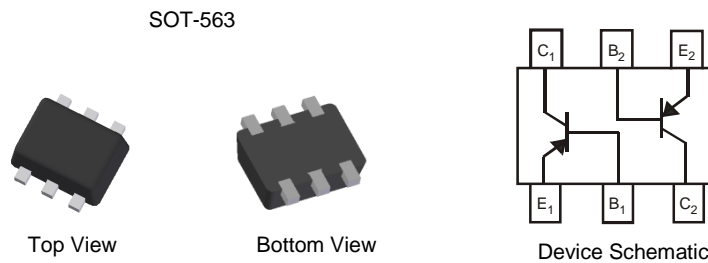


## Features

- $BV_{ce0} > -60V$
- $I_C = -600mA$  Collector Current
- Ultra-Small Surface Mount Package
- Complementary NPN Type: MMDT2222V
- **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**

## Mechanical Data

- Case: SOT-563
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Plated Leads Solderable per MIL-STD-202, Method 208 Ⓢ
- Weight: 0.003 grams (Approximate)

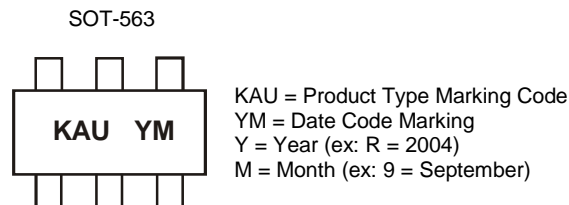


## Ordering Information (Note 4)

| Part Number | Status | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per reel |
|-------------|--------|------------|---------|--------------------|-----------------|-------------------|
| MMDT2907V-7 | Active | AEC-Q101   | KAU     | 7                  | 8mm             | 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



### Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | B    | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    |

| 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic            | Symbol           | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage    | V <sub>CBO</sub> | -60   | V    |
| Collector-Emitter Voltage | V <sub>CEO</sub> | -60   | V    |
| Emitter-Base Voltage      | V <sub>EBO</sub> | -5    | V    |
| Collector Current         | I <sub>C</sub>   | -600  | mA   |

**Thermal Characteristics**

|  |                                   |             |      |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 150         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 833         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 6)

| 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           |

Notes: 5. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.  
 6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

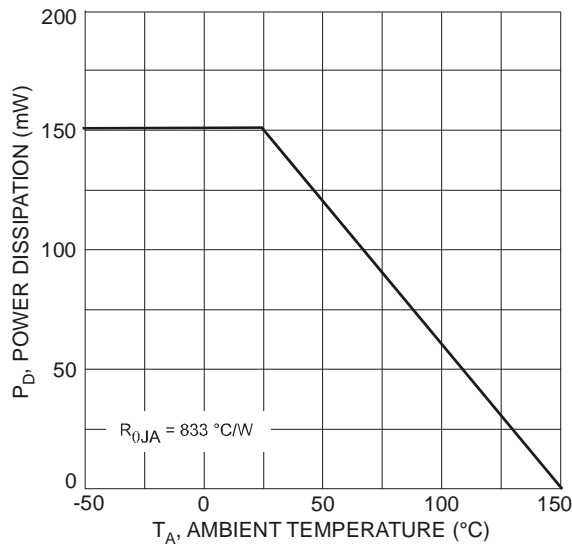


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 3)

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                 | Symbol               | Min                           | Max                     | Unit | Test Condition   |
|--|----------------------|-------------------------------|-------------------------|------|--|
| <b>OFF CHARACTERISTICS</b>                     |                      |                               |                         |      |  |
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>    | -60                           | —                       | V    | I <sub>C</sub> = -10μA, I <sub>E</sub> = 0   |
| Collector-Emitter Breakdown Voltage ( Note 7)  | BV <sub>CEO</sub>    | -60                           | —                       | V    | I <sub>C</sub> = -10mA, I <sub>B</sub> = 0   |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>    | -5                            | —                       | V    | I <sub>E</sub> = -10μA, I <sub>C</sub> = 0   |
| Collector Cut-Off Current                      | I <sub>CBO</sub>     | —                             | -10                     | nA   | V <sub>CB</sub> = -50V, I <sub>E</sub> = 0   |
| Collector Cut-Off Current                      | I <sub>CEX</sub>     | —                             | -50                     | nA   | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = -0.5V   |
| Base Cut-Off Current                           | I <sub>BL</sub>      | —                             | -50                     | nA   | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = -0.5V   |
| <b>ON CHARACTERISTICS</b>                      |                      |                               |                         |      |  |
| DC Current Gain ( Note 7)                      | h <sub>FE</sub>      | 75<br>100<br>100<br>100<br>50 | —<br>—<br>—<br>300<br>— | —    | I <sub>C</sub> = -100μA, V <sub>CE</sub> = -10V<br>I <sub>C</sub> = -1.0mA, V <sub>CE</sub> = -10V<br>I <sub>C</sub> = -10mA, V <sub>CE</sub> = -10V<br>I <sub>C</sub> = -150mA, V <sub>CE</sub> = -10V<br>I <sub>C</sub> = -500mA, V <sub>CE</sub> = -10V |
| Collector-Emitter Saturation Voltage ( Note 7) | V <sub>CE(SAT)</sub> | —                             | -0.4<br>-1.6            | V    | I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA<br>I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA   |
| Base-Emitter Saturation Voltage ( Note 7)      | V <sub>BE(SAT)</sub> | —                             | -1.3<br>-2.6            | V    | I <sub>C</sub> = -150mA, I <sub>B</sub> = -15mA<br>I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>            |                      |                               |                         |      |  |
| Output Capacitance                             | C <sub>obo</sub>     | —                             | 8.0                     | pF   | V <sub>CB</sub> = -10V, f = 1MHz, I <sub>E</sub> = 0   |
| Input Capacitance                              | C <sub>ibo</sub>     | —                             | 30                      | pF   | V <sub>EB</sub> = -2V, f = 1MHz, I <sub>C</sub> = 0  |
| Current Gain-Bandwidth Product                 | f <sub>T</sub>       | 200                           | —                       | MHz  | V <sub>CE</sub> = -20V, I <sub>C</sub> = -50mA,<br>f = 100MHz  |
| <b>SWITCHING CHARACTERISTICS</b>               |                      |                               |                         |      |  |
| Turn-On Time                                   | t <sub>off</sub>     | —                             | 45                      | ns   | V <sub>CC</sub> = -30V, I <sub>C</sub> = -150mA,<br>I <sub>B1</sub> = -15mA  |
| Delay Time                                     | t <sub>d</sub>       | —                             | 10                      | ns   |  |
| Rise Time                                      | t <sub>r</sub>       | —                             | 40                      | ns   |  |
| Turn-Off Time                                  | t <sub>off</sub>     | —                             | 100                     | ns   | V <sub>CC</sub> = -6V, I <sub>C</sub> = -150mA,<br>I <sub>B1</sub> = I <sub>B2</sub> = -15mA   |
| Storage Time                                   | t <sub>s</sub>       | —                             | 80                      | ns   |  |
| Fall Time                                      | t <sub>f</sub>       | —                             | 30                      | ns   |  |

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

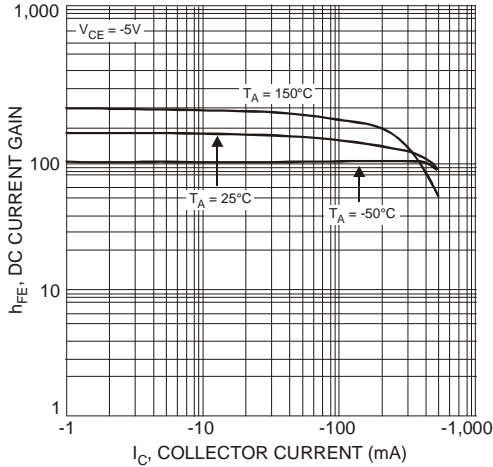


Fig. 2 Typical DC Current Gain vs. Collector Current

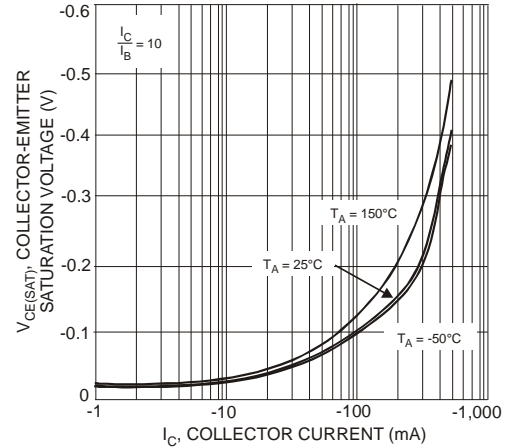


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

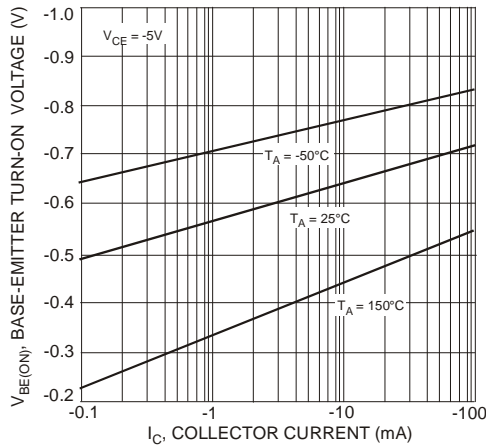


Fig. 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

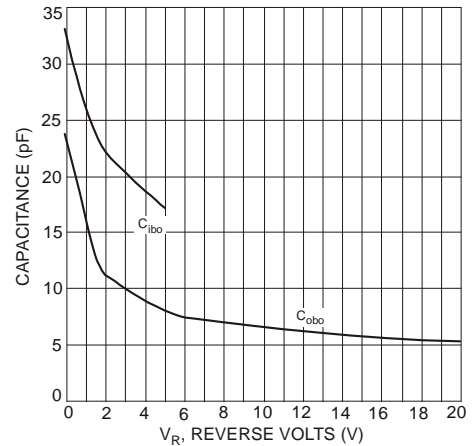


Fig. 5 Typical Capacitance Characteristics

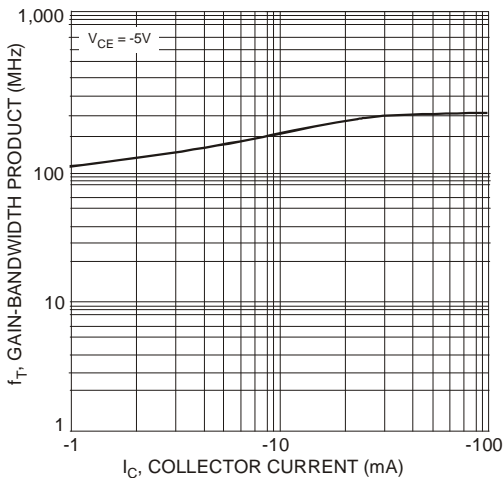


Fig. 6 Typical Gain-Bandwidth Product vs. Collector Current

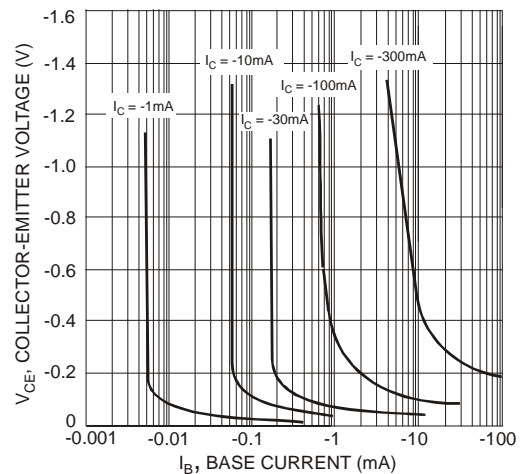
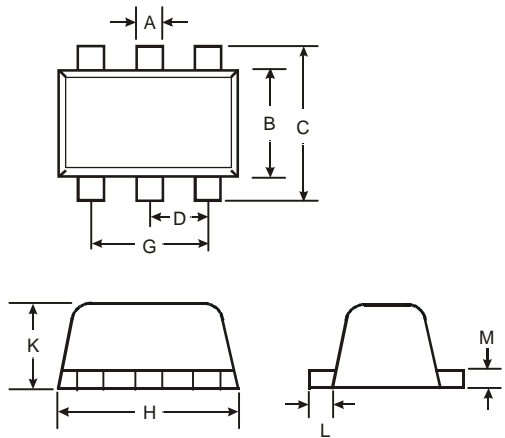


Fig. 7 Typical Collector Saturation Region

**Package Outline Dimensions**

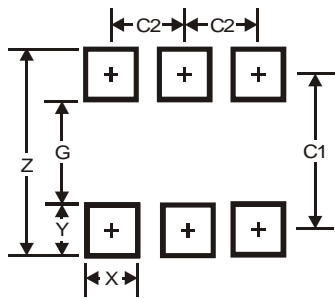
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT- 563             |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.20 |
| B                    | 1.10 | 1.25 | 1.20 |
| C                    | 1.55 | 1.70 | 1.60 |
| D                    | -    | -    | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| K                    | 0.55 | 0.60 | 0.60 |
| L                    | 0.10 | 0.30 | 0.20 |
| M                    | 0.10 | 0.18 | 0.11 |
| 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          | 2.2           |
| G          | 1.2           |
| X          | 0.375         |
| Y          | 0.5           |
| C1         | 1.7           |
| C2         | 0.5           |

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